



# CLEVE HILL SOLAR PARK

## **UPDATES TO EXISTING DOCUMENTS OUTLINE LANDSCAPE AND BIODIVERSITY MANAGEMENT PLAN**

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**CLEVE HILL**  
SOLAR PARK



## **OUTLINE LANDSCAPE AND BIODIVERSITY MANAGEMENT PLAN**

### **REVISION D**

**CLEVE HILL SOLAR PARK LTD**

**OCTOBER 2019**

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## **1 INTRODUCTION**

1. This Outline Landscape and Biodiversity Management Plan (LBMP) addresses recommendations set out in the Environmental Statement (ES) chapters for Cleve Hill Solar Park (the Development). In particular (but not limited to):
  - Chapter 7: Landscape and Visual Impact Assessment;
  - Chapter 8: Ecology; and
  - Chapter 9: Ornithology.
2. These assessments within the ES have identified mitigation and enhancement measures designed to reduce impacts and/or protect and enhance landscape and biodiversity resources.
3. Landscape and biodiversity mitigation and enhancement measures have been combined in this LBMP as they are closely related; landscape improvements create important habitat for protected and priority species to achieve a net conservation gain, and coordinated large-scale habitat management focused on biodiversity has a net positive effect on the appearance of the landscape.
4. The measures in the LBMP will be agreed prior to the commencement of construction through a requirement of the DCO application, and this will ensure that measures are implemented that deliver at least the equivalent level of mitigation as the measures in this outline LBMP.

### **1.1 LBMP Structure**

5. This LBMP provides detail of how the landscape and habitat management proposals will be successfully implemented, monitored and managed throughout the construction and operational phases of the Development. The following sections are included:
  - Section 2 – Aims and Objectives of the LBMP;
  - Section 3 – Summary of Measures during Construction;
  - Section 4 – Summary of Measures during Operation; and
  - Appendices A to K – Specific Detailed Management Prescriptions.
  - Figure A5.1 - Landscape and Biodiversity Masterplan

### **1.2 Guidance**

6. The LBMP has been produced with reference to the following guidance:
  - Institute of Environmental Management and Assessment and Landscape Institute, 2013, Guidelines for Landscape and Visual Impact Assessment, 3rd Edition;
  - National Plant Specification 'Handling and Establishing Landscape Plants'. All plants and planting operations are to comply with the requirements and recommendations of all current relevant British Standard specification including but not limited to:
    - BS 8545. Trees: From Nursery to Independence in the Landscape
    - BS 3936-1:1992. Nursery stock. Specification for trees and shrubs
    - BS 3882:2015 - Specification for topsoil
    - BS 4428:1989. Code of practice for general landscape operations (excluding hard surfaces) (AMD 6784)
    - BS 5837: 2012 Trees in relation to design, demolition and construction. Recommendations
    - BS3998:2010 Recommendations for Tree Work
  - All planting to be carried out during appropriate climatic conditions and where possible in the optimal planting period October through until March. Existing topsoil and/or imported, clean/inert horticultural ameliorants from sustainable sources.
  - The Hedgerow Regulations 1997
  - Local Authority Guidance

- Biodiversity Guidance for Solar Developments<sup>1</sup>
- TIN101 Solar Parks: Maximising Environmental Benefits<sup>2</sup>
- Bumblebee Conservation Trust Website<sup>3</sup>

### **1.3 Monitoring**

#### **1.3.1 Pre-construction**

7. In order to establish an appropriate baseline for comparison with the monitoring set out in this LBMP, existing data and survey methods will be reviewed prior to the finalisation of this outline LBMP and if necessary, updated baseline surveys will be undertaken prior to construction using methods that will be comparable with the methods to be utilised during operation.

#### **1.3.2 Construction Phase**

8. An ECoW will be in post throughout the construction phase. Part of the ECoW's responsibilities will be to monitor the implementation of the measures set out in this LBMP.
9. Ornithological surveys will be undertaken during construction to monitor the effectiveness of the measures undertaken and propose amendments if required.

#### **1.3.3 Operational Phase**

10. Each management plan (Appendices A to K) sets out the requirement for operational phase monitoring. A summary is provided in section 19.

### **1.4 Habitat Management Steering Group Governance**

11. *[This section is subject to consultation with the HMSG prior to insertion].*

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<sup>1</sup> BRE (2014) *Biodiversity Guidance for Solar Developments*. Eds Parker, G. E. and Greene, L.

<sup>2</sup> Natural England (2011) *TIN101 Solar Parks: Maximising Environmental Benefits*, Natural England

<sup>3</sup> <https://www.bumblebeeconservation.org/>

## 2 AIMS AND OBJECTIVES

12. Cleve Hill Solar Park Ltd is committed to the development being a 'good neighbour' to the adjacent habitats around the site, and to developing ongoing land management practices onsite with input from members of the HMSG to achieve mutual biodiversity aims and objectives. This is in addition to the wider ecological benefits of decarbonisation through renewable electricity generation.

### 2.1 Overarching aims

13. The broad aims of the LBMP are:
- Construction Phase:
    - To minimise impacts on existing biodiversity resources; and
    - To ensure that appropriate landscape and biodiversity enhancement measures are implemented effectively.
  - Operational Phase:
    - To ensure that proposed mitigation and enhancement measures are properly established during the operational phase; and
    - To ensure that the landscape and biodiversity mitigation and enhancement measures are managed appropriately throughout the operational phase.

### 2.2 Landscape and Visual

14. The landscape and visual objectives of this LBMP are:
- To screen elements of the Development from key receptor locations, *e.g.*, nearby residential properties;
  - To soften 'hard edges' of the Development from the Saxon Shore Way;
  - To reflect existing landscape elements and character in areas of the wider Development site which will not be subject to built development; and
  - To retain or enhance the amenity of the existing public rights of way within the Development site boundary.

### 2.3 Ecology

15. The ecological objectives of this LBMP are:
- To minimise impacts on existing habitats and species during construction;
  - To extend and enhance the most valuable existing habitats onsite;
  - To create new habitats onsite that reflect the natural flora and fauna of the area;
  - To make the most of opportunities to improve biodiversity within the Development site and surrounding area.

### 2.4 Ornithology

16. The ornithological objectives of this LBMP are:
- To protect and minimise impacts on birds within and around the site during construction;
  - To secure the continued use of the Development site for a wide range of bird species;
  - To mitigate for the loss of existing arable habitats onsite which are used by bird species associated with designated sites;
  - To create a range of new habitats onsite to provide roosting, foraging and nesting resources for birds; and
  - To make the most of opportunities to improve biodiversity within the Development site and surrounding area.

### 3 CONSTRUCTION PHASE MEASURES

17. Table 1 summarises the measures that will be undertaken during construction to protect existing landscape and biodiversity resources and the actions that will be required to ensure the measures can be implemented. Construction activities will be controlled by the Construction Environmental Management Plan (CEMP), an outline of which is provided as Technical Appendix A5.4 in the ES. If these measures are updated, they should also be updated in the CEMP.
18. An Ecological Clerk of Works (ECoW) will oversee the construction phase, undertaking monitoring of implementation and establishment as required and providing monthly reports which will be made available to the HMSG.

**Table 1: Construction Landscape and Biodiversity Measures**

Intervention	Action	Management Prescriptions	Reason or justification
<b>Protection of existing designated habitats adjacent to Site</b>	Follow measures detailed in the Construction Environment Management Plan (CEMP)	Reduce negligible risk of accidental inputs to both the designated sites, field margins and ditch network leading to designated sites by isolation. Follow measures detailed in CEMP including: Use interceptor ditches, bunding, and best practice measures to isolate potential input sources such as oil leaks, dust emissions and other contaminated runoff.	To protect designated sites from contamination and be compliant with legislation and best practice.
<b>Protection of existing habitats onsite</b>	Follow measures detailed in CEMP	Follow measures detailed in CEMP including: Use interceptor ditches, bunding and best practice measures to isolate potential input sources such as oil leaks, dust emissions and other contaminated runoff into terrestrial and aquatic habitats.	To ensure the construction is ecologically sensitive and compliant with legislation and best practice.
<b>Protection of species</b>	General protective measures Follow measures detailed in CEMP	All water control structures will be designed to ensure that they'll be mammal/ eel/elver (all life stages) friendly. Fence under-passes or small openings (of approximately 150 mm diameter) will be installed in the perimeter fence approximately every 50 m to enable badger and other mammals (e.g. hedgehog and brown hare) to retain or improve their current resources. An update survey for protected and notable species will be undertaken by an ecologist before works begin who will advise about constraints. Where required, works will commence under the conditions of a Natural England mitigation licence for protected species, following an agreed method statement.	To ensure the construction is ecologically sensitive and compliant with legislation and best practice.

Intervention	Action	Management Prescriptions	Reason or justification
		<p>Deep excavations will be filled in at the end of the day or where this is not possible, either securely covered at night to prevent badgers and other animals falling into them or installed with mammal 'ramps' where covering is impractical. Heras or similar fencing to be installed within the works perimeter of excavations.</p> <p>All excavations will be checked for the presence of animals before recommencing work.</p> <p>Where pipework is required for drainage and other purposes, these will need to be stored in areas which do not offer ecological value to wildlife and will need to be capped until such time as they are used in the Development.</p> <p>The ECoW will facilitate clear differentiation between any native frog species and the invasive marsh frog.</p>	
	<p>Follow measures detailed in CEMP. Control of Lighting</p>	<p>Night-time lighting during construction (if installed) will be minimised as far as possible and where used will be directed into the works area, away from potential habitats of value to bats and other nocturnal creatures, if compatible with operational Health and Safety procedures.</p> <p>Any lighting required for public safety and security purposes near bat roosts or bat flight lines have the potential to alter the distribution of artificial lighting on site, which may impact on the flight and foraging behaviour of bats present in the area<sup>4</sup>. Light levels during construction (and post construction) should be carefully managed to ensure they do not impact on potential bat foraging/commuting habitat such as hedgerows, waterbodies, ditches and marginal habitats. The following approach based on BCT guidelines<sup>5</sup> can help when designing the lighting strategy for the site:</p> <ul style="list-style-type: none"> <li>• Lighting in ecologically sensitive areas within the Development site such as ditch habitats, and towards sensitive habitats outwith the Development site such as: trees and mature habitats, and the adjacent South Bank of the Swale LNR will be avoided;</li> </ul>	<p>To reduce disturbance to bats and other nocturnal animals and to avoid a criminal offence under the Conservation of Habitats and Species Regulations 2017 (as amended).</p>

<sup>4</sup> Jones, J. (2000) Guidelines on the Impact of Lighting on Bats. English Nature, Peterborough

<sup>5</sup> BCT (2014) Artificial lighting and wildlife Interim Guidance: Recommendations to help minimise the impact artificial lighting.

Intervention	Action	Management Prescriptions	Reason or justification
		<ul style="list-style-type: none"> <li>• The siting of lights will avoid locations where lighting could reflect off solar panels and other reflective surfaces;</li> <li>• Lighting will be positioned to minimise the spread of light to, at, or below horizontal and ensure that only the task work area or compound (during the construction phase) or security area (operational phase) is lit;</li> <li>• Flat cut-off lanterns or accessories will be used to shield or direct light to where it is required, with the height of lighting columns optimised to ensure light spill is minimised and non-target areas are not lit;</li> <li>• The demarcation of works areas (temporary and permanent) with white lining, good signage and LED cats eyes to reduce lighting requirements in the Development site. Ensure only high-risk areas of the Development site are lit, allowing headlights or torchlight to provide any necessary illumination at other times;</li> <li>• Lights will be limited to such that there are dark periods within the Development site. This will include measures such as the use of adaptive lighting, to reduce lighting intensity from lights, adjustment to the timing of lighting within the Development site, and provision of motion sensitive lighting to suit human health and safety as well as wildlife needs; and</li> <li>• Technical specifications to lighting will include the use of narrow spectrum light sources to lower the range of species affected by lighting, the use of light sources that emit minimal ultra-violet light, with a lighting peak no higher than 550 nm. White and blue wavelengths of the light spectrum will be avoided to reduce insect attraction, and where white light sources are required in order to manage the blue short wave length content they should be of a warm /neutral colour temperature.</li> </ul>	
<b>Protection of Invertebrates</b>	Follow measures detailed in CEMP	Reduce dust and other air pollutants that may impact water quality within aquatic habitats and plants and flora in terrestrial habitats within the Development site via dust and emissions from construction vehicles, the building of access roads and the substation.  Follow measures detailed in CEMP to achieve this including:	To reduce disturbance to invertebrates.

Intervention	Action	Management Prescriptions	Reason or justification
		Use interceptor ditches, bunding and best practice measures to isolate potential input sources such as oil leaks, dust emissions and other contaminated runoff into terrestrial and aquatic habitats.	
<b>Nesting bird protection</b>	Follow measures detailed in CEMP including Breeding Bird Protection Plan (BBPP)	The CEMP contains a BBPP which will be followed during construction.	To safeguard nesting birds and avoid legal offences.
<b>Great crested newt (GCN) construction mitigation</b>	All works will be undertaken in adherence to a Natural England European Protected Species (EPS) Mitigation licence as required in habitats supporting GCN	<p>EPS Mitigation licence to be obtained from Natural England post-DCO application, which must be granted prior to any work commencing in areas of habitat supporting GCN. The method statement to be agreed with Natural England under licence will likely include, but not be limited to the following aspects:</p> <ul style="list-style-type: none"> <li>- The population size recorded within offsite ponds will be determined in accordance with the <i>Great Crested Newt Mitigation guidelines</i><sup>6</sup> in the latest season prior to the start of works.</li> <li>- The minimum number of nights trapping will be informed by updated GCN surveys that will record the latest distribution and population size estimates within ponds. However, the minimum trapping days may be longer as trapping will need to occur until all newts are removed from site and traps fail to catch great crested newts over 5 consecutive nights.</li> <li>- All suitable GCN habitats will be trapped out using perimeter and drift fencing. Pitfall traps will be installed adjacent to the inside of the perimeter fence and on both sides of the internal drift fencing. Refugia such as carpet tiles will also be deployed to enhance the capture rate.</li> <li>- Any GCN found will be translocated to a dedicated receptor area the details of which will be agreed with Natural England.</li> <li>- Consequently, trapping will occur until all GCN are removed from within the development areas where this species has the potential to be impacted.</li> </ul>	To reduce the risk of disturbance and harm to GCN and to avoid legal offences under the Conservation of Habitats and Species Regulations 2017.

<sup>6</sup> English Nature (2001) Great Crested Newt Mitigation Guidelines, English Nature, Peterborough.

Intervention	Action	Management Prescriptions	Reason or justification
		The removal of vegetation and a destructive search will be undertaken after a thorough hand search of the area and supervised by a suitably qualified ecologist, with a tool box talk to be given to all contractors by a suitably qualified Ecological Clerk of Works (ECoW) before works proceed.	
<b>Water vole construction mitigation</b>	All works will be undertaken in adherence to either a Natural England <i>Science, Education &amp; Conservation</i> <sup>7</sup> or a <i>Class</i> <sup>8</sup> licence, where water vole habitat and burrows are likely to be impacted.	Licencing will be agreed with Natural England and granted prior to any works commencing. Licencing will be required in areas of suitable ditch network habitat where water vole burrows are evident.  Details of licencing requirements and approach can be found in <i>Appendix H – the Aquatic Habitat Management Plan (AHMP)</i> and detailed in Technical Appendix A5.4 of the Construction Environment Management Plan (CEMP).	To reduce the risk of disturbance and harm to water vole and to avoid legal offences under the Wildlife and Countryside Act 1981.
<b>Reptile construction mitigation</b>	Follow measures detailed in CEMP Follow measures detailed in the Reptile Mitigation Strategy (RMS) as implemented through a method statement.	Any work commencing in areas of suitable field margin habitat where reptiles are evident will need to commence following the Reptile Mitigation Strategy (RMS) set out below. This will be implemented during the construction phase of the Development. The RMS includes the following aspects: <ul style="list-style-type: none"> <li>- The trapping of reptiles will be completed in suitable weather and temperatures between April and the end of September and prior to construction activity. Beyond this timeframe, reptiles are likely to begin finding sites for hibernating and ecology Development site clearance cannot be undertaken as it would present a significant risk to any reptiles present;</li> <li>- Habitats of value to reptiles that will be removed as part of the substation construction and associated works, and at each of up to 26 ditch crossings will be fenced off with Temporary Reptile Fencing (TRF). This will ensure that any captured reptiles do not re-enter each of the construction zones;</li> </ul>	To reduce the risk of killing and injury of reptiles and to avoid legal offences under the Wildlife and Countryside Act 1981.

<sup>7</sup> A29 Licence Application Form: Application for a licence to kill, take, disturb or possess wild animals: Science, education and conservation. Natural England

<sup>8</sup> WML-CL31 Class Licence: Intentional disturbance of water voles and damage/destruction of water vole burrows by means of 'Displacement'. Natural England



Intervention	Action	Management Prescriptions	Reason or justification
		<ul style="list-style-type: none"> <li>- Reptile refugia tins and felts will be placed within the proposed construction zone, to attract reptiles that need to be translocated. The tins and felts will be left within these areas for a minimum of a week and preferably a fortnight to allow reptiles to familiarise themselves with these features;</li> <li>- The Development contains good habitat for supporting a population of reptiles, with only small areas of habitat requiring removal (totalling c. 0.13 ha) and extensive areas of adjacent suitable reptile habitat being retained. Given the small size of habitat to be lost, it is anticipated that this would only affect a 'low' population of reptiles. Current guidance states that a minimum 30 days of trapping (plus five clear days) be undertaken however, the area of habitat loss is incredibly small. On this basis, it is expected that a minimum of sixteen days trapping of reptiles followed by five clear days of trapping (where reptiles have not been observed or caught) within each construction zone will be required, with translocation of any caught reptiles released to adjacent habitat;</li> <li>- On completion of the translocation period, part of the TRF will need to be taken down, with strimming activity taking place towards this opening to allow any remaining reptiles to escape in the unlikely event of their presence. Habitat manipulation using a strimmer and under the supervision of a suitably experienced ecologist will take place in warm weather conditions. This will require a high cut at 100 mm, with strimming activity taking place towards the opening to allow any remaining reptiles to escape. This will be followed by a low cut to ground the following day; and</li> <li>- Once the habitat has been cleared to ground level, and until such time as the construction activity is likely to take place, it will be necessary to ensure that habitats are not allowed to grow back beyond 50 mm to ensure that reptiles are not attracted back into these areas.</li> </ul> <p>The implementation of the RMS will need to take place as guided by the ECoW and with consideration to the timings and requirements of other protected species works activities and licencing. This will be considered with respect to water vole and great crested newts. Details on approach</p>	

<b>Intervention</b>	<b>Action</b>	<b>Management Prescriptions</b>	<b>Reason or justification</b>
		can also be seen in Technical Appendix A5.4, Outline Construction Environment Management Plan (CEMP).	

#### 4 OPERATIONAL PHASE MEASURES

19. Table 2 outlines the landscape and biodiversity measures that will be in place during the operational stage of the Development. Figure A5.1 shows the location of the measures proposed.
20. It is expected that all implementation will occur prior to the commencement of operation, or in the first planting season following commencement of operation. Certain habitats, such as the AR HMA are required to be implemented early in the construction phase. This is specified in the management plans, and where this is the case, their establishment will be overseen by the ECoW.
21. Each management plan sets out timescales for activities during the operational phase, and where this is the case, the timescales (years) relate to time since the commencement of operation.
22. The LBMP is a live document, and following the implementation of the habitats set out, the document can be updated to include specific timescales for management activities during the operational phase (e.g., refer to 2025 rather than year 5)

**Table 2: Summary of Landscape and Biodiversity Measures in place during Operation of the Development**

Habitat Type	Phase	Management Prescriptions	Aims	Timing
<b>Grazing Marsh Grassland</b>  <b>[Appendix A]</b>	Implementation	<p>Grazing marsh to be created under the solar panels and in linear formations adjacent to existing grassland buffer field margins.</p> <p>Seed mix to be selected based on ground conditions.</p> <p>New grassland habitat areas to be seeded with a mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.</p> <p>Construction activities have the potential to disturb the seed bed/grassland and so it may be necessary to repeat the pre-construction ground preparation to establish a suitable seed bed.</p>	To provide a grassland sward that provides greater ecological value than the existing arable land.	<p>To be implemented during the construction phase ahead of construction in each field.</p> <p>Sowing typically in late autumn/early winter (October to December preferred).</p> <p>Section 18 provides indicative timing of pre-construction sowing in each field relative to the construction start date.</p>
	Management	<p><u>Within the Perimeter Fence and within the array</u></p> <p>The grassland will be grazed by sheep at a low density (2-3 sheep/ha) to manage the flush of annuals, but grazing will not commence until a sward is established.</p> <p>Grazing within the perimeter fence line of the solar panel fields will take place year-round on a rotational basis and</p>	To maximise biodiversity opportunities for terrestrial invertebrates, small mammals, ground-nesting birds and other foraging wildlife, and to provide augmented habitats that are	<p>Cutting of grass or grazing from year 0-1 onwards to take place after end September in areas outside the perimeter fence.</p> <p>Grazing to take place year-round within the perimeter fence from year 0-1, with sensitive habitat</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<p>between each solar panel compartment within this period. This avoids overgrazing within individual solar panel fields and allows flowering plants to be present throughout the plant growth season, whilst ensuring that shading of solar panels from plant growth is avoided.</p> <p><u>Within the perimeter fence and between the arrays</u></p> <p>The inter-array grasslands within the perimeter fence will be segregated from the grassland being established within the solar arrays by the deployment of temporary stock-proof fencing. This will permit different management regimes in the two different areas.</p> <p><u>Outside the Perimeter Fence</u></p> <p>Mechanical cutting outside the perimeter fence line of the solar farm will be in line with a low intensity meadow management regime where the sward is cut to 100 mm once per year from the end of September onwards with all arisings collected as hay or silage. Alternatively, low intensity grazing may be used if it can achieve the same aims.</p> <p>The timing and length of the cut will ensure that impacts to ground nesting birds and other wildlife from these management activities are avoided.</p>	<p>sympathetic to the adjacent habitats and designated sites.</p> <p>To maximise habitat availability and suitability for marsh harrier.</p>	<p>areas protected from grazing using temporary stock proof fencing until after the end of September.</p>
	Monitoring	<p>Check effectiveness of seed sowing to ensure that seed has been sown correctly. Remedial actions will be communicated to the HMSG at the next meeting.</p> <p>Ornithological monitoring to take place at the same time to ensure habitat is being utilised as required by target bird species (foraging marsh harrier and breeding birds).</p>	<p>To determine the efficacy of the management plans and to determine whether the biodiversity objectives have been met.</p> <p>Monitoring results to be fed back to the HMSG with recommendations on remedial actions taken or required.</p>	<p>Twice annual visits in spring (May) and Autumn (September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to check the establishment of seed mix and weeds.</p> <p>Bird monitoring in year 0-1, year 1-2, year 2-3, year 4-5, year 10 and year 20 as per, Scottish Natural Heritage. Guidance Note - Monitoring the impact of</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
				onshore windfarms on birds (2009).
	Remediation	Where establishment is not occurring as required, corrective action will be taken to alter the seed mix and/or management methodologies to ensure the new approach will establish the desired habitat.	To ensure all commitments are met.	Throughout construction and operational stages.
<b>Lowland Grassland Meadow (incl. LGM HMA)</b>  <b>[Appendix B]</b>	Implementation	<p>Lowland meadow creation to be implemented in blocks to the east and west of the site as shown on Figure A5.1.</p> <p>Seed mix to be selected based on ground conditions.</p> <p>New grassland habitat areas to be seeded with a mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.</p>	To provide a grassland sward that provides greater ecological value than the existing arable land.	<p>To be implemented during construction prior to the commencement of operation.</p> <p>Sowing typically in late autumn/early winter (October to December preferred).</p>
	Management	<p>A mechanical cut of grassland habitat within the lowland meadow grassland habitat management fields will be completed twice, which will be in line with a hay meadow management regime. The sward is to be cut to 100 mm in summer (July) and again in September, with all arisings collected as hay or silage.</p> <p>The frequency of the cuts will ensure that the lowland grassland habitat within this area will in time become less fertile, to favour a more diverse wildflower grassland structure. The high cut of 100 mm favours lower growing flowering plants that are competing with the longer grassland sward, but will not be collected during the hay cuts.</p> <p>In later years, when soil fertility has decreased, a single cut may be adequate.</p> <p>Low intensity grazing option with timings will be as guided by the HMSG and KWT Land Management Advice Sheet 5 - Choosing livestock for conservation grazing.</p>	To maximise biodiversity opportunities for terrestrial invertebrates, ground-nesting birds and other foraging wildlife, and to provide augmented habitats that are sympathetic to the adjacent habitats and designated sites.	Cutting of grass to take place in July and September, or single cut in July when fertility has reduced.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Monitoring	<p>Check effectiveness of seed sowing to ensure that seed has been sown correctly. Remedial actions will be communicated to the HMSG at the next meeting.</p> <p>Ornithological surveys to take place during the breeding season to monitor use of the habitat management area by breeding bird species.</p>	<p>To determine the efficacy of the management plans and to determine whether the biodiversity objectives have been met.</p> <p>Monitoring results to be fed back to the HMSG with recommendations on remedial actions taken or required.</p>	<p>Two visits in spring (May) and summer (July/August) in year 0-1 to check the establishment of seed mix and weeds.</p> <p>Single annual visit in late-spring (May) in years 1-2, 2-3, 4-5, 9-10 and 19-20 to assess the success of grassland management.</p> <p>Bird monitoring in year 0-1, year 1-2, year 2-3, year 4-5, year 10 and year 20 as per, Scottish Natural Heritage. Guidance Note - Monitoring the impact of onshore windfarms on birds (2009).</p>
	Remediation	<p>Where establishment is not occurring as required corrective action will be taken to alter the seed mix and/or management methodologies to ensure the new approach will establish the desired habitat.</p>	<p>To ensure all commitments are met.</p>	<p>Throughout construction and operational stages.</p>
<b>Hedgerows (with Trees)</b>  <b>[Appendix C]</b>	Implementation	<p>3.63 km of native species hedgerows, containing 519 native species trees will be planted within the southern areas of the Development site.</p>	<p>To augment the existing hedgerows and tree belts to further increase the green infrastructure within the Development site and local area and to create significant additional habitat.</p> <p>To create low level screening (3-4 m) with new tree planting within hedgerows to provide further screening.</p>	<p>Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction.</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Management	<p>Any hedgerow plants and trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Hedgerows will be mechanically maintained once a year for the first five years allowing the height of the hedge to increase to a maximum height of 4 m during this time.</p> <p>For operational years six and beyond the hedgerow will be mechanically maintained once every three years to allow habitats to establish whilst enabling the hedge to retain its shape and form whilst naturalising. A variable cutting schedule on a 3 year rota will be adopted to provide a range of habitats and a supply of fruit and berries within the hedgerows each year. Visually this will also create a more varied and natural looking landscape.</p>	To ensure that the hedgerows remain dense and healthy throughout the establishment period to provide suitable habitat and to maintain screening.	<p>Annually for the first five years; every two/three years following a variable cutting schedule thereafter.</p> <p>Hedgerows to be cut between 1st October and 28th February to avoid disturbance to nesting birds.</p>
	Monitoring	The hedgerow and trees would be monitored each year within the first 5 years.	To ensure that the hedgerow is fully established and management and maintenance is undertaken in line with the HMP.	Two visits in year one (spring and summer), followed by yearly visits in late spring up to year 5.
	Remediation	<p>Where establishment is not occurring as required corrective action will be taken:</p> <p><i>0-5 years</i></p> <p>Any hedgerow plants and trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Hedgerows will be mechanically maintained once a year for the first five years allowing the height of the hedge to increase to a maximum height of 4 m during this time.</p> <p><i>Year 5 onwards</i></p> <p>If following Year 5, any defects are identified by the site operator then these can subsequently be addressed e.g.</p>	To ensure all commitments are met.	Throughout operation.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		reimplementation of the planting methodology for any replacement tree planting for Years 1-5. If any parts of the shelterbelt planting fail during the lifetime of the Development then replacement planting will be undertaken as prescribed in Years 1-5.		
<b>Shelterbelt</b>  <b>[Appendix D]</b>	Implementation	1.27 ha of native species trees and shrubs will be planted, predominantly within the southern areas of the Development site.	To augment the existing hedgerows, trees, shelterbelts and woodlands associated with the local landscape character. To further increase the green infrastructure within the Development site and local area and to create significant additional habitat.  To create low level screening (4-9m) creating a visual screen and areas of natural vegetation. The species chosen are designed to screen the Development at sensitive locations close to residential receptors whilst retaining distant views.	Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction.
	Management	Any shrubs/ trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification. Beyond this time the planting will be allowed to naturalise with any gaps filled in to maintain a dense low level screen.	To ensure that the plants form small natural areas of native species shelterbelts which remain dense and healthy with a good understory.	As required during for the first five years following planting. Management to be undertaken between 1st October and 28th February to avoid nesting birds.
	Monitoring	The shelterbelt would be monitored each year within the first 5 years.	To ensure that the planting is fully established and management and maintenance is undertaken in line with the SMP ensuring heights are maintained and understory is established.	Two visits in year 0-1 (spring and summer) after planting, followed by annual visits in late spring up to year 4-5.



Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Remediation	<p>Where establishment is not occurring as required corrective action will be taken:</p> <p><i>Year 0-1</i></p> <p>Any plants and trees which are found to be dying, damaged or diseased within the first year following planting will be replaced with the same species and specification as part of the implementation works.</p> <p><i>Year 1-5</i></p> <p>Any shrubs/ trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works.</p> <p><i>Year 5 onwards</i></p> <p>If following Year 5, any defects are identified by the site operator then these can subsequently be addressed e.g. reimplementation of the planting methodology for any replacement tree planting for Years 1-5. If any parts of the shelterbelt planting fail during the lifetime of the Development then replacement planting will be undertaken as prescribed in Years 1-5.</p>	To ensure all commitments are met.	Throughout operation.
<p><b>Woodland</b></p> <p><b>[Appendix E]</b></p>	Implementation	0.72 ha of native species trees will be planted, within the southern area of the Development site to the north of Warm House.	<p>To augment the existing hedgerows, trees, shelterbelts and woodlands associated with the local landscape character.</p> <p>To further increase the green infrastructure within the Development and local area and to create a dense visual screen between the Development and Warm House between 5 m and 25 m high.</p>	Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Management	<p>Any trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works.</p> <p>Beyond this time the planting will be allowed to naturalise with any gaps filled in to maintain a dense woodland screen.</p>	<p>To ensure that the plants form a native species woodland which remains dense and healthy with a good understory.</p>	<p>Management to be undertaken between 1st October and 28th February to avoid nesting birds.</p>
	Monitoring	<p>The woodland would be monitored each year within the first 5 years.</p>	<p>To ensure that the planting is fully established and management and maintenance is undertaken in line with the WMP ensuring a mixed height woodland and enhanced woodland flora is established.</p>	<p>Two visits in year 0-1 (spring and summer), followed by yearly visits in late spring up to year 5.</p>
	Remediation	<p>Where establishment is not occurring as required corrective action will be taken:</p> <p><i>Year 0-1</i></p> <p>Any plants and trees which are found to be dying, damaged or diseased within the first year following planting will be replaced with the same species and specification as part of the implementation works.</p> <p><i>Year 1-5</i></p> <p>Any trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Beyond this time the planting will be allowed to naturalise with any gaps filled in to maintain a dense woodland screen.</p> <p><i>Year 5 onwards</i></p> <p>If following Year 5, any defects are identified by the site operator then these can subsequently be addressed e.g. reimplementation of the planting methodology for any replacement tree planting for Years 1-5. If any parts of the woodland fail during the lifetime of the development then</p>	<p>To ensure all commitments are met.</p>	<p>Throughout operation.</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		replacement planting will be undertaken as prescribed in Years 1-5.		
<b>Electrical Compound Buffer Planting</b>  <b>[Appendix F]</b>	Implementation	1.5 ha of native species trees and shrubs will be planted upon the bund surrounding the site compound.	<p>To augment the existing hedgerows, trees, shelterbelts and woodlands associated with the local landscape character to further increase the green infrastructure within the Development and local area and to create significant additional habitat.</p> <p>To create low level screening creating a natural visual screen and areas of natural vegetation. The species chosen is designed to screen infrastructure within the site compound and to naturalize the shape and form of the bund.</p>	Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction.
	Management	<p>Any shrubs/ trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works.</p> <p>Beyond this time the planting will be allowed to naturalise with any gaps filled in to maintain a low level screen.</p>	To ensure that the plants form a natural area of native scrubland which remains healthy with a good understory of natural scrub to remain healthy through the establishment period to provide suitable habitat and to maintain screening.	Management to be undertaken between 1st October and 28th February to avoid nesting birds.
	Monitoring	The buffer planting would be monitored each year within the first 5 years	To ensure that the planting is fully established and management and maintenance is undertaken in line with the BPMP.	Two visits in year 0-1 (spring and summer), followed by yearly visits in late spring up to year 5.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Remediation	<p>Where establishment is not occurring as required corrective action will be taken:</p> <p><i>Year 0-1</i></p> <p>Any plants and trees which are found to be dying, damaged or diseased within the first year following planting will be replaced with the same species and specification as part of the implementation works.</p> <p><i>Year 1-5</i></p> <p>Any shrubs/ trees which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Beyond this time the planting will be allowed to naturalise with any gaps filled in to maintain a low level screen.</p>	To ensure all commitments are met.	Throughout operation.
<b>Scrub</b>  <b>[Appendix G]</b>	Implementation	4.3 ha of native species scrub will be planted within the Development site along the northern edge and south eastern corner.	<p>To augment the existing scrub associated with the local landscape character to further increase the green infrastructure within the Development and local area and to create additional habitat.</p> <p>To create low level intermittent screening creating a partial visual screen and areas of natural vegetation. The species chosen is designed to naturalize within grassland.</p>	Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction.
	Management	Any plants which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Beyond this time the planting will be allowed to naturalise.	To ensure that the plants form a natural area of sparse native scrub which remains healthy through the establishment period to provide suitable habitat.	Management to be undertaken between 1st October and 28th February to avoid nesting birds.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Monitoring	The scrub planting would be monitored each year within the first 5 years.	To ensure that the planting is fully established and management and maintenance is undertaken in line with the SPMP.	Two visits in year 0-1 (spring and summer), followed by yearly visits in late spring up to year 5.
	Remediation	Where establishment is not occurring as required corrective action will be taken: <i>Year 0-1</i> Any plants which are found to be dying, damaged or diseased within the first year following planting will be replaced with the same species and specification as part of the implementation works. <i>Year 1-5</i> Any plants which are found to be dying, damaged or diseased within the first five years following planting will be replaced with the same species and specification as part of the implementation works. Beyond this time the planting will be allowed to naturalise.	To ensure all commitments are met.	Throughout operation.
<b>Aquatic Habitats</b>  <b>[Appendix H]</b>	Implementation	Existing, new and upgraded flow control infrastructure will be used to achieve this aim and there will be an ongoing need to engage with the HMSG to deliver this. Figure A5.1 of this LBMP shows key existing and proposed flow control structures. Mechanical or chemical treatment of invasive duckweed within areas of the ditch system to encourage improved assemblage of biodiversity to be retained as an option. Creation of a new circa 355 m cut ditch to replace a circa 355 m length of lost ditch and c. 120 m of suitable riparian habitat created, with associated planting to maximize benefits for biodiversity and as a conservation benefit to water voles.	To improve overall water levels (particularly in the AR HMA and FGM HMA) and therefore biodiversity in the ditch system and its value to wildlife, including marsh harrier, eels/elver (all life stages) and water vole. Create separate individually managed hydrological compartments for the development area, AR HMA and FGM HMA.	Mechanical/chemical treatment of duckweed, excavation of new ditch to be undertaken at the start of the construction phase. The eel/elver/mammal-friendly culverts will be installed during construction. Water control measures and planting of the new reedbed between the solar park and the AR HMA will be implemented during construction, outside the wintering season to be in place prior to the commencement of operation.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<p>The inclusion of mammal/eel/elver (all life stages) friendly box culverts that increase the ditch network habitat connectivity for water voles.</p> <p>Creation of additional reedbed habitat (0.5 ha) located between the solar park and AR HMA to provide increased nesting habitat for species such as marsh harrier, bearded tit, reed warbler, sedge warbler and reed bunting whilst also benefitting other invertebrate and bird species. The land adjacent to the areas of additional reedbed creation will also be reprofiled within the site in order to create shallower sloping bankside(s) as opposed to the steep banks currently present (see section 21, Indicative Bank Profiles).</p>		<p>Ditch reprofiling and reedbed improvements would be undertaken during the construction period.</p> <p>The reprofiling works however will require the watercourses to be divided into groups. Reprofiling across each group will therefore be spread across multiple years so as to avoid significant impact on water vole across a single year.</p>
	Management	<p>To maintain and manage higher ditch water levels across the site, new flow control structures (likely to be drop board style sluices) will be located within drainage ditches at the Site. Figure A5.1 of this LBMP shows key existing and proposed flow control structures. This will create the potential for three individually controlled areas of the Development site.</p> <p>Water may be either held back behind structure, or sluice boards used as a top height, above which water may 'overtop' in a controlled fashion to maintain water level at known height.</p> <p>The translocation of macrophyte habitat from a lost ditch to the new c. 355 m cut ditch, in combination with new plug planting and seeding to improve biodiversity and provide suitable habitat for water voles and other wildlife.</p> <p>The mechanical clearance of vigorous invasive macrophyte growth on an annual/bi-annual basis to be retained as an option, and in areas away from water vole habitat and newly created riparian areas.</p>	<p>To maximise the potential for biodiversity gains within the ditch system whilst maintaining the ability to safely operate the site.</p>	<p>New cut habitat activities to be completed during the construction phase, with ongoing management of ditches and water levels during the operational phase of the Development.</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		Ditch maintenance and reprofiling works will be undertaken concurrently to minimise impacts from these activities if undertaken separately.		
	Monitoring	<p>Monitoring of any Natural England licenced conservation improvements for water voles, to determine efficacy, with corrective action as required.</p> <p>Monitoring of the ditch system and new habitat created areas, with corrective remedial actions communicated to the HMSG. Monitoring to take place in year 0-1, year 1-2, year 2-3 and year 4-5, following completion with reference to Natural England water vole licencing requirements as detailed within Appendix H.</p> <p>Water levels will be monitored during site visits and adjustment of water board heights will be undertaken as required. The visiting ecologist will also have responsibility of visual inspection of the boards. Should boards become warped or damaged or the rubber seals degrade, then they will be replaced as required.</p> <p>Ornithological surveys to be undertaken to monitor use of the aquatic habitats by target bird species (marsh harrier) and breeding bird community.</p>	To demonstrate the efficacy of riparian and aquatic management of the ditches on the Site, and to propose corrective remedial action where applicable.	<p>Site visits in spring (May) and summer (July/August) in year 0-1 to check the establishment of the new ditch habitats and record establishment of the new reedbed.</p> <p>Assuming that planting has established successfully after year 0-1, an ecologist will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the habitat establishment.</p> <p>Water levels and the status of water control structures will also be monitored by the visiting ecologist (and more regularly by the Site Operator).</p> <p>Ornithological monitoring in operational year 0-1, year 1-2, year 2-3, year 4-5, year 10 and year 20 as per, Scottish Natural Heritage. Guidance Note - Monitoring the impact of onshore windfarms on birds (2009).</p>
	Remediation	Where establishment is not occurring as required corrective action will be taken to alter the species or management methodologies to establish the desired habitat.	To ensure all commitments are met.	Throughout operation.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
<b>Pillbox Bat Roost</b>  <b>[Appendix I]</b>	Implementation	Pillbox to be converted to be suitable for use by roosting bats. The external features of the pillbox will be modified, through installation of a metal door and blocking up of windows to allow bat access only and ensure that microclimate conditions within the pillbox are optimized. A number of roost features to be installed within the interior walls for hibernating bats but without damaging the pillbox itself e.g. use of Kent Bat Boxes which can be glued to internal walls.	To provide bat roosting opportunities on the site.	Following completion of construction activities in this locality prior to the hibernation period (November to February).
	Management	Vegetation control as necessary to avoid damage to the structure.	To preserve the bat roost availability and avoid damage to the pillbox as a heritage asset.	Throughout operation.
	Monitoring	Annual hibernation roost visits should be undertaken. Additional surveys can be undertaken if a partnership with the local bat group can be established.	To achieve a greater understanding of bat distribution in the local area.	An ecologist will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to check the status of the bat roost.
	Remediation	Where roost establishment does not occur, alternative roost types to be considered to benefit bats.	To ensure all commitments are met.	Throughout operation.
<b>AR HMA</b>  <b>[Appendix J]</b>	Implementation	<p>Pre-sowing activities will include sub-soiling and ground preparation.</p> <p>Autumn (September/October) sowing is preferred because this favours grassland species that germinate in autumn and will provide young nutritious grass shoots through the winter for geese.</p> <p>The seed mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.</p>	To establish a minimum of 50 ha of functional grassland habitat to be of benefit to overwintering brent geese, lapwing and golden plover.	The grassland habitats within the AR HMA will be established prior to the first winter of construction.
	Management	The grassland will be grazed by cattle/sheep at a low density (2-3 sheep/ha or up to 1 head of cattle per ha) to manage the flush of annuals, but grazing will not	To maintain soil fertility and to ensure that the grassland plant structure supports species	From implementation throughout construction and operation.



Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<p>commence until a grassland sward is sufficiently established within AR HMA.</p> <p>Grazing within the AR HMA will take place during the summer months (April to September).</p> <p>The summer grazing intensity will need to be sufficient that a sward length of less than 100 mm is established prior to the autumn arrival of the wintering waterbirds, or that an early autumn cut is implemented to achieve this.</p>	<p>favoured by foraging overwintering geese.</p> <p>To attract invertebrates for the golden plover and lapwing</p>	
	Monitoring	<p>Check effectiveness of seed sowing to ensure that seed has been sown correctly. Remedial actions will be communicated to the HMSG at the next meeting.</p> <p>Ornithological monitoring to take place at the same time to ensure habitat is being utilised as required by target bird species (brent geese, lapwing and golden plover).</p>	<p>To determine the efficacy of the management plans and to determine whether the biodiversity objectives have been met.</p> <p>Monitoring results to be fed back to the HMSG with recommendations on remedial actions taken or required.</p>	<p>Twice annual visits in spring (May) and Autumn (September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to check the establishment of seed mix and weeds.</p> <p>Bird monitoring in year 0-1, year 1-2, year 2-3, year 4-5, year 10 and year 20 as per, Scottish Natural Heritage. Guidance Note - Monitoring the impact of onshore windfarms on birds (2009).</p>
	Remediation	<p>If there is lower than expected use of the AR HMA, or an evident decline in SPA populations of target species, remedial measures will be considered, which could include:</p> <ul style="list-style-type: none"> <li>Adapt survey effort to increase understanding of bird use of the site and wider area;</li> <li>Inspect sward status and adjust sward management if necessary – considerations include grazing/cutting intensity, water management, herbicide to control weed growth and manure fertilisation (including ivermectin content).</li> <li>Install fencing to protect ditch banks from damage by poaching if necessary.</li> </ul>	<p>To ensure all commitments are met.</p>	<p>From implementation.</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<ul style="list-style-type: none"> <li>Consideration of supplementary feeding of brent geese.</li> </ul>		
<b>FGM HMA</b>  <b>[Appendix K]</b>	Implementation	Minor earth works (not level changes greater than 0.5 m) such as scrape creation, foot drains and small bunds at field edges designed to convey and hold water within the FGM HMA.	To provide habitat enhancements to hold water on the surface of fields such as scrapes and foot drains for wintering water birds that are complementary to the management of the AR HMA	<p>The enhancements within the FGM HMA should be in place ahead of the first winter during construction.</p> <p>The works will be undertaken during late summer to avoid the nesting bird season.</p>
	Management	<p>The current grazing practice and water level management will also be reviewed and adjusted in consultation with Natural England to provide the optimal conditions to meet SSSI targets.</p> <p>The water control structures proposed to be implemented across the site will also allow water to be managed more effectively to achieve the management aims.</p>	To complement the function of the AR HMA for overwintering birds	
	Monitoring	Check the condition and function of enhancements.	To monitor the success of the enhancements.	<p>Twice yearly visits in winter (January) and late summer/early autumn (August/September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to assess the success of the enhancements and any additional management required to ensure optimum condition for the following winter.</p> <p>Bird monitoring in year 0-1, year 1-2, year 2-3, year 4-5, year 10 and year 20 as per, Scottish Natural Heritage. Guidance Note - Monitoring the impact of onshore windfarms on birds (2009).</p>

Habitat Type	Phase	Management Prescriptions	Aims	Timing
	Remediation	If the enhancements are not achieving the required aims, the following remediation measures could be considered. Alternative management of water levels, maintenance of existing enhancements, further implementation of enhancements, or consideration of changes to grazing pressure.	To ensure all commitments are met.	Ahead of the following winter season.
<b>OTHER MEASURES Fencing</b>	Implementation	Fence under-passes or small openings (of approximately 150 mm diameter) will be installed in the perimeter fence approximately every 50 m to enable badger and other mammals (e.g. hedgehog and brown hare) to retain or improve their current resources.	To allow continued commuting/foraging routes for wildlife across the development parcels.	During construction
	Management	Carrying out remedial works as necessary.	To allow continued commuting/foraging routes for wildlife across the development parcels.	During construction and operation
	Monitoring	Inspections to be undertaken during other monitoring and by the site operator to ensure that openings are still fully accessible for wildlife and haven't become blocked.	To allow continued commuting/foraging routes for wildlife across the development parcels.	During construction and operation
	Remediation	If damage has occurred or access points are blocked, repair and/or clearing of blockages will occur.	To ensure commuting is possible for wildlife.	During construction and operation
<b>OTHER MEASURES Lighting</b>	Implementation	Any lighting required for public safety and security purposes near bat roosts or bat flight lines have the potential to alter the distribution of artificial lighting on site, which may impact on the flight and foraging behaviour of bats present in the area <sup>9</sup> . Light levels during construction (and post construction) should be carefully managed to ensure they do not impact on potential bat foraging/commuting habitat such as hedgerows, waterbodies, ditches and marginal	To ensure no adverse effect on nocturnal wildlife such as bats.	During construction

<sup>9</sup> Jones, J. (2000) Guidelines on the Impact of Lighting on Bats. English Nature, Peterborough

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<p>habitats. The following approach based on BCT guidelines<sup>10</sup> can help when designing the lighting strategy for the site:</p> <ul style="list-style-type: none"> <li>• Lighting in ecologically sensitive areas within the Development site such as ditch habitats, and towards sensitive habitats outwith the Development site such as: trees and mature habitats, and the adjacent South Bank of the Swale LNR will be avoided;</li> <li>• The siting of lights will avoid locations where lighting could reflect off solar panels and other reflective surfaces;</li> <li>• Lighting will be positioned to minimise the spread of light to, at, or below horizontal and ensure that only the task work area or compound (during the construction phase) or security area (operational phase) is lit;</li> <li>• Flat cut-off lanterns or accessories will be used to shield or direct light to where it is required, with the height of lighting columns optimised to ensure light spill is minimised and non-target areas are not lit;</li> <li>• The demarcation of works areas (temporary and permanent) with white lining, good signage and LED cats eyes to reduce lighting requirements in the Development site. Ensure only high-risk areas of the Development site are lit, allowing headlights or torchlight to provide any necessary illumination at other times;</li> <li>• Lights will be limited to such that there are dark periods within the Development site. This will include measures such as the use of adaptive lighting, to reduce lighting intensity from lights, adjustment to the timing of lighting within the Development site, and provision of motion sensitive lighting to suit human health and safety as well as wildlife needs; and</li> </ul>		

<sup>10</sup> BCT (2014) Artificial lighting and wildlife Interim Guidance: Recommendations to help minimise the impact artificial lighting.

Habitat Type	Phase	Management Prescriptions	Aims	Timing
		<ul style="list-style-type: none"> <li>Technical specifications to lighting will include the use of narrow spectrum light sources to lower the range of species affected by lighting, the use of light sources that emit minimal ultra-violet light, with a lighting peak no higher than 550 nm. White and blue wavelengths of the light spectrum will be avoided to reduce insect attraction, and where white light sources are required in order to manage the blue short wave length content they should be of a warm /neutral colour temperature.</li> </ul>		
	Management	Inspections to be undertaken by the ECoW during construction and at the same time as other monitoring visits during operation to ensure that appropriate locations only are being lit and no areas of sensitivity are affected.	To ensure no adverse effect on nocturnal wildlife such as bats.	During construction and operation
	Monitoring	Inspections to be undertaken during other monitoring visits to ensure that appropriate locations only are being lit and no areas of sensitivity.	To ensure no adverse effect on nocturnal wildlife such as bats.	During construction and operation
	Remediation	If lighting is identified to be facing inappropriate habitats/sensitive receptors, then these will be redirected to ensure no adverse effect.	To ensure all commitments are met.	During construction and operation

## 5 HABITAT MANAGEMENT AREAS

23. Four main areas have been set aside as Habitat Management Areas (HMA) within the Development site as set out in Chapter 5: Development Description of the ES [APP-035]. The specific management of these areas in order to achieve the stated aims is summarised below.

### 5.1 Arable Reversion Habitat Management Area (AR HMA)

24. The AR HMA management prescriptions are set out in Appendix J.

### 5.2 Designated Freshwater Grazing Marsh HMA (FGM HMA)

25. The FGM HMA management prescriptions are set out in Appendix K.

### 5.3 Lowland Grassland Meadow HMA (LGM HMA)

26. The LGM HMA is based on the Lowland Grassland Meadow management prescription (Appendix B) with no additional management prescriptions.

### 5.4 Existing Cleve Hill Substation HMA (CHS HMA)

27. The CHS HMA is based on the Lowland Grassland Meadow management prescription (Appendix B) with the limitations as set out in Table 5.

**Table 5: CHS HMA**

Phase	Management Prescriptions	Aims	Timing
Implementation	Not required – grassland habitat already exists.		
Management	Dependent on consultation with London Array Ltd but likely related to cutting frequency and encouraging floristic diversity.	To provide a different range of biodiversity enhancements relating to ground nesting birds, small mammals, birds of prey, pollinators etc. and to be complementary to the adjacent management and species present in habitats close to the area (e.g., GCN in adjacent ponds).	Cutting of grass to take place in July and September.
Monitoring	None proposed		

## 6 APPENDIX A – GRAZING MARSH GRASSLAND MANAGEMENT PLAN



28. Arable land may be one of the most challenging types of habitat to convert/attempt sward enhancement due to its high soil fertility which promotes dominance by a limited diversity of competitive plant species which limits the establishment and success of less-competitive wildflowers and fine grasses. Consequently, grassland enhancement/ restoration is a complex process requiring monitoring and intervention over several years to ensure success, especially on sites with a long history of agricultural improvement.
29. The prescriptions set out in this Grazing Marsh Grassland Management Plan (GMGMP) are intended to provide a flexible management framework that will be subject to review depending on the outcomes of ongoing monitoring and management. The work outlined below will be undertaken by a suitably qualified contractor with specialist knowledge of grassland management. The ecologist/landscape architect will be responsible for monitoring the success and implementation of measures and for taking appropriate remedial action, if needed. An ecologist will be available during all stages of the Development to undertake scheduled monitoring (specified below) and to provide ad hoc support.
30. The grassland established on site will enhance the character of the wider landscape and will aim to build on the ecological benefits associated with the proximity to the adjacent SSSI. The Public Right of Way will be kept clear and open throughout the duration of the development.

### 6.1 Aims and Objectives

31. The aim of the GMGMP is to establish a grassland sward with greater ecological value than the existing arable land. It is also designed to be maintainable for the entire duration of the construction and development phases of the Development and therefore the management is separated out into several management prescriptions to ensure the differing areas to be managed are dealt with in the most appropriate and ecologically sound way.
32. In addressing this aim, prescriptions will be defined for the three key phases of the Development:
  - Implementation: measures required to prepare the ground and establish the grassland.

- Construction: measures required during and immediately following construction to establish and maintain the grassland.
- Operation: monitoring and management measures for the duration of the operational period.

33. The GMGMP follows best practice published by Natural England and specialist seed distributors<sup>11</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

## 6.2 Implementation

### 6.2.1 Timing

34. Autumn (October to December) sowing is preferred because this favours species that germinate in autumn and species that require a period of cold to break their dormancy before they germinate in spring.
35. Section 18 provides recommendations on sowing timing in relation to alternative construction start dates in each field of the Development site. Grass will be sown prior to the commencement of construction in each field hosting solar panels, labelled as 'Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory - under and around solar panels' on Figure A5.1.

### 6.2.2 Ground Preparation

36. Ground preparation is necessary to establish a clean seed bed into which a grass seed mix can be sown. It is assumed that large-scale, mechanical ground preparation will not be possible once the solar arrays are installed, except outside the perimeter fence.
37. Soil testing may be undertaken to determine other preparatory and management requirements.
38. The grassland sowing in each field will be undertaken following ground preparation and in advance of any construction activities in a field. Should there be a delay between the sowing of seed at the implementation phase and construction phase within a solar panel field, there may be a requirement to either mechanically control sward length of grassland or through stock grazing of 2-3 sheep/ha (managed by a suitably competent grazer). This could be required to avoid reptiles and other wildlife becoming attracted into this habitat that may lead to direct conflict and harm to these species from construction activities.
39. A grass surface will be created and maintained during construction for Public Right of Way ZR485.

### 6.2.3 Seed Mix

40. The seed mix will be selected based on the results of the soil testing, however, at this stage it is envisaged that Emorsgate EM3 – *Special General Purpose Meadow Mixture*<sup>12</sup> will be suitable as detailed in Table 5.1. The mix is diverse and is suitable for sites where soil conditions vary across a site or where soil and site characteristics have not been established before sowing. Some natural recolonization by local, native species (e.g., *Lolium perenne*) will be tolerated/encouraged in-combination with the identified seed mix ensuring a locally appropriate habitat is created.

<sup>11</sup> Emorsgate Seeds: <http://wildseed.co.uk/home>

<sup>12</sup> <http://wildseed.co.uk/mixtures/view/4>



**Table 5.1 Emorsgate EM3 – Special General Purpose Meadow Mixture**

%	Scientific name	Common name
<b>Wildflowers</b>		
0.5	<i>Achillea millefolium</i>	Yarrow
2.4	<i>Centaurea nigra</i>	Common Knapweed
1	<i>Centaurea scabiosa</i>	Greater Knapweed
0.6	<i>Daucus carota</i>	Wild Carrot
0.6	<i>Filipendula ulmaria</i>	Meadowsweet
0.8	<i>Galium verum</i>	Lady's Bedstraw
1.5	<i>Knautia arvensis</i>	Field Scabious
0.3	<i>Leontodon hispidus</i>	Rough Hawkbit
1	<i>Leucanthemum vulgare</i>	Oxeye Daisy
1	<i>Lotus corniculatus</i>	Bird's-foot Trefoil
0.1	<i>Origanum vulgare</i>	Wild Marjoram
1	<i>Plantago lanceolata</i>	Ribwort Plantain
0.5	<i>Plantago media</i>	Hoary Plantain
1.8	<i>Poterium sanguisorba</i>	Salad Burnet
0.5	<i>Primula veris</i>	Cowslip
2	<i>Ranunculus acris</i>	Meadow Buttercup
1	<i>Rhinanthus minor</i>	Yellow Rattle
0.6	<i>Rumex acetosa</i>	Common Sorrel
1	<i>Silene dioica</i>	Red Campion
0.2	<i>Silene flos-cuculi</i>	Ragged Robin
1	<i>Silene vulgaris</i>	Bladder Campion
0.1	<i>Trifolium pratense</i>	Wild Red Clover
0.5	<i>Vicia cracca</i>	Tufted Vetch
<b>Grasses</b>		
8	<i>Agrostis capillaris</i>	Common Bent
40	<i>Cynosurus cristatus</i>	Crested Dog's-tail
28	<i>Festuca rubra</i>	Slender-creeping Red-fescue
4	<i>Phleum bertolonii</i>	Smaller Cat's-tail

#### 6.2.4 Sowing

41. The seed mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.

#### 6.2.5 Implementation Monitoring

42. An ecologist/landscape architect will visit the site before seed is sown to check that ground conditions are suitable, and following seed sowing to check that seed has been sown correctly. Remedial actions will be communicated to the Site Operator and the HMSG through monthly reporting during construction.

### 6.3 Construction Phase Management

43. Grassland is anticipated to already have been established at this stage through directly sowing a seed mix into the prepared ground. The following measures will take place during, or immediately after construction.
44. Vegetation established during construction will be cut or grazed as necessary to facilitate construction activities in line with the operational prescriptions for year 0-1.
45. Construction activities have the potential to disturb the seed bed/grassland and so it may be necessary to repeat the pre-construction ground preparation to establish a suitable seed bed. Similarly, if the seedbed lies dormant following construction but before autumn sowing, then further treatment may be required.
46. Earthworks onsite (e.g., transformer foundation excavations) during construction may result in a small surplus of material in areas of the Development site. This material will be reused in landscaping and restoration of the Development site during and after construction. If there remains a surplus post-construction, small mounds of site won material of up to 1.5 m in height may be formed and seeded in vacant areas of the Development site (located within the 'Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory' and 'Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory - under and around solar panels' shown on Figure A5.1, anywhere within the perimeter fence) to provide a range of habitats for certain species such as, reptiles, amphibians and invertebrates. Each mound will effectively form hibernacula piles. The exact size of the mounds will be dependent on the quantity of surplus soil however, would potentially be up to 3 m x 3 m x 1.5 m (length x width x height).

### 6.4 Operational Phase Management

47. The following work will be carried out upon completion of all construction works and following the sowing of the grassland seed mix. The activities are relevant for the duration of the operational phase.
48. A flush of weeds is to be expected in the first season after sowing and these can be managed by a short period of intensive grazing. It is likely that some pernicious weeds will persist following the ground preparation and can be treated by hand pulling or spot treatment with herbicides.
49. Grassland within the perimeter fence will be managed by sheep grazing as a preference rather than mechanical cutting, but mechanical cutting may be required to ensure the management plan aims are met. The stock grazing densities proposed are in line with best practice for managing lowland grasslands for conservation purposes<sup>13</sup>.
50. Grassland outside the fence will be managed through mechanical cutting as a preference and collection of arisings.
51. Throughout operation, the vegetation on and around public footpath ZR485 and the permissive path will be maintained to ensure accessibility of the public right of way.

#### ***6.4.1 Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory - under and around solar panels***

52. Throughout operation, solar PV modules may be cleaned with water. Detergents or abrasive products will not be used as they have potential to damage the solar PV modules. The run-off from cleaning would therefore be clean water and would disperse in the same way as rainwater.

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<sup>13</sup> BRE (2014) Agricultural Good Practice Guidance for Solar Farms. Ed J Scurlock

#### *6.4.1.1 Year 0-1 of Operation*

53. The grassland will be grazed by sheep at a low density (2-3 sheep/ha) to manage the flush of annuals, but grazing will not commence until a sward is established.
54. Grazing within the perimeter fence line of the solar panel fields will take place year round on a rotational basis across the solar panel fields. This avoids overgrazing within individual solar panel fields and allows flowering plants to be present throughout the plant growth season, whilst ensuring that shading of solar panels from plant growth is avoided.

#### *6.4.1.2 Following Year 0-1 of Operation*

55. In the second and subsequent years the grassland within the perimeter fence and within the array can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland.
56. Within the perimeter fence, the best results would be obtained by traditional meadow-pasture management based around a year-round grazing regime, with a similar approach to Year 0 to 1 recommendations. As the habitats become more established, the stocking density within the grazed grassland inside the solar panel compartment areas can be increased to c. 4 sheep/ha throughout the year.

### **6.4.2 Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory (inter-array grasslands within the perimeter fence)**

#### *6.4.2.1 Year 0-1 of Operation*

57. The inter-array grasslands within the perimeter fence will be segregated from the grassland being established within the solar arrays by the deployment of temporary stock-proof fencing. This will permit different management regimes in the two different areas. Initially, the tops of the ditch banks may also be fenced off to prevent poaching by livestock, although this should only be implemented in the event that monitoring demonstrates that damage occurs as a result of poaching. That being said, with the reedbed in this location establishing it is not considered likely that poaching will be a significant risk. This is due to the density at which common reed will establish thereby reducing ease of access for sheep. The KWT Land Management Advice Sheet 5 – Choosing livestock for conservation grazing documents also states that '*sheep have smaller feet than cattle or horses and are therefore less likely to cause poaching*'.
58. As ditch bank vegetation and less restricted growth of reeds develops in the ditches, it should not be necessary to maintain fencing along the ditch banks. The grassland will be grazed extensively by cattle and/or sheep to create a suitable, tussocky sward structure, with supplementary late summer cutting if necessary, to control dominance by undesirable weeds and maintain best practice lowland meadow management. Grazing would be undertaken in accordance with the KWT Land Management Advice Sheet 5 – Choosing livestock for conservation grazing.
59. Measures to protect grassland habitat that currently supports reptiles, ground nesting birds and foraging bats, such as habitats adjacent to the ditch network will need to be protected from sheep grazing using temporary stock proof fencing. The protection of areas of this grassland from grazing to allow late flowering plants to set seed in late September will also ensure that pollinators such as the Shrill Carder Bee *Bombus sylvarum* will have available habitat for colonisation, which ensures that land management considers the objectives of local conservation initiatives<sup>14</sup>.

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<sup>14</sup> Bumblebee Conservation Trust's 'Making a Buzz for the Coast'

60. Improvements to the hydrology of the area will be made through additional control of drainage, whereby water levels surrounding/within the development are raised higher than the current baseline (see Appendix H - Aquatic Habitat Management Plan for further details).

#### *6.4.2.2 Following Year 0-1 of Operation*

61. In the second and subsequent years the grassland within the perimeter fence between the arrays can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland.
62. The grassland within the perimeter fence and between the arrays will be allowed to further establish thick/diverse swards which will continue to support high numbers of rodents/ prey, for marsh harrier.
63. Unless otherwise agreed through the HMSG, the management of grassland within the perimeter fence and between the arrays will be undertaken in line with year 0-1 and for the duration of the development.

### **6.4.3 Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory (outside the perimeter fence)**

#### *6.4.3.1 Year 0-1 of Operation*

64. Mechanical cutting outside the perimeter fence line of the solar farm will be in line with a low intensity meadow management regime where the sward is cut to 100 mm once per year from the end of September onwards with all arising's collected as hay or silage. This ensures that seeds are able to fall and flowering has finished providing habitat and feeding over the summer. This also ensures seed is returned to the ground and will add to the natural seed bank each year. The collection of arisings will also ensure that wildflowers within the seed mix will continue to flourish each year.
65. The timing and length of the cut will ensure that impacts to ground nesting birds and other wildlife from these management activities are avoided.
66. Alternatively, a lower intensity grazing regime will be implemented outside the perimeter fence with the same timings as the mechanical cut and to achieve the same aims.

#### *6.4.3.2 Following Year 0-1 of Operation*

67. In the second and subsequent years the grassland outside the perimeter fence can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland.
68. Unless otherwise agreed the management of grassland outside the perimeter fence line will be undertaken in line with year 0-1 and for the duration of the Development.

## **6.5 Operational Monitoring, Triggers and Remedial Actions**

### **6.5.1 Habitats**

69. A suitably qualified ecologist will visit the site twice annually in spring (May) and Autumn (September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to check the establishment of seed mix and weeds. The condition of ditch banks and any damage by poaching will also be recorded. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
70. The monitoring will assess the success of grassland management and if necessary recommend revisions to the GMGMP.

71. Remedial measures will be implemented if necessary, to achieve the desired sward length and structure – e.g. grazing management, spring/ autumn cutting, herbicide application, spot-treatments.

### **6.5.2 Bird use (incl. Marsh Harrier)**

72. An ecologist will visit the site regularly during construction, and during operation in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to monitor bird activity at the site using a comparable method to the baseline surveys to allow comparison between pre- and post-construction bird-use, including:
- Breeding and non-breeding season surveys, with a minimum of 6 hours flight activity survey per month, totalling a minimum of 36 hours in each of the breeding and non-breeding seasons;
  - Mapping of flight activity and flight behaviour of marsh harriers within the site, (including AR HMA);
  - General breeding bird survey following the same three-visit Common Birds Census style method used in the baseline survey;
  - Specific breeding marsh harrier survey to locate nest sites following best-practice published methodology; if feasible, monitor productivity of any nests found; and
  - Undertake sampling of small mammal population (in relation to marsh harrier prey availability).
73. The locations of suitable vantage points for the operational phase flight activity surveys will be determined after the construction of the Development to ensure that bird activity between the arrays will be visible.

### **6.5.3 Triggers and Remedial Actions**

The inter-array grassland is designed to provide foraging resources for marsh harrier. Following reporting of the findings of monitoring to the HMSG, if the following triggers occur, remedial actions will be considered:

- Lower than expected use (indicated by lower frequency of flight activity than baseline) by marsh harriers.
  - Absence of nesting birds in the immediate environs of the site, including within the KWT South Bank of the Swale reserve.
  - Lower than expected density of small mammals.
74. The HMSG will discuss the findings of the above, in the context of the site and of the wider area and discuss remedial measures if necessary. These could include:
- Adapting the survey effort to increase understanding of bird use of the site and wider area.
  - Adjust GMGMP if necessary – such as changes to grazing/cutting intensity, water management, herbicide to control weed growth, measures to encourage small mammals (as marsh harrier prey) etc.
  - Adjusting the location of temporary fencing to control grazing and change extents of different types of grassland habitats.
75. Remedial measures will be implemented as soon as practicable following agreement at the HMSG meetings.

## 7 APPENDIX B – LOWLAND GRASSLAND MEADOW MANAGEMENT PLAN



76. Arable agricultural land may be one of the most challenging types of habitat to convert/attempt sward enhancement due to its high soil fertility which promotes dominance by a limited diversity of competitive plant species which limits the establishment and success of less-competitive wildflowers and fine grasses. Consequently, grassland enhancement/restoration is a complex process requiring monitoring and intervention over several years to ensure success, especially on sites with a long history of agricultural improvement.
77. The prescriptions set out in this Lowland Grassland Meadow Management Plan (LGMMP) are intended to provide a flexible management framework that will be subject to review depending on the outcomes of ongoing monitoring and management. The work outlined below will be undertaken by a suitably qualified contractor with specialist knowledge of grassland management. The contractor will be responsible for monitoring the success and implementation of measures and for taking appropriate remedial action, if needed. An ecologist will be available during all stages of the Development to undertake scheduled monitoring (specified below) and to provide ad hoc support. The emphasis of the LGMMP will be to provide benefits to pollinating invertebrate species, such as bumblebees. It is anticipated that the LGMMP seed mix will be the same as that described for grazing marsh habitat management, but with management approach reflecting practical and conservation objectives within this habitat. The prescriptions for the habitat can be found in the following sections.

### 7.1 Aims and Objectives

78. The aim of the LGMMP is to establish a grassland sward with greater ecological value than the existing arable land. In addressing this aim, prescriptions will be defined for the three key phases of the Development:
- Implementation: measures required to prepare the ground and establish the grassland.
  - Construction: measures required during and immediately following construction to establish and maintain the grassland.
  - Operation: monitoring and management measures for the duration of the operational period.

79. The LGMMP follows best practice published by Natural England specialist seed distributors<sup>15</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operational programmes when these are developed.

## 7.2 Implementation

### 7.2.1 Timing

80. Autumn (October to December) sowing is preferred because this favours species that germinate in autumn and species that require a period of cold to break their dormancy before they germinate in spring. Sowing must take place when conditions are warm and moist, and so winter and drought periods must be avoided.
81. The LGM will be established prior to the commencement of operation.

### 7.2.2 Ground Preparation

82. Ground preparation is necessary to establish a clean seed bed into which a grass seed mix can be sown. As the lowland grassland habitats will be outside of the footprint of the solar arrays and much of the construction activities, the option for large-scale, mechanical ground preparation is available irrespective of the stage of construction. Soil testing may be undertaken, at the discretion of the appointed contractor/ecologist, following ground preparation to determine other preparatory and management requirements.
83. Following implementation of the LGMMP a grass surface will be created and maintained during construction for Public Right of Way ZR488.
84. The LGM HMA will be fenced along Cleve Hill Road, with gates to allow continued access to the Public Right of Way.

### 7.2.3 Seed Mix

85. The seed mix will be selected based on the results of the soil testing (if undertaken), however, at this stage it is envisaged that the final seed mix will be decided following consultation with the Bumblebee Conservation Trust<sup>16</sup>, with a seed mix of local provenance suited to damp lowland habitats. An example seed mix such as *Emorsgate EM3 – Special General Purpose Meadow Mixture*<sup>17</sup> may be suitable.
86. The final selected mix will need to be diverse and suitable for sites where soil conditions vary across a site or where soil and site characteristics have not been established before sowing. The list of plant species that could be included within the final seed mix is seen in Table 6.1. Some natural recolonization by local, native species (e.g., *Lolium perenne*) will be tolerated/encouraged in combination with the identified seed mix ensuring a locally appropriate habitat is created.

**Table 6.1 Emorsgate EM3 – Special General Purpose Meadow Mixture**

%	Scientific name	Common name
<b>Wildflowers</b>		
0.5	<i>Achillea millefolium</i>	Yarrow
2.4	<i>Centaurea nigra</i>	Common Knapweed
1	<i>Centaurea scabiosa</i>	Greater Knapweed

<sup>15</sup> Emorsgate Seeds: <http://wildseed.co.uk/home>

<sup>16</sup> <https://www.bumblebeeconservation.org/>

<sup>17</sup> <http://wildseed.co.uk/mixtures/view/4>

0.6	<i>Daucus carota</i>	Wild Carrot
0.6	<i>Filipendula ulmaria</i>	Meadowsweet
0.8	<i>Galium verum</i>	Lady's Bedstraw
1.5	<i>Knautia arvensis</i>	Field Scabious
0.3	<i>Leontodon hispidus</i>	Rough Hawkbit
1	<i>Leucanthemum vulgare</i>	Oxeye Daisy
1	<i>Lotus corniculatus</i>	Bird's-foot Trefoil
0.1	<i>Origanum vulgare</i>	Wild Marjoram
1	<i>Plantago lanceolata</i>	Ribwort Plantain
0.5	<i>Plantago media</i>	Hoary Plantain
1.8	<i>Poterium sanguisorba</i>	Salad Burnet
0.5	<i>Primula veris</i>	Cowslip
2	<i>Ranunculus acris</i>	Meadow Buttercup
1	<i>Rhinanthus minor</i>	Yellow Rattle
0.6	<i>Rumex acetosa</i>	Common Sorrel
1	<i>Silene dioica</i>	Red Champion
0.2	<i>Silene flos-cuculi</i>	Ragged Robin
1	<i>Silene vulgaris</i>	Bladder Champion
0.1	<i>Trifolium pratense</i>	Wild Red Clover
0.5	<i>Vicia cracca</i>	Tufted Vetch
<b>Grasses</b>		
8	<i>Agrostis capillaris</i>	Common Bent
40	<i>Cynosurus cristatus</i>	Crested Dog's-tail
28	<i>Festuca rubra</i>	Slender-creeping Red-fescue
4	<i>Phleum bertolonii</i>	Smaller Cat's-tail

#### 7.2.4 Sowing

87. The seed mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.

#### 7.2.5 Implementation Monitoring

88. An ecologist/landscape architect will visit the site before seed is sown to check that ground conditions are suitable, and following seed sowing to check that seed has been sown correctly. Remedial actions will be communicated to the Site Operator and HMSG at the next meeting (see Section 1.4).

### 7.3 Construction Phase Management

89. Grassland will be established by directly sowing a seed mix into the prepared ground. The following measures will take place prior to, as part of, or immediately after, construction.
90. Vegetation established during construction will be cut or grazed as necessary in line with the operational prescriptions for year 0-1.



91. No impact is anticipated as lowland grassland meadow areas are located outside the construction area. However, if construction activities encroach on the edges of this habitat then there is the potential to disturb the seed bed and so it may be necessary to repeat the pre-construction ground preparation to establish a suitable seed bed. Similarly, if the seedbed lies dormant following construction but before autumn sowing, then further ground preparation may be required.

#### **7.4 Operational Phase Management**

92. The following work will be carried out upon completion of all construction works and following the sowing of the grassland seed mix. The activities are relevant for the duration of the operational phase.
93. A flush of weeds is to be expected in the first season after sowing and these can be managed by cutting (see below). It is likely that some pernicious weeds will persist following the ground preparation and can be treated by hand pulling.
94. For the purposes of this plan it is assumed that grassland will be managed by appropriate mechanical cutting, to be managed as a wildflower rich hay meadow. Alternatively, a low intensity grazing regime could be employed in agreement with the HMSG.
95. Throughout operation, the vegetation on and around public footpath ZR488 and the permissive path will be maintained to ensure accessibility of the public right of way.

##### **7.4.1 Year 0-1**

96. A mechanical cut of grassland habitat within the lowland meadow grassland habitat management fields will be completed twice, which will be in line with a hay meadow management regime. The sward is to be cut to 100 mm in summer (July) and again in September, with all arisings collected as hay or silage.
97. The frequency of the cuts will ensure that the lowland grassland habitat within this area will in time become less fertile, to favour a more diverse wildflower grassland structure. The high cut of 100 mm favours lower growing flowering plants that are competing with the longer grassland sward, but will not be collected during the hay cuts.
98. A higher proportion of flowering plants within the lowland grassland sward will provide benefits for invertebrates and other wildlife through the spring and summer months. Any seeds that are returned to the ground will add to the natural seed bank each year. The collection of arisings will also ensure that wildflowers within the seed mix will continue to flourish each year, and not be out competed by vigorous grass species.

##### **7.4.2 Year 1-2**

99. As in year 0-1, mechanical cut of grassland habitat within the lowland meadow grassland habitat management fields will be completed twice, which will be in line with a hay meadow management regime. The sward is to be cut to 100 mm in summer (July) and again in September, with all arisings collected as hay or silage.
100. The timing of the cut ensures that flowering will be able to take place throughout the peak growth season uninterrupted and that seeds are either available for foraging birds or are able to fall to the ground. The timing of the cut will ensure that lowland grassland habitat is available to foraging bats, birds, invertebrates and other wildlife through the spring and summer months. Any seeds that are returned to the ground will add to the natural seed bank each year. The collection of arisings will also ensure that wildflowers within the seed mix will continue to flourish each year, and not be out competed by vigorous grass species.

### **7.4.3 Year 2 onwards**

101. Following year 1-2 the grassland can be managed in a similar way as year 1-2 which, with consideration with soil fertility, will determine the character of the grassland. The best results are usually obtained by traditional hay meadow management.
102. The grassland will need to be cut at a similar height and cutting times as to year 1-2, with two cuts per year, and an annual cut in lowland meadow outside the perimeter fence. On completion of each cut, the arising's will be taken away for use as silage or as hay.
103. As the soil fertility decreases in subsequent years, the frequency of cutting can be reduced to a single summer cut in July annually. Similarly, lowland grassland outside the perimeter fencing can be cut at a reduced frequency of once every two years when soil fertility has reduced. Following habitat monitoring, consultation with an ecologist or agricultural contractor will determine when the cutting frequency can be reduced in subsequent years.

## **7.5 Operational Monitoring, Triggers and Remedial Actions**

### **7.5.1 Habitats**

104. A suitably qualified ecologist will visit the site in spring (May) and summer (July/August) year 0-1 to check the establishment of seed mix and weeds.
105. Assuming that the seed mix has established successfully after year 0-1, an ecologist will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 9-10 and 19-20 to assess the success of grassland management. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
106. The monitoring will assess the success of grassland management and, if necessary, recommend revisions to the LGMMP.

### **7.5.2 Bird use**

107. Monitoring will also comprise ornithological surveys as set out in section 6.5.2 to understand the use of these areas by foraging marsh harriers and nesting birds.
108. The ornithological surveys will include observations of potential disturbance of birds by walkers using Public Right of Way ZR488.

### **7.5.3 Triggers and Remedial Actions**

109. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 7.1), remedial measures will be implemented if necessary, to achieve the desired sward length and structure – e.g. grazing management, spring/ autumn cutting, herbicide application, spot-treatments.
110. If human disturbance to the area is found to be occurring and affecting nesting birds, a hierarchy of intervention from signage requesting dogs are kept on leads, through to temporary or permanent stock fencing could be implemented to mitigate disturbance.

## 8 APPENDIX C – HEDGEROW (WITH TREES) MANAGEMENT PLAN



111. Hedgerows provide an important habitat within the local area with many networks of hedgerows traversing the landscape and forming an important component of local green infrastructure, providing wildlife corridors and habitat for a variety of species of flora and fauna. Within the Development site there are currently no hedgerows present, some patchy areas of scrub and therefore the introduction of hedgerows at the scale proposed (approximately 3.6 km) would significantly increase the habitat diversity on site in line with the surrounding landscape character and provide green linkage between areas of offsite vegetation within the wider landscape context.

### 8.1 Aims and Objectives

112. The hedgerows (with trees) should be implemented within the planting seasons during or immediately post construction to ensure that mitigation measures are completed in a timely manner and their impact is delivered in as short a timeframe as possible.

113. The aim of the HMP is to establish a dense healthy hedgerow which ties existing areas of green infrastructure together creating a landscape asset which enhances the local green infrastructure whilst creating on site mitigation and screening of the Development site with greater ecological value than the existing arable land and pockets of vegetation. In addressing this aim, prescriptions will be defined for the two key phases of the Development:

- Implementation: measures required to prepare the ground and establish the hedgerows.
- Operation: monitoring and management measures for the duration of the operational period.

114. The HMP follows best practice published by British Standards Institution<sup>18</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

<sup>18</sup> British Standards Institution: <https://www.bsigroup.com/en-GB/>

## **8.2 Implementation**

115. Hedgerows and hedgerow trees will be established by planting into the prepared ground. The following measures will take place as part of, or immediately after, construction.

### **8.2.1 Timing**

116. All planting will be undertaken between November and March during construction or in the first planting season following construction.

117. If planting is undertaken during construction, hedgerows and trees planted along the route of the existing 11 kV overhead line and the proposed underground route of the line (e.g., northwest of Warm House) will be planted after the undergrounding has been completed.

118. Similarly, hedgerows within the perimeter fence adjacent to fields V and X will be planted after the construction of solar arrays in these fields.

### **8.2.2 Ground Preparation**

119. Ground preparation is necessary to establish a clean planting bed into which hedgerow plants can be planted. An area 0.5 m either side of the centre line of the hedgerow line will be sprayed with herbicide and cultivated to a depth of 450 mm prior to planting. Repeated treatments may be necessary to exhaust weeds. Any imported topsoil must be BS 3882:2015 compliant and existing topsoil must be cultivated in accordance with BS 3882:2015. No cultivation should take place in wet/ waterlogged conditions and onsite topsoil is to be used in areas of uneven surfaces to make good levels to create a smooth level surface for hedge planting.

### **8.2.3 Hedgerow Planting and Species Mix**

120. Mixed native hedging will comprise of a double staggered row of plants 450 mm apart within each row, overall 5 plants per linear metre. Species will be mixed throughout the hedge line in random groups of 3/5. A 500 mm wide trench will be excavated to take plants and topsoil cultivated to 450 mm depth prior to application of fertiliser. All native planting shall be of local provenance. Native hedgerow plants will be protected by spiral shelters and one cane per plant.

121. The proposed hedge species mix shown in Table 8.1 is informed by a survey of existing hedgerows species surrounding the site. The mix includes species that are currently found at the Development site and in the surrounding landscape. The new hedge and hedgerow trees will benefit biodiversity by creating a hedge with nut and fruit bearing species which will provide a food source for birds, small mammals and invertebrates.

**Table 8.1: New Hedge Planting: Plant Species, Mix Percentage, Size and Root**

% within mix	Scientific name	Common name	Size (cm)	Root
10	<i>Acer campestre</i>	Field Maple	60-90	Bare Root (BR)
5	<i>Carpinus betulus</i>	Hornbeam	60-90	BR
2.5	<i>Cornus sanguinea</i>	Dogwood	60-90	BR
10	<i>Corylus avellana</i>	Hazel	60-90	BR
45	<i>Crataegus monogyna</i>	Hawthorn	60-90	BR
5	<i>Fagus sylvatica</i>	Beech	60-90	BR
2.5	<i>Ilex aquifolium</i>	Holly	30-40	Containerised (C)
15	<i>Prunus spinosa</i>	Blackthorn	60-90	BR
2.5	<i>Rosa canina</i>	Dog Rose	60-90	BR
2.5	<i>Sambucus nigra</i>	Elder	60-90	BR

#### 8.2.4 Hedgerow Tree Planting and Species Mix

122. Within the new hedgerows, hedgerow trees will be planted to provide additional habitat and to create a strong vertical presence within the landscape which aims to provide a setting for and to screen views of the Development site. Within the new hedgerows standard trees will be planted at a random spacing of between 5-9 m (on average 1 tree per 7 m centres) to create informal/natural landscape features. Tree species will be mixed along the hedgerows in random patterns of 1, 3 or 5 trees (of the same species) to reinforce a natural layout of species within the landscape. All species will be native and of local provenance and will reflect those tree species found in hedgerows locally.
123. The prescriptions set out in the Hedgerow Management Plan (HMP) are intended to provide a management framework that will enable hedgerows and hedgerow trees to be planted and established within the first five years of operation. The work outlined will be undertaken by a suitably qualified landscape contractor in line with current British Standards. The contractor will be responsible for implementation and maintenance of the work which would be executed through a JCLI Landscape Works Contract 2017 (JCLI LWC 2017), and a JCLI Landscape Maintenance Works Contract 2017 (JCLI LMWC 2017), under the supervision of a Chartered Landscape Architect to ensure all work is undertaken to the correct standards.
124. Figure A5.1 of the LBMP shows the location of hedgerows where hedgerow trees will be planted. Trees within hedgerows will be planted as Select Standards with a height of between 3.0-3.5 m, a girth of between 8 and 10 cm and a clear stem of 1.75-2.0 m. The location of each hedge tree will be marked by a timber post 1.5 m in height so that its location is noticeable to operators of tractor flails during maintenance periods. Select Standard trees to be planted in pits 800x800x450 mm or dimensions of rootball, whichever is greater. Trees will be supported by two round timber stakes (75 mm diameter x 1500 mm long, per tree, and finished at 600 mm above ground), with cross bar (400x100x15 mm) and two biodegradable tree ties. A 25 kg bag of soil improver and 140 g Enmag (or equivalent) slow release fertiliser will be incorporated into the soil of all new tree pits. Trees will be planted centrally within the new hedgerow (along the centre line of the hedge).

**Table 8.2: New Hedgerow with Tree Planting: Plant Species, Mix Percentage, Size and Root**

% within mix	Scientific name	Common name	Height (cm)	Root
25	<i>Acer campestre</i>	Field Maple	300-350	Root Ball (RB)
25	<i>Crataegus monogyna</i>	Hawthorn	300-350	RB
10	<i>Malus sylvestris</i>	Crab Apple	300-350	RB
25	<i>Prunus spinosa</i>	Blackthorn	300-350	RB
15	<i>Quercus robur</i>	Common Oak	300-350	RB

### 8.3 Operational Phase Management

125. The following work will be carried out upon completion of hedgerow planting prior to the commencement of operation, or in the first planting season following commencement of operation. The activities are relevant for the duration of the operational phase.

#### 8.3.1 Maintenance Operations - Year 0-1

126. The hedgerow should be regularly watered in its first summer and weeds should be controlled through the use of biodegradable mulch matting prior to the addition of bark mulch. A 75 mm layer of bark mulch 0.5 m either side of the hedge will be spread along the length of the hedge to suppress weeds and retain soil moisture.

127. Allow for 1 cut per season and only between 1<sup>st</sup> October and 28<sup>th</sup> February. Carefully clip and prune the top and sides of the hedge to promote dense growth to ground level and in the desirable parameters that the hedge will eventually attain. Prune the top of the hedge when it has achieved a height of 90 cm. Care should be taken to avoid damage to hedgerow trees during cutting new hedgerow planting.

128. Hedge plant shelters to be checked 4 times in the first year. Shelters which have fallen should be straightened and any damaged or missing shelters should be replaced.

129. Any plants during the first year of establishment which die or are dying should be replaced with 60–90 cm plants of the same species (planted in November).

#### 8.3.2 Year 1-2

130. The hedgerow should be watered as required in prolonged periods (1 week) without rainfall. Spot treat any weeds growing at the base of the hedge with Glyphosate during the growing season prior to topping up with 75 mm depth bark mulch where applicable to suppress weeds and retain soil moisture.

131. Directly apply fungicide and or insecticide as spot treatment to any plants suffering from fungal infection or insect attack. Care needs to be taken to avoid these chemicals coming into contact with the ground or near aquatic habitats.

132. Allow for 1 cut per year and only between 1<sup>st</sup> October and 28<sup>th</sup> February. Carefully clip and prune the top and sides of the hedge to promote dense growth to ground level and in the desirable parameters that the hedge will eventually attain. Prune the top of the hedge when it has achieved a height of 90 cm. Care should be taken to avoid damage to hedgerow trees during cutting.

133. It is best to cut in January or February and if this is not feasible, cut as late as possible in autumn. The bird breeding season of 1<sup>st</sup> March to 30<sup>th</sup> September should be avoided.

134. Hedge plant shelters to be checked 4 times in the second year. Shelters which have fallen should be straightened and any damaged or missing shelters should be replaced.
135. Any plants during the second year of establishment which die or are dying should be replaced with 60–90 cm plants of the same species (planted in November).
136. Water recently replaced plants as necessary to ensure establishment.

### **8.3.3 Year 2-3 and 3-4**

137. Repeat procedures as for year 1-2.
138. When cutting a hedgerow in rotation, allow the height of the trim to increase a little each time (e.g. 10-20 cm). If a hedgerow is cut back at the same height repeatedly, after some years a hard knuckle will start to form.
139. At year 4 the hedge should be dense and clothed in leaves to ground level, no further requirement for spot treating weeds or topping up mulch is necessary. Replace dead or missing plants as necessary to maintain the hedge density.

### **8.3.4 Year 4-5**

140. Remove hedge plant shelters and stakes to allow natural establishment of the hedgerows. After year 4 it is optimal to cut on a two or (preferably) a three year cycle, as most tree or shrub flowers are produced on year old twigs, which annual cutting removes, resulting in no flowers, berries or nuts being produced. Care should be taken to avoid damage to hedgerow trees during cutting.
141. It is best to cut in January or February and if this is not feasible, cut as late as possible in autumn. The peak bird breeding season March to September should always be avoided.
142. Where viable, different wildlife likes different sizes and shapes of hedge, so create a variety, though favouring large, dense, infrequently cut hedges ranging in height of between 3-4 m high.

### **8.3.5 Year 5 onwards**

143. Continue to cut hedges on a two or (preferably) a three year cycle, as most tree or shrub flowers are produced on year old twigs, which annual cutting removes, resulting in no flowers, berries or nuts being produced. Care should be taken to avoid damage to hedgerow trees during cutting.
144. As wildlife like different sizes and shapes of hedge, so create a variety, though favouring large, dense, infrequently cut hedges ranging in height of between 3-4 m high. This can be undertaken by adopting a variable cutting schedule on a 3 year rota to provide a range of habitats and to ensure a supply of fruit and berries is available to birds and wildlife within the hedgerows each year. Visually this will also create a more varied and natural looking landscape.
145. No work which might harm nesting birds or destroy their nests should be undertaken throughout the duration of the Development; therefore hedge cutting should not be undertaken between the main bird nesting period from 1st March to 30<sup>th</sup> September. A green cover on land within 2 m of the centre of a hedge should be maintained at all times and no cultivation or application of fertilisers or pesticides should be undertaken within 2 m of the centre of the hedge. Optimally the management of a margin should be cut in two halves; whereby the closest half to the hedgerow is allowed to grow rough and tussocky, by cutting once every few years and the other half should be cut annually, after mid-July. Prevent weed growth of the ground flora margin by excluding fertilisers and allowing the grassland on site to develop up to the hedgerows.

## **8.4 Operational Monitoring, Triggers and Remedial Actions**

### **8.4.1 Habitats**

146. A landscape architect will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of hedgerows and trees.
147. Assuming that the hedgerow has established successfully after year 0-1, a landscape Architect will visit the site in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of hedgerow management. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
148. The monitoring will assess the success of hedgerow management and if necessary recommend revisions to the HMP.

### **8.4.2 Bird use**

149. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

### **8.4.3 Triggers and Remedial Actions**

150. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 8.1), remedial measures will be implemented if necessary, to achieve the desired hedgerow characteristics.



## 9 APPENDIX D - SHELTERBELT MANAGEMENT PLAN



152. Shelterbelts provide an important habitat within the local area and contribute to the landscape character of the Graveney Fruit Farms linking hedgerows and woodlands as part of the local green infrastructure. The role of the Shelterbelts will be to create structural planting along the southern boundary of the Development site immediately north of the Graveney Fruit Farms Landscape Character Area. This will extend the influence of the character area and provide a relatively low level screen within the landscape. This is particularly prevalent to contribute to screening adjacent to properties at Nagden. The planting will consist of native species of local provenance and will reflect those tree species found in shelterbelts locally. Trees will be maintained to a height of between 5-7 m with the exception of black poplar, alder, beech and hornbeam planted at a low density to provide some structure in keeping with the edge of the Graveney Fruit Farm Character Area. The planting will be maintained at a height which screens views of the Development in short and medium distance views whilst retaining some long distance views over the sea wall surrounding the Development site. Trees will be planted to provide habitat and to create a strong vertical presence within the landscape which aims to provide a setting for and to screen views of the Development site.

153. The prescriptions set out in the Shelterbelt Management Plan (SMP) are intended to provide a management framework that will enable shelterbelts to be planted and established within the first five years post development. The work outlined below will be undertaken by a suitably qualified landscape contractor in line with current British Standards. The contractor will be responsible for implementation and maintenance of the work which would be executed through a JCLI Landscape Works Contract 2017 (JCLI LWC 2017), and a JCLI Landscape Maintenance Works Contract 2017 (JCLI LMWC 2017), under the supervision of a Chartered Landscape Architect to ensure all work is undertaken to the correct standards.

### 9.1 Aims and Objectives

154. The trees and shrubs should be implemented within the planting seasons during or immediately post construction to ensure that mitigation measures are completed in a timely manner and their impact is delivered in as short a timeframe as possible.

155. The aim of the SMP is to establish a dense healthy shelterbelt which ties into proposed and existing areas of green infrastructure together creating a landscape asset which enhances the local green infrastructure whilst creating on site mitigation and screening of the Development site with greater ecological value than the baseline. In addressing this aim, prescriptions will be defined for the two key phases of the Development:

- Implementation: measures required to prepare the ground and establish the shelterbelts.
- Operation: monitoring and management measures for the duration of the operational period.

156. The SMP follows best practice published by British Standards Institution<sup>19</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

## **9.2 Implementation**

157. Shelterbelts will be established by planting into the areas of land recently sown with wildflower and grass seed. This ensures a ground cover habitat whilst the shelterbelt establishes. The following measures will take place as part of, or immediately after, construction.

158. If construction activities with the potential to damage planting are not complete in the area, temporary heras fencing will be installed to protect the shelterbelt planting.

### **9.2.1 Timing**

159. All planting will be undertaken between November and March during construction or in the first planting season following construction.

### **9.2.2 Ground Preparation**

160. Ground preparation is necessary to establish a clean planting bed into which trees and shrubs can be planted. The extent of the planting area will be sprayed with herbicide and cultivated to a depth of 450 mm prior to planting and prior to sowing of wildflower and grass seed in line with section 6.2.4. Repeated treatments may be necessary to exhaust weeds prior to sowing. Any imported topsoil must be BS 3882:2015 compliant and existing topsoil must be cultivated in accordance with BS 3882:2015. No cultivation should take place in wet/ waterlogged conditions and onsite topsoil is to be used in areas of uneven surfaces to make good levels to create a smooth level surface for new planting.

### **9.2.3 Shelterbelt Planting and Species Mix**

161. New Shelterbelt planting will consist of trees/shrubs planted at 1 m centres to create informal/natural landscape features. Tree/shrub species will be planted in groups of 1, 3, 5 and 7 (of the same species) to reinforce a natural layout of species within the landscape.

162. Trees and shrubs will be planted as Whips, Transplants and Feathered specimens in pits approximately 300 x 300 x 400 mm or the dimensions of the rootball (RB) whichever is greater. Shrubs will be planted directly into the ground without guards to enable them to develop into a bushy and dense understorey. Whips will be protected by spiral shelters supported by a cane. Transplants will be protected by shelterguard with post tie with a single round timber stake 1.2 m x 50 mm fitted in line with manufactures instructions. Feathered Trees will be supported by one round timber stake (75 mm diameter x 1500 mm long, per tree, and finished at 600 mm above ground), and a biodegradable tree tie. Soil improver and 140 g Enmag (or equivalent) slow release fertiliser will be incorporated into the soil of all new tree pits.

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<sup>19</sup> British Standards Institution: <https://www.bsigroup.com/en-GB/>

163. The proposed shelterbelt species mix shown in Table 9.1 is informed by a survey of existing vegetation within or surrounding the site. The mix includes species that are currently found at the Development site and in the surrounding landscape. The new shelterbelt trees will benefit biodiversity by creating a dense shelterbelt with nut and fruit bearing species which will provide a food source for birds, small mammals and invertebrates.

**Table 9.1: New Shelterbelt Planting: Plant Species, Mix Percentage, Size and Root**

<b>% within mix</b>	<b>Scientific name</b>	<b>Common name</b>	<b>Size (cm)</b>	<b>Form</b>	<b>Root</b>
10	<i>Acer campestre</i>	Field Maple	125-150	Whip	BR
5	<i>Alnus glutinosa</i>	Alder	200-250	Feathered	RB
5	<i>Carpinus betulus</i>	Hornbeam	100-125	Transplant	BR
2.5	<i>Cornus sanguinea</i>	Dogwood	60-90	Transplant	BR
10	<i>Corylus avellana</i>	Hazel	100-125	Transplant	BR
45	<i>Crataegus monogyna</i>	Hawthorn	125-150	Whip	BR
5	<i>Fagus sylvatica</i>	Beech	100-125	Transplant	BR
2.5	<i>Ilex aquifolium</i>	Holly	40-60	3L	C
10	<i>Malus sylvestris</i>	Crab Apple	125-150	Whip	RB
	<i>Populus nigra</i>	Black Poplar	200-250	Feathered	
15	<i>Prunus spinosa</i>	Blackthorn	200-250	Feathered	RB
2.5	<i>Rosa canina</i>	Dog Rose	60-90	Transplant	BR
2.5	<i>Sambucus nigra</i>	Elder	100-125	Transplant	BR

### 9.3 Operational Phase Management

164. The following work will be carried out upon completion of shelterbelt planting prior to the commencement of operation, or in the first planting season following commencement of operation. The activities are relevant to the duration of the operational phase.

#### 9.3.1 Year 0-1

165. The trees/shrubs should be regularly watered in the first summer and weeds should be controlled by the use of biodegradable base collars around each tree/shrub prior to the addition of bark mulch. A 75 mm layer of bark mulch 0.5 m in diameter will be spread around each tree/shrub to suppress weeds and retain soil moisture.

166. Tree shelters and stakes to be checked 4 times in the first year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.

167. Any plants during the first year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

#### 9.3.2 Year 1-2

168. The trees and shrubs should be watered as required in prolonged periods (1 week) without rainfall.

169. Directly apply fungicide and or insecticide as spot treatment to any plants suffering from fungal infection or insect attack. Care needs to be taken to avoid these chemicals coming into contact with the ground or near aquatic habitats.

170. Tree shelters to be checked twice in the second year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.

171. Any plants during the second year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).
172. Water recently replaced plants as necessary to ensure establishment.
173. Top up bark mulch to maintain a depth of 75 mm, 0.5 m in diameter around each tree/shrub as required to suppress weeds and retain soil moisture.

### **9.3.3 Year 2-3 and 3-4**

174. Repeat procedures as for Year 2 above.
175. Clip and prune the top and sides of the shrubs (10 cm) to promote dense growth to ground level and in the desirable parameters that the shrub will eventually attain.
176. It is best to cut in January or February and if this is not feasible, cut as late as possible in autumn. The peak bird breeding season March to September should always be avoided.
177. At year 4 the shelterbelt should be forming a dense low level landscape feature with some height achieved from the larger trees (black poplar and alder) and understorey shrubs should be clothed in leaves to ground level, no further requirement for spot treating or topping up mulch is necessary. Replace dead or missing plants as necessary to maintain the planting density.

### **9.3.4 Year 4-5**

178. In line with the objectives of the shelterbelts the overall height should be maintained to between 5-7 m with the exception of black poplar, alder, beech and hornbeam. Due to the species and density of planting proposed the mature heights of plants will be relatively low and therefore maintenance should be minimal at this time. Black poplar and alder will be relatively sparse in the mix creating some filtering of views and these trees should be left to mature throughout the Development. Beech and hornbeam will also be left to mature; however, these species are slower growing and will gain height over a longer period.
179. Remove any tree/shrub shelters and stakes to allow natural establishment of the shelterbelt.

### **9.3.5 Year 5 onwards**

180. In line with the objectives of the shelterbelts the overall height should be between 5-7 m with the exception of black poplar, alder, beech and hornbeam. To ensure a natural shape to the shelterbelt tree maintenance should be undertaken on a four year cycle whereby a maximum of 25% of the shelterbelt is maintained in any one year with heights of trees (with the exception of those four species above) reduced to between 5-7 m where necessary. This will encourage a better habitat on site and will also create a natural landscape feature over time. All pruning work should be undertaken in line with BS3998:2010. At years 15-20 the black poplar should be assessed for the ability to pollard in line with the local landscape character of the Graveney Fruit Belt. This should be undertaken in line with an assessment of the wider landscape management offsite (adjacent) at the time to ensure a consistent approach. Hazel trees within the shelterbelt should be coppiced at year 6 with coppicing repeated on a 6-12 year cycle to create an enhanced habitat and landscape feature.
181. No work which might harm nesting birds or destroy their nests should be undertaken throughout the duration of the Development; therefore pruning/cutting should not be undertaken between the main nesting period from 1st March to 30<sup>th</sup> September.

## **9.4 Operational Monitoring, Triggers and Remedial Actions**

### **9.4.1 Habitats**

182. A landscape architect will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of trees and shrubs.

183. Assuming that plants have established successfully after year 0-1, a landscape architect will visit the site in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the shelterbelt planting. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
184. The monitoring will assess the success of shelterbelt management and if necessary recommend revisions to the SMP.

#### **9.4.2 Bird use**

185. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

#### **9.4.3 Triggers and Remedial Actions**

186. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 9.1), remedial measures will be implemented if necessary, to achieve the desired shelterbelt characteristics.

## 10 APPENDIX E – WOODLAND MANAGEMENT PLAN



187. Woodland planting provides an important habitat within the local area and contributes to the landscape character of the Graveney Fruit Farms linking hedgerows, shelterbelts and woodlands as part of the local green infrastructure. The role of the proposed woodland planting will be to create a visual screen along a section of the southern boundary of the Development site immediately adjacent to Warm House and north of the Graveney Fruit Farms Landscape Character Area. This will extend the influence of the landscape character area and provide a dense visual screen between Warm House and the Development.
188. The planting will consist of native species of local provenance and will reflect those tree species found in woodlands locally. Trees will be allowed to naturalise over time achieving a height which screens views of the Development from Warm House. Trees will be planted to provide habitat and screening creating a strong visual presence to residents at Warm House. The woodland is approximately 45 m wide and 230 m long to ensure the screen is effective all year round.
189. The prescriptions set out in the Woodland Management Plan (WMP) are intended to provide a management framework that will enable the woodland to be planted and established within the first five years post development. The work outlined below will be undertaken by a suitably qualified landscape contractor in line with current British Standards. The contractor will be responsible for implementation and maintenance of the work which would be executed through a JCLI Landscape Works Contract 2017 (JCLI LWC 2017), and a JCLI Landscape Maintenance Works Contract 2017 (JCLI LMWC 2017), under the supervision of a Chartered Landscape Architect to ensure all work is undertaken to the correct standards.

### 10.1 Aims and Objectives

190. The trees should be planted within the planting seasons during or immediately post construction to ensure that mitigation measures are completed in a timely manner and their impact is delivered in as short a timeframe as possible.
191. The aim of the WMP is to establish a dense healthy woodland which ties into proposed and existing areas of green infrastructure together creating a landscape asset which enhances the local green infrastructure whilst creating on site mitigation and screening of the

Development site with greater ecological value than the baseline. In addressing this aim, prescriptions will be defined for the two key phases of the Development:

- Implementation: measures required to prepare the ground and to establish the woodland.
- Operation: monitoring and management measures for the duration of the operational period.

192. The WMP follows best practice published by British Standards Institution<sup>20</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

## **10.2 Implementation**

193. Woodlands will be established by planting into the areas of land recently sown with wildflower and grass seed. This ensures a ground cover habitat whilst the woodland establishes. The following measures will take place as part of, or immediately after, construction.

194. The woodland areas are located outside the perimeter fence, and will be implemented following the completion of construction works in the vicinity (e.g., the undergrounding of the 11 kV overhead line) protecting the newly planted trees.

### **10.2.1 Timing**

195. All planting will be undertaken between November and March during construction or in the first planting season following construction.

196. Woodland planting (outside the perimeter fence) will be undertaken following the establishment of the site perimeter fence. If woodland planting is undertaken during construction, trees planted in the vicinity of the route of the existing 11 kV overhead line and the proposed underground route of the line (e.g., northwest of Warm House) will be planted after the undergrounding has been completed.

### **10.2.2 Ground Preparation**

197. Ground preparation is necessary to establish a clean planting bed into which trees can be planted. The extent of the planting area will be sprayed with herbicide and cultivated to a depth of 450 mm prior to planting and prior to sowing of wildflower and grass seed in line with section 6.2.4. Repeated treatments may be necessary to exhaust weeds prior to sowing. Any imported topsoil must be BS 3882:2015 compliant and existing topsoil must be cultivated in accordance with BS 3882:2015. No cultivation should take place in wet/waterlogged conditions and onsite topsoil is to be used in areas of uneven surfaces to make good levels to create a smooth level surface for new planting.

### **10.2.3 Woodland Planting and Species Mix**

198. New Woodland planting will consist of trees planted at 1 m centres to create informal/natural landscape features. Tree species will be planted in groups of 1, 3, 5 and 7 (of the same species) to reinforce a natural layout of species within the landscape.

199. Trees will be planted as Whips, Transplants and Feathered specimens in pits approximately 300x300x400 mm or the dimensions of the rootball whichever is greater. Whips will be protected by spiral shelters supported by a cane. Transplants will be protected by shelterguard with post tie with a single round timber stake 1.2 m x 50 mm fitted in line with manufactures instructions. Feathered Trees will be supported by one round timber stake (75 mm diameter x 1500 mm long, per tree, and finished at 600 mm above ground), and a

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<sup>20</sup> British Standards Institution: <https://www.bsigroup.com/en-GB/>

biodegradable tree tie. Soil improver and 140 g Enmag (or equivalent) slow release fertiliser will be incorporated into the soil of all new tree pits.

200. The proposed woodland species mix shown in Table 10.1 is informed by a survey of existing vegetation within or surrounding the site. The mix includes species that are currently found at the Development site and in the surrounding landscape. The new woodland trees will benefit biodiversity by creating a dense woodland with nut and fruit bearing species which will provide a food source for birds, small mammals and invertebrates.

**Table 10.1: New Woodland Planting: Plant Species, Mix Percentage, Size and Root**

<b>% within mix</b>	<b>Scientific name</b>	<b>Common name</b>	<b>Size (cm)</b>	<b>Form</b>	<b>Root</b>
10	<i>Acer campestre</i>	Field Maple	125-150	Whip	BR
20	<i>Alnus glutinosa</i>	Alder	200-250	Feathered	RB
2.5	<i>Betula pendula</i>	Silver Birch	100-125	Transplant	BR
10	<i>Corylus avellana</i>	Hazel	100-125	Transplant	BR
5	<i>Crataegus monogyna</i>	Hawthorn	125-150	Transplant	BR
10	<i>Ilex aquifolium</i>	Holly	40-60	3L	C
5	<i>Populus nigra</i>	Black Poplar	200-250	Feathered	RB
10	<i>Quercus robur</i>	English Oak	125-150	Transplant	RB
10	<i>Quercus patrea</i>	Sessile Oak	125-150	Transplant	RB
15	<i>Salix caprea</i>	Goat Willow	60-90	Transplant	BR
2.5	<i>Sambucus nigra</i>	Elder	100-125	Transplant	BR

### 10.3 Operational Phase Management

201. The following work will be carried out upon completion of woodland planting prior to the commencement of operation, or in the first planting season following commencement of operation. The activities are relevant to the duration of the operational phase. Residential input can be considered and discussed within the HMSG if there is a desire to change the habitat type.

#### 10.3.1 Year 0-1

202. The trees should be regularly watered in the first summer and weeds should be controlled by the use of biodegradable base collars around each tree/shrub during the growing season prior to the addition of bark mulch. A 75 mm layer of bark mulch 0.5 m in diameter will be spread around each tree to suppress weeds and retain soil moisture.
203. Tree shelters and stakes to be checked 4 times in the first year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.
204. Any plants during the first year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

#### 10.3.2 Year 1-2

205. The trees should be watered as required in prolonged periods (1 week) without rainfall.
206. Directly apply fungicide and or insecticide as spot treatment to any plants suffering from fungal infection or insect attack. Care needs to be taken to avoid these chemicals coming into contact with the ground or near aquatic habitats.



207. Tree shelters to be checked twice in the second year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.
208. Any plants during the second year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).
209. Water recently replaced plants as necessary to ensure establishment.
210. Top up bark mulch to maintain a depth of 75 mm, 0.5 m in diameter around each tree as required to suppress weeds and retain soil moisture

### 10.3.3 Year 2-3 and 3-4

211. Repeat procedures as for Year 2 above.
212. At year 4 the woodland should be forming a dense landscape feature with height achieved from the larger fast growing trees (black poplar, goat willow, birch and alder) and a good understorey establishing to ground level (field maple, hazel, holly and elder), no further requirement for spot treating or topping up mulch is necessary. Replace dead or missing plants as necessary to maintain the planting density.

### 10.3.4 Year 4-5

213. In line with the objectives of the woodland a natural form should be establishing and a slight closing of the canopy will be forming at year 5. At this stage any tree/shrub shelters and stakes should be removed and recycled, to allow natural establishment of the trees.
214. At year 5 it is proposed to further establish the woodland by introducing a more diverse woodland flora through the addition of a further wildflower and grass seed mix as follows:
215. The seed mix will be Emorsgate EW1 – *Woodland Mixture*<sup>21</sup> will be suitable as detailed in Table 10.2.

**Table 10.2 Emorsgate EW1 – Woodland Mixture**

%	Scientific name	Common name
<b>Wildflowers</b>		
3	<i>Alliaria petiolata</i>	Garlic Mustard
1	<i>Allium ursinum</i>	Ramsons
1.6	<i>Betonica officinalis</i> - ( <i>Stachys officinalis</i> )	Betony
1	<i>Digitalis purpurea</i>	Foxglove
2	<i>Filipendula ulmaria</i>	Meadowsweet
1	<i>Galium album</i> - ( <i>Galium mollugo</i> )	Hedge Bedstraw
3	<i>Geum urbanum</i>	Wood Avens
2.6	<i>Hyacinthoides non-scripta</i>	Bluebell
0.4	<i>Hypericum hirsutum</i>	Hairy St John's-wort
0.2	<i>Primula vulgaris</i>	Primrose
1	<i>Prunella vulgaris</i>	Selfheal
2	<i>Silene dioica</i>	Red Campion
0.2	<i>Silene flos-cuculi</i> - ( <i>Lychnis flos-cuculi</i> )	Ragged Robin

<sup>21</sup> <http://wildseed.co.uk/mixtures/view/11>

1	<i>Teucrium scorodonia</i>	Wood Sage
<b>Grasses</b>		
10	<i>Agrostis capillaris</i>	Common Bent (w)
2	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass (w)
7	<i>Brachypodium sylvaticum</i>	False Brome (w)
28	<i>Cynosurus cristatus</i>	Crested Dogstail
1	<i>Deschampsia cespitosa</i>	Tufted Hair-grass (w)
20	<i>Festuca rubra</i>	Slender-creeping Red-fescue
12	<i>Poa nemoralis</i>	Wood Meadow-grass

216. The seed mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown into the existing surface sward following light scarification/cultivation to disturb soil, particularly at canopy edges away from tree roots, and seed then applied by hand. Once sown, the seed should be lightly pressed into the seedbed by treading. Once sown the seed should be left to naturalise with any pernicious weeds removed by hand and removed from site.

#### **10.3.5 Years 5 onwards**

217. In line with the objectives of the woodland minimal maintenance should be undertaken to encourage a natural woodland form. This will encourage a better habitat on site and will also create a natural landscape feature over time. Hazel trees within the shelterbelt should be coppiced at year 6 with coppicing repeated on a 6-12 year cycle to create an enhanced habitat and landscape feature. Coppiced hazel can be either used by the contractor, or retained on site, cut into 2m lengths and stacked in piles approximately 500 mm high to create brush and log pile shelters to benefit wildlife.

218. No work that might harm nesting birds, disturb, or destroy their nests should be undertaken throughout the duration of the Development; therefore coppicing should not be undertaken between the main nesting period from 1st March to 30<sup>th</sup> September.

### **10.4 Operational Monitoring, Triggers and Remedial Actions**

#### **10.4.1 Habitats**

219. A landscape architect will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of trees.

220. Assuming that trees have established successfully after year 0-1, a landscape architect will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the woodland. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).

221. The monitoring will assess the success of woodland management and if necessary recommend revisions to the WMP.

#### **10.4.2 Bird use**

222. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

### ***10.4.3 Triggers and Remedial Actions***

223. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 10.1), remedial measures will be implemented if necessary, to achieve the desired shelterbelt characteristics.
224. If following Year 5, any defects are identified by the Site Operator these can subsequently be addressed e.g. reimplementation of the planting methodology for any replacement tree planting method as set out for years 1-5. If any parts of the woodland fail during the lifetime of the Development then replacement planting will be undertaken as prescribed in Years 1-5.

## 11 APPENDIX F – ELECTRICAL COMPOUND BUFFER PLANTING MANAGEMENT PLAN



225. Buffer planting provides a large area of habitat creation within the local area and would be planted on the bund surrounding the Electrical Compound. The role of the buffer planting will be to create screen planting and naturalisation of the bund surrounding the Electrical Compound within the eastern section of the Development site. The planting will consist of native species of local provenance and will reflect those tree species found in hedgerows and natural groups locally. Trees will be planted at a low density to provide a natural landscape feature which reduces the uniform shape of the bund and provides low level screening to plant within the Electrical Compound.
226. The prescriptions set out in the Buffer Planting Management Plan (BPMP) are intended to provide a management framework that will enable the buffer planting to naturalise effectively and retain a low level landscape feature within the Development site. The work outlined below will be undertaken by a suitably qualified landscape contractor in line with current British Standards. The contractor will be responsible for implementation and maintenance of the work which would be executed through a JCLI Landscape Works Contract 2017 (JCLI LWC 2017), and a JCLI Landscape Maintenance Works Contract 2017 (JCLI LMWC 2017), under the supervision of a Chartered Landscape Architect to ensure all work is undertaken to the correct standards.

### 11.1 Aims and Objectives

227. The planting should be implemented within the planting seasons during or immediately post construction to ensure that mitigation measures are completed in a timely manner and their impact is delivered in as short a timeframe as possible.
228. The aim of the BPMP is to establish a healthy area of natural planting which when viewed from the Saxon Shore Way appear as naturalising areas of vegetation which screen the majority of the site compound and partly screen the existing substation whilst creating

greater ecological value than the baseline. In addressing this aim, prescriptions will be defined for the two key phases of the Development:

- Implementation: measures required to prepare the ground and establish the buffer planting.
- Operation: monitoring and management measures for the duration of the operational period.

229. The BPMP follows best practice published by British Standards Institution<sup>22</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

## **11.2 Implementation**

230. Buffer planting will be established by planting into the newly formed bund which has been recently sown with wildflower and grass seed. This ensures a ground cover habitat and soil stabilisation whilst the buffer planting establishes. The following measures will take place as part of, or immediately after, construction.

### **11.2.1 Timing**

231. All planting will be undertaken between November and March during construction or in the first planting season following construction.

### **11.2.2 Ground Preparation**

232. Ground preparation is necessary to establish a clean planting bed into which tree and shrubs can be planted. The extent of the planting area will be sprayed with herbicide (prior to seeding). Repeated treatments may be necessary to exhaust weeds (prior to seeding). Any imported topsoil must be BS 3882:2015 compliant. Given the trees and shrubs will be planted into the bund no further preparation will be required.

### **11.2.3 Buffer Planting and Species Mix**

233. Buffer planting will consist of trees/shrubs planted at 2 m centres to create informal/natural landscape features. Tree/shrub species will be planted in groups of 1, 3 and 5 (of the same species) to reinforce a natural layout of species within the landscape.

234. Trees and shrubs will be planted in pits approximately 400x400x400 mm or the dimensions of the rootball whichever is greater. Shrubs will be planted directly into the ground/bund (assuming a minimum of 450 mm of topsoil is available within the bund capping layer) and will be protected by spiral shelters (with the exception of bramble) supported by a cane. Soil improver and 140 g Enmag (or equivalent) slow release fertiliser will be incorporated into the soil of all new planting pits.

235. Areas of grassland can be established within the bund area that is based on the Lowland Grassland Meadow management prescription (Appendix B).

236. The proposed buffer planting species mix shown in Table 11.1 is informed by a survey of existing vegetation within or surrounding the site. The mix includes species that are currently found at the Development site and in the surrounding landscape. The buffer planting mix will benefit biodiversity by creating shelter and habitat with nut and fruit bearing species which will provide a food source for birds, small mammals and invertebrates.

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<sup>22</sup> British Standards Institution: <https://www.bsigroup.com/en-GB/>

**Table 11.1: Buffer Planting: Plant Species, Mix Percentage, Size and Root**

% within mix	Scientific name	Common name	Size (cm)	Root
5	<i>Acer campestre</i>	Field Maple	60-90	BR
5	<i>Corylus avellana</i>	Hazel	60-90	BR
70	<i>Crataegus monogyna</i>	Hawthorn	60-90	BR
15	<i>Prunus spinosa</i>	Blackthorn	60-90	BR
2.5	<i>Rosa canina</i>	Dog Rose	60-90	BR
2.5	<i>Rubus fruticosus agg.</i>	Bramble	60-90	BR

### 11.3 Operational Phase Management

237. The following work will be carried out upon completion of buffer planting prior to the commencement of operation, or in the first planting season following commencement of operation. The activities are relevant to the duration of the operational phase.

#### 11.3.1 Year 0-1

238. The trees/shrubs should be regularly watered in the first summer (3 days of no rain due to the sloped site). Weeds should be controlled by the use of biodegradable base collars around each tree/shrub prior to adding 75 mm depth of bark mulch will ensure weeds are suppressed and soil moisture is retained.

239. Tree shelters and canes to be checked 4 times in the first year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.

240. Any plants during the first year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

#### 11.3.2 Year 1-2

241. The trees and shrubs should be watered as required in prolonged periods (5 days) without rainfall. The bark mulch should be topped up to 75 mm depth where applicable to ensure weeds are suppressed and soil moisture is retained.

242. Directly apply fungicide and or insecticide as spot treatment to any plants suffering from fungal infection or insect attack. Care needs to be taken to avoid these chemicals coming into contact with the ground or near aquatic habitats.

243. Tree shelters to be checked twice in the second year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.

244. Any plants during the second year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

245. Water recently replaced plants as necessary to ensure establishment.

#### 11.3.3 Year 2-3 and 3-4

246. Repeat procedures as for Year 2 above.

247. At year 4 the buffer planting should be forming a natural low level landscape feature with shrubs clothed in leaves to ground level, no further requirement for spot treating or topping up mulch is necessary after year 4.

248. Remove any tree/shrub shelters and stakes to allow natural establishment of the planting.

#### 11.3.4 Year 4-5

249. Due to the species and density of planting proposed the mature heights of plants will be relatively low and due to the requirement to create a natural planting area maintenance

should be minimal. At this point the planting should be left to fully naturalise in shape and form adapting to the exposed conditions of the site. Any maintenance of planted trees/shrubs will be determined as a result of monitoring recommendations as per the below.

#### **11.3.5 Year 5 onwards**

250. In line with the objectives of the buffer planting maintenance should be limited to the replacement of any dead, dying or diseased plants. Should plants begin to lean due to wind no action would be required unless the plants fall or are uprooted. If this occurs the fallen plants should be retained on site for low level habitat and a replacement specimen planted in its place based on the original specification and maintained in line with years 1-5. Any maintenance of planted trees/shrubs will be determined as a result of monitoring recommendations as per the below.

### **11.4 Operational Monitoring, Triggers and Remedial Actions**

#### **11.4.1 Habitats**

251. A landscape architect will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of the buffer planting.

252. Assuming that planting has established successfully after year 0-1, a landscape architect will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the planting. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).

253. The monitoring will assess the success of the buffer planting and if necessary recommend revisions to the BPMP.

#### **11.4.2 Bird use**

254. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

#### **11.4.3 Triggers and Remedial Actions**

255. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 11.1), remedial measures will be implemented if necessary, to achieve the desired shelterbelt characteristics.

256. If following Year 5, any defects are identified by the Site Operator these can subsequently be addressed e.g. reimplementation of the planting methodology for any replacement shrub planting method as set out for years 1-5. If any parts of the scrub habitat fail during the lifetime of the Development then replacement planting will be undertaken as prescribed in Years 1-5.

## 12 APPENDIX G - SCRUB PLANTING MANAGEMENT PLAN



257. Scrub planting provides a site wide opportunity to enrich existing and proposed grassland and watercourses. The naturalising vegetation found adjacent to the sea wall creates a simple habitat and adds to the landscape character in this area. The role of the Scrub Planting will be to create visual interest in the landscape and reinforce landscape character found to the east and west of the Development site at Oare and Graveney Marshes; together with further naturalisation of the site. The planting will consist of native species of local provenance and will reflect those tree species found in hedgerows and naturalising locally. Scrub is also already present within sections of the Development site as shown in the above photograph taken on 31 May 2019 on the Saxon Shore Way at approximate National Grid Reference TR 024 637.

258. The prescriptions set out in the Scrub Planting Management Plan (SPMP) are intended to provide a management framework that will enable the scrub planting to establish effectively with minimal maintenance, whilst encouraging the future naturalisation of scrubland within areas of grassland. The work outlined below will be undertaken by a suitably qualified landscape contractor in line with current British Standards. The contractor will be responsible for implementation and maintenance of the work which would be executed through a JCLI Landscape Works Contract 2017 (JCLI LWC 2017), and a JCLI Landscape Maintenance Works Contract 2017 (JCLI LMWC 2017), under the supervision of a Chartered Landscape Architect to ensure all work is undertaken to the correct standards.

### 12.1 Aims and Objectives

259. The scrub should be implemented within the planting seasons during or immediately post construction to ensure that mitigation measures are completed in a timely manner and their impact is delivered in as short a timeframe as possible.

260. The aim of the SPMP is to establish a healthy area of natural planting which when viewed from the Saxon Shore Way appears as naturalising areas of vegetation which add to the character of the Development site within the wider landscape context, whilst creating greater ecological value than the baseline. In addressing this aim, prescriptions will be defined for the two key phases of the Development:

- Implementation: measures required to prepare the ground and establish the scrub planting.



- Operation: monitoring and management measures for the duration of the operational period.

261. The SPMP follows best practice published by British Standards Institution<sup>23</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

## 12.2 Implementation

262. Scrub planting will be established by planting into areas recently sown with wildflower and grass seed. This ensures a ground cover habitat and soil stabilisation whilst the planting establishes. The following measures will take place as part of, or immediately after, construction.

### 12.2.1 Timing

263. All planting will be undertaken between November and March during construction or in the first planting season following construction.

### 12.2.2 Ground Preparation

264. Given the natural and limited nature of the planting proposed, no ground preparation would be undertaken other than that prescribed in the GMGMP.

### 12.2.3 Scrub Planting and Species Mix

265. Scrub planting will consist of trees/shrubs planted randomly along the site boundaries at a density of 50 plants per hectare to create informal/natural landscape features. Planting would increase to 100 plants per hectare along the southern and western boundaries towards Nagden and Sandbanks Road.

266. Tree/shrub species will be planted as individual specimens at random spacings mimicking existing scrub growth on site to create a naturalising element within the landscape.

267. Trees and shrubs will be planted in pits approximately 300x300x400 mm or the dimensions of the rootball whichever is greater. Shrubs will be planted directly into the ground and will be marked by a stake 50 mm x 1.2 m driven 600 mm into the ground. Soil improver and 140 g Enmag (or equivalent) slow release fertiliser will be incorporated into the soil of all new planting pits.

268. The proposed scrub species mix shown in Table 12.1 is informed by a survey of existing vegetation within or surrounding the site. The mix includes species that are currently found at the Development site and in the surrounding landscape. The scrub planting mix will benefit biodiversity by creating shelter within areas of open grassland and habitat with fruit bearing species which will provide a food source for birds, small mammals and invertebrates.

**Table 12.1: Scrub Planting: Plant Species, Mix Percentage, Size and Root**

% within mix	Scientific name	Common name	Size (cm)	Root
85	<i>Crataegus monogyna</i>	Hawthorn	60-90	BR
10	<i>Prunus spinosa</i>	Blackthorn	60-90	BR
5	<i>Rubus fruticosus</i>	Bramble	60-90	BR

<sup>23</sup> British Standards Institution: <https://www.bsigroup.com/en-GB/>

### **12.3 Operational Phase Management**

269. The following work will be carried out upon completion of scrub planting prior to the commencement of operation, or in the first planting season following commencement of operation. The activities are relevant to duration of the operational phase. The Public Right of Way will be kept clear and open throughout the duration of the Development.

#### **12.3.1 Year 0-1**

270. The trees/shrubs should be regularly watered in the first summer (1 week of no rain due to the sloped site) and weeds should be controlled by the use of biodegradable base collars around each tree/shrub during the growing season prior to the addition of bark mulch. A 75 mm layer of bark mulch 0.5 m in diameter will be spread around each tree/shrub to suppress weeds and retain soil moisture.

271. Plant stakes to be checked 4 times in the first year. Stakes which have fallen or are not straight should be straightened and any damaged or missing stakes should be replaced.

272. Any plants during the first year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

#### **12.3.2 Year 1-2**

273. The trees/shrubs should be watered as required in prolonged periods (1 week) without rainfall. No further requirement for spot treating weeds or topping up mulch is necessary as the plants are to be encouraged to naturalise following initial establishment at year 0-1.

274. Directly apply fungicide and or insecticide as spot treatment to any plants suffering from fungal infection or insect attack. Care needs to be taken to avoid these chemicals coming into contact with the ground or near aquatic habitats.

275. Tree stakes to be checked twice in the second year. Shelters which have fallen or are not straight should be straightened and any damaged or missing shelters should be replaced.

276. Any plants during the second year of establishment which die or are dying should be replaced with plants of the same size and species (planted in November).

277. Water recently replaced plants as necessary to ensure establishment.

278. Top up bark mulch to maintain a depth of 75 mm, 0.5 m in diameter around each tree/shrub as required to suppress weeds and retain soil moisture.

#### **12.3.3 Year 2-3 and 3-4**

279. Repeat procedures as for Year 2 above.

280. At year 4 the scrub planting should be forming natural low level landscape features with shrubs clothed in leaves, no further requirement for spot treating or topping up mulch is necessary at year 4.

#### **12.3.4 Year 4-5**

281. Due to the species and density of planting proposed the mature heights of plants will be relatively low and due to the requirement to create natural planting area maintenance should be minimal. At this point the planting should be left to fully naturalise in shape and form adapting to the exposed conditions of the site.

282. Remove timber stakes as shrubs/trees should be noticeable within the landscape.

#### **12.3.5 Year 5 onwards**

283. In line with the objectives of the scrub planting, maintenance will not be required after year 6 unless the trees/shrubs begin to encroach across public or permissive rights of way. Any

plants which fail following establishment should be allowed to die back and left insitu as habitat. It is desirable to retain any naturalising native scrub vegetation on site and whilst maintenance is not required, the retention of such naturalising vegetation should be considered as part of the grassland maintenance.

## **12.4 Operational Monitoring, Triggers and Remedial Actions**

### **12.4.1 Habitats**

284. A landscape architect will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of the scrub planting.
285. Assuming that planting has established successfully after year 0-1, a landscape architect will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the planting. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
286. The monitoring will assess the success of the scrub planting and if necessary recommend revisions to the SPMP.

### **12.4.2 Bird use**

287. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

### **12.4.3 Triggers and Remedial Actions**

288. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 12.1), remedial measures will be implemented if necessary, to achieve the desired scrub characteristics.

### 13 APPENDIX H – AQUATIC HABITATS MANAGEMENT PLAN



289. The existing ditches cross the site between arable fields, which are subject to fertiliser application. It is expected that these ditches receive some enrichment from these terrestrial habitats, which is likely to lead to typical eutrophic conditions that would normally be experienced in lowland habitats. The eutrophic conditions within the ditches provides a fertile environment, which promotes dominance by a limited diversity of competitive macrophyte species. Many macrophyte species that dominate eutrophic waters, are also naturally invasive. It is understood that many of the ditches on the site are already managed by the Internal Drainage Board (IDB), where any dominating macrophytes that choke the ditch systems and alter the drainage capacity/efficiency of the ditch system and neighbouring land are removed through management. It is expected that through land use change from agricultural practice to a solar park, (complete with a suite of enhancement measures) will naturally reduce the input of enrichment to the ditch system.
290. However, any attempt to enhance the flora within these habitats before there are any changes to enrichment levels, is likely to limit the establishment and success of less-competitive planted or seeded macrophytes.
291. Consequently, ditch enhancement/ restoration is a complex process requiring monitoring and intervention over several years to ensure success, especially on sites with a long history of agricultural improvement. Small areas of the ditch network will also be subject to disturbance and change during the construction phase at the electrical substation, spine road, access track and 11kV underground cable crossing points that may impact on water vole habitat found throughout the site. Water voles are a very mobile species, and can enter or leave suitable habitat on a regular basis throughout the active season. They are a protected species, which require a licence from Natural England should their burrows or habitat be disturbed or subject to change, or should there be a risk of killing or injuring of the animal itself.
292. The prescriptions set out in the Aquatic Habitats Management Plan (AHMP) are intended to provide a flexible management framework based on the assumption that water vole is in the area. This will be subject to review depending on the outcomes of ongoing monitoring and management. The work outlined below will be undertaken by a suitably qualified contractor

with specialist knowledge of aquatic habitat creation and management. The contractor will be responsible for monitoring the success and implementation of measures and for taking appropriate remedial action, if needed. An ecologist will be available during all stages of the Development to undertake scheduled monitoring (specified below) and to provide ad hoc support, and to fulfil the requirements of Natural England's water vole licencing requirements.

### 13.1 Aims and Objectives

293. The aim of the AHMP is to establish a ditch system with greater ecological value than what is currently extant. In addressing this aim, prescriptions will be defined for the three key phases of the Development:

- Pre-construction: measures required before infrastructure construction begins in order to prepare the ditch systems by the removal of invasive or vigorous macrophyte growth.
- Implementation: measures required to prepare the ground and establish the aquatic habitats.
- Construction: measures required during construction to establish new aquatic habitats (where required).
- Operation: monitoring and management measures for the duration of the operational period.

294. The AHMP follows best practice published by Natural England<sup>24</sup> and the Wildlife Trusts<sup>25</sup>, specialist seed distributors<sup>26</sup>, and others<sup>27</sup>. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

295. There will also be creation of a new 0.5 ha reedbed located between the solar park and AR HMA within an existing ditch. The reedbed will comprise common reed (*Phragmites australis*) and Branched Bur-reed (*Sparganium erectum*). The aim of this habitat will be to create additional habitat for invertebrates and birds such as, marsh harrier, reed warbler and Cetti's Warbler. Other bird species will also benefit from the creation of this reedbed habitat.

296. Water levels within the Development site are proposed to be managed at a higher level, with additional controls being placed in the network to provide a greater level of control across sections of the site, such as the FGM HMA, the AR HMA, and the GMG area. This will allow the Development (areas of solar panels) to be accessed and operated safely without compromising the future ability to hold greater volumes of water in ditches within and adjacent to the habitat management areas.

### 13.2 Pre-Construction Activities (Water Vole)

297. The following work will be carried out before the construction of site infrastructure begins.

#### 13.2.1 Water Vole Licencing

##### 13.2.1.1 Approach

298. The trapping and displacement of water voles needs to be carried out under licence from Natural England. In England and Wales there is no provision for licencing the Development or other construction activities under the Wildlife and Countryside Act 1981 (as amended). Such works will need to be carried out under licence, which requires the applicant to demonstrate a conservation benefit for water voles. The conservation benefit will be

<sup>24</sup> Natural England Research Report NERR067

<sup>25</sup> Wetland Restoration Manual – Wildlife Trusts

<sup>26</sup> <https://wildseed.co.uk/mixtures>

<sup>27</sup> [www.pondconservation.org.uk](http://www.pondconservation.org.uk)

achieved by delivering a net gain in the amount of habitat available to the water vole population on the Site, or by improving the quality of the habitat.

299. It is expected that the quality of habitats for water voles (and other species) will be improved across the extent of the Site, following the prescriptions provided within this appendix. Similarly, the extent of drainage ditch lost under the footprint of the substation, will be replaced by c. 355 m of diverted drainage ditch link, which ensures no net loss in the quantity of this habitat. The provision of enhanced riparian habitat quality within this new drainage ditch section provides a marked qualitative improvement over the replaced ditches existing riparian habitat. This approach can be viewed as likely to comply with the requirements of a Science, Education & Conservation licence, providing demonstrable conservation benefit for water voles with appropriate habitat enhancements in place.
300. The exact requirements of the Natural England licence will be detailed in the conditions of the relevant licence, which will include, but not be limited to the prescriptions in the following sections.
301. Any licenced water vole activities will need to have consideration to the presence of other protected species such as, reptiles and nesting birds.
302. Any water vole works will also need to have consideration to the Construction Environmental Management Plan (CEMP), the details of which are referenced within Technical Appendix A5.4 of the ES.

#### 13.2.1.2 Displacement Licencing

303. It has already been identified that the proposed 'spine' road and access tracks within the Site will need to be developed following the requirements of a Natural England licence for the displacement of water voles. Water voles are restricted to discrete parts of the field drain network that contain open water consistently throughout the year and suitable foraging and burrowing conditions for them. The construction of drain crossings in these areas risks disturbing and directly harming water voles, which would constitute a legal offence under the Wildlife and Countryside Act 1981 (as amended).
304. As such, mitigation and required enhancements are proposed within the following sections to reduce the likelihood of harm from Development activities and to demonstrate how net conservation benefits can be achieved for water voles.
305. For activities that involve the impact to < 50 m sections of ditch where water voles are present and that meet other qualifying criteria, it is possible that works can continue under the conditions detailed within a Natural England Water Vole *Class*<sup>28</sup> Licence. This will take place under the supervision of a suitably trained and experienced ecologist who is pre-registered to use the *Class* licence. Working on this basis, works can progress and allow the legal displacement of water voles in the affected areas, so that drain crossings can be constructed with minimal risk of disturbance or harm to water vole.

#### 13.2.1.3 Trapping and Translocation Licencing

306. Whilst no water voles have been found within a c 355 m section of ditch within the footprint of the proposed substation, they are a mobile species that means there is the potential they could move into this section from neighbouring and connected ditch sections. If water vole are present within this ditch section there will be the requirement to obtain a *Science, Education & Conservation*<sup>29</sup> licence from Natural England for the additional approach of trapping and translocation of water vole.

<sup>28</sup> Class Licence: Intentional disturbance of water voles and damage/destruction of water vole burrows by means of displacement (to facilitate development activities). (WML-CL31 – Class Licence) Natural England.

<sup>29</sup> Licence Application Form: Application for a licence to kill, take, disturb or possess wild animals for science, education or conservation (A29 – Science, Education or Conservation) Natural England.

#### **13.2.1.4 Letters of No Impediment (LoNI)**

307. Letters of no impediment have been sought and received from Natural England (July 2019) for undertaking works activities that have the potential to impact protected species specifically, water voles and great crested newt.

#### **13.2.2 Displacement activities**

308. Displacement activities will follow that required within the Class licence conditions only in areas of the Development where water vole burrows and/or field signs are present. Displacement activities will not be required in the absence of water vole activity and burrows. However, displacement activities are likely to be required within the footprint of the proposed 'spine' road, where access crossings are to be constructed, and in known water vole habitat. The main activities for water vole displacement requires a vegetation and destructive search approach, with the details of this approach seen in Section 13.4.1.

309. Full details of these activities will be included within the Natural England *Class* licence for displacement and following established water vole mitigation guidance<sup>25</sup>.

#### **13.2.3 Trapping, Translocation and related activities**

310. Dependent on the presence of water voles in the ditch section within the footprint of the substation, and subject to the requirement of a Natural England licence for the trapping of water voles, the pre-construction activities will need to include, but not be limited to the following:

- *Creation of new ditch habitat:* To provide high quality established habitat into which water vole can be released following completion of the trapping and temporary captivity of water vole as described below. This will need establishing prior to any of the following stages commencing.
- *Fencing of the ditch section:* To ensure that water voles do not re-enter the area of ditch system to be lost during initial trapping and during construction works, it will be necessary to install a water vole fence across the ditch section for the duration of the phased works programme. It will also be necessary to fence off the created habitat to ensure that no water voles begin using it before the reintroduction has been completed;
- *Trapping of water voles:* During the active season, water voles are to be trapped in standard water vole traps baited with carrot or apple feed. This needs to be set the previous late afternoon and checked the following morning, re-set and checked again in the afternoon, before being set again overnight. The water vole trap needs to have a nesting area for the overnight welfare of water voles;
- *Temporary water vole captivity:* Any water voles that are trapped, will need to be processed, with sex, weight and breeding state identified before being health checked and micro-chipped. They will then need to be kept within temporary and separate storage cages/release pens, within a suitable overnight structure. Bedding and food will need to be replaced daily to ensure the welfare of the water voles is fully considered;
- The exact details of these activities will be included within the Natural England *Science, Education and Conservation* licence (should it be required for trapping) and following established water vole mitigation guidance<sup>30</sup>.

#### **13.2.4 Pre-construction Phase Monitoring**

311. An ecologist will visit the site during the habitat establishment and before water vole translocation to ensure that the new ditch conditions are suitable, and following habitat

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<sup>30</sup> Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. The Mammal Society, London

checks to ensure that it has successfully established. Remedial actions will be communicated to the HMSG and in particular Natural England (if any risk to licence specifics) at the earliest opportunity if this is not the case.

### **13.3 Implementation**

#### **13.3.1 Timing**

312. The timings of any habitat removal or installation (including the infill of the existing ditch, the creation of the new ditch and the creation of the 0.5 ha reed bed) will avoid impacting water voles and take place outside of the most sensitive season for water voles, which is stipulated within the Natural England Class licence as 15<sup>th</sup> February to 15<sup>th</sup> April for water vole displacement. If dedicated trapping is required this can be undertaken between March and April or potentially, August to September but only under full licence from Natural England.
313. The timing for the removal and translocation of water voles will be determined following agreement with Natural England and as stipulated within the applicable licence type.
314. Water control structures will be in situ prior to the commencement of operation.

#### **13.3.2 Ground Preparation**

315. It is expected that the removal of pesticide and fertiliser inputs to land through the cessation of agricultural activities will lead to the decline of the invasive least duckweed from within the ditch network, by allowing other less vigorous macrophytes that may be more sensitive to pesticide applications opportunities to grow. However, should this not occur naturally, the option to remove invasive least duckweed either mechanically or through glyphosate application should be available.
316. This latter activity will need to take into account the implications for water vole populations on site, and will need to be applied by a suitably experienced operative where feasible. Permission will need to be granted from the Environment Agency (EA) or Internal Drainage Board (IDB) before a programme of works starts.
317. During construction there will also be creation of a new 0.5 ha reedbed located between the solar park and AR HMA within an existing ditch. The reedbed will comprise common reed and branched bur-reed. Re-profiling of the existing ditch will also be undertaken to create a more gradual sloping bankside as opposed to the current steep sided banks which are present (see section 21, indicative ditch reprofiling). This re-profiling will be informed by the 2019 water vole surveys currently being completed. The banksides once reprofiled will be top soiled and left bare of vegetation allowing target reed species to be planted along the watercourse/bank sides. Common reed will also be transplanted from existing ditches where present and, only where water voles are not present. The combination of planting and transplanting will ensure quick establishment of the created reedbed.
318. With the reedbed in this location establishing it is not considered likely that poaching will be a significant risk to the ditch network. This is due to the density at which common reed will establish thereby reducing ease of access for sheep. The above referenced document also states that *'sheep have smaller feet than cattle or horses and are therefore less likely to cause poaching'*.

##### **13.3.2.1 New Ditch Cut and Existing Ditch Destroyed**

319. A new ditch will be cut along the northern boundary of the electrical compound at the foot of the flood protection bund. This ditch will need to be appropriately planted with all planting fully established before any works are undertaken to the existing ditch to be lost. In this way the habitat will immediately be available for release of the trapped water vole following their temporary captivity.



320. To accommodate water voles and help establish a population within the new ditch section, it is proposed that artificial water vole burrows made of plastic drainage pipe are installed in clusters throughout the circa 355 m length of new cut ditch. These will be focussed around areas chosen for the release pens as this is where the water vole will focus their initial burrowing activity. Whilst the habitat creation is being undertaken exclusion fencing will also be installed around the perimeter of the new ditch to ensure that no water vole move into the new ditch prior to the water vole reintroduction should it be required. The new ditch will therefore remain viable for use for the reintroduced water vole upon completion of the trapping and temporary captivity.
321. As soon as all the water vole have been removed from the existing ditch network it will be destructively searched and destroyed under full ecological supervision, as per the requirements of this licence type. In this way there will be no risk of water vole re-entering this ditch network.

#### *13.3.2.2 Water Vole habitat Creation*

322. Approximately c 355 m of new high quality ditch habitat will be created to mitigate for losses of aquatic ditch and riparian habitat within the substation footprint and will take place as part of construction. If water voles are confirmed present, this creation will be pre-construction as detailed in section 13.2. The new ditch will be cut along the northern perimeter of the substation footprint, to include riparian habitats that represent a qualitative improvement over the removed ditch and that will provide net conservation gains for water voles and other wildlife.
323. New 'spine' road crossings will be completed across the ditch system, which will consist of five ditch crossings that will link through the Development. This will involve the loss of c 235 m of riparian habitat suitable for water voles and other wildlife. However, the aquatic components of the ditch network will be maintained with no net loss. This will be achieved by the inclusion of mammal friendly open box culverts at each crossing where either a new culvert is being constructed or replacement culverts are proposed. This will therefore not lead to the fragmentation of the ditch network, with open aquatic connectivity maintained as a minimum, with likely enhancement possible.
324. Where water voles are present, these activities will need to take place following the requirements of the work schedule and method statement detailed within a NE water vole *Science, Education & Conservation* licence and/or following the conditions within a NE water vole *Class* licence. Elements of this will be required pre-construction.

#### *13.3.2.3 New Reedbed Creation*

325. The new reedbed creation will be undertaken via reprofiling of the existing ditch (where no adverse effect on water vole will occur) to create more gradual sloping banksides. Common reed will be transplanted from existing ditches on site where water voles have been confirmed absent. Transplanting will therefore supplement the planting to be undertaken i.e. through coir rolls. Supplementary planting will also comprise branched bur-reed thereby creating additional habitat for a variety of bird species.
326. With the reedbed in this location establishing it is not considered likely that poaching will be a significant risk to the ditch network. This is due to the density at which common reed will establish thereby reducing ease of access for sheep.

#### *13.3.2.4 Water Control Structures*

327. Section 10.3.10 of Chapter 10 - Hydrology, Hydrogeology, Flood Risk and Ground Conditions of the ES [APP-040] identified that several manmade concrete flow controls were observed within the Development site. Discussions with the Lower Medway IDB and the HMSG have

indicated that these flow control structures are currently used to regulate water levels within the ditches within and surrounding the Development.

328. In order to promote suitable conditions for arable reversion, water levels within the drainage ditch network surrounding the site will be managed utilising existing flow control measures and through the introduction of new structures, such as drop boards sluices, as outlined within RSPBs 'Water management structures for conservation - Technical case study series'<sup>31</sup>.
329. Existing flow control infrastructure will be used to achieve this aim and there will be an ongoing need to engage with the HMSG to deliver this. Figure A5.1 of this LBMP shows key existing and proposed flow control structures. All structures will be designed to ensure that they are mammal/ eel/elver (all life stages) friendly.
330. To maintain and manage high ditch water levels across the site, new flow control structures, (likely to be drop board style sluices) will be located within drainage ditches at the Site. Figure A5.1 of this LBMP shows key existing and proposed flow control structures.
331. Water may be either held back behind the structure, or sluice boards used as a top height, above which water may 'overtop' in a controlled fashion to maintain the water level at known height. An example of the implementation of drop board sluices for arable reversion is provided as Technical case study No. 5: Berney Marshes, Norfolk of RSPBs 'Water management structures for conservation - Technical case study series'.

### **13.3.3 Riparian Plant Mix**

332. Planting needs to be incorporated into the new length of ditch. This will help in the establishment of a new thick macrophyte sward, which will provide both habitat cover and food source for water voles. Plug planting should focus on a higher proportion of branched bur reed *Sparganium erectum*, sedges *Carex sp.* and reed sweet grass *Glyceria maxima*, as these species are important in establishing a lush thick macrophyte growth suitable for foraging and sheltering water voles. Additional seeding of the new ditch cut, with seeds of local provenance can also be applied to assist the development of this new habitat.
333. Careful additional planting to the margins of the new cut ditch provide an attractive backdrop to this habitat, and can enhance the habitat for wildlife. This can attract a greater diversity of aquatic and terrestrial invertebrates that are likely to be fed upon by a variety of bat species and other wildlife found in riparian habitats.
334. Marginal plants such as purple loosestrife *Lythrum salicaria*, spearwort *Ranunculus flammula*, yellow flag iris *Iris Pseudacorus*, and meadowsweet *Filipendula ulmaria* can be planted to the boundary margins of the new ditch, which provides interest to pollinators.
335. Emergent plants such as water forget-me-not *Myosotis scorpioides* and water mint *Mentha aquatica* will provide a route for dragonflies and damselflies to emerge into adults, providing habitat for a greater diversity of invertebrate species.
336. Exotic plant species, in particular: New Zealand pygmyweed *Crassula helmsii*, parrot's-feather *Myriophyllum aquaticum*, water fern *Azolla filiculoides*, water hyacinth *Eichhornia crassipes*, Canadian pondweed *Elodea canadensis*, Nuttall's pondweed *Elodea nutallii*, and water primrose *Ludwigia peploides* must not be added to the new ditch. These species are alien invasive plants.
337. Native aquatic plant species that can also become invasive include: reedmace *Typha latifolia* and *T. angustifolia*, common reed *Phragmites australis*, white water lily *Nymphaea alba*, yellow water lily *Nuphar lutea*, and fringed water lily *Nymphoides peltata*. These species also need to be avoided in any planting plan for the water vole habitat.

<sup>31</sup> [http://ww2.rspb.org.uk/Images/Water\\_management\\_structures\\_tcm9-214636.pdf](http://ww2.rspb.org.uk/Images/Water_management_structures_tcm9-214636.pdf)

<b>Emergent plants (Options)</b>	
Branched Bur-reed	<i>Sparganium erectum</i>
Amphibious Bistort	<i>Persicaria amphibium</i>
Reed sweet-grass	<i>Glyceria maxima</i>
Arrowhead	<i>Sagittaria aquatilis</i>
Water Crowfoot	<i>Ranunculus aquatilis</i>
Water mint	<i>Mentha aquatica</i>
Flowering Rush	<i>Butomus umbellatus</i>
Water Plantain	<i>Alisma plantago-aquatica</i>
Water Forget-me-not	<i>Myosotis Scorpiodes</i>
Stinking Iris	<i>Iris foetidissima</i>
Marsh Cinquefoil	<i>Potentilla palustris</i>
Yellow flag Iris	<i>Iris Pseudacorus</i>

<b>Margin Wildflowers (Options)</b>	
Sneezewort	<i>Achillea ptarmica</i>
Wild Angelica	<i>Angelica sylvestris</i>
Marsh Marigold	<i>Caltha palustris</i>
Hemp Agrimony	<i>Eupatorium cannabinum</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Water Avens	<i>Geum rivale</i>
Yellow Iris	<i>Iris pseudacorus</i>
Gypsywort	<i>Lycopus europaeus</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
Meadow Buttercup	<i>Ranunculus acris</i>
Water Figwort	<i>Scrophularia auriculata</i>

## 13.4 Construction Phase Management

### 13.4.1 Displacement of Water Voles – Vegetation Clearance and Destructive Search Activities

338. In accordance with the licence conditions stipulated within the Natural England Class licence, the following section details the methodology for vegetation clearance and destructive searches proposed for the Development leading up to the construction phase. The approach used to displace water voles at ditch crossings within the footprint of the proposed 'spine' road and access track crossings where construction activities will affect known water vole populations is as follows:

- Before vegetation cutting takes place, the locations of known water vole burrows must be identified. This requires that the vicinity of site works needs to be surveyed by a suitably competent person to check for evidence of occupied water vole burrows. Areas where burrows are located will be identified on the ground with a cane;
- The removal of vegetation including marginal vegetation must take place and be completed during the period 15th February to 15th April, inclusive. Displacement should only take place in suitable weather conditions (i.e. no snow / ice, mild

conditions, over 5 °C and where this is no flooding) and when there is sufficient forage available to support the displaced water voles and following relevant guidance<sup>32</sup>;

- Cutting of vegetation must be limited to a continuous length of bank not exceeding 50 metres, and where there is suitable water vole habitat in adjoining lengths of bank or in other immediately adjacent areas, which are unaffected by the works. There must be a gap of at least 500 metres in length between cuts on the same bank;
- Vegetation cutting can take place concurrently on both banks of the same watercourse, not exceeding 50 metres in length on each bank, where this is required for the development works, or to increase the likelihood of water voles being displaced. The unaffected habitat must be sufficient in terms of both quantity and quality to accommodate the displaced animals and those outside the footprint of the works;
- Removal of vegetation including marginal vegetation must only take place where a cut has already been made between 15<sup>th</sup> February and 15<sup>th</sup> April and where it is necessary to maintain a previously cut area. Any re-growth must be removed and maintained as short as possible, through cutting or herbicide use, at a height no greater than 10 cm (4 inches) above ground level.
- All vegetation on the bank face within the working area must be cut, along with an appropriate 'buffer' around it. The area in which vegetation cutting or water draw down/removal is undertaken should include the entire working area plus an appropriate buffer area around it (either side of the working area, and back from the bank top). The buffer should comprise at least an additional three metres either side of the working area and on the bank top (at least three metres back from the bank), where suitable habitat for water voles is present. Any emergent aquatic vegetation located along the water margin should also be cut;
- Cut vegetation, weed cuttings and arising's need to be raked off from the cut area, and must not be deposited or burned on the bank where there are retained water vole refuge areas or be left where they will prevent access to water vole burrows; and
- Where water draw-down/removal is to be used in parallel with vegetation cutting, this must be limited to no more than 50 m, and between 15<sup>th</sup> February and 15<sup>th</sup> April.
- Following vegetation removal, the cut area must be left intact, for a minimum period of five consecutive days and a maximum period of ten consecutive days before a destructive search is carried out.
- Prior to undertaking the destructive search, the cut area must be surveyed for evidence of the continued presence of water voles. Monitoring can include the use of an endoscope where necessary. Where this survey records no evidence that the burrows in the cut area are still occupied by water voles, each burrow affected must be carefully excavated and searched, and destroyed once the search is completed. This will minimise the risk that any water voles remaining in burrows will be harmed. Where monitoring does find fresh signs of water vole activity, the monitoring period may need to be extended and vegetation cutting or draw down/removal repeated. If there are still signs that water voles are present, a destructive search by hand should be carried out and water voles allowed to escape or captured temporarily. Captured water voles must be kept in an appropriate animal container with suitable bedding material and food provided<sup>29</sup>, for release at an adjacent refuge area on the same day;
- A destructive search is not required, if it is judged that it is neither safe nor technically feasible to do so (e.g. due to engineering constraints such as destabilisation of the bank that would occur as a result of the destructive search, presence of a road or other permanent structure, or no safe access from which to undertake a destructive search). Justification for not undertaking a destructive search or modifying the methodology to account for any of the above constraints must be provided by the class licenced registered ecologist in their annual report; and

<sup>32</sup> Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook for Development and Other Construction Activities. Eds. Fiona Mathews and Paul Chanin.

- Any water voles found during excavation of burrows must either be allowed to escape to an adjacent refuge area or be captured and kept in a suitable animal container, with suitable bedding material and food provided<sup>29</sup>, for release at an adjacent refuge area on the same day.
- All works will be overseen by a licenced ecologist or their accredited agent and therefore, will be able to differentiate between any native frog species and the invasive marsh frog.

### **13.5 Operational Phase Management**

339. The following work will be carried out upon completion of all construction works and following habitat creation. The activities are relevant for the duration of the operational phase.
340. A flush of weeds is to be expected in the first season after planting of new riparian habitat. It is likely that some pernicious weeds will persist following the ground preparation and can be treated by hand pulling.
341. It is thought that the removal of pesticide and fertiliser inputs to land through the cessation of agricultural activities will lead to the decline of the invasive least duckweed *Lemna minuta* from within the ditch network, by allowing other less vigorous macrophytes that may be more sensitive to pesticide applications opportunities to grow. However, should this not occur naturally, the option to remove this invasive species either mechanically or through glyphosate application should remain. No invasive species will be present in the newly created ditch therefore removing any risk of ongoing maintenance in this ditch section. Monitoring checks will be undertaken of this should invasive species be found in the site (e.g. from bird movements) and if required, appropriate maintenance will be identified and undertaken.
342. This latter activity will need to take into account the implications for water vole populations on site, and will need to be administered by suitably qualified personnel with an appropriate National Proficiency Testing Certificate (NPTC) certificate of competence. Permission will need to be granted from the Environment Agency (EA) or Internal Drainage Board (IDB) before a programme of works starts.
343. For the purposes of this plan it is assumed that aquatic macrophyte habitats will be managed on an annual basis at a suitable time of the year (as per Paragraph 13.5.2) that does not/limits impact to wildlife.

#### **13.5.1 Year 0-1**

344. Removal of vigorous and crowding perennial growth in the riparian zone of the ditches, actions on identifying the presence of any invasive species, followed by remedial actions.
345. This management activity will exclude areas where water voles will be released under licence, or where new habitats have been created for them. No management will be undertaken of the created water vole ditch habitat as establishment will have already been ensured before water vole trapping/release occurred. Monitoring will be undertaken to ensure habitat continues to provide appropriate conditions for water vole.

#### **13.5.2 Year 0-1 onwards**

346. Monitoring will be undertaken to ensure habitat continues to provide appropriate conditions for water vole and remediated if necessary.
347. Common reed are fast growing species in the right conditions so habitat creation following initial planting/transplanting is anticipated to quickly establish with little management required. Establishment of the reedbed is considered to be led by ensuring the water levels are maintained at appropriate levels throughout the lifetime of the Development.

## **13.6 Operational Monitoring, Triggers and Remedial Actions**

### **13.6.1 Habitats**

348. An ecologist will visit the site in spring (May) and summer (July/August) Year 0-1 to check the establishment of the new ditch habitats and record establishment of the new reedbed.
349. Assuming that planting has established successfully after year 0-1, an ecologist will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to assess the success of the habitat establishment.
350. Water levels and the status of water control structures will also be monitored by the visiting ecologist. Adjustment of board heights will be undertaken as required by the Site Operator. Should boards become warped or damaged or boards or rubber seals degrade, then they will be replaced as required by the Site Operator.
351. In years where monitoring is not proposed under the LBMP, visual checks of the status water control structures will be carried out by the Site Operator and included in annual reports to the HMSG.
352. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).
353. The monitoring will assess the success of the habitat management and if necessary recommend revisions to the AHMP.

### **13.6.2 Water Vole Use**

354. As part of any Natural England Licencing requirements, there will be a requirement to monitor the efficacy of the licenced water vole works. i.e. to demonstrate that a net conservation benefit has been achieved. This involves looking for field signs, and to determine if artificial burrows are being used, along with the catch and release of water voles within the newly created ditch cut, if full trapping was required. Monitoring will be undertaken through field sign surveys in years 1-3 following temporary captivity if required.
355. Monitoring will also include these habitats in the general breeding bird survey monitoring as set out in section 6.5.2.

### **13.6.3 Triggers and Remedial Actions**

356. If through discussion at the HMSG it is agreed that the habitat is not establishing as required (section 13.1), remedial measures will be implemented if necessary, to achieve the desired riparian characteristics.

## 14 APPENDIX I – PILLBOX BAT ROOST CREATION



357. The Site is open and largely unlit by security lighting, providing dark corridors and areas within the Site to benefit all species of foraging and commuting bat, including those likely to be more sensitive to lighting. Previous surveys of the Site found that the ditch systems, and grassland habitats adjacent to these aquatic habitats were important for a variety of foraging bats, and also to bats commuting into it from the wider landscape. Bat species frequently recorded within the Site include: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyctalus noctula*) and serotine bat (*Eptesicus serotinus*). Other bats using the Site include: Daubenton's bat (*Myotis daubentonii*), Leisler's bat (*Nyctalus leisleri*), brown long-eared bat (*Plecotus auritus*) and Nathusius' pipistrelle (*Pipistrellus nathusii*). This represented a diverse assemblage of different bat species utilising the Site. It is thought that some of these bats are found roosting close to the Site, although no roosting provision is available to bats within the Site.

358. An intact Second World War era pillbox emplacement is found on the Site, which was identified as having the potential to be converted for roosting bats. Hibernation sites are characterised by thick walls that buffer their interior spaces from fluctuating ambient winter temperature and humidity. Man-made sites include a wide range of built structures that have fallen into disuse, such as various military structures that includes pillboxes such as the one found on the Site. If accessible to humans, structures such as these are often disturbed and this can preclude their use by bats. The installation of grilled entrance gates, metal doors, and partially bricking up access holes to control access and limit disturbance, as well as other enhancements to improve their performance as hibernacula, are important activities to improve local bat conservation. The presence of a pillbox structure within the boundary of the Site, will exclude the regular disturbance from humans. The pillbox is located close to bat foraging habitat along the south of the Site and is adjacent to a damp ditch. These factors maximise the potential of this structure to attract and maintain roosting bats on Site. The creation of a bat roost within the pillbox therefore provides a unique opportunity to enhance the Site for roosting bats.

## 14.1 Aims and Objectives

359. The aim of the Pillbox Bat Roost Creation is to convert a Second World War pillbox to enable the provision of artificial bat roosts within the Site, which will provide an ecological enhancement and feature that is not currently available within the Site.
360. The general aim of the design is to stabilise air temperature and moisture content, making the pillbox cool and damp, ideal conditions for bats.
361. Implementation will commence once all construction activities in this locality are complete:
- Measures required to modify the structure in order to prepare the pillbox to make it a suitable design for encouraging roosting bats.
  - Prepare the external areas of the pillbox, so that it maximises the potential of the pillbox to provide a variety of environmental conditions for different types of bat roost.
  - Preparation of the internal areas of the pillbox, so that different types of roosting provision is incorporated within the pillbox structure to attract different species of bat.
  - Exploring whether there is an opportunity to partner with a local wildlife group, such as Kent Bat Group, with a view to monitoring how bats use this enhancement feature, and expanding the understanding of how roosting bats use this feature and near landscape.
362. The pillbox enhancement follows guidance provided by the Bat Conservation Trust<sup>33</sup> and found in the Bat Workers Manual<sup>34</sup>. The timing for this individual activity is provided in the text and should be integrated into the Development programme when this is established.

## 14.2 Implementation

### 14.2.1 Timing

363. It is recommended that works on converting the pillbox take place once all solar related construction activities are completed in this locality thereby limiting any disturbance on the pillbox from construction activities.

### 14.2.2 Pillbox preparation - External

364. To complete the external conversion works on the pillbox, the following external works activities should be completed;
- Filling hole gaps in the pillbox, so they are temporarily blocked leaving openings only big enough for bat species, but not for detritus to enter;
  - A metal lockable door to be fitted to secure the pillbox from human disturbance; and
  - Ivy, which is favoured by foraging bats is currently growing across the pillbox. This will provide cover for bats, attract more prey insects and act as insulation to prevent rapid warming of the pillbox by the sun in summer.

### 14.2.3 Pillbox preparation - Internal

365. To ensure that suitable conditions for roosting bats and a variety of different roosting opportunities are available within the pillbox for different bat species, the following prescriptions are recommended to be installed on the interior wall of the pillbox:
- Roofing tiles glued (so as not to damage the structure) to and supported by wooden batons are recommended to provide crevice features for small numbers of crevice dwelling bats;
  - Lay damp leaves and detritus on the floor of the pillbox to help raise humidity within the pillbox;

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<sup>33</sup> Bat Conservation Trust

<sup>34</sup> A.J. Mitchell-Jones and A. McLeish (ed.) (2004) *Bat Workers' Manual*. JNCC, Peterborough



- The installation of 'Kent Bat Boxes' affixed directly to supporting batons, with the design as specified by the Kent Wildlife Trust<sup>35</sup>; and
- The installation of a Schwegler 1FW hibernation box<sup>36</sup> (or similar) to the interior wall of the pillbox, to provide an internal bat roost space suitable for hibernating bats.

366. The inclusion of these different types of bat roosting feature will provide crevice and cavity features that are favoured by a number of different bat species. Ensuring that the features are installed within the pillbox structure on different walls, where there are subtle microclimate changes, will encourage individual bats to seek optimum areas within the structure to roost.

### **14.3 Operational Phase Management**

367. Future management may be needed should the ivy growth become too substantial across the pillbox and threaten the integrity of the structure.

### **14.4 Operational Monitoring, Triggers and Remedial Actions**

#### **14.4.1 Bat Use**

368. An ecologist will visit the site in spring (May) and summer (July/August) Year 0-1 to check if the bat roost is occupied.

369. An ecologist will visit the site once in late-spring (May) in years 1-2, 2-3, 4-5, 10 and 20 to check the status of the bat roost.

370. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4). The status of vegetation cover and the condition of the pillbox should be included in monitoring reports.

371. Opportunities to explore a partnership with a local conservation group, such as the Kent Bat Group will be explored to look at the monitoring of this structure for bats during the operational period of the solar park.

372. If a partnership can be established with a local conservation group, hibernation survey visits could be arranged annually between November to February. This provides an opportunity to help understand the local conservation status and behaviour of bats within this area of Kent.

373. Once bats have inhabited the prescribed bat roost features within the pillbox, they may only be disturbed by licenced bat workers.

#### **14.4.2 Triggers and Remedial Actions**

374. If through discussion at the HMSG it is agreed that the habitat is not being used as required (section 14.1), remedial measures will be implemented if necessary, to achieve the desired characteristics.

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<sup>35</sup> [www.kentbatgroup.org.uk](http://www.kentbatgroup.org.uk)

<sup>36</sup> <https://www.nhbs.com/1fw-bat-hibernation-box>

## 15 APPENDIX J – ARABLE REVERSION HABITAT MANAGEMENT AREA MANAGEMENT PLAN



376. Due to the proximity of the Development to The Swale SPA/SSSI/Ramsar Wetland Site, it was recognised at an early stage in the evolution of the project that there was potential for effects from the Development on this European site.
377. The Swale is a wetland of international importance, comprising intertidal mudflats, shell beaches, saltmarshes and extensive grazing marshes. It provides habitats for important assemblages of wintering waterfowl and also supports notable breeding bird populations.
378. A Report to Inform an Appropriate Assessment (RIAA) accompanies the Application [APP-026] that identified potential effects of the Development on avian fauna. One of these effects was the loss of habitats outside the European Site that is functionally linked to the European site because it provides important foraging resources for some of the wintering waterbird qualifying interests, dark-bellied brent goose, lapwing, and golden plover.
379. To mitigate for impacts of loss of foraging resources on these species, an Arable Reversion Habitat Management Area (AR HMA) will be developed in an extensive area of c. 56 ha to the east of the Development, with the aim of providing alternative foraging resources.
380. The management of the mitigation grassland will be focussed on provision of optimal foraging conditions for dark-bellied brent goose. This will involve grazing and/or cutting during the summer (and as necessary during the course of the winter) and application of organic fertiliser (e.g. farmyard manure) to provide a nutritious short sward favoured by foraging brent geese, lapwing and golden plover. The manure will be sourced from ivermectin free cattle (where possible) to avoid adverse effect on invertebrates.
381. Measures will also be included to increase the water levels around the AR HMA and in doing so, enhance the habitat present for target bird species. The specifics of the water control measures are detailed in Appendix H.
382. The grassland will be established in advance of the first winter before construction is due to commence (see section 18, Grassland Implementation Timing). The following sections set out the proposals for how the land will be managed throughout the construction and

operational phases, and how this will be implemented following the completion of construction.

## **15.1 Aims and Objectives**

383. The aim of the AR HMA is to establish a grassland sward to provide foraging resources for overwintering dark bellied brent geese, golden plover and lapwing. In addressing this aim, prescriptions will be defined for the three key phases of the Development:

- Implementation: measures required before the first winter during construction to prepare the ground and establish the grassland.
- Construction: measures required to maintain the created habitat during the construction phase.
- Operation: monitoring and management measures for the duration of the operational period.

384. The AR HMA management plan follows consultation advice from Natural England and through the HMSG. Timings for individual activities are provided in the text and should be integrated into the Development construction and operation programmes when these are developed.

385. Monitoring and triggers for any remedial actions have been discussed with the HMSG. During discussion it was agreed that there are too many permutations to set out specific triggers at the outset. This LBMP document has therefore been updated to include the mechanism by which monitoring results can be reviewed and discussed by the HMSG to determine whether or not remedial actions are necessary, based on the results of the monitoring in combination with analysis of WeBS counts for The Swale.

386. Primary considerations will include the development of the target grassland sward structure in the management areas, the consistent absence of key species from the management areas and evidence of decline in populations within The Swale.

## **15.2 Implementation**

### **15.2.1 Timing**

387. The enhancements within the AR HMA will be in place ahead of the first winter during construction.

388. Autumn (September/October) sowing is preferred because this favours grassland species that germinate in autumn and will provide young nutritious grass shoots through the winter for geese. The timing avoids the breeding bird season to prevent any disturbance to ground-nesting birds and allows establishment of the grassland prior to the arrival of the wintering species. Sowing is most effective when conditions are warm and moist, which is a further reason to avoid winter and drought periods.

389. The application of farmyard manure fertiliser within the AR HMA can be undertaken in mid/late October to increase fertility and encourage vigorous growth and quantity of plant species favoured for foraging by overwintering dark bellied brent geese. It will also attract invertebrates for the golden plover and lapwing<sup>37</sup>.

390. The manure will be sourced (where possible) from ivermectin free cattle to avoid adverse effect on invertebrates (see section 15.5.2).

### **15.2.2 Ground Preparation**

391. Ground preparation will be required in the AR HMA to establish a clean seed bed into which a grass seed mix can be sown following the cessation of arable agricultural activities. As the

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<sup>37</sup> Rowcliffe-Mitchell (1996) The Conservation Management of Brent Geese In The UK

AR HMA will be outside of the footprint of the solar arrays and much of the construction activities, the option for large-scale, mechanical ground preparation is available outside of the breeding bird season and is ideally timed to occur in early autumn when birds have finished nesting but before the arrival of the wintering water birds. This can include subsoiling, and the mechanical harrowing of arable fields in September and prior to sowing.

392. Soil testing may be undertaken, at the discretion of the appointed contractor/ecologist, following ground preparation to determine other preparatory and management requirements, (e.g. need to add fertiliser or other applications).
393. It is not envisaged that there will be a requirement to control grassland sward length whilst the new grassland becomes established; however, this will need to be monitored to ensure it does not grow above 100 mm in height prior to winter.
394. Water control measures will be established to increase the water levels around the AR HMA and in doing so, enhance the habitat present for target bird species. The specifics of the proposed water control measures are detailed in Appendix H.

### 15.2.3 Sowing and Seed Mix

395. The seed mix will be sown at a rate of 40 kg/ha (4 g/m<sup>2</sup>). The seed must be surface sown and can be applied by machine. Once sown, the seed should be lightly pressed into the seedbed by rolling.
396. The seed mix will be selected based on the results of the soil testing (if undertaken) and to be applied within existing arable field areas within the AR HMA; however, at this stage it is envisaged that the final seed mix will be decided based on the foraging requirements of overwintering dark-bellied brent geese, with a seed mix to be sourced from an agricultural wholesaler.
397. The final selected mix will need to be simple and suitable for sites where soil conditions vary across a site or where soil and site characteristics have not been established before sowing. The list of plant species that need to be included within the final seed mix is seen below:

**Table 7.1 AR HMA Grassland Mix**

Scientific name	Common name
<b>Wildflowers</b>	
<i>Trifolium repens</i>	White Clover
<i>Trifolium pratense</i>	Red Clover
<b>Grasses</b>	
<i>Agrostis capillaris</i>	Common Bent
<i>Lolium perenne</i>	Rye Grass
<i>Festuca rubra</i>	Red fescue
<i>Cynosurus cristatus</i>	Crested Dog Tail

### 15.2.4 Implementation Monitoring

398. During the implementation of the AR HMA (which will occur before or during construction), the establishment will be monitored by the ECoW who will ensure that the necessary habitat is in place prior to the start of the first winter season of construction (September).
399. The ECoW will check the site before seed is sown to check that ground conditions are suitable, and following seed sowing to check that seed has been sown correctly. Remedial actions will be communicated to the Site Operator and the HMSG at the next meeting.

## **15.3 Construction Phase Management**

### ***15.3.1 Between the establishment of the grassland and the completion of construction / commencement of operation***

400. The grassland will be grazed by cattle/sheep at a low density (2-3 sheep/ha or up to 1 head of cattle per ha<sup>38</sup>) to manage the flush of annuals, but grazing will not commence until a grassland sward is sufficiently established within AR HMA.
401. Grazing within the AR HMA will take place during the summer months (April to September). This favours the development and quantity of clovers and availability of stolons during autumn and winter, which would otherwise be outcompeted by higher sward species. Clover stolons are a particularly favoured foraging plant source for geese.
402. The summer grazing intensity will need to be sufficient that a sward length of less than 100 mm is established prior to the autumn arrival of the wintering waterbirds, or that an early autumn cut is implemented to achieve this. This is required to ensure that the habitats are attractive to foraging geese.
403. A flush of weeds is to be expected in the first season after sowing and these can be managed by a short period of intensive grazing or cutting management. It is likely that some pernicious weeds will persist following the ground preparation and can be treated e.g., by hand pulling or spot treatment by selective herbicide.
404. It is not proposed to apply manure during the construction phase as the soil will remain nutrient rich from arable cultivation.

## **15.4 Operational Phase Management**

405. The activities set out in the following sections are relevant for the duration of the operational phase.

### ***15.4.1 From the commencement of operation***

406. The management of grassland within the AR HMA will be undertaken in line with the management during construction throughout the operational phase.
407. In the second and subsequent years following establishment the grassland will need to be managed such that soil fertility is maintained, and the grassland plant structure supports species favoured by foraging overwintering geese.

### ***15.4.2 Sward Management***

408. Within the AR HMA, the best results are likely to be obtained by traditional meadow-pasture management to be focussed on a summer grazing regime, with a similar approach to year 0-1 recommended.
409. For the purposes of this plan it is identified that grassland within the AR HMA will be managed by cattle/sheep grazing and/or by mechanical cutting. Suitable stock grazing densities are in line with best practice for managing grasslands for conservation purposes. The grazing will be overseen by a suitably competent grazier.
410. As the habitats will have started to become more established, the stocking density within these AR HMA habitat compartment areas can be increased to c. 4 sheep/ha (or approximately 1 head of cattle/ha) throughout the summer months.
411. Overwintering bird species such as dark-bellied brent geese, lapwing and golden plover prefer habitats with a sward height of no greater than 100 mm, the stocking density will need to be reviewed and adjusted to ensure sufficient grazing takes place during summer

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<sup>38</sup> Kent Wildlife Trust Land Management Advice Sheet 5 - Choosing livestock for conservation grazing

months, such that sward height in winter is below this figure, or an early autumn cut can be introduced to create the favourable sward height prior to arrival of the wintering birds.

### **15.4.3 Farmyard Manure Application**

412. The application of fertiliser in the form of farmyard manure within the AR HMA can be undertaken in mid/late October to increase fertility and encourage vigorous growth and quantity of plant species favoured for foraging by overwintering dark bellied brent geese. It will also attract invertebrates for the golden plover and lapwing<sup>39</sup>. Application of the fertiliser will be excluded from within 10 m of the drainage ditches, in line with DEFRA best practice guidance. The manure will be sourced (where possible) from ivermectin free cattle to avoid adverse effect on invertebrates. In the event that it is not possible to entirely source ivermectin-free manure, monitoring will be undertaken to understand the difference in developing invertebrate communities in areas treated with ivermectin-free manure and in areas with manure from ivermectin-dosed cattle.

## **15.5 Operational Monitoring, Triggers and Remedial Actions**

### **15.5.1 Habitats**

413. Assuming that the seed mix has established successfully by the commencement of operation, an ecologist will visit the site twice in spring (May) and late summer/early autumn (August/September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to assess the success of grassland management and any management required to ensure optimum condition for the following winter (such as a late cut). Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).

414. The monitoring will assess the success of grassland management and the status of water levels within ditches within and adjacent to the AR HMA, and if necessary recommend revisions to the ARHMAMP (and related management plans).

415. Remedial measures will be implemented if necessary, to achieve the desired sward length and structure – e.g. grazing management, spring/ autumn cutting, herbicide application, spot-treatments, alternative management of water levels (see Appendix H).

### **15.5.2 Bird use (incl. wintering birds)**

416. An ecologist will visit the site regularly during operation in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to monitor bird activity at the site using a comparable method to the baseline surveys to allow comparison between pre- and post-construction bird-use, including:

- Winter bird surveys following similar protocol to baseline surveys, making counts of wintering waterbirds within the ARHMA, twice per month between September and March at both high and low tide;
- Inclusion of the AR HMA in the general breeding bird survey and flight activity survey for marsh harriers;
- Monitor condition of ditch banks and assess damage by poaching; and
- Undertake sampling of ivermectin content of fertiliser applied to AR HMA and invertebrate biomass sampling and establish any difference in usage according to variations in ivermectin content.

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<sup>39</sup> Rowcliffe-Mitchell (1996) The Conservation Management of Brent Geese In The UK

### ***15.5.3 Triggers and Remedial Actions***

417. The grassland is designed to provide foraging resources for dark-bellied brent goose, lapwing and golden plover. Following reporting of the findings of monitoring to the HMSG, if the following triggers occur, remedial actions will be considered:

- Lower than expected use (indicated by lower peak-mean count metric) of the ARHMA by brent goose, lapwing and/or golden plover; and/or
- Evident decline in SPA populations of brent goose, lapwing and/or golden plover detected through Wetland Bird Survey counts of The Swale.

418. The HMSG will discuss the findings of the above, in the context of the site and of the wider area and discuss remedial measures if necessary. These could include:

- Adapt survey effort to increase understanding of bird use of the site and wider area;
- Inspect sward status and adjust sward management if necessary – considerations include grazing/cutting intensity, water management, herbicide to control weed growth and manure fertilisation (including ivermectin content and invertebrate density).
- Install fencing to protect ditch banks from damage by poaching if necessary.
- Consideration of supplementary feeding of brent geese.

419. Remedial measures will be implemented as soon as practicable following agreement at the HMSG meetings (see section 1.4).

## 16 APPENDIX K - FRESHWATER GRAZING MARSH HABITAT MANAGEMENT AREA MANAGEMENT PLAN



### 16.1 Aims and Objectives

421. The aim of the Freshwater Grazing Marsh Habitat Management Area Management Plan (FGM HMA MP) is to provide habitat enhancements to hold water on the surface of fields such as scrapes and foot drains for wintering water birds that are complementary to the management of the AR HMA.
422. The works would be undertaken with reference to RSPB Guidance, Scrape Creation for Wildlife<sup>40</sup>.
423. The majority of the FGM HMA is designated as a Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA), therefore as well as the agreement of the HMSG for the measures proposed, consent from Natural England for any works must be sought.
424. The objective is to complement the function of the AR HMA for overwintering birds.

### 16.2 Implementation

#### 16.2.1 Timing

425. The enhancements within the FGM HMA will be in place ahead of the first winter during construction, however they may not work to their full potential until the water control structures have been installed prior to the commencement of operation (see Appendix H).
426. The works will be undertaken during late summer to avoid the nesting bird season.

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<sup>40</sup> RSPB, Farming for Wildlife, Scrape Creation for Wildlife. Available at:  
[https://www.rspb.org.uk/globalassets/downloads/documents/farming-advice/scrapecreationforwildlife\\_tcm9-255102.pdf](https://www.rspb.org.uk/globalassets/downloads/documents/farming-advice/scrapecreationforwildlife_tcm9-255102.pdf)  
[accessed 02/10/2019]



### **16.2.2 Ground Preparation**

427. The enhancements proposed are minor earth works (not level changes greater than 0.5 m) such as scrape creation, foot drains and small bunds at field edges designed to convey and hold water within the FGM HMA.
428. These works can be undertaken using a rotary ditcher or 360° excavator.
429. The water control structures proposed to be implemented across the site will also allow water to be managed more effectively to achieve the management aims.

### **16.3 Construction and Operational Phase Management**

430. The current grazing practice and water level management will also be reviewed and adjusted in consultation with Natural England to provide the optimal conditions to meet SSSI targets.
431. Once the enhancements are implemented it is not expected that further intervention will be required, unless required by the HMSG in relation to other issues. If monitoring sets out that remedial actions are required to preserve the form or function of the enhancements these will be actioned during construction / operation.

### **16.4 Operational Monitoring, Triggers and Remedial Actions**

#### **16.4.1 Habitats**

432. Assuming that the enhancements have been established successfully by the commencement of operation, an ecologist will visit the site twice in winter (January) and late summer/early autumn (August/September) in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to assess the success of the enhancements and any management required to ensure optimum condition for the following winter. Following each survey visit, a report will be provided to the HMSG to be available for the next HMSG meeting (see section 1.4).

#### **16.4.2 Bird use (incl. wintering birds)**

433. An ecologist will visit the site regularly during operation in years 0-1, 1-2, 2-3, 4-5, 10 and 20 to monitor bird activity at the site using a comparable method to the baseline surveys to allow comparison between pre- and post-construction bird-use, including:
- Winter bird surveys following similar protocol to baseline surveys, making counts of wintering waterbirds within the FGM HMA, twice per month between September and March at both high and low tide; and
  - Inclusion of the FGM HMA in the general breeding bird survey and flight activity survey for marsh harriers.

#### **16.4.3 Triggers and Remedial Actions**

434. Remedial measures will be implemented if necessary, such as alternative management of water levels or maintenance of existing enhancements or further implementation of enhancements, or consideration of changes to grazing pressure.

## 18 GRASSLAND IMPLEMENTATION TIMING

### 18.1 Arable Reversion Habitat Management Area Implementation

<b>Quarter 2 Year 0-1 (Y1)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 3 Year 0-1 (Y1)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 4 Year 0-1 (Y1)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 1 Year 1-2 (Y2)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 2 Year 1-2 (Y2)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 3 Year 1-2 (Y2)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

<b>Quarter 4 Year 1-2 (Y2)</b>	<b>Y1</b>				<b>Y2</b>			
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Construction Start Date								
AR HMA Implementation								

## 18.2 Grazing Marsh Grassland Implementation

435. Dark green is optimal period, light green is possible period.

<b>Quarter 2 Year 0-1 (Y1)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

<b>Quarter 3 Year 0-1 (Y1)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

<b>Quarter 4 Year 0-1 (Y1)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

<b>Quarter 1 Year 1-2 (Y2)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

<b>Quarter 2 Year 1-2 (Y2)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

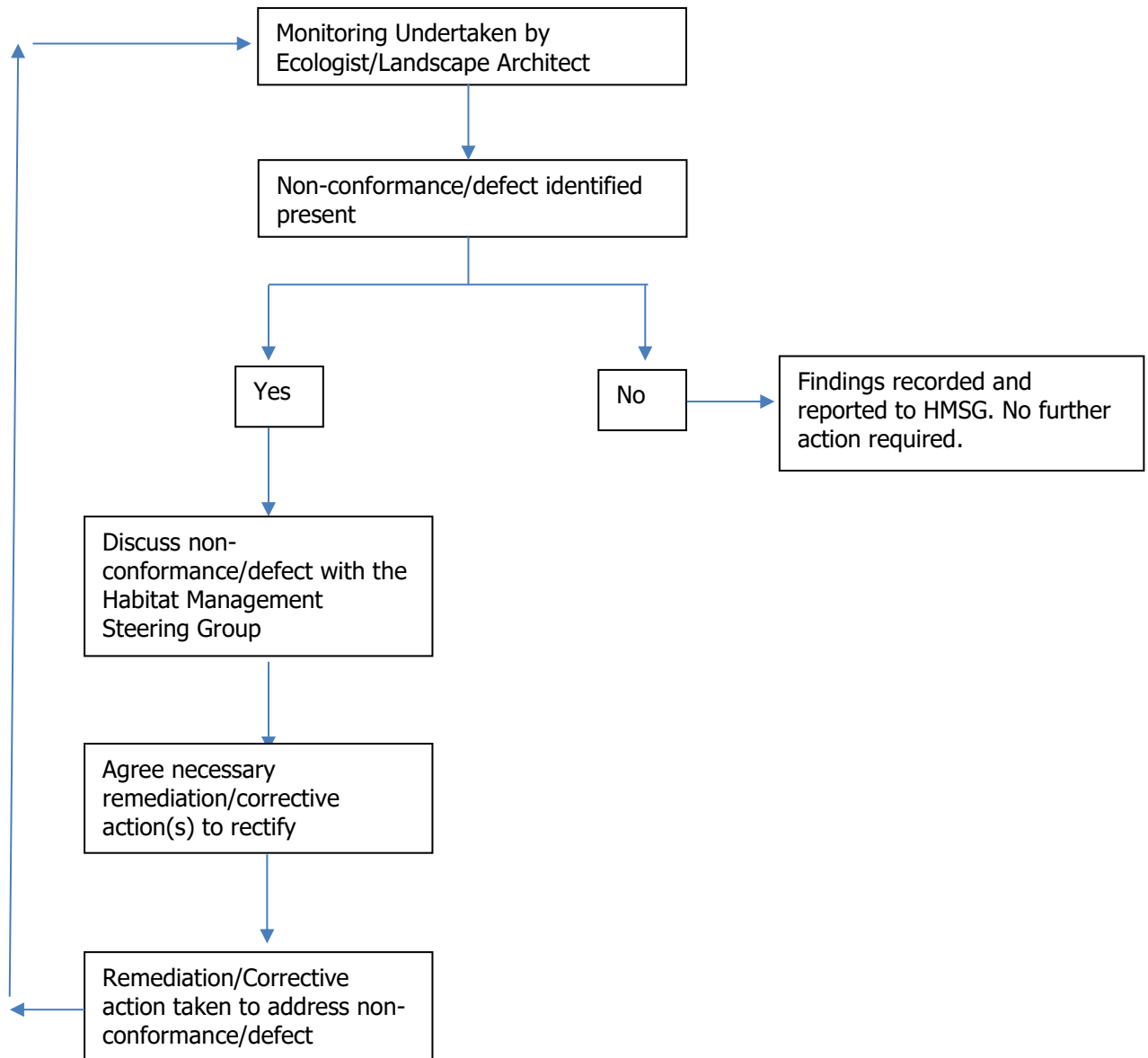
<b>Quarter 3 Year 1-2 (Y2)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

<b>Quarter 4 Year 1-2 (Y2)</b>	Y1				Y2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Start Date								
Grassland Implementation (in fields to be built)								

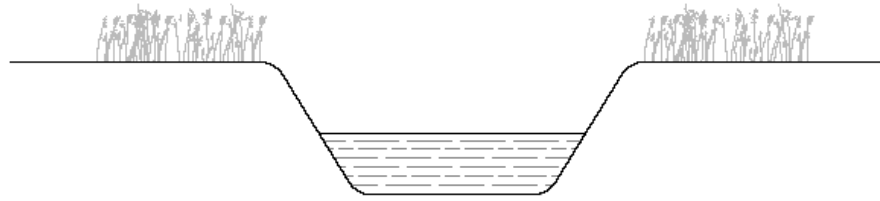
## **19 MONITORING, REPORTING AND MEETINGS**

436. *[This section is subject to consultation with the HMSG prior to insertion].*

## 20 MONITORING / MITIGATION / REMEDIATION ROUTE MAP



## 21 INDICATIVE DITCH REPROFILING CROSS SECTIONS



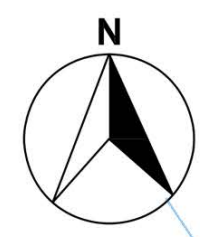
EXISTING INDICATIVE STEEP DITCH PROFILE




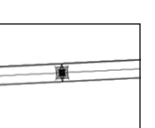




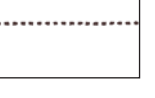
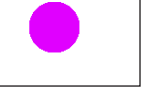







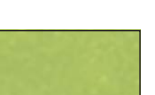
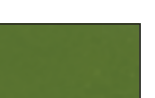






PROPOSED INDICATIVE GRADUAL SLOPING DITCH PROFILE

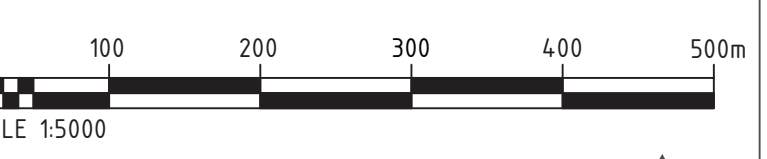
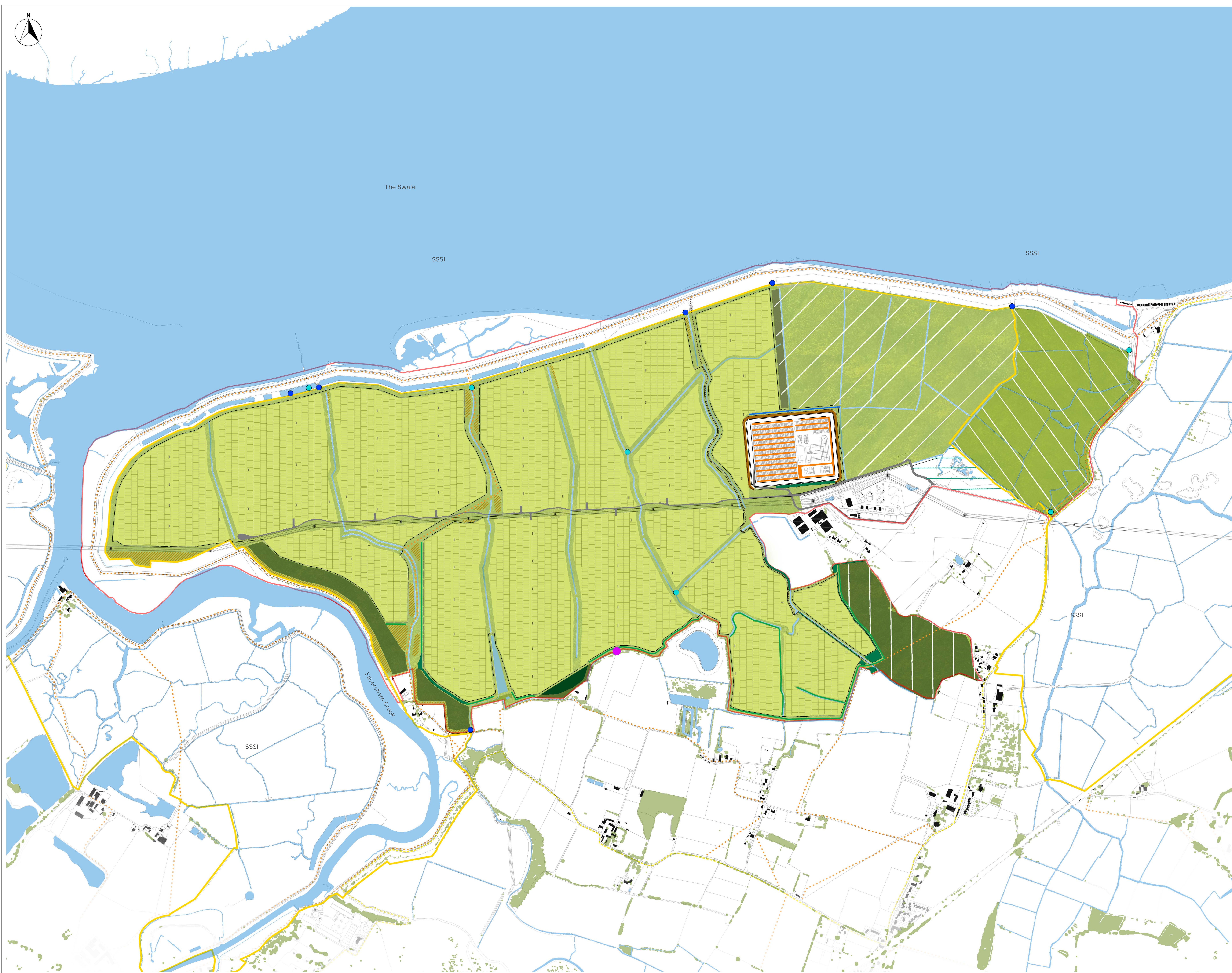
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**22 FIGURE A5.1 - LANDSCAPE AND BIODIVERSITY MASTERPLAN**



KEY

-  Site Boundary
-  Existing Pylons and Overhead Cables
-  Existing Vegetation
-  Existing Built Form
-  Existing Hydrological Features
-  Existing Public Rights of Way
-  Existing National Cycle Route
-  Proposed Permissive Footpath
-  Proposed Bat Roost
-  SSSI
-  Proposed Perimeter Fence
-  Proposed Site Compound
-  Proposed New Ditch
-  Proposed Native Species Hedging
-  Proposed Native Species Shelterbelt
-  Proposed Native Woodland
-  Proposed Native Species Buffer Planting
-  Proposed Establishment of Low Density Native Species Scrub to Link to Existing Areas Around Site
-  Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory - under and around solar panels
-  Proposed Coastal and Floodplain Grazing Marsh Based on Priority Habitat Inventory
-  Proposed Lowland Meadow Based on Priority Habitat Inventory
-  Areable reversion Habitat Management Area
-  Fresh Water Grazing Marsh Habitat Management Area
-  Lowland Grassland Meadow Habitat Management Area
-  Cleve Hill Substation Habitat Management Area
-  Area of Proposed Reedbed Creation
-  Key Existing Water Flow Control Structures (x6)
-  Key Proposed Water Flow Control Structures (x6)



Scale 1:5,000 @ A0

Produced By: BM	Ref: 2238-DR-LAN-103
Checked By: MT	Date: 09/11/2018

Outline Landscape Biodiversity Management Plan  
Figure A5.1  
Cleve Hill Solar Park  
LBMP

Y:\Projects\2238 Cleve Hill Farm Solar PV Array\Figures\General Figures\Landscape\Photoshop\Photoshop Masterplan\Masterplan\20180911\2238\_Cleve Hill LBMP