

West Burton Solar Project

Outline Landscape and Ecological Management Plan Revision **BD**

Prepared by: Clarkson & Woods Ltd

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Issue Sheet

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Outline Landscape and Ecological Management Plan Revision ~~B~~D

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1 Introduction

1.1 Introduction

1.1.1 This outline Landscape and Ecological Management Plan (LEMP) sets out a framework for the planting, management and monitoring of landscaping and ecological mitigation and enhancement habitats for the proposed West Burton Solar Project (hereafter referred to as “the Scheme”). This LEMP concerns works which will be required during both construction and operation phases of the Scheme. This LEMP is to be read in conjunction with the following documents:

- Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 - 8.18.3 [REP1-026 to REP1-031] of the Landscape Visual Impact Assessment (LVIA) [APP-046]) – Displays the location and specification of all habitats to be planted and managed.
- Ecological Protection and Mitigation Strategy (OEPMS) [APP-326] – Document setting out how valuable ecological features will be protected (e.g., through fencing or avoidance measures) and adverse impacts mitigated for (e.g., through seasonal timing of works or supervision by an Ecological Clerk of Works).

1.1.2 The purpose of the final LEMP document is to set out planting, management and monitoring prescriptions to be followed by, or on behalf of the undertaker, and will be approved by the relevant planning authority pursuant to the Requirement in the Development Consent Order (DCO) for the Scheme. However, while as much detail has been included in this outline LEMP as possible to accompany the DCO application submission, it is anticipated that it will be revised during the DCO examination process. Post consent it will be updated to include all final detail necessary to produce the final LEMP version. In addition, there are current unknowns in terms of availability of plants/seed. In some cases in this version, several options are set out in order to leave some flexibility, but all achieve the same ecological goals. However, the final LEMP must be substantially in accordance with this Outline LEMP.

1.1.3 A preliminary outline LEMP was prepared as part of the Preliminary Environmental Information Report which formed the basis of this document which has been developed through consultation with Natural England, Lincolnshire and Nottinghamshire Wildlife Trust and the Greater Lincolnshire Nature Partnership (GLNP) as well as further ecological survey.

1.1.4 This document focusses on the three solar Sites known as West Burton 1, 2 and 3, as shown in Figure 1.1 overleaf. Ecological protection and remediation measures required in relation to the cable installation works are contained within the OEMPS [APP-326].

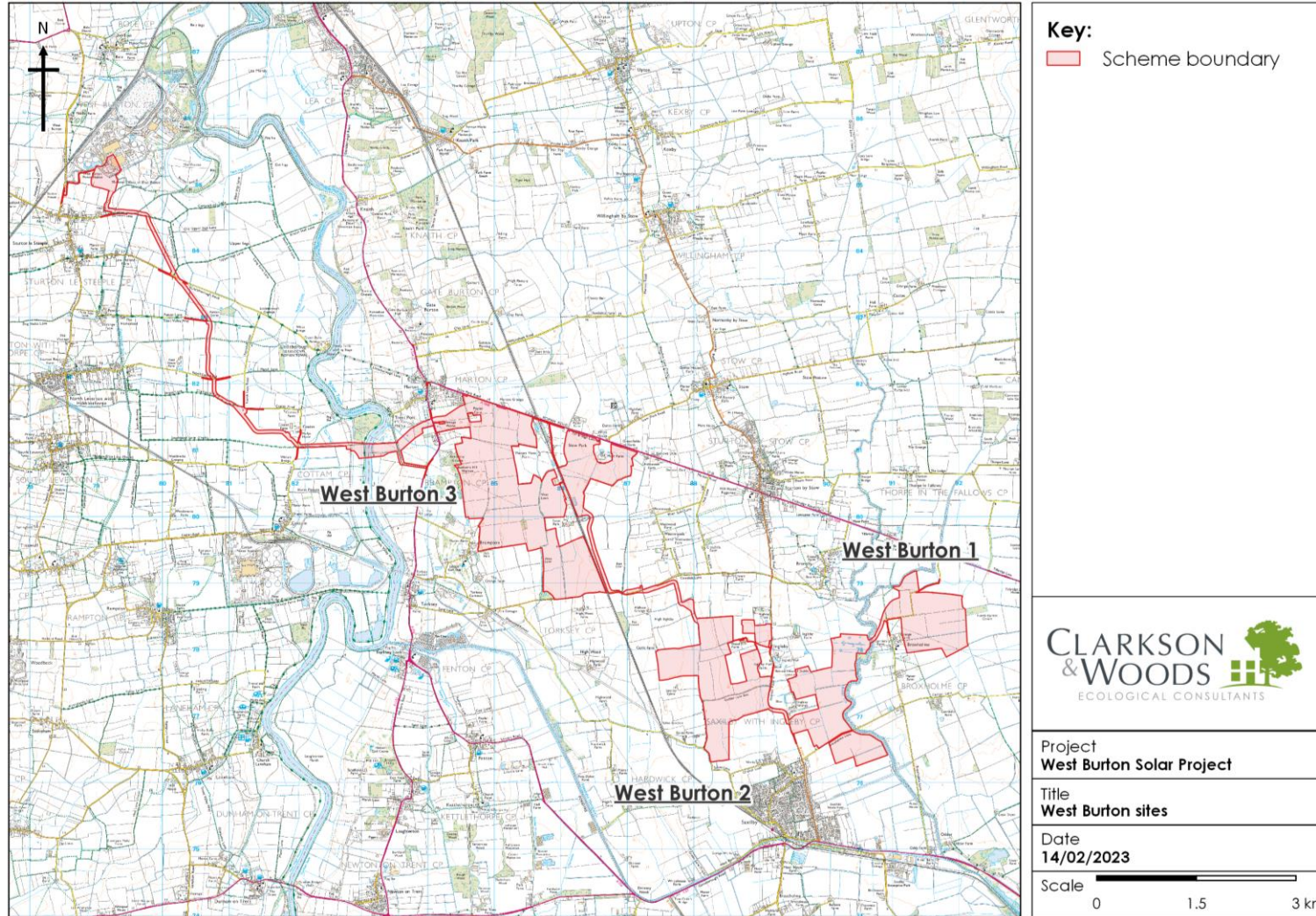
1.2 Approach to Construction and Maintenance Access Gaps at Hedgerows

- 1.2.1 Wherever feasible, the Scheme utilises existing access points to accommodate internal access between fields, land areas, solar panel areas, substation sites, battery storage areas and along the Cable Route Corridor. In certain locations where existing access points do not exist, some minor hedgerow works (pruning and removal) are necessary. In other locations, existing gaps may need to be widened slightly or works carried out to hedgerows adjacent to private tracks or the public highway. These minor hedgerow works: pruning and removal, widening of existing gaps, and works to hedgerows adjacent to private tracks and the public highway, are required for the passage of vehicles during the construction, maintenance and operational phases or for any apparatus used in connection with the Scheme. In addition, minor hedgerow works may be required to facilitate the proposed hedgerow enhancement works.
- 1.2.2 Indicative locations of these minor hedgerow works relating to access points and the Cable Route Corridor are shown in Appendix C - Hedgerow Removal Plans. These plans show both the temporary hedgerow works (pruning or removal) required during the construction phase for accesses and for the transport of abnormal indivisible loads (AILs) and also the removals that will be in place for the full operational lifetime of the Scheme. The first five sheets of the plans show the indicative locations of hedgerow sections which will contain new hedgerow works (pruning or removal). Temporary removals are required along the Cable Route Corridor only, and these will be replanted/reinstated once the cable installation is complete. Permanent removals for the duration of the operational period of the Scheme are required for maintenance tracks (this includes some locations along the Cable Route Corridor where maintenance tracks intersect with the proposed route) and are required to facilitate ongoing maintenance access and will be required for the full lifetime of the Scheme. The final sheet of Appendix C¹ shows the indicative locations of possible hedgerow works (pruning and/or removal) which may be required to accommodate AIL movements and locations where it is not known at this stage whether or how hedgerows will be affected. All possible locations have therefore been included on a precautionary basis.
- 1.2.3 The length of individual instances of temporary hedgerow removal required for access and the Cable Route Corridor will range between 3 and 7.1m in order to accommodate a maximum arrangement of the cable trench, a haul route and a passing bay.
- 1.2.4 The length of individual instances of permanent hedgerow removal during the operational period for the Scheme will range between 3 and 6.5m, in keeping with typical gap sizes in an agricultural setting.

¹ Please see the sheet in Appendix C: Hedgerow Removal Plans named "Indicative Access Location/Abnormal Indivisible Loads and Potential Vegetation Works/Removal – Index Plan".

- 1.2.5 Further details on the methodology to be followed during the hedgerow works as well as the reinstatement/replanting of temporarily affected hedgerows is contained within Section 7.3 of the OEMPS [APP-326].
- 1.2.6 The extent of these minor hedgerow works (pruning and removal) and widenings of existing gaps will be confirmed post DCO consent. No hedgerow works (pruning and removal) can take place until a detailed Landscape and Ecological Management Plan has been approved by the relevant planning authority, as secured by Requirement 7 of Schedule 2 of WB3.1_~~CE~~ Draft Development Consent Order Revision ~~CE~~ [EN010132/~~EX3EX4~~/WB3.1_~~CE~~]. All minor hedgerow works (pruning and removal) will be carried out in accordance with the final, approved version(s) of the Landscape and Ecological Management Plan.

Figure 1.1: Scheme Boundary



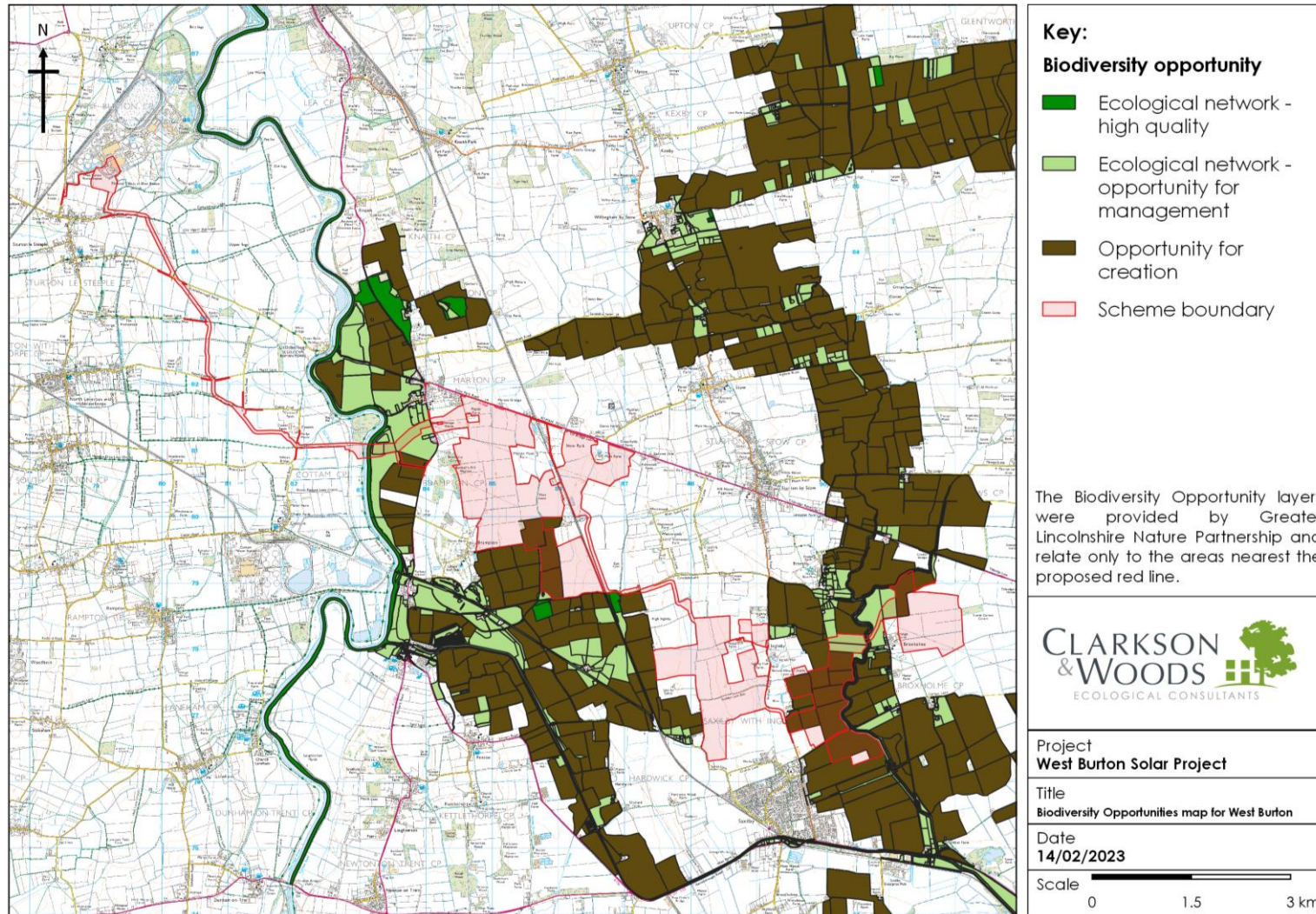
2 **Aims**

- 2.1.1 The overarching aim of the LEMP is to set out prescriptions for habitat creation and management in order to provide a significant ecological enhancement, strengthen the green infrastructure within the local area as well as to provide visual and landscape screening of the Scheme where this has been identified as necessary in Section 8.8 of the LVIA.
- 2.1.2 The document takes into account the habitats and species already recorded (Chapter 9: Ecology and Biodiversity of the Environmental Statement [APP-047]) as present in order to tailor management for the most optimal outcome. For example, where floodplain is present, grassland seeding/management may be selected to reflect the wetter conditions or where a certain bird species has been recorded, management of hedgerows may be tailored to suit specific nesting requirements. In addition, certain planting may be required in order to mitigate for visual impacts of the development, such as tree belts or new/taller hedgerows a minimum of 4m high and in a range of 4-5m high. Furthermore, this LEMP provides detail on the provision of additional species-specific mitigation and habitat creation identified as necessary within Chapter 9 of the Environmental Statement.
- 2.1.3 Local conservation priorities have been considered when designing the detailed habitat enhancements. This includes the Lincolnshire and Nottinghamshire Biodiversity Action Plan as well as policies within the Draft Bassetlaw Local Plan and Central Lincolnshire Local Plan. In particular, Biodiversity Opportunities Mapping (BOM) produced by Greater Lincolnshire Nature Partnership (GLNP) has been closely consulted, as described in Section 2.2 below. The presence of locally and nationally designated sites for nature conservation have also been considered along with opportunities to enhance or extend these features.
- 2.1.4 Public amenity has also been considered when planning the location and type of habitats to establish, for example, diverse pollinator mixes which are flower rich and have a long flowering season are focussed near residential dwellings or public rights of way.
- 2.1.5 This document has been prepared following consultation with various relevant bodies including Natural England, Lincolnshire Wildlife Trust, Nottinghamshire Wildlife Trust and the GLNP. Local community input has also been sought via public consultations undertaken as part of the DCO process.
- 2.1.6 In line with current best practice guidance (Ref.1), a preliminary financial table (for habitat creation and management over the lifetime of the array) has been set out in Appendix A of this document. This financial table contains estimates only as fine detail is not known at this stage, however, the aim would be to update this table in the final version of this document approved under a requirement of the DCO so that the costs relating to build and operation are transparent as contracts are drawn up.

2.2 Biodiversity Opportunities Mapping

- 2.2.1 Central Lincolnshire Local Plan Policy S60 relates to the delivery of measurable net gains for biodiversity within the county. Biodiversity Opportunity Mapping (BOM) has been created by the GLNP to show which areas and habitats are of greatest potential strategic value for enhancement in order to achieve this goal. This study built on a previous Central Lincolnshire Green Infrastructure Study and factors in potential beneficial outcomes for the local economy and society as well as nature. Key drivers for the inclusion of land within the mapping included agri-environment scheme targeting, restoring, buffering and connecting Local Wildlife Sites, and targets under Lincolnshire’s Biodiversity Action Plan.
- 2.2.2 The GLNP has been consulted as part of the preparation of this document and although local conservation priorities are currently being reviewed and a Local Nature Recovery Strategy not yet finalised, it has been confirmed that the focus will be on creating a mosaic of healthy ecological networks including both semi-natural and managed habitats. This document may be updated once the Greater Lincolnshire Local Nature Recovery Strategy has been published (likely November 2023) in order to reflect the local priorities in terms of habitat creation that are set out.
- 2.2.3 The Biodiversity Opportunities Mapping is shown in Figure 2 overleaf, with the Scheme overlaid.
- 2.2.4 West Burton 1 and 2 fall within and close to the Biodiversity Opportunity Area known as River Till and Fosdyke Navigation Biodiversity Opportunity Area.
- 2.2.5 West Burton 3 falls partly within the Trent Vale Biodiversity Opportunity Area.
- 2.2.6 Notably, no areas within the Site fall within land classed as “Ecological Network – High Quality”. Two fields of permanent pasture with ponds within the north east of West Burton 2 are classed as “Ecological Network – Opportunity for Management”; these fields lie outside of the development footprint and will included within an ecological enhancement/mitigation area. Consequently, the BOM presents extensive, LPA-recognised opportunities for ecologically favourable habitat management and very few constraints.
- 2.2.7 The habitat creation prescriptions have been prepared with the contribution to the objectives of the BOM in mind, and through consideration of GLNP’s Practical Application Principles for development within land assigned as “Opportunity for Creation”.

Figure 2.1: Biodiversity Opportunities Map



3 Key Personnel

- 3.1.1 The final LEMP will set out the roles and responsibilities of those involved in creating, managing and monitoring the prescriptions within this document. A suitably qualified person will be appointed to oversee the coordination of implementing the LEMP including sourcing seed/plants, which will need to be considered at an early stage given the quantities required.

4 Creation and Management Prescriptions by Habitat Type

- 4.1.1 This section sets out the various principles and prescriptions for habitat creation and management which will drive the requirements for both landscape and ecological mitigation and enhancement which have been identified in the Environmental Statement (ES).
- 4.1.2 The enhancements and mitigation are illustrated within the relevant Landscape and Ecology Mitigation and Enhancement Plans, as referenced throughout this document.
- 4.1.3 This section should be read in conjunction with Appendix B which sets out management prescriptions which would be adopted for the duration of the Scheme.

4.2 General Planting Implementation and Management Prescriptions

General Implementation Prescriptions

- 4.2.1 Planting to be undertaken in the planting season between October and March during construction, or within the first available year/season post construction. Planting to be carried out during appropriate climatic conditions.
- 4.2.2 Where existing ground vegetation is retained or has re-established during the construction phase, the following clearance works should be undertaken prior to planting works:
- All grass and perennial vegetation should be cleared from site including epicormic and below ground growth;
 - All rubbish, debris and stones over 25mm diameter should be cleared; and
 - All arisings should be removed from site.
- 4.2.3 The handling of plants on Site must be in accordance with National Plant Specification "Handling and Establishing Landscape Plants" (Ref.2).
- 4.2.4 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; and
- BS3998:2010: Tree Work – Recommendations.

4.2.5 Topsoil within planting pits should be cultivated to a minimum depth of 400mm where tree/hedgerow/woodland planting is proposed to ensure sufficient room to accommodate new planting and to provide appropriate growing conditions for new planting is achieved.

4.2.6 Topsoil in areas to be seeded with wildflower and grass seed mixes to be cultivated using minimum tilling or direct drilling of seed straight into previous stubble of the previous arable crop. This retains some surface protection offered by the stubble and cuts the number of cultivator passes across the soil surface.

4.2.7 No cultivation should take place in wet/ waterlogged conditions and within the root protection areas of existing trees as defined by BS5837:2012 on land not previously subject to arable crop production. Drilling required within the root protection areas of existing trees are located within land not currently subject to arable production should include surface scarification only and of no more than 50mm depth to ensure roots are not damaged.

4.2.8 In the interest of biodiversity protection, the use of herbicides should be kept to a minimum in the preparation or management of the planted or seeded areas.

4.2.9 All trees and shrubs to be planted with the appropriate biodegradable tree or shrub guards and removed subject to satisfactory establishment and growth within 2-3 years post construction or as required to ensure establishment.

4.2.10 All tree/hedgerow specimens will be native and of UK provenance. Trees will be locally sourced and of local provenance where possible. The “Local Seed Zone Provenance” (i.e., the region within which the Site lies) is region 402 (Ref.3).

General Management Prescriptions

4.2.11 Any plants and trees which are found to be dying, damaged or diseased following planting will be replaced with the same species and specification for the first 5 years of the Scheme.

4.2.12 Any maintenance works such as cutting of trees or flailing, should take place during September to February which is outside of the bird nesting season (March to August), for the duration of the development. These works should also be carried out when the ground is dry enough to allow machinery access.

4.2.13 All shelters, guards, rabbit spirals and stakes will be checked annually and secured or replaced where necessary. Shelters will be removed from all plants and will be disposed of off-site (subject to satisfactory establishment and growth) by year 5 post planting.

4.2.14 Autumn sowing is preferable, with the seed sown as soon as possible subsequent to construction of the array to avoid a flush of unwanted species such as annual plants and injurious and invasive weeds (as well as careful preparation of the land prior to seeding, as set out above). Following this, weeds and invasive non-native species will be controlled by hand pulling, if not too excessive or treated using a spot herbicide treatment if more widespread.

4.3 Native Hedgerows and Hedgerow Trees

4.3.1 Hedgerows and Hedgerow Trees are a Habitat of Principal Importance and listed on the Lincolnshire and Nottinghamshire Biodiversity Action Plans (BAPs).

4.3.2 The hedgerow network is extensive across the majority of the Sites and is generally annually managed and species-poor, although several sections of species-rich hedgerow are present (see Environmental Statement Chapter 9 [APP-047] and Appendix 9.2 - 9.3 [APP-078 and APP-079]). It is also generally intact, with few gaps, however, there are opportunities to replace historic hedgerows where these have previously been removed. A historic hedgerow on West Burton 1 (Figure 8.18.1_A) [REP1-026] has been identified using 1940s Ordnance survey maps and will be re-planted.

4.3.3 Roughly half of the hedgerows contained at least sporadic mature and semi-mature trees. Trees were predominantly restricted to outer boundary hedgerows, while minor internal hedgerows were normally devoid of trees. The ash (*Fraxinus excelsior*) trees showed extensive signs of ash die back.

4.3.4 The Scheme offers significant opportunities for tree and hedgerow planting, in line with local conservation priorities, national targets and to mitigate significant impacts created by the Scheme. Strengthening the local hedgerow network will significantly enhance the area for bat species, as well as birds and invertebrates.

4.3.5 All tree/hedgerow specimens will be native and of UK provenance. Trees will be locally sourced and of local provenance where possible; the "Local Seed Zone Provenance" (i.e., the region within which the Site lies) is region 402.

Hedgerow Planting

4.3.6 Proposed new hedgerows will provide additional linking habitat and reinforce the existing green network. Any gaps in existing hedgerows will be gapped up with new hedgerow and hedgerow tree planting.

4.3.7 All new and gapping mixed native hedgerows will comprise of a double staggered row of plants 400 mm apart within each row, overall 6 plants per linear metre. Species will be mixed throughout the hedge line in random groups of 3/5/7. A 500 mm wide trench will be excavated to take plants and topsoil cultivated to 450 mm depth prior to application of fertiliser. All species will be planted as bare root Whips.

4.3.8 Locally appropriate species will be used, based on those already found within the local area. The planting of blackthorn will provide habitat for rare species such as brown hairstreak butterfly *Thecla betulae* (a population is present approximately

30km away). Management of hedgerows will be key for species such as this. Tall thorny hedgerows are also suitable for nesting birds including turtle dove *Streptopelia turtur* and other declining farmland birds.

4.3.9 A list of locally appropriate species is given below in Table 4.1 (those which have been identified within the hedgerows on the Site).

Table 4.1: Hedgerow species for planting within the Scheme.

Scientific Name	Common Name	Size	Form
<i>Acer campestre</i>	Field maple	45-60 cm	Whip (Bare Root)
<i>Corylus avellana</i>	Hazel	45-60 cm	Whip (Bare Root)
<i>Crataegus monogyna</i>	Hawthorn	45-60 cm	Whip (Bare Root)
<i>Ilex aquifolium</i>	Holly	30-40 cm	Containerised
<i>Ligustrum ovalifolium</i>	Privet	45-60 cm	Whip (Bare Root)
<i>Lonicera periclymenum</i>	Honeysuckle	45-60 cm	Whip (Bare Root)
<i>Prunus spinosa</i>	Blackthorn	45-60 cm	Whip (Bare Root)
<i>Rosa arvensis</i>	Field rose	45-60 cm	Whip (Bare Root)
<i>Rosa canina</i>	Dog rose	45-60 cm	Whip (Bare Root)
<i>Viburnum lantana</i>	Guelder rose	45-60 cm	Whip (Bare Root)

4.3.10 The planting of new hedgerows adjacent to existing ones would provide a wildlife corridor and contribute to the green infrastructure policies in the local area. These “green lanes” provide important commuting and foraging resources for bats, birds and invertebrates.

4.3.11 A total length of 7.1km of new hedgerow is proposed within the Site.

Hedgerow Management

4.3.12 Poor management of hedgerows in the form of over-management, lack of management, damage due to narrow field margins or drift of herbicides/pesticides has led to degraded hedgerow habitats being common at present within the Scheme. This LEMP will seek to secure appropriate management of all hedgerows within the Site, with a focus on optimising this habitat for local wildlife.

4.3.13 The hedgerow should be regularly watered in its first summer and weeds should be controlled through the use 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 immediately after planting to suppress weeds and retain soil moisture.

4.3.14 Newly planted hedgerows should be trimmed in at least the first 2 years to encourage bushy growth, allowing the hedge to become taller and wider at each cut.

- 4.3.15 Hedgerows will be enhanced through less regular mechanical cutting, for example, every 2-3 years and on rotation (either by rotating hedgerows or cutting each side of the hedgerow on rotation). This will benefit species such as brown hairstreak which rely on uncut blackthorn to lay eggs (and has significantly declined due to the practice of annual cutting).
- 4.3.16 Cutting should take place outside the bird nesting season, and ideally in January/February where the ground is dry enough to allow machinery access. This will provide an important food source, such as nuts and berries, for bird species over the winter. This may be focussed on hedgerows adjacent to roads and tracks where a tractor will be able to access in wet conditions without damaging the ground.
- 4.3.17 Hedgerows will be maintained to an optimum height of 4 – 5m tall.
- Hedgerow Tree Planting**
- 4.3.18 All newly planted hedgerows will include Select Standard trees randomly spaced between 5 – 9 m centres. On occasions where visual receptors are likely to see visual effects in close proximity, denser tree planting of between 2-3m centres may be adopted to provide more instant screening effects. Where this occurs species will be appropriately mixed to ensure large species trees are intermittently mixed with smaller species trees to ensure suitable growing conditions in perpetuity.
- 4.3.19 All hedgerow trees will be planted as Select Standard trees between 1.75m – 3.5 m tall. Select Standard trees to be planted in pits 800mm deep x 800mm wide x 700 mm deep or dimensions of the rootball, whichever is greater.
- 4.3.20 All trees should be planted with a 75 mm depth of bark mulch, 0.5 m in diameter around each tree/shrub to suppress weeds and retain soil moisture.
- 4.3.21 Any trees planted in or alongside hedgerows as part of the proposed hedgerows enhancements, are to be planted with a 1.5m tall white tipped marker post. This will allow locations of newly planted trees to be noticeable to operators of flails during maintenance periods.
- 4.3.22 Planting will focus on long-lived trees in order to replace the many ash trees noted to be present within the hedgerow network, the majority of which can be expected to be lost in the next five years due to ash dieback.
- 4.3.23 The tree species selected will reflect the species identified within the Sites to ensure they are locally appropriate. Tree planting locations will require an appropriate offset from solar panels to ensure shading will not occur once the tree has matured, or leaf fall become a problem on the panel structures. Lower growing species to be planted adjacent to the proposed solar array to avoid overshadowing.
- 4.3.24 It may be desirable to plant trees not identified in the local area which are ecologically similar to ash or are resistant to both disease and climate change impacts. A list of locally appropriate and resistant trees are listed in Table 4.2 below.
- 4.3.25 It may be feasible to plant locally sourced native black poplar *Populus nigra* subsp. *betulifolia*, for example, within some of the riparian habitats on the Site. Local

genetic stock would be preferable ensuring that they are not hybridised and a mixture of male and female plants would need to be planted. However, the fall of the seeds would need to be considered to ensure that they do not negatively impact the solar panels or adjacent land.

Table 4.2: Hedgerow Tree species for planting within the Scheme.

Scientific Name	Common Name	Size	Form
<i>Acer campestre</i>	Field maple	300-350 cm	Select Standard (Bare Root/Rootball)
<i>Crataegus monogyna</i>	Hawthorn	300-350 cm	Select Standard (Bare Root/Rootball)
<i>Malus sylvestris</i>	Crab apple	300-350 cm	Select Standard (Bare Root/Rootball)
<i>Prunus padus</i>	Cherry (bird)	300-350 cm	Select Standard (Bare Root/Rootball)
<i>Quercus robur</i>	Pedunculate oak	300-350 cm	Select Standard (Bare Root/Rootball)

Hedgerow Tree Management

4.3.26 An inspection and formative prune will be carried out annually in accordance with good arboricultural practice to BS 3998:2010. A clear stem will be maintained for all hedgerow trees in order to be distinguishable.

4.3.27 All trees and shrubs will be regularly watered in the first summer and thereafter as required to ensure successful establishment. Bark mulch is to be maintained at a depth of 75 mm, 0.5 m in diameter around each tree/shrub as required to suppress weeds and retain soil moisture.

4.4 Woodland Copses and Shelterbelts

4.4.1 Tree planting will mainly be required within the hedgerow network, but planting of copses and shelterbelts have also been incorporated into the proposals. Small copses and shelter belts can provide 'stepping stones' between larger areas of woodland. Copses and shelterbelts comprising native species have been included at all Sites, with extensive shelterbelts at West Burton 3 (Figure 8.18.3_A) [REP1-027].

- 4.4.2 Shelter belts are typically 5 m wide and comprise of mixed native tree planting. Species to be included are shown in Table 3 (below).
- 4.4.3 The tree species selected will reflect the species identified within the Sites to ensure they are locally appropriate. Tree planting locations will require an appropriate offset from solar panels to ensure shading will not occur once the tree has matured, or to ensure leaf fall does not become a problem on the panel structures. Lower growing species to be planted adjacent to the proposed solar array to avoid overshadowing, details of which will be provided in Detailed Landscape Proposal plans which would be prepared prior to implementation of the Scheme. Detailed Landscape Proposal plans would include detailed planting specification and schedule as well as locations of all proposed planting.
- 4.4.4 A total area of 13.7ha of woodland is proposed across the Scheme and this has been identified within the Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact Assessment (LVIA) [APP-046].

Woodland and Shelterbelt Planting

- 4.4.5 Trees within woodland copses and shelterbelts will be planted at 1m centres. Plant species will be a planted as a mix of sizes from 60-90cm Transplants, 125-150cm whips and 200-250cm Feathered trees. 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.
- 4.4.6 Trees will be planted appropriately depending on size. Trees will be planted as Whips, Transplants and Feathered specimens in pits approximately 300mm deep x 300mm wide x 400mm deep, or the dimensions of the rootball, whichever is greater.
- 4.4.7 All trees should be planted with a 75 mm depth of bark mulch, 0.5 m in diameter around each tree/shrub to suppress weeds and retain soil moisture.
- 4.4.8 Planting will focus on long-lived trees in order to replace the many ash trees noted to be present within the hedgerow network, the majority of which can be expected to be lost in the next five years due to ash dieback.
- 4.4.9 It may be desirable to plant trees not identified in the local area which are ecologically similar to ash or are resistant to both disease and climate change impacts. A list of locally appropriate and resistant trees are listed in Table 4.3. below.

Table 4.3: Tree Species for Planting within the Scheme

Scientific Name	Common Name	Size	Form
<i>Acer campestre</i>	Field maple	125-150cm	Whip (Bare Root)
<i>Betula pendula</i>	Silver birch	60-80cm	Transplant (Bare Root)
<i>Corylus avellana</i>	Hazel	100-125cm	Transplant (Bare Root)
<i>Crataegus monogyna</i>	Hawthorn	125-150cm	Whip (Bare Root)

<i>Fagus sylvatica</i>	Beech	125-150cm	Feathered (Bare Root)
<i>Ilex aquifolium</i>	Holly	20-30cm	Containerised
<i>Ligustrum spp.</i>	Privet	60-80cm	Transplant (Bare Root)
<i>Lonicera periclymenum</i>	Honeysuckle	60-80cm	Containerised
<i>Malus sylvestris</i>	Crab apple	125-150cm	Whip (Bare Root)
<i>Prunus padus</i>	Bird cherry	100-125 cm	Transplant (Bare Root)
<i>Prunus avium</i>	Cherry	100-125cm	Transplant (Bare Root)
<i>Prunus spinosa</i>	Blackthorn	125-150cm	Whip (Bare Root)
<i>Quercus robur</i>	Pedunculate oak	125-150cm	Whip (Bare Root)
<i>Rosa arvensis</i>	Field rose	40-60cm	Transplant (Bare Root)
<i>Rosa canina</i>	Dog rose	60-80cm	Transplant (Bare Root)
<i>Salix cinerea</i>	Grey willow	60-80cm	Transplant (Bare Root)
<i>Salix fragilis</i>	Crack willow	60-80cm	Transplant (Bare Root)
<i>Sambucus nigra</i>	Elder	60-80cm	Transplant (Bare Root)
<i>Sorbus aucuparia</i>	Rowan	100-125 cm	Transplant (Bare Root)
<i>Viburnum lantana</i>	Wayfaring tree	60-80cm	Transplant (Bare Root)
<i>Viburnum opulus</i>	Guelder rose	100-125 cm	Transplant (Bare Root)
Resistant/Ash Replacement Tree Species			
<i>Alnus glutinosa</i>	Alder	60-80cm	Transplant (Bare Root)
<i>Betula pendula</i>	Birch	60-80cm	Transplant (Bare Root)
<i>Populus nigra subsp. betulifolia</i>	Black poplar	60-80cm	Transplant (Bare Root)
<i>Alnus glutinosa</i>	Alder	60-80cm	Transplant (Bare Root)
<i>Betula pendula</i>	Birch	60-80cm	Transplant (Bare Root)

- 4.4.10 Locally sourced native black poplar *Populus nigra* subsp. *Betulifolia* and Crack Willow, *Salix fragilis* are to be proposed within some of the riparian habitats along major water courses on the Sites and along the eastern boundaries of the Scheme. Local genetic stock is to be sourced where available ensuring that they are not hybridised and a mixture of male and female plants would be planted. Seed fall would be monitored and self-sown specimens that may negatively impact the solar panels or adjacent land would be removed.

Woodland and Shelterbelt Management

4.4.11 All trees and shrubs will be regularly watered in the first summer and as required thereafter to ensure successful establishment. Bark mulch will be maintained at a depth of 75 mm, 0.5 m in diameter around each tree/shrub as required to suppress weeds and retain soil moisture.

4.4.12 Hand pulling of persistent weeds if not too excessive or treated using a spot herbicide treatment if more widespread.

4.5 Scattered Trees with a Native Shrub Mix

4.5.1 Bands of scattered trees with lower canopy shrub planting have also been proposed throughout the Sites. This planting typology has been specified along water courses and to provide additional vegetative layering within the landscape. The mix of shrub and scattered tree planting is to provide effective screening up to 3-4m without compromising the open aspects of particular views.

4.5.2 The tree species selected will reflect the species identified within the Sites to ensure they are locally appropriate. Tree planting locations will require an appropriate offset from solar panels to ensure shading will not occur once the tree has matured, or leaf fall become a problem on the panel structures.

4.5.3 An area of 2ha of scrub habitat with scattered trees will be established across the Scheme.

4.6 Scattered Trees a with Native Shrub Planting

4.6.1 Shrub planting will be planted at 1m centres to form a dense lower canopy. Scattered trees will be planted at 5-11m centres. All tree and native 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.

4.6.2 Plant species will be a planted as a mix of sizes from 60-90cm Transplants, 125-150cm Whips and 200-250cm Feathered trees.

4.6.3 Trees will be planted appropriately depending on size. Trees will be planted as Whips, Transplants and Feathered specimens in pits approximately 300mm deep x 300mm wide x 400mm deep, or the dimensions of the rootball, whichever is greater.

4.6.4 All trees should be planted with a 75 mm depth of bark mulch, 0.5 m in diameter around each tree/shrub to suppress weeds and retain soil moisture.

4.6.5 A list of locally appropriate species is given below in Table 4.4 (those which have been identified on the Site).

Table 4.4: Tree Species for Planting within the Scheme

Scientific Name	Common Name	Size	Form
Scattered Trees			
<i>Acer campestre</i>	Field maple	125-150 cm	Whip (Bare Root)
<i>Betula pendula</i>	Silver birch	100-125 cm	Transplant (Bare Root)

<i>Malus sylvestris</i>	Crab apple	125-150 cm	Whip (Bare Root)
<i>Prunus padus / avium</i>	Cherry (wild or bird)	100-125 cm	Transplant (Bare Root)
<i>Quercus robur</i>	Pedunculate oak	125-150 cm	Whip (Bare Root)
<i>Salix fragilis</i>	Crack willow	125-150 cm	Whip (Bare Root)
<i>Sorbus aucuparia</i>	Rowan	100-125 cm	Transplant (Bare Root)
<i>Ulmus procera</i>	English elm	125-150 cm	Feathered (Bare Root)
Resistant/Ash Replacement Tree Species			
<i>Acer pseudoplatanus</i>	Sycamore	100-125 cm	Transplant (Bare Root)
<i>Alnus glutinosa</i>	Alder	100-125 cm	Transplant (Bare Root)
<i>Betula pendula</i>	Birch	100-125 cm	Transplant (Bare Root)
<i>Ulmus 'New Horizon'</i>	Elm (disease resistant cultivars)	125-150 cm	Feathered (Bare Root)
Shrubs			
<i>Corylus avellana</i>	Hazel	60-80 cm	Whip (Bare Root)
<i>Crataegus monogyna</i>	Hawthorn	60-80 cm	Whip (Bare Root)
<i>Ilex aquifolium</i>	Holly	60-80 cm	Containerised
<i>Prunus spinosa</i>	Blackthorn	60-80 cm	Whip (Bare Root)
<i>Salix cinerea</i>	Grey willow	60-80 cm	Transplant (Bare Root)

4.6.6 Locally sourced native black poplar *Populus nigra* subsp. *Betulifolia* and Crack Willow, *Salix fragilis* are proposed within some of the riparian habitats along major water courses on the Site, and along the eastern boundaries of the Scheme. Local genetic stock is to be sourced where available, ensuring that they are not hybridised, and a mixture of male and female plants would be planted. Seed fall would be monitored and self-sown specimens that may negatively impact the solar panels or adjacent land would be removed.

Scattered Trees a with Native Shrub Management

4.6.7 Due to the naturalised appearance of the shrub and scattered trees, this particular planting typology will require little maintenance once established.

4.6.8 All trees and shrubs will be regularly watered in the first summer and as required thereafter to ensure successful establishment. Bark mulch will be maintained at a depth of 75 mm, 0.5 m in diameter around each tree/shrub as required to suppress weeds and retain soil moisture.

4.6.9 Hand pulling of persistent weeds will be undertaken if they are not too excessive, or they will be treated using a spot herbicide treatment if more widespread.

4.7 Buffer Areas

4.7.1 Buffer areas have been incorporated into the design of the Scheme to ensure an appropriately-sized offset free from development between the various valued habitats typically located at field boundaries (hedgerows, watercourses and woodland etc.). Buffer zones are located between the retained field boundary habitats and the perimeter security fence in the case of the 'outermost' fields within a Site, and between field boundary habitats and the panels in other fields.

4.7.2 Chapter 9 [APP-047] and Appendix 9.10 [APP-086] of the Environmental Statement contain detail on the layout of these buffers. The criteria on which buffers have been applied are as follows in Table 4.5 below.

Table 4.5: Buffer Size Criteria

Buffer Size	Criteria Where Buffer Applied
5m	Species poor hedgerows with no ditch
8m	At least one of: <ul style="list-style-type: none"> Species rich hedgerow A ditch or water course of any kind <ul style="list-style-type: none"> Any hedgerow with a tree with low potential for roosting bats
10m	At least one of: <ul style="list-style-type: none"> Signs of otter or water vole in the ditch/watercourse Any hedgerow with a tree with moderate potential for roosting bats Outlier badger setts
12m	Any hedgerow with a tree with high potential for roosting bats
15m	Some minor watercourses (depending on ecological value)
20m	At least one of: <ul style="list-style-type: none"> Woodland edge Some minor-moderately large watercourses (depending on ecological value) Subsidiary or annexe badger setts
30m	At least one of: <ul style="list-style-type: none"> Ancient woodland Major watercourses (depending on ecological value) Main badger setts

50m	Ponds containing great crested newts
Unknown/ case-by-case	<ul style="list-style-type: none"> Bat roosts Schedule 1 bird nests (barn owl, hobby etc)

4.7.3 The above table shows that the ecological buffer areas, when applied across the entire Scheme, will comprise a large amount of land outside the footprint of the solar array which can be ecologically enhanced, and a range of habitats have been proposed below to create a mosaic within the landscape. Diversification of grassland management maximises the available niches for invertebrates to lay eggs, overwinter and feed and in turn drive opportunities for diversification up the food chain. Extensive, low-input and higher species diversity grassland types have been chosen for the buffer areas (as well as within the footprint of the array) as these represent a locally appropriate habitat type, as opposed to extensive woodland, scrub or wetland creation, which are proportionately less well represented in the local landscape.

4.7.4 As conservation management of grassland will be applied throughout all grassland habitats within the Scheme (i.e. no management during the flowering season), differing seed mixes and creation prescriptions may be used between different, adjacent buffer zones, as well as the array footprint.

4.7.5 Widening of existing arable field margins (typically 1-5m at present) into these larger ecological buffer zones has the beneficial effect of enhancing the neighbouring hedgerows and ditches they frequently run parallel with. This in turn increases the interconnectedness of habitats within the Scheme and within the neighbouring landscape, a key tenet of the NPPF and local planning policy.

4.7.6 It has been assumed within this plan that any grassland creation on previously arable land would require seeding given that the land will have been under agricultural production for many years. Although there are several methods for establishment of habitat on a previously arable site, such as natural regeneration to maintain a local genestock and distinctiveness (Ref.4) or use of a local donor site to provide green hay, given the size of the Scheme, it is likely that a large proportion of seed will need to be purchased from outside the local area. Whilst this is acceptable it is important that seed is sourced as locally as possible and as a minimum will be native to the UK and UK sourced.

4.7.7 The following principles will be used when considering seeding:

- If there is evidence that the land was previously grassland (as opposed to arable cropland) or there is a diverse grassland habitat nearby, soil inversion and natural regeneration will be considered in the first instance which would be specified in detailed landscape proposal plans;
- Where possible, local donor sites will be used to source seed;

- Where seed requires purchase from a supplier. The source will be as local as possible (eg. Habitat Aid gives details of their donor sites); and
- Seed will be native to the UK (unless otherwise specified in the LEMP).

4.7.8 It will be important to gain an understanding of soil conditions prior to any seeding being carried out – this will include an assessment of soil type and pH, as well as nutrient levels which may affect the species that will establish. Consequently, the information in this outline LEMP will be subject to revision following completion of such investigations, which would further tailor and refine the appropriate seed mixes and habitat establishment techniques to be adopted.

4.7.9 Where enhanced grassland is to be created on existing grassland, this will first require some level of scarification or harrowing in order to open the sward up for over sowing of seed. The aim would be to create at least 50% bare ground in order to do this.

4.7.10 The following sections set out the grassland habitat types to be created within the different buffer areas.

Flower-Rich Pollinator Strips

4.7.11 Within areas under this treatment, a floristically rich habitat will be created (see Figure 3) which will have a benefit for pollinating insects (Ref.5), therefore boosting invertebrate numbers which are currently in decline and providing ecosystem services for the adjacent arable land. This would also benefit species such as farmland birds, amphibians and reptiles.

4.7.12 In order to create this habitat, a more flower rich seed mix will be utilised, such as Habitat Aid's Standard Pollen and Nectar Mix (Ref.6) which includes a carefully selected range of nectar rich flowers to allow for a long flowering season.

4.7.13 The seed mix includes species to attract specific butterflies, such as the inclusion of birdsfoot trefoil which is a foodplant for dingy skipper Erynnis tages, a Nottinghamshire BAP species.

4.7.14 This habitat would be cut once on an annual basis, in September to avoid impacts on nesting birds, with arisings removed.

Figure 4.1: Wide, Herb Rich Flowering Field Margin



- 4.7.15 The creation of this habitat is focussed on areas within the Sites where development is constrained for other reasons (i.e. overhead and underground utilities) . This habitat will also be created within sunnier buffer areas, such as on the south side of hedgerows. This will create a network of pollinator strips running through the Site, being linked with other habitats as set out below. In addition, this habitat has been focussed on buffers near residential dwellings as the flower rich sward (with species selected to provide a long flowering season) will create a visually attractive habitat.
- 4.7.16 Wide easements of this habitat will be created within West Burton 1 and 2, with a large network of easements within West Burton 3. Areas have also been created adjacent to residential properties on West Burton 2 and 3, as well as alongside the Public Right of Way at West Burton 3.
- 4.7.17 A total area of 52.4ha of herb rich pollinator mix has been identified within the Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact Assessment (LVIA) [APP-046].

Tussock Grassland Margins

- 4.7.18 Low intensity managed grassland can provide valuable tussocky habitat (see Figure 4) for a range of birds, providing a food source both during breeding and wintering, as well as nesting habitat for species such as corn bunting *Emberiza calandra*, reed

bunting *Emberiza schoeniclus*, yellowhammer *Emberiza citrinella* and whitethroats *Sylvia communis*.

- 4.7.19 The tussocks also provide breeding and wintering habitat for a range of invertebrates and also optimal habitat for small mammals (which in turn benefits species such as barn owl), amphibians and reptiles. Tussocks can provide nesting opportunities for harvest mice *Micromys minutus*, a Nottinghamshire BAP species.
- 4.7.20 Tussocky field margins created on arable land will be seeded with an appropriate tussock forming seed mix such as Habitat Aid's Tussock Mix (Ref.7) or similar. Where grassland margins already exist, management can be altered in order to encourage a tussocky sward to form.
- 4.7.21 Once established, the tussocky grassland should be cut (ideally) or grazed on a rotational basis once every 3 years in September, to allow plants to flower and set seed and also avoid impacts on nesting birds using the hedgerows/margins.

Figure 4.2: Tussocky Field Margin Between Security Fencing & Field Boundary



- 4.7.22 Tussock habitat has been focussed on more shaded areas such as on the northern side of hedgerows or adjacent to scrub and woodland where the tussocky grassland will form a transitional habitat into the more regularly managed grassland within the solar farm. The Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact

Assessment (LVIA) [APP-046] show this habitat being created extensively across the Scheme forming an important connected corridor for wildlife with a total area of 53.1ha.

Successional Scrub

- 4.7.23 Some field margins will be allowed to develop into scrub. Scrub is a valuable habitat as it provides shelter and food for invertebrates, birds and mammals. It can be a particularly valuable habitat to develop on woodland edges, as it provides an important transitional zone between the wooded area and grassland.
- 4.7.24 Scrub establishment has been focussed in areas on the edges of woodland and has been located on outermost fields and outside the security fencing only, to prevent encroachment into the solar farm itself (the annual cutting of the grassland inside the security fencing will prevent the scrub from spreading).
- 4.7.25 Where possible, scrub establishment will take the form of “rewilding”, with locally sourced tree seeds and berries being scattered within the areas to be established and allowing the habitat to grow without any specific planting. This will ensure local gene stock is used and the species which thrive will be those most suitable to the specific conditions in that area. Whip planting will be undertaken where this approach is not successful.
- 4.7.26 The following species are found locally and would be appropriate for the supplementary approach highlighted above:

Table 4.6: Scrub Species

Locally Appropriate Scrub Species	
Hawthorn	<i>Crataegus monogyna</i>
Blackthorn	<i>Prunus spinosa</i>
Field rose	<i>Rosa arvensis</i>
Bramble	<i>Rubus fruticosus</i> agg.
Hazel	<i>Corylus avellana</i>
Crab Apple	<i>Malus sylvestris</i>
Honeysuckle	<i>Lonicera periclymenum</i>

- 4.7.27 The scrub areas will require some management in the form of cutting; this may be through cutting of small areas each year. The management plan will aim to ensure the scrub areas are cut on rotation, with each area cut approximately 3 times over the lifespan of the array. This will create a mosaic within the scrub areas, with some cut and some mature patches which creates valuable habitat for wildlife. The

frequency of cuts is prescribed in the Management Prescription timetable in Appendix B.

- 4.7.28 An area of 9ha of successional scrub habitat will be established across the Scheme, with wide strips at West Burton 2 and 3.

4.8 Beneath Panel Habitat

- 4.8.1 Arable fields occupy the vast majority of the Site and are intensively farmed monocultures which are likely to receive periodic fertiliser and pesticide treatments, as well as being ploughed on a regular basis. The arable fields across all Sites are therefore generally botanically poor and contained little particular ecological interest, save for their value to a relatively small number of ground-nesting bird species and arable specialists including hunting raptors (several of which are notable species of conservation concern) and brown hare.

- 4.8.2 Considerable opportunities for the enhancement of these fields' ecological value compatible with a solar array, as well as their use by hunting raptors and mammals such as brown hare, are available. The reversion from intensive agriculture to low (or no) inputs (fertiliser and soil improvers) grassland alone would be expected to provide a modest net gain in plant and invertebrate species diversity over time. The establishment of meadows within a predominately arable landscape will drive a diversification of local habitats toward that of historical land use patterns where agriculture in the region was characterised by a mix of arable and pasture farming, which supported a greater abundance of wildlife.

Diverse Meadow Creation and Management

- 4.8.3 It has been shown that diverse grassland can be created within a solar array, where managed appropriately (Ref.8). This can have a significant benefit to biodiversity but can also benefit surrounding agricultural land through offering an increase in pollinator species. Other benefits in terms of ecosystem services include an increase in water quality as a result of the cessation of fertilisation and herbicide spraying as well as an increase in soil health as a result of the cessation of ploughing.
- 4.8.4 Lowland meadows are a Habitat of Principal Importance under the Natural Environment and Rural Communities (NERC) Act 2006 and are a Lincolnshire BAP priority.
- 4.8.5 Diverse grassland can take time to develop on previously arable land which has been fertilised and ploughed. However, with an appropriate seed mix selected and correct habitat management implemented, wildflower meadows have been created on many solar farms in the UK(Ref.9). The preparation of the fields before reversion to grassland will be key and must aim to minimise the impact of competition between desirable, sown species and unsown agricultural weeds and cereals (Ref.10).

- 4.8.6 Prior to finalisation of this LEMP, soil investigations will be essential to ensure appropriateness of seed mix/establishment techniques and promote a high likelihood of success. The seed mix will be selected to reflect the soil type, pH and nutrient levels in order to ensure that it establishes successfully. A mix such as Habitat Aids Solar Farm Wildflower Meadow Seed Mix (Ref.11) would be appropriate as it contains a diversity of native wildflowers and non-vigorous grasses.
- 4.8.7 Autumn sowing is preferable, with the seed sown as soon as possible subsequent to construction of the array to avoid a flush of unwanted species such as annual plants and injurious weeds (as well as careful preparation of the land prior to seeding, as set out above).
- 4.8.8 Management during the first year is critical, with more regular cutting taking place to tackle annual or agricultural plants and injurious weeds. Herbicide application may be necessary should there be an abundance of injurious weeds. Subsequent to this, management would be in the form of a “haycut” between late July and September and/or grazing by sheep (aftermath grazing). The fields would be “shut up”, with no grazing or cutting between April and late July to allow the flowering species to grow, flower and set seed.
- 4.8.9 Where possible cutting will be carried out using a cut-and-collect system so as to minimise nutrient build up in the soil which stifles species diversity. It will be necessary to balance the requirement for a late cut to allow plants to flower and set seed and ensuring that the cut is not taken so late that too much dead material is present, rendering the baled material unsuitable for agricultural applications. Careful monitoring and selection of seed mixes will be required in order to achieve both a diverse meadow and a use for the arisings collected. Alternatively, there may be an opportunity to use the cuttings within local composting sites such as anaerobic digesters or open air windrows.
- 4.8.10 An alternative to use of arisings for feedstock or composting is to use hay collected from the established meadow as a source of seed for other sites in the vicinity. However, this would be more appropriate where the meadow has been established using local seed, which will be defined in the finalised version of this LEMP approved pursuant to a requirement under the DCO.
- 4.8.11 Cutting or mowing can be carried out relatively quickly and cost-effectively, particularly with single axis tracker panels (as is proposed to be the case for this Scheme, although flexibility is retained within the application for the use of fixed panels), which can be moved so that they are vertical to allow machinery to access.
- 4.8.12 Where grassland becomes too long and shading of panels is a problem, a “shade cut” may be taken along the leading edge of the panels (i.e., a strip no more than 1m wide) in order to reduce the sward height during the late summer months (as shown in Figure 3 below). However, careful selection of an appropriate seed mix may reduce the necessity of this type of management.

Figure 4.3: Sites where a “Shade Cut” has been employed during the growing season to prevent shading of panels, but allow flowering meadow elsewhere



- 4.8.13 Low intensity grazing throughout the year may be employed, with a low enough stocking density to ensure a varied sward establishes, however, this type of management will need to be carefully monitored as it can lead to a lower number of flowering species given sheep will preferentially graze flowers. However, a diverse grassland can still develop under this management, which will benefit birds and invertebrates. Grazing too often or too densely carries the risk of depleting botanical diversity through the raising of nutrient levels, favouring of fewer vigorous species, and inhibition of flowering and seed-setting. Ideal grazing regimes would include the limiting of number of animals per hectare/acre to ‘conservation grazing’ or Higher Level Stewardship (agri-environment scheme) rates. If possible, sheep should be removed for at least 8 weeks between April and August to allow for plants to flower.

- 4.8.14 Diverse meadow creation has been focussed within the Biodiversity Opportunities Mapping zones present within all Sites, in order to create a network of habitats of high ecological value within these priority areas.
- 4.8.15 The total area of this diverse meadow habitat measures 147ha and has been identified within the Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact Assessment (LVIA) [APP-046].

Longer Term Meadow Creation

- 4.8.16 The large remainder of the Scheme’s panelled areas will be converted to a diverse grassland over a longer timespan. This approach has been chosen after consultation with a seed supplier, as it is likely that there would not be enough seed available in the UK to plant the entire Site with an appropriate mix immediately. The following approach leaves time to create the meadow over several years and allows more careful sourcing of seed from local sources where possible (or potentially from other parts of the Site which are more established and so could act as donor sites).
- 4.8.17 Given that seeding should be done as soon as possible post construction to prevent encroachment of injurious weeds, initial seeding of this large area will take a “nurse crop approach”. This will be discussed with the seed supplier to ensure the correct approach is taken and that non-native cultivars do not persist in the swards.
- 4.8.18 One approach to this may be that a seed mix is used containing 90-95% of short lived cultivar grasses and 5-10% wildflower seeds. The short lived grasses would comprise species such as annual ryegrasses or tetraploid ryegrasses that would not persist in the sward; as these grasses die out it is anticipated that local species would naturally colonise. A seed such as Westerwold ryegrass (Ref.12) would be suitable for this purpose. This will be carefully monitored over the first few years and where required, extra seed may be added.
- 4.8.19 Another approach may be that a nurse crop is used which is then replaced with a wildflower mix over several years, depending on the quantities of seed available.
- 4.8.20 This flexibility has been built into the LEMP after consultation with a seed supplier that has been involved in habitat creation on other NSIP-scale solar projects. The approach ensures that there is time to select a locally appropriate seed mix, particularly given the uncertainty around seed supply which can vary year on year depending on climate and the requirements of other large scale projects.
- 4.8.21 The total area proposed for this longer term meadow creation is 245ha and this has been identified within the Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact Assessment (LVIA) [APP-046].

4.9 Bird Mitigation Habitats

- 4.9.1 As set out in Chapter 9 of the Environmental Statement [APP-047], several areas will be managed specifically to mitigate for the potential adverse impacts of the Scheme on a small number of bird species.

Bird Mitigation/Enhancement Area

- 4.9.2 A large expanse of land (approximately 97ha) at West Burton 2 (Figure 8.18.2_A [REP1-028]) will be managed as mitigation for ground nesting birds such as skylarks, yellow wagtail and lapwing and also as an enhancement for these species and other red/amber listed birds such as curlew and meadow pipit. The area will also continue to provide habitat for overwintering golden plover, which have been recorded during surveys.
- 4.9.3 A 3 year rotation will be established within the previously arable fields in order to provide optimal nesting habitat and foraging resources for skylarks of greater value than at present. Spring sown cereal crops will be established; these crops will contain undrilled 'skylark plots' each measuring at least 16m² (4x4m) which will remain unsown and uncultivated to provide low growing weedy areas for foraging. A total of 2 plots per ha will be established within the fields.
- 4.9.4 The spring sown cereal crop will be rotated between the three areas, so that one field is cultivated each year and the other two remain fallow. The cultivated field will have the cereal crop harvested after mid-July (to avoid the nesting season), then the stubble will remain over winter and the field will remain uncultivated for two years following this harvest. After two years of the field remaining fallow, it will be ploughed and sown again with a spring cereal crop. The fallow fields will provide valuable seed and invertebrate rich habitat for foraging birds and optimal nesting habitat for skylarks. A two year fallow period is particularly important for invertebrates.
- 4.9.5 The cereal crop will be grown without the use of pesticides which may otherwise affect invertebrate abundance. Herbicides will be avoided where possible, however, herbicide application (or changes in management) may be considered should ecological monitoring identify high levels of injurious weeds.
- 4.9.6 In addition, ecological monitoring will focus on the establishment of habitat within the fallow fields; should the vegetation not be establishing as planned, it may be necessary to sow a seed mix in order to encourage a vegetation structure which supports breeding skylarks, or carry out an interim mow/cut to ensure the vegetation does not become dense, scrub-encroached or too tall (>70cm during May-June).
- 4.9.7 In addition to the above, areas of permanent grassland with shallow wetland scrapes will also be established as an enhancement for species such as lapwing and also to increase the general abundance of invertebrates in the area, which will

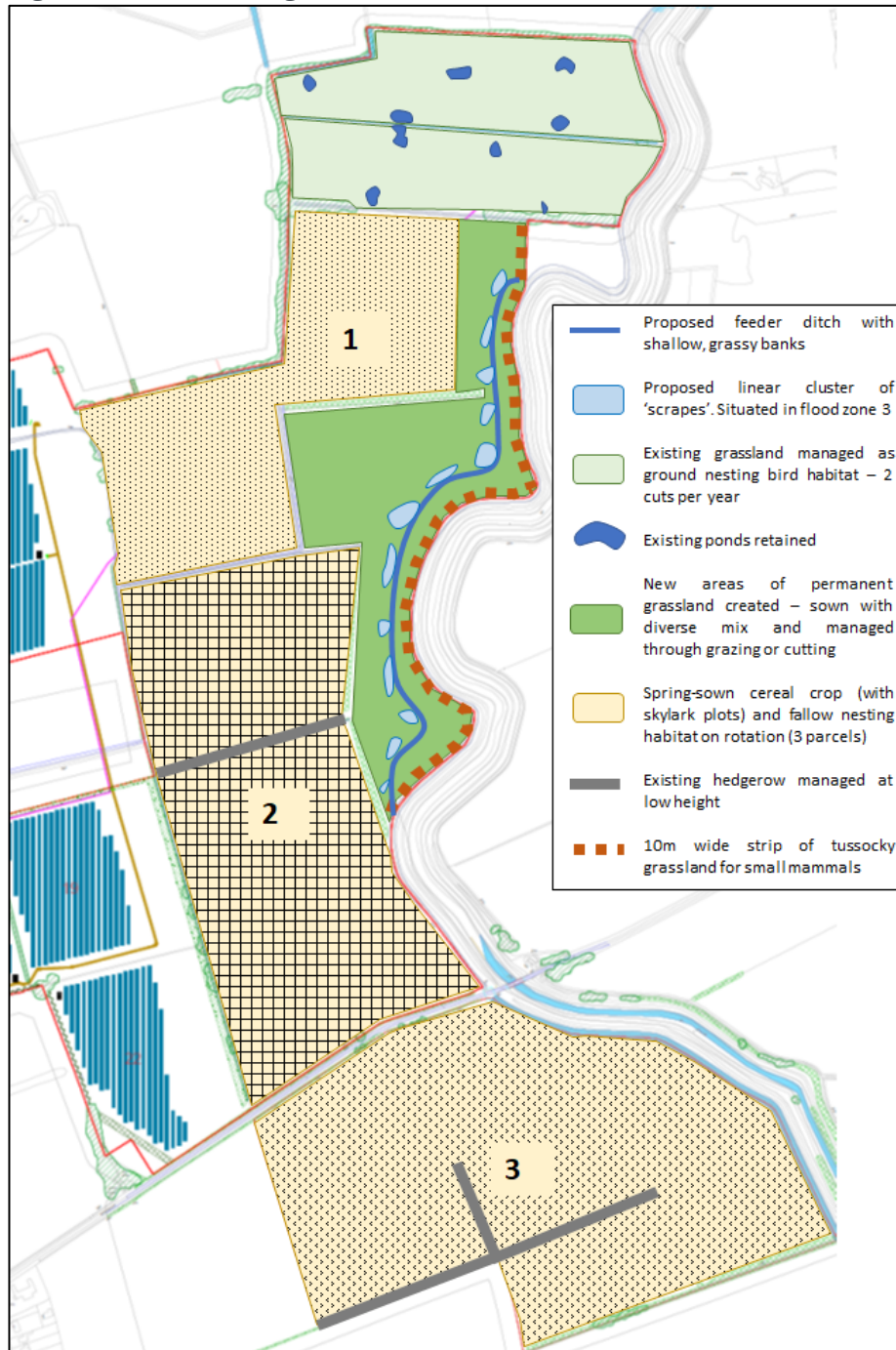
benefit many bird species, including skylark. To do this, the area in question would receive a mix of low-input permanent grassland management to increase invertebrate prey abundance (crucial for feeding chicks for lapwing), newly created features for further foraging opportunities, plus traditional fallow and spring-sown cereal cultivation with specific harvest timing to avoid nest interference and an organic approach to pest control and other inputs. Taken together with the large size of the fields, optimal conditions for high-density nesting by the target species should be created.

- 4.9.8 A linear cluster of scrapes will be excavated close to the River Till, with a feeder ditch connecting these scrapes and supplying a source of water. Scrapes are shallow depressions and the aim would be to ensure they hold water until at least June. The scrapes would be up to 0.5m deep, with shallow margins and irregular outlines as well as a variety of depths to create as many niches as possible. The minimum size for each scrape would be 20m². A cluster of relatively small scrapes is more desirable than fewer larger ones.
- 4.9.9 The scrapes may be connected on a ditch line to ensure they remain wet into June. Where necessary, this may be connected into the River Till, however, this would be discussed with the Environment Agency and other experts. The feeder ditch would be excavated to have shallow, grassy banks to provide further wetland habitat. The sides would be no more than 30-40° and the banks subject to rotational cutting every 2-5 years.
- 4.9.10 Figure 4.4 below shows an irregular edged scrape on a ditch line.
Figure 4.4: Scrape Connected to Ditch Line (RSPB Guidance) (Ref.13)



- 4.9.11 The habitat around the scrapes and existing ponds would be managed as permanent grassland, with the currently arable areas seeded with a meadow grass seed mix such as Habitat Aids Wet Meadow Seed Mix or a grazing mix such as Emorsgate's Special Old Fashioned Grazing Mix (if the area is to be grazed).
- 4.9.12 The grassland habitat would be managed to be suitable for nesting and foraging lapwing, which require a sward height of around 5-15cm, with 5-10% bare ground. Ideally, short tussocks would be present, occupying less than 30% of the area. The best way to achieve this sward would be through cattle grazing from mid-late summer onwards to ensure the sward remains short over the winter period. Alternatively, the area could be cut and chain harrowed to create this sward. Rushes would need to be topped annually to prevent spread, after the nesting season (end of July).
- 4.9.13 The existing grassland in the northernmost field of the area will be retained, with two cuts per year applied in order to ensure the grass is short enough for nesting skylark. The first cut will be taken between February and mid-March, before nesting commences, with a second cut taken at the end of August. Arisings will be removed.
- 4.9.14 A full illustration of the bird mitigation and enhancement area is given in Figure 4.5 overleaf.

Figure 4.5: Bird Mitigation and Enhancement Area



4.10 Other Habitats

Habitat management area to south west of West Burton 2

- 4.10.1 An area of approximately 0.8ha in the south west of West Burton 2 will be seeded with a native grass and wildflower mix (such as Emorsgate EM4), with new native hedgerow planting, a coppice area and wetland habitat created for wildlife. The

initial design of this habitat management area has taken into account the objectives of the Saxibly Nature Project in light of its proximity to nearby sites that form part of the Saxibly Nature Project.

Miscanthus Strip

- 4.10.2 An area of Elephant grass *Miscanthus giganteus* will be planted to act as screening in the south west of West Burton 1. These will be pot grown specimens planted at 1-3 plants per m² in order to create a dense strip.
- 4.10.3 The ground will first be cleared of vegetation and debris, with no fertiliser added. Given that the plants are vigorous, no mulch is required. Planting can occur at any time of year, however, autumn is preferable to avoid drying out of plants.
- 4.10.4 No management is required, however, the sides of the planting may be faced with a flail should they become too overgrown, at the same time as the hedgerows.

Ditches/Rivers

- 4.10.5 Rivers are a Habitat of Principal Importance while rivers, canals and drains are listed on the Lincolnshire BAP and ditches, rivers and streams on the Nottinghamshire BAP.
- 4.10.6 The ditch quality was often poor due to agricultural impacts such as runoff; the cessation of intensive agricultural will lead to better water quality within this habitat. In addition, wide buffers of at least 8m will enhance the ditch and river habitats for birds and invertebrates as well as otters and water vole, where present.
- 4.10.7 Adjacent to rivers and ditches, a tall herb community will be established through seeding. This marginal habitat is important for species such as water vole as well as aquatic invertebrates. A suitable seed mix for this habitat would be Habitat Aid's Low Maintenance Wildflower and Grasses Seed Mix (Ref.14) or a bespoke mix suitable for wetter situations. A total area of 9ha of this tall herb habitat will be created within the Scheme and this has been identified within the Landscape and Ecology Mitigation and Enhancement Plans (Figures 8.18.1 – 8.18.3 [REP1-026 to REP1-031]) of the Landscape and Visual Impact Assessment (LVIA) [APP-046].
- 4.10.8 Planting of trees may also be undertaken adjacent to ditches and rivers, with sufficient distance from the ditch to prevent damage and on the northern side where possible to prevent shading.
- 4.10.9 Ditch management will follow an ecologically sensitive approach which will include the following principles:
- Ditch management will be undertaken on a 2-5yr rotational basis so that undisturbed areas remain annually with the objective of ensuring a mosaic of habitat maturity across the Order Limits at all times. This will include a proportion of bare ground and tussocky grassland on banks and banktops, together with intervening successional habitats.

- An ecologist will collaborate with the management contractor to prepare a plan and timetable of management operations. This will involve the identification of ditches most in need of vegetation clearance or re-profiling as well as the identification of protected species constraints as appropriate. In addition, priority ditches in terms of enhancement of wetland corridors for water voles and otters will be identified. Measures to protect any adjacent newly-created habitat within the Order Limits will also be identified.
- An ecologist will assess the coverage of filamentous algae within the ditches and remedial measures will be carried out where filamentous algae coverage is frequent, abundant or dominant. Remedial measures will follow guidance set out in The Drainage Channel Biodiversity Manual².
- Management practices would avoid the bird nesting season and so not take place between March and August inclusive.
- Ditch cleaning will be undertaken using excavators equipped with weed-clearing buckets to remove choking vegetation.
- The efficacy of the ditch management operations would be periodically reviewed and incorporated into the LEMP monitoring timetable.

Ponds

- 4.10.10 Ponds are a Habitat of Principal Importance and listed on the Lincolnshire BAP, with eutrophic and mesotrophic standing water listed on the Nottinghamshire BAP.
- 4.10.11 Ponds are of significant ecological value, and as a strong, high-quality pond network is absent within the local landscape, any creation of such features would be beneficial. Ponds could be created within field margin buffer zones (see Figure 8) and have a role to play in flood risk alleviation and water attenuation. These could take the form of linear ponds such as deepened swales, where this type of drainage is required for the development.
- 4.10.12 Creation of wetland habitats such as ponds, swales and scrapes will benefit a range of species that have been recorded within the Site, including birds such as snipe *Gallinago gallinago*, lapwing *Vanellus vanellus*, mallard *Anas platyrhynchos* and reed bunting *Emberiza schoeniclus*. Ponds will also provide habitat for newts, which are all listed as Lincolnshire BAP priority species.
- 4.10.13 Ponds will be created within areas outside the footprint of the array.

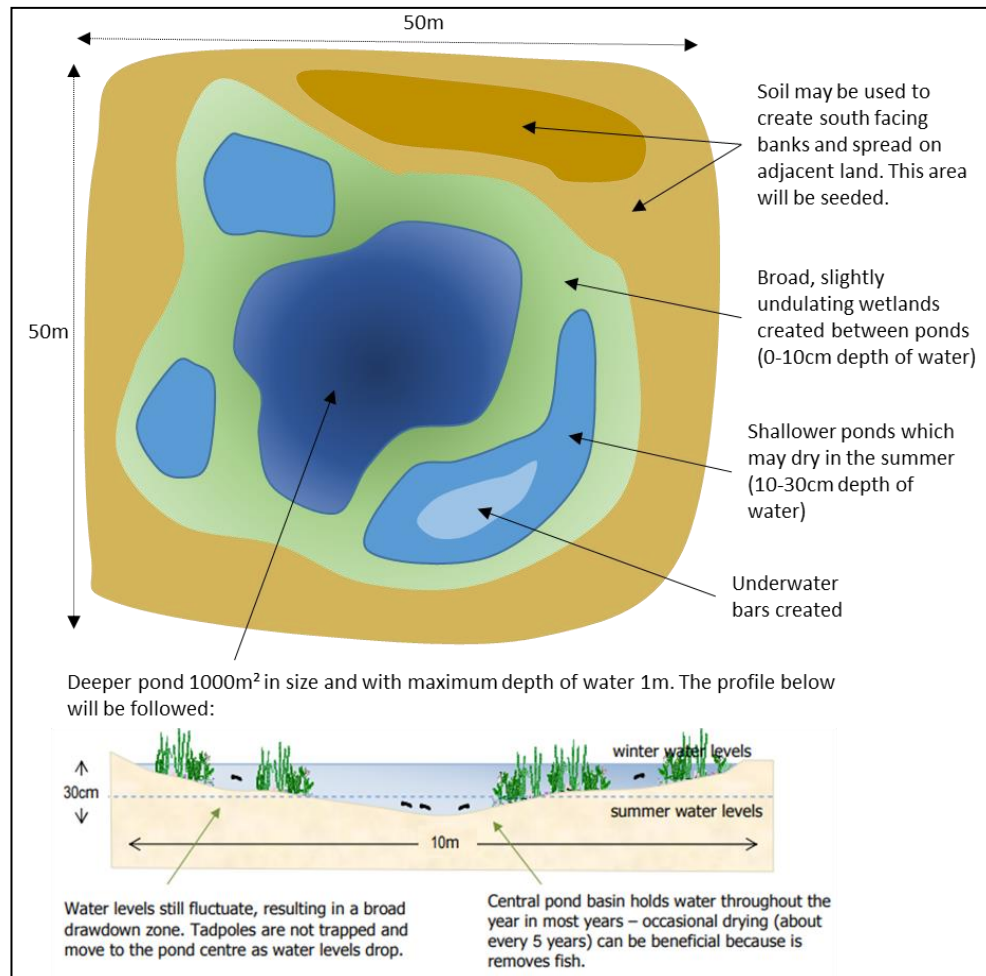
² Buisson, R. S. K., Wade, P. M., Cathcart, R. L., Hemmings, S. M., Manning, C. J. & Mayer, L. (2008). The Drainage Channel Biodiversity Manual: Integrating Wildlife and Flood Risk Management. Association of Drainage Authorities and Natural England, Peterborough.

Figure 4.6: Pond Creation In Margin of Solar Farm



- 4.10.14 The ponds will allow for the widest variety of habitats possible, with shallow margins (some wide and some narrow) and a deeper area of at least 1.5m. They will be designed to provide shallower pools of water, as well as a larger, deeper area (so creating a complex of ponds), as recommended by the Million Ponds Project (Ref.15).
- 4.10.15 Principles for pond construction are as follows:
- No planting will be introduced so as to allow species which use early successional stages of ponds to establish.
 - At every location where a pond to be created is shown on the Landscaping Plans [REP1-026 to REP1-031], this will comprise one deep pond and three shallower ponds as show in Figure 11 below.
 - Pond slopes will be shallow: less than 1:5 (12°), but preferably 1:20 (3°)
- 4.10.16 Spoil will be used to create south facing bunds and spread on adjacent land, then seeded with a suitable native diverse mix (such as the mixes set out in previous sections).
- 4.10.17 A suitable design for the ponds is shown in Figure 4.7 below.

Figure 4.7: Suitable Pond Design



- 4.10.18 The design of the pond ensures suitability for great crested newts, but also for other amphibians. The areas of marshy wetland will create a mosaic of habitats and will increase the diversity of the area as a variety of plants will be able to establish. This will attract a greater diversity of invertebrates.
- 4.10.19 The ponds will be checked during monitoring visits to ensure they are establishing without any problems.
- 4.10.20 Some management will be required, depending on the establishment of scrub, trees and prolific species such as bulrush (although the variety of pond depths will ensure that some open water will be available). The ecologist will advise on the correct timing of any management required subsequent to the monitoring visits. Anticipated management will be as follows:
- Every 5 years: a cut of vegetation surrounding the ponds to prevent tree growth and shading. This will be carried out in the winter months using hand-tools. Some patches of scrub can be left to develop on the northern side of the

pond. Arisings will be left in a pile close to the pond area (but over 20m from open water to prevent nutrients entering the pond system).

- Every 10 years: Some hand pulling or mechanical dredging may be required if there is a build-up of vegetation within the ponds. This will only be carried out where there is a risk of all open water being covered and will be carried out under the direction of an ecologist as great crested newts may be present.

4.10.21 A total of 5 new ponds are proposed; two ponds at West Burton 1 (Figure 8.18.1_A) [REP1-026] and three ponds at West Burton 3 (Figure 8.18.3_A) [REP1-030].

Habitat Boxes

4.10.22 Habitat boxes can be a useful tool for monitoring and can provide nesting/roosting opportunities where there is a lack of natural features within the landscape. For this outline LEMP, exact locations and plans for bat and bird boxes have not been produced owing to the likely refinement of these specifications during the examination process. It is anticipated that a finalised location and specification plan will be produced as part of the final LEMP approved pursuant to a DCO Requirement.

Bird Boxes

4.10.23 Bird boxes that mimic cavities can be installed on Sites where there is a lack of mature trees which may naturally provide these features. Boxes can be installed according to the species and their distribution identified during the breeding bird surveys and so are known to be present within the local area.

4.10.24 Barn owl boxes are known to be particularly successful on solar sites (Ref.16), especially when placed close to areas of rough grassland where there will be an abundance of small mammals. Where no mature trees are present, barn owl boxes can be post mounted (although trees are preferable). Barn owls are a priority species under the Nottinghamshire BAP.

4.10.25 Table 6 gives outline details of which boxes will be installed together with numbers, distribution and siting recommendations. Where the exact boxes cannot be sourced, a similar model will be secured and all boxes will be constructed from long-lasting materials such as woodcrete, where possible. All bird boxes will be installed out of direct sunlight, facing away from prevailing wind (northerly, easterly or south-easterly preferably). Boxes should also be placed clear of vegetation and away from ivy growth. All boxes will be placed 3m of the ground unless otherwise specified.

4.10.26 The numbers of boxes proposed for the Scheme have been calculated as approximately 1 box for every 100m of hedgerow (based on an estimate of 52km of hedgerow). This gives a total of 520 boxes which have been split between various target species depending on what has been recorded within the surveys.

4.10.27 Opportunities for installing bird boxes on buildings such as the structures associated with the battery site will be explored and if feasible, boxes for species

such as swifts, house sparrows and house martins will also be included within the final LEMP.

Table 4.6: Bird Box Specifications

Box Type	No.	Description	Placement	Location
Schwegler 2GR (32mm entrance)	105	Suitable for tree sparrow, with a specially designed predator protection entrance	Installed in clusters of 15 placed over a group of trees	Clusters will be located close to records at West Burton 3 (close to the railway line)
Schwegler 1b (26mm entrance)	200	Suitable for tit species and wrens	On mature trees, half placed at a lower height (1.5m) within the hedgerow network and within vegetation to attract wrens	Across Site
Schwegler 3S (45mm hole)	100	Suitable for nesting starlings and roosting woodpeckers	On suitable trees	Across Site
Schwegler 28 Kestrel box	20	Nest box with perch	On a solitary tree on the edge of woodland	Across site where woodland is present
Barn Owl Trust nest box	45	Nest box with platform for young	At least 1km from a motorway/fast unscreened main road. Placed on a solitary tree with a high canopy and few/no lower branches, with the entrance clearly visible.	Close to records at West Burton 2 and 3
Schwegler 5 Tawny owl box	50	Suitable for tawny owls and stock doves	On suitable trees	Close to records at West Burton 2 and 3, with a smaller number at West Burton

				1 (where stock dove was recorded).
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Bat Boxes

- 4.10.28 Again, bat boxes can be particularly useful where natural cavities are limited. The installation of boxes suitable for common pipistrelle *Pipistrellus pipistrellus* (a Lincolnshire BAP species) may act as an enhancement for this species, but could also provide an important monitoring tool.
- 4.10.29 Boxes could be installed in a variety of places including hedgerow trees, woodland or post mounted. Within marshy or riparian areas, post mounted boxes can be used, which may attract soprano pipistrelle *Pipistrellus pygmaeus* or Nathusius' pipistrelle *Pipistrellus nathusii*, which has been recorded on the Site. Boxes may form a useful monitoring tool, given that some notable bat species have been recorded in the area, Nathusius pipistrelle and barbastelle *Barbastella barbastellus*). Double panel bat boxes may be more desirable in some cases, as these prevent birds from nesting within the boxes.
- 4.10.30 Table 7 gives outline details of which boxes will be installed together with numbers, distribution and siting recommendations. Where the exact boxes cannot be sourced, a similar model will be secured and all boxes will be constructed from long-lasting materials such as woodcrete, where possible. Bat boxes will be placed in sunny locations without obscuring vegetation and away from ivy growth. Boxes will be placed approximately 3m from the ground and preferably on south facing mature tree trunks.
- 4.10.31 The numbers of bat boxes installed are based on one box every 200m stretch of hedgerow.

Table 4.7: Bat Box Specifications

Box Type	No.	Description	Placement	Location
Schwegler 2F (with front panel)	100	Especially suitable for pipistrelle species	On suitable trees	Across Site
Schwegler 1FF	100	Suitable for pipistrelle species	On suitable trees	Across Site
Schwegler 1FS Large colony box	30	Suitable for groups of breeding bats including noctule, Nathusius' pipistrelle and long-eared bats	On suitable trees	Across Site

Schwegler 1FW Hibernation box	30	Suitable internal insulation for hibernating bats	On suitable trees	Across Site
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Other Habitats

- 4.10.32 Hibernacula and log piles will be created, particularly close to ponds and tussocky or scrub mosaic grassland. These provide shelter and hibernation opportunities for reptiles and amphibians, but also house invertebrates.
- 4.10.33 A total of two hibernacula per pond will be created (in total 22 adjacent to 11 ponds).

4.11 Ecological Monitoring

- 4.11.1 An outline ecological monitoring strategy is set out below, however, the final details for essential regular monitoring of the developing habitats will be set out within the final LEMP, based on a standardised approach(Ref.17). This monitoring will be carried out more regularly during the first five years of operation, when habitats are in the early stages of developing. This regular monitoring will identify issues early on so that remediation measures or changes in management can be applied.
- 4.11.2 Habitat specific monitoring will be required as part of Biodiversity Net Gain delivery/progress reporting and is included as a 'UKHab' survey along with Condition Assessments of the habitats recorded.

UKHab Survey

- 4.11.3 A habitat survey as well as Condition Assessments of the establishing habitats will be requirement under the Biodiversity Net Gain Assessment prepared for the Scheme [APP-088] pursuant to a DCO requirement. As rough guidance, it is suggested that this assessment is undertaken every 2 years for the first 8 years, then every 5 years until the proposed habitats and conditions are achieved.
- 4.11.4 The requirements for monitoring under Biodiversity Net Gain are currently not established as this topic is still at consultation stage with Defra, however, the monitoring requirements will be finalised in the final LEMP and Biodiversity Net Gain Strategy approved pursuant to the DCO requirements.

Botanical Quadrats

- 4.11.5 Fixed point quadrats will be recorded at selected locations, with quadrats focussing on each habitat type to be established. As rough guidance, it is estimated that approximately 160 quadrats will be recorded, ensuring that each habitat is sampled. The number of quadrats is based on the size of the area and estimated species diversity of the proposed habitat.
- Flower Rich Pollinator – 30 quadrats
 - Tussock Grass Margins – 20 quadrats

- Diverse Meadow (BOMS areas) – 40 quadrats (including 10 directly under panels)
- Tall Herb – 20 quadrats
- Longer Term Meadow Creation – 50 quadrats (including 20 directly under panels)

4.11.6 This will help to track establishment and identify any problems should the habitat not be forming as required. Where these quadrats are undertaken within panelled fields, locations will ensure that all habitats are sampled, including directly beneath and between the strings of panels, as well as within the field edges, outside of the array.

4.11.7 Botany surveys should be undertaken regularly within the first few years as habitats are establishing; a suitable schedule would be years 1, 2, 3, 5, 10, 20, 30, 40.

Nectar Production Potential

4.11.8 From the above data, nectar production potential can be extrapolated for each habitat. This is a calculation that can be made from the species present and their cover using an established data set of nectar sugar values(Ref.18). This is a relatively easy way to ascertain the Site's value for pollinating species without undertaking extensive pollinator surveys.

4.11.9 This calculation can be made subsequent to the botanical surveys as set out above.

Soil Survey

4.11.10 A soil survey would provide a helpful measurement, particularly within an area that had previously been subject to intensive agricultural production for many years. It is therefore proposed that such a survey is carried out prior to seeding and habitat establishment across the Scheme, although this could be targeted or sampled according to needs identified during the finalisation of this document pursuant to a DCO requirement. Basic measurements may include pH, soil type, soil organic matter, bulk density, soil moisture, infiltration capacity, and texture. Additional measurements may include soil carbon, nitrogen, phosphorous, potassium and magnesium.

4.11.11 There may also be opportunities to monitor other indicators such as fungal:bacterial ratio or fungal DNA.

Bird Survey

4.11.12 Given that robust baseline data on the use of the Scheme by birds has been obtained, this can be compared to similar surveys undertaken post construction. Surveys should focus on areas where high numbers of notable birds have been identified, as well as the mitigation habitats to be established. Species of particular interest due to the identification of potential residual adverse effects requiring mitigation would be skylark, lapwing, curlew, and yellow wagtail.

- 4.11.13 The surveys should be undertaken using the same methodology as employed for the baseline surveys and a suitable schedule may be year 2, 4, 10, 20, 30, 40 (although this may need to be adjusted should remedial measures be required where bird mitigation habitat is not establishing as desired).

Bat Survey

- 4.11.14 Again, given that baseline information of bat activity has been obtained, monitoring should seek to replicate this (i.e. with the same static bat detector locations used) in order to assess how bat activity changes post construction.

- 4.11.15 As with the birds, a suitable schedule may be year 2, 4, 10, 20, 30, 40.

Great Crested Newt Survey

- 4.11.16 An eDNA survey of existing and newly created ponds on the Scheme would be a simple way to assess if the great crested newt range has expanded from the baseline extent. Given that it will take time to this species to find new ponds, a survey could be undertaken in years 5, 10, 20, 30, 40.

Additional Monitoring

- 4.11.17 Given the extensive baseline survey information, the range of habitats to be created and the size of the Scheme, there may be opportunities to link up with academic research either through supplying the collected baseline data to an academic body to analyse or through establishment of research plots within the Site. There may also be opportunities to link up with NGOs such as the BTO or Bumblebee Trust (who have been involved in monitoring bumblebees on solar sites).

4.12 Review of Management Prescriptions

- 4.12.1 The Landscape and Visual Impact Assessment (the 'LVIA') [APP-046] sets out in paragraph 8.8.2 an intention to undertake a review at Year 15 of the management prescriptions associated with the operation of the Scheme. These management prescriptions relate to the landscape mitigation and enhancement measures and the review will consider the ability of each habitat type for habitat creation and any associated management measures. This review is to address the existing management prescriptions, to consider whether any prescriptions need to be amended, changed or removed.

5 References

- Ref.1 <https://solarenergyuk.org/wp-content/uploads/2022/05/Natural-Capital-Best-Practice-Guidance.pdf>
- Ref.2 The National Plant Specification – Handling and Establishment (November 1995). Available at: <https://www.csdhub.com/wp-content/uploads/2014/12/The-National-Plant-Specification-Handling-and-Establishment.pdf> [Accessed August 2020].
- Ref.3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/797909/Regions_of_provenance_and_seed_zone_map.pdf
- Ref.4 [Plantlife – Keeping the Wild in Wildflower](#)
- Ref.5 Solar park management and design to boost bumble bee populations. / Blaydes, Hollie; Gardner, Emma; Whyatt, Duncan; Potts, Simon G; Armstrong, Alona. In: Environmental Research Letters, Vol. 17, No. 4, 044002, 30.04.2022.
- Ref.6 <https://www.habitataid.co.uk/products/superior-pollen-and-nectar-seed-mix-1?variant=31994370621485>
- Ref.7 <https://www.habitataid.co.uk/products/tussock-seed-mix>
- Ref.8 H. Montag, G Parker & T. Clarkson. 2016. The Effects of Solar Farms on Local Biodiversity; A Comparative Study. Clarkson and Woods and Wychwood Biodiversity
- Ref.9 <https://solarenergyuk.org/resource/natural-capital/>
- Ref.10 Blakesley, D. and Buckley, G.P. (2016) *Grassland Restoration and Management*. Exeter: Pelagic Publishing, UK
- Ref.11 <https://www.habitataid.co.uk/products/wildflower-seed-solar-farms>
- Ref.12 <https://www.cotswoldseeds.com/species/74/westerwold-ryegrass>
- Ref.13 RSPB Farming for Wildlife Advice Note – Scrape Creation for Wildlife https://www.rspb.org.uk/globalassets/downloads/documents/farming-advice/scrapecreationforwildlife_tcm9-255102.pdf
- Ref.14 <https://www.habitataid.co.uk/products/low-maintenance-wildflower-and-grasses-seed-mix>
- Ref.15 <https://freshwaterhabitats.org.uk/projects/million-ponds/pond-creation-toolkit/>
- Ref.16 <https://www.clarksonwoods.co.uk/wp-content/uploads/PDF/Solarview2019.pdf>
- Ref.17 <https://solarenergyuk.org/resource/solar-energy-uk-guidance-a-standarised-approach-to-monitoring-biodiversity/>
- Ref.18 <https://catalogue.ceh.ac.uk/documents/69402002-1676-4de9-a04e-d17e827db93c>

Appendix A: Financial Table

Overleaf is a draft Financial Table which sets out the estimated costs of the prescriptions within this LEMP. It should be noted that these costs are indicative only and the purpose to is to give a rough idea of finances which can then be passed on within a contract to any future parties involved in this project. The table will be updated as this LEMP progresses, and both should be viewed as live documents. Ecological monitoring costs have not been included at this stage but should also be considered.

Habitat type							Product			Implementation			I+P	Management in year 1				Management costs (annual thereafter)			
Habitat	Type	Description	Location	Area (Ha)	Length (km)	No. of units	Type	Cost per Ha / km / unit	Product cost	Type	Cost per Ha / km / unit	Implement Cost	Total Product + Implement Cost	Timing	Activity	Cost per Ha / km / unit	Cost	Activity	Activities no. p.a.	Cost per Ha / km / unit	Cost
Grassland / Sward / Seed mixes	Flower Rich Pollinator Mix	Sown within buffer areas	Margins and easements	52.4			Standard Pollen and Nectar Seed Mix or similar (https://www.habitataid.co.uk/products/superior-pollen-and-nectar-seed-mix-1)	£245.50/kg. Sow at 20kg per ha	£256,760	Twice cultivation, sowing, rolling, seeding	£800.00	£41,920	£298,680	Assume 3 times in a year	Cut and collect.	£300.00	£47,160	Cut and collect.	1	£300.00	£15,720
	Tall Herb Mix	Sown within buffer areas	Margins near watercourses	9			Pond Edge Seed Mix (https://www.habitataid.co.uk/products/pond-edge-seed-mix) or similar	£75.50/kg. Sow at 20kg per ha	£13,590	Twice cultivation, sowing, rolling, seeding	£800.00	£7,200	£20,790	Assume 3 times in a year	Cut and collect.	£300.00	£8,100	Cut and collect.	1	£300.00	£2,700
	Tussock Mix	Sown within buffer areas	Margins	53.1			Tussock Seed Mix (https://www.habitataid.co.uk/products/tussock-seed-mix) or similar	£45.00/kg	£47,826	Twice cultivation, sowing, rolling, seeding	£800.00	£42,512	£90,338	Assume 3 times in a year	Cut and collect.	£300.00	£47,826	Cut and collect every 3 years	0.3	£300.00	£4,783
	Array Grassland (all wildflower mix) - BOMS Areas	Wildflower mix sown within BOMS area subsequent to construction	BOMS areas	147			Solar Farm Wildflower Meadow Seed Mix (https://www.habitataid.co.uk/products/wildflower-seed-solar-farms) or similar	variable - assume £75/kg	£220,500	Twice cultivation, sowing, rolling, seeding	£800.00	£117,600	£338,100	Assume 3 times in a year	Cut and collect.	£300.00	£132,300	Cut and collect.	1	£300.00	£44,100
	Array Grassland (5% wildflower)	Majority of development to be seeded with mix of short lived cultivar grasses and wildflower for establishment over time	Majority of site	245			Assume short term ley mix (https://www.cotswoldseeds.com/products/75fast-and-vast-high-clover-one-two-year-ley) with 5% wildflower mix (eg. Solar farm wildflower meadow as above)	£21.73/ha Plus wildflower	£25,353	Twice cultivation, sowing, rolling, seeding	£800.00	£196,000	£221,353	Assume single cut required	Cut and collect.	£300.00	£73,500	Cut and collect annually. May require oversowing of wildflower seed once annual plants have reduced in density - not included	1	£300.00	£73,500

Habitat type							Product			Implementation			I+P	Management in year 1			Management costs (annual thereafter)				
Habitat	Type	Description	Location	Area (Ha)	Length (km)	No. of units	Type	Cost per Ha / km / unit	Product cost	Type	Cost per Ha / km / unit	Implement Cost	Total Product + Implement Cost	Timing	Activity	Cost per Ha / km / unit	Cost	Activity	Activities no. p.a.	Cost per Ha / km / unit	Cost
Woody plants, scrub & screening plants	Scrub	Small patches of successional scrub planted with whips or seeds	Discrete areas	11		11,000	Mixed species	€150 per unit	€16,500	Spirals, slot planting, mulching	€3.36	€36,960	€53,460	November	Check of planting, topping up mulch, spot treatment of herbicide	€1,000.00	€11,000	Mechanical cut after year 15 on rotation	0.05	€50.00	€27,500
	Hedgerows	New native hedgerow planting with standard trees	Across site		7.13	21,390	Mixed species whips	€150 per unit	€32,085	Spirals, slot planting, mulching	€15/m	€106,950	€139,035	November	Check of planting, topping up mulch, spot treatment of herbicide	€200.00	€1,426	Trim whole site with flail (2-3 year rotation) - 81km	0.3	€65.00	€1,580
	Trees	Shelterbelt woodland	Discrete areas	13.7		17,125	Mixed species	€0.25	€4,200	Spirals, slot planting, mulching	€4.00	€68,500	€72,700	November	Check of planting, topping up mulch, spot treatment of herbicide	€1,000.00	€13,700	Thin & coppice every 5 years plus annual check	0.2	€50.00	€171,250
Wetland features / Ponds & scrapes	Ponds	Construction of new ponds	5 new ponds			5				Excavation	€2,500.00	€12,500	€12,500	September - October	Weed pulling around pond	€450.00	€2,250	Clear 50% of vegetation from pond every 3 years using a small excavator	0.3	€300.00	€450
	Scrapes	Creation of wader scrapes and feeder ditches	At West Burton 2			13				Excavation	€1,000.00	€13,000	€13,000	September - October	Weed pulling around scrape	€450.00	€5,850	Clear 50% of vegetation from scrape every 3 years using a small excavator	0.3	€300.00	€1,170
Bird Mitigation Area	Wetland Bird Habitat	Arable and mosaic of habitat for ground nesting birds including lapwing	At West Burton 2	97			Grassland sowing of seed (modified grassland)	€20.00/ha	€1,940	Twice cultivation, sowing, rolling, seeding	€800.00	€77,600	€79,540	Grazing/ crop management TBC				Grazing/ crop management TBC			
Animal and insect habitat creation	Hibernacula	Pile of logs and stone	Near ponds and other locations			30	Use on site materials	€0.00	€0	Minor machine time	€37.00	€1,110	€1,110								
	Bat boxes	Variety of boxes	Across site			260	Average price per box estimated	€100.00	€26,000				€26,000			€0.00	€0	Replacement of some nesting and roosting structures after five years	0.2	€2.46	€640
	Bird boxes	Variety of boxes	Across site			520	Average price per box estimated	€70.00	€36,400				€36,400			€0.00	€0	Replacement of some nesting and roosting structures after five years	0.2	€0.32	€480
Total Landscaping and Biodiversity Expenses (excl General Provisions)									€544,493	Implementation total	€789,724	€1,334,217		1st year subtotal	€316,790		€369,324				

Appendix B: Management Prescription Timetable

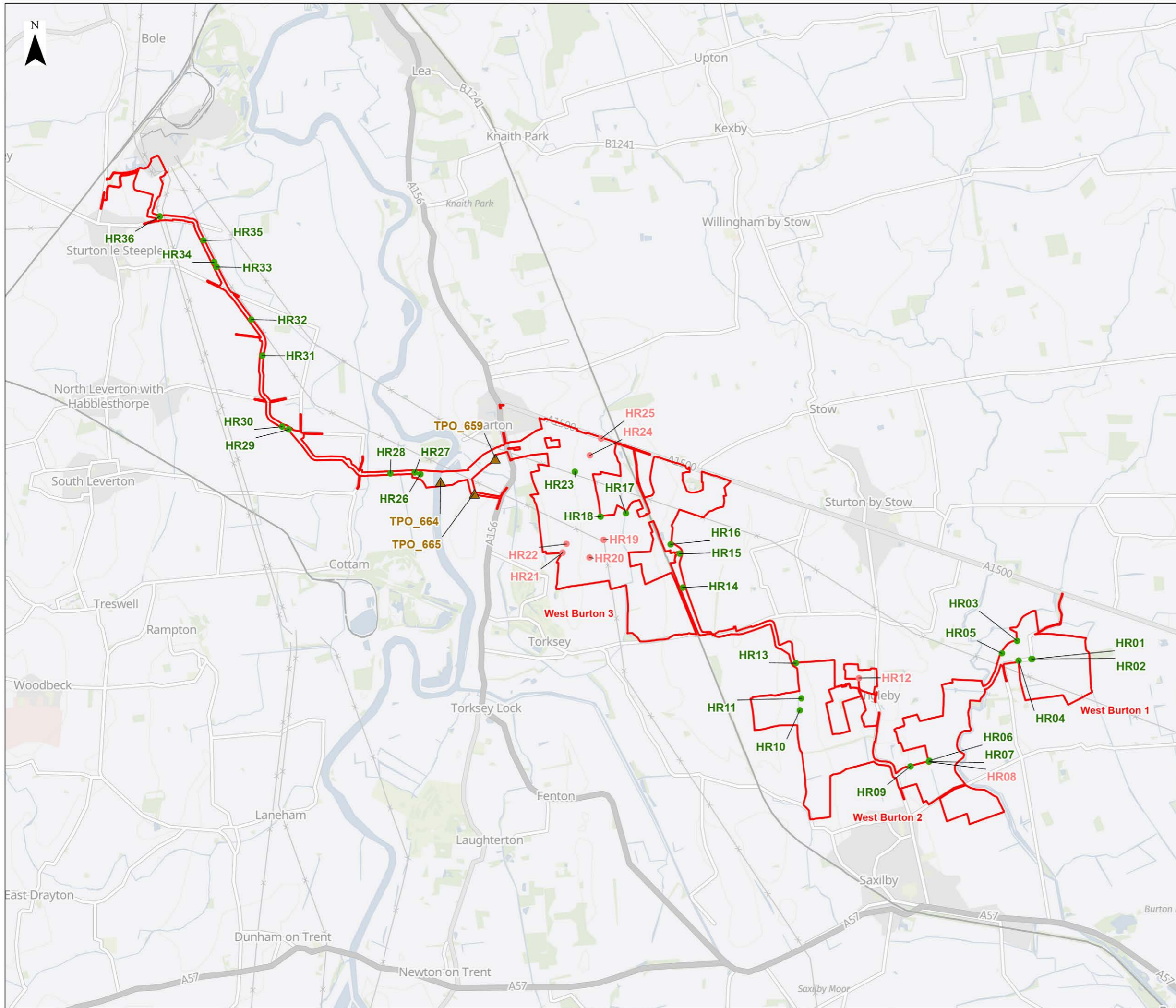
Operation Management Prescription	Frequency per Annum	Season	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 onwards
Hedgerow								
Maintain weed free planting area through herbicide spot treatment and topping up bark mulch	Biannually	April - August						
Mechanical cut	2-3 years on rotation	September-January						Ongoing
Replace dead plants	Check annually	Next available planting season						
Hedgerow Trees								
Maintain weed free planting area through herbicide spot treatment and topping up bark mulch	Biannually	April - August						
Inspection and formative prune carried out annually in accordance with good arboricultural practice to BS 3998:2010. A clear stem will be maintained for all hedgerow trees in order to be distinguishable.	Annually	September-January						Ongoing
Replace dead plants	Check annually	Next available planting season						
Woodland Copse & Shelter Belts								
Maintain weed free planting area through herbicide spot treatment and topping up bark mulch	Biannually	April - August						

Operation Management Prescription	Frequency per Annum	Season	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 onwards
Thinning / Coppicing	Every 5 years, after year 10 once planting has established	Nov- March						From Year 10
Replace dead plants	Check annually	Next available planting season						
Scattered Trees & Shrub Planting								
Maintain weed free planting area through herbicide spot treatment and topping up bark mulch	Biannually	April - August						
Mechanical cut on a rotation basis after year 15, once scrub has established.	Mechanically cut rotational areas once every 10 years	February						Ongoing
Replace dead plants	Check annually	Next available planting season						
Flower Rich Pollinator Strips								
Annual hay cut	1	September						Ongoing
Tussock Grassland Margins								
Spot herbicide application	Where required	April - August						Ongoing
Hay cut / Grazed	On a rotation basis. Once every 3 years	September						Ongoing
Successional Scrub								

Operation Management Prescription	Frequency per Annum	Season	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 onwards
Mechanical cut on a rotation basis after year 15, once scrub has established.	Mechanically cut rotational areas once every 10 years	February						Ongoing
Mechanical cut along internal edges to keep fenceline clear	Annually	February						Ongoing
Spot herbicide application	Where required	April - August						Ongoing
Diverse Meadow Creation and Management								
Year 1 only - regular cutting after seeding	3 times in the year	Spread through year						
Option 1 - Hay Cut	Annually after year 1	Late July - September						Ongoing
Option 2 - Grazing at a low stocking density	Annually after year 1	Ideally with sheep removed for 8 weeks in summer						Ongoing
Spot herbicide application	Where required	April - August						Ongoing
Bird Mitigation/Enhancement Area								
Spring sown cereal crop planted in one third of area containing skylark plots	Annually							Ongoing
Two thirds of area left fallow once crop removed	Fallow for 2 years							Ongoing
Grassland Habitat: Option 1 - Cattle grazing	Annually	August - February						Ongoing

Operation Management Prescription	Frequency per Annum	Season	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 onwards
Grassland Habitat: Option 2 - Chain harrowed to create varied sward	Annually	August - February						Ongoing
Rushes to be topped	Annually	end of July						Ongoing
Ditch Management								
Vegetation Clearance and Bank Re-profiling	Rotationally every 2 - 5 years	September - February						Ongoing
Management of filamentous algae	Where required	Summer						Ongoing

Appendix C: Hedgerow Removal Plans



Key

- Order Limits
- Section of hedge to be removed temporarily
- Section of hedge to be removed permanently
- ▲ Tree Preservation Order (TPO)

Notes:
i) Drawing to be read in conjunction with ES Figures 8.18.1 [EX1/WB8.18.1_A] to Figures 8.18.3 [EX1/8.18.3_A] Landscape and ecology Mitigation and Enhancement Plans.

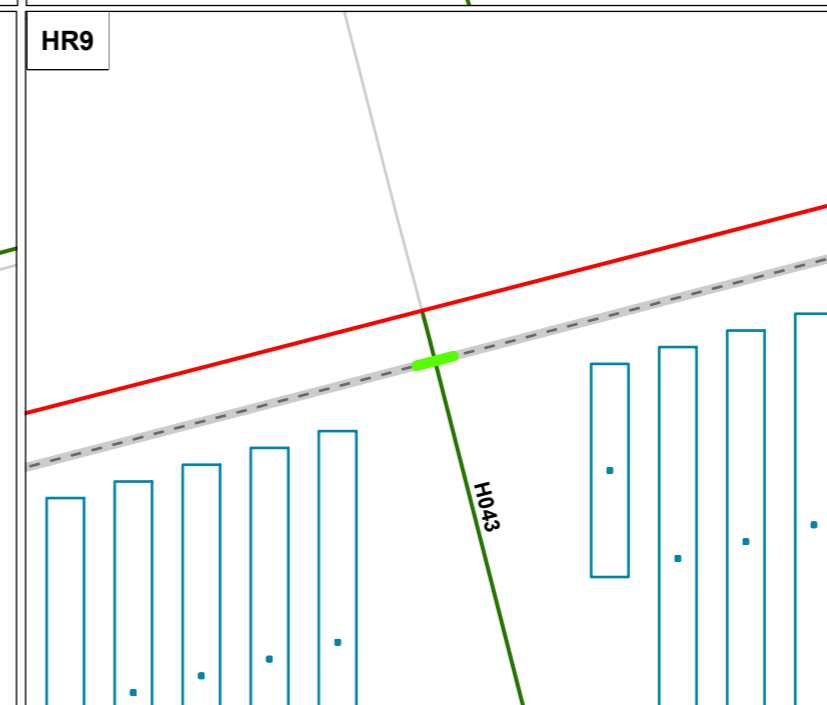
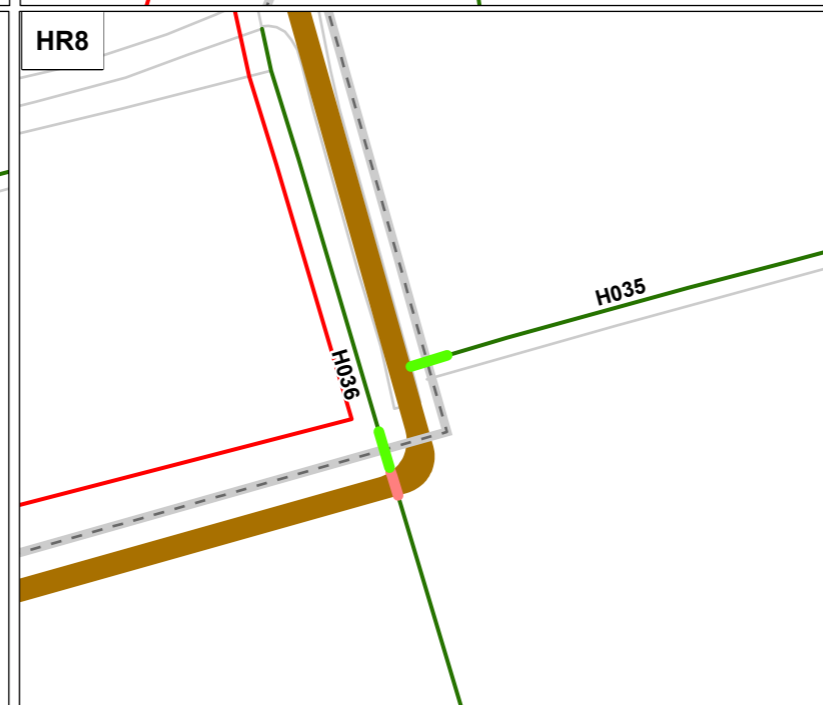
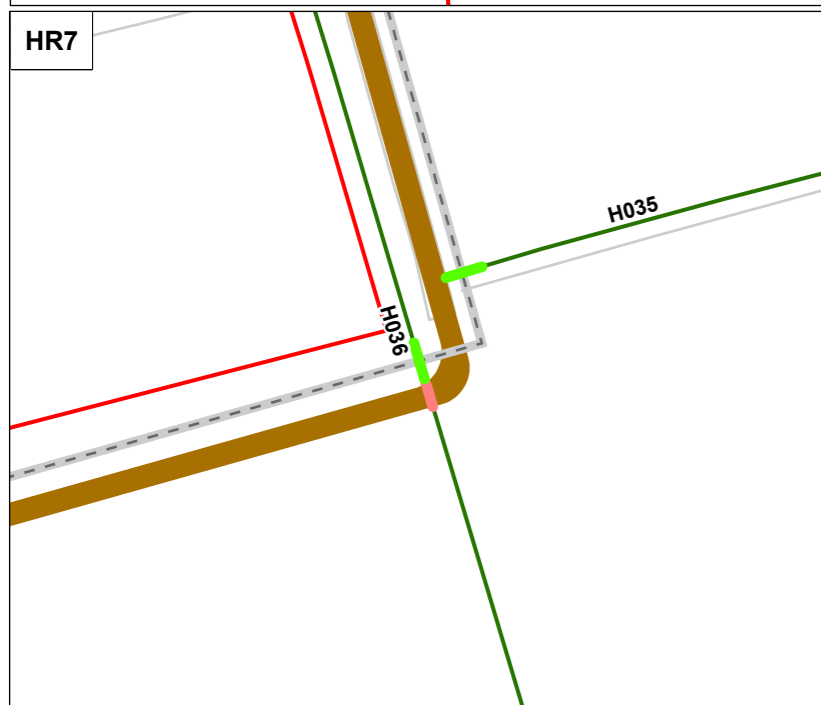
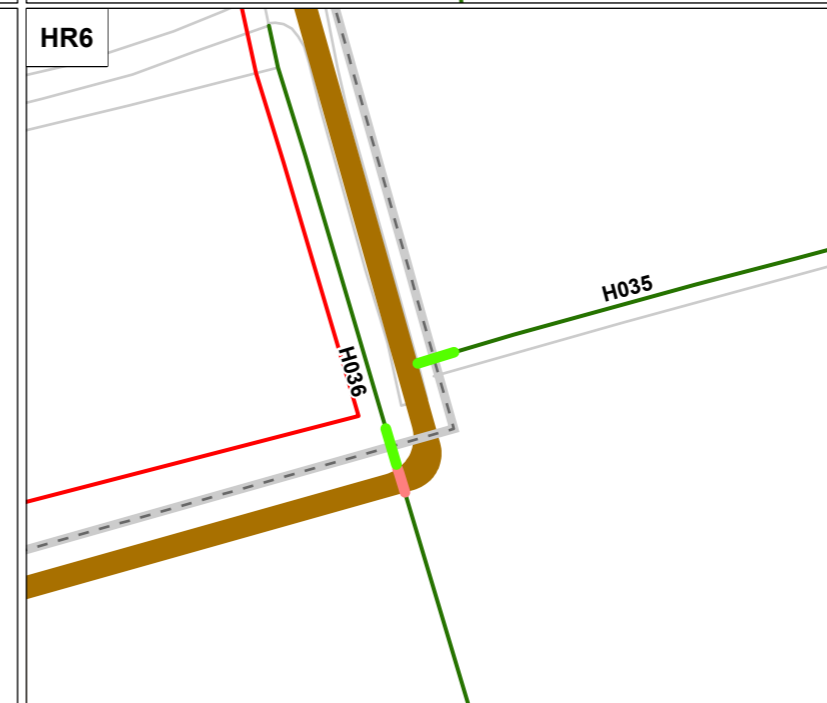
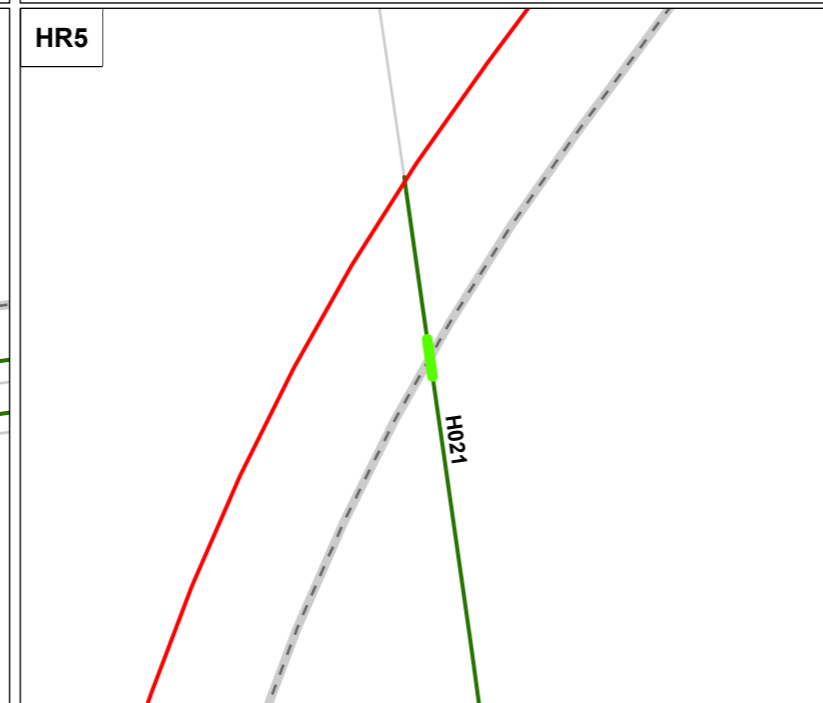
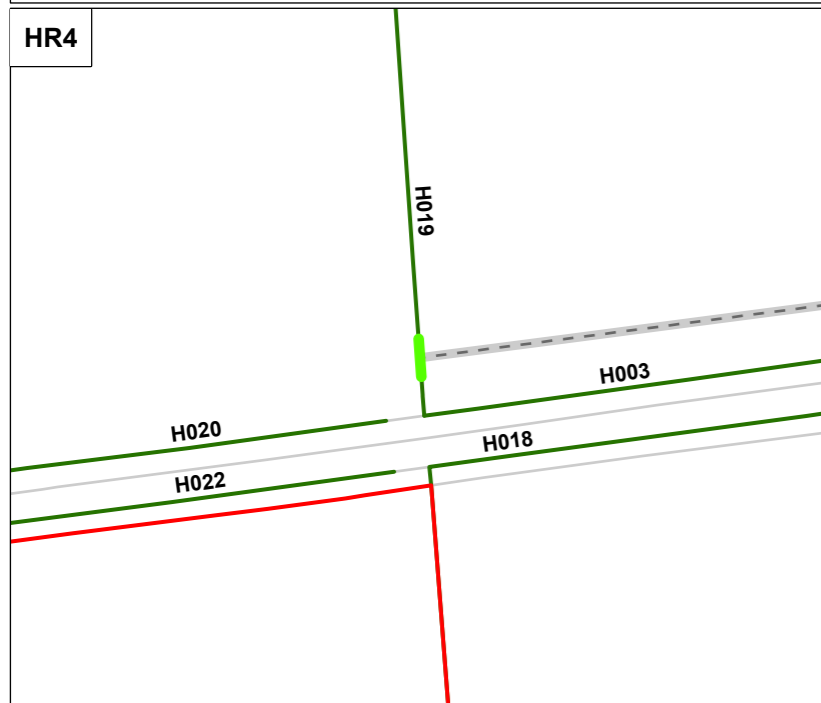
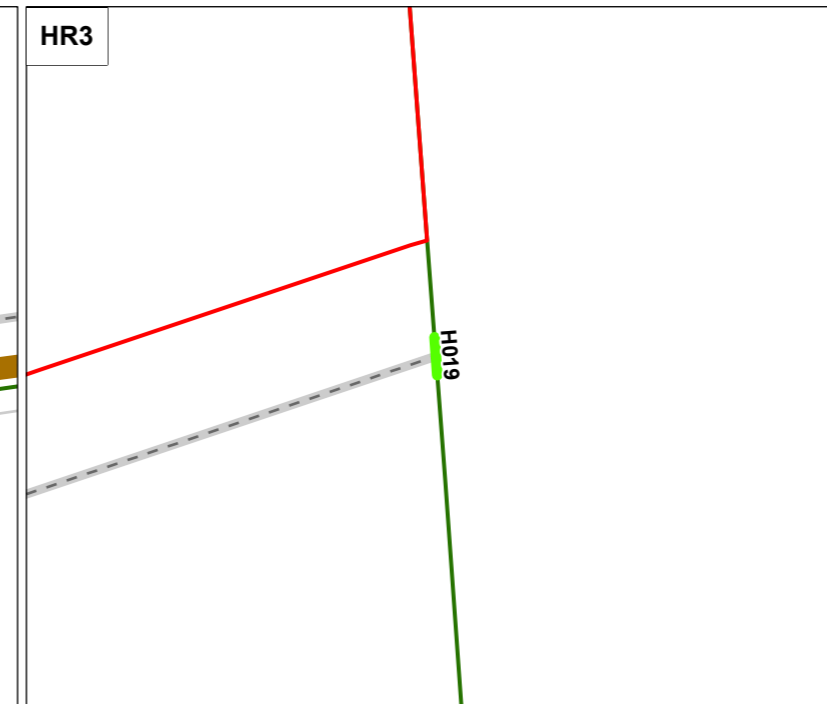
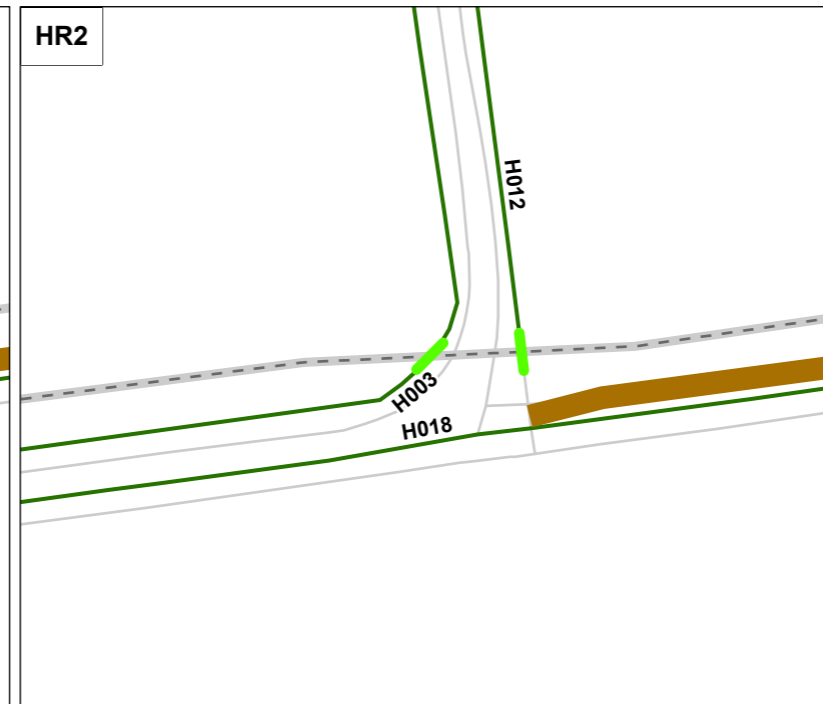
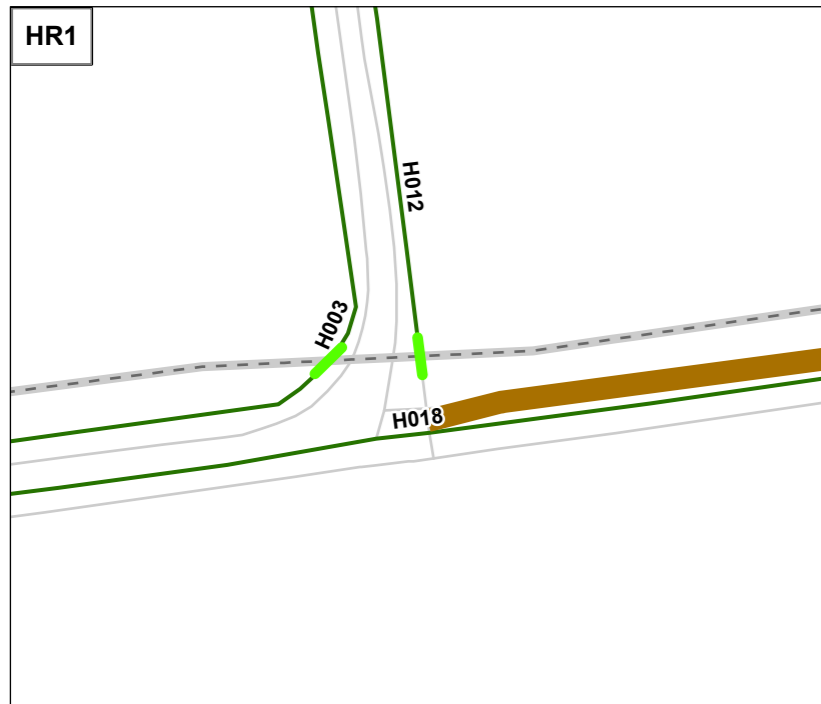
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Base map: Contains OS data © Crown Copyright and database right 2023
Contains data from OS Zoomstack



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Hedgerows to be removed and
Tree Preservation Orders (TPO) - Index Plan
(Change Request Version)

WEST BURTON SOLAR PROJECT
Landscape and Visual Impact Assessment
Environmental Statement (ES)



- Key**
- Order Limits
 - Solar panel module
 - Access track
 - Cable Route
 - Section of hedge to be removed temporarily
 - Section of hedge to be removed permanently
 - Hedgerow

Notes:
 i) Drawing/s to be read in conjunction with ES figures 8.18.1 [EX1/WB8.18.1_A] to 8.18.3 [EX1/8.18.3_A] Landscape and Ecology Mitigation and Enhancement Plans.

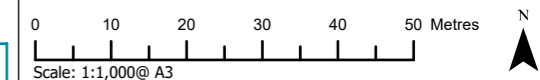
ii) Any potential vegetation removal or vegetation works associated with the Indicative Access and Abnormal Invisibile Load (AIL) locations is shown on the additional plans at Appendix C of the oLEMP [WB7.3_C] Indicative Access Location/Abnormal Invisibile Loads and Potential Vegetation Works/Removal – Index Plan.

iii) Buffers between field boundary habitats and the nearest array/battery hardware have been utilised according to a set of ecological importance criteria. Buffers are measured from the outer edge of the hedgerow, root protection area of the tree canopy (in the case of woodland or individual trees) or the banktop of the watercourse. Buffers over 5m may contain perimeter fencing or simple tracks for maintenance vehicle access although this will only be where essential. Protected construction-phase fencing will also observe these buffer distances. The layout of ecological buffers is mapped in ES Appendix 9.11 [APP-087].

The measurement criteria are as follows:

- 5m minimum from species-poor hedgerows with no associated ditch.
- 8m minimum from either a species-rich hedgerow, a field boundary containing a tree with 'low' potential for roosting bats, or a field boundary/hedgerow with a ditch of any kind.
- 10m minimum from an 'outlier' badger sett, any field boundary with a ditch/watercourse with signs of either otters or water vole, or a boundary containing a tree with 'moderate' potential for roosting bats.
- 12m minimum from any boundary containing a tree with 'high' potential for roosting bats.
- 20m minimum from a 'subsidiary' or 'annexe' badger sett, moderate[1]sized watercourses (e.g. becks, dykes and streams), ponds (not positive for GCN eDNA) or woodland.
- 30m minimum from a 'main' badger sett, ancient woodland or major watercourses (e.g. rivers).
- 50m minimum from ponds testing positive for GCN eDNA

iii) A Tree Survey Report and Arboriculture Impact Assessment in line with BS 5837:2012 would be undertaken concurrently with detailed design of the Scheme, to identify where trees are likely to be affected by the construction works and to inform the development of the detailed design. Such pre construction surveys and assessment work would be undertaken in accordance with the Outline Landscape and Ecological Management Plan, (See Table 3.5: Landscape and Visual, of Outline CEMP Revision A [EN010132/EX1/WB7.1_A])



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Drawn by: AZ	Checked by: WW

Hedgerows to be removed - Sheet 1 of 4
(Change Request Version)

WEST BURTON SOLAR PROJECT
 Landscape and Visual Impact Assessment
 Environmental Statement (ES)



Key

- Order Limits
- Solar panel module
- Access track
- Cable Route
- Section of hedge to be removed temporarily
- Section of hedge to be removed permanently
- Hedgerow

Notes:

i) Drawing/s to be read in conjunction with ES figures 8.18.1 [EX1/WB8.18.1_A] to 8.18.3 [EX1/8.18.3_A] Landscape and Ecology Mitigation and Enhancement Plans.

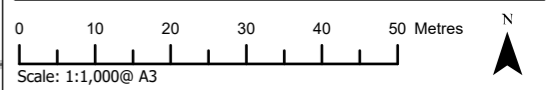
ii) Any potential vegetation removal or vegetation works associated with the Indicative Access and Abnormal Indivisible Load (AIL) locations is shown on the additional plans at Appendix C of the oLEMP [WB7.3.C] Indicative Access Location/Abnormal Indivisible Loads and Potential Vegetation Works/Removal – Index Plan.

iii) Buffers between field boundary habitats and the nearest array/battery hardware have been utilised according to a set of ecological importance criteria. Buffers are measured from the outer edge of the hedgerow, root protection area of the tree canopy (in the case of woodland or individual trees) or the banktop of the watercourse. Buffers over 5m may contain perimeter fencing or simple tracks for maintenance vehicle access although this will only be where essential. Protected construction-phase fencing will also observe these buffer distances. The layout of ecological buffers is mapped in ES Appendix 9.11 [APP-087].

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- 50m minimum from ponds testing positive for GCN eDNA

iii) A Tree Survey Report and Arboriculture Impact Assessment in line with BS 5837:2012 would be undertaken concurrently with detailed design of the Scheme, to identify where trees are likely to be affected by the construction works and to inform the development of the detailed design. Such pre construction surveys and assessment work would be undertaken in accordance with the Outline Landscape and Ecological Management Plan, (See Table 3.5: Landscape and Visual, of Outline CEMP Revision A [EN010132/EX1/WB7.1_A])



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Hedgerows to be removed - Sheet 2 of 4
(Change Request Version)

WEST BURTON SOLAR PROJECT
Landscape and Visual Impact Assessment
Environmental Statement (ES)



Key

- Order Limits
- Solar panel module
- Access track
- Cable Route
- Section of hedge to be removed temporarily
- Section of hedge to be removed permanently
- Hedgerow

Notes:

i) Drawing/s to be read in conjunction with ES figures 8.18.1 [EX1/WB8.18.1_A] to 8.18.3 [EX1/8.18.3_A] Landscape and Ecology Mitigation and Enhancement Plans.

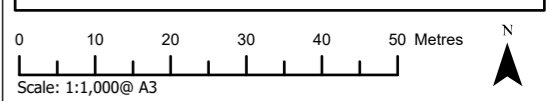
ii) Any potential vegetation removal or vegetation works associated with the Indicative Access and Abnormal Indivisible Load (AIL) locations is shown on the additional plans at Appendix C of the oLEMP [WB7.3_C] Indicative Access Location/Abnormal Indivisible Loads and Potential Vegetation Works/Removal – Index Plan.

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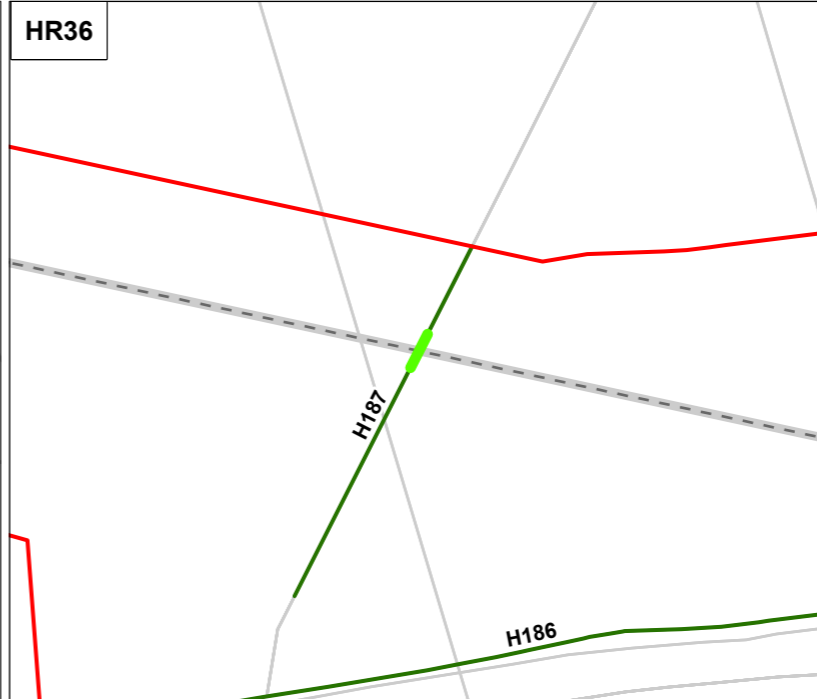
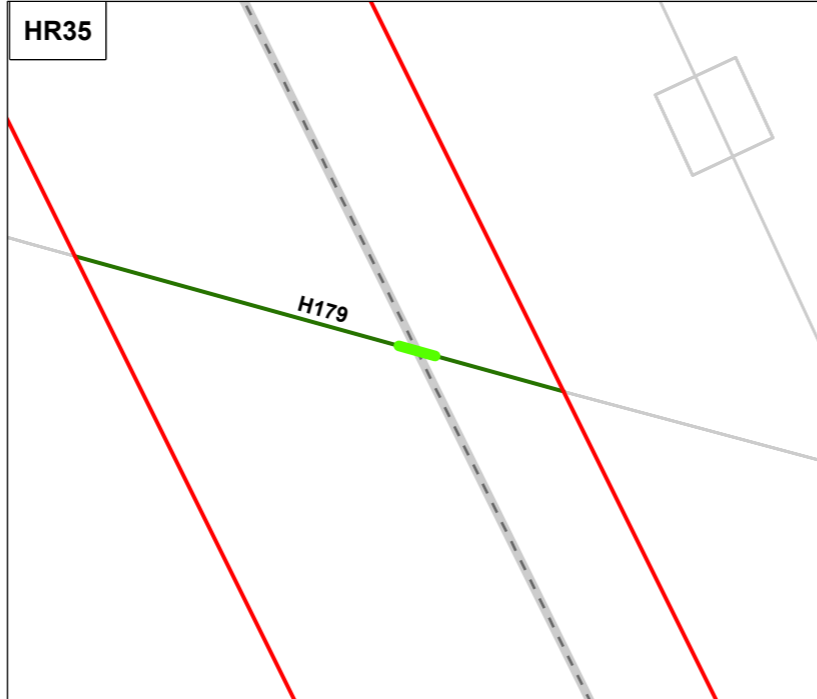
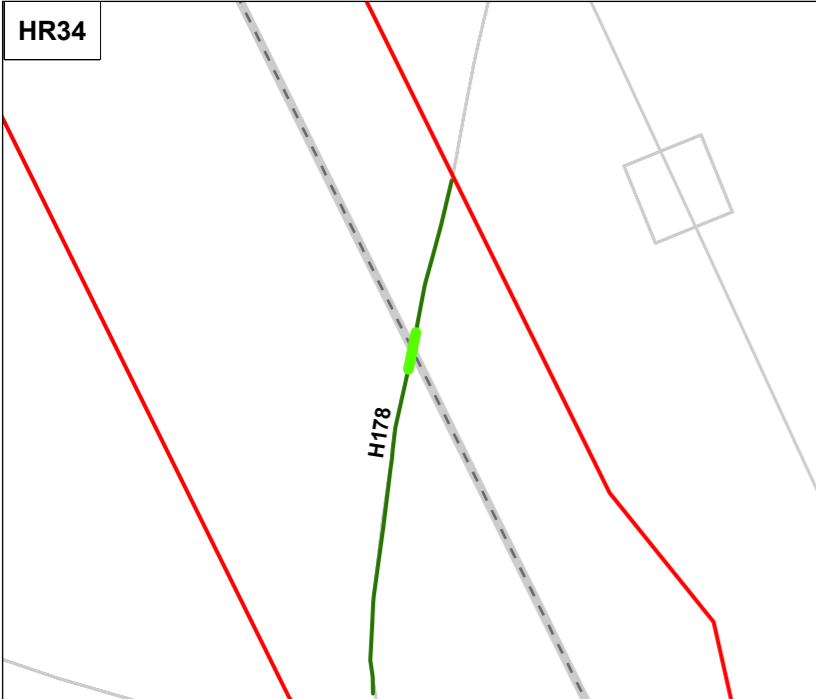
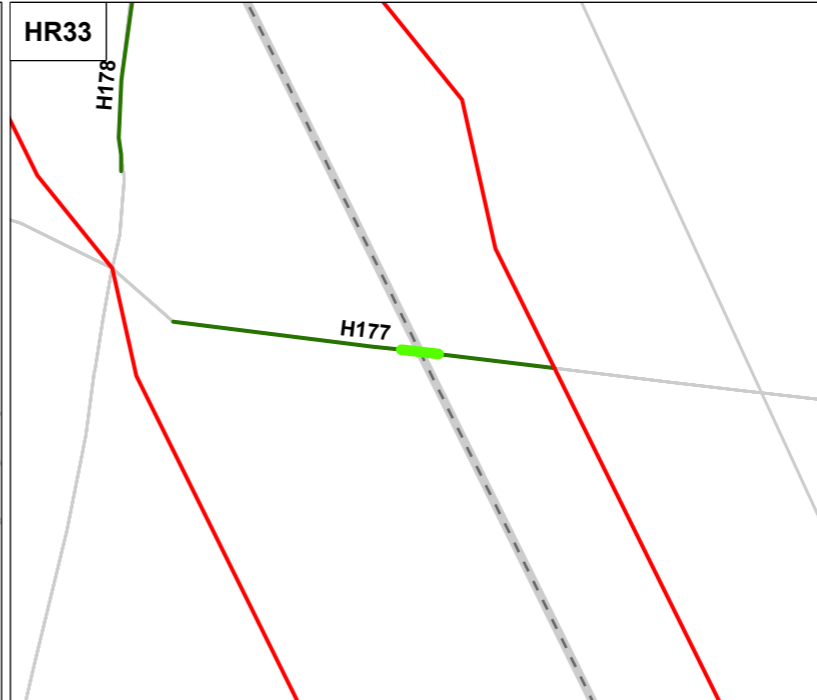
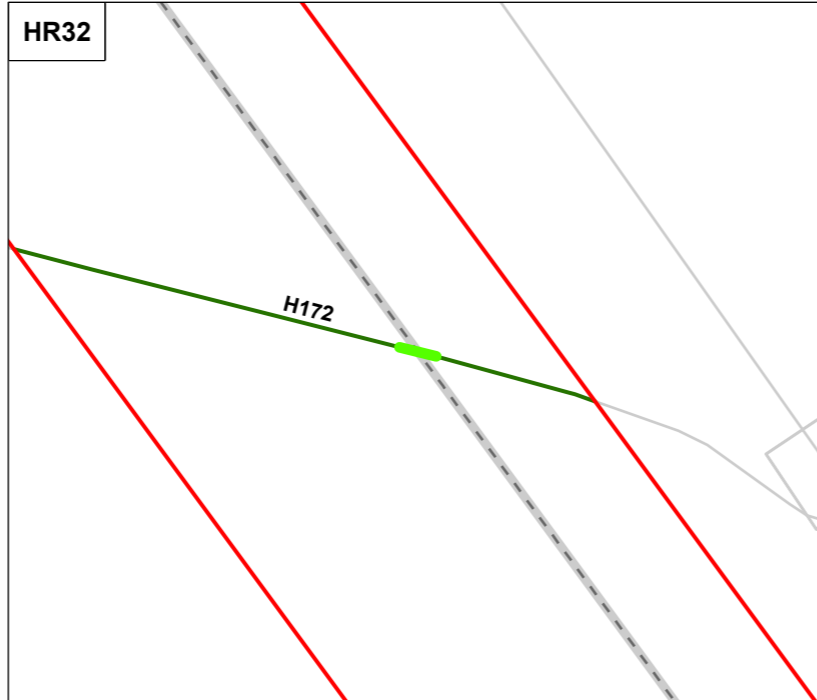
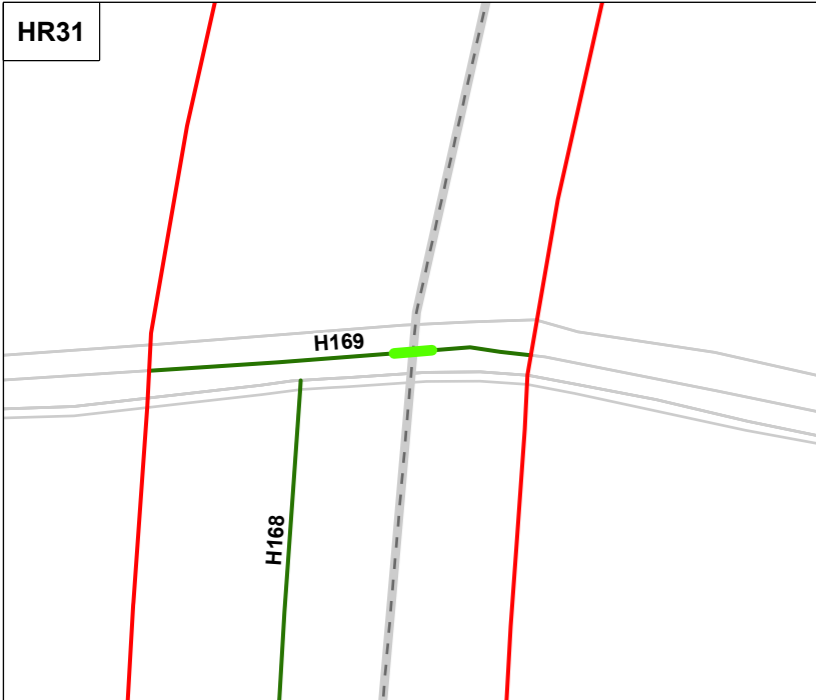
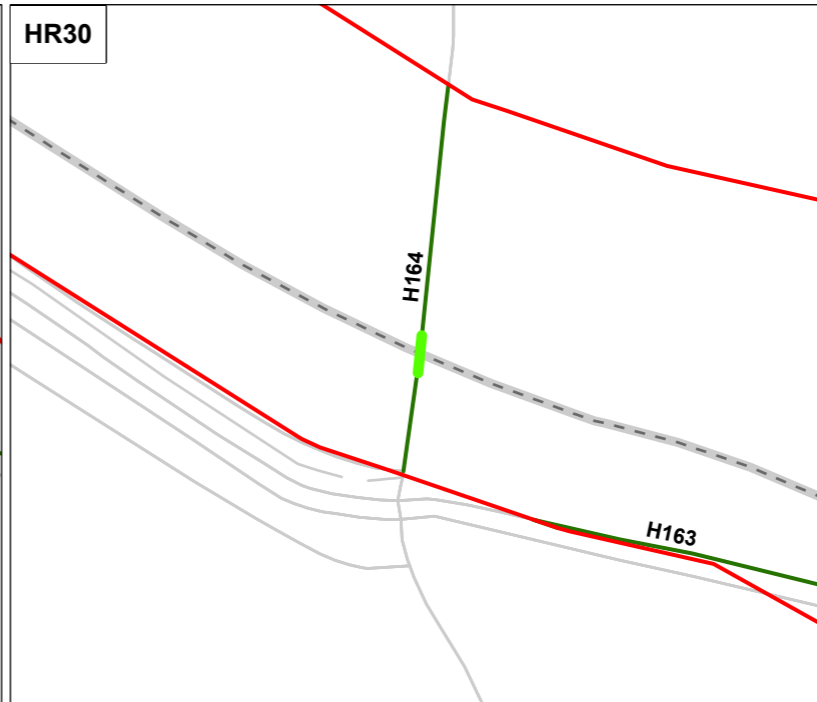
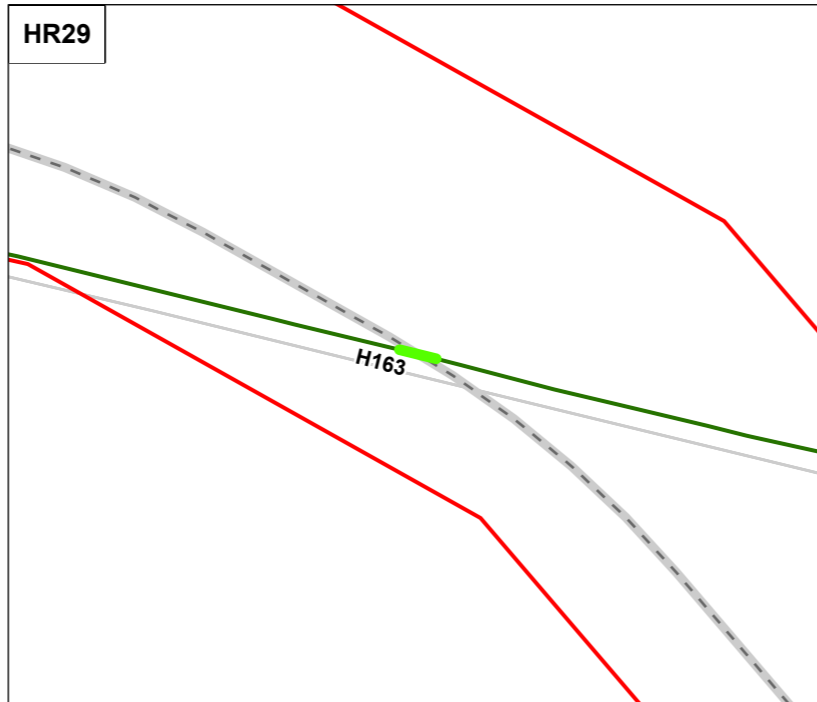
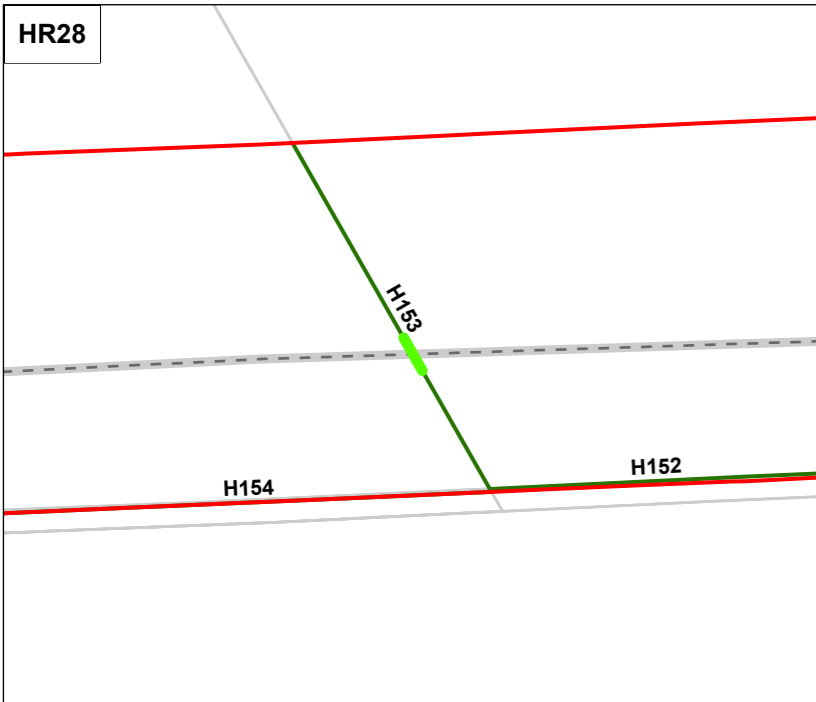
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iii) A Tree Survey Report and Arboriculture Impact Assessment in line with BS 5837:2012 would be undertaken concurrently with detailed design of the Scheme, to identify where trees are likely to be affected by the construction works and to inform the development of the detailed design. Such pre construction surveys and assessment work would be undertaken in accordance with the Outline Landscape and Ecological Management Plan, (See Table 3.5: Landscape and Visual, of Outline CEMP Revision A [EN010132/EX1/WB7.1_A])



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Key

- Order Limits
- Solar panel module
- Access track
- Cable Route
- Section of hedge to be removed temporarily
- Section of hedge to be removed permanently
- Hedgerow

Notes:

i) Drawing/s to be read in conjunction with ES figures 8.18.1 [EX1/WB8.18.1_A] to 8.18.3 [EX1/8.18.3_A] Landscape and Ecology Mitigation and Enhancement Plans.

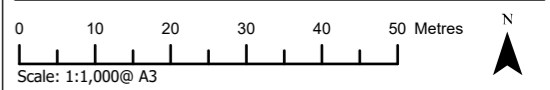
ii) Any potential vegetation removal or vegetation works associated with the Indicative Access and Abnormal Indivisible Load (AIL) locations is shown on the additional plans at Appendix C of the oLEMP [WB7.3_C] Indicative Access Location/Abnormal Indivisible Loads and Potential Vegetation Works/Removal – Index Plan.

iii) Buffers between field boundary habitats and the nearest array/battery hardware have been utilised according to a set of ecological importance criteria. Buffers are measured from the outer edge of the hedgerow, root protection area of the tree canopy (in the case of woodland or individual trees) or the banktop of the watercourse. Buffers over 5m may contain perimeter fencing or simple tracks for maintenance vehicle access although this will only be where essential. Protected construction-phase fencing will also observe these buffer distances. The layout of ecological buffers is mapped in ES Appendix 9.11 [APP-087].

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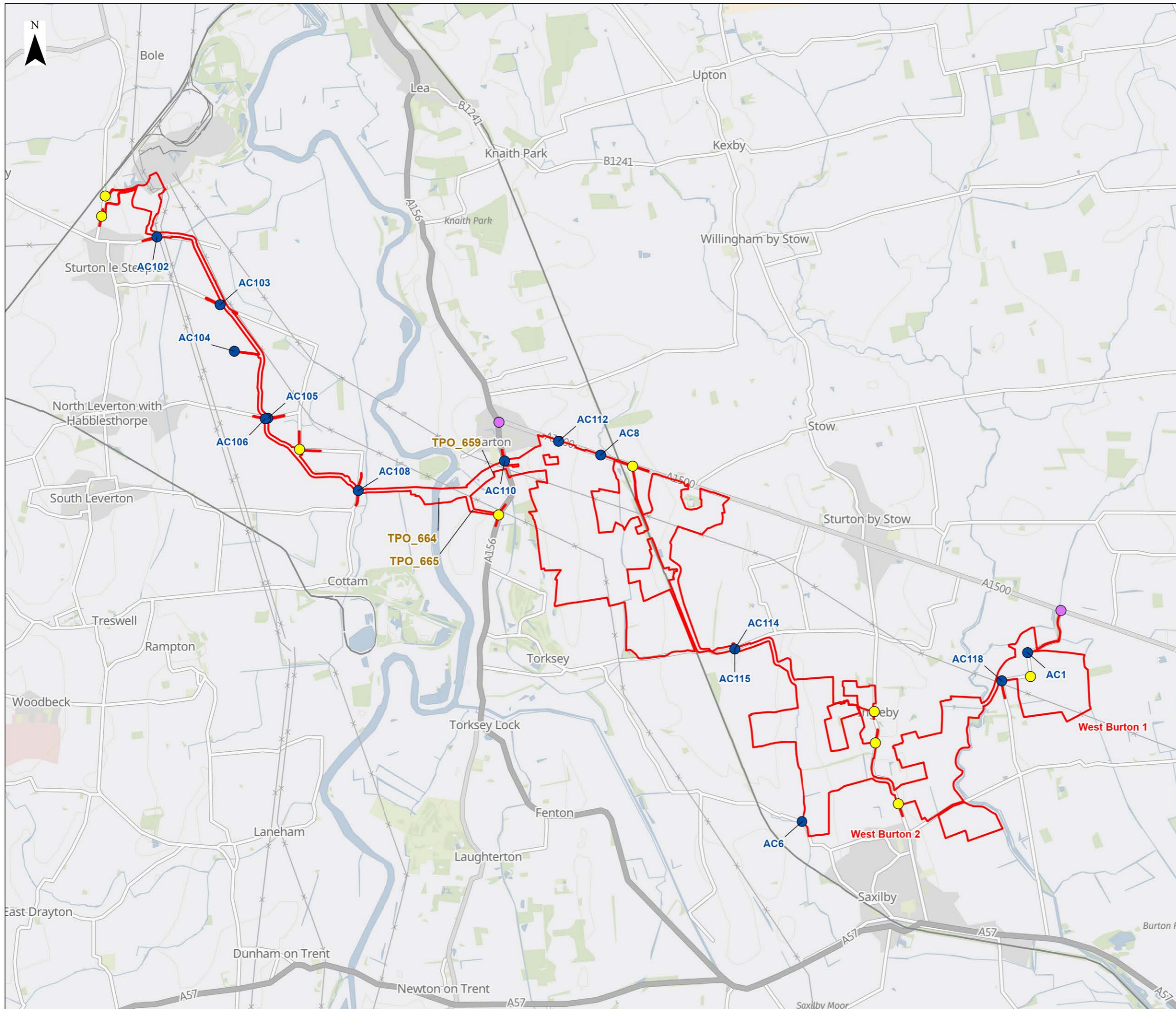
iii) A Tree Survey Report and Arboriculture Impact Assessment in line with BS 5837:2012 would be undertaken concurrently with detailed design of the Scheme, to identify where trees are likely to be affected by the construction works and to inform the development of the detailed design. Such pre construction surveys and assessment work would be undertaken in accordance with the Outline Landscape and Ecological Management Plan, (See Table 3.5: Landscape and Visual, of Outline CEMP Revision A [EN010132/EX1/WB7.1_A])



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Hedgerows to be removed - Sheet 4 of 4
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WEST BURTON SOLAR PROJECT
Landscape and Visual Impact Assessment
Environmental Statement (ES)

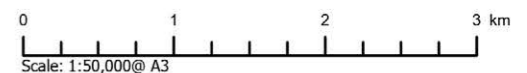


Key

- Order Limits
- Indicative access location with potential hedgerow works / removal
- Indicative access location with no potential hedgerow works / removal
- Abnormal Indivisible Load (AIL) access location with no potential hedgerow works / removal

Notes:
 i) 1. Drawing to be read in conjunction with ES Figures 8.18.1 [EX1/WB8.18.1_A] to Figures 8.18.3 [EX1/8.18.3_A] Landscape and ecology Mitigation and Enhancement Plans.
 ii) Any potential hedgerow removal associated the proposed Cable Route Corridor is shown on the additional plans at Appendix C of the oLEMP [WB7.3_C] Hedgerows to be Removed and Tree Preservation Orders (TPO) - Index Plan.

Layers: Lanpro, 2024
 Base map: Contains OS data © Crown Copyright and database right 2023
 Contains data from OS Zoomstack



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Indicative Access Location/Abnormal Indivisible Loads and Potential Vegetation Works/Removal – Index Plan (Change Request Version)

WEST BURTON SOLAR PROJECT
 Landscape and Visual Impact Assessment
 Environmental Statement (ES)