

**NORTH LITTLEHAMPTON (CENTRAL WETLAND),
TODDINGTON LANE, WEST SUSSEX**

**ECOLOGICAL MITIGATION AND MANAGEMENT
PLAN**

Final Document (Revision 1)

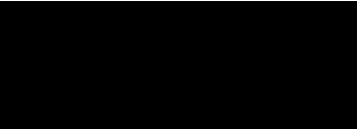
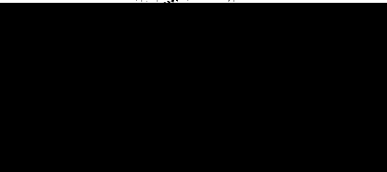
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Author:	 Jo Richmond BSc (Hons) GradCIEEM Ecologist
Checked by:	 Simon Boswell MSc MCIEEM CEcol Principal Ecologist
Reviewed by:	 Simon Colenutt BSc (Hons) MCIEEM CEnv Principal Ecologist

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¹ CIEEM, 2017. Guidelines for Ecological Report Writing. 2nd ed. Winchester: Chartered Institute of Ecology and Environmental Management.

**NORTH LITTLEHAMPTON (CENTRAL WETLAND),
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ECOLOGICAL MITIGATION AND MANAGEMENT PLAN

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1.0 INTRODUCTION

1.1 Background

Ecological Survey & Assessment Limited (ECOSA) have been appointed by Persimmon Homes Limited to prepare an Ecological Mitigation and Management Plan for North Littlehampton (Central Wetland), Toddington Lane, West Sussex.

The central wetland is located within the wider North Littlehampton development which comprises the construction of up to 1,260 dwellings, associated facilities, employment areas and open space (Arun District Council planning reference LU/47/11).

Within this document where reference is made to 'the site' this refers to the central wetland and reference to the 'wider site' relates to the wider North Littlehampton development. The location of the site in relation to the wider site is shown in **Map 1**.

This EMP has been written to support a Reserved Matters application to Arun District Council for the site. Under LU/47/11 there are three conditions relating to ecology (**Table 1**).

Table 1: Ecological conditions

Condition	Details
17	Prior to the submission of any reserved matters applications, a scheme shall be submitted for the creation of the proposed central wetland area and the restoration of habitat onsite. The scheme shall be submitted to and approved in writing by the Local Planning Authority. Thereafter the development shall be constructed as set out in the approved scheme and any subsequent amendments shall be agreed in writing with the Local Planning Authority.
19	Development shall not begin until further ecological surveys have been carried out and submitted to the Local Planning Authority. These surveys shall relate to water voles, bats, birds, invertebrates and reptiles.
20	Prior to the commencement of development on any phases of development east of the new road than spans the railway line (running north – south), details of appropriate mitigation, and a programme of implementation, in relation to water voles, bats, birds, invertebrates and reptiles shall be submitted to an approved in writing by the LPA.
21	No development within any phase or sub phase shall commence until details of an ecological management plan for the construction phase of that element of the development has been submitted to and approved in writing by the Local Planning Authority. The management plan shall be implemented in accordance with the approved plans.

The EMP is based on the results of ecological surveys and assessments carried out by ECOSA and White Young and Green (WYG) between 2008 and 2018 (**Table 2**). Further details of the species surveys and results are provided in Section 4.0.

Table 2: Summary of ecological surveys

Species Group/Species	2008	2009	2014	2017	2018
Ecological scoping Phase One habitat survey ²	✓	-	-	-	-
Ecological constraints appraisal ³	-	-	✓	-	-
Updating walkover survey ⁴	-	-	-	✓	-
Bat transect surveys		✓	✓	✓	
Reptile survey ⁵	-	✓	✓	-	-
Water vole survey ⁶	-	-	✓	✓	✓
Breeding Bird Survey ⁷	✓	-	✓	-	-

The results of the surveys have been used to provide mitigation and enhancement proposals within the central wetland. Surveys for birds, reptiles and invertebrates have not been updated since 2014 as the site provides limited habitat for these species groups.

1.2 The Site

The site is located in Littlehampton, West Sussex, centred on National Grid Reference (NGR) TQ 03672 04236 (**Map 1**).

The site is located within the centre of the wider development site and covers an area of seven hectares. Prior to demolition and clearance works taking place on site between 2016 and 2017 the site contained a number of industrial buildings, grassland, scattered trees and hardstanding. During 2017 the site was cleared of all existing buildings.

The wider landscape comprises the agricultural land associated with the floodplain of the Black Ditch (a river) to the north, an allotment to the west and housing to the east and south of the wider site. The main south coast railway line and its associated bankside vegetation is located close to the sites southern boundary. Littlehampton is town centre is located approximately 1.3 kilometres south.

1.3 Aims and Scope of Report

The aim of this document is to outline the proposed ecological mitigation and management required at the site. The mitigation and management plan set out the

² White Young and Green (2009) Proposed Lyminster Bypass (South) North Littlehampton - Ecological Scoping / Phase 1 Habitat Survey. White Young and Green, Droxford, Hampshire

³ White Young and Green (2014) Toddington Lane, North Littlehampton - Ecological Constraints Appraisal. White Young and Green, Droxford, Hampshire

⁴ An ecological walkover survey was undertaken by ECOSA on 13th January 2017

⁵ White Young and Green (2014) Proposed Lyminster Bypass (South) North Littlehampton - Reptile Presence / Absence Survey Report. White Young and Green, Droxford, Hampshire

⁶ White Young and Green (2014) Toddington Lane, North Littlehampton - Water Vole Presence / Likely Absence Survey Report. White Young and Green, Droxford, Hampshire

⁷ White Young and Green (2014) Toddington Lane, North Littlehampton – Breeding Bird Report. White Young and Green, Droxford, Hampshire

prescriptions for the site in order to retain the long-term ecological value. This plan covers a period of 10 years following the commencement of the development.

1.4 Site Proposals

Proposals of the site are to create an area of greenspace within the wider development site. This is to include parkland, a wetland area and areas of scattered trees and shrubs. Pathways are to be constructed across the site for pedestrian access from the newly constructed residential houses (**Appendix 1**).

2.0 MITIGATION AND MANAGEMENT PLAN OBJECTIVES

2.1 Introduction

This section provides an overview of the objectives of the Ecological Mitigation and Management Plan for the central wetland. Specific objectives for each individual habitat type are detailed within the management prescriptions.

2.2 Overview of Mitigation and Management Plan Objectives

The overarching objective of the Ecological Mitigation and Management Plan is to retain and enhance the long-term ecological value of the site. These will be achieved through the following measures:

- Creation of new, native species-rich and wildlife friendly habitats to enhance biodiversity at the site;
- Establishment of long-term management prescriptions for new and retained habitats to ensure the habitat diversity and suitability for wildlife is maintained; and
- Delivery of mechanisms to ensure ecological connectivity is included across the site and into semi-natural habitats in the wider landscape.

2.3 Structure of the Mitigation and Management Plan

The general overarching management prescriptions for the site are provided within Section 3.0, with species specific management and mitigation measures detailed in Section 4.0.

The main habitat types which are the focus of this management plan are wetland area, grassland and native trees. Management prescriptions for each of these habitat types are detailed individually within Section 5.0.

3.0 GENERAL MANAGEMENT PRESCRIPTIONS

3.1 Introduction

This section provides an overview of the general management prescriptions for the site.

3.2 Review

As part of on-going monitoring and review process, the management plan will be periodically reviewed in order to ensure that the objectives are being met. Details of this review process are provided within Section 7.0.

3.3 Responsibilities

The implementation of the management plan will be the responsibility of the landowner, who will likely transfer the ownership of the land to a third party following the completion of the development. This third party will be responsible for implementing the management plan. For the purposes of this management plan the “management site” is the area of the site which will be retained by the third party and outside of residential ownership.

3.4 Contractors

The proposed management works will be undertaken by specialist contractors with suitable experience in the management measures proposed. Monitoring and review will be undertaken in conjunction with suitably qualified ecologists with other specialists, such as arboricultural consultants employed/consulted as necessary.

4.0 SPECIES-SPECIFIC MITIGATION AND MANAGEMENT

4.1 Introduction

This section provides an overview of the species-specific mitigation measures and management prescriptions for the site.

4.2 Water Vole

Surveys undertaken by WYG in 2008² and 2014⁶ identified the presence of water vole within the Black Ditch (river) in the north of the site. No records were made from the ditch immediately west of the central wetland (**Figure 1** and **Figure 2**). No water vole were recorded by WYG within the westernmost on-site reservoir and this waterbody has subsequently been drained.

Updating water vole surveys undertaken by ECOSA in January 2017 and January 2018 did not record evidence water vole in the ditch to the west of the site or to the north of the central wetland. In addition, in January 2018 the two ponds to the east of the site were surveyed however, no evidence of water vole was recorded.

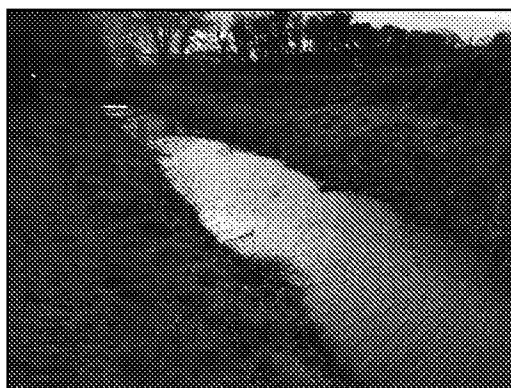


Figure 1: Southern end of ditch immediately west of the site.



Figure 2: Northern end of ditch immediately east of the site

The ditches and ponds outlined above are due to be filled in as part of site levelling works. Before the ditch and ponds are filled, a survey of the banks will be undertaken by a suitability qualified ecologist to reassess the site for water vole presence and identify if the status of the species on the site has changed. If the species is identified on site a licence from Natural England will be required prior to filling works commencing.

If no evidence of water vole is located it will be possible to continue with the infilling of the ditch and ponds under the supervision of a suitability qualified ecologist. If water vole evidence is recorded during infilling, work will stop and a licence from Natural England obtained.

As an enhancement for water vole within the site a pond and wetland feature are to be constructed which will connect the site to the Black Ditch. The wetland habitat will be

constructed to provide suitable habitat for water vole, further details are provided within Paragraphs 5.5 and 5.6.

4.3 Bats

Pre-demolition the site contained a number of large greenhouses. All buildings were assessed to have negligible bat roosting potential by WYG Ecology³ an assessment which was reconfirmed by ECOSA during a walkover survey undertaken in 2017. As a result these buildings were demolished in 2017.

Prior to clearance works, the site provided limited bat foraging and commuting opportunities in the form of hardstanding, a small number of trees and greenhouses. Bat transect surveys undertaken by WYG Ecology² and ECOSA has recorded a small range of common and widespread species across the wider site.

No artificial lighting is proposed within the Central Wetland and light spill from adjacent areas will be minimised. This will have the effect of creating a dark corridor from the Black Ditch in the north to the south coast railway line in the south.

As an enhancement, bat boxes will be erected, this will include two Schwegler 1FF and two Schwegler 2F bat boxes within suitable on-site trees. If Schwegler bat boxes are unavailable a suitable alternative woodcrete / WoodStone[®] box will be used.

4.4 Birds

Breeding bird surveys were carried out by WYG Ecology in 2008² covering the floodplain grazing land to the north of the wider development site. Updating surveys carried out by WYG Ecology in 2014⁷ covered the whole site, these surveys recorded eight red listed and seven amber listed Birds of Conservation Concern⁸. A single Schedule 1⁹ species the Cetti's warbler *Cettia cetti* was frequently recorded around the reservoirs to the east of the site. Occasional records of this species were also made from the ditches within the wider site.

Any vegetation clearance work will be undertaken outside the main breeding bird season of March to August, inclusive, or if this is not possible, an ecologist will be present immediately prior to clearance to check vegetation. Active nests will be left with an undisturbed 5-10m buffer until nesting ends naturally. If nests are identified then there is the potential for the programme of the works to be affected.

⁸ The UK's birds are split in to three categories of conservation importance - red, amber and green. Red is the highest conservation priority, with species needing urgent action. Red List criteria include species which are: globally threatened; have been subject to historical population decline in UK during 1800–1995; are in severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period, or; subject to severe (at least 50%) contraction of UK breeding range over last 25 years, or longer-term period.

⁹ Birds listed on Schedule 1 of the Wildlife and Countryside Act (1981 as amended) are afforded additional protection receive further protection making it an offence to: Intentionally or recklessly disturb any bird while it is nest building, or is at a nest containing eggs or young; or; Intentionally or recklessly disturb the dependent young of any such bird.

To avoid potential impacts on Cetti's warbler vegetation clearance works around the ditches and waterbodies on site will be undertaken outside of the species' breeding season which extends from March to August¹⁰, inclusive.

A number of bird boxes are to be erected across the wider site, as an enhancement measure within the central wetland a single barn owl box is to be installed within a suitable location to the north. The water features proposed as part of central wetland have been designed to provide suitable habitat for Cetti's warbler, see Paragraphs 5.5 and 5.6 for further details.

4.5 Reptiles

Reptile surveys were carried out across the wider by WYG Ecology during 2008² and 2014⁵. No reptiles were recorded within the central wetland area. Low populations of common lizard *Zootoca vivipara* and slow-worm *Anguis fragilis* were recorded in the wider site.

As an enhancement measure, three log piles will be installed along the eastern and western edges of the site (**Figure 3**). Log piles do not require regular maintenance but will be repaired / replaced if subject to damage/vandalism. The log piles will be constructed by an ecologist.

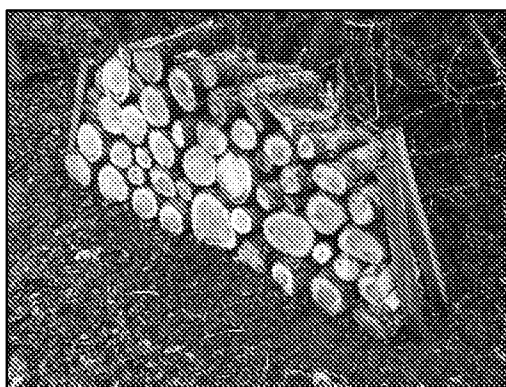


Figure 3: Log pile example

The grassland, parkland, wetland and interface between these habitats within the whole central wetland area will provide suitable habitat for common species of reptiles.

4.6 Badgers and Other Species

No evidence of badger was recorded from the site which comprises mainly hardstanding, however the species is known to be present in the local landscape. As a result the southern bridge crossing has been designed with a mammal tunnel. The mammal tunnel comprises a pipe with a diameter of 600 millimetres¹¹, to all badger to

¹⁰ Frances Le Sueur (1980) Some Cetti's Warbler breeding observations, Bird Study, 27:4, pgs. 249-253,

¹¹<https://www.atkinsglobal.com/~media/Files/A/Atkins-Corporate/group/sectors-documents/environmental/library-docs/technical-papers/Monitoring%20the%20use%20of%20badger%20tunnels%20on%20Highways%20Agency%20schemes.pdf>

move through the central wetland without crossing the southern road (see **Appendix 2**). The mammal tunnel is also suitable for a range of other animals.

The northern bridge includes a single span structure with an arched bridge which will permit both aquatic and terrestrial animal movements (see **Appendix 2**).

5.0 HABITAT-SPECIFIC MANAGEMENT

5.1 Introduction

This section provides an overview of the habitat-specific management objectives and prescriptions for the site.

5.2 Native Trees and Shrubs

A number of native trees are present within the site, particularly to the north and within the central area. A number of trees within the centre of the site are to be retained and new tree planting introduced, with further details including the planting schedule found within **Appendix 3**.

5.2.1 Objectives

The specific objectives for native tree and shrub habitat are to:

- Protect all retained trees;
- To establish and maintain new tree and shrub planting; and
- Establish an area of hazel coppice within the site.

5.2.2 Mitigation and Enhancement

Any trees not to be removed during construction will follow protective measures in line with BS 5837:2012 *Trees in Relation to Design, Demolition and Construction - Recommendations*. This document outlines the use of tree protection barriers to be used for the duration of the construction phase. These barriers are proposed to shield the boundary vegetation from damage during construction.

A number of trees will be included within the site, these will comprise native species. Following previous comments from the Local Planning Authority it is recommended that a proportion of these specimens comprise whitebeam *Sorbus aria* as this is a characteristic native species associated with the area. Additional recommended species shown within the landscaping plan (**Appendix 3**) include:

- Alder *Alnus glutinosa*;
- Blackthorn *Prunus spinosa*;
- Elder *Sambucus nigra*;
- Field maple *Acer campestre*;
- Guelder rose *Viburnum opulus*;
- Hawthorn *Crataegus monogyna*;
- Hazel *Corylus avellana*;
- Holly *Ilex aquifolium*;
- Pedunculate oak *Quercus robur*;
- Rowan *Sorbus aucuparia*; and
- Silver birch *Betula pendula*.

The parkland location in the southern end of the Central Wetland will include areas of hazel coppice which will be managed for its wildlife value. Rotational coppicing will be undertaken in conjunction with standard thinning to create canopy cover of approximately 25 – 30%. The following methods will create higher value wildlife habitat:

- Coppicing will be undertaken on a long rotation of around 15-20 years between cycles. This is the optimum cycle length to produce a continuous and plentiful supply of hazel nuts;
- The sequence of coppicing in subsequent years will avoid cutting adjacent areas in successive years; and
- Newly coppiced areas will be protected from deer browsing to minimise damage of new coppice growth. On this site the most appropriate method would be through stacking brash on newly cut hazel stools (stumps).

5.2.3 Management Prescriptions

The tree and shrub planting will be subject to management annually in order to maintain a dense bushy structure. Management works will be undertaken over winter (October to February) in order to avoid the nesting bird period.

Any plants dying within the first year will be replaced with matching species. Light, regular, trimming of the trees and shrubs in the first five years will encourage dense, bushy growth and is recommended. After five years, cutting will occur on a biennial basis (every two years) to provide a bushy habitat with suitability for a range of species including common breeding birds.

5.3 Seasonally Wet Grassland

At the time of the preparation of this management plan there were no areas of seasonally wet grassland present within the site.

5.3.1 Objectives

The specific objectives for seasonally wet grassland habitat are to:

- Increase ecological value of grassland habitats on site through creation of native species rich areas of planting; and
- Introduce a suitable management regime for grassland, in order to encourage herbaceous diversity and provide suitable habitat for a range of species.

5.3.2 Mitigation and Enhancement

Much of the central wetland will comprise of seasonally wet grassland with occasional flood events. There is likely to be natural colonisation of grassland plants from the Black Ditch and its associated floodplain to the north of the site. However, relying on natural

colonisation throughout the site is unlikely to result in a diverse sward in the seasonally wet grassland.

Therefore, natural recolonisation will be augmented with an appropriate seed mixture such as Emorsgate EM8. This mix is suitable for seasonally wet soils, especially those that may flood for short periods in winter but are usually well drained in the summer. Species contained within this mix are as follows, the percentage of seeds from each plant species is shown in brackets:

- Betony *Stachys officinalis* (1%);
- Common bent *Agrostis capillaris* (10%);
- Common knapweed *Centaurea nigra* (2.5%);
- Common sorrel *Rumex acetosa* (1.5%);
- Cowslip *Primula veris* (0.4%);
- Greater birds-foot trefoil *Lotus pedunculatus* (0.8%);
- Crested dogs-tail *Cynosurus cristatus* (36%);
- Lady's bedstraw *Galium verum* (1%);
- Meadow barley *Hordeum secalinum* (3%);
- Meadow buttercup *Ranunculus acris* (2.5%);
- Meadow foxtail *Alopecurus pratensis* (4%);
- Meadowsweet *Filipendula ulmaria* (1.5%);
- Oxeye daisy *Leucanthemum vulgare* (0.8%);
- Quaking grass *Briza media* (1%);
- Ragged robin *Lychnis flos-cuculi* (0.2%);
- Red fescue *Festuca rubra* (24%);
- Ribwort plantain *Plantago lanceolata* (2%);
- Selfheal *Prunella vulgaris* (2%);
- Sneezewort *Achillea ptarmica* (0.3%);
- Sweet vernal-grass *Anthoxanthum odoratum* (1%);
- Tufted hair-grass *Deschampsia cespitosa* (1%);
- Tufted vetch *Vicia cracca* (1.5%);
- Yarrow *Achillea millefolium* (0.5%); and
- Yellow rattle *Rhinanthus minor* (1.5%).

5.3.3 Management Prescriptions

EM8 should be sown in September / October, alternatively in spring once the land has drained sufficiently. The seed must be surface sown and can be applied by machine. The soil will then be rolled to give good soil/seed contact.

After cultivation, dormant weed seeds will germinate, these should be sprayed off with a general purpose herbicide (preferably Glyphosate) and harrowed. After a second germination of annual weeds, the site should be sprayed and harrowed again, now the ground should be ready for sowing. If annual weeds continue to germinate repeat the herbicide application and harrowing until the weeds diminish.

In the second and subsequent years EM8 sowings can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland. The best results are usually obtained by traditional meadow management based around a main summer hay cut in combination with autumn and possibly spring mowing or grazing. No fertilizers are to be used on the grassland.

The vegetation will not be cut from spring through to late July/August to give the sown species an opportunity to flower. After flowering in July or August a 'hay cut' will be taken with arisings removed.

5.4 Meadow Grassland

At the time of the preparation of this management plan there were no areas of grassland present within the site. Within the southern section of the site there will be an area of parkland with associated grassland.

5.4.1 Objectives

The specific objectives for meadow grassland habitat are to:

- Increase ecological value of grassland habitats on site through creation of native species rich areas of planting; and
- Introduce a suitable management regime for grassland, in order to encourage herbaceous diversity and provide suitable habitat for a range of species.

5.4.2 Mitigation and Enhancement

Areas of grassland associated with the parkland area and road embankments will comprise native wildflowers. It is recommended that the meadow grassland habitat is sown with Emorsgate EM2 General Purpose Meadow Mixture or similar.

5.4.3 Management Prescriptions

The overall objective of the grassland will be to provide a continued nectar source for invertebrates throughout the spring and summer.

Within the first year of grassland sowing areas will be mown regularly to a height of 40-60 millimetres. It is important when managing an area of wildflower that the (arisings) cuttings will be removed to prevent the grassland from becoming enriched with nitrates from discarded arisings. This will deter vigorous weed species such as common nettle *Urtica dioica* and creeping thistle *Cirsium arvense* from colonising the flowering lawn.

In the second and subsequent years post-grassland sowing mowing will not be undertaken from spring to late July/August to allow plants to flower.

5.5 Standing Water

The existing standing water within the site will be filled and levelled. A pond is proposed in the northern end of the central wetland.

5.5.1 Objectives

The specific objectives for the standing water habitat are to:

- Increase ecological value of the central wetland through creation a natural waterbody with associated native aquatic vegetation
- Provide habitat for a range of species including Cetti's warbler and water vole
- Provide a habitat linkage with the Black Ditch to the north.

5.5.2 Mitigation and Enhancement

The pond will be designed with the following overarching characteristics which will provide habitat for a range of wildlife:

- Scalloped edges to increase habitat for invertebrates;
- Shallow marginal areas suitable for establishment of aquatic vegetation;
- The waterbodies will be checked and signed off by a suitably qualified ecologist post construction;
- No stocking of fish or crayfish; stocking with fish has detrimental impacts on amphibian populations; and
- The marginal areas of the lake will be provided with an undulating landform, providing a variety of water depths to further add diversity.

The waterbodies will not be planted with aquatic vegetation but left to colonise naturally. Information from the Freshwater Habitats Trust¹² indicates that ponds not stocked with aquatic vegetation colonise rapidly. Indeed the early successional stages of ponds provide valuable wildlife resources for a range of species. Given the location of Black Ditch to the north of the site it is likely that colonisation with aquatic plants will occur quickly.

5.5.3 Management Prescriptions

It is possible that some vegetation clearance may be required on an occasional basis, the exact management prescription should be reviewed in the second year after creation of the pond. If vegetation clearance is required then this work should be done outside of the nesting bird season which runs from March-August, inclusive.

¹² Freshwater Habitats Trust (2011) Aggregate Toolkit Sheet A2 - Pond Design Principles for Biodiversity Available from: www.freshwaterhabitats.org.uk/projects/million-ponds/

5.6 Running Water

A central channel through the wetland will hold running water on a seasonal basis. This channel will be created through significant earthworks and will connect site to the Black Ditch to the north, providing suitable habitat for water vole and breeding birds.

5.6.1 Objectives

The specific objectives for the running water habitat are to:

- Increase ecological value of habitats on site through diversification; and
- Provide a habitat linkage with the Black Ditch to the north.

5.6.2 Mitigation and Enhancement

The central ditch running from the Black Ditch into the site will be newly created. The only mitigation required involves protection of retained trees and vegetation within the site (see Paragraph 5.2.2 for further details).

The central channel will be functionally linked to the Black Ditch in the north of the site and therefore will colonise naturally with the species present in this area. Where appropriate natural colonisation is preferable to planting.

5.6.3 Management Prescriptions

It is possible that some in channel clearance of vegetation may be required on an occasional basis, the exact management prescription should be reviewed in the second year after creation of the central channel. If vegetation clearance is required then this work should be done outside of the nesting bird season which runs from March-August, inclusive.

6.0 MONITORING AND REVIEW

A review of the mitigation and enhancement measures implemented will be undertaken by a suitably qualified ecologist following the completion of the development. Following the implementation of the proposed mitigation and enhancement measures, any necessary revisions to the Ecological Mitigation and Management Plan will be made.

It is proposed that the party responsible for implementation of this mitigation and management plan carry out regular *ad hoc* monitoring at the site to establish any obvious deviations or faults. A walkover will also be carried out by a suitably Qualified Ecologist to ascertain whether the habitat prescriptions are meeting their objectives. Where any issues are highlighted, a suitably qualified ecologist will be consulted for advice where necessary.

An integral part of the mitigation and management plan process will be a system of monitoring and a formal progress review. There will be a review meeting at the end of five years, post-completion, attended by the landowner and management contractor, to discuss the progress of the activities undertaken. This will enable issues to be identified and resolved where required. The meeting will take place to assess the effectiveness of the plan's aims, objectives and prescriptions.

The monitoring and review process will comprise a review report to include the following elements:

- Details of extent, timing and outcome of all works undertaken in the previous five years;
- Managing agent's assessment of effectiveness of works undertaken and the Ecological Mitigation and Management Plan as a whole; and
- Recommendations for next five year's management requirements.

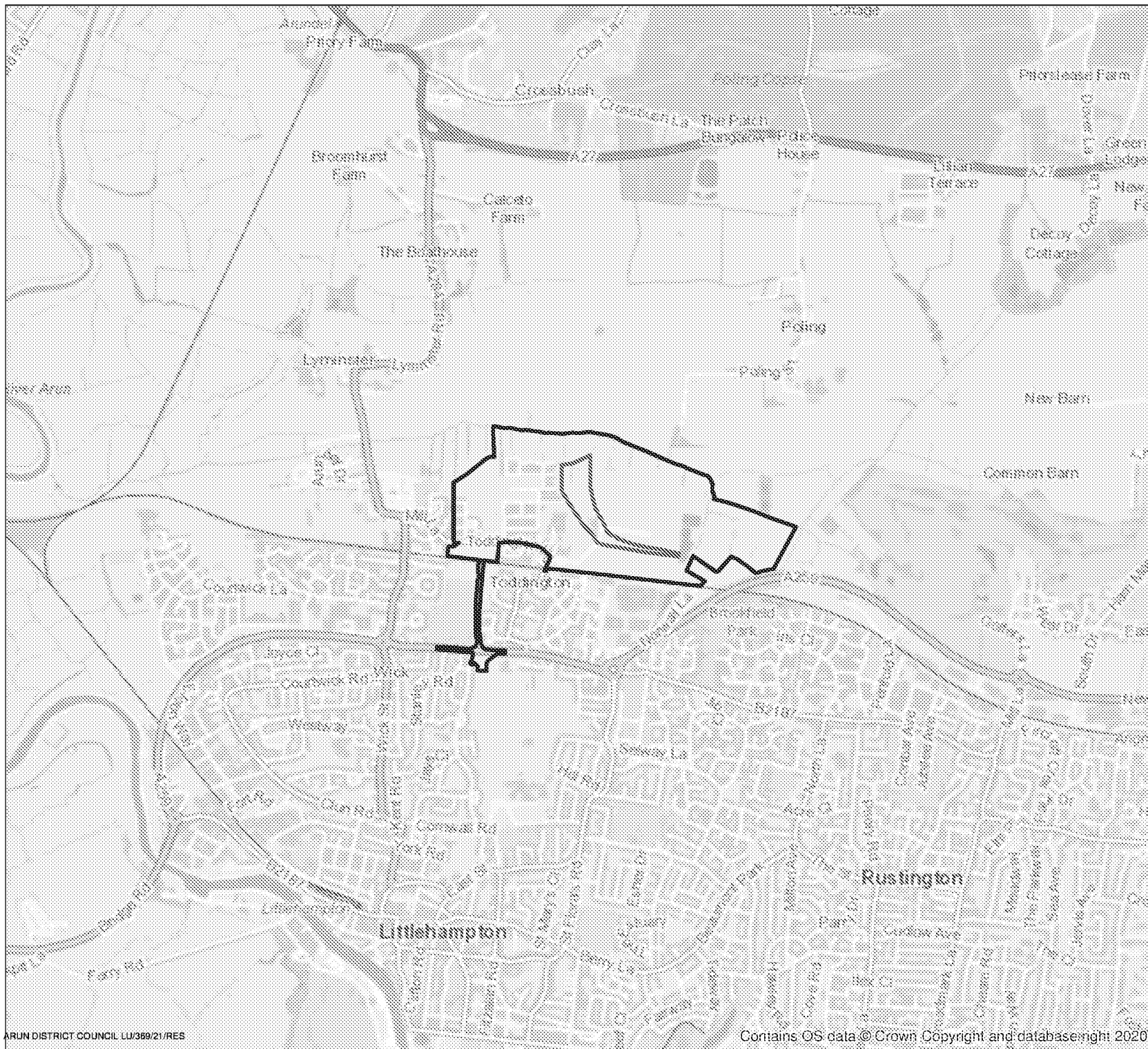
7.0 TIMETABLE OF MANAGEMENT AND MONITORING WORKS

Management Prescription		Paragraph Reference	Year ¹³											
			-1	0	1	2	3	4	5	6	7	8	9	10
Pre-Construction	Inspection of waterbodies in the east of the site for evidence of water vole prior to filling and levelling work	4.2												
Construction Phase Mitigation and Enhancement	Protection of retained trees in accordance with BS 2012:5387	5.2.2												
	Vegetation clearance necessary to be undertaken outside of nesting bird season (March to August)	4.4												
	Erection of new bat boxes at the site	4.3												
	Erection of new bird boxes within the site, including barn owl box	4.4												
	Creation of hibernacula	4.5												
	New landscaping implemented at the site including new grassland seeding and tree and scrub planting and creation of water features	5.3, 5.4 and Appendix 1												
Habitat Management	Meadow grassland and seasonally wet grassland management (late summer / autumn), arisings removed	5.3.3 and 5.4.3												
	Management of tree and scrub habitat to be undertaken outside of nesting bird season (March to August)	5.2.3												
	Water feature management, as necessary (October to March)	5.5.3 and 5.6.3												

¹³ The exact timescales for the construction of the development are unknown. For the purposes of this mitigation and management plan, construction works are referred to as “Year 0” with the mitigation and management plan covering subsequent years “Year 1 – 10”.

Management Prescription		Paragraph Reference	Year ¹³											
			-1	0	1	2	3	4	5	6	7	8	9	10
Monitoring and Progress Review	Walkover survey by Suitably Qualified Ecologist	6.0												
	<i>Ad hoc</i> monitoring by management contractors	6.0												
	Five-year management review	6.0												

Map 1 Site Location Plan



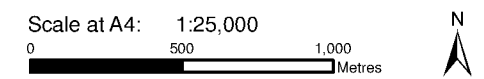
NORTH LITTLEHAMPTON (CENTRAL WETLAND), TODDINGTON LANE, WEST SUSSEX

ECOLOGICAL MITIGATION AND MANAGEMENT PLAN

Map 1 - Site Location Plan

Client:	Persimmon Homes Thames Valley
Date:	October 2021
Status:	Final (Revision 1)

- KEY**
- Site Boundary (Central Wetland)
 - Wider Site Boundary



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Ecological Survey & Assessment
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ECOSA Ltd., Ten Hogs House, Manor Farm Offices,
Flixton Road, North Baddesley, Hampshire SO62 8GF
Telephone: 02380 261065 Email: info@ecosa.co.uk
Web: www.ecosa.co.uk

Map 2 Ecological Enhancements

NORTH LITTLEHAMPTON (CENTRAL WETLAND), TODDINGTON LANE, WEST SUSSEX

ECOLOGICAL MITIGATION AND MANAGEMENT PLAN

Map 2 - Ecological Enhancements

Client:	Persimmon Homes Thames Valley
Date:	October 2021
Status:	Final (Revision 1)

KEY

-  Possible Location of Barn Owl Box
-  Indicative Location of Reptile Hibernacula

Key

-  **Wetland area:** Pond to be created for breeding and to increase the potential for species diversity. Pond to include aquatic plants, rushes and reeds. A footpath (if at low level) to be provided at the north with a boardwalk where appropriate. Tree and shrub planting provided in the edge of the development (placemat) to allow for open uncontaminated views towards the north, in the hills within the National Park.
-  **Perkland area:** retained trees to be bolstered with new native tree and shrub planting, and hazel copse, to create an area for informal recreation. Footpaths at low level to be provided with boardwalks where appropriate. Long grass / species rich grass and wildflowers to be established.
-  **Open views:** provided across the wetland to the north and south from the bridge. Tree and shrub planting positioned strategically on the embankments, at both ends, to ensure that views from the bridge are maintained. Planting on the bridge embankments will also provide interest from within the wetland area and will integrate the structure into the landscape scheme.
-  **Tree planting:** positions at the top of the bank, to provide an edge to the development and define the wetland area. For detail refer to Plant Schedule in DWG no. 20.000.01.
-  Existing trees to be retained
-  Large specimen native trees. For detail refer to Plant Schedule in DWG no. 20.000.01.
-  Native tree and shrub planting
-  Planting within water
-  Low level path: self-finding gravel. Gravel walks provided where necessary. Tarmac paths to be provided on 1:1% gradient slope into the wetland area.



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Ecological Survey & Assessment
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ECOSA Ltd., Ten Hogs House, Manor Farm Offices,
Roxford Road, North Baddesley, Hampshire SO52 9DF
Telephone: 02380 281065 Email: info@ecosa.co.uk
Web: www.ecosa.co.uk

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Appendix 1 Landscape Plan

Key

-  **Wetland area:** Pond to be created for interest and to increase the potential for species diversity. Pond to include aquatic plants, rushes and reeds. A footpath link at low level to be provided at the north with a boardwalk where appropriate. Tree and shrub planting provided at the edge of the development plateaux to allow for open uninterrupted views towards the north, to the hills within the National Park.
-  **Parkland area:** retained trees to be bolstered with new native tree and shrub planting, and hazel coppice, to create an area for informal recreation. Footpaths at low level to be provided with boardwalks where appropriate. Long grass / species rich grass and wildflowers to be established.
-  **Open views** provided across the wetland to the north and south from the bridge. Tree and shrub planting positioned strategically on the embankments, at both ends, to ensure that views from the bridge are maintained. Planting on the bridge embankments will also provide interest from within the wetland area and will integrate the structure into the landscape scheme.
-  **Tree planting** positioned at the top of the bank, to provide an edge to the development and define the wetland area. For detail refer to Plant Schedule in DWG no. sk.cwa.3.
-  Existing trees to be retained
-  Large specimen native trees. For detail refer to Plant Schedule in DWG no. sk.cwa.3.
-  Native tree and shrub planting
-  Planting within swales
-  Low level path: self-binding gravel. Boardwalks provided where necessary. Tarmac paths to be provided on 1:21 gradient slopes into the wetland area

0 10 20 30 40 50 100 m

Scale 1:1,000 @ A1



North

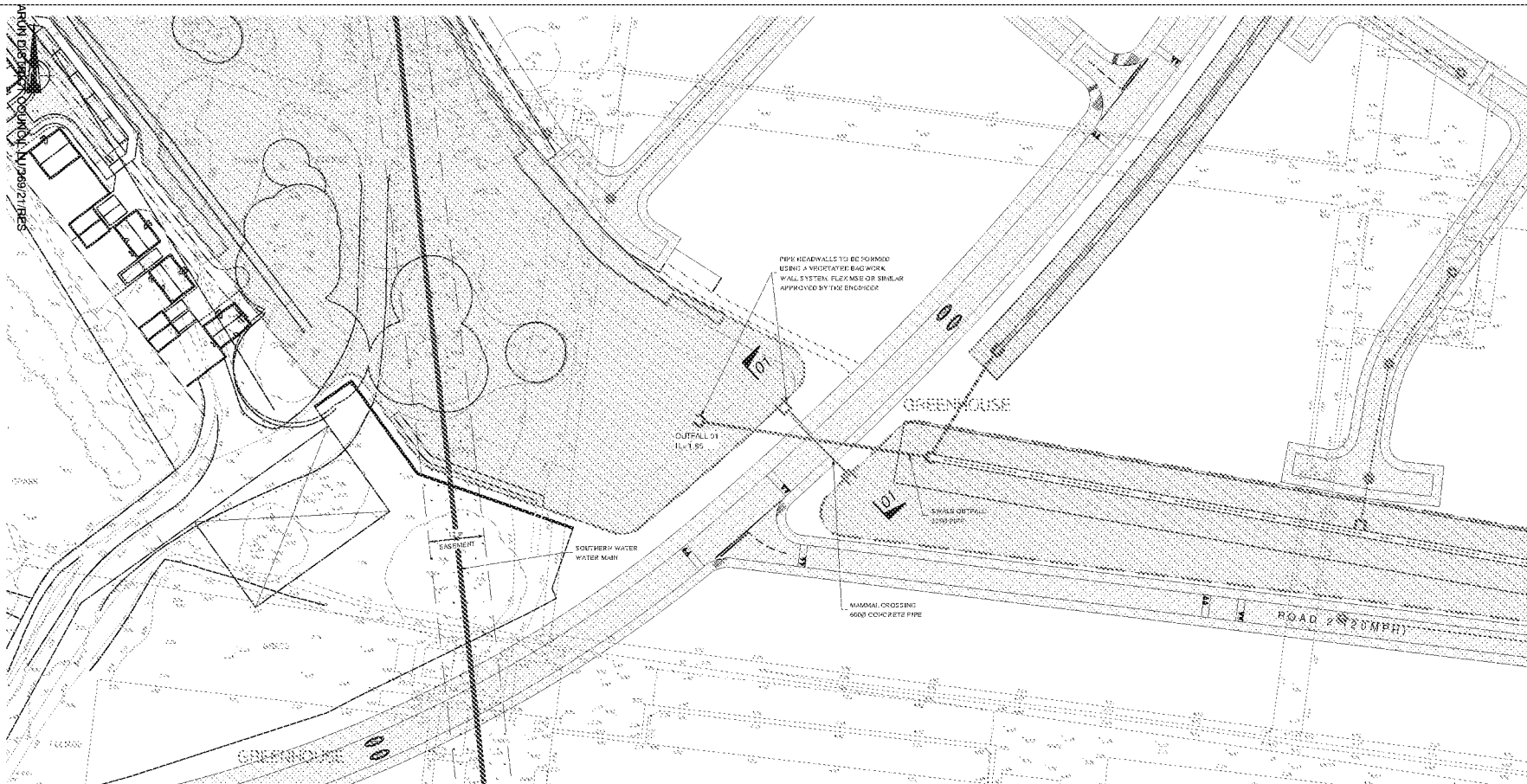
A088461 SK.CWA.2[D].dwg 25 October 2021

5th Floor, Longcross Court, 47 Newport Road, Cardiff CF24 0AD
Tel: +44 (0) 29 2082 9200 Fax: +44 (0) 29 2045 5321
www.tetratechukraine.com

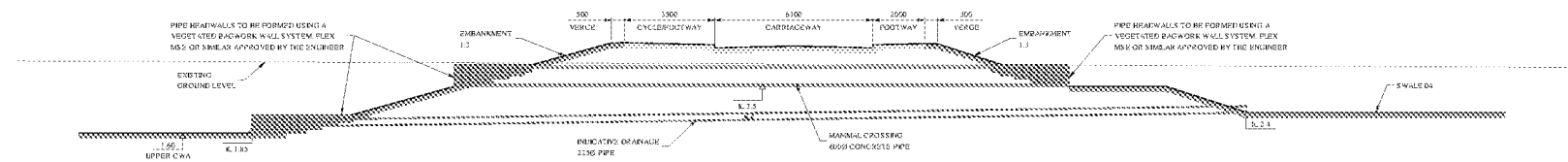
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Appendix 2 Road Crossing Designs



PLAN
1:500



SECTION 01-01
(OUTFALL PIPE SHOWN RELATIVE TO MAMMAL CROSSING)
1:500

NOTES

GENERAL

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
2. SPECIFICATION SHALL BE IN ACCORDANCE WITH THE DEPARTMENT FOR TRANSPORT / HIGHWAYS ENGLAND SPECIFICATION FOR HIGHWAY WORKS INCLUDING REVISIONS UP TO MAY 2017.
3. ALL DIMENSIONS ARE BY METRES UNLESS NOTED OTHERWISE.
4. ALL LEVELS ARE IN METRES AND RELATIVE TO OPENANCE DATUM (NEWLY).
5. ALL CO-ORDINATES ARE BY METRES AND RELATIVE TO OPENANCE SURVEY ORG.
6. ALL PROPRIETARY PRODUCTS TO BE PLACED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
7. THIS DRAWING IS BASED UPON THE FOLLOWING SUPPLIED ORIGIN INFORMATION:
 - ORIGINAL SURVEY BY GEORGE & CO. LTD. DATE: JULY 2009. LOCALISE UPDATES TO THE SURVEY HAVE BEEN CARRIED SPACE AND COMBINED WITH THE ORIGINAL SURVEY.
 - ROAD ROAD ALIGNMENT AND LEVELS BY MBE DRAWING REFERENCE: APM/JTS/PLAN 104-1 & 04-2 REV P01, DATE: 27 OF 2018.
 - PLOTTED COMPENSATION AND LEVELS BY PBA DRAWING REFERENCE: 1957/00/00, DATED: 05.05.2017.
 - SOUTHERN WATER MAIN AS SURVEYED IN JUNE 2017.
 - LANDSCAPE LAYOUT BY WYC DRAWING REFERENCE: ACB/361 C/W1 DRAFT V6, DATED: 05.05.2016.
 - DRAINAGE AND PROPOSED LEVELS BY MBE DRAWING REFERENCE: MBS/104/00-1 REV. P02 DRAFT, DATED: 26 OF 2018.

FIG 1: FIRST ISSUE	07.08.18	CRD	JWS	JWS
Mark: Pavilion	Date:	Drawn:	Chkd:	Apd:
DRAWING NOTE: Do not scale from this drawing. If in doubt, ask.				
UTILITIES NOTE: The position of any existing public or private services, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty for this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake his own investigation where the presence of any existing services, services, plant or apparatus may affect his operations.				

Drawing Issue Status

FOR DISCUSSION

NORTH LITTLEHAMPTON
CENTRAL WETLAND AREA
SOUTH CROSSING

Client



Date of 1st Issue: 07.08.2018
AS SHOWN

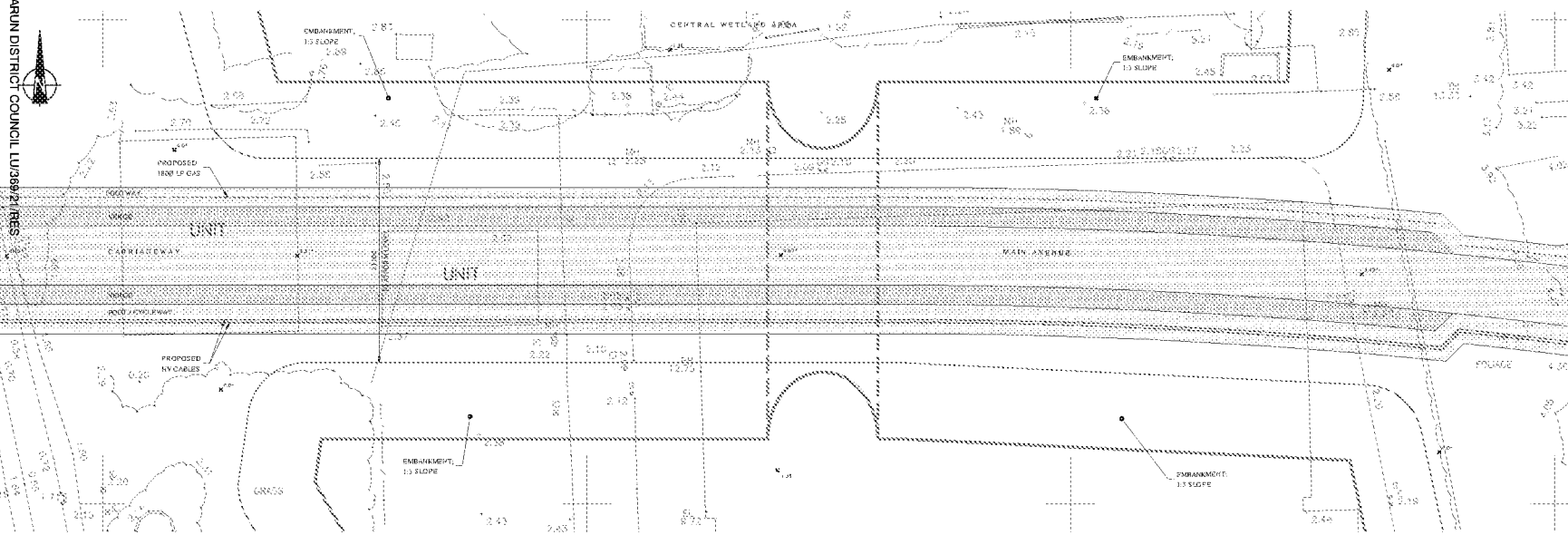
Designed: JWS
Created: JWS

Drawn: CRD
Approved: JWS

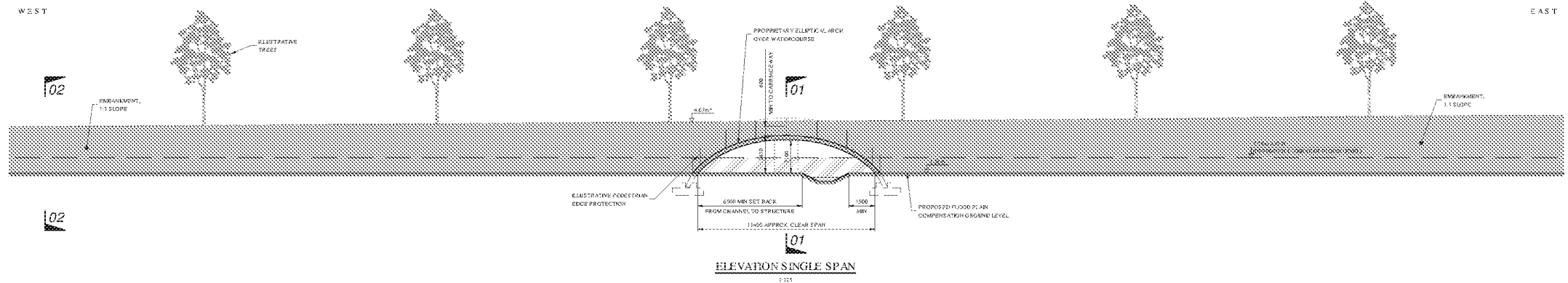
Revised: P01

pba
peter brett

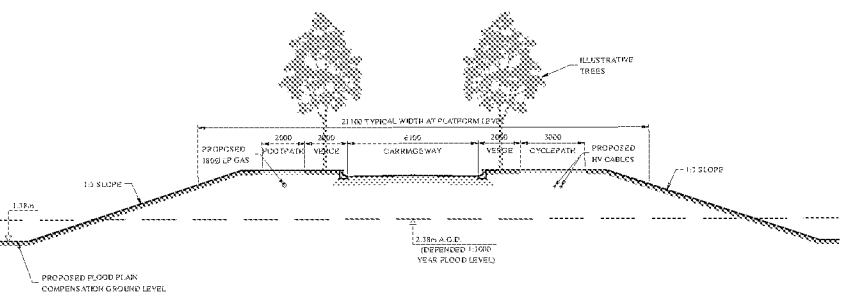
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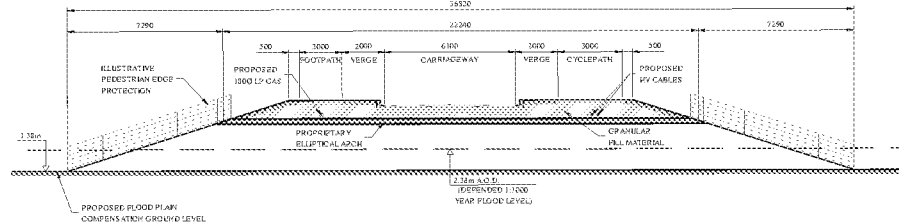
SCHEMATIC PLAN
1:100



ELEVATION SINGLE SPAN
1:125



SECTION 02-02. ILLUSTRATIVE EMBANKMENT CROSS SECTION
1:125



SECTION 01-01. ILLUSTRATIVE BRIDGE CROSS SECTION
1:125

NOTES

GENERAL

01. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE
02. ALL LEVELS ARE IN METRES AND RELATIVE TO GREENWICH DATUM (NEWLYM)
03. THIS DRAWING IS BASED UPON PRELIMINARY DATA AND IS FOR ILLUSTRATIVE PURPOSES ONLY
04. THIS DRAWING IS BASED UPON THE FOLLOWING SUPPLIED INFORMATION:
 ORIGINATING SURVEY: RECONSTRUCTION COMMISSIONED BY WMC AND CARRIED OUT BY DD
 YEATMAN SURVEYING AND ENGINEERING LTD, DATED JULY 2006. LOCALISED IMPACTS TO
 THE SURVEY HAVE BEEN CARRIED SINCE AND COMPARED WITH THE ORIGINAL SURVEY.
 ROAD ALIGNMENT AND LEVELS BY HANLEY BROWN, EXISTING REFERENCE
 MARK (R00642_P1) LEVELS ON DRAWING EXTRACTED WITH +
 PROPOSED CWA GROUND MODEL BY PBA, REFERENCE '1981_FLOOD COMPENSATION
 SCHEM 4'g

LEGEND

- EMBANKMENT BRIDGE OUTLINE
- EMBANKMENT OUTLINE FROM FLOOD
 ANNOTATION: SEE DRAWING 359/P/ARUN/003

P02	CHANNEL SET BACK DIMENSION ADDED	17.07.19	GOP	TOSG	JWS
P01	FIRST ISSUE	05.05.18	CRD	JWS	JWS
Mark	Revision	Date	Drawn	Chkd	Appo

BUILDING NOTE: Do not scale from this drawing. If in doubt, ask
 UTILITIES NOTE: The position of any existing public or private sewers, utility services, pipes or apparatus shown on this
 drawing is believed to be correct, but no liability for loss or expense is implied. Other such pipes or apparatus may also
 be present but not shown. The Contractor is therefore advised to undertake their own investigation where the existence
 or any existing sewers, services, pipes or apparatus may affect their operations

Drawing Issue Status

FOR DISCUSSION

NORTH LITTLEHAMPTON
 CENTRAL WETLAND AREA
 NORTH CROSSING

Client



Date of 1st Issue
 05.05.2018

At Scale
 AS SHOWN

Drawing Number
 35944/1507/003

Designed
 TOSG

Checked
 JWS

Revision
 P02

Drawn
 CRD

Approved
 JWS

Revised
 P02



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Appendix 3 Planting Plan

**Central
Wetland Area
Planting Plan**

sk.CWA.3

Key

-  Wetland area: To be allowed to naturally regenerate
-  Parkland area
-  Tree planting along the edge of the embankment
-  Existing trees to be retained
-  Large specimen native trees.
-  Native tree and shrub planting
-  Planting within swales: To be allowed to naturally regenerate

Plant Schedule

Trees				
Number	Abbreviation	Species	Height	Specification
14 -	Ag	Alnus glutinosa	550-600cm	Semi mature: 3x/4x: RB
4 -	Qr	Quercus robur	450-500cm	Extra heavy: 3x: RB
25 -	TcGS	Tilia cordata 'Green Spire'	450-500cm	Extra heavy: 3x: RB
28 -	Ac	Acer campestre	300-350cm	Selected standard: 2x: B
9 -	SAFL	Salix fragilis	300-350cm	Selected standard: 2x: B
6 -	Sa	Salix alba	300-350cm	Selected standard: 2x: D
16 -	BPPP	Betula pendula	250-300cm	Multi stem: 3x: RB
18 -	Sa	Sorbus aucuparia	400-450cm	Extra heavy: 3x: B
11 -	Ag	Alnus glutinosa	250-300cm	Multi stem: 3x: RB
5 -	BPPP	Betula pendula	250-300cm	Semi mature: 3x/4x: RB
5 -	Qr	Quercus robur	300-350cm	Selected standard: 2x: RB
6 -	BPPP	Betula pendula	300-350cm	Selected standard: 2x: RB
4 -	Sa	Salix alba	400-450cm	Extra heavy: 3x: B

Native shrub mix				
Number	Abbreviation	Species	Height	Specification
612 -	Cav	Corylus avellana	60-80cm	1+2 or 1/2: Branched: B: 3 bies
459 -	Cro	Crataegus monogyna	60-80cm	1+1 or 1/1: B
308 -	PRJP	Prunus spinosa	60-80cm	1+1 or 1/1: B: Branched: 2 bies
308 -	SACA	Salix caprea	60-80cm	5/1: B: Branched: 2 bies
384 -	SLE	Salix cinerea	60-80cm	5/1: B: Branched: 2 bies
308 -	SALV	Salix viminalis	30-40cm	1+0 or 1/0: Branched: B
308 -	SANN	Sambucus nigra	60-80cm	1+1 or 1/1: B: Branched: 3 bies
384 -	VIBOP	Viburnum opulus	60-80cm	1+2 or 1/2: B: Branched: 3 bies
Total: 3071 Planted at 1.25m c/s				

0 10 20 30 40 50 100 m
Scale 1:1,000 @ A1
North

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