

Didcot Garden Town HIF 1 Scheme

Outline Landscape & Biodiversity Management Plan (OLBMP)

September 2021

Didcot Garden Town HIF 1 Scheme Outline Landscape & Biodiversity Management Plan (OLBMP)

Prepared for:

Oxfordshire County Council County Hall New Road Oxford OX1 1ND

Prepared by:

AECOM Limited AECOM House 63-77 Victoria Street St Albans Hertfordshire AL1 3ER United Kingdom

T: +44(0)1727 535000 aecom.com

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1. Introduction

1.1 Overview

- 1.1.1 This Outline Landscape and Biodiversity Management Plan (OLBMP) has been prepared on behalf of Oxfordshire County Council (OCC). It includes provision for the successful establishment and future management of biodiversity and landscaping works for the proposed Didcot Garden Town Housing Infrastructure Fund (HIF 1) Scheme (hereby referred to as 'the Scheme').
- 1.1.2 The Scheme is set within a landscape consisting of ecological designations, geometric fields and areas of scrub and woodland. The OLBMP, therefore, forms part of the strategy for successfully integrating the Scheme within this landscape and for mitigating many of the related impacts as identified within the Environmental Statement (ES).
- 1.1.3 Stakeholder engagement will continue as the Scheme progresses and will include further discussion regarding habitat creation and long-term management with Natural England, OCC, South Oxfordshire District Council (SODC), The Vale of White Horse District County (VoWHDC), Wild Oxfordshire and Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT). This OLBMP will therefore be updated with more detailed information during the Scheme detailed design stage, incorporating feedback received during stakeholder engagement.

1.2 The Scheme

- 1.2.1 The Scheme consists of four separate but interdependent highway schemes (the Site), namely: i) the A4130 Widening; ii) Didcot Science Bridge; iii) Didcot to Culham River Crossing; and iv) Clifton Hampden Bypass. A brief overview of each section of the Scheme is presented below. The full description of the Scheme can be found in ES Chapter 2: The Scheme.
- 1.2.2 In addition to the highway elements as described below, the Scheme includes landscape and ecological mitigation and enhancement measures as defined on the drawings provided in Appendix B.

A4130 Widening

- 1.2.3 The proposal includes providing a dual carriageway from Milton Interchange, eastwards to the proposed eastern roundabout on the A4130. A four-arm roundabout is proposed to provide access to a new business park and Local Plan housing allocation to the south of the existing A4130. A new signalised T-junction will provide access to a planned residential area (Valley Park) and is located west of a proposed eastern roundabout. This is a new three-arm roundabout and will provide a link to the section of the current A4130 that is to be retained as a single carriageway.
- 1.2.4 A roundabout (Old A4130 roundabout) will additionally provide the main access to the planned Valley Park housing development. The road corridor will also include two-way segregated pedestrian and cycle facilities on the southern side of the dual carriageway, as well as several formal crossing points.

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Didcot Science Bridge

1.2.5 The proposed road bridge will connect the Valley Park residential development, which will be located to the south of the A4130 and existing Great Western Railway mainline, to the former Didcot A Power Station redevelopment site to the north of the railway line and the A4130. The second part is a single carriageway road, linking the northern side of the bridge to the existing A4130 Northern Perimeter Road north-east of the Didcot A redevelopment. High quality pedestrian and cycle routes are also proposed along this section of the Scheme.

Didcot to Culham River Crossing

1.2.6 The proposed river crossing will run approximately parallel to the western side of the existing Didcot to Culham railway line. The new road will be approximately 3.5 km in length and include the construction of two new roundabouts; construction of two new bridges; enlargement of an existing roundabout; and the creation of new high-quality pedestrian/ cycle routes.

Clifton Hampden Bypass

1.2.7 This section proposes to provide a new single carriageway link between the B4015 Oxford Road and the A415 which also provides access/ egress to Culham Science Centre (CSC). The new road will be approximately 2 km long and includes the construction of two new roundabouts at the A415 CSC entrance, and the junction of the new road with the existing B4015. High quality pedestrian/ cycle facilities are included in the proposed design.

1.3 Site description

- 1.3.1 The Scheme is located within the county of Oxfordshire. The topography of the Site is broadly flat due to its location within the Thames valley, with the landscape rising gently across the north, and rising towards the North Wessex Downs in the east and south of the Site.
- 1.3.2 Within the Site there are localised manmade alterations to the landform, including areas of landfill, earthworks, bunds and embankments related to existing infrastructure and flood defences, and water bodies formed from disused gravel pits. This gives much of the Site between Didcot and Culham a somewhat engineered and less natural character.
- 1.3.3 The principal watercourse through the study area is the River Thames, which flows through the north of the Site and separates Culham and Clifton Hampden to the north of the river, from Sutton Courtenay, Appleford and Long Wittenham to the south of the river. Moor Ditch, a Water Framework Directive (WFD) water body and tributary of the River Thames, is crossed in the Didcot Science Bridge area.
- 1.3.4 The Site is characterised by several man-made water bodies formed by disused gravel pits or other industrial land uses, most notably the Hanson Restoration Area and water bodies at the Appleford Siding.
- 1.3.5 Trees and hedgerows within the Site and near to the Site boundary are generally found alongside roads, footpaths, settlement boundaries, railways and field boundaries, and as such the landscape has the perception of being well-vegetated, despite the broad areas of open agricultural and mining/ industrial land uses.
- 1.3.6 The landscape south of the River Thames through which the Site passes has a fragmented and somewhat industrialised character relating to land use including the

former Didcot A Power Station, Milton Park industrial and commercial estate, Didcot Industrial Estate, working and former landfill sites, and gravel extraction areas and pits.

- 1.3.7 The landscape north of the River Thames has a more rural pattern of fields, hedgerows and treelines, but with CSC a notable area of development on the north side of the A415.
- 1.3.8 The Site passes several settlements which from south to north are:
 - The town of Didcot, which the Site passes around its north-west boundary through the former Didcot A Power Station site;
 - The Site passes close to the village of Appleford; and
 - The village of Clifton Hampden, which the Site passes to the north, between the village and CSC.
- 1.3.9 Several roads, rail and public rights of way pass through the Site.

1.4 Purpose of this Document

Landscape

- 1.4.1 This document identifies specific management and maintenance operations and their frequencies to ensure the successful establishment of the landscape and ecological elements of the Scheme. This document contains objectives focused on an annual timetable for each landscape element and assigns responsibilities where appropriate.
- 1.4.2 The landscape design proposals have the following objectives:
 - Integrate the Scheme into the surrounding landscape as far as practicable given the nature of the highway and landscape context;
 - Reduce the Scheme impact on visual amenity of residents in the village of Appleford on Thames, Clifton Hampden, Harwell, a village in the far south, Sutton Courtenay, Culham, Drayton and Milton in the west, and Long Wittenham in the east:
 - Provide planting to screen/ mitigate views of the Scheme, including views for recreational users on public rights of way (PRoW);
 - Connect existing retained vegetation to proposed planting; and
 - Increase the quality and extent of biodiversity (through species rich grassland, attenuation pond planting, woodland, trees and hedgerows), for green/ blue infrastructure enhancement and in line with biodiversity net gain requirements for planning applications.
- 1.4.3 To support the rationale and aim of this document, a series of design objectives that guide the management of the Site have been developed in line with the Design Manual for Roads and Bridges (DMRB) LA117 Landscape Design. These are set out in this report and briefly described below:
 - Landscape design and tree planting can contribute to a visually interesting journey along the Scheme;
 - Road corridors offer considerable areas of infrequently visited grass and scrub which support a range of flora and fauna, which contribute to the biodiversity bank of this country;

- The reinstated grassland needs to be maintained to a 'good' condition, as specified under the Farm Environmental Plan (FEP) Manual guidance criteria for Lowland Meadows G06 (refer to http://adlib.everysite.co.uk/resources/000/251/202/NE264.pdf);
- Sympathetic treatment of the areas adjacent to the carriageway can help to fit the road back into its setting and help reduce the Scheme impacts of traffic on neighbours; and
- Landscape management carried out on roadsides can contribute to wider habitat creation and biodiversity initiatives.
- 1.4.4 This document should be read in conjunction with the following documents:
 - Appendix A comprises a programme detailing typical landscape management works and actions to be carried out by the landscape contractor throughout the 5-year period of this plan; and
 - Appendix B Landscape Plans.
- 1.4.5 Each landscape element has a series of management actions specifically designed to enable the objectives to be achieved and to allow the successful establishment of a sustainable, healthy landscape which will implement all landscape and visual mitigation measures along with the habitat enhancements. This management plan should be reviewed on an annual basis to enable the inclusion of additional maintenance activities or improve frequency of activities.

Biodiversity

- 1.4.6 This document sets out the proposed strategy to mitigate the effects of the Scheme on biodiversity features and to enhance the biodiversity value of the Site to secure compliance with relevant national and local planning policies. These are outlined in Section 2.
- 1.4.7 The Scheme has been designed, as far as is practicable, to avoid or reduce effects on biodiversity features through development design and impact avoidance. This assessment process and the impact avoidance measures to be implemented are described in ES Chapter 9: Biodiversity.
- 1.4.8 There is also a need to avoid impacts on protected and, or notable species during both Scheme construction and operation. This is to ensure compliance with relevant legislation and to compensate for unavoidable losses of habitat, through habitat creation or restoration to meet local and national planning policy objectives for no net loss and net gain of biodiversity.
- 1.4.9 This document outlines the biodiversity impact avoidance measures that will be implemented prior to and during construction of the Scheme, as well as the enhancement, management and monitoring measures to be implemented once the Scheme is operational. This management plan should be reviewed on a regular basis to enable the inclusion of additional information and changes to the ecological baseline that may influence subsequent monitoring and maintenance activities, which arise during the lifespan of this management plan.

1.5 Structure of this Document

- 1.5.1 The OLBMP is structured as follows:
 - Section 2 summarises relevant legislation and planning policy;

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- Section 3 describes the existing landscape and biodiversity features and the impacts of the Scheme;
- Section 4 outlines the requirements for protection of landscape and biodiversity features, both during preliminary works and during the main construction phase;
- Section 5 describes the proposals for landscape and biodiversity enhancement (Appendix B shows the areas of the Site to which the different proposals will be applied);
- Section 6 outlines the measures required for the effective management and maintenance of the proposed enhancements; and
- Section 7 describes the roles and responsibilities of all parties involved in the delivery of the final Landscape and Biodiversity Management Plan.

2. Legislative and Policy Framework

2.1 Overview

2.1.1 The legislation and policies relevant to biodiversity, landscape and visual amenity are summarised below.

2.2 Legislation

- Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) (Birds Directive);
- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive);
- Regulation (EU) 1143/2014 on the introduction and spread of invasive alien species (IAS);
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- Wildlife and Countryside Act (WCA) 1981 (as amended);
- Countryside & Rights of Way Act 2000 (as amended);
- Natural Environment and Rural Communities (NERC) Act 2006 (as amended);
- Protection of Badgers Act 1992 (as amended);
- Hedgerow Regulations 1997 (as amended);
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Salmon and Freshwater Fisheries Act 1975;
- Invasive Alien Species (Permitting and Enforcement) Order 2019; and
- Animal Welfare Act 2006.

2.3 National Planning Policy

- 2.3.1 The National Planning Policy Framework (NPPF) was originally published on 27th March 2012 and detailed the Government's planning policies for England and how these are expected to be applied. The NPPF was then revised on 24th July 2018, 19th February 2019 and July 2021. The NPPF states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible.
- 2.3.2 The NPPF states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, including establishing coherent ecological networks that are more resilient to current and future pressures.
- 2.3.3 It specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this it to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

2.3.4 The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution.

2.4 Local Planning Policy

- 2.4.1 The local planning policies that are relevant to the Scheme are set out in the following documents:
 - The South Oxfordshire Local Plan 2034; and
 - The Vale of White Horse Local Plan 2031.
- 2.4.2 Section 7 of SODC Local Plan is concerned with the natural environment and sets out several policies that development within the district will have to conform with. These policies seek to address the following environmental themes:
 - Landscape and Countryside Policy ENV1: Landscape and Countryside;
 - Biodiversity Policy ENV2: Biodiversity Designated Sites, Priority Habitats and Species; Policy ENV3: Biodiversity & Policy ENV4: Watercourses; and
 - Green Infrastructure Policy ENV5: Green Infrastructure in New Developments.
- 2.4.3 Among the key challenges and opportunities identified in Part 1 of the VoWHDC Local Plan are "Protecting our high-quality landscape," "Protecting biodiversity" and "Protecting Water Resources".
- 2.4.4 Section 3 (Development Management Policies) in Part 2 of the VoWDC Local Plan outlines the policies pertaining to the local landscape, biodiversity and green infrastructure:
 - Core Policy 44 identifies the most important landscape features that should be protected and enhanced and requires proposals to demonstrate how they have responded to these identified aspects of landscape character;
 - Core Policy 45: Green Infrastructure ensures a net gain in green infrastructure is achieved for new development proposals. The Part 1 plan recognises the contribution of waterways and river corridors to the character, biodiversity and landscape quality in the Vale; and
 - Core Policy 46: Conservation and Improvement of Biodiversity in the Part 1 plan ensures that proposals likely to harm links between priority habitats or corridors for priority species achieve a net gain in biodiversity either through appropriate mitigation or offsetting.

2.5 Other Guidance

Priority Habitats and Species

- 2.5.1 Under Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006, a statutory duty is placed on public bodies that, in exercising its functions, they must have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity (the biodiversity duty). The Government, through Section 41 of the NERC Act 2006, has published a list of habitats and species that are of principal importance for the conservation of biodiversity in England.
- 2.5.2 The UK Biodiversity Action Plan (UKBAP) was launched in 1994 and established a framework and criteria for identifying species and habitat types of conservation concern. From this list, action plans for priority habitats and species of conservation

concern were published and have subsequently been succeeded by the UK Post-2010 Biodiversity Framework (July 2012). The UK list of priority species and habitats, however, remains an important reference source and has been used to help draw up statutory lists of priority habitats and species in England, Scotland, Wales and Northern Ireland. For this assessment, the UK BAP is still used as one of the criteria to assist in assigning national value to an ecological receptor.

- 2.5.3 The UK Post-2010 Biodiversity Framework sets a broad enabling structure for action across the UK, including a shared vision and priorities for UK-scale activities to help deliver the Aichi targets and the EU Biodiversity Strategy. A major commitment by Parties to the Convention of Biological Diversity is to produce a National Biodiversity Strategy and, or Action Plan.
- 2.5.4 The UK Post- 2010 Biodiversity Framework is relevant within England in the context of Section 40 of the Natural Environment and Rural Communities (NERC Act) 2006, meaning that Priority Species and Habitats are material considerations in planning. These habitats and species are identified as those of conservation concern due to their rarity or a declining population trend. This list encompasses 56 habitats and 943 species.

2.6 Biodiversity 2020

- 2.6.1 Published in summer 2011, Biodiversity 2020 is a national strategy for England's wildlife and ecosystem services. It sets out the Government's ambition to halt overall loss of England's biodiversity by 2020, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.
- 2.6.2 The strategy sets the following ambitious goals, amongst other, to halt overall biodiversity loss by 2020:
 - Better wildlife habitats quality goals for priority habitat and Sites of Special Scientific Interest (SSSIs);
 - More, bigger and less fragmented areas for wildlife an increase in priority habitats by at least 200,000 hectares (ha);
 - The restoration of 15% of degraded ecosystems as a contribution to climate change mitigation and adaption;
 - An overall improvement in status of our wildlife and prevention of further human-induced extinctions of known threatened species; and
 - Significantly more people engaged in biodiversity issues, aware of its value and taking positive action.
- 2.6.3 The strategy builds on the focus for conservation of priority habitats and species and considers what needs to happen at a larger scale so our habitats are better able to support more species and that our conservation action should focus on whole natural systems.

2.7 Local Biodiversity Action Plan

Oxfordshire Biodiversity Action Plan 2015-2020

2.7.1 In 1998 OCC produced its first Biodiversity Action Plan (BAP); a framework for reporting on national and local priorities through Habitat Action Plans which placed an emphasis on numerical targets for increasing particular habitats or conserving species.

- 2.7.2 The Biodiversity Plan for OCC is hosted by Oxfordshire Nature Conservation Forum (ONCF) and includes:
 - The Conservation Target Areas (CTA) Map;
 - Individual Conservation Target Area target statements;
 - OCC BAP habitat targets for maintaining extent, achieving condition, restoration and creation of habitats; and
 - Numerical targets for restoration and creation of habitat. Restoration and creation targets for specific CTAs are collated across the county and then feed into the delivery of the OCC BAP habitat targets for maintaining extent, achieving condition, restoration and creation of habitats.
- 2.7.3 In OCC there are 20 UK BAP priority habitats which are widely distributed through the county. Many of these are designated as Special Areas of Conservation (SACs), SSSI or Local Wildlife Sites (LWS). These are presented in Appendix C.

2.8 Oxfordshire Infrastructure Strategy (2017)

- 2.8.1 The Oxfordshire Infrastructure Strategy (OxIS) has been prepared on behalf of the Oxfordshire Growth Board to provide a view of emerging development and infrastructure requirements to support growth from 2016 to 2031 and beyond. Responding to the predicted growth in Didcot and surrounding areas, which incorporates the Scheme, the strategy envisaged sustaining and enhancing the quality of life for the Borough's communities and ensure environmental sustainability.
- 2.8.2 Embedded in the OxIS is the Green Infrastructure Strategy (GIS) which focuses on strategic green infrastructure grouped into three themes:
 - Landscape-scale green infrastructure at a landscape scale focuses on the character and macro functions of the environment including the Areas of Outstanding Natural Beauty (AONB), the green belt and the 'blue' river networks.
 - Strategic ecological resources focuses on the wide range of habitats and significant biodiversity in Oxfordshire and how new infrastructure, particularly linear infrastructure such as road and rail, has the potential to further fragment habitats. The strategy recommends the need for further work to understand the ecological mitigation that will be required to mitigate these impacts and identify the potential of new growth to support improved ecological connectivity and the objectives of the Conservation Target Areas.
 - Strategic recreational resources recognises the deficiency in strategic recreational green infrastructure assets, with growth likely to increase pressure in the existing space and wider countryside. This strategy looks at the provision of new green space associated with developments as a requirement for planning, and the need for coordinated efforts for the provision of more strategic assets.

2.9 The Oxfordshire Strategic Environmental Economic Investment Plan (SEEIP)

The Environmental Strategy in SEEIP provides direction on how investment in our environment will be delivered. The priorities of SEEIP are:

 Growing the green economy in Oxfordshire – including farming, forestry, low carbon energy, and environmental research and services;

- Promoting and enabling access to Oxfordshire's countryside, the River Thames and its tributaries, wildlife and heritage assets;
- Improving management of land in the Thames River Basin catchment reducing flood risk, enhancing water resources and promoting biodiversity;
- Improving the setting of new and existing development and heritage assets by investing in strategic green infrastructure – including public open spaces, habitats, sustainable drainage systems and walking and cycling connections; and
- Engaging people in their environment and encouraging more sustainable lifestyles.
- 2.9.1 The landscape and ecological mitigation measures incorporated in the Scheme design fulfil objectives of the strategy, which acknowledges that green infrastructure delivered through development can have a positive contribution.

Communities

- Potential new greenspace and improved access infrastructure; and
- Enhanced sustainable transport options.

Wildlife

- New, enhanced and accessible wildlife areas close to communities; and
- Habitat networks created/re-connected along access routes.

Landscapes

- Green Infrastructure delivered through development could reinforce landscape character through retaining and enhancing landscape elements; and
- Poor quality or neglected land could be enhanced, improving sense of place.

Environmental Processes

- Layout design could include Sustainable Drainage Systems (SuDS), reducing runoff and providing space for wildlife; and
- Tree planting could reduce airborne particulates, provide cooling and habitat.

2.10 The Oxfordshire Nature Recovery Network

- 2.10.1 The Oxfordshire Nature Recovery Network (NRN) was established in response to DEFRA's 25 Year Environment Plan to 'leave our environment in a better state than we found it and to pass on to the next generation a natural environment protected and enhanced for the future'. The aim of the NRN is to protect and restore wildlife, as well as providing greater public enjoyment of the countryside; increased carbon capture; and improvements in water quality and flood management.
- 2.10.2 The strategy priorities biodiversity for the area and a local habitat map that identifies opportunities for recovering or enhancing biodiversity.

3. Existing Landscape and Biodiversity Features and Development Impacts

3.1 Existing Landscape and Habitat Features

- 3.1.1 The main settlement in the vicinity of the Scheme is Didcot, a railway town, and civil parish located approximately 22 km south of Oxford. Didcot holds "Garden Town" status and is considered Oxfordshire's gateway to future science, applied technology, nature, and vibrant communities.
- 3.1.2 The land cover away from the town is primarily arable farming with fragmented and somewhat industrialised character relating to land use including the former Didcot A Power Station, Milton Park industrial and commercial estate, Didcot Industrial Estate, working and former landfill sites, and gravel extraction areas and pits.
- 3.1.3 The landscape north of the River Thames has a more rural pattern of fields, hedgerows and treelines, but with CSC a notable area of development on the north side of the A415.
- 3.1.4 Away from the main town of Didcot, settlement is typically either concentrated in small villages such as Appleford on Thames and Clifton Hampden. Other areas of settlement in the study area include Harwell, a village in the far south; Sutton Courtenay, Culham, Drayton and Milton in the west; and Long Wittenham in the east.
- 3.1.5 Landscape character assessment is a hierarchical process from national to regional and local scales. At a national scale majority of the Site lies within National Character Area (NCA) 108: Upper Thames Clay Vales.
- 3.1.6 Analysis of NCA 108 within the Site identifies the characteristics which are applicable or partly applicable to the site and study area as set out in Table 3.1.

Table 3.1: Key Characteristics of NCA 108

NCA 108 Upper Thames Clay Vale: Key Characteristics within the Study Area.

A broad belt of open, gently undulating lowland farmland on predominantly clay soils.

Contrasting landscapes, including enclosed pastures of the clay lands with wet valleys, mixed farming, hedges, hedge trees and field trees and more settled, open, arable lands. Mature field oaks give a parkland feel in many places.

An extensive area of low-lying land which is dominated by watercourses, including the Thames and its tributaries, and there are also lakes associated with mineral extraction areas.

Hedgerows and mature field and hedgerow trees are features, and many watercourses are fringed with willow or poplar.

- 3.1.7 The landscape context of the Site exhibits some of these key characteristics and they are taken as an appropriate description of it at a regional scale. The full list of key characteristics is available in the NCA 108 profile on the Natural England website.
- 3.1.8 At a county level, OCC has prepared the Oxfordshire Wildlife and Landscape Study (OWLS). The OWLS identify Landscape Character Types (LCTs) for all of Oxfordshire, and Landscape Character Areas (LCAs) within these LCTs.

3.1.9 A summary of the Landscape Character Areas (LCA) within the Site is included within Table 3.2. These descriptions form the baseline against which the potential impacts of the Scheme on landscape character have been assessed.

Table 3.2: Oxfordshire Landscape Character Areas

Landscape Character Area	Key characteristics
LCA WH/ 20 Sutton Courtenay	Characterised by medium to large-sized arable and grass fields. To the east of Sutton Courtenay and north of Didcot Power Station, the landscape is dominated by an extensive area of mineral extraction and landfill sites, which are at varying stages of restoration. Fields are generally enclosed by a prominent network of tall, thick hawthorn and blackthorn hedges with a dense pattern of ash, willow, poplar, dead elm and oak trees, particularly bordering roads and country lanes. Roadside hedges are generally intact, but many internal field hedges are fragmented and gappy, particularly where they enclose arable land. Significant number of tree-lined ditches with species such as crack willow, ash, poplar and dead elm. Small deciduous plantations and trees within villages are also characteristic.
LCA WH/1 Lower River Thames	Characterised by small to medium-sized semi-improved grass fields and some arable farming, particularly around Radley. Hawthorn hedges are not a conspicuous feature, except in some of the less built-up areas. They are overgrown and gappy and, in places, replaced by fences. Gardens, and some parklands, come down to the river edge and are particularly noticeable adjacent to villages and other built-up areas. Continuous tree corridor that borders the river, consisting mainly of willows, poplars, alder and sycamore. Pollarded willows bordering the river and ditches and, along the river, there are a few small mixed poplar and conifer plantations and ash and sycamore woods. More ornamental and exotic species such as weeping willows and conifers are associated with suburban gardens.
LCA WH/ 15 Culham	Dominated by medium to large-sized arable fields. Field boundaries are almost non-existent, although roadside hawthorn hedges have remained intact. The most prominent feature in the area is the linear strips of crack willows and poplars bordering watercourses. There are also occasional very small deciduous plantations.
LCA WH/ 14 Clifton Hampden	Very intensively managed landscape characterised by large arable fields. The extensive grounds of Culham laboratory dominate the western part of the area. Hawthorn and dead elm hedges are often gappy and in poor condition. Scattered hedgerow trees and linear treebelts along ditches provide some structure to the landscape. There are a few small deciduous plantations scattered throughout the character area.
LCA CR/15 Nuneham Courtenay	Dominated by large geometrically shaped arable fields. Large blocks of ancient woodland and mixed plantations are prominent throughout the area. There are a few hedgerow trees, but they are not a significant landscape feature. Fields are enclosed by woodland and gappy thorn hedges. The parkland surrounding Nuneham Park is dominated by arable farming.

3.1.10 At the district level, SODC has prepared the South Oxfordshire Landscape Assessment (SOLA) in 2017 and the VoWHDC has prepared the Vale of White Horse

- Landscape Character Assessment in 2017. Further details on the LCAs identified in these assessments can be found ES Chapter 8: Landscape and Visual.
- 3.1.11 The Site is not within any statutory designated landscapes. The wider study area lies partially within the North Wessex Downs AONB, with the far south of the study area (south of Harwell) within the AONB, and the Wittenham Clumps within the AONB.

3.2 Existing Biodiversity Features

3.2.1 The following notable habitats, presented in Table 3.3, are present within the Site.

Table 3.3: Notable habitats within the Site

Habitat type	Status
A1.1.1 Broad-leaved semi-natural woodland	LBAP habitat. Lowland Mixed Deciduous Woodland is a UK habitat of Principal Importance.
F1 Swamp	Reedbed is an LBAP habitat and UK habitat of Principal Importance.
Freshwater: Ponds and Eutrophic Standing Waters)	Eutrophic Standing Waters and Ponds are LBAP habitats and may qualify as UK habitat of Principal Importance.
Freshwater: Rivers with running water (watercourses including 'ditches' with running water)	Rivers are an LBAP habitat and may qualify as a UK habitat of Principal Importance.
J1.1 Arable land (including arable margins)	Arable margins are an LBAP habitat.
Intact hedge (with trees) – native speciesrich	LBAP habitat. Habitat of principal importance. One species-rich and 'important' hedgerow within Scheme.

- 3.2.2 Field signs of Otter (*Lutra lutra*) spraints were recorded at the River Thames and Moor Ditch. Water voles were not identified within the survey area.
- 3.2.3 Four active Badger (*Meles meles*) setts were identified within 100 m of the Scheme. Patterns of Badger activity have potential to change over time, so the relevance of Badger will need to be considered in the lead-in to implementation of the final approved Landscape and Biodiversity Management Plan (LBMP).
- 3.2.4 Twenty-three (23) buildings/ structures and one hundred and sixty-one (161) trees across the Site were determined to have Potential Roosting Feature (PRF) within the Scheme footprint and 100 m buffer zone. Further surveys of these trees and buildings/ structures confirmed roosts in three trees (T45, T49 and T63) and eight buildings (B6, B16, B18, B19, B20, B21, B22 and B29). The confirmed roosts consist of day, night and feeding roosts used by small numbers of common pipistrelle and soprano pipistrelle. The bat activity surveys recorded at least nine species of bat foraging and commuting at various levels of activity across the Site. These species comprised common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), noctule (*Nyctalus noctula*), Leisler's bat (*Nyctalus leisleri*), serotine (*Eptesicus serotinus*), brown long-eared bat (*Plecotus auritus*) Myotis bats (*Myotis* sp.) and barbastelle (*Barbastella barbastellus*).
- 3.2.5 A total of 306 terrestrial invertebrate species were recorded within the survey area, the majority of which are common and widespread. Some notable species are present, particularly in habitats identified within the Didcot to Culham River Crossing section of the Scheme.

- 3.2.6 Of 87 bird species were recorded within the survey area during surveys for breeding birds, with territories for 53 species confirmed and 14 probable or possible territories, resulting in a breeding bird assemblage of 67 species across the survey area. The survey area supports a number of notable species during the breeding season, including Lapwing (*Vanellus vanellus*), Yellowhammer (*Emberiza citronella*), Linnet (*Linaria cannabina*), Reed Bunting (*Emberiza schoeniclus*) and Skylark (*Alauda arvensis*); all are BoCC Red or Amber list species, listed as Priority bird species on the UKBAP or species of principal importance.
- 3.2.7 Grass Snake (*Natrix helvetica*) and Common Lizards (*Zootoca vivipara*) were identified within two areas of suitable habitat within the Scheme during field surveys.
- 3.2.8 European eel (Anguilla anguilla) and bullhead (Cottus gobio) were reported in WB07 through eDNA survey. The European eel is a critically endangered Section 41 species of principal importance and UK BAP and LBAP priority species. Bullhead is listed on Annex II of the EC Habitats Directive, and also listed as a UK BAP species. Other evidence of fish in unnamed ponds at the Appleford Siding (WB16, WB18, WB19 and WB32) within the Site include Bullhead, Carp (Cyprinis carpio), Three-spined stickleback (Gasterosteus aculeatus), Roach (Rutilus rutilus), Rudd (Scardinius erythrophthalmus), Common dace (Leuciscus leuciscus), Minnow (Phoxinus phoxinus), Tench (Tinca tinca) Stone loach (Barbatula barbatula), Perch (Perca fluviatilis), Nine-spined stickleback (Pungitius pungitius) and Common bream (Abramis brama).
- 3.2.9 The trumpet ramshorn snail (*Menetus dilatatus*) was recorded in the River Thames (WB15). Two notable species of beetle were recorded, *Berosus affinis* in WB07 and WB16, and *Peltodytes caesus* in WB19. *Peltodytes caesus* is classified as Nationally Scarce (neither Red List nor Near Threatened) which means it occurs in 16-100 hectads in Great Britain. Species from the damselfly family Coenagrionidae were recorded in WB07, WB15, WB16, WB19 and WB32. Species such as *Coenagrion pulchellum* are regarded as nationally rare or notable and are listed in the citation of the Cothill Fen SAC and SSSI because of their scarcity.
- 3.2.10 Invasive Non–Native species (INNS) listed on Schedule 9 of the WCA 1981 have been identified on the Site. Curly Pondweed (*Lagarosiphon major*) was recorded in the fishing pond near the Appleford Siding (WB32). Himalayan Balsam *Impatiens glandulifera* was recorded on the banks at of Moor ditch (WB09 and WB11) and the River Thames (WB15). New Zealand pigmyweed (*Crassula helmsii*) was recorded on the banks of the wetland and Nuttall's waterweed was present in the wetted area of the Culham finger lakes (WB16). Furthermore, Signal Crayfish (*Pacifastacus leniusculus*) was confirmed present within Moor Ditch and thought likely to be present within the connected River Thames.
- 3.2.11 One species-rich hedgerow classified as 'important' under the Hedgerows Regulations will be directly impacted by the Scheme.

3.3 Impacts on Landscape and Biodiversity Features

Landscape

- 3.3.1 There will be potential adverse landscape and visual effects due to the construction and operation of the Scheme. A summary is provided here, but full details can be found in ES Chapter 8: Landscape and Visual.
- 3.3.2 Potential impacts on landscape receptors will occur from the activities detailed below.

Construction

- Stripping of soils and re-grading of land and the presence of earthmoving machinery, vehicles and construction compounds; and
- Removal of hedgerows and trees and general construction activity affecting tranquillity.

Operation Year 1

- Change in land use from the introduction of the Scheme;
- Reduction in established vegetation as a result of vegetation loss, severance of field boundaries and creation of new atypical field patterns;
- Modification of landscape character through severance of landform and field patterns;
- Modification of natural landform to introduce engineered landforms and modification of the natural landform to accommodate the Scheme on embankment/ cutting and at grade; and
- Increased vehicle movement and urbanisation, including new and additional lighting.
- 3.3.3 The following landscape receptors will experience significant adverse effects due to the Scheme:
 - LLCA 12 Thames Floodplain; and
 - LLCA 16 Clifton Hamden Farmland.
- 3.3.4 Potential Scheme impacts on visual amenity/ the nature of views experienced by people will occur as a result of:

Construction

 Views of the Scheme construction activity, including machinery, compounds and vegetation removal and the formation of embankments and implementation of structures.

Operation Year 1

- Introduction of highway infrastructure and vehicles into the landscape, changing the composition of views.
- 3.3.5 The following visual receptors (VR) will experience significant adverse visual impacts due to the implementation and operation of the Scheme:
 - VR 6a Residents of New Farm;
 - VR 7 Residents at Gary O'Donnell Drive, Didcot;
 - VR 8 Recreational users PRoW 373/24 (bridleway) on the perimeter of the former Didcot Power Station;
 - VR 10 Recreational users on PRoW 106/4 to the west of Appleford Crossing;
 - VR 10a Residents of Appleford Crossing Cottage and Hill Farm;
 - VR 10b Residents west of Main Road north of the level crossing;
 - VR 16 Road users on the B4016;
 - VR 18, VR19, VR20 and VR21 Recreational users on the Thames Path National Trail:

- VR 23 and VR24 Road users on the A415;
- VR 26 Road users on Station Road, Culham;
- VR 27 Residents at Fullamoor;
- VR 28 Road users on the A415;
- VR 31 Recreational users on PRoW 171/10 (footpath) on the boundary of CSC;
- VR 32 Recreational users on PRoW 171/10 (footpath), west of Clifton Hampden;
- VR 34 Recreational users on PRoW 171/6 (footpath) north-west of Clifton Hampden;
- VR 36 Residents on the northern edge of Clifton Hampden;
- VR 37 Recreational users on PRoW 171/5 (footpath), to the north of Clifton Hampden; and
- VR 38 Recreational users on PRoW 171/3 (footpath), between Clifton Hampden and Nuneham Courtenay.

Biodiversity

- 3.3.6 The Scheme will result in temporary or permanent loss of some of the notable habitats as presented in Table 3.3.
- 3.3.7 There will be adverse impacts on several protected or notable species during construction and operation of the Scheme. These include negative impacts to:
 - Aquatic Macroinvertebrates and macrophytes due to loss and fragmentation
 of habitat, surface water run-off and damage/ disturbance from salt spray/
 emissions into/ onto hydrologically connected habitats supporting these species
 adjacent to the scheme boundary;
 - Fish due to direct habitat loss and fragmentation, surface water run-off and damage/ disturbance from salt spray/ emissions into/ onto hydrologically connected habitats supporting these species adjacent to the Scheme boundary;
 - Grass Snake and Common Lizard due to killing or injuring during construction:
 - Birds negative impacts to nesting bird species due to temporary and permanent loss of habitat and negative impacts due to permanent loss of foraging habitat - pastoral/ arable land, mortality due to collision with traffic and reduced population size and breeding success due to traffic noise and disturbance. As well as negative impacts to population of wintering birds due to loss of habitat and noise and visual disturbance from construction;
 - Bats temporary and permanent loss of habitats of value to bats as well as
 disturbance (from operational light). Additionally, severance of habitats being
 used as flight corridors crossing the scheme route will result in the killing/ injury/
 of bats in flight through collision with operational traffic;
 - Badger due to temporary and permanent loss of foraging habitat and severance of territories and commuting routes and due to loss of setts and killing/ injury through collision with operational traffic;
 - Otter due to disturbance to resting sites, killing/ injury through collision with operational traffic or becoming trapped in drain outfalls, permanent loss and severance of habitats; and

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> There are also potential negative impacts due to the spread of terrestrial and aquatic INNS, due to proposed works within waterbodies and watercourses along the Scheme, whilst working in the vicinity of contaminated waterbodies, and through the potential spread of riparian and terrestrial INNS through vehicle movement, stockpiling of materials and other construction activities.

4. Impact Avoidance Requirements

4.1 Overview

- 4.1.1 The impact avoidance measures outlined below will be implemented, as relevant and appropriate, prior to and during the construction phase of each relevant part of the Scheme, the purpose being to minimise the impact of works on biodiversity features and trees and to achieve legislative compliance.
- 4.1.2 Actions that have been taken that have contributed to avoiding and/ or reducing potential ecology and nature conservation effects have included the following:
 - In defining the Scheme design, a range of alternative alignments have been subject to review. Ecological and nature conservation issues were considered as part of the evaluation process; and
 - Minimising building demolition requirements along the Scheme alignment.
- 4.1.3 As detailed in ES Chapter 8: Landscape and Visual, the Scheme design included a preliminary landscape design that incorporates tree and shrub planting. The proposed design has been developed in an iterative manner through the planning and design process, including ecological mitigation requirements as detailed herein.
- 4.1.4 Standard environmental best practice and mitigation will be implemented to ensure construction and operation of the Scheme complies with legislation relating to protected species. Such measures will be detailed in the construction contractor's Construction Environmental Management Plan (CEMP), which will be produced prior to the commencement of Scheme construction and based on, and incorporate, the content and requirements of the Outline Environmental Management Plan (OEMP) (refer to ES Appendix 4.2).
- 4.1.5 The CEMP will aim to ensure the Scheme does not compromise the local conservation status of ecological receptors present within or in the vicinity of the Scheme. Where protected species licences are required, these will be obtained from Natural England sufficiently in advance of the works to meet the optimum time for mitigation and to minimise any changes to the construction programme.
- 4.1.6 The implementation of these measures has been taken into account when assessing the likely impacts and effects of the Scheme on biodiversity features, as detailed in ES Chapter 9: Biodiversity.

4.2 Update Surveys

- 4.2.1 A competent ecologist will complete a Site walkover in advance of mobilisation and any potential Scheme advance works to reconfirm the ecological baseline conditions and to identify any new ecological risks. The walkover will be completed sufficiently far in advance of Scheme construction works to allow for the completion of any additional, seasonally constrained surveys (e.g. surveys in support of any identified requirements for protected species licences) that may be required.
- 4.2.2 Immediately prior to site clearance and start of construction of each relevant part of the Scheme, further walkover surveys will be undertaken by a competent ecologist and landscape architect or arboriculturist to confirm that the risks associated with the Site remain as previously assessed and, or to confirm that appropriate impact avoidance measures are being implemented (e.g. tree protection fencing, protected species stand-offs and other protection measures). The scope of the required

walkovers will be defined on a case by case basis in consultation with the project team and OCC, based on the specific risks associated with each relevant part of the Scheme and informed by the preceding ecological walkover described above.

- 4.2.3 Existing or potential landscape and biodiversity constraints that will be re-assessed and/ or monitored during the update surveys are:
 - Badgers;
 - Great Crested Newt;
 - Reptiles;
 - Riparian mammals (Water Voles and Otters);
 - Suitability of trees for roosting bats;
 - Suitability of structures for roosting bats;
 - Bat roost status update;
 - Nesting birds, including for specially protected species, such as Barn Owl;
 - Fish pre-construction eDNA survey in the RWE western lagoon;
 - INNS; and
 - Trees.
- 4.2.4 Should any new constraints be identified as a result of the updated surveys, then this document will be updated, and any additional impact avoidance or mitigation requirements identified in consultation with OCC and/or the relevant statutory consultees.
- 4.2.5 Any additional walkover surveys or requirements for site supervision will be instructed during the advance works, site clearance and construction phases as advised as necessary by the ecologist or landscape architect based on professional judgement and the findings of the updated surveys, or otherwise as identified as appropriate by OCC or their appointed Principal Contractor (PC) based on changes to programme, working requirements or following identification of specific issues and constraints not covered by previous advice.

4.3 Protected Species Licences

- 4.3.1 All necessary protected species licences required for the Scheme will be obtained prior to undertaking any works that might result in offences under relevant legislation.
- 4.3.2 With reference to the defined existing baseline conditions, the requirement for licences relates to the following species:
 - Bats; and
 - Badgers.
- 4.3.3 In addition, consent will be required to capture and relocate fish away from the works areas in water bodies to be directly impacted, namely at: the unnamed lake and ponds at the Appleford Siding (WB07, WB18, WB19 and WB32) and the Culham finger lakes (WB16). Fish capture will be facilitated by an FR2 application to use fishing instruments other than rod and line from the Environment Agency, and fish translocation may require an SP1 Application for a Live Fish Movements Site Permit, also from the Environment Agency, and potentially a fish health check. This will be agreed in consultation with the local Environment Agency Biodiversity Team.

4.4 Ecological Clerk of Works and Toolbox Talks

- 4.4.1 Requirements for Ecological Clerk of Works (ECoW) and toolbox talks will be advised by the ecologist and landscape architect based on relevant environmental commitments, the findings of the update surveys and with reference to the relevant project programmes.
- 4.4.2 Relevant site staff will receive toolbox talks on the relevant ecological risks present, legal requirements and the working requirements necessary to comply with legislation and the final approved Landscape and Biodiversity Management Plan. Toolbox talks will be repeated as necessary over the duration of the relevant works.

4.5 Tree Works

- 4.5.1 Most of the established trees and woodland blocks around the Site will be unaffected by the Scheme. Full details of necessary tree removals are contained within the Arboriculture Impact Assessment Report (AECOM, 2021).
- 4.5.2 Where trees have been identified as requiring removal due to poor physiological and, or structural condition, consideration will be given to monolithing (cutting back the canopy and branches without felling) where appropriate in order to leave standing dead wood of benefit to biodiversity such as bats, birds and invertebrates.
- 4.5.3 Prior to any felling or tree work, bat suitability assessments, endo-scoping and/ or emergence/ re-entry surveys will be conducted to confirm absence of roosting bats prior to works taking place.
- 4.5.4 Where works are closely located to retained trees and cannot be practicably avoided then these works will be undertaken in accordance with current best practice. At the time of issue of this OLBMP, current best practice is defined in:
 - British Standard (BS) 5837: 2012 Trees in relation to design, demolition and construction – Recommendations; and
 - National Joint Utilities Group (NJUG) Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.
- 4.5.5 All necessary protective fencing will be installed prior to the commencement of any site clearance or construction works, as set out in the Arboriculture Impact Assessment Report and to be detailed as part of the Arboriculture Method Statement.

4.6 Impact Avoidance Measures for Hedgerows and Tree Loss

Hedgerows

- 4.6.1 Species poor hedgerows will be crossed by the Scheme and about a third of a species-rich and 'important' hedgerow will need to be wholly or partially removed to facilitate the Scheme.
- 4.6.2 On completion of Scheme construction, the temporary loss of any hedgerows to facilitate construction works will be re-instated in full and a diversity of native woody species of local provenance will be used to improve their biodiversity value. Species will include Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*) and Field Maple (*Acer campestre*).
- 4.6.3 All hedgerow planting will be notch planted into cultivated ground at approximate 75cm spacings in a double staggered row and supported by an appropriate timber stake and guard (all fitted as per manufacturer's recommendations).

Trees

- 4.6.4 Trees within the Scheme footprint that cannot be retained will be replaced with native species (either the same as the tree that has been removed or another suitable native species).
- 4.6.5 In several places, trees are proposed as visual screening to mitigate the visual impacts of the Scheme. Heavy standard trees are proposed in several locations within hedgerows to provide more immediate visual screening. Elsewhere, smaller trees have been specified to assist establishment.
- 4.6.6 All new trees will be notch planted at approximate 2 m centres with a random distribution into cultivated ground. All planting will be supported by an appropriate timber stake and tree shelter fitted as per manufacturer's recommendations.

Precautionary Working Methods

4.6.7 The following precautionary working methods will be employed to minimise potential adverse impacts on protected species prior to and during Scheme construction and in consideration of legal compliance. Precautionary working method statements will be produced as necessary to specify working requirements and other necessary impact avoidance measures. These measures will be controlled and implemented through the CEMP that will be developed by the main construction contractor for the Scheme.

Bats

4.6.8 Species specific Method Statements will be produced for bats for all known bat roosts which could be temporarily impacted during Scheme construction or to prevent any potential impacts due to proximity which will not be directly lost and therefore subject to a European Protected Species Mitigation Licence (EPSML).

Nesting Birds

- 4.6.9 Where practicable, vegetation clearance works will be undertaken outside the bird nesting season, which is typically between March and August inclusive. Where it is not practicable to avoid the bird nesting season, an ecologist will inspect all areas of vegetation prior to clearance and clearance will only be undertaken subject to the instruction and requirements of the ecologist to ensure the protection of birds and their nests. Cleared ground will be maintained in a disturbed state in the run-up to construction, to minimise the risk of ground nesting birds attempting to nest on cleared ground.
- 4.6.10 Where vegetation clearance works are required during the bird nesting season (i.e. between the months of March and August inclusive), these works can only proceed following the completion of a nesting bird check which will be undertaken by an experienced ornithologist. Vegetation clearance will not be undertaken where any active bird nest is identified, and all nests will be protected from harm until the nesting attempt is complete. This will require a buffer of vegetation to be left around the nest, the size of which will depend upon the species involved. Vegetation clearance can only proceed once the nesting attempt has been deemed, by a suitably qualified ornithologist, to have finished.

Reptiles (Grass Snake and Common Lizard) and common amphibian species

4.6.11 Precautionary working methods to avoid accidental killing or injury of reptiles and amphibians will be implemented during construction of the Scheme. Precautionary

methods will include initial clearance of potentially suitable vegetation down to a height of approximately 30cm, followed by dismantling of any suitable features, such as log piles and tree stumps, under ecological supervision. Vegetation will be cleared to ground level once no risk of the presence of reptiles remains. Vegetation within working areas will be kept short during construction to discourage reptiles from entering the Site.

- 4.6.12 Regarding otters, physical disturbance created by the construction of a new road can seriously affect the activities of an otter if no mitigation measures are enforced. Noise, lights for night working, the use of machinery, the obstruction of holts and paths and the presence of many people can all have detrimental effects. Site compounds and storage or waste dumping facilities should be located away from potential otter habitat. This will avoid disturbance to the otters' routine and a minimise pollution risks. All personnel working on Site should also be aware of the mitigation in place and of the obligations. Night working should be suspended in areas where otters are thought to be active. Areas of scrub should be retained with as little disturbance as possible during construction and fenced with signs to clearly mark areas that contractors should not enter.
- 4.6.13 Otters are inquisitive animals and may be attracted onto the road to investigate new machinery or spoil heaps and so measures must be taken to prevent this. Where otters are known to be active, they should be excluded from the area by fencing and an alternative route provided to allow them to pass the site safely. This may include underpasses for site access roads. The fence should be positioned to guide otters to these safe crossing points. Temporary fencing can be used; either a stiff plastic mesh that otters cannot scale, but does not entangle them, or a chestnut paling fence with 25 mm spacing. Care must be taken to keep equipment, materials and portacabins from obstructing the otters' preferred path. An otter could be diverted and forced to cross the road where no safe crossing point exists, so care must be taken that this does not occur. This may also require the installation of temporary fencing.

4.7 Animal Welfare Requirements

- 4.7.1 Construction excavations have the potential to trap wildlife, such as badger and otter, and result in offences under animal welfare legislation. This will be avoided through implementation of simple precautionary mitigation. All excavations deeper than 1 m will be covered overnight, or where this is not practicable a means of escape will be fitted e.g. battered soil slope or scaffold plank, to provide an escape route should any animals stray into the construction site and fall into an excavation.
- 4.7.2 Measures will be put in place at any construction compounds located adjacent to the River Thames and Moor Ditch to minimise the risk of disturbance and obstruction of otter movements at night. This will include measures, as relevant, to minimise light spill and to minimise noise from plant and construction activities.
- 4.7.3 During the culverting of watercourses and construction activities within water bodies, due regard will be given to the fish and other fauna present within water bodies. Where there is a risk of fish becoming trapped during construction, or otherwise adversely affected for example by localised deteriorations in water quality, fish rescue and translocation may be required to remove them from the works area.

4.8 Invasive Species Management Plan

4.8.1 An Invasive Species Management Plan (ISMP) is required prepared as necessary based on the findings of the updated surveys. The ISMP will identify requirements for invasive plant management to achieve legislative compliance over the Scheme construction phase. It is anticipated that the construction phase requirements will be

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included as part of an ISMP covering preliminary works including site clearance. There may be ongoing requirements to control invasive plant species during establishment of new habitats and soft landscape, or otherwise to address wider requirements for legislative compliance.

4.8.2 If necessary, the ISMP will be updated to allow it to be rolled forward into the operational phase of the Scheme.

5. Landscape and Biodiversity Enhancement

5.1 Approach

- 5.1.1 Proposals for new habitat creation and landscaping are accommodated, where feasible, within the existing Scheme site, but the primary focus is on protection and enhancement of existing habitats.
- 5.1.2 The landscape and biodiversity effects of the Scheme are considered limited. While there will be a short-term impact during Scheme construction, the land and associated field boundary features (hedgerows, drainage ditches, trees) will be reinstated following construction. Opportunities for meaningful landscape and biodiversity enhancement along the Scheme route have been identified where appropriate.

5.2 Features to be Created, Enhanced and Managed

- 5.2.1 The Scheme's proposed landscape design includes the following elements:
 - Amenity and Modified grassland;
 - Grassland with bulbs;
 - Species-rich grassland, including wet flower-rich grassland approximating to MG4/ MG5 grassland in the Hanson Restoration area;
 - Native broad-leaved woodland, including wet woodland in the Hanson Restoration area;
 - Native woodland edge;
 - Native shrubs;
 - Ornamental shrubs;
 - Native hedgerows;
 - Individual trees;
 - Marginal planting, including reedbed in the Hanson Restoration area; and
 - Wetland meadow.
- 5.2.2 The above elements are designed to provide a range of functions in line with DMRB standards for highways. The aim is to integrate the Scheme into the existing landscape and minimise the impact of disturbance. There are a range of planting elements and types specifically chosen to replicate those elements lost and including those prevalent in the existing landscape.
- 5.2.3 This OLBMP has been prepared in line with the DMRB LA 117 Landscape Design. This document is to be read alongside the Preliminary Landscape Proposals drawings: and the Manual of Contract Documents for Highway Works (MCHW).
- 5.2.4 Biodiversity enhancement proposals are outlined in Table 5.1.

Table 5.1: Landscape and Biodiversity Enhancement Proposals

Enhancement	Key Elements	Landscape Function	Biodiversity Function
Amenity grassland	Amenity Grassland (LE1.1) will be established mainly on highway verges, visibility splays and roundabouts.	Yes	No
Grassland with Bulbs	Grassland with Bulbs (LE1.2) will be established mainly in areas of high pedestrian use and highway verges to increase the visual amenity and enhance the sense of a gateway/ entrance.	Yes	Yes
Species rich grassland	Species Rich Grassland (LE1.3) will provide biodiversity, visual and amenity benefits throughout the Scheme. Wet flower-rich grassland approximating to MG4/ MG5 grassland is proposed in the Hanson Restoration area.	Yes	Yes
Native woodland	Woodland (LE 2.1) is proposed in areas where large areas of structural planting will assist to screen views of the Scheme from the neighbouring landscape and provide biodiversity and landscape integration benefits. Wet woodland is proposed to the west of the Scheme in the Hanson Restoration area.	Yes	Yes
Native woodland edge	Woodland edge (LE 2.2) is used throughout the Scheme as a margin to areas of woodland, and as scrub planting. The purpose of woodland edge is to integrate these areas into the surrounding landscape while also providing valuable resource for wildlife.	Yes	Yes
Native shrubs	Native shrub (LE 2.6) species have been proposed to soften the road landscape, provide visual screening and replace vegetation lost to the Scheme.	Yes	Yes
Ornamental Shrubs	Ornamental Shrubs (LE 3.2) are intended to provide an increase in visual amenity and enhance the sense of gateway/ entrance in strategic areas across the Scheme.	Yes	Yes
Native hedgerows	Native species hedgerows (LE 4.3) will provide visual screening as well as valuable habitat and food source for local wildlife.	Yes	Yes
Individual trees	Individual trees (LE5.1) provide an additional layer of vegetation and structure within the landscape as well as screening views.	Yes	Yes
Marginal planting	Marginal planting (LE 6.1) will provide habitat with a diversity of species along the water's edge of the 10 balancing ponds. Reedbed is proposed in the Hanson Restoration area.	Yes	Yes
Wetland meadow	Wetland meadow (LE 6.4) within the boundaries of the 10 balancing ponds will provide additional species of grass and flowers within the Scheme.	Yes	Yes

Amenity Grassland

- 5.2.5 Amenity grassland will be established mainly on highway verges, visibility splays and roundabouts. An appropriate seed mix (e.g. Emorsgate EG22 or similar approved) will be broadcast evenly across the area at a rate of approximately 25g/m², with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact.
- 5.2.6 A specification for the amenity grass mix with reference to the indicative species and percentages is presented in Table 5.2. All areas to receive amenity grass seeding will be prepared according to the type of grassland to be established and free of weeds and debris prior to seeding being carried out.

Table 5.2: Amenity Grassland Mix

Species	Common Name	Percentage mix %
Agrostis capillaris	Common Bent	10
Betonica officinallis	Betony	20
Festuca rubra	Red Fescue	50
Lolium perenne	Perennial Ryegrass	30

Grassland with Bulbs

- 5.2.7 Grassland with bulbs will be established mainly in areas of high pedestrian use and highway verges to increase the visual amenity and enhance the sense of the gateway/ entrance while maintaining forward visibility due to their low growing nature. Grassland with bulb planting will provide seasonal interest while enhancing visual amenity and enriching biodiversity. The grass mix used for this landscape element will consist of a general-purpose meadow grass mixture (e.g. Emorsgate EG1 or similar and approved) to provide a naturalistic backdrop to the bulb planting.
- 5.2.8 A specification for the grass mix with bulbs with reference to the indicative species and percentages is presented in Table 5.3. All areas to receive this mix will be prepared according to the type of grassland to be established and free of weeds and debris prior to seeding being carried out.

Table 5.3: Grassland with Bulb Mix

Species	Common Name	Percentage mix %
Agrostis capillaris	Common Bent	10
Betonica officinalis	Betony	20
Festuca rubra	Red Fescue	50
Galanthus nivalis	Common Snowdrop	Bulb
Lolium perenne	Perennial Ryegrass	30
Narcissus 'Loth Lorien'	Daffodil 'Loth Lorien'	Bulb
Narcissus pseudonarcissus	Lent Lily	Bulb
Narcissus 'Salome'	Daffodil 'Salome'	Bulb
Narcissus 'Thalia'	Daffodil 'Thalia'	Bulb

Species Rich Grassland

Species-rich grassland (e.g. Emorsgate EM3 or similar and approved) will establish a diverse sward of grasses and herbs, comprising nine or more species per m², including species found locally. Seed will be broadcast at approximately 4g/m² over exposed and scarified subsoil with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact.

5.2.9 A specification for the species-rich grass mix with reference to the indicative species and percentages is presented in Table 5.4. All areas to receive species rich grass seeding will be prepared according to the type of grassland to be established and free of weeds and debris prior to seeding being carried out.

Table 5.4: Species Rich Grassland Mix

Species	Common Name	Percentage mix %
Achillea millefolium	Yarrow	0.4
Agrimonia eupatoria	Agrimony	0.8
Agrostis capillaris	Common Bent	8
Anthyllis vulneraria	Kidney Vetch	0.1
Betonica officinallis	Betony	0.1
Centaurea nigra	Common Knapweed	2.7
Cynosurus cristatus	Crested Dogstail	28
Centaurea scabiosa	Greater Knapweed	2.5
Daucus carota	Wild Carrot	1.5
Festuca rubra	Red Fescue	24
Galium album	Hedge Bedstraw	0.5
Geranium pratense	Meadow Cranesbill	0.2
Knautia arvensis	Field Scabious	1.3
Leucanthemum vulgare	Oxeye Daisy	3.2
Lotus corniculatus	Birdsfoot Trefoil	0.1
Medicago lupulina	Black Medick	1.2
Origanum vulgare	Wild Marjoram	0.1
Pastinaca sativa	Wild Parsnip	0.4
Festuca rubra	Red Fescue	24
Phleum bertolinii	Smaller Cat's-tail	4
Poa pratensis	Smooth-stalked Meadow-grass	16
Poterium sanguisorba	Salad Burnet	0.5
Primula veris	Cowslip	0.1
Prunella vulgaris	Selfheal	2.5
Ranunculus acris	Meadow Buttercup	0.2
Rumex acetosa	Common Sorrel	0.2
Silaum silaus	Pepper Saxifrage	0.1

Species	Common Name	Percentage mix %
Silene vulgaris	Bladder Campion	0.3
Torilis japonica	Upright Hedge-parsley	0.5
Vicia cracca	Tufted Vetch	0.5

5.2.10 A separate grassland seed mix has been included for wet flower-rich grassland approximating to MG4/ MG5 grassland - refer to Table 5.5. While a planting specification has not been provided by Hanson for the restoration area, this grassland mix is considered appropriate for this area.

Table 5.5: Species Rich Grassland Mix

Species	Common Name	Percentage mix %
Angelica sylvestris	Wild Angelica	2%
Centaurea nigra	Common Knapweed	16%
Filipendula ulmaria	Meadowsweet	18%
Geum rivale	Water Avens	3%
Iris pseudacorus	Yellow Flag Iris	24%
Juncus effusus	Soft Rush	2%
Juncus inflexus	Hard Rush	8%
Lathyrus pratensis	Meadow Vetchling	2%
Lotus pedunculatus	Greater Birds-foot Trefoil	2%
Lychnis flos-cuculi	Ragged Robin	2%
Lythrum salicaria	Purple Loosestrife	3%
Ranunculus acris	Meadow Buttercup	16%
Succisa pratensis	Devils-bit Scabious	2%
Vicia cracca	Tufted Vetch	2%
Agrostis capillaris	Common Bent	5%
Cynosurus cristatus	Crested Dog's-tail	15%
Festuca trachyphylla	Hard Fescue	20%
Festuca rubra ssp. litoralis	Slender Creeping Red Fescue	20%
Festuca rubra ssp. rubra	Strong Creeping Red Fescue	20%
Poa pratensis	Smooth Stalked Meadow Grass	20%

Native woodland

- 5.2.11 Woodland will make up a large proportion of the planting throughout the Scheme. A mix of locally found native species will be used to provide maximum benefit to biodiversity while also preserving the landscape character. Establishing woodland will help to provide landscape integration, visual screening and mitigation for the habitats and vegetation that will be lost due to the Scheme. In areas of existing woodland, LE 2.1 will be used to tie in the existing landscape with the development to provide continuity and habitat connectivity.
- 5.2.12 A specification for the woodland species mix with reference to the indicative species is presented in Table 5.6. These species are reflective of the species present in

existing woodlands in the local area. Areas of woodland will be underseeded with a woodland seed mix (e.g. Emorsgate EW1 or similar and approved) containing wildflowers and grasses that work well in a woodland setting.

5.2.13 Wet woodland species have been included from the planting specification for the Hanson Restoration area. These are indicated as wet woodland species in Table 5.6.

Table 5.6: Native Woodland Mix

Species	Common Name	Wet Woodland	Percentage Mix %
Acer campestre	Field Maple	Yes	10
Alnus glutinosa	Alder	Yes	15
Betula pendula	Silver Birch	Yes	15
Cornus sanguinea	Common dogwood	Yes	5
Carpinus betulus	Hornbeam		5
Corylus avellana	Hazel		15
Crataegus monogyna	Hawthorn	Yes	10
Ilex aquifolium	Holly		2
Malus sylvestris	Crab Apple		2
Populus tremula	Aspen	Yes	2
Prunus avium	Wild Cherry		2
Quercus robur	Oak		5
Rosa canina	Dog Rose		2
Salix alba	White willow	Yes	2
Salix caprea	Goat willow	Yes	2
Salix viminalis	Common osier	Yes	2
Sambucus nigra	Elder		2
Viburnum opulus	Guelder rose	Yes	2

Native Woodland Edge Mix

- 5.2.14 Woodland edge is used throughout the Scheme areas as a margin to areas of woodland, and as scrub planting. The purposes of woodland edge are to integrate these areas into the surrounding landscape while also providing valuable resource for wildlife. Establishing woodland edge planting will help to provide screening, create a more naturalistic feel to the landscape and improve habitat connectivity and continuity.
- 5.2.15 A specification for the woodland edge species mix with reference to the indicative species is presented in Table 5.7. These species are reflective of those present in the existing landscape and local area.

Table 5.7: Native Woodland Edge Mix

Species	Common Name	Percentage Mix %
Acer campestre	Field Maple	35
Crataegus monogyna	Hawthorn	35
Prunus spinosa	Blackthorn	10

Species	Common Name Percentage Mi	
Rosa canina	Dog Rose	10
Rubus fruticosus	Blackberry	10

Native shrubs

- 5.2.16 Native shrubs will be used throughout the Scheme to help establish a more rural aesthetic along road corridors and help integrate these newly developed routes into the surrounding landscape. Establishing native shrub planting will help to provide screening, create a more naturalistic feel to the landscape and improve habitat connectivity and continuity.
- 5.2.17 A specification for the shrub species mix with reference to the indicative species is presented in Table 5.8. These species are reflective of those present in the existing landscape and local area.

Table 5.8: Native Shrub Mix

Species	Common Name	Percentage Mix %
Crataegus monogyna	Hawthorn	30
Cornus alba	Dogwood	5
Ilex aquifolium	Holly	10
Ligustrum vulgare	Wild Privet	15
Prunus spinosa	Blackthorn	15
Rosa canina	Dog Rose	5
Sambucus nigra	Elder	10
Viburnum opulus	Guelder-rose	10

Ornamental Shrubs

- 5.2.18 Ornamental shrubs are intended to provide an increase in visual amenity and enhance the sense of gateway/ entrance in strategic areas across the Scheme. Ornamental shrubs are to be established to try to create a sense of place and add seasonal interest around these gateway areas while also enriching the biodiversity of the landscape.
- 5.2.19 A specification for the ornamental shrub mix with reference to the indicative species and percentages is presented in Table 5.9. Where possible and appropriate, a native species that fulfils the design criteria for ornamental shrubs will be specified.

Table 5.9: Ornamental Shrub Mix

Species	Common Name	Percentage Mix %
Berberis thunbergii	Barberry	15
Choisya ternata	Mexican Orange Blossom	10
Cornus alba Elegantissima	Dogwood	20
Cornus sanguinea	Dogwood	20
Cotoneaster conspicuus 'Decorus'	Tibetan Cotoneaster Decorus	5
Deschampsia cespitosa 'Goldtau'	Tufted Hair Grass	5

Species	Common Name	Percentage Mix %
Festuca glauca 'Golden toupee'	Golden Toupee	5
Hebe 'White Gem'	White Gem	10
Hebe pingufolia 'Sutherlandii'	Hebe Sutherlandii	10

Native hedgerows

- 5.2.20 Hedgerows are to be established across the Scheme in order to maintain and improve the existing resource of hedgerows, optimise connectivity with retained hedgerows/ other habitats, integrate the Scheme into the surrounding landscape pattern, provide visual screening in areas of higher sensitivity and retain a balance of species reflective of adjoining woodland and other vegetation, maximising diversity for the benefit of wildlife. Due to the nature of the existing hedgerows around the Scheme being predominantly hawthorn, this forms the basis for the hedgerows included in the Scheme landscape design.
- 5.2.21 A specification for native species hedgerow with reference to the indicative species and percentages is presented in Table 5.10. All areas to receive native species hedgerow will be cleared of existing vegetation growth to provide a clean bed for the plants while improving the quality of the planting and its rate of success.

Table 5.10: Native hedgerow mix

Species	Common Name	Percentage mix %
Acer campestre	Field Maple	5
Alnus glutinosa	Common Alder	5
Corylus avellana	Hazel	5
Crataegus monogyna	Hawthorn	35
Fagus sylvatica	Beech	10
Ilex aquifolium	Holly	5
Ligustrum vulgare	Wild Privet	5
Prunus spinosa	Blackthorn	20
Rosa canina	Dog Rose	5
Sambucus nigra	Elder	5

Individual trees

- 5.2.22 Individual trees will establish an additional layer of vegetation and structure within the landscape and provide a diverse habitat for birds, bats and insects. The choice of tree species will respond to the local landscape character while providing visual interest and a sense of height and maturity within the scheme.
- 5.2.23 A specification for the mix of individual trees with reference to the indicative species and their attributes are presented in Table 5.11. The use of both ornamental and woodland species trees is in response to the varying landscape character throughout the Scheme and the different uses and needs within the Scheme. For instance entrances and roundabouts are to be planted with ornamental species to improve the visual amenity of the area and prove an attractive space with seasonal interest, whereas in the more wooded areas to the north of the Scheme, a more wooded approach will be taken and this is reflected in the choice of tree species. By providing a diverse array of species, the Scheme looks to combat the effects of disease also

helps by providing a rich and varied resource for the local wildlife. Where possible and appropriate, a native species that fulfils the design criteria for individual trees will be specified.

Table 5.11: Individual Trees

Species	Common Name	Ornamental	Woodland
Acer campestre	Field Maple	Yes	Yes
Acer monspessulanum	Montpelier Maple	Yes	No
Acer rubrum	Red Maple	Yes	No
Alnus glutinosa	Common Alder	No	Yes
Amelanchier arborea	Amelanchier	Yes	No
Betula pubescens	Common Birch	No	Yes
Carpinus betulus	Hornbeam	No	Yes
Crataegus laevigata	Midland Hawthorn	Yes	Yes
Crataegus monogyna	Hawthorn	No	Yes
Fagus sylvatica	Copper Beech	Yes	No
Ginkgo biloba	Maidenhair	Yes	No
Liquidambar styraciflua	Liquidambar	Yes	No
Quercus ilex	Holm Oak	Yes	No
Quercus palustris	Pin Oak	No	Yes
Quercus robur	English Oak	No	Yes
Populus tremula	Aspen	No	Yes
Prunus cerasifera	Cherry Plum	Yes	No
Salix alba	White Willow	No	Yes
Sorbus aucuparia	Rowan	Yes	No
Sorbus intermedia	Whitebeam	Yes	No
Taxus baccata	Yew	Yes	No
Tilia cordata	Small leaved-lime	No	Yes
Tilia x europaea	Common Lime	No	Yes
Tilia tormentosa	Silver Lime	No	Yes
Ulmus 'New Horizon'	Elm New Horizon	No	Yes

Marginal planting

- 5.2.24 Marginal planting is proposed along open water courses and drainage features and has been designed to soften the appearance of these features, integrating them into the landscape and providing seasonal interest as well as a valuable resource for the local wildlife. A separate selection of riparian planting along the bank of the Thames has been included below.
- 5.2.25 A specification for the marginal planting with reference to the indicative species is presented in Table 5.12. This includes reedbed species named in the planting specification for the Hanson Restoration area. Where possible and appropriate, a native species that fulfils the design criteria for marginal plants will be specified.

Table 5.12: Marginal Planting Mix

Species	Common Name	Reedbed	Percentage Mix %
Astilbe 'Rheinland'	Astilbe 'Rheinland'	-	10
Cardamine pratensis	Cuckoo Flower	-	12.5
Carex pendula	Pendulous Sedge	-	15
Carex pseudocyperus	Cyperus Sedge	-	12.5
Geum rivale	Water Avens	-	7.5
Iris pseudocorus	Yellow Flag Iris	-	7.5
Iris siberica	Siberian Flag	-	7.5
Libertia chilensis	New Zealand Satin Flower	-	5
Persicaria vacciniifolia	Rock Knotweed	-	2.5
Phragmites australis	Common reed	Yes	20

5.2.26 In addition, a specific specification for the riparian planting at the River Thames has been prepared, with reference to the indicative species presented in Table 5.13.

Table 5.13: Riparian planting mix

Species	Common Name	Percentage Mix %
Alnus glutinosa	Alder	10
Butomus umbellatus	Flowering rush	5
Carex pendula	Pendulous Sedge	5
Geum rivale	Water Avens	5
Glyceria maxima	Reed sweet-grass	5
Iris pseudocyperus	Yellow Flag Iris	10
Juncus effusus	Soft Rush	5
Lycopus europaeus	Gypsywort	5
Lythrum salicaria	Purple Loosestrife	5
Mentha aquatica	Water Mint	5
Mentha pulegium	Creeping Pennyroyal	5
Persicaria amphibia	Amphibious bistort	5
Phragmites australis	Common reed	10
Salix alba	White Willow	10
Schoenoplectus lacustris	Common club-rush	5
Sparganium erectum	Branched bur-reed	5

Wetland meadow

5.2.27 Wetland meadow mix (e.g. Emorsgate EM8 or similar and approved) will establish grassland in areas where drainage is a key aspect of the landscape. Seeding areas of wetland, including ditches, swales and engineered drainage features will help to provide treatment for pollutants, prevent adverse impacts to habitats, it will deliver significant biodiversity benefits and also it will help to control the rate of discharge of

runoff from the road to receiving watercourses containing habitats. Seed will be broadcast at $4g/m^2$ over exposed and scarified subsoil with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact. Sowings on ground prone to winter flooding are safest either in the early autumn or in spring once the land has drained.

5.2.28 A specification for the wetland meadow mix with reference to the indicative species and percentages is presented in Table 5.14. All areas to receive wetland meadow seeding will be prepared according to the type of grassland to be established and free of weeds and debris prior to seeding being carried out.

Table 5.14: Wetland Meadow Mix

Achillea millefolium Centaurea nigra	Yarrow Common Knapweed	0.2
Centaurea nigra	Common Knapweed	
		2
Filipendula ulmaria	Meadowsweet	2
Galium verum	Lady's Bedstraw	1.5
Geum rivale	Water Avens	0.5
lris pseudocorus	Yellow Iris	0.2
Leucanthemum vulgare	Oxeye Daisy	1.5
Lotus corniculatus	Birdsfoot Trefoil	1
Lotus pendunculatus	Greater Birdsfoot Trefoil	0.04
Plantago lanceolata	Ribwort Plantain	1
Primula veris	Cowslip	0.4
Prunella vulgaris	Selfheal	2
Pulicaria dysenterica	Common Fleabane	0.5
Ranunculus acris	Meadow Buttercup	0.46
Rhinanthus minor	Yellow Rattle	1
Rumex acetosa	Common Sorrel	1
Sanguisorba officinalis	Great Burnet	1.5
Silaum silaus	Pepper Saxifrage	1
Taraxacum officinale	Dandelion	1
Thalictrum flavum	Common Meadow-rue	0.2
Vicia cracca	Tufted Vetch	1
Agrostis capillaris	Common Bent	10
Alopecurus pratensis	Meadow Foxtail	3
Anthoxanthum odoratum	Sweet Vernal-grass	3
Briza media	Quaking Grass	3
Cynosurus cristatus	Crested Dogstail	24
Deschampsia cespitosa	Tufted Hair-grass	2
Festuca rubra	Red Fescue	32
Hordeum secalinum	Meadow Barley	3

Provision of wildlife boxes

- 5.2.29 A range of artificial bird and bat boxes will be installed in existing woodland areas to increase the availability of nesting and roosting features and enhance the value of the woodlands for these species groups.
- 5.2.30 A total of 100 bird nest boxes and 50 bat roost boxes of varying types to suit different species of birds and bats will be installed within the retained woodland areas on suitable trees, in locations to be determined by an ecologist at the time of installation.

Creation of Habitat Piles

5.2.31 Habitat piles and hibernacula will be constructed throughout the Scheme areas using natural materials generated during clearance of the Site, such as logs, turf and grass strimmings. These will provide refuge and hibernation opportunities for amphibians and reptiles, as well as dead wood habitat for invertebrates, which will in turn benefit fauna such as bats and birds.

6. Management and Maintenance of Landscape and Biodiversity

6.1 Introduction

- 6.1.1 This section sets out principles and outline prescriptions for maintenance of grassland and planting proposed within the Scheme in the first five years following implementation. This maintenance will be the responsibility of OCC.
- 6.1.2 A detailed plan for the establishment of planting within the contract period will be developed, based on the following principles and outline prescriptions. This will include a schedule of site inspections, which will be recorded in a site inspection report. These reports will be provided to OCC and/ or the PC and landscape officers of relevant Local Planning Authorities. An annual review report will be published at the end of each growing season (September/ October), which will include a summary of plants which have failed to thrive and will be replaced in the subsequent planting season, referred to as the beat-up (November to end of March).

6.2 Grassland

Amenity Grassland

- 6.2.1 Management will be appropriate to the location and intended maintenance regime of that area of the Scheme and will be established to achieve a uniform grass sward over at least 95% of the relevant area with no scrub.
 - Amenity grassland areas will be allowed to establish to a height of approximately 75 mm before the first establishment cut;
 - Amenity grassland areas will be subsequently maintained to an appropriate height through regular cutting sufficient to maintain visibility splays, as and when necessary to maintain grass to a maximum height of 40 mm (75 mm maximum height of growth at any time);
 - All litter (including fallen leaves) will be removed from grassed areas prior to mowing;
 - Mowers and strimmers will not be used within approximately 100 mm of any tree stem, shrub or hedgerow to prevent damage;
 - Arisings from cuts will be left in situ;
 - The use of a selective herbicide to suppress injurious weeds, or other plants that are detrimental to the establishment of the grassland, using appropriate application techniques to achieve die-back followed by removal off-site; and
 - Bare areas and areas of dead grass where establishment has failed will be rectified by over-seeding in appropriate conditions, although not for those areas that have been left deliberately bare.
- 6.2.2 Grass cutting frequency in line with that stated within the maintenance schedule in Appendix A. Arisings shall be mulched by a minimum of two passes of the mower.

Grassland with Bulbs

6.2.3 Native selection of bulb species should be accompanied by proof of provenance. The depth of planting should be appropriate for the bulb species. A medium frequency

maintenance regime will apply to the grass areas on the roundabouts. Works will include the following actions:

- Remove litter, rubbish and debris throughout the year as and when required at a frequency of no more than every other month;
- Spot treat undesirable species as appropriate three times a year January, May and September;
- Check annually bald and patchy areas of dead grass and reseed as necessary;
- Hand pulling of Ragwort and similar species (if required) in June and August;
- Cut over bulb areas no less than 6 weeks after flowering once a year and remove arisings;
- Subsequent cuts in August in the first maintenance year and twice a year in August and October for the rest of the maintenance period; and
- Bare areas and areas of dead grass where establishment has failed will be rectified by over-seeding in appropriate conditions, although not for those areas that have been left deliberately bare.

Species Rich Grassland

- 6.2.4 The principal aim will be to encourage the development of biodiversity interest over time, based on the following principles and outline prescriptions:
 - Immediately after sowing, the ground will be left undisturbed and un-watered to allow the grassland to establish naturally;
 - Mowing will be carried out once annually with arisings raked into piles and left in situ for seven days before collection and removal to an off-site green waste composting facility;
 - Visual inspections will be made during the growing season;
 - Control of undesirable species (e.g. arable weeds) and injurious weeds will be undertaken to prevent colonisation and domination of the grassland through the use of a selective herbicide; and
 - Bare areas and areas of dead grass where establishment has failed will be rectified by over-seeding in appropriate conditions, although not for those areas that have been left deliberately bare.
- 6.2.5 Botanical surveys will be carried out in late spring to confirm that the establishment species-rich grassland has been successful in achieving its intended aims and objectives. Spot checks will be undertaken at locations within each grassland area by a suitably qualified ecologist during years one, three and five, the purpose being to record plant species, their distribution and the overall condition of the grassland. Other relevant indicators relating to the sward that may require remedial action during the contract period or in the future will also be recorded.

6.3 Planting

Native Woodland, Woodland Edge, Shrubs, Ornamental Shrubs and Native Species- rich Hedgerows

6.3.1 A detailed plan for the establishment of planting will be developed. The aim of establishment maintenance will be to support the early stages of growth to encourage the canopy to close, reducing future management requirements to address

competition from weeds. This is based on the following principles and outline prescriptions:

- Watering of new plants as necessary to maintain vigour and support their successful establishment;
- Maintenance of approximately 1 m weed free circles around each plant through mulching, as well as chemical and mechanical control;
- Fitting of individual recycled plastic spiral or mesh guards around trees, shrubs and hedgerow plants selected appropriate to species and growth habit, which should be sufficient to protect them from strimming activities and damage from animals, with guards checked regularly and straightened to avoid impeding natural movement and growth;
- Quarterly checking of plants to record their growth and condition, including adjustments and replacement of faulty or poorly positioned tree guards and stakes as necessary;
- Removal of non-desirable woody species and the cutting of scrub growth to avoid suppression of newly planted material;
- Replacement of any dead, damaged or diseased plants with matching species of the same size during the next planting season after failure;
- Removal of litter and debris from planted areas (fallen branches and leaf litter to be retained); and
- Re-firming of soil around roots to ensure plants are supported and upright.
- 6.3.2 Monitoring of newly planted areas will be undertaken during the contract period by OCC, or PC, to ensure successful establishment and to record the health and condition of plants. This will involve quarterly walkovers through each planting plot with results recorded in field notes.

Native Species-rich Hedgerows

- 6.3.3 A detailed plan for the establishment and management of hedgerows will be developed and will be based on the principles and outline prescriptions identified for other types of planting (e.g. trees, shrubs and scrub) within the contract period.
- 6.3.4 Additional maintenance specific to hedgerows will be developed and incorporated into the plan. This will include weed control to the base of the hedgerow until the canopy has closed. Cutting of hedgerows is not anticipated in the establishment phase.
- 6.3.5 OCC and/or the PC will be responsible for developing a set of criteria against which the success of hedgerows can be measured during the contract period.

All Shrubs and Trees

- 6.3.6 During the first five years after planting, all plants found to be dead or dying will be replaced within the first available planting season.
- 6.3.7 If areas of trees are seen to be failing, soil samples may be needed to identify potential soil issues affecting tree health. Either soil remediation will be required or, if not practical, a more suitable tree species or location will be chosen with a view to continuing the existing landscape features.

- 6.3.8 Areas of tree and shrub planting will be inspected every five years throughout the operational phase of the scheme and replacement planting will be implemented as and when required to replace failing or failed specimens.
- 6.3.9 If biodegradable tree guards are not used then tree guards shall be removed, and disposed of appropriately, at the end of the 5-year maintenance period (or earlier if monitoring reports adequate growth and establishment and in agreement with OCC).

Individual Trees

- 6.3.10 A detailed plan for the establishment of planting will be developed and will be based on the following principles and outline prescriptions:
 - Check trees remain upright and the root ball is secure;
 - Check tree ties and stakes; and
 - Report on health and vigour, including any remedial action required to remove deadwood, for example.
- 6.3.11 A detailed plan for the management of planting within the contract period will be developed and will be based on the following principles and outline prescriptions:
 - Re-firm plants following high winds or prolonged periods of frost;
 - Inspect and adjust stakes, guards, irrigation pipes and ties;
 - Apply herbicide to plant circles;
 - Inspect and top-up mulch as required;
 - Formative pruning;
 - · Check and record failed or defective plants; and
 - Replacement of failed or defective plants.

Marginal Planting and Wetland Meadows

- 6.3.12 Vegetated drainage systems require frequent inspection to ensure they continue to operate as designed. The growth of aquatic and marginal plants will need to be controlled and managed.
- 6.3.13 A detailed plan for the establishment and management of planting within the drainage features, ditches and wetland areas will be developed and will be based on the following principles and outline prescriptions:
 - Vegetation at the base of these features to be cut to approximately twice the depth of the water to be treated;
 - ii) Scrub and weeds to be removed from drainage features that may adversely affect or impede drainage function in August with a subsequent cut the following May;
 - iii) Banksides of wetland features to be cut at least annually to ensure the flow of water is not restricted; and
 - iv) Arisings to be disposed of off-site or in dedicated habitat piles beyond the swales in liaison with the project ecologist.
- 6.3.14 Monitoring of wetland areas will be undertaken quarterly during the contract period to ensure the successful establishment of the planting and to record the health and condition of plants. Monitoring inspections will inform the need for any remedial measures to be implemented during the contract period, for example slope reinforcement and the reseeding of bare ground.

6.4 Biodiversity

Wildlife Boxes

- 6.4.1 Bird and bat boxes made from long lasting materials (such as Woodcrete) will be used and will be expected to have a life expectancy of 20 25 years. However, the condition of all wildlife boxes installed will be monitored every five years during the operation of the Scheme and replacements will be made as necessary. Inspections can be timed to coincide with the required inspections of new tree and shrub plantings.
- 6.4.2 All wild birds, their active nests and eggs are protected under the Wildlife and Countryside Act (1981), as amended. This makes it an offence to deliberately, or recklessly kill or injure any wild bird or damage or destroy any active nest or eggs of a wild bird.
- 6.4.3 Therefore, annual cleaning of bird boxes cannot be undertaken between the months of March and August inclusive, when birds may be using the boxes. Therefore, bird boxes should be cleaned between October and February to prevent the build-up of nest parasites in the boxes whilst avoiding the risk of disturbing birds using the boxes as a roost site during the cold winter months.
- 6.4.4 Bat boxes will be inspected by an appropriately licensed bat surveyor for evidence of uptake, and any evidence of roosting bats will be recorded to assist with ongoing management of the woodland on site.
- 6.4.5 Bat boxes are, in most circumstances, unlikely to be used by hibernating bats during winter months (between November and February inclusive). Therefore, any maintenance that is required on bat boxes should be undertaken during these months, when bat droppings and any bird nests will be removed.
- 6.4.6 If bats are inadvertently discovered during maintenance, the person undertaking the maintenance should replace the box and leave site.

Post-construction Monitoring

- 6.4.7 Monitoring is required to determine that the objectives documented within this OLBMP are being achieved and whether remedial action may be required. The baseline against which the effects of the actions resulting from the monitoring can be compared against, comprise the pre-construction baseline data.
- 6.4.8 A post-construction monitoring programme will be formalised and agreed with relevant stakeholders and included within the finalised Landscape and Biodiversity Management Plan. Walkover surveys of the Site will be undertaken between April and June in years one, three, five and ten post-construction and will involve an inspection of the hedgerows and grassland habitats to ensure that they are being managed accordingly.
- 6.4.9 Post-construction monitoring for flora, birds (breeding and non-breeding), riparian mammals, Badgers, bats and reptiles will be undertaken in the respective seasons, in years one, three, five and ten post-construction.
- 6.4.10 It is recommended that an annual check of wildlife boxes is made each winter to ensure that all boxes are still in position and secure.
- 6.4.11 The Landscape and Biodiversity Management Plan will be amended accordingly, based on the post-construction monitoring.

7. Roles and Responsibilities

- 7.1.1 OCC and/ or the appointed principal contractor will be responsible for:
 - Correct instruction of all parties contributing to the delivery of the final approved Landscape and Biodiversity Management Plan (including but not restricted to OCC staff, ecologists, landscape architects, landscape contractors, construction contractors and management organisations);
 - Compliance with the final approved Landscape and Biodiversity Management Plan, relevant legislation and any related planning commitments;
 - Keeping the appointed ecologist/ landscape architect/ arboriculturist informed of work activities that require support and supervision, so that it is clear when attendance at site is required;
 - Enacting/ enforcing recommendations made by the ecologist/ landscape architect/ arboriculturist, or otherwise agreeing an appropriate alternative course of action if it is subsequently determined that previous advice is not practicable or is out of date; and
 - Keeping a record of measures taken to deliver the requirements of the final Landscape and Biodiversity Management Plan to provide an auditable record of compliance.
- 7.1.2 The appointed ecologist will be responsible for:
 - Advising OCC on ecological matters and requirements for compliance with relevant legislation, providing support as instructed, and monitoring compliance with the final approved Landscape and Biodiversity Management Plan;
 - Reviewing the Landscape and Biodiversity Management Plan at appropriate intervals and revising management requirements as necessary for the following five-year period and subsequently for the duration of the Plan;
 - Where a European Protected Species Mitigation Licence (EPSML) has been granted it is the responsibility of the 'Named Ecologist' and licence holder or otherwise appointed ecologists to ensure the compliance of the licence and working activities associated with the agreed licence; and
 - Providing OCC with survey reports and other written evidence required in accordance with the agreed scope of work and contractual obligations.
- 7.1.3 The appointed landscape architect/ arboriculturist will be responsible for:
 - Providing specialist site supervision in the form of walk over assessments
 relating to relevant landscape areas. This will be to assess landscape
 components and their condition and identify the need for landscape
 enhancement as instructed and in accordance with the agreed scope of work
 and contractual obligations, once the scheme has been completed;
 - Monitoring and assessing the landscape related elements of the approved Strategy for their effectiveness on an annual basis for the first five years following the completion of the development;
 - Ensuring that the landscape related elements of the approved Plans are
 reviewed every five years beyond the initial monitoring and assessment stage.
 The Strategy shall be amended accordingly to suit any changing landscape
 conditions and ultimately inform the maintenance operations associated with
 the development throughout the operational life of the Scheme; and

Didcot Garden Town HIF 1 Scheme Outline Landscape & Biodiversity Management Plan (OLBMP)

> Ensuring that any reviews associated with landscape related elements of the approved Strategy clearly identifies any changes to site conditions and circumstances, whether the aims and objectives of the approved Plans are being met, and where identified changes are needed to existing management practices and timeframes.

8. References

AECOM, 2017. Oxfordshire Infrastructure Strategy. Oxfordshire County Council.

European Commission, 2019. Water Framework Directive. EEAC.

JNCC and DEFRA (2012) The UK Post-2010 Biodiversity Framework. http://jncc.defra.gov.uk/page-6189 accessed 10.04.21

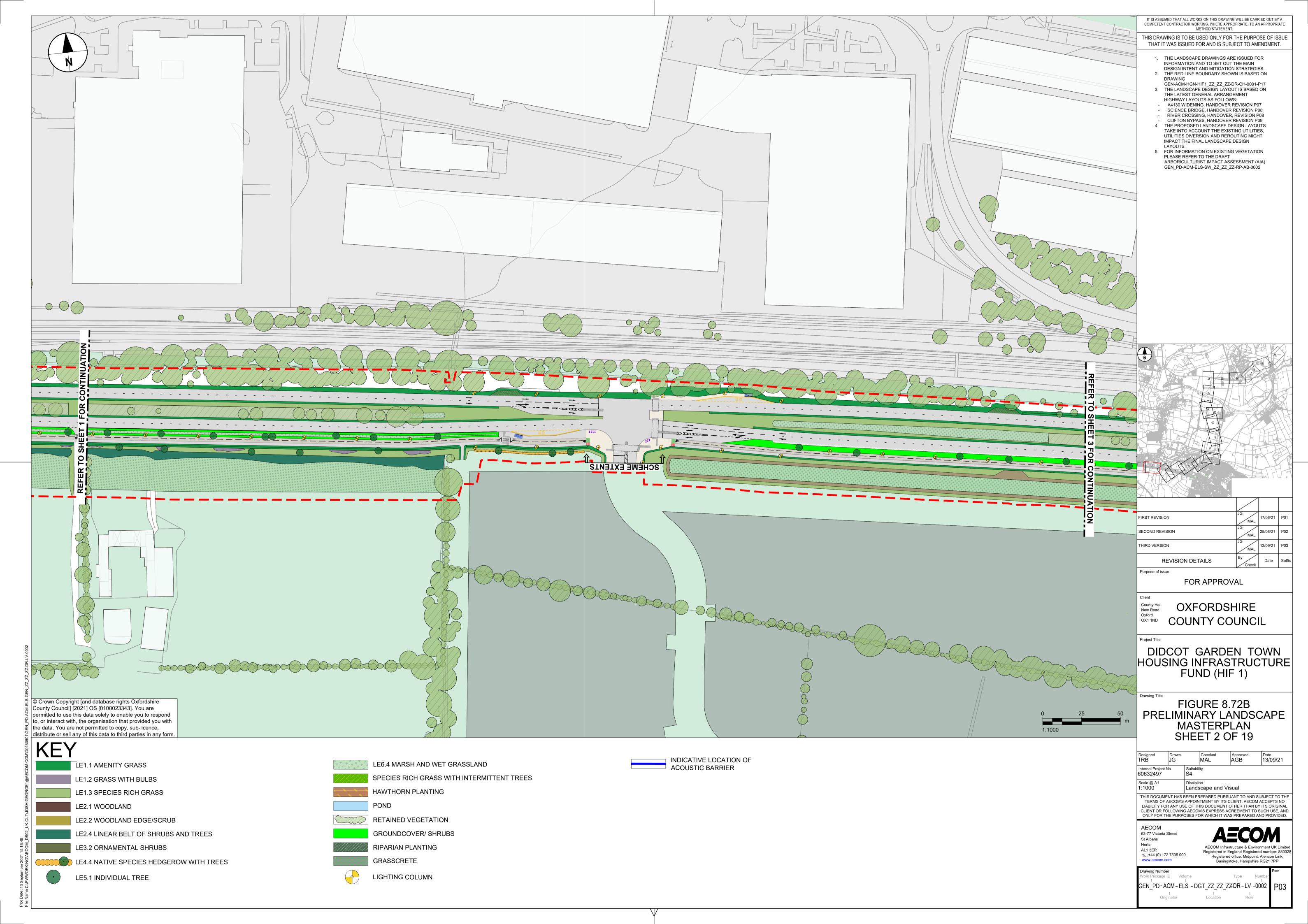
Natural England (2010) Habitats and species of principal importance in England. http://webarchive.nationalarchives.gov.uk/20140605090108/http:/www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx accessed 18.06.18

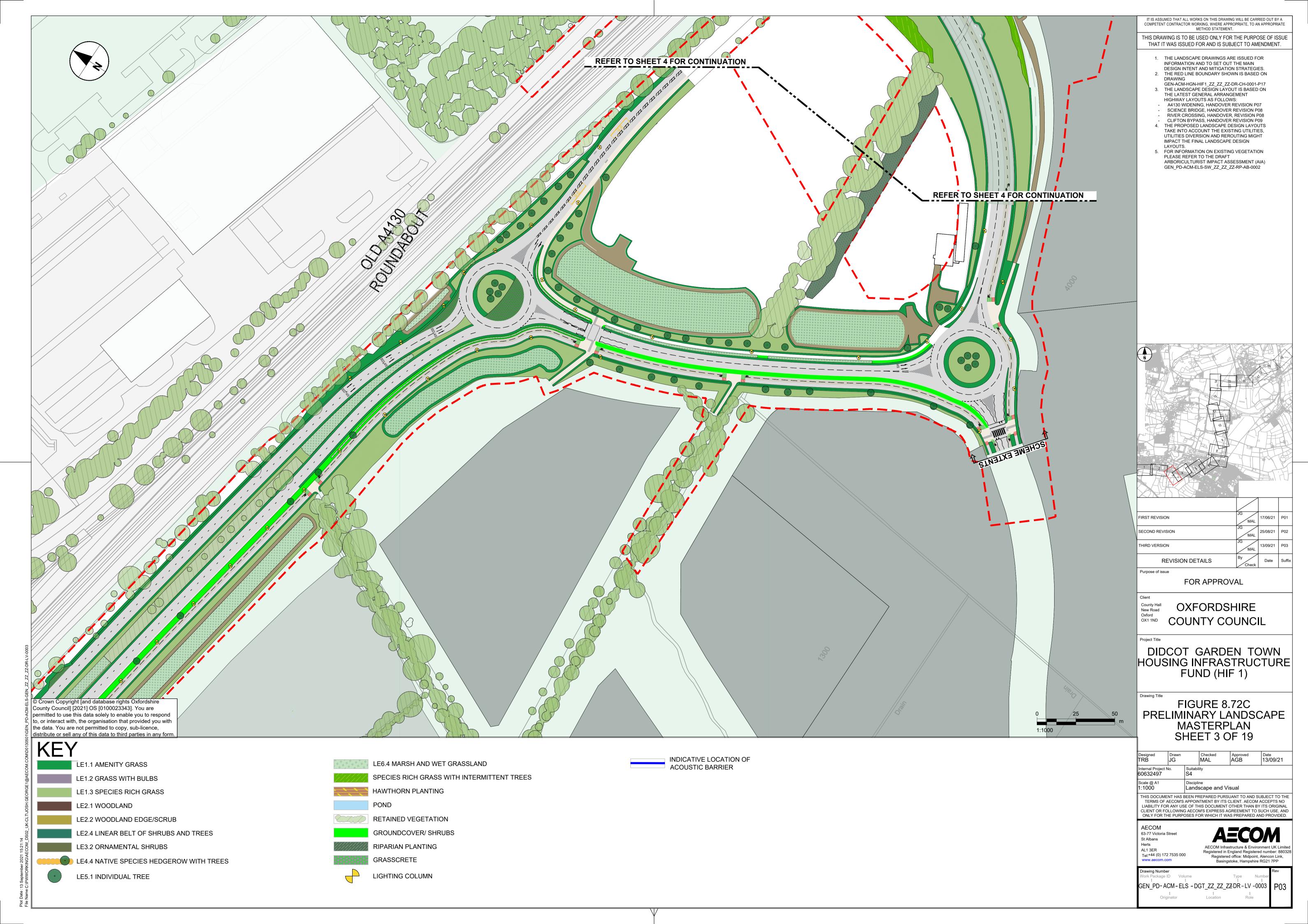
Appendix A Landscape Maintenance Schedule

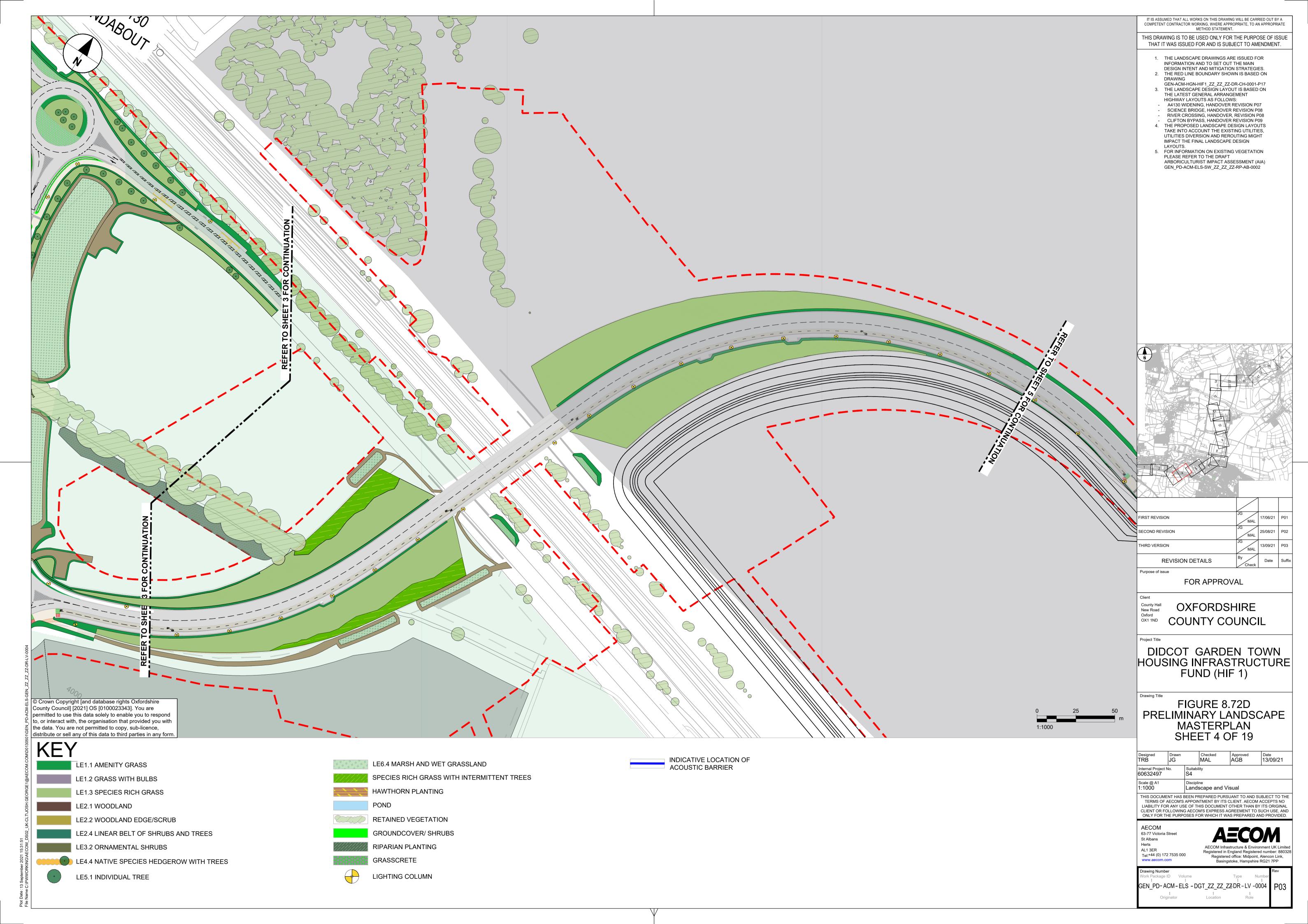
		-	Contract Ye	ar 1	-		Contra	ct Year 2			Contrac	t Year 3			Contract Year 4	ı.		C	ontract Year 5 to 15
	ary (T		t mber	nber nber	y ary		t mber	nber nber	ary Ty		mber ner	nber	ry ary		mber eer	nber nber ry	ary	mber ner
Landscape Element Type	Janua	March	May June	Augus	Octob Nover Decen	Janual Februi March	April May June	July Augus Septer	Octob Nover Decen	Janua	March April May June	July Augus Septer	Nover	Janua Februi March April	May June July	Augus Septer	Nover Decen Janua	Februs March April	June July Augus Septe
Amenity Grassland (LE1.1) and Grassland with Bulbs (LE1.2)	7																		
Remove litter, rubbish and debris																			
Spot treat undesirable species Hand-pulling of Ragwort (if required)	+				+					+			+						
Establishment cuts																			
Subsequent cuts Re-seed failed areas	+				+++					-			+						
		l l				J			1 1										
Species Rich Grassland (LE1.3) Remove litter, rubbish and debris	+ $ -$																		
Spot treat undesirable species																			
Hand-pulling of Ragwort (if required) Establishment cuts	+				+	+				+			+						
Subsequent cuts																			
Collect and remove arisings Remove emerging scrub	+												 						
Re-seed failed areas																			
Native Woodland (LE2.1) and Native Woodland Edge (LE2.2)	٦																		
Remove litter, rubbish and debris																			
Re-firm plants Inspect and adjust stakes, guards, irrigation pipes and ties																			
Apply herbicide to plant circles																			
Inspect and top-up mulch as required													+						
Formative pruning Check and record failed or defective plants																			
Replacement of failed or defective plants																			
Native Shrubs (LE2.6)																			
Remove litter, rubbish and debris																			
Spot treat undesirable species Hand-pulling of Ragwort (if required)	+																		
Re-firm plants																			
Inspect and adjust stakes, guards and ties Apply herbicide to plant circles	+																		
Remove emerging scrub within plots																			
Check and record failed or defective plants Replacement of failed or defective plants	+				+					+			+						
	→	1 1																	
Ornamental Shrubs (LE3.2) Spot treat undesirable species	+ $ -$																		
Hand-pulling of Ragwort (if required)																			
Re-firm plants	+																		
Pruning Apply mulch to plant beds																			
Watering (as necessary if dry summer) Replacement of failed/failing plants	+																		
		1 1																	
Native Hedgerows (LE4.3) Remove litter, rubbish and debris	+ $ -$																		
Spot treat undesirable species																			
Hand-pulling of Ragwort (if required) Re-firm plants	+																		
Inspect and adjust guards																			
Apply herbicide to hedge base Trim hedge	+												+						
Check and record failed or defective plants																			
Replacement of failed or defective plants																			
Individual Trees (LE5.1)]		, , , , , , , , , , , , , , , , , , , ,			, <u> </u>		, , , , , , , , , , , , , , , , , , , 		-,									
Re-firm plants Inspect and adjust stakes, guards irrigation pipes and ties	+			+++									╂				-		
Apply herbicide to plant circles																			
Inspect and top-up mulch as required Formative pruning	+			+									1				-		
Check and record failed or defective plants																			
Replacement of failed or defective plants																			
Marginal Planting (LE6.1)]																		
Remove litter, rubbish and debris	+																		
Remove emerging scrub Check and record failed or defective plants																			
Replacement of failed or defective plants																			
Wetland Meadow (LE6.4)]																		
Remove litter, rubbish and debris																			
Spot treat undesirable species Hand-pulling of Ragwort (if required)	_	+ +				<u> </u>				_ - - -			+						
Establishment cut																			
Subsequent cuts Collect and remove arisings	+	++			++	 				+++			++++				+++		
Remove emerging scrub																			
Check and record defective plants and identify a list of replacements Re-seed failed areas	+	++	+ + +		+	1				+			+				-		
		1							1			1 1							

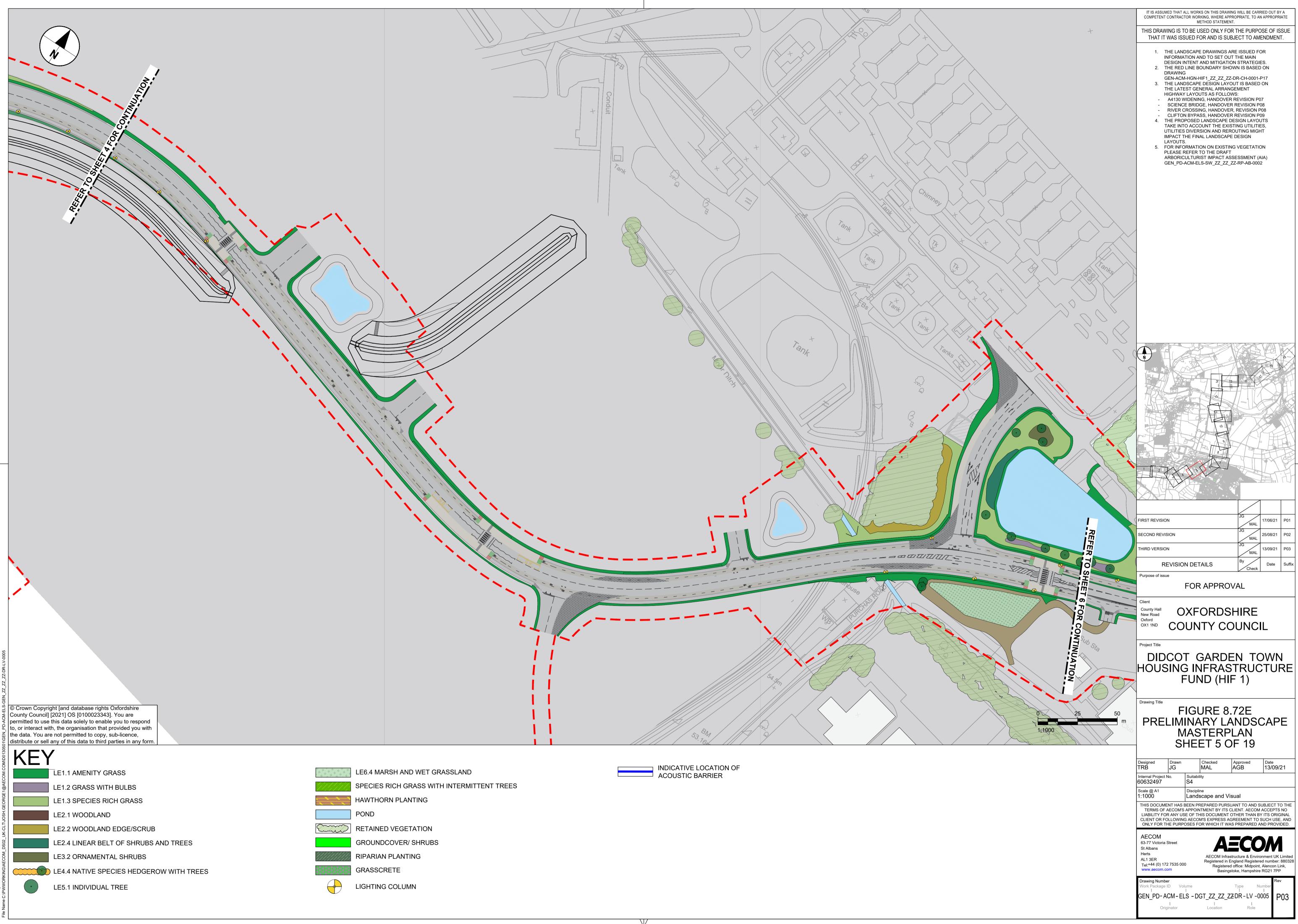
Appendix B Landscape & Biodiversity Enhancement Plan



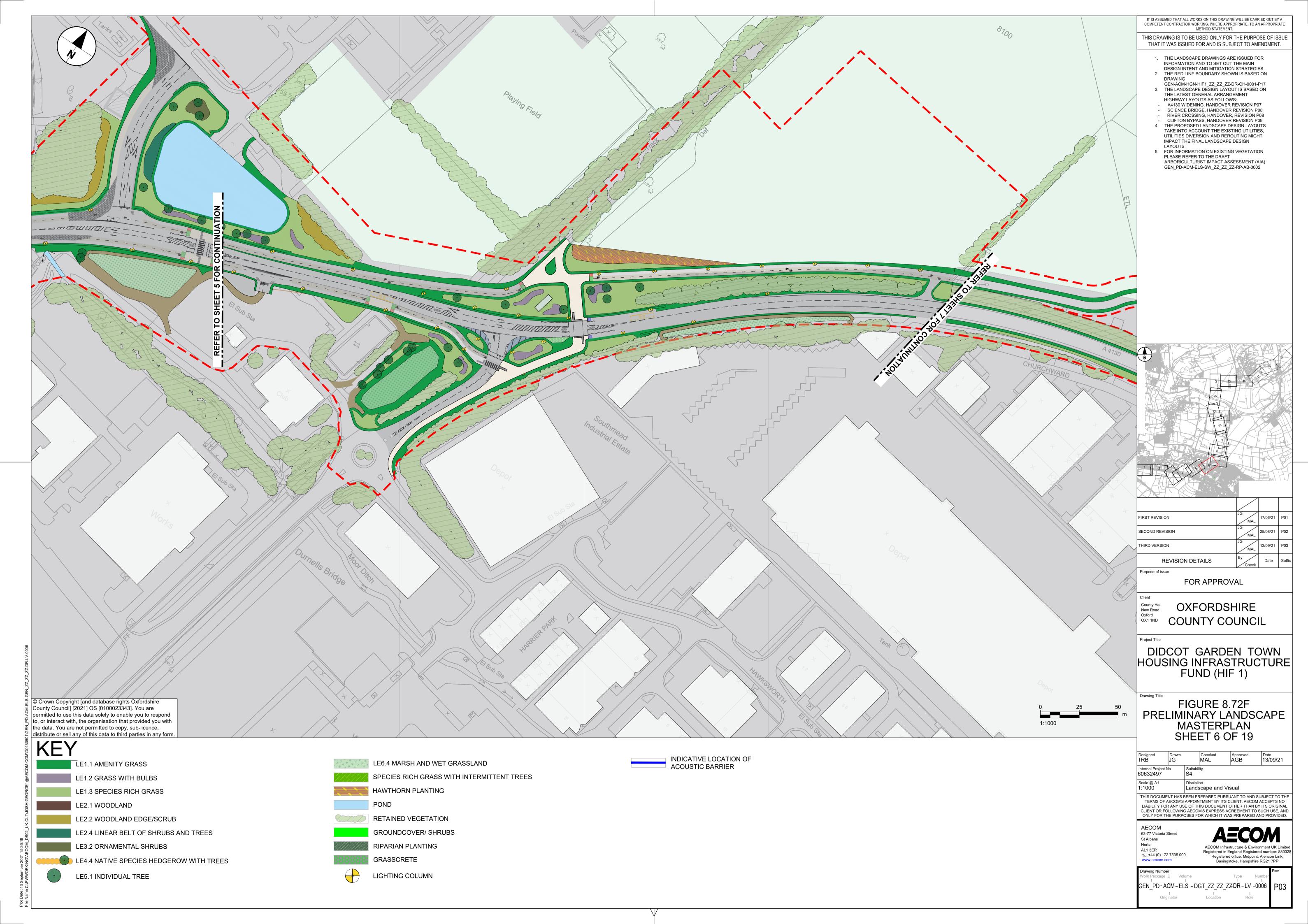




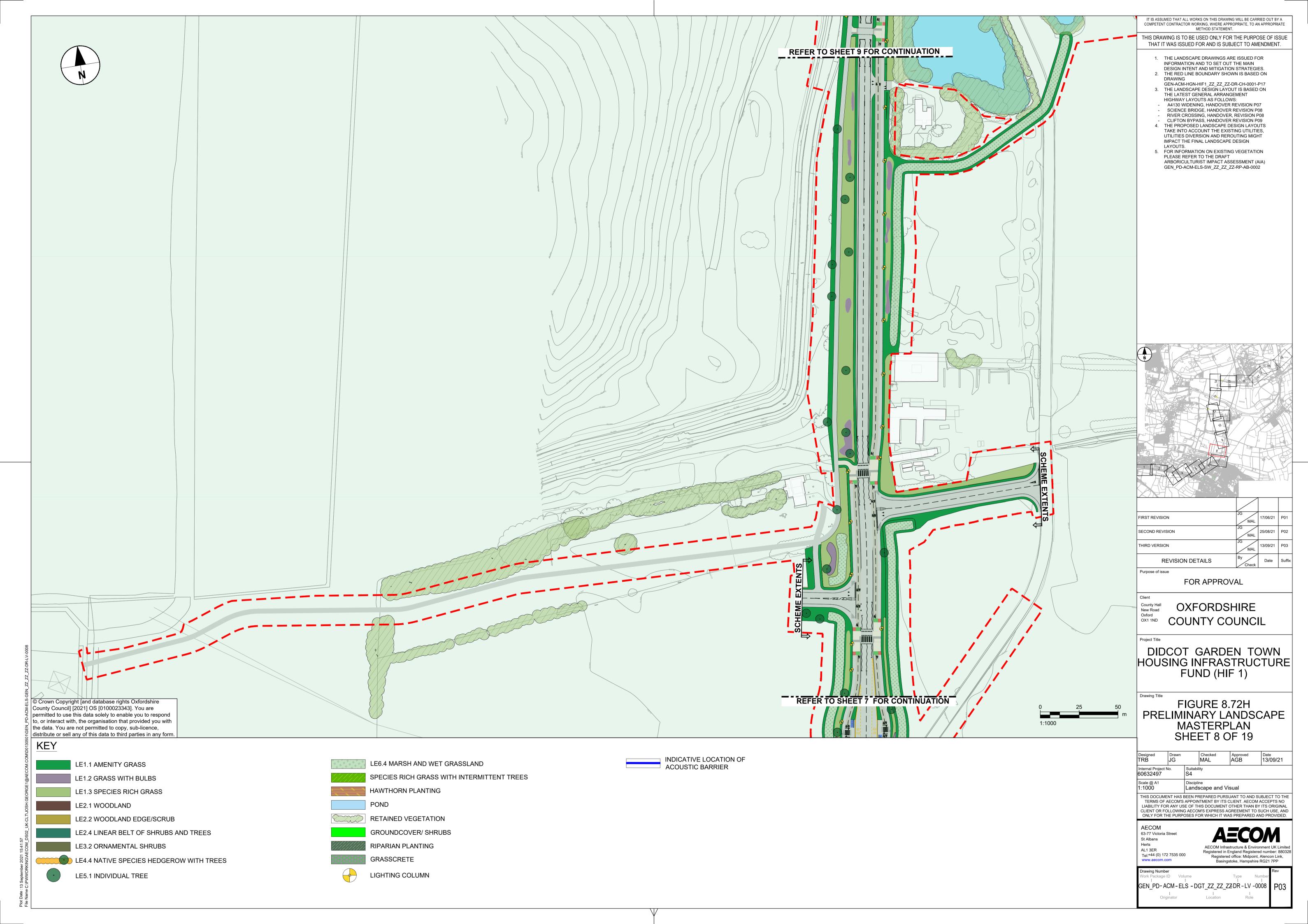


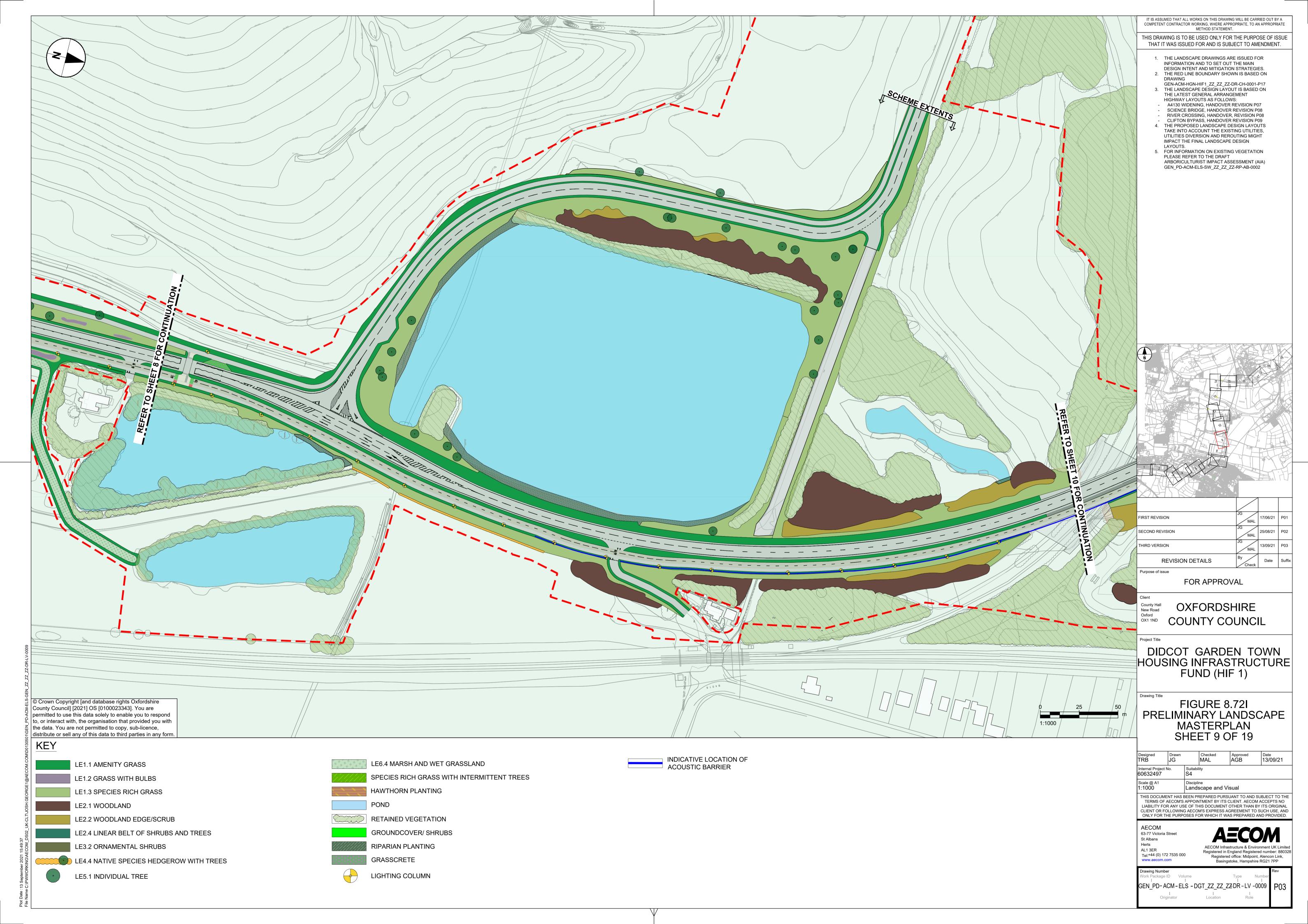


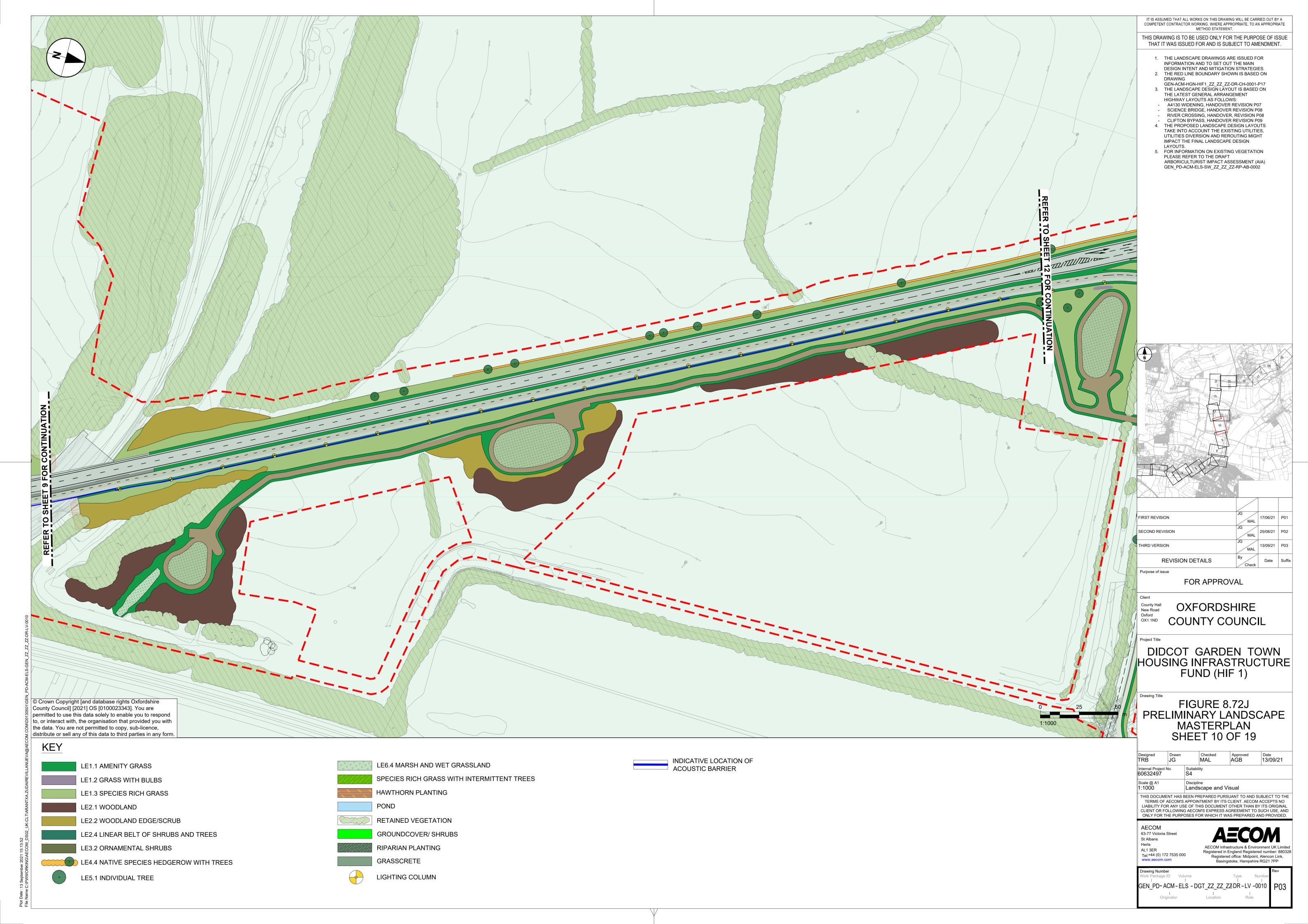
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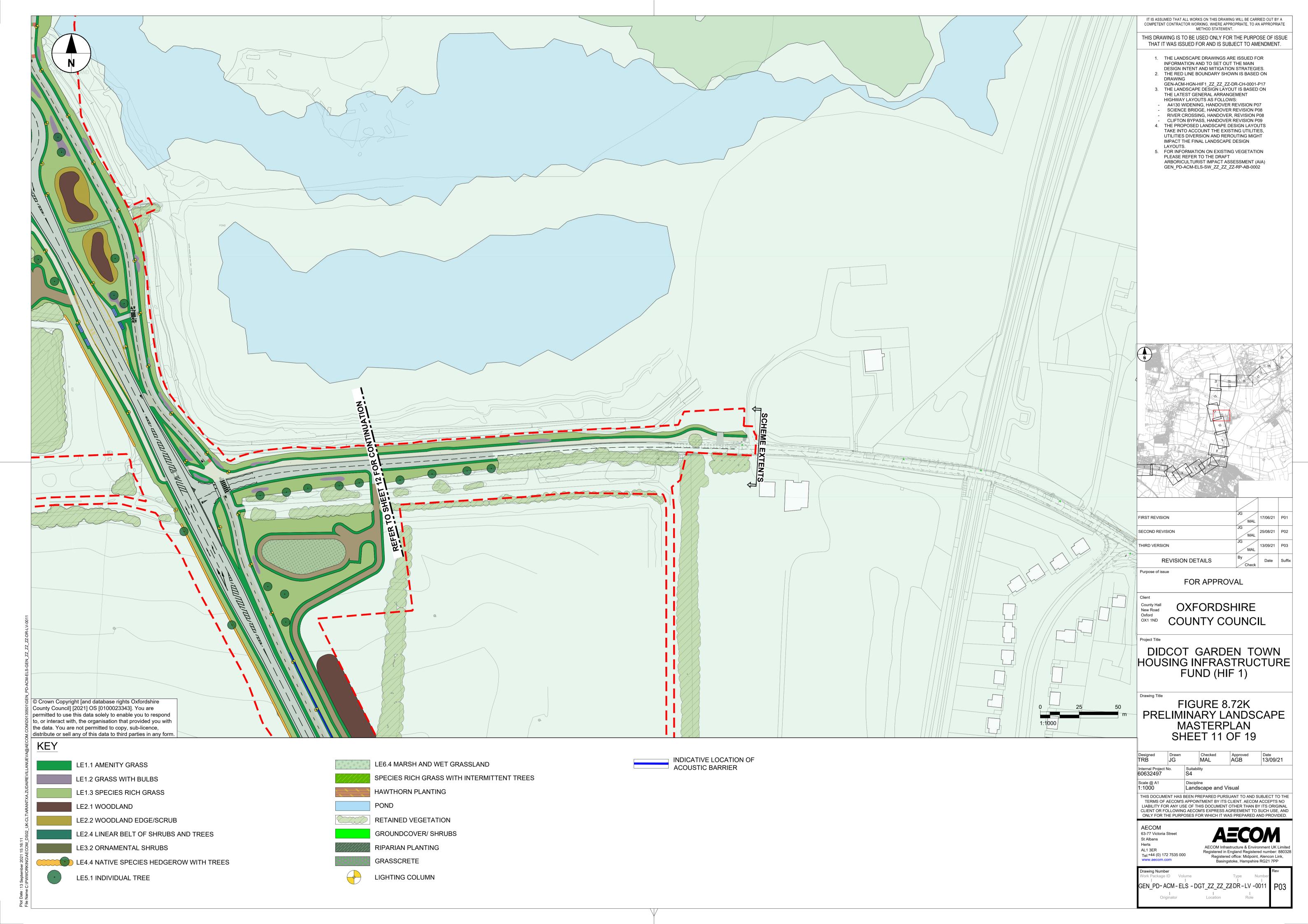








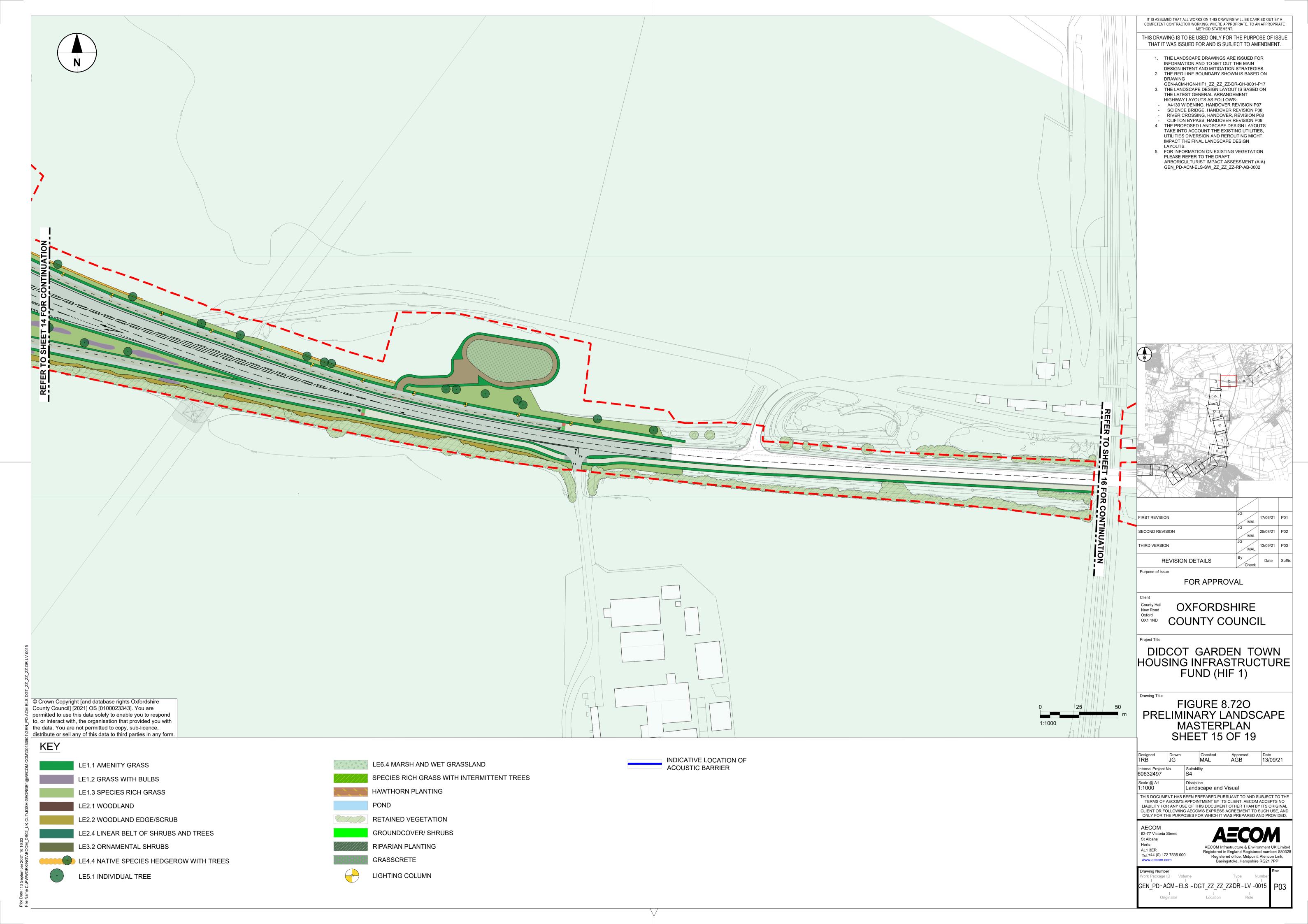




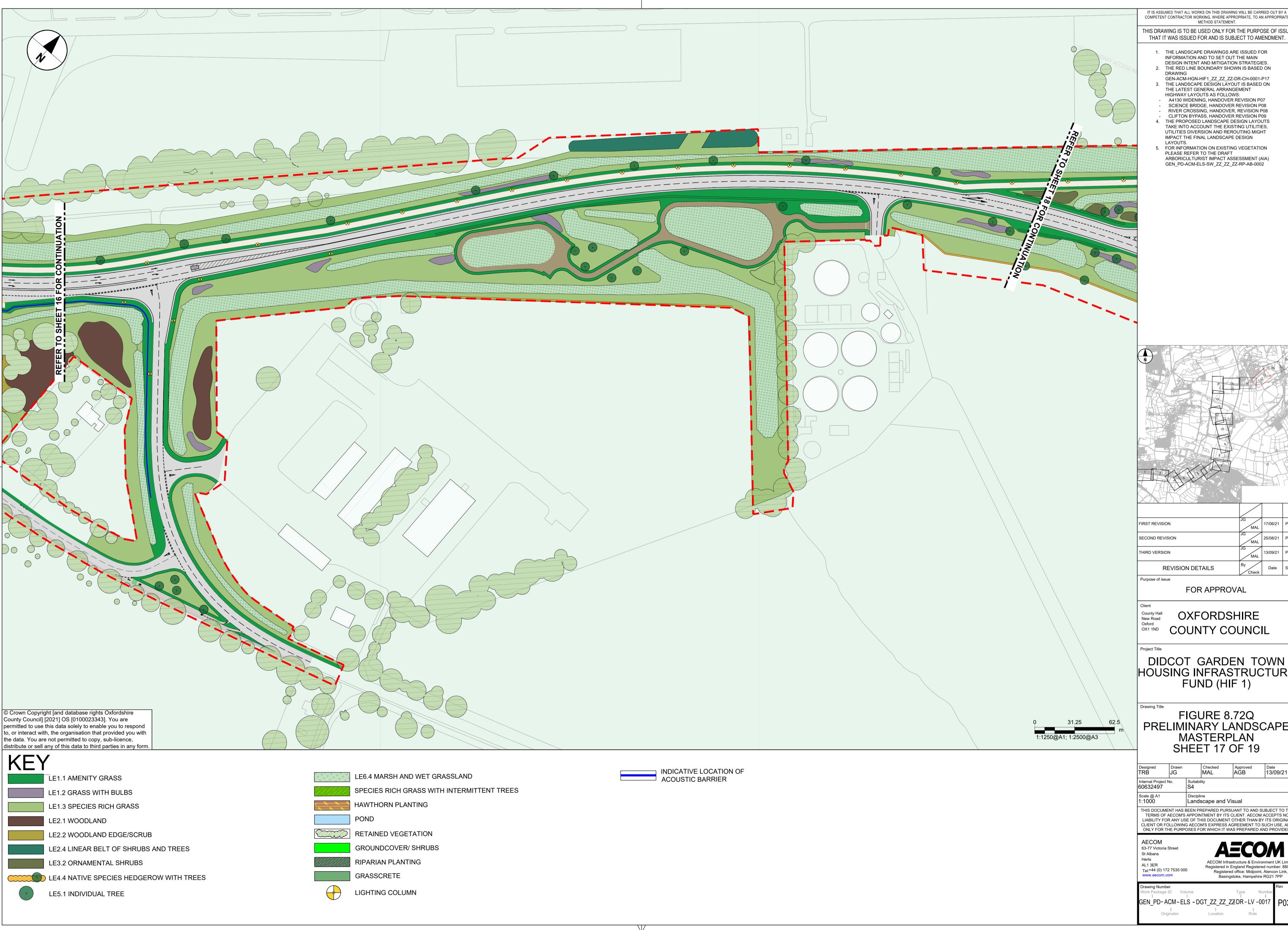












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 THE RED LINE BOUNDARY SHOWN IS BASED ON

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 - 5. FOR INFORMATION ON EXISTING VEGETATION PLEASE REFER TO THE DRAFT ARBORICULTURIST IMPACT ASSESSMENT (AIA)

25/08/21 P02 13/09/21

Date

OXFORDSHIRE

DIDCOT GARDEN TOWN HOUSING INFRASTRUCTURE FUND (HIF 1)

FIGURE 8.72Q PRELIMINARY LANDSCAPE MASTERPLAN **SHEET 17 OF 19**

Designed TRB	Drawn JG		Checked MAL	Approved AGB	Date 13/09/21			
Internal Project 60632497	No.	Suitability S4						
Scale @ A1 1:1000		Discipline Landscape and Visual						
THIS DOCUM	THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE							

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 - HIGHWAY LAYOUTS AS FOLLOWS: A4130 WIDENING, HANDOVER REVISION P07 SCIENCE BRIDGE, HANDOVER REVISION P08
 - RIVER CROSSING, HANDOVER, REVISION P08 CLIFTON BYPASS, HANDOVER REVISION P09 THE PROPOSED LANDSCAPE DESIGN LAYOUTS TAKE INTO ACCOUNT THE EXISTING UTILITIES,
 - UTILITIES DIVERSION AND REROUTING MIGHT IMPACT THE FINAL LANDSCAPE DESIGN
 - FOR INFORMATION ON EXISTING VEGETATION PLEASE REFER TO THE DRAFT ARBORICULTURIST IMPACT ASSESSMENT (AIA) GEN_PD-ACM-ELS-SW_ZZ_ZZ_ZZ-RP-AB-0002

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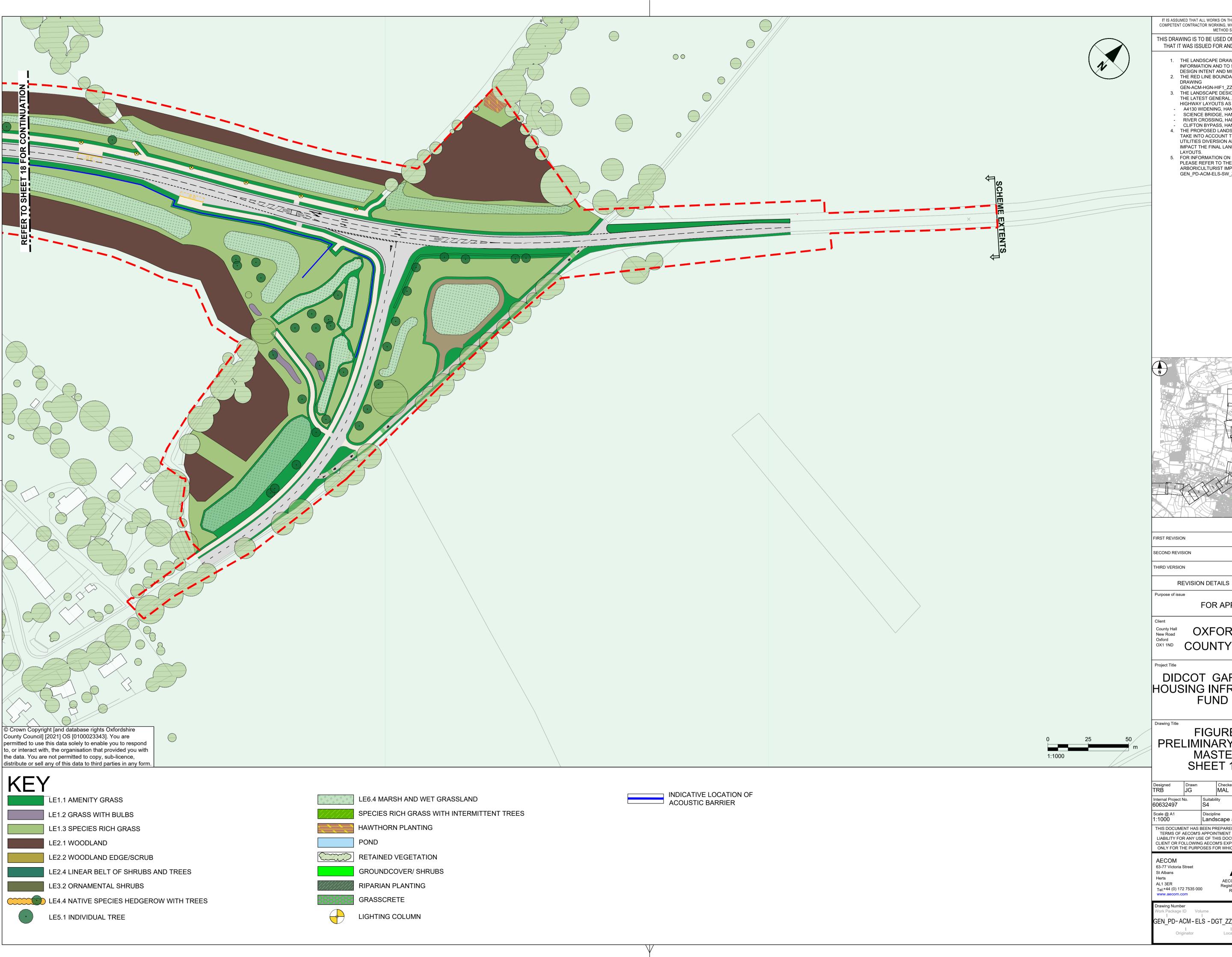
FIGURE 8.72R PRELIMINARY LANDSCAPE MASTERPLAN **SHEET 18 OF 19**

Designed TRB	Drawn JG		Checked MAL	Approved AGB	Date 13/09/21		
Internal Project 60632497	No.	Suitabil S4	,				
Scale @ A1 1:1000		Discipline Landscape and Visual					
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- HIGHWAY LAYOUTS AS FOLLOWS:
 A4130 WIDENING, HANDOVER REVISION P07 SCIENCE BRIDGE, HANDOVER REVISION P08
- RIVER CROSSING, HANDOVER, REVISION P08 CLIFTON BYPASS, HANDOVER REVISION P09 4. THE PROPOSED LANDSCAPE DESIGN LAYOUTS
- TAKE INTO ACCOUNT THE EXISTING UTILITIES, UTILITIES DIVERSION AND REROUTING MIGHT IMPACT THE FINAL LANDSCAPE DESIGN
- 5. FOR INFORMATION ON EXISTING VEGETATION PLEASE REFER TO THE DRAFT ARBORICULTURIST IMPACT ASSESSMENT (AIA) GEN_PD-ACM-ELS-SW_ZZ_ZZ_ZZ-RP-AB-0002



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FIGURE 8.72S PRELIMINARY LANDSCAPE MASTERPLAN **SHEET 19 OF 19**

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Appendix C Oxfordshire Priority Habitats

Grassland	Wetland	Woodland	Other
Lowland Meadows	Lowland Meadows and Floodplain Grazing Marsh:	Lowland Wood pasture & parkland	Arable Field Margins
Lowland Calcareous Grassland	Fens	Lowland Beech and Yew Woodland	Hedgerows
Lowland Heathland	Eutrophic Standing Waters	Lowland Mixed Deciduous Woodland	Open mosaic habitats
	Ponds	Wet Woodland	
	Reedbed	Traditional Orchards	
	River		
	Mesotrophic Lakes		
	Purple Moor Grass		
	Rush Pastures		

