



LAND AT DEAL GROUND AND MAY GURNEY

Environmental Statement Addendum – Chapter 9: Ecology

Serruys Property Company Limited

CONTENTS

9	Ecology	1
9.1	Introduction	1
9.1.1	Purpose and Structure of the Chapter	1
9.2	Methodology.....	1
9.2.1	Changes in Legislation, Guidance and Planning Policy	1
9.2.2	Scoping Opinion	6
9.2.3	Assessment Methodology.....	6
9.2.4	Effects Not Requiring Further Assessment	11
9.3	Changes In Baseline Conditions	11
9.3.1	ES Baseline	11
9.3.2	ES Future Baseline.....	13
9.3.3	Current Baseline.....	14
9.3.4	Changes in Baseline.....	22
9.4	Assessment of Effects	23
9.4.1	Construction Phase Effects	23
9.4.2	Additional Operational Phase Effects	29
9.4.3	Additional Cumulative Effects.....	35
9.5	Requirement for Additional Mitigation	36
9.5.1	Alternate or Additional Mitigation.....	36
9.6	Residual Effects	38
9.6.1	Construction Phase	38
9.6.2	Operational Phase.....	38
9.7	Other Environmental Issues.....	39
9.8	Summary of Effects	39
9.9	Conclusions	43

Figures

- Figure 9.1 Ecological Designations
- Figure 9.2 Habitats and Ecological Features

Figure 9.3 Fen Retention and Losses

Tables

Table 9.1 – Summary of the Update Phase 2 Faunal Surveys Undertaken at the Survey Area.....	8
Table 9.2 – Assessment of Scale of Effect.....	10
Table 9.3 – Summary of Baseline Habitat Evaluation in the ES ecology chapter	12
Table 9.4 – Summary of Baseline Faunal Evaluation in the ES ecology chapter.....	13
Table 9.5 – Ecological Designations in the Vicinity of the Site.....	14
Table 9.6 – Summary and Evaluation of Important Habitats and Ecological Features Within and Adjacent to the Site.....	17
Table 9.7 – Summary and Evaluation of Important Faunal Species Within and Adjacent to the Site.....	19
Table 9.8 – Significant Residual Ecological Effects at the Operational Phase.....	38
Table 9.9 – Summary of Effects on Ecological Receptors	40

Appendices

Appendix 9.1	Baseline Ecological Appraisal
Appendix 9.2	Shadow Habitats Regulations Assessment
Appendix 9.3	Environmental Action Plan
Appendix 9.4	Nature Conservation Management Plan

9 ECOLOGY

9.1 INTRODUCTION

9.1.1 Purpose and Structure of the Chapter

This chapter of the ESA assesses the likely levels of significant effects of the Proposed Development in terms of Ecology and Nature Conservation and incorporates a summary of the Baseline Ecological Appraisal, which is included at Appendix 9.1.

The chapter describes the assessment methodology; the baseline conditions at the Site and its surroundings; the likely significant environmental effects; the mitigation measures required to prevent or reduce any significant adverse effects; the likely residual effects after these measures have been employed; any compensation measures to offset significant residual effects; and enhancement measures to provide gains in biodiversity. This chapter has been reviewed by a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and as such accords with CIEEM's Code of Professional Conduct.

The ESA is supported by a Shadow Habitats Regulations Assessment (Appendix 9.2), an Environmental Action Plan which sets out mitigation and compensation measures (Appendix 9.3), and a Nature Conservation Management Plan covering Carrow Abbey Marsh County Wildlife Site (CWS) and adjoining open space within the Site.

9.2 METHODOLOGY

9.2.1 Changes in Legislation, Guidance and Planning Policy

9.2.1.1 *Legislation*

A summary of relevant legislation is set out in Annex 6592/6 of the Baseline Ecological Appraisal at Appendix 9.1. In summary, the key pieces of legislation relating to nature conservation of relevance to the Site in England are:

- Wildlife and Countryside Act 1981 (as amended);
- Protection of Badgers Act 1992;
- Hedgerows Regulations 1997;
- Countryside and Rights of Way (CROW) Act for England and Wales 2000;
- Natural Environment and Rural Communities Act 2006;
- Conservation of Habitats and Species Regulations 2017.

9.2.1.2 Guidance

The approach to environmental impact assessment has been informed by the latest guidance published by CIEEM, which is referred to in the 'Methodology' section below where appropriate.

9.2.1.3 National Planning Policy Framework (July 2021)

The NPPF describes the Government's national policies on 'conserving and enhancing the natural environment' (Chapter 15).

NPPF takes forward the Government's strategic objective to halt overall biodiversity loss, as set out at Paragraph 174, which states that planning policies and decisions should contribute to and enhance the natural and local environment by:

"Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures".

The approach to dealing with biodiversity in the context of planning applications is set out at Paragraph 180:

"When determining planning applications, local planning authorities should apply the following principles:

- a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*
- c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*
- d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate."*

The above approach encapsulates the 'mitigation hierarchy' described in British Standard BS 42020:2019, which involves the following step-wise process:

- **Avoidance** – avoiding adverse effects through good design;
- **Mitigation** – where it is unavoidable, mitigation measures should be employed to minimise adverse effects;

- **Compensation** – where residual effects remain after mitigation it may be necessary to provide compensation to offset any harm; and
- **Enhancement** – planning decisions often present the opportunity to deliver benefits for biodiversity, which can also be explored alongside the above measures to resolve potential adverse effects.

The measures for avoidance, mitigation, compensation and enhancement should be proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development (BS 42020:2019, section 5.5).

9.2.1.4 Norwich City Council Planning Policy

Planning policy in Norwich City is primarily set out within the Adopted Local Plan (December 2014). Policy DM6 of the Development Management Policies Plan, which forms part of the Adopted Local Plan, is particularly relevant to ecology. This policy sets out the need to avoid harm to the natural environment, with particular regard to the adjoining Broads Authority area. The policy encourages proposals which deliver significant benefits to local biodiversity, and encourages developments to incorporate “*biodiversity, green infrastructure and wildlife friendly features*”. Where developments lead to substantial and unavoidable harm to Priority Habitats and Species, the policy requires developers to provide compensation through biodiversity offsetting.

Policy DM6 also affords protection to ecological sites, including Sites of Special Scientific Interest (SSSIs) and sites of regional or local importance for biodiversity such as County Wildlife Sites. Developments affecting regional and local sites would only be permitted “*where it would not result in significant and demonstrable harm to the particular interest and value of the site, taking account of:*”

- *The effectiveness of any proposals to mitigate the environmental impact of the development,*
- *any overriding benefits arising from that development in achieving the wider objectives of the JCS and*
- *any opportunities for local enhancements to biodiversity, geodiversity or green infrastructure associated with the proposal.”*

Further guidance regarding landscaping within new developments is set out within the Landscape and Trees Supplementary Planning Document (SPD) (adopted June 2016). This SPD encourages new developments to incorporate biodiversity features, such as:

“An approach to planting that achieves biodiversity and year round interest is encouraged. There are often opportunities within open spaces to plant specimen trees that would be too large for streets or gardens, which may offer great value in terms of character and focus for the community”.

“Developments should seek to retain native landscape features and consider opportunities to extend similar or provide new types of habitats in key locations to ensure that ecology is an integral part of the site proposals and wider ecological network. Consideration should be given to the selection of boundary treatments such as mixed species hedges that have potential to improve biodiversity rather than prohibit wildlife. Sites that have boundaries with rivers or other water courses also present opportunities for habitat enhancement. This could include for example provision of floating

vegetation platforms, where appropriate, which will increase and diversify vegetation along the river, and include native and high yield pollination species”.

“Ornamental planting and semi-ornamental planting also has potential to serve an ecological function, and the use of ecologically informed non-native planting mixes will be particularly encouraged on urban sites where a native species approach is not appropriate. The style of planting can also contribute to ecological value, for example an informal or naturalised planting will provide more variation of species and plant communities than mass planting. Flowering, fruit and berry bearing plants will provide a good food source for insects and birds. Generally speaking, double-flowered plant varieties are of much less value for insects and should be avoided.”

9.2.1.5 South Norfolk Council Planning Policy

South Norfolk District Council adopted its Development Management Policies Document, which forms part of the Local Plan, in October 2015. Within this Policy DM 4.4 refers to ‘Natural environmental assets – designated and locally important open space’, with relevant extracts set out below:

- *“New development impacting on these designated sites will be required to contribute positive improvement of these natural environmental assets where opportunities arise. International, National and County-wide level sites will be accorded the highest levels of priority,*
- *Developers will need to work with partners to evolve strategies to enable individual new development sites to contribute most effectively to the opportunities for the establishment and positive improvement of coherent ecological networks, Biodiversity Enhancement Areas and multi-functional Green Infrastructure Networks.”*

Other policies relevant to ecology include DM 4.8 which promotes the retention, conservation and appropriate management of significant trees and woodlands, and DM 4.9 which refers to incorporating a high-quality landscape design, implementation and management under development proposals.

Further guidance regarding open space is set out within the ‘Guidelines for recreation provision in new residential developments’ SPD (adopted September 2018). Chapter 9 within this SPD relates to biodiversity, and seeks to promote biodiversity within open space as follows:

“In assessing planning applications that provide for recreational open space and play facilities, a high priority will be given to schemes that provide good quality green spaces, enhance ecology and biodiversity and promote green infrastructure connectivity”

“Opportunities to increase biodiversity and wildlife corridors should be maximised across all development sites”

“The potential for new open space to contribute to improvements to Green Infrastructure... should also be explored.”

9.2.1.6 Joint Core Strategy

In addition to the district-level policies, both Norwich City Council and South Norfolk District Council have adopted the Joint Core Strategy for Broadland, Norwich and South Norfolk (amendments adopted January 2014). Policy 1 of the Joint Core Strategy includes ecological matters, for example:

“Development and investment will seek to expand and link valuable open space and areas of biodiversity importance to create green networks. Where there is no conflict with biodiversity objectives, the quiet enjoyment and use of the natural environment will be encouraged and all proposals should seek to increase public access to the countryside.

All new developments will ensure that there will be no adverse impacts on European and Ramsar designated sites and no adverse impacts on European protected species in the area and beyond including by storm water runoff, water abstraction, or sewage discharge. They will provide for sufficient and appropriate local green infrastructure to minimise visitor pressures. Development likely to have any adverse affect on nationally designated sites and species will be assessed in accordance with national policy and legislation.

In areas not protected through international or national designations, development will:

- minimise fragmentation of habitats and seek to conserve and enhance existing environmental assets of acknowledged regional or local importance. Where harm is unavoidable, it will provide for appropriate mitigation or replacement with the objective of achieving a long-term maintenance or enhancement of the local biodiversity baseline*
- contribute to providing a multifunctional green infrastructure network, including provision of areas of open space, wildlife resources and links between them, both off site and as an integral part of the development*
- help to make provision for the long- term maintenance of the green infrastructure network”*

9.2.1.7 Great Norwich – Emerging Local Plan

Norwich City Council and South Norfolk District Council are currently working on a Greater Norwich Local Plan, together with Broadland District Council and Norfolk County Council. Policy 3 of the Pre-Submission Draft Strategy (2021) refers to environmental protection and enhancement. This policy requires developments to “conserve and enhance the natural environment” by “being designed to respect and retain, and add to, natural assets” and “avoiding harm to designated and non-designated assets of the natural environment unless there are overriding benefits from the development and the harm has been minimised.”

In addition, Policy 3 requires developments to deliver net biodiversity gains through on- or off-site features, with at least a 10% gain delivered compared with the existing situation. Habitat enhancements should seek to help achieve local green infrastructure strategies.

Policy 3 also requires residential developments to address potential visitor pressure on sites protected under the Habitats Regulations, through “the payment of a contribution towards the cost of mitigation measures at the protected sites (as determined under the Norfolk Green Infrastructure and Recreational Impact Avoidance and Mitigation Strategy)” and “provision or enhancement of adequate green infrastructure, either on the development site or nearby, to provide for the informal recreational needs of the residents as an alternative to visiting the protected sites. This will equate to a minimum of 2 hectares per 1,000 population and will reflect Natural England’s Accessible Natural Greenspace Standard.”

9.2.2 Scoping Opinion

Scoping opinions have been received from the Broads Authority (2 November 2022), Norwich City Council (23 November 2022), South Norfolk Council (7 December 2022). These are summarised in turn below.

The Broads Authority's scoping opinion highlights the proximity of the Site to local designations, and requests that up-to-date ecology surveys are undertaken at the Site. Details of biodiversity enhancements are requested.

Norwich City Council's scoping opinion requests that the Ecology ESA chapter considers the following:

- Presence of Japanese Knotweed;
- Correct boundary of Carrow Abbey Marsh County Wildlife Site (CWS);
- Nutrient neutrality impacts on European-level statutory designations;
- Potential presence of Priority Habitats and Species;
- Impacts of noise, dust and vibration during construction on statutory and non-statutory ecological designations, in particular Carrow Abbey Marsh CWS and Whitlingham Local Nature Reserve (LNR);
- Recreational impacts on Whitlingham LNR.

South Norfolk Council's scoping opinion requests that up-to-date ecology survey work is undertaken, and refers to Natural England's generic consultation response. In addition, the Council requests that the ESA considers nutrient neutrality impacts on statutory designations.

As stated within the initial chapters of this ESA, a further specific Scoping Request was submitted on 27 February 2023, which dealt specifically the LVIA viewpoints and risk of major accidents and disasters. The responses received were not relevant to ecology.

9.2.3 Assessment Methodology

To inform the scope of the assessment, consideration has been given to the zone of influence of the Proposed Development. The zone of influence is defined as the area over which ecological features may be affected by the biophysical changes caused by the Proposed Development and associated activities. The extent of such changes will typically reduce over distance, and whether effects are experienced is dependent on the sensitivity of individual habitats, species or other ecological features, such that it is difficult to define a specific zone of influence which captures all potential effects arising from the Proposed Development. As such, two broad zones are identified:

- A primary zone of influence largely relating to the Site itself and the wider survey area (which incorporates Carrow Abbey Marsh CWS), incorporating habitats and associated species directly affected by the development footprint and associated works (in terms of habitat loss or damage, in addition to habitat restoration and management proposals). This zone also includes areas affected by factors such as noise, vibration, lighting, dust and pollution, the effects of which will be focused within the nearby surrounds (i.e. within 100m) of the Proposed Development. Survey work has specifically focused on this area, to allow an assessment of habitats and species directly affected by the Proposed Development.
- Beyond this, a wider (or secondary) zone of influence exists, where ecological features may be subject to wider scale effects such as recreational disturbance, air pollution from traffic or

water pollution within the wider river catchment. The assessment of features within this zone is largely based on background information identifying ecological designations, known habitats or species populations of importance which could be sensitive to such wider scale effects.

The methodology utilised for the survey work can be split into three main areas: desktop study, habitat survey, and faunal survey. Further details on survey methodologies are provided in the Baseline Ecological Appraisal in Appendix 9.1, and a summary is set out below.

9.2.3.1 Desktop Study

In order to compile background information on the Site and its immediate surroundings, a number of recording organisations and online data sources were consulted, including:

- Norfolk Biodiversity Information Service (NBIS);
- Multi-Agency Geographic Information for the Countryside (MAGIC) database;
- Woodland Trust database of notable, veteran and ancient trees.

9.2.3.2 Habitat and Plant Community Survey

Ecological survey work was previously carried out at the Site and the adjoining CWS (together referred to as the 'survey area') by Aspect Ecology in 2008 to 2009. This included an extended Phase 1 habitat survey in addition to specific survey work for plant communities (NVC). Subsequently, an update habitat and NVC survey of the same survey area was undertaken in August and September 2022 (for the Deal Ground land and CWS) and November 2022 (for the May Gurney land) to confirm the current extent of habitats within the survey area and identify any changes since the previous surveys.

The habitat survey was based on extended Phase 1 survey methodology (Joint Nature Conservation Committee, 2010), as recommended by Natural England, whereby the habitat types present are identified and mapped, together with an assessment of the species composition of each habitat.

Plant community survey of the fen habitat within the Deal Ground land was carried out initially in June and August 2009, with update survey work carried out in August and September 2022. The survey was undertaken in accordance with the National Vegetation Classification (NVC) methodology.

9.2.3.3 Faunal Surveys

In addition to the habitat and plant community surveys, specific faunal surveys were undertaken at the survey area in 2008 to 2009 for bats (tree and building inspection surveys, emergence/re-entry surveys and manual activity surveys), Badger *Meles meles*, breeding birds, Great Crested Newt *Triturus cristatus*, reptiles, and invertebrates. The bat inspection survey and Badger survey work was updated in 2022, while specific survey work was undertaken for Desmoulin's Whorl Snail *Vertigo moulinsiana*. In addition, the update survey in 2022 also included an assessment of any change in the Site's likely value for fauna. Methodologies for the latest Phase 2 survey work are summarised in Table 9.1 below. Further detail on survey methodologies is provided in the Baseline Ecological Appraisal at Appendix 9.1.

Further to this, update Phase 2 survey work for bats (activity survey comprising walked transects and static detectors), Badger, Water Vole, Otter, reptiles, and breeding birds, is being undertaken in 2023. The results of these surveys will be reviewed separately when available.

Table 9.1 – Summary of the Update Phase 2 Faunal Surveys Undertaken at the Survey Area

Faunal group	Survey methodology	Date of surveys	Guidance
Bats (tree inspections)	An examination of the trees within the Site was undertaken to search for the presence of features which could be of potential value to roosting bats such as splits, cracks, rot holes, coverings of ivy, peeling bark or similar. The potential for the trees to support roosting bats was ranked in accordance with the criteria set out in the Bat Conservation Trust guidelines (BCT, 2016).	Conducted during Phase 1 surveys (most recently in August to November 2022)	'Bat Mitigation Guidelines' (English Nature, 2004) (Ref 11.1); 'Bat Surveys – Good Practice Guidelines' (Bat Conservation Trust, 2012) (Ref 11.2); Bat Surveys for Professional Ecologists – Good Practice Guidelines" Bat Conservation Trust, 2016) (Ref 11.3).
Bats (building inspections)	Buildings within the Site were subject to specific external investigations for bats, whilst buildings with enclosed loft spaces were subject to internal investigations.	Conducted during Phase 1 surveys (most recently in August to November 2022)	
Badger	The entire survey area and immediate surrounds were surveyed for evidence of Badger setts and activity, including presence of well-worn paths, push-throughs, snagged hair, footprints, latrines and foraging signs	Conducted during Phase 1 surveys (most recently in August to November 2022)	'Occasional Publication No.9 – Surveying Badgers' (Mammal Society, 1989) (Ref 11.4)
Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i>	Wetland habitats within the Deal Ground land were surveyed by specialists in this species to provide information on the population and distribution of the species, including its finer scale distribution. Survey methods included tray beating, ground moisture recording, and vegetation composition	October 2022	Killeen IJ & Moorkens EA (2003). <i>Monitoring Desmoulin's Whorl Snail, Vertigo moulinsiana</i> . Conserving Natura 2000 Rivers Monitoring Series No. 6, English Nature, Peterborough

9.2.3.4 Evaluation of Ecological Baseline

The evaluation of ecological features and resources should be based on sound professional judgement whilst also drawing on the latest available industry guidance and research. The approach taken in this report is based on that described in the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and

Ireland' (Ref 11.13) whereby important ecological features are identified, and these are considered within a defined geographical context using the following frame of reference:

- International;
- National;
- Regional;
- County;
- District;
- Local;
- Site (not of elevated importance at a local level).

Features considered to be of importance within the context of the Site only (site level importance) have been scoped out of this assessment (with the exception of protected species which are considered in terms of mitigation and any legislative requirements).

Further details on this approach and the criteria used for evaluation are provided in the Baseline Ecological Appraisal at Appendix 9.1.

9.2.3.5 Assessment of Impacts and Significance

The CIEEM publication 'Guidelines for Ecological Impact Assessment in the UK and Ireland' also sets out a methodology for the assessment of potential effects arising from development. These methods are followed which can be summarised as below.

Using the agreed parameters of the scheme, likely effects are determined with reference to aspects of the ecological structure and function on which the feature or resource depends. This includes factors such as the available resources, ecological processes, human influences, historical context, ecological relationships, ecological role or function and ecosystem properties. Based on this context, the nature of the effect is characterised and considered under the following parameters:

- Positive or negative – will the activity lead to an adverse, beneficial or neutral effect;
- Extent – the size or amount of an impact, the area of habitat or number of individuals affected;
- Duration – the time for which the impact is expected to last prior to recovery or replacement, i.e. short-term or long-term;
- Reversibility – an effect may be irreversible in that recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it, i.e. permanent or temporary;
- Timing and frequency – some changes may only cause an impact if they coincide with critical life-stages or seasons, whilst frequent events may cause a greater effect than a single event.

Based on these parameters, the scale of effect (or magnitude) can be summarised as follows. This is in relation to adverse effects, although a similar scale can be applied to beneficial effects.

Table 9.2 – Assessment of Scale of Effect

Scale of Effect	Description
Substantial	A permanent or long-term effect on the receptor, which may result in severe damage to key characteristics and implications for the integrity of the receptor or its conservation status.
Moderate	Impacts resulting in partial loss of or damage to a receptor, which could have implications for the integrity of the receptor or its conservation status.
Slight	Short-term or temporary impacts resulting in only minor loss of or damage to a receptor, unlikely to have implications for the integrity of the receptor or its conservation status.
Negligible	No effect or only a short-term reversible impact with no long-term effect on the receptor.

Based on the nature of the effect, an assessment is then made whether the effect on a habitat or species is likely to be ecologically 'significant'. CIEEM guidance defines a 'significant effect' as *"an effect that either support or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general"*, going onto state that *"significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)."*

Significance is also assessed at an appropriate geographic scale. For example, a significant effect on a Site of Special Scientific Interest (SSSI) would be of national significance. Notwithstanding this however, consideration is also given to whether an effect is significant at a scale below the geographic context in which the feature is considered important.

For some ecological features (notably designations), there may be an existing statement of the conservation status of a feature and objectives and targets against which the effect can be judged. For example, Sites of Special Scientific Interest (SSSI) are assessed under six condition categories, namely favourable, unfavourable recovering, unfavourable no change, unfavourable declining, part destroyed, and destroyed. An effect that exerts a change between these condition categories would be considered as significant.

Where no existing statement of conservation status is available, an assessment is made against the existing status and condition of the habitat or species population, as recorded by survey data and background information, taking into account the level of ecological resilience or existing conditions that a habitat or species is currently subject to. An effect resulting in a long-term change to the existing background population trend or status at a given geographical level would be considered as significant. In this regard, a significant beneficial impact could be defined as one that prevents or slows an existing decline in the favourable conservation status of a habitat or population as much as one that permitted a population or habitat area to increase.

The likelihood or uncertainty of an effect occurring as predicted is also considered. To assist with defining certainty, the following scale is used (with broad confidence levels indicated in percentage terms):

- Certain/near-certain: probability estimated at 95% chance or higher;
- Probable: probability estimated above 50% but below 95%;
- Uncertain: probability estimated above 5% but less than 50%;
- Extremely unlikely: probability estimated at less than 5%.

9.2.3.6 Limitations of the Assessment

All of the species that occur in each habitat would not necessarily be detectable during survey work carried out at any given time of the year, since different species are apparent during different seasons. The Phase 1 habitat survey of the ecologically important habitats within the Site was undertaken within the optimal season, therefore allowing a robust assessment of habitats and botanical interest across the Site, and is further supported by previous ecology survey work undertaken at the Site.

The specific Phase 2 surveys were undertaken at the appropriate time of year and during suitable weather conditions to an appropriate level of survey effort, given the outline nature of the application. Any specific limitations are noted as part of the full methodology or results in the Baseline Ecological Appraisal at Appendix 9.1, although no significant constraints were experienced.

It is recognised that some of the faunal survey information is now several years old, and there may have been minor changes to the status of populations at the Site. However, the assessment of faunal species has been informed by update habitat survey work, which recorded no significant changes in habitat suitability for important faunal species at the Site and, if anything, a deterioration of habitat quality because of the lack of ecologically favourable management. As such, there are unlikely to have been any significant changes to the population status of faunal species at the Site.

9.2.4 Effects Not Requiring Further Assessment

No effects are scoped out of the assessment at this stage.

9.3 CHANGES IN BASELINE CONDITIONS

9.3.1 ES Baseline

9.3.1.1 Ecological Designations

The ecology chapter of the ES identified a number of statutory designations in the vicinity of the Site, including The Broads Special Area of Conservation (SAC), River Wensum SAC, and Lion Wood Local Nature Reserve (LNR). In addition, a number of non-statutory designations were identified in the vicinity of the Site, including Carrow Abbey Marsh County Wildlife Site (CWS) and Carey's Meadow CWS.

The ecological designations in the vicinity of the Site have been fully re-evaluated as part of this ESA. This process included extended search areas in relation to international-level designations, given the increased concern regarding indirect impacts such as nutrient neutrality and recreational impacts since the ES was produced. The revised scope of ecological designations is set out in Section 9.3.3 below.

9.3.1.2 Habitats and Ecological Features

The baseline habitat evaluation set out within the ES ecology chapter is summarised in Table 9.3 below.

Table 9.3 – Summary of Baseline Habitat Evaluation in the ES ecology chapter

Habitats	Level of Importance	Value Level
Eutrophic Floodplain Fen	Moderate to high	County
Neutral Grassland	Low	Local
Tall Herb/Ruderal Vegetation	Low to moderate	Site/local
Woodlands	Low	Local
Trees and Groups of trees	High	Local
Scrub	Low	Site/local
River Wensum and River Yare and associated riverbanks	Moderate	Local/county
Ephemeral Ponds	Low	Local
Building and Built Form	Low to negligible	Local
Derelict Industrial Ares / Hardstanding and Recolonising Ground	Negligible to low	Local
Ornamental/ Landscape Planting	Negligible	Site/local
Invasive Species	Negligible	Local

9.3.1.3 Fauna Use of the Site

The baseline evaluation of faunal species set out within the ES ecology chapter is summarised in Table 9.4 below.

Table 9.4 – Summary of Baseline Faunal Evaluation in the ES ecology chapter

Habitats	Level of Importance	Value Level
Bats – roosting	Moderate	Local
Bats – foraging	Moderate to high	Local
Water Vole	Low	Local
Otter	Moderate	Local
Badger	High	Local
Other mammals	Low	Local
Breeding birds – fen habitat	High	Local
Breeding birds – habitat outside fen	Low to moderate	Local
Great Crested Newts and other amphibians	Low	Local
Reptiles – Deal Ground	Moderate	Local
Reptiles – May Gurney	Low	Local
Fish	Low	Local
Invertebrates – woodland	Low	Local
Invertebrates – ruderal vegetation	Moderate	Local/county
Invertebrates – wetland	Moderate to high	County

9.3.2 ES Future Baseline

The ES sets out that the future baseline condition of Carrow Abbey Marsh CWS is likely to decline, because of the lack of active management, with the CWS largely abandoned following the cessation of industrial works at the Site. As a result, the ES sets out that the CWS is in “*a state of gradual decline which may or may not accelerate over time.*” Therefore, under a ‘do nothing’ scenario, moderate adverse effects are identified at the county level in relation to the CWS and lowland fen habitat, while moderate adverse effects at the local level are identified for wet woodland and the River Yare. Minor to moderate adverse effects at the local level are identified for breeding birds, moderate to major adverse effects at the local level for reptiles, and moderate to major adverse effects at the local/county level for invertebrates, on the basis of the succession of fen to scrub and woodland. Minor positive effects are however identified for roosting bats.

9.3.3 Current Baseline

9.3.3.1 Ecological Designations

A revised list of ecological designations in the vicinity of the Site is set out at Table 9.5 below and at Figure 9.1. Further detail is provided in Section 3 of the Baseline Ecological Appraisal at Appendix 9.1.

Table 9.5 – Ecological Designations in the Vicinity of the Site

Name	Designation*	Brief description	Distance from Site	Level of value
Statutory Designations				
<u>International Designations (within 20km)</u>				
River Wensum	SAC	Watercourse habitat and important population of White-clawed Crayfish <i>Austropotamobius pallipes</i> .	5.4km to NW	International
The Broads	SAC	Supports Annex I wetland and woodland habitats and populations of Desmoulin's Whorl Snail, Ramshorn Snail <i>Anisus vorticulus</i> and Fen Orchid <i>Liparis loeselii</i> .	5.5km to E	International
Broadland	SPA and Ramsar	SPA supports important populations of breeding and overwintering wetland bird species. Ramsar site supports rare habitats and species as described for the SPA and The Broads SAC.	5.5km to E	International
Norfolk Valley Fens	SAC	Supports alkaline fen habitat and important populations of Narrow-mouthed Whorl Snail <i>Vertigo angustior</i> and Desmoulin's Whorl Snail.	11.3km to SW	International
Breydon Water	SPA and Ramsar	Supports important populations of breeding and overwintering wetland bird species.	18.7km to E	International
<u>Other Statutory Designations (within 5km)</u> NB. A number of geological SSSIs are located within the search area, which are not included here.				
Whitlingham	LNR	Country Park supporting variety of habitats including woodland, meadow, lakes and associated wetland habitat.	<0.1 km to E	Local

Name	Designation*	Brief description	Distance from Site	Level of value
Lion Wood	LNR	Woodland including ancient woodland, Bluebell ground flora	0.9km to N	Local
Mousehold Heath	LNR	Remnant of formerly extensive heathland, supporting woodland, scrub, acid grassland.	1.6km to N	Local
Danby Wood	LNR	Semi-natural woodland on an old chalk mine	2.6km to SW	Local
Marston Marshes	LNR	Floodplain grazing marsh / fen, plus wet woodland, drier grassland, ponds, supporting notable wetland species	2.9km to SW	Local
Wensum Valley (Mile Cross March and Sycamore Crescent)	LNR	Areas of fen, damp grassland, pond, mature woodland, supporting toads and Water Voles in the past	3.6km to NW	Local
Eaton Common	LNR	Neutral grassland, marshy in places, plus tall herb vegetation and broadleaved woodland	3.8km to SW	Local
Sweetbriar Road Meadows	SSSI	Unimproved wet meadows with tall fen	4.1km to NW	National
Dunston Common	LNR	Grassland with indicator species e.g. Harebell, plus semi-mature woodland	4.6km to S	Local
<u>Non-statutory Designations (within 2km)</u>				
Carrow Abbey Marsh	CWS	Mosaic of tall fen and tall herb vegetation with young woodland and willow carr, supporting Desmoulin's Whorl Snail in ditches	Located partly within the Site	County
Trowse Meadows	CWS	Mix of habitats including semi-improved grassland, marshy grassland, woodland, and swamp	Located adjacent to part of the Site	County

Name	Designation*	Brief description	Distance from Site	Level of value
Trowse Wood	CWS	Large, broadleaved woodland on site of former lime kilns	0.1km to E	County
County Hall Woods	CWS	Belt of woodland	0.4km to W	County
Carey's Meadow	CWS	Former brownfield site colonised with semi-natural vegetation including neutral grassland, inundated grassland, grassland with a calcareous influence, and scrub	0.5km to NE	County
Lion Wood, Telegraph Plantation & Rosary Cemetery	CWS	Supports ancient semi-natural woodland	0.7km to N	County
Pinebanks	CWS	Disused gravel pit with neutral to acid grassland, plus ancient semi-natural woodland	1.2km to NE	County
Old Wood	CWS	Broadleaved woodland previously used for lime kilns	1.4km to E	County
Mousehold Heath & Valley Drive	CWS	Large complex of former heathland, now mostly recent woodland with some patches of acid grassland and heath	1.6km to N	County

* Abbreviations: CWS = County Wildlife Site; LNR = Local Nature Reserve; SAC = Special Area of Conservation; SPA = Special Protection Area; SSSI = Site of Special Scientific Interest.

As set out above, Carrow Abbey Marsh CWS is located partly within the Site itself. This is further evaluated in Section 4 of the Baseline Ecological Appraisal at Appendix 9.1, which includes an assessment of the habitats within the CWS (as recorded during the 2022 survey) against the Norfolk CWS selection criteria. In summary, the majority of the fen habitat is considered to warrant CWS designation (aside of drier parts i.e. F13 and F14 which have potential for restoration), in addition to the adjacent scrub, while the wet woodland does not presently qualify but is potentially restorable to fen, supporting a fen ground flora. The remainder of the habitats within the CWS, including dry tall ruderal vegetation, dry woodland, and dry grassland, are not considered to warrant CWS status. In particular, according to the CWS boundary provided by Norfolk Biodiversity Information Service, much of the northern part of the CWS is covered by dry, secondary Sycamore woodland (W4, albeit much of this has recently been felled according to the June 2023 tree survey), which does not meet the CWS selection criteria. This non-qualifying habitat area is not considered to function as part of the CWS designation for the purposes of this ESA. This is in line

with the CWS boundary shown in the Norwich City Council Local Plan which is the CWS boundary taken for assessment purposes¹, and was used for the assessment in the outline planning application (see Figures 9.1 and 9.2).

9.3.3.2 Habitats and Ecological Features

Full descriptions of habitats and ecological features within the Site and wider survey area are set out in Section 4 of the Baseline Ecological Appraisal at Appendix 9.1, whilst the location of habitats and ecological features are represented on Figure 9.2.

Of the habitats within and in close proximity to the Site, i.e. within the primary zone of influence, the fen (added to the NPPF as an irreplaceable habitat in 2018), wet woodland and River Yare are considered to represent important ecological features. In addition, the Nationally Scarce plant species Marsh Fern *Thelypteris palustris* was recorded within the Site. These are described in Table 9.6 below.

Table 9.6 – Summary and Evaluation of Important Habitats and Ecological Features Within and Adjacent to the Site

Habitat type / feature	Description	Level of importance
Eutrophic floodplain fen	<p>An area of fen habitat intersected with a drainage ditch system is present in the centre and east of the survey area, the majority of which falls within the CWS designation. The fen habitat is somewhat variable in its vegetation types, the majority being dominated by Greater Pond Sedge <i>Carex riparia</i>, while Reed Sweet-grass <i>Glyceria maxima</i>, Reed Canary-grass <i>Phalaris arundinacea</i> and Common Reed <i>Phragmites australis</i> are locally dominant. At the southern end, the fen becomes drier and transitions into tall ruderal vegetation. The vegetation is consistently tall and dense, with no evidence of recent management or access.</p> <p>In the absence of management, the fen is gradually drying with encroachment of trees and scrub at the margins. This is evidenced by the change of vegetation types since the previous survey in 2009, with a shift to less wet, species poorer communities.</p>	County
Wet woodland	Six areas of wet woodland were recorded within the survey area. These are all young in nature and dominated by Willow species, much of which has recently colonised historically open fen, which is reflected in the ground flora.	Local
River Yare	The River Yare flows along much of the boundaries of the survey area, briefly passing within the Site. Much of the river is natural in character, measuring approximately 6-10m in width, and supports some aquatic vegetation. The banks support a mixture of tall ruderal	Local

¹ <https://ncc.maps.arcgis.com/apps/webappviewer/index.html?id=7ff6d4cdf8ca4d70b50e935fec378e11>

Habitat type / feature	Description	Level of importance
	<p>vegetation with scattered trees, especially in the south and the central portion of the stretch along the Deal Ground land, while dense woodland in the form of W11 abuts the river in the southern section of the Deal Ground land. In the southern part of the survey area, adjacent to the May Gurney land, the riverbank is variable with some areas of stone walling or metal sheet piling but predominantly comprising heavily shaded steep banks supporting sparse vegetation largely dominated by Ivy.</p>	
<p>Nationally Scarce Plants</p>	<p>One plant species of conservation importance was recorded within the survey area, namely Marsh Fern, which was recorded close to the River Wensum in an area of felled woodland (W2), now occupied by colonising vegetation (PDL8). This species is listed as Nationally Scarce, albeit Norfolk is a significant stronghold. Its known extent within the Site is limited to one small patch, while the species has not previously been recorded within the survey area, such that it is likely to either be a recent colonist or has for some time only occurred as a very small population. Hoary Mullein <i>Verbascum pulverulentum</i> has been previously recorded within the Site, but was not re-recorded in 2022.</p>	<p>Local</p>

In addition, three invasive plant species listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) were recorded within the survey area. These comprise Japanese Knotweed *Reynoutria japonica*, Giant Hogweed *Heracleum mantegazzianum*, and Himalayan Balsam *Impatiens glandulifera*. Japanese Knotweed in particular forms dense stands in parts of the Site and appears to have expanded its extent since 2009. Giant Hogweed and Himalayan Balsam were only recorded in the fen habitat and along the banks of the River Yare.

Other habitats present within the survey area include species-poor neutral grassland, tall ruderal vegetation, dry non-native woodland, scrub and Bramble, tree lines, scattered trees and shrubs, River Wensum, an ephemeral pond, colonising vegetation on previously developed land, amenity planting, hardstanding, and buildings and structures. Such habitats are not considered to form habitats of ecological importance and are not subject to specific assessment.

9.3.3.3 Faunal Use of the Site

A range of faunal surveys have been undertaken at the Site for bats, Badger, Water Vole *Arvicola amphibius*, Otter *Lutra lutra*, breeding birds, Great Crested Newt *Triturus cristatus*, reptiles and invertebrates. During the update survey work in 2022, general observations were made of any faunal use of the survey area with specific attention paid to the potential presence of protected or notable species. Specific update survey work was undertaken in respect of Badgers, bats, and Desmoulin's Whorl Snail. Further to this, update Phase 2 survey work for bats (activity survey comprising walked transects and

static detectors), Badger, Water Vole, Otter, reptiles, and breeding birds, is being undertaken in 2023. The results of these surveys will be reviewed when available and should any revision to the assessment in this chapter be necessary, an update will be provided.

Full details of the completed survey work are included in the Baseline Ecological Appraisal at Appendix 9.1, while a summary of faunal species considered to be of ecological importance occurring within the Site and its immediate surrounds (i.e. the primary zone of influence) is set out in Table 9.7 below.

Table 9.7 – Summary and Evaluation of Important Faunal Species Within and Adjacent to the Site

Faunal species	Description	Level of importance
Bats (roosting)	<p>A number of buildings are present within the Site offering bat roosting potential. No evidence of roosting bats has been recorded within the Site itself, although one <i>Myotis</i> bat was recorded returning to roost within an off-site part of Building B7 in August 2010.</p> <p>Numerous trees within the Site have been identified as providing bat roosting potential, particularly within the southern and central parts of the Site, occurring as individual scattered trees, tree groups or within woodland areas. Possible evidence of roosting bats was recorded in one of these trees (T1), comprising a possible Soprano Pipistrelle <i>Pipistrellus pygmaeus</i> emergence in July 2010, with at least five Soprano Pipistrelle possibly emerging in August 2010.</p>	Local
Bats (foraging and commuting)	<p>The survey work recorded a moderate level of foraging activity, attributable to Common Pipistrelle <i>Pipistrellus pipistrellus</i>, Soprano Pipistrelle, Noctule <i>Nyctalus noctula</i>, and <i>Myotis</i> species including Daubenton's Bat <i>M. daubentonii</i>. Soprano Pipistrelle and Common Pipistrelle were the most frequently recorded species. The greatest levels of activity were associated with the River Yare corridor along the eastern margin of the survey area, which provides connectivity to the adjacent Whitlingham Country Park, where known roosts are present. Groups of trees and scrub around the fen margins were also subject to regular use. More occasional activity was recorded in the fen habitat and along the River Wensum. Update habitat assessment in 2022 concluded that there is unlikely to be any significant change in bat activity patterns across the survey area.</p>	Local

Faunal species	Description	Level of importance
Water Vole	<p>Survey work for Water Vole was undertaken along the river banks and within the ditches in the fen in the Deal Ground land in 2009. No evidence of this species was recorded, which is consistent with previous surveys undertaken in 2000 and 2003. The apparent absence of this species was explained by the limited open water in ditches within the survey area, and the scarcity of grass cover along the river banks. The 2022 habitat assessment concluded that the Site remains of poor suitability for Water Vole, albeit the species is known to occur along the River Yare at Whitlingham Country Park, and may therefore occur sporadically along the Yare corridor.</p>	Negligible to Low
Otter	<p>Survey work in 2009 for Otter along the banks of the River Yare and River Wensum within the survey area found no evidence of use by Otter, although the dense vegetation along the River Yare corridor was identified as potentially suitable habitat for Otter. The species was considered unlikely to occur elsewhere within the survey area, e.g. within the fen, because of the lack of year-round standing water. Habitat assessment in 2022 concluded that there was no significant change to the previous assessment, with any potential interest focussed along the River Yare corridor.</p>	Negligible to Low
Other mammals (including Priority Species)	<p>The Priority Species Harvest Mouse <i>Micromys minutus</i> could be present within the fen habitat and Hedgehog <i>Erinaceus europaeus</i> could utilise the drier parts woodland and scrub habitats. Polecat <i>Mustela putorius</i> has also been recorded in the local area and could use the drier woodland and scrub habitats.</p>	Local
Reptiles	<p>Survey work undertaken in April to August 2009 recorded a low population of Grass Snake <i>Natrix natrix</i> in grassland and fen habitat across both the Deal Ground and May Gurney land, although the population was considered to represent a good size within the fen habitat. No other reptile species were recorded. Habitat assessment in 2022 concluded that the suitability of the survey area remains similar to 2009, with slightly reduced suitability due to tree and scrub encroachment.</p>	Local

Faunal species	Description	Level of importance
Birds	<p>Breeding bird survey undertaken at the Deal Ground land in 2009 recorded a total of 53 species, of which 26 were considered to be breeding or probably breeding within the survey area, and 7 possibly breeding. The remaining 20 species were observed flying over or foraging at the survey area, but presumed to be breeding elsewhere. A good density of breeding birds was recorded within the survey area overall, with the fen habitat in particular supporting a significant assemblage of birds, in contrast to the drier areas of woodland, scrub, ruderal and grassland habitats which supported a much reduced diversity of species.</p> <p>Notable species recorded within the fen included the Schedule 1 species Cetti's Warbler <i>Cettia cetti</i> and the RSPB red-listed species Grasshopper Warbler <i>Locustella naevia</i> and Cuckoo <i>Cuculus canorus</i>, while the red-listed species Linnet <i>Linaria cannabina</i> was recorded within scrub. In addition, the Schedule 1 species Barn Owl <i>Tyto alba</i> and Kingfisher <i>Alcedo atthis</i> were recorded as non-breeding individuals, recorded hunting over the fen and along the River Yare, respectively. Amber-listed species included Sedge Warbler <i>Acrocephalus schoenobaenus</i>, Willow Warbler <i>Phylloscopus trochilus</i> and Reed Bunting <i>Emberiza schoeniclus</i>, all of which were recorded in the fen habitat.</p> <p>Update habitat assessment in 2022 concluded that the previous evaluation remains appropriate, albeit there could be a minor change in the bird assemblage, reflecting the higher prevalence of scrub and woodland at the expense of fen and tall ruderal vegetation. However, this is not likely to significantly alter the conservation importance of the assemblage.</p>	Local
Fish	<p>Fisheries data held by the Environment Agency for the Rivers Wensum and Yare in the vicinity of the Site include records of three UK Priority Species and one Annex 2 species. These species could occur within the stretches of river adjacent to the Site, including the section of the River Yare which passes through part of the Site.</p>	Local
Desmoulin's Whorl Snail	<p>Survey work for invertebrates undertaken in 2009 recorded the presence of Desmoulin's Whorl Snail in sedge-dominant vegetation and the ditches within the fen habitat. Update survey work in October 2022 recorded this species in approximately half of the sample points taken within the fen. The distribution of the species was patchy and concentrated on the south-central part of the fen.</p>	County

Faunal species	Description	Level of importance
Other Invertebrates	<p>Survey work for terrestrial invertebrates undertaken at the Deal Ground land in 2009 identified a total of 592 species of invertebrates. This assemblage included 17 Priority Species, one Nationally Rare RDB3 species (Twin-spotted Wainscot Moth <i>Archanara geminipuncta</i>, associated with reedbeds), 14 Nationally Notable species, and 30 Nationally Local species. These species of conservation interest were primarily associated with wetland and ruderal habitats, which supported 40% and 42% of the species of conservation interest within the survey area, respectively. Woodland habitat was of comparatively lower interest, supporting 26% of the species of conservation interest within the survey area.</p> <p>Update habitat assessment in 2022 identified that the condition of habitats for invertebrates remains similar to the situation in 2009, albeit the gradual drying of the fen and associated reduction in floristic diversity may have reduced the value of this habitat for invertebrates. The distribution of ruderal habitats within the site has shifted since 2009, with the majority now located along the River Yare banks, which are likely to be of particular importance for invertebrates. Overall, the value of the Site for invertebrates is likely to be unchanged since the previous assessment.</p>	<p>Local (woodland assemblage), Local to County (ruderal assemblage), County (wetland assemblage)</p>

Other fauna supported by the survey area include non-priority species of mammals and non-protected amphibian species, while Badger and Great Crested Newt have not been recorded within the Site. These species are not considered to form important ecological features.

9.3.4 Changes in Baseline

9.3.4.1 Habitats and Ecological Features

Although there have been changes in the assessment methodology in terms of habitat evaluations since the ES was produced, the ESA finds that the current baseline conditions for habitats and ecological features are similar to the ES baseline. All of the habitats identified as moderate or greater value in the ES baseline are considered to represent important ecological features under the current baseline, albeit the ‘trees’ habitat has largely been absorbed by woodland habitat categories under the current baseline.

In addition, it should be noted that the distribution of habitats within the Site has been remapped since the original ES. This exercise identified changes in the distribution of habitats within the Site, most notably for the fen and scrub/woodland habitats, with the latter habitats increasing in extent at the expense of the former. However, subsequent update tree survey work in June 2023 has recorded that parts of the woodlands have since been felled (see Figure 9.2).

In addition, there have been changes in the distribution of plant communities within the fen habitat, probably reflecting a gradual drying of the fen. Furthermore, the distribution of tall ruderal vegetation within the Site has also changed considerably. Other changes include the loss of an ephemeral pond (P2) and several buildings within the May Gurney land. Changes to the distribution of invasive and notable plant species include an apparent increase in the distribution of Japanese Knotweed, presence of Himalayan Balsam, and the presence of an additional notable (Nationally Scarce) plant species, Marsh Fern. However, the Nationally Scarce species Hoary Mullein was not re-recorded during the latest survey work in 2022.

9.3.4.2 Fauna

The update survey work in 2022 included specific survey work for Badger, bats, and Desmoulin's Whorl Snail, while an assessment of habitats was undertaken to evaluate any changes in habitat conditions for other fauna.

The ESA finds that the current faunal baseline conditions are similar to the ES baseline. Minor changes were identified in habitat suitability for a number of species groups, as set out in the Baseline Ecological Appraisal (Appendix 9.1). Generally these tend to a gradual decline in habitat suitability for important faunal groups, mainly because of the slight drying of the fen, which is likely to be somewhat detrimental for the value of the Site to breeding birds, reptiles, and invertebrates.

9.4 ASSESSMENT OF EFFECTS

9.4.1 Construction Phase Effects

The potential effects considered within this section are those relating to temporary factors arising from the construction process, such as construction site noise, vibration and dust production, and which will cease to apply following completion of the Proposed Development (referred to as 'Operational Phase'). Therefore, loss of habitats through permanent land take for development is considered as an 'Operational Phase' effect, although the land take actually occurs during the construction phase of the Proposed Development.

9.4.1.1 Ecological Designations

9.4.1.1.1 Carrow Abbey Marsh CWS

This section assesses potential construction impacts on the non-statutory designation Carrow Abbey Marsh CWS, with particular regard to the interest features of the CWS according to the citation, namely fen and associated scrub habitat and the population of Desmoulin's Whorl Snail. As set out in the Baseline Ecological Appraisal (Appendix 9.1), the northern parts of the CWS comprise dry Sycamore woodland (albeit this has recently been felled) which is not considered to warrant CWS status, nor does it form part of its reason for selection. This area is also excluded from the CWS boundary in the Norwich Local Plan 2016 policies map (see Annex 6592/3 of Appendix 9.1). As such, impacts on this part of the CWS are not considered to impact the CWS.

9.4.1.1.1.1 Temporary Land-take

A minor loss of habitat within Carrow Abbey Marsh CWS will occur as a result of the Proposed Development. This permanent land-take is considered in the Operational Phase section below. The retained areas of the CWS could be subject to indirect construction effects including temporary loss or

disturbance to habitats during construction works, for example through temporary encroachment of construction machinery and materials into the retained parts of the CWS. This could impact both the extent and condition of fen and associated scrub habitats, and the availability of habitat for Desmoulin's Whorl Snail for which the CWS is designated.

9.4.1.1.1.2 Hydrological impacts

The construction phase could result in hydrological impacts associated with increased run-off following vegetation clearance and during ground re-levelling, in addition to water quality impacts such as increased siltation via surface water run-off following vegetation clearance. In addition, the operation of vehicles and machinery has the potential for surface water to become contaminated with hydrocarbons, while pollution events such as spillages during construction could further exacerbate these impacts. High levels of these contaminants and suspended solids in water flowing into the CWS are likely to have a detrimental effect on the condition of the habitat interest features, namely the fen and associated scrub habitats, with corresponding impacts on the population of Desmoulin's Whorl Snail. Water run-off into the fen could also be affected by minor changes in pH level, brought about by possible contamination by construction materials such as cement and concrete. However, it is also acknowledged that the Site has a history as an industrial land use, such that historically the fen would likely have received some contaminated run-off from the Site. Furthermore, the plant communities within the fen habitat are associated with eutrophic conditions, such that they are not highly vulnerable to increases in fertility levels arising from nutrient inputs.

9.4.1.1.1.3 Noise and Vibration

Piling and foundation works that will occur during the construction phase are likely to cause ground vibrations. However vibrations of the magnitude likely created during the construction of the development are unlikely to adversely affect the habitats or faunal interest features (namely Desmoulin's Whorl Snail) within the CWS. Similarly, the interest features of the CWS are not sensitive to noise or light disturbance, albeit impacts on noise and light pollution to associated fauna such as birds and bats are considered separately in the relevant sections below (given that these do not explicitly form part of the designation of the CWS).

9.4.1.1.1.4 Dust

Dust created during the construction phase, particularly during site clearance, building demolition and foundation laying period, may affect the floral interest of the CWS should this comprise of sufficiently fine particulates to be wind blown in large quantities. Nevertheless, the groups of trees adjacent to and within CWS are likely to intercept a high proportion of the dust and prevent it from affecting the main habitat features, namely the fen habitat.

9.4.1.1.1.5 Fire

An uncontrolled fire during construction could potentially have a very large effect on the CWS depending on the magnitude or vigour of the fire and weather conditions, by destroying or severely damaging habitats, with associated effects on the population of Desmoulin's Whorl Snail.

9.4.1.1.1.6 Impact Assessment

In the absence of mitigation, impacts on Carrow Abbey Marsh CWS are considered to be **slight, adverse** and **medium-term**, and could be **significant** at the county level (uncertain).

9.4.1.1.2 Whitlingham LNR, Trowse Meadows CWS and Trowse Wood CWS

This section assesses potential construction impacts on the statutory designation Whitlingham LNR, which contains the CWS' Trowse Meadow and Trowse Wood. These designations are separated from the Site by the River Yare (or its back-channel in the case of May Gurney land), while Carrow Abbey Marsh CWS separates much of the Site from the designations.

9.4.1.1.2.1 Hydrological impacts

The construction phase could result in hydrological impacts associated with increased run-off following vegetation clearance and during ground re-levelling. However, the scope for any such impacts is mainly associated with the May Gurney land and the north-eastern extreme of the Deal Ground land, which lie in close proximity to the LNR. These parts of the Site are relatively flat and have a former industrial land use, largely comprising made ground. As such, the potential for hydrological impacts arising from these parts of the Site is somewhat limited, while the potential for hydrological impacts arising from the central and southern parts of the Deal Ground land is limited by the separation of these parts of the Site from the LNR, albeit there is a hydrological link. Any such impacts are therefore likely to be very short-term in nature.

Similarly, there is some potential for water quality impacts associated with siltation and pollutants from construction activities, but any such effects would be very short-term given that these would be intercepted by the River Yare and swiftly dispersed downstream of the LNR.

9.4.1.1.2.2 Noise and Vibration

The LNR and CWS' are not known to be designated for any important faunal species which are sensitive to noise and vibration, albeit public enjoyment of the LNR (which is an important feature of these designations) could be disrupted by these impacts. Nevertheless, given the screening provided by the tree line along the River Yare and the eastern boundary of the May Gurney land, any such impacts are likely to be highly localised to parts of the LNR in closest proximity to the Site, and will be very short-term in nature.

9.4.1.1.2.3 Dust

Dust created during the construction phase, particularly during site clearance, building demolition and foundation laying period at the May Gurney land and northern parts of the Deal Ground land, may affect the botanical interest of the LNR should this comprise of sufficiently fine particulates to be wind blown in large quantities. Nevertheless, the tree line along the eastern margin of the Site is likely to intercept a high proportion of dust.

9.4.1.1.2.4 Impact Assessment

In the absence of mitigation, impacts on Whitlingham LNR, Trowse Meadows CWS and Trowse Wood CWS are considered to be **slight, adverse** and **short-term**, and could be **significant** at the county level (uncertain).

9.4.1.1.3 Other designations

The next nearest ecological designation is County Hall Woods CWS, located approximately 0.4 km to the west of the Site, whilst the next nearest statutory ecological designation is Sweetbriar Road SSSI, located approximately 4.1 km to the north-west of the Site. At these distances, these and other more distant ecological designations are highly unlikely to be affected during the construction phase. Effects on other ecological designations are therefore considered to be **negligible** and **non-significant** (near certain).

9.4.1.2 *Habitats and Ecological Features*

Large parts of the Site will be subject to construction works resulting in the loss of existing habitats. This permanent land-take of habitats (and resultant effects on fauna supported by such habitats) is discussed in the Operational Phase section below. This section relates to effects during the construction phase, which are largely temporary in nature.

9.4.1.2.1 Eutrophic Floodplain Fen

Impacts to the fen habitat during the construction phase are discussed above under Carrow Abbey Marsh CWS. The vast majority of the fen habitat falls within the CWS boundary, while parts of the fen outside of the CWS will be subject to the same identified impacts. In summary, potential effects are identified in relation to temporary land-take, hydrological impacts (water quantity and quality), dust, and fire. In the absence of mitigation, impacts on this habitat are considered to be **slight, adverse** and **medium-term**, and could be **significant** at the county level (uncertain).

9.4.1.2.2 Wet Woodland

Impacts to the wet woodland habitat during the construction phase are discussed above under Carrow Abbey Marsh CWS. One additional area of wet woodland (W3) lies outside of the CWS boundary, however this will largely be lost to the Proposed Development with the exception of tree retention within areas of open space. In summary, potential effects are identified in relation to temporary land-take, hydrological impacts (water quantity and quality), dust, and fire. In the absence of mitigation, impacts on this habitat are considered to be **slight, adverse** and **medium-term**, and could be **significant** at the local level (uncertain).

9.4.1.2.3 River Yare

During the construction phase, the River Yare could be impacted by hydrological pollution associated with construction activities, including increased siltation, pollution from hydrocarbons, and slight changes in pH from construction materials. Any such impacts are likely to be very short-term in nature because any pollutants would be rapidly dispersed and diluted downstream. Nevertheless, in the absence of mitigation, impacts on this habitat are considered to be **slight, adverse** and **short-term**, and could be **significant** at the local to county level (uncertain).

9.4.1.2.4 Nationally Scarce Plants

The single known specimen of Marsh Fern will be removed under the operational phase of the development (with a translocation exercise proposed as mitigation), such that temporary impacts during the construction phase are not relevant. Hoary Mullein has been previously recorded within the Site but is not currently known to be present. As such, construction phase impacts are not relevant and under **negligible** and **non-significant** (near-certain).

9.4.1.2.5 Invasive Plant Species

Three invasive plant species (Japanese Knotweed, Giant Hogweed and Himalayan Balsam) were recorded within the survey area, and Japanese Knotweed in particular forms extensive stands within the Site. In the absence of mitigation, all three of these invasive species could be spread within the Site and potentially within the wider surrounds. This could occur through insensitive strimming of vegetation, movement of soil containing roots and seeds, and movement of machinery contaminated with plant parts, and subsequent spread of these species from propagules. In the absence of mitigation, impacts arising from

invasive plant species are considered to be **moderate, adverse** and **long-term**, and could be **significant** at the local level (probable).

9.4.1.3 Fauna

9.4.1.3.1 Bats – Roosting

Two buildings (B7 and B10, Figure 9.2) and two trees (T1 and T2, Figure 9.2) with potential to support roosting bats require removal under the Proposed Development. Without mitigation, any roosting bats present could be disturbed or injured by felling / demolition activities, which would constitute an offence under relevant legislation. Retained trees and buildings with bat roosting potential, particularly Buildings B4 (the kiln) and B6 (the former subway tunnel) (Figure 9.2) which lie in close proximity to proposed construction areas, could also be subject to disturbance effects such as noise and light-spill during construction.

Prior to mitigation, construction effects on roosting bats are considered to be **slight to moderate, adverse** and **medium-term**, and could be **significant** at the local level (uncertain).

9.4.1.3.2 Bats – Foraging and Commuting

Foraging and commuting bats could be affected during the construction phase by lighting of construction areas. However, such effects would only be for the duration of the construction phase within any particular area (with works to be phased across the Site over a period of many years). Furthermore, the requirement for lighting during construction works is expected to be limited to working hours, such that lighting would only be required during the winter months when bats are less active. In addition, the main habitats of value to foraging and commuting bats, namely the River Yare corridor, the fen and associated wet woodland, are well separated from construction areas and screened by dense woody vegetation which will likely be particularly effective during the summer months when bats are most active. More sporadic bat foraging and commuting activity was recorded along the River Wensum, and this area is likely to already be subject to moderate levels of light-spill from nearby development. Foraging and commuting bats could also be affected by noise disturbance, although this would be mostly during the day (particularly in summer) when bats would very rarely be foraging or commuting. Other construction effects such as airborne pollutants are unlikely to result in a direct effect on foraging or commuting bats.

Construction activities could also result in temporary disruption or severance of commuting routes between roosts and retained foraging areas, while the land within the Site will also be of very limited value to foraging bats for the duration of construction works until new habitats are established.

Accordingly, prior to mitigation, construction effects on foraging and commuting bats are considered to largely relate to temporary increases in lighting levels, and would be **slight, adverse** and **medium-term** and potentially **significant** at the local level (uncertain).

9.4.1.3.3 Water Vole

Water Vole is not known to be present within the Site and is assessed as a precautionary measure. In the absence of mitigation, construction works could encroach into the vicinity of the River Yare, in the north-eastern part of the Deal Ground land. This could impact any Water Voles using this habitat through disturbance or temporary habitat destruction. Accordingly, prior to mitigation, construction effects on Water Vole are considered to be **slight, adverse** and **medium-term** and potentially **significant** at the local level (uncertain).

9.4.1.3.4 Otter

Similarly, Otter is not known to be present within the Site and is assessed as a precautionary measure. In the absence of mitigation, construction works could encroach into the vicinity of the River Yare, in the north-eastern part of the Deal Ground land. This could result in disturbance to Otters and potentially the destruction of any couches present, albeit given the extent of any such encroachment, these effects are highly unlikely. Nevertheless, prior to mitigation, construction effects on Otter are considered to be **slight, adverse and medium-term** and potentially **significant** at the local level (uncertain).

9.4.1.3.5 Other mammals

Vegetation clearance during the construction phase could potentially harm mammals such as Hedgehog through injury or direct mortality. However, given the nature of the habitats present, any such effects would only impact low numbers of Priority Species of mammal. Accordingly, prior to mitigation, construction effects on other mammals are considered to be **slight, adverse and medium-term** and potentially **significant** at the local level (uncertain).

9.4.1.3.6 Reptiles

Grass Snake has been recorded within the Site, and is likely to use grassland and fen habitats. Reptiles within these habitats would be at risk of injury or mortality from construction activities such as vegetation clearance and tracking of vehicles, which could also constitute an offence under the relevant legislation.

Accordingly, prior to mitigation, construction effects on reptiles are considered to be **moderate, adverse and medium-term**, and could be **significant** at the local level (probable).

9.4.1.3.7 Birds

Potential effects on bird species during the construction phase relate to a direct loss of active nests, resulting in a direct effect on local populations and also constituting an offence under the Wildlife and Countryside Act 1981 (as amended), which affords protection to wild birds and their eggs. In this regard, areas of woodland, scrub and trees are to be removed under the Proposed Development. Construction activities could also result in noise and visual disturbance to nesting birds in close proximity to construction areas, albeit these effects are anticipated to be relatively localised and for a short duration in any one location.

Accordingly, prior to mitigation, construction effects on birds are considered to be **moderate, adverse and short-term**, and could be **significant** at the local level (probable).

9.4.1.3.8 Fish

Noise and vibration, particularly from any piling works which are required during the construction phase, may have the potential to affect fish within nearby rivers. However, any such effects would be highly localised and very short-term. In addition, hydrological impacts such as pollutants and siltation during construction could adversely affect fish populations, albeit any such impacts would be rapidly diluted.

Accordingly, prior to mitigation, construction effects on fish are considered to be **slight, adverse and short-term**, and could be **significant** at the local level (uncertain).

9.4.1.3.9 Desmoulin's Whorl Snail

Impacts to the population of Desmoulin's Whorl Snail, which is present within wetter parts of the fen, during the construction phase are discussed above under Carrow Abbey Marsh CWS. In summary,

potential effects are identified in relation to temporary land-take, hydrological impacts (water quantity and quality), dust, and fire. In the absence of mitigation, impacts on this habitat are considered to be **slight, adverse and medium-term**, and could be **significant** at the county level (uncertain).

9.4.1.3.10 Other Invertebrates

The generation of dust from construction activities and its subsequent deposition on vegetation could potentially affect invertebrates and egg-laying sites within retained habitats. However, such effects would be temporary in nature. Nevertheless, impacts on the fen including hydrological effects could result in adverse effects on invertebrates associated with the fen. Accordingly, prior to mitigation, construction effects on invertebrates are considered to be **slight, adverse and medium-term**, and could be **significant** at the county level (uncertain).

9.4.2 Additional Operational Phase Effects

The potential effects considered within this section are those relating to the operational phase of the Proposed Development. This includes the loss of habitats through permanent land take for development, in addition to potential effects resulting from the operation of the Proposed Development such as recreational pressure, and disturbance from noise and artificial lighting.

Operational phase effects were comprehensively set out within the ecology ES chapter. Therefore, this section only describes any additional effects identified arising from detailed design of the Proposed Development, changes in baseline conditions since the ES, and changes in policy or guidance.

9.4.2.1 Ecological Designations

9.4.2.1.1 International/European Designations

Since the ES was produced, there has been greater recognition regarding potential indirect effects on SACs and SPAs, particularly with regard to recreational disturbance and water-borne nutrient impacts. This has led to Natural England issuing guidance regarding these indirect effects, and local authorities developing strategic mitigation schemes to address these impacts. Given the presence of a number of European designations in the wider area surrounding the Site, an assessment of effects on European designations is set out in the shadow Habitats Regulations Assessment (sHRA) at Appendix 9.2.

The sHRA screening exercise concludes that in the absence of mitigation, the potential for a likely significant effect arising from the Proposed Development alone cannot be ruled out in relation to water quality at The Broads SAC and Broadland Ramsar site.

On this basis, operational effects on The Broads SAC and Broadland Ramsar site prior to mitigation arising from water quality impacts are considered to be **slight, adverse and long-term**, and could be **significant** at the international level (uncertain).

9.4.2.1.2 National and Local Statutory Designations

Whitlingham LNR lies in close proximity to the Site, particularly the May Gurney land and the northern part of Deal Ground, where it is separated from the Site by the River Yare or its backchannel. As such, there is potential for adverse effects associated with increased recreational use of the LNR by new residents within the Proposed Development. New residents would only need to walk approximately 75m to access the closest part of the LNR from the closest part of the Proposed Development. However, it is understood that this part of the LNR (Trowse Meadows) was closed to the public in August 2022

(<https://www.whitlinghamcountrypark.com/notices.html>) due to existing levels of recreational impacts, including littering, fires, and vandalism. Nevertheless, it is possible that new residents could occasionally make unauthorized access into the meadow.

The closest accessible part of the LNR comprises Trowse Wood, which requires a walk of around 0.2 miles from the closest part of the Proposed Development. This is an area of closed canopy woodland which is more resilient to recreational impacts. To access the main entrance to the LNR, which lies further afield to the north-east, would require a walk of approximately 0.75 miles each way, i.e. an approximately 30 minute round trip just to access the LNR from the closest part of the Proposed Development. Pedestrian access to this point is likely to be more sporadic. New residents could also drive and park at this point of the LNR, which would incur parking charges that fund the management of the LNR, hence mitigating some of the increased recreational pressure.

The Proposed Development includes embedded mitigation in the form of accessible open space. This comprises a total of 3.75 ha of open space, which is equivalent to 2.5 ha per 1000 population. The open space includes 0.99 ha of informal amenity open space and 2.33 ha of natural green space. These provisions are likely to absorb substantial amounts of recreational pressure.

On this basis, operational effects on Whitlingham LNR prior to mitigation are considered to be **negligible to slight, adverse and long-term**, and **non-significant** (probable).

The next nearest statutory ecological designation is Sweetbriar Road Meadows SSSI, located approximately 4.1km north-west of the survey area. This designation is managed by Norfolk Wildlife Trust who have plans to provide public access. However, the SSSI is separated from the Site by Norwich city centre, such that it requires a drive of approximately 15 minutes from the Proposed Development to access the SSSI. Given the size of the SSSI and closer proximity of other recreational opportunities, any increase in visitors to this SSSI, and statutory designations further afield, are likely to be negligible.

9.4.2.1.3 Non-statutory designations

The effects of the Proposed Development on Carrow Abbey Marsh CWS are comprehensively set out within the ES ecology chapter. Based on the latest mapping exercise, the revised calculated losses and gains of fen habitat within the CWS to the Proposed Development are as follows (see Figure 9.3):

- Current area of fen habitat within survey area and CWS (including adjacent off-site CWS): 4.58 ha
- On-site fen within CWS retained: 0.1733 ha
- Area of fen within CWS lost to development: 0.135 ha (previously 0.1 ha)
- New fen creation within CWS (including translocation receptor areas): 0.101 ha

Additional fen habitat outside of the CWS boundary will also be impacted, which is set out under the assessment on 'Habitats and Ecological Features' below.

The Proposed Development will also result in very minor losses of scrub and wet woodland habitat along the western margin of the CWS. Losses of dry woodland habitat (W4 and W7) in the north of the CWS are not considered to impact the CWS, given that this habitat does not justify CWS selection and does not form part of the CWS description (as discussed further in Appendix 9.1).

Indirect operational effects on Carrow Abbey Marsh identified in the ecology ES chapter include recreational disturbance, hydrological and drainage impacts, and water quality. The Proposed

Development no longer proposes a footpath along the eastern margin of the CWS (along the River Yare), which was proposed within the ES chapter. This has been omitted to minimize the risk of recreational disturbance at the CWS, thereby lowering the potential for adverse effects on the CWS arising from recreational pressure.

In addition, a more detailed assessment of air quality impacts arising from the Proposed Development on Carrow Abbey Marsh CWS has been undertaken since the ES ecology chapter (see Chapter 11 of the ESA, with an illustrative figure relating to the CWS receptor shown within Appendix 11.1). This assessment has identified that road traffic emission contributions from the Proposed Development alone are predicted to be above the 1% critical level of the annual mean oxides of nitrogen (NO_x), for a small part of the south-western corner of the CWS. However, these road traffic emission contributions to nutrient nitrogen within the CWS are below 1% of the 'rich fen' Critical Load (CLO) class and are, therefore, concluded to result in no likely significant effect. In addition, the fen habitat is not considered to be highly sensitive to acidification. As such, air quality effects arising from the operational phase on non-statutory designations are considered to be negligible and non-significant.

Otherwise, the assessment set out in the ES chapter is considered to remain relevant.

Although the discussion of ecological impacts on Carrow Abbey Marsh CWS in the ecology ES chapter remains largely relevant, the ES chapter included ecological management of the fen and translocation of fen turfs as embedded mitigation. This addendum treats these elements as mitigation measures subsequent to the impact assessment, such that the impact assessment prior to mitigation requires revision. Accordingly, prior to mitigation, operational effects on Carrow Abbey Marsh CWS are considered to be **slight, adverse and long-term**, which could be **significant** at the county level (uncertain).

Potential effects on Trowse Meadows CWS and Trowse Wood CWS are discussed in relation to Whitlingham LNR above, i.e. operational effects on these designations are considered to be **negligible to slight, adverse and long-term**, and **non-significant** (probable).

9.4.2.2 Habitats and Ecological Features

9.4.2.2.1 Eutrophic Floodplain Fen

Impacts to the fen habitat during the operational phase are discussed above under Carrow Abbey Marsh CWS. Additional areas of fen lost and created under the Proposed Development, which are functionally linked to the CWS, are as follows:

- Current area of fen habitat within survey area and outside of CWS: 0.078 ha (total including CWS: 4.66 ha)
- On-site fen outside CWS retained: 0.0607 ha (total including CWS: 0.234 ha)
- Area of fen outside CWS lost to development: 0.0176 ha (total including CWS: 0.1526)
- New fen creation outside CWS (including translocation receptor areas): 0.1433 ha (total including CWS: 0.2443 ha)

The ES ecology chapter set out that 0.1 ha of fen would be lost to the proposals. The revised area regarding the fen lost to development has been refined according to more modern precise habitat mapping techniques rather than a significant change in scheme design.

The latter area of new fen creation is somewhat conservative in that only the parts of the fen creation closest to the existing fen are included in the calculation, and compare with a figure of 0.29 ha in the ES chapter which included all new wetland habitat within the swales. Additional areas of wetland habitat will be created further north of these areas, which are not included in the calculation given that these are more likely to represent marshy grassland habitat.

Indirect operational effects on the fen habitat are described above in relation to Carrow Abbey Marsh CWS, including recreational disturbance (albeit the footpath along the eastern margin of the CWS is no longer proposed, reducing the potential for any such effects), hydrological and drainage impacts, and water quality.

As set out above for Carrow Abbey Marsh CWS, the ES ecology chapter included ecological management of the fen and translocation of fen turfs as embedded mitigation. This addendum treats these elements as mitigation measures subsequent to the impact assessment, such that the impact assessment prior to mitigation requires revision. Accordingly, prior to mitigation, operational effects on the eutrophic floodplain fen habitat are considered to be **slight, adverse** and **long-term**, and could be **significant** at the county level (uncertain).

9.4.2.2.2 Wet Woodland

The areas of wet woodland within the CWS will largely be retained under the Proposed Development, with the exception of very minor losses around the western margin of W8. In addition, the wet woodland W3, adjacent to the River Wensum, will largely be lost under the Proposed Development, albeit with the retention of trees within open space. W3 is a lower quality area of wet woodland, comprising a very open canopy over ruderal species, especially Common Nettle *Urtica dioica*, such that it is a very poor example of the Priority Habitat. The main interest of this woodland is associated with the mature trees, which are largely retained under the Proposed Development.

Indirect effects on the retained wet woodland within Carrow Abbey Marsh CWS are discussed above in relation to this designation.

Overall, in the absence of mitigation, effects on wet woodland at the operational phase are considered to be **slight, adverse**, and **long-term**, and could be **significant** at the local level (uncertain).

9.4.2.2.3 River Yare

The assessment set out within the ecology ES chapter regarding the River Yare is considered to remain appropriate, with potential impacts identified in relation to vegetation loss through bridge construction between the May Gurney and Deal Ground parts of the Site, in addition to indirect effects associated with contaminated run-off and littering. Effects on this habitat are considered to be **slight, adverse** and **long-term**, and could be **significant** at the local level (uncertain).

9.4.2.2.4 Nationally Scarce Plants

Marsh Fern was not previously recorded within the Site and therefore was not assessed under the original ES. The presence of this species was limited to a single specimen in the north of the Site, on previously developed land. Therefore, the Site does not support an important population of this species, and instead the species is likely to be a recent colonist of the Site. In the absence of mitigation, the single known specimen of this species within the Site would be lost. Nevertheless, given the likelihood of recent colonization, it is possible that the species would be able to recolonize newly created habitats such as

swales within the Site. Hoary Mullein has previously been recorded within the Site but is not currently known to occur. Therefore, in the absence of mitigation, effects on this species at the operational phase are considered to be **slight, adverse, and long-term**, and could be **significant** at the local level (probable).

9.4.2.2.5 Invasive Plant Species

Impacts relating to the spread of invasive species would largely occur at the construction phase of the development. Upon operation, it is unlikely that these species would be further spread within the Site or its surrounds, and instead measures may be taken to control these species (e.g. where Japanese Knotweed is found to occur near buildings). As such, impacts arising from invasive plant species at the operational phase are considered to be **negligible and non-significant** (probable).

9.4.2.3 Fauna

9.4.2.3.1 Bats – Roosting

The ES ecology chapter includes an assessment of operational phase effects on potential bat roosting features, including potential impacts arising from the loss of roosts and indirect effects from artificial light-spill on retained roosts. This assessment is considered to remain relevant, such that operational effects on roosting bats are considered to be **slight, adverse and long-term**, and **significant** at the local level (uncertain).

9.4.2.3.2 Bats – Foraging and Commuting

Potential operational phase effects on foraging and commuting bats are described in the ES ecology chapter, including loss of foraging habitat within the Site, in addition to indirect effects associated with light-spill onto retained and newly created habitats. This assessment is considered to remain appropriate, such that effects on foraging and commuting bats are considered to be **slight, adverse and long-term**, and **significant** at the local level (uncertain).

9.4.2.3.3 Water Vole

Water Vole is not known to be present within the Site. Nevertheless, a 10m vegetated corridor is retained along the River Yare, which will avoid any impacts on this species should it colonise. Therefore, and in accordance with the ecology ES chapter, effects on Water Vole are considered to be **negligible and non-significant** (probable).

9.4.2.3.4 Otter

Similarly, Otter is not known to be present within the Site and is assessed as a precautionary measure. The retention of a vegetated corridor of at least 10m will minimize any impacts on this species, should it occur, while permanent habitat loss in the vicinity of the River Yare is limited to previously developed land, open grassland and poor-quality woodland (W3), which are highly unlikely to be used by Otter. Therefore, and in accordance with the ecology ES chapter, effects on Otter are considered to be **negligible and non-significant** (probable).

9.4.2.3.5 Other mammals

The loss of areas of woodland, scrub and grassland could reduce habitat availability for Hedgehog and Polecat, while losses of fen habitat could reduce the available habitat for Harvest Mouse. However, the Proposed Development will include creation of areas of wildflower grassland, scrub and hedgerows, which could be colonized by Hedgehog, while the creation of swales could provide suitable habitat for Harvest

Mouse. The ecology ES chapter included fen management as embedded mitigation, which for the purposes of this Addendum is considered separately after the impact assessment. Accordingly, prior to mitigation, operational effects on other mammals are considered to **slight, adverse and long-term** and potentially **significant** at the local level (uncertain).

9.4.2.3.6 Reptiles

Grass Snake has been recorded within the Site, and are likely to use grassland and fen habitats. Although the majority of reptile habitat associated with the fen will be retained within the Site and CWS, approximately 0.153 ha of fen and 1.55 ha of grassland will require removal under the proposals. The Proposed Development will however include the creation of new habitats of suitability for reptiles, such as wetland meadow and scattered trees/shrubs within Kiln Park, and wetland swales within the Deal Ground land. Nevertheless, indirect effects could occur should reptiles persist or colonise habitats within the Site. For example, public disturbance or predation from pets could impact the local population. As such, operational effects on reptiles are considered to be **slight to moderate, adverse and long-term** and potentially **significant** at the local level (probable).

9.4.2.3.7 Birds

The ecology ES chapter acknowledges a number of potential effects on breeding birds, associated with loss of woodland, scrub and grassland habitats, noise disturbance, pet predation, and light-spill. This impact assessment is considered to remain appropriate, such that effects on birds are considered to be **slight to moderate, adverse and long-term**, and **significant** at the local level (probable).

9.4.2.3.8 Fish

In the absence of mitigation, the ES chapter describes that local fish populations within the Rivers Wensum and Yare could be affected by contaminated run-off during the operational phase. However, any such effects are likely to be short-lived given that any pollutants would be rapidly dispersed downstream. Accordingly, prior to mitigation, construction effects on fish are considered to be **negligible to slight, adverse and long-term**, and would be **non-significant** (probable).

9.4.2.3.9 Desmoulin's Whorl Snail

Impacts to the population of Desmoulin's Whorl Snail during the operational phase are discussed above in relation to Carrow Abbey Marsh CWS. In summary, potential effects are identified in relation to habitat loss, recreational disturbance, hydrological and drainage impacts, and water quality. Impacts on this habitat are considered to be **slight, adverse and long-term**, and could be **significant** at the county level (uncertain).

9.4.2.3.10 Other Invertebrates

The ecology ES chapter discusses the potential for effects on other invertebrates arising from habitat loss and lighting impacts. Although these are considered to remain largely relevant, the decreased area of tall ruderal vegetation within the Site, which was found to be an important feature for invertebrates but had since developed into closed-canopy woodland, somewhat lowers the impact. As such, effects on invertebrates are considered to be **slight, adverse and long-term**, and could be **significant** at the local level (probable).

9.4.3 Additional Cumulative Effects

9.4.3.1 Ecological Designations

9.4.3.1.1 International/European Statutory Designations

Since the ES was produced, there has been greater recognition regarding potential indirect effects on SACs and SPAs as a result of regional strategic growth, particularly with regard to recreational disturbance and water-borne nutrient impacts. Given the presence of European designations in the wider area, an assessment of effects on European designations arising both from the Proposed Development alone, and together with other plans and projects, is set out in the shadow Habitats Regulations Assessment (sHRA) at Appendix 9.2.

The sHRA screening exercise concludes that in the absence of mitigation, the potential for a likely significant effect arising from the Proposed Development identified in combination with other plans and projects arising from regional strategic growth plans cannot be ruled out in relation to recreational disturbance at a number of Norfolk SACs, SPAs, and Ramsar sites.

On this basis, cumulative operational effects on Norfolk SACs, SPAs, and Ramsar sites prior to mitigation arising from recreational impacts are considered to be **slight, adverse** and **long-term**, and could be **significant** at the international level (uncertain).

9.4.3.1.2 Other Statutory and Non-statutory Designations

The identified cumulative schemes could increase recreational pressure on local designations, particularly Whitlingham LNR and the associated Trowse Meadows CWS and Trowse Wood CWS. Of the identified cumulative schemes, Land off White Horse Lane (ref. 2019/2318, proposed for 83 dwellings) and Carrow Works (ref. 22/00540/EIA2, EIA scoping proposed for residential development) are in closest proximity to the aforementioned LNR and CWS'. The Land off White Horse Land scheme is closest to the south-eastern part of the LNR, Trowse Wood, which comprises closed-canopy woodland habitat that is more resilient to recreational pressure. With regard to the Carrow Works scheme, the scale of development and open space provision is not known at this stage, although it is noted that Policy 3 of the emerging Greater Norwich Local Plan requires all residential development to provide green infrastructure equating to a minimum of 2 hectares per 1,000 population to reflect Natural England's Accessible Natural Greenspace Standard. Where this provision cannot be met on-site, a relevant commuted sum will be sought based upon the total number of dwellings and respective housing mix. Although this requirement was put in place to protect SACs and SPAs, these measures are likely to simultaneously reduce impacts on other nearby designations. As such, it is considered that emerging policy provisions to mitigate recreational impacts arising from residential developments are sufficient to avoid significant adverse effects on Whitlingham LNR, Trowse Meadows CWS and Trowse Wood CWS.

Carrow Abbey Marsh CWS is not publicly accessible, while the cumulative schemes are well separated from the CWS by existing development (and/or the Proposed Development), such that no significant impacts on this CWS arising from cumulative schemes are anticipated.

On this basis, cumulative effects on other ecological designations are considered to be **negligible** and **non-significant** (probable).

9.4.3.2 Habitats and Ecological Features

The cumulative schemes will primarily impact urban habitats and agricultural land. None of the schemes have identified impacts on fen or wet woodland habitat, while the schemes are well separated from the important ecological habitats within the Site by existing development, and/or the Proposed Development. As such, cumulative effects on habitats are considered to be **negligible** and **non-significant** (probable).

9.4.3.3 Faunal Species

In terms of impacts on fauna arising from the cumulative schemes, none of the schemes are highly functionally linked to the Site via important habitat corridors, being separated by existing infrastructure such as roads, railway lines, and built development. As such, the schemes are unlikely to result in significant habitat fragmentation in combination the Proposed Development. Any adverse effects arising from the Proposed Development will be fully mitigated within the Site and/or within Carrow Abbey Marsh CWS, such that the scheme is not reliant on any off-Site habitats or habitat connectivity to mitigate the identified effects. As such, cumulative effects on fauna are considered to be **negligible** and **non-significant** (probable).

9.5 REQUIREMENT FOR ADDITIONAL MITIGATION

9.5.1 Alternate or Additional Mitigation

9.5.1.1 Statutory Designations

Additional mitigation is proposed in relation to potential impacts on international/European designations arising from the Proposed Development, alone or in combination with other plans and projects. These measures are set out in the report to inform a Habitat Regulations Assessment (Appendix 9.2). Mitigation is being designed to provide certainty that the proposals would avoid adverse effects by achieving nutrient neutrality in line with Natural England's guidelines. Mitigation will be provided via the purchase of off-site nutrient neutrality credits which are being brought forward by Norfolk Environmental Credits Ltd as a joint venture of Anglian Water, North Norfolk District Council, Breckland District Council, Norwich City Council and South Norfolk and Broadland District Councils. The applicant has registered for this scheme. The River Wensum SAC & Broads SAC Nutrient Budget Calculator (v1.1) has been used to calculate the credits required to be offset (51.88 kgTP/yr and 1515.75 kgTN/yr, including a 20% precautionary buffer) and these will be purchased prior to occupation of the scheme.

Mitigation is also proposed in relation to recreational impacts in combination with other plans and projects. This will comprise a financial contribution to the Norfolk Green Infrastructure and Recreational impact Avoidance and Mitigation Strategy (GIRAMS).

9.5.1.2 Non-statutory Designations, Habitats and Fauna

The ecology ES chapter set out a comprehensive scheme of mitigation measures to fully mitigate any identified adverse effects, while delivering net enhancements to biodiversity where possible. These mitigation measures have been incorporated into an Environmental Action Plan (EAP) and Nature Conservation Management Plan (NCMP) for the Proposed Development, in accordance with Condition 8 (Norwich City Council) and Condition 38 (South Norfolk Council) of the outline planning permissions. These documents are provided at Appendices 9.3 and 9.4, respectively. The proposed mitigation, compensation and enhancement measures set out in the ES ecology chapter have been brought forward into these

documents, and refined where appropriate (for example, by including Marsh Fern translocation which has been recorded within the Site since the ecology ES chapter was prepared).

In summary, the mitigation measures include the following (see Appendix 9.3 for further details):

- Protection of important habitats, including trees, woodland, fen and rivers/riverbanks during construction;
- Translocation of fen habitat to be lost to the Proposed Development into onsite receptor areas, comprising the proposed swales (so as to ensure no actual net loss or deterioration of fen habitat arises under the proposals);
- Translocation of Nationally Scarce Marsh Fern and Hoary Mullein into onsite receptor areas, if these species are found to remain present;
- Control and eradication of invasive plant species (Japanese Knotweed, Giant Hogweed and Himalayan Balsam) from within the Site and Carrow Abbey Marsh CWS;
- Safeguards prior to and during demolition of buildings and felling of trees with potential to support roosting bats, including pre-works update survey where appropriate;
- Vegetation clearance safeguards for breeding birds and Priority Species of mammal such as Hedgehog;
- Reptile translocation exercise and destructive search, to relocate reptiles (e.g. Grass Snake) into Carrow Abbey Marsh CWS, which will be enhanced to increase its carrying capacity;
- Sensitive lighting scheme to minimise impacts on retained and newly created habitats;
- Creation of new habitats within the Site, to include wetland swales, tree planting (focussed along the proposed woodland corridor along the western margin of the Deal Ground land), native thickets, native hedgerows, and multi-functional green space within Kiln Park including wetland meadow, trees and shrubs;
- Green roofs;
- Installation of bat boxes onto new buildings and retained trees along the River Yare;
- Enhancement of the historic kiln structure for roosting bats;
- Creation of an artificial Otter holt (using natural materials) along the River Yare;
- Provision of bird boxes for Priority Species of birds known to occur locally;
- Provision of 'bee bricks' on new buildings for invertebrates.

A separate Construction Method Statement and Construction and Environmental Management Plan will be prepared to address from water- or air-borne pollution, hydrological changes, and disturbance from noise, vibration and light during construction, as required under conditions in the outline planning permission. As set out in the ecology ES chapter, these documents will aim to maintain greenfield surface water run-off rates during construction, intercept any pollutants during construction, provide dampening and screening to reduce dust deposition, implement noise reduction techniques and lighting control measures, and provide protective fencing to avoid encroachment into important retained habitats.

The surface water drainage scheme for the Proposed Development has been designed to maintain surface water run-off rates into the CWS from the Site, such that the surface water run-off regime replicates that existing prior to development. The implementation of pollution control measures under the surface water drainage scheme will also act to intercept pollutants arising from the Proposed Development (see Chapter 12 of the ESA).

A key aspect of the mitigation and compensation package is the introduction of ecologically favourable management to Carrow Abbey Marsh CWS. This will aim to arrest and reverse the decline in the condition of the CWS which has been brought about by the lack of management, leading to gradual drying of the fen, loss of floristic diversity, and encroachment of woodland and scrub. The NCMP (Appendix 9.4) sets out the management proposals for the CWS, in addition to functionally linked habitat within the Site including the proposed swales and Kiln Park. Together, these areas form the ‘management area’ addressed in the NCMP. In summary, the management objectives include the following (see Appendix 9.4 for further details):

- Restoration of the fen through the introduction of sensitive ecological management in the form of low-density livestock grazing, to arrest and reverse the decline (deterioration) in its condition and secure the continued presence of the Priority Habitat ‘lowland fen’ in perpetuity;
- Maintain and enhance habitat diversity through the retention of wet woodland, scrub, tall ruderal vegetation, and fen habitats, in addition to the creation of new habitats such as wetland meadow within Kiln Park;
- Localised coppicing of woody vegetation where fen vegetation remains present below the canopy to restore fen habitat where this has recently been colonised by trees or shrubs;
- Provision of suitable access and infrastructure within and throughout the fen for livestock;
- Establishment of new habitats including swales to draw the fen out into the built development, in addition to a variety of habitats within Kiln Park for multi-functional use;
- Control and eradication of non-native invasive plant species;
- Control of access into the CWS by the public and pets through the creation of physical barriers, including native thicket planting, a stock-proof fence, and a wet ditch system;
- Monitoring of management operations and identification of any remedial measures or alterations required to achieve the above aims and objectives.

9.6 RESIDUAL EFFECTS

9.6.1 Construction Phase

Following the implementation of the above mitigation measures during the construction phase, all effects are considered to be negligible and non-significant (probable).

9.6.2 Operational Phase

Following the implementation of mitigation, compensation and enhancement measures during the operational phase, all adverse effects are considered to be fully mitigated, while the Proposed Development will deliver a number of ecologically beneficial effects, which are set out in Table 9.8 below.

Table 9.8 – Significant Residual Ecological Effects at the Operational Phase

Receptor	Sensitivity	Impact magnitude	Nature	Duration	Degree of Effect	Level of Certainty
Carrow Abbey Marsh CWS	County	Moderate	Beneficial	Long-term	Significant	Probable

Eutrophic floodplain fen	County	Moderate	Beneficial	Long-term	Significant	Probable
Invasive plant species	Site to local	Moderate	Beneficial	Long-term	Significant	Probable
Roosting bats	Local	Slight	Beneficial	Long-term	Significant	Probable
Otter	Local	Slight	Beneficial	Long-term	Significant	Uncertain
Birds	Local	Slight	Beneficial	Long-term	Significant	Probable
Reptiles	Local	Slight	Beneficial	Long-term	Significant	Probable

9.7 OTHER ENVIRONMENTAL ISSUES

This section seeks to detail any considerations and environmental effects that have been identified with regard to the range of topics which have been introduced into the EIA requirements through the EIA Regulations 2017. No such considerations or environmental effects relevant to ecology have been identified.

9.8 SUMMARY OF EFFECTS

This chapter assesses the likely significant effects resulting from the Proposed Development in terms of Ecology and Nature Conservation and describes the assessment methodology. It summarises the baseline conditions at the Site and its surroundings, the likely significant environmental effects, outline mitigation measures required to prevent, reduce or offset any significant adverse effects and the likely residual effects after these measures have been employed.

Important ecological receptors have been identified in relation to statutory and non-statutory designations, including a number of regional SACs and SPAs, in addition to designations in closer proximity including Whitlingham LNR, Trowse Meadows CWS, and Trowse Wood CWS. Furthermore, a small part of Carrow Abbey Marsh CWS lies within the Site and the entirety of the CWS falls within the landholding. Although the Site is dominated by habitats which are not considered to be of ecological importance, important habitats identified within the Site include small areas of eutrophic floodplain fen, wet woodland, and the River Yare, while two Nationally Scarce plant species have been recorded in addition to three invasive plant species. The Site supports a number of protected or notable faunal species, including the potential for roosting bats, foraging/commuting bats, potential presence of Priority Species of mammal, breeding birds, reptiles, Desmoulin's Whorl Snail, and other notable invertebrates.

A range of potential effects have been identified during the construction and operational phases on ecological designations, habitats and fauna within and surrounding the Site (see Table 9.9). Mitigation, compensation and enhancement measures are therefore proposed to avoid, minimise or compensate for significant adverse effects resulting from the Proposed Development, while delivering overall enhancements to ecological receptors where possible. These measures, and the resultant residual effects, are summarised in Table 9.9 below.

The Proposed Development and mitigation scheme have been designed to achieve compliance with relevant legislation and planning policy. Measures are proposed to avoid killing or injury of protected

species such as bats, birds and reptiles (protected under the Wildlife and Countryside Act 1981, the Conservation of Habitats and Species Regulations 2017 and the Protection of Badgers Act 1992) and opportunities for enhancements to biodiversity are also proposed, in accordance with NPPF, the NERC Act 2006 and local policy. Proposed enhancements will also deliver significant benefits in terms of fen restoration within Carrow Abbey Marsh CWS and faunal enhancement features.

Table 9.9 – Summary of Effects on Ecological Receptors

Potential effect	Nature of effect	Significance	Mitigation measures	Residual effects
Construction Phase				
<i>Ecological Designations</i>				
Carrow Abbey Marsh CWS	Slight, adverse and medium-term	Significant adverse at county level (uncertain)	Protection of habitats and pollution control measures, set out within Construction Method Statement, and Construction and Environmental Management Plan	Non-significant (probable)
Whitlingham LNR, Trowse Meadows CWS, Trowse Wood CWS	Slight, adverse and short-term	Significant at county level (uncertain)		Non-significant (probable)
Other ecological designations	Negligible	Non-significant (near certain)	No mitigation required	Non-significant (near certain)
<i>Habitats and Ecological Features</i>				
Eutrophic floodplain fen	Slight, adverse and medium-term	Significant at county level (uncertain)	Protection of habitats and pollution control measures, set out within Construction Method Statement, and Construction and Environmental Management Plan	Non-significant (probable)
Wet woodland	Slight, adverse and medium-term	Significant at local level (uncertain)		Non-significant (probable)
River Yare	Slight, adverse and short-term	Significant at local to county level (uncertain)		Non-significant (probable)
Invasive plant species	Moderate, adverse and long-term	Significant at local level (probable)	Control and eradication programme	Non-significant (probable)
<i>Faunal Species</i>				
Bats – roosting	Slight to moderate, adverse and medium-term	Significant at local level (uncertain)	Demolition / felling safeguards and disturbance control measures	Non-significant (probable)

Potential effect	Nature of effect	Significance	Mitigation measures	Residual effects
Bats – foraging and commuting	Slight, adverse and medium-term	Significant at local level (uncertain)	Habitat protection and disturbance control measures	Non-significant (probable)
Water Vole	Slight, adverse and medium-term	Significant at local level (uncertain)	Protection of habitats	Non-significant (probable)
Otter	Slight, adverse and medium-term	Significant at local level (uncertain)	Protection of habitats	Non-significant (probable)
Other mammals	Slight, adverse and medium-term	Significant at local level (uncertain)	Vegetation clearance safeguards	Non-significant (probable)
Reptiles	Moderate, adverse and medium-term	Significant at local level (probable)	Translocation exercise	Non-significant (probable)
Birds	Moderate, adverse and short-term	Significant at local level (probable)	Vegetation clearance safeguards, disturbance controls	Non-significant (probable)
Fish	Moderate, adverse and short-term	Significant at local level (uncertain)	Disturbance and pollution controls	Non-significant (probable)
Desmoulin’s Whorl Snail	Slight, adverse and medium-term	Significant at county level (uncertain)	Habitat protection and disturbance control measures	Non-significant (probable)
Other invertebrates	Slight, adverse and medium-term	Significant at county level (uncertain)	Habitat protection and disturbance control measures	Non-significant (probable)
Operational Phase				
<i>Ecological Designations</i>				
The Broads SAC and Broadland Ramsar site	Slight, adverse and long-term	Significant at international level (uncertain)	Nutrient neutrality strategy	Non-significant (probable)
Whitlingham LNR, Trowse Meadows CWS, Trowse Wood CWS	Negligible to slight, adverse and long-term	Non-significant (probable)	No mitigation required, albeit design of on-site green space will absorb recreational pressure	Non-significant (probable)
Carrow Abbey Marsh CWS	Slight, adverse and long-term	Significant at county level (uncertain)	Fen translocation, fen restoration and management (see NCMP)	Significant beneficial (probable)
<i>Habitats and Ecological Features</i>				

Potential effect	Nature of effect	Significance	Mitigation measures	Residual effects
Eutrophic floodplain fen	Slight, adverse and long-term	Significant at county level (uncertain)	Fen translocation, swale creation, fen restoration and management (see NCMP), access barriers, drainage scheme	Significant beneficial (probable)
Wet woodland	Slight, adverse and long-term	Significant at local level (uncertain)	Woodland management (see NCMP), access barriers, drainage scheme	Non-significant (probable)
River Yare	Slight, adverse and long-term	Significant at local level (uncertain)	Riverbank management (see NCMP)	Non-significant (probable)
Nationally Scarce plants	Slight, adverse and long-term	Significant at local level (probable)	Translocation exercise	Non-significant (probable)
Invasive plant species	Negligible	Non-significant (probable)	Control and eradication programme	Significant beneficial (probable)
<i>Faunal Species</i>				
Bats – roosting	Slight, adverse and long-term	Significant at local level (uncertain)	Sensitive lighting, bat boxes, Kiln enhancement	Significant beneficial (probable)
Bats – foraging and commuting	Slight, adverse and long-term	Significant at local level (uncertain)	Sensitive lighting, management of retained habitats, new habitat provision	Non-significant (probable)
Water Vole	Negligible	Non-significant (probable)	No mitigation required	Non-significant (probable)
Otter	Negligible	Non-significant (probable)	No mitigation required, but artificial holt proposed	Significant beneficial (uncertain)
Other mammals	Slight, adverse and long-term	Significant at local level (uncertain)	Fen management, habitat creation	Non-significant (probable)
Reptiles	Slight to moderate, adverse and long-term	Significant at local level (probable)	Fen management, creation of habitat piles, habitat creation	Significant beneficial (probable)
Birds	Slight to moderate, adverse and long-term	Significant at local level (probable)	Bird nesting opportunities, fen management	Significant beneficial (probable)

Potential effect	Nature of effect	Significance	Mitigation measures	Residual effects
Fish	Negligible to slight, adverse and long-term	Non-significant (probable)	SuDS scheme	Non-significant (probable)
Desmoulin's Whorl Snail	Slight, adverse and long-term	Significant at county level (uncertain)	Fen translocation, habitat creation including swales, fen restoration and management (see NCMP), drainage scheme	Non-significant (probable)
Other invertebrates	Slight, adverse and long-term	Significant at local level (uncertain)		Non-significant (probable)
Cumulative Effects				
Norfolk SACs, SPAs and Ramsar sites	Slight, adverse and long-term	Significant at international level (uncertain)	Contribution to regional GIRAMS, provision of open space	Non-significant (probable)

9.9 CONCLUSIONS

The implementation of the proposed mitigation, compensation and enhancement measures set out in Appendices 9.3 and 9.4, together with the Construction Method Statement, and Construction and Environmental Management Plan, and SuDS scheme, would result in significant beneficial residual effects on Carrow Abbey Marsh CWS and its associated irreplaceable fen habitat, primarily through the introduction of ecologically favorable management to arrest and reverse the decline (deterioration) in condition arising from fen drying, loss of floristic diversity and scrub/woodland encroachment observed since the ES baseline. In addition, the Proposed Development will result in significant beneficial effects on invasive plant species, which currently form extensive stands within the Site and Carrow Abbey Marsh CWS, threatening the native biodiversity, which would be subject to an eradication programme with ongoing monitoring under the Proposed Development. Significant beneficial effects are also identified for a number of faunal groups, including bats which will benefit from new roosting opportunities including bat boxes and the enhanced kiln structure. Otter could benefit from the provision of an Otter holt and rewetting of the fen ditches. Provisions to benefit breeding birds will include new nesting opportunities for urban species, in addition to fen restoration and management to benefit fenland species. Benefits to reptiles will be provided through fen restoration and management to increase structural diversity and basking sites. Overall, it is considered that the Proposed Development would result in a significant beneficial effect to biodiversity at the local to county level (probable).

Environmental Statement Addendum – Chapter 09: Ecology Appendix 9.1

Land at Deal Ground and May Gurney, Norwich

Baseline Ecological Appraisal

June 2023

Quality Management	
Client:	Serruys Property Company Ltd
Project:	Land at Deal Ground and May Gurney, Norwich
Report Title:	Baseline Ecological Appraisal
Project Number:	ECO-6592
File Reference:	6592 BaselineEcoAp vf /TS/AB
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Legal Guidance

The information set out within this report in no way constitutes a legal opinion on the relevant legislation (refer to the relevant Annex for the main provisions of the legislation). The opinion of a legal professional should be sought if further advice is required.

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Contents

Text:

Executive Summary	1
1 Introduction	2
2 Methodology	3
3 Ecological Designations.....	8
4 Habitats and Ecological Features.....	12
5 Faunal Use of the Survey Area.....	35
6 Conclusions	49

Plans:

Plan 6592/ECO1	Site Location
Plan 6592/ECO2	Ecological Designations
Plan 6592/ECO3	Habitats and Ecological Features
Plan 6592/ECO4	NVC Survey Plan
Plan 6592/ECO5	Trees with Bat Potential
Plan 6592/ECO6	Desmoulin's Whorl Snail Survey Results

Photographs:

Photographs 1-12

Annexes:

Annex 6592/1	Evaluation Methodology
Annex 6592/2	CWS Citation
Annex 6592/3	CWS Boundary (Norwich Local Plan)
Annex 6592/4	NVC Quadrat Data

Annex 6592/5

NVC MAVIS Output

Annex 6592/6

Legislation Summary

Executive Summary

- i) **Introduction.** Aspect Ecology was commissioned by Serruys Property Company Ltd in August 2022 to undertake an update baseline Ecological Appraisal in respect of land at Deal Ground and May Gurney, Norwich. The site is in receipt of outline planning permission for mixed development, including residential and commercial uses with landscaping and biodiversity enhancements. Ecological survey work to inform the outline permission was undertaken in 2008 and 2009. This report presents the findings of update ecology surveys undertaken to inform reserved matters.
- ii) **Survey.** Survey work was undertaken at the proposed development site, in addition to adjoining land to the east within the same landholding (together comprising the 'survey area'). Update surveys were undertaken in August, September and November 2022 based on standard extended Phase 1 methodology, while National Vegetation Classification (NVC) survey was undertaken of fen habitat within the survey area. In addition, a general update appraisal of faunal species was undertaken to record the potential presence of any protected, rare or notable species, with specific update surveys conducted in respect of bats, Badger, and Desmoulin's Whorl Snail. Additional update Phase 2 faunal surveys are being undertaken in 2023.
- iii) **Statutory Ecological Designations.** The nearest statutory designation to the survey area is Whitlingham Local Nature Reserve (LNR), located on the east side of the River Yare where it abuts the survey area. The closest international designation to the survey area comprises The Broads Special Area of Conservation and Broadland Ramsar and Special Protection Area (SPA), which lie approximately 5.4 km to the east.
- iv) **Non-statutory Ecological Designations.** Part of the survey area is designated as a non-statutory County Wildlife Site (CWS), named Carrow Abbey Marsh. The CWS is designated for its mosaic of tall fen and tall herb vegetation with young woodland and willow carr, and for the presence of Desmoulin's Whorl Snail.
- v) **Habitats.** The survey area itself comprises a number of different habitats, primarily comprising former industrial land in the north and south, and an area of fenland in the centre and east. Woody vegetation including wet and dry woodland, scrub, scattered trees, and Bramble thickets, is present in various locations across the survey area. In addition, relatively small areas of species-poor neutral grassland and tall ruderal vegetation are present in parts of the survey area. The River Wensum lies immediately adjacent to the north of the survey area, while the River Yare adjoins parts of the boundaries and intersects the survey area. Priority Habitats recorded within or adjacent to the survey area include lowland fen irreplaceable habitat, wet woodland, and the River Yare.
- vi) **Protected Species.** The survey area has potential to support roosting bats within trees and built structures. The breeding bird and invertebrate interest of the survey area is focused on the fen and associated wetland habitats. Bird species recorded within the survey area include the Schedule 1 species Cetti's Warbler and the RSPB red-listed species Grasshopper Warbler and Cuckoo. Invertebrate species include Desmoulin's Whorl Snail and 17 Priority Species, one Nationally Rare RDB3 species (a moth associated with reedbeds), and 14 Nationally Notable species. Grass Snake has been recorded within the grassland and fen within the survey area. The River Yare along the eastern boundary has potential to support Water Vole and Otter, although these species have not been recorded within the survey area.

1 Introduction

1.1 Background and Proposals

- 1.1.1 Aspect Ecology was commissioned by Serruys Property Company Ltd in August 2022 to undertake an update baseline Ecological Appraisal in respect of land at Deal Ground and May Gurney, Norwich, centred at grid reference TG 247 074 (see red line boundary on Plan 6592/ECO1). The proposed development site lies within a larger landholding which notably includes an area of fen to the east (see blue line boundary on Plan 6592/ECO1). This wider boundary represents the area of ecology survey work, and is hereafter referred to as the 'survey area'.
- 1.1.2 The survey area is split into two main parcels, comprising the larger 'Deal Ground' land to the north and west of the River Yare, and the 'May Gurney' land which lies to the south and east of the River Yare (see Plan 6592/ECO1).
- 1.1.3 The site is in receipt of outline planning permission (ref. 12/00875/O [Norwich City Council] and 2011/0152/O [South Norfolk Council]) for mixed development, including up to 670 residential dwellings, commercial uses, and landscaping and biodiversity enhancements.

1.2 Site Overview

- 1.2.1 The survey area is located in Trowse, south-east Norwich, within an urban-edge context. The survey area is bound by the River Wensum to the north, beyond which lies industrial and former industrial land within a railway depot. The River Yare intersects the survey area (separating the Deal Ground and May Gurney land) and runs adjacent to the east of the Deal Ground land, beyond which lies parkland (including Whitlingham Country Park) and low density residential development within the boundary of the Norfolk Broads Authority. An asphalt plant and railway line lies to the west of the survey area, with more dense development beyond this.
- 1.2.2 The survey area itself comprises a number of different habitats, primarily comprising former industrial land in the north and south, and an area of fenland in the east. Woody vegetation including wet and dry woodland, scrub, scattered trees, and Bramble thickets, is present in various locations across the survey area. In addition, relatively small areas of species-poor neutral grassland and tall ruderal vegetation are present in parts of the survey area.

1.3 Purpose of the Report

- 1.3.1 This report presents the findings of update ecology surveys undertaken to inform a reserved matters application. The report documents the methods and findings of the baseline ecology surveys and desktop study carried out in order to establish the existing ecological interest of the survey area. The importance of the habitats and species present is evaluated. A separate ES chapter presents an appraisal of the likely ecological effects of the proposals, along with mitigation, compensation and enhancement measures.

2 Methodology

2.1 Desktop Study

- 2.1.1 In order to compile background information on the site and its immediate surroundings, Norfolk Biodiversity Information Service (NBIS) was contacted in August 2022, with data requested on the basis of a search radius of 2km (see Plan 6592/ECO2). In addition, previous ecology reports for the survey area were reviewed, comprising ecological assessments undertaken in 2001¹, 2003², and 2008³.
- 2.1.2 Information on statutory designations was obtained from the online Multi-Agency Geographic Information for the Countryside (MAGIC) database, which utilises data provided by Natural England, with an extended search radius (25km). The MAGIC database was also searched to identify the known presence of any Priority Habitats within or adjacent the survey area.
- 2.1.3 In addition, the Woodland Trust database was searched for any records of ancient, veteran or notable trees within or adjacent to the survey area.

2.2 Habitat Survey

- 2.2.1 Previous surveys were undertaken by Aspect Ecology at the survey area in March 2008 and April to September 2009, to inform the outline planning application. Update survey work was undertaken at the Deal Ground land in August and September 2022, and of the May Gurney land in November 2022, in order to ascertain the general ecological value of the land contained within the boundaries of the survey area and to identify the main habitats and ecological features present.
- 2.2.2 The survey area was surveyed based on standard Phase 1 Habitat Survey methodology⁴, whereby the habitat types present are identified and mapped (see Plan 6592/ECO3), together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas identified can then be examined in more detail through Phase 2 surveys. This method was extended, in line with the Guidelines for Preliminary Ecological Appraisal⁵ to record details on the actual or potential presence of any notable or protected species or habitats.
- 2.2.3 Using the above method, the survey area was classified into areas of similar botanical community types, with a representative species list compiled for each habitat identified. The nomenclature used for plant species is based on the Botanical Society for the British Isles (BSBI) Checklist.

¹ Norfolk Wildlife Services (2001) *Background ecological assessment of Deal Land and implications for future development guidelines.*

² The Environment Practice (2003) *Deal Ground, Norwich: Ecological Survey & Assessment*

³ Mott MacDonald (2008) *NCC Deal and Utilities: Ecological Review.*

⁴ Joint Nature Conservation Committee (2010, as amended) *'Handbook for Phase 1 habitat survey: A technique for environmental audit.'*

⁵ Chartered Institute for Ecology and Environmental Management (CIEEM) (2013) *'Guidelines for Preliminary Ecological Appraisal.'*

2.3 Plant Community Survey

- 2.3.1 To further evaluate the ecological value of the fen habitat within the Deal Ground land, and to evaluate changes since the previous survey work in 2009, update plant community survey work was carried out in August and September 2022. The survey was carried out in accordance with the National Vegetation Classification (NVC) methodology, as set out in the NVC Users' Handbook⁶.
- 2.3.2 Four categories of homogenous fen vegetation were identified within the Deal Ground land. Each of these was sampled using between five and ten quadrats, giving a total of 27 quadrats (see Plan 6592/ECO4). The quadrats were placed in areas of homogenous, representative vegetation.
- 2.3.3 Each quadrat measured 4x4 m, which is the appropriate size for tall herbaceous vegetation (according to the NVC Users' Handbook). Within each quadrat, the percentage cover of all plant species was recorded, with Domin scores of 1-3 used where cover was less than 4%. The height of the sward was recorded along with a 10-figure grid reference using a GPS smartphone app. The NVC survey was undertaken by an ecologist with over ten years of botanical survey experience, including NVC surveys of various habitats throughout the UK.
- 2.3.4 The quadrat data was analysed and interpreted using a combination of experience and the published keys and community descriptions⁷. The data was also analysed using the Modular Analysis of Vegetation Information System software (MAVIS version 1.04). MAVIS results were interpreted with caution and used only as an aid to identification⁸.

2.4 Faunal Surveys

- 2.4.1 Previously, survey work has been undertaken at the survey area in 2009 and 2010 for bats, Badger *Meles meles*, Water Vole *Arvicola amphibius*, Otter *Lutra lutra*, breeding birds, Great Crested Newt *Triturus cristatus*, reptiles, and invertebrates.
- 2.4.2 During the update survey work in 2022, a habitat assessment was undertaken for the above groups to evaluate any change in habitat conditions since the previous surveys. General faunal activity, such as mammals or birds observed visually or by call during the course of the update surveys was recorded. Specific update surveys were undertaken for bats, Badger, and Desmoulin's Whorl Snail *Vertigo moulinsiana*, as described below.
- 2.4.3 Further to this, update Phase 2 survey work for bats (activity survey comprising walked transects and static detectors), Badger, Water Vole, Otter, reptiles, and breeding birds, is being undertaken in 2023. The results of these surveys will be reviewed separately when available.

⁶ Rodwell JS (2006) *National Vegetation Classification: Users' Handbook*. Joint Nature Conservation Committee, Peterborough

⁷ Rodwell JS (ed.) (1995) *British Plant Communities Volume 4: Aquatic communities, swamps and tall-herb fens*. Cambridge University Press.

⁸ The limitations of NVC analysis software are described in the NVC Users' Handbook (Rodwell 2006), for example, "they are no substitute for the experience of the ecologist and should never be used alone to provide identifications. Like written keys, they are simply a guide to negotiating a way around a complex classificatory landscape and to understanding variation that, in reality, is extremely complex." (p.48)

Bats⁹

Visual Inspection Surveys

- 2.4.4 **Buildings.** Buildings and other structures within the survey area were subject to specific internal and external inspection surveys using ladders, torches and binoculars where necessary, during the update Phase 1 habitat surveys in 2022.
- 2.4.5 During the external inspections, particular attention was given to any potential roost features or access points, such as broken or lifted roof tiles, lifted lead flashing, soffit boxes, weatherboarding, hanging tiles, etc. and for any external signs of use by bats such as accumulations of bat droppings or staining. Binoculars were used to inspect any inaccessible areas more closely where appropriate.
- 2.4.6 During the internal inspections, evidence for the presence of bats was searched for with particular attention paid to any loft voids and relevant potential roost features and locations, such as ridge boards, rafters, purlins, gable walls, and mortise joints. Specific searches were made for bat droppings that can indicate present or past use and extent of use, whilst other signs that can indicate the possible presence of bats were also searched for, e.g. presence of stained areas, feeding remains, corpses, etc.
- 2.4.7 **Trees.** During the update Phase 1 surveys in 2022, trees were assessed for their suitability to support roosting bats based on the presence of features such as holes, cracks, splits or loose bark. Suitability for roosting bats was rated based on relevant guidance¹⁰ as:
- Negligible;
 - Low;
 - Moderate; or
 - High.
- 2.4.8 Any potential roost features identified were also inspected for any signs indicating possible use by bats, e.g. staining, scratch marks, bat droppings, etc.

Badger (*Meles meles*)¹¹

- 2.4.9 A detailed Badger survey was carried out during the update Phase 1 habitat surveys in 2022. The survey comprised two main elements. The first element involved searching for evidence of Badger setts. The second element involved searching for signs of Badger activity such as well-worn paths and push-throughs, snagged hair, footprints, latrines and foraging signs, so as to build up a picture of any use of the survey area by Badger.

Desmoulin's Whorl Snail

- 2.4.10 Wetland habitats within the Deal Ground land were surveyed by specialists in this species from Abrehart Ecology in October 2022, to provide information on the population and distribution of the species, including its finer scale distribution.

⁹ Surveys based on: English Nature (2004) '*Bat Mitigation Guidelines*' and Collins, J. (ed.) (2016) '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn).' Bat Conservation Trust

¹⁰ Collins, J. (ed.) (2016) '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn).' Bat Conservation Trust

¹¹ Based on: Mammal Society (1989) '*Occasional Publication No. 9 – Surveying Badgers*'

2.4.11 Survey methodology broadly followed the 'level 1' survey techniques detailed in Killeen & Moorkens (2003)¹². Consequently, searches for Desmoulin's Whorl Snail were carried out by the well-established technique of beating herbaceous fen vegetation onto a gridded white plastic tray. Specifically, the survey comprised the following methods:

- Tray beating, undertaken in damp weather conditions. A gridded white beating tray measuring approximately 38cm x 54cm was used at selected locations. This allowed approximate Desmoulin's Whorl Snail numbers per unit area to be estimated (5 trays being approximately equivalent to 1m²). At each sample location the beating tray was placed at the base of a fresh, undisturbed area of vegetation. These samples were located within 5m of a single sampling point. All molluscs were recorded in the field with Desmoulin's Whorl Snail numbers counted in the field to record numbers of adult and juvenile. Survey stations were selected at approximate 5m distance from the previous point in a transect until the habitat had become obviously unsuitable. In areas of low or lying flat vegetation where beating was difficult, the vegetation was shaken over a sieve to try and release Desmoulin's Whorl Snail from the vegetation.
- Degree of ground moisture (using a version of the '5 Point Wetness scale') was recorded at all survey locations:
 1. Ground dry: Possibly with cracks, and no evidence of surface moisture;
 2. Ground damp: Moisture observed on the surface but water does not rise under light pressure;
 3. Ground wet: No surface veneer, but water rises under light (foot) pressure;
 4. Ground wet: Surface veneer of water less than 1-2cm deep;
 5. Ground very wet: Water depth greater than 2cm which may cover the sward and tussocks.
- Vegetation composition (via recording the abundance of plant species on a DAFOR scale).

2.5 Survey Constraints and Limitations

2.5.1 All of the species that occur in each habitat would not necessarily be detectable during survey work carried out at any given time of the year, since different species are apparent during different seasons. The Phase 1 habitat survey of the ecologically important habitats within the survey area was undertaken within the optimal season, therefore allowing a robust assessment of habitats and botanical interest across the survey area, and is further supported by previous ecology survey work.

2.5.2 Attention was paid to the presence of any invasive species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). However, the detectability of such species varies due to a number of factors, e.g. time of year, site management, etc., and hence the absence of invasive species in any part of the survey area should not be assumed.

2.5.3 Densely vegetated habitats within the survey area have the potential to reduce the detectability of field signs for faunal species such as Badger. Whilst dense scrub vegetation

¹² Killeen IJ & Moorkens EA (2003). *Monitoring Desmoulin's Whorl Snail, Vertigo moulinsiana*. Conserving Natura 2000 Rivers Monitoring Series No. 6, English Nature, Peterborough.

is present within the survey area, it is considered that the survey results do provide an accurate baseline to assess the potential for impacts on Badger under the development proposals, particularly given that the results are supported by previous survey information.

- 2.5.4 The Desmoulin's Whorl Snail survey was carried out at an appropriate time of year. Sampling was limited to the southern, mid-reaches, and western areas of the fen due to the north-eastern areas being difficult to access, specifically a flooded ditch prevented crossing for extensive sampling in this section. However, the distribution of this species was strongly concentrated in the wetter south-centre part of the fen, such that this constraint is unlikely to significantly underestimate the population and distribution of this species within the survey area.

2.6 Ecological Evaluation Methodology

- 2.6.1 The evaluation of ecological features and resources is based on professional judgement whilst also drawing on the latest available industry guidance and research. The approach taken in this report is based on that described by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018)¹³, which involves identifying 'important ecological features' within a defined geographical context (i.e. international, national, regional, county, district, local or site importance). For full details refer to Annex 6592/1.

¹³ CIEEM (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine', ver. 1.2, Chartered Institute of Ecology and Environmental Management, Winchester

3 Ecological Designations

3.1 Statutory Designations

Description

- 3.1.1 The statutory designations of ecological importance that occur within the local area are shown on Plan 6592/ECO2. The nearest statutory designation to the survey area is Whitlingham Local Nature Reserve (LNR), located on the east side of parts of the River Yare where it abuts the survey area. The LNR is managed as a Country Park within the Broads Authority, supporting a variety of habitats including woodland, meadow, lakes and associated wetland habitat.
- 3.1.2 One biological SSSI lies within 5km of the survey area, comprising Sweetbriar Road Meadows, located approximately 4.1km north-west of the survey area. The SSSI is designated for its unimproved wet meadows with tall fen, which is subject to traditional grazing management. A number of geological SSSIs also lie within 5km of the survey area, the closest being around 1.7km north of the survey area.
- 3.1.3 The closest international designations to the survey area comprise The Broads Special Area of Conservation and Broadland Ramsar and Special Protection Area (SPA), which lie approximately 5.4 km east of the survey area. The SAC is designated for its wetland habitats and populations of Desmoulin's Whorl Snail, Ramshorn Snail *Anisus vorticulus*, and Fen Orchid *Liparis loeselii*, while Otter is present as a qualifying feature. Broadland SPA, which follows the same boundary as the SAC at this point, is designated for its populations of breeding and wintering wetland birds. The component SSSI of the SPA/SAC at the closest point to the survey area is Yare Broads and Marshes. The site lies within the nutrient neutrality catchment for Norfolk Broads Special Area of Conservation (SAC).
- 3.1.4 The River Wensum SAC lies approximately 5.4 km upstream (north-west) of the survey area. The SAC is designated for its vegetated watercourse habitat and its population of White-clawed Crayfish *Austropotamobius pallipes*. Other species present as qualifying features, but not primary reasons for selection, comprise Desmoulin's Whorl Snail, Brook Lamprey *Lampetra planeri*, and Bullhead *Cottus gobio*.
- 3.1.5 Further afield, European and international designations include Norfolk Valley Fens SAC, located 11.3km south-west of the survey area at its closest point, and Breydon Water SPA and Ramsar, located 18.7km east of the survey area.

3.2 Non-statutory Designations

Description

- 3.2.1 The non-statutory designations of nature conservation interest that occur within the local area are shown on Plan 6592/ECO2. A non-statutory County Wildlife Site, 'Carrow Abbey Marsh', occupies much of the Deal Ground land (see citation at Annex 6592/2). The boundary of the CWS provided by NBIS shows this to include dry woodland and other habitats e.g. in the north, however these areas are excluded from the boundary of the CWS shown on the Norwich City Council Local Plan¹⁴ (see Annex 6592/3).
- 3.2.2 Carrow Abbey Marsh CWS is designated for its mosaic of tall fen and tall herb vegetation with young woodland and willow carr, and for the presence of Desmoulin's Whorl Snail

¹⁴ <https://ncc.maps.arcgis.com/apps/webappviewer/index.html?id=7ff6d4cdf8ca4d70b50e935fec378e11>

which according to the citation occurs in some of the fen ditches. Update survey information in relation to the features is included in Section 4.

3.2.3 The next nearest CWS comprises Trowse Meadows CWS, which forms part of Whitlingham LNR (described above), designated for its mix of habitats including semi-improved grassland, marshy grassland, woodland, and swamp. Trowse Wood CWS lies adjacent to the east of this (c. 0.1 km east of the survey area), comprising a broadleaved woodland within the same LNR. A number of other CWS' are located in the wider area, including County Hall Woods which lies 0.4 km to the west of the survey area, comprising a belt of woodland, and Carey's Meadow CWS, located approximately 0.5 km to the north-east of the survey area, which is a former brownfield site that has been colonised with semi-natural vegetation including neutral grassland, inundated grassland, grassland with a calcareous influence, and scrub.

Assessment of Carrow Abbey Marsh Against CWS Criteria

3.2.4 According to Aspect Ecology's survey work in 2022, habitats within the NBIS CWS boundary largely comprise eutrophic floodplain fen, with substantial areas of wet and dry woodland, in addition to smaller areas of scrub and tall ruderal vegetation. Current CWS habitat selection criteria are set out within a 2016 document published by NBIS¹⁵. An assessment of the site's qualification under the CWS criteria, based on the 2022 survey information provided in Section 4, is set out in Table 3.1 below.

Table 3.1. Assessment of habitats within the CWS boundary under the 2016 CWS criteria. Further descriptions of each habitat are presented in Section 4.

Habitat	Selection criteria	Criterion met?	Habitat justifies inclusion within CWS?
Fen	1. Single species swamp dominated by typical swamp species	Mostly yes, save for F13 and F14 in the south	Mostly yes: criterion 4 met with criterion 1, 2 and/or 5. Parts in the south (F13 and F14) do not presently qualify but have potential for restoration
	2. Tall fen with typical species, not dominated indicators of drying	Mostly yes, save for F13 and F14 in the south	
	3. Significant population or combination of rare, scarce or priority plant species	No	
	4. Size at least 0.5 ha	Yes	
	5. Presence of rare, scarce, or priority fauna	Yes, Desmoulin's Whorl Snail, albeit patchily distributed, plus other invertebrate and bird species (see Section 5)	
Tall ruderal vegetation	Not included as a CWS habitat	N/A	No
Dry woodland (W4, W7, W11)	1. Ancient semi-natural woodland	No	No
	2. Herb layer of native plants typical of semi-natural woodland	No	
	3. Presence of rare, scarce, or priority plant species	No	
	4. At least 2 ha in extent	No	
	5. Predominantly woody species native to Norfolk	No (non-natives are prevalent, especially Sycamore in W4 & W7)	

¹⁵ 'Criteria for the selection of County Wildlife Sites in Norfolk (2016 Version)

	6. Diverse physical and age structure	No	
	7. Presence of rare, scarce or priority faunal species	Potentially Priority Species of invertebrates and birds	
Wet woodland (W6, W8, W9, W10, W11)	1. Ancient semi-natural woodland	No	Not currently (fails criterion 1 and 4), but potentially restorable to fen
	2. Herb layer of native plants typical of semi-natural woodland	Yes	
	3. Presence of rare, scarce, or priority plant species	No	
	4. At least 2 ha in extent	No	
	5. Predominantly woody species native to Norfolk	Yes	
	6. Diverse physical and age structure	No	
	7. Presence of rare, scarce or priority faunal species	Potentially Priority Species of invertebrates and birds	
Scrub (S2-S6 plus Bramble scrub)	1. Part of, or adjacent to, another CWS habitat	Yes – adjacent to fen	Yes, only scrub S3 to S6
	2. More than 2 ha	No	
	3. At least three species of native shrub	Yes, except for S2 which is dominated by non-native species and Bramble scrub	
	4. Presence of rare or scarce fauna	Potentially Priority Species of invertebrates and birds	
Grassland (NG4)	1-4. Appropriately species-rich acid, neutral, basic, or wet grassland	No	No
	5. Significant rare, scarce, or priority plant species	No	
	6. Moderately species-rich, adjacent to another CWS habitat or extensive	No	
	7. >0.5 ha for species-rich, or >5 ha for moderately species-rich	No	
	8. Presence of rare, scarce, or priority fauna	Potentially Priority Species of invertebrates	
Riverine habitat	1. Appropriately species-rich marginal and riverine flora	No	No – fails essential criterion 1
Habitat mosaics	1. Individual habitats do not meet size criteria	No – fen habitat does meet size criteria individually	No

3.2.5 The above table indicates that the majority of the fen habitat and associated scrub within the CWS boundary is considered to warrant CWS status, while the wet woodland has potential to be restored to CWS-quality habitat. However, the tall ruderal vegetation along the eastern margin of the CWS, the dry woodland (W4, W7 and W11) particularly in the north of the CWS (according to the NBIS boundary), and the dry grassland (NG4), do not justify inclusion within the CWS.

3.2.6 On the basis of this review, the CWS boundary shown in the Norwich City Council Local Plan (see Annex 6592/3), represents the most relevant for assessment purposes. This boundary was also used for the assessment in the outline planning permission.

3.3 **Priority Habitats, Ancient Woodland (and other irreplaceable habitat) and Notable Trees**

Description

- 3.3.1 Three Priority Habitat types are mapped by the MAGIC database within the survey area. These comprise (i) lowland fen (added to the National Policy Planning Framework as an irreplaceable habitat in 2018), which occupies much of the area designated as Carrow Abbey Marsh CWS, (ii) deciduous woodland, woodland W4 and tree cover along the River Yare in the east of the Deal Ground land, and (iii) open mosaic habitat, which occupies areas covered by grassland and scrub in the west of the Deal Ground land. These are described further in the relevant habitat sections below.
- 3.3.2 No ancient woodland is present within or in close proximity to the survey area. There are no records of any notable or veteran trees within or adjacent to the survey area.

4 Habitats and Ecological Features

4.1 Background Records

4.1.1 Information received from NBIS included two records of Pointed Stonewort *Nitella mucronata* adjacent to the survey area, most recently recorded in 2009. Although the grid references refer to the River Wensum adjacent to the north of the survey area, the location details state 'River Yare'. This is an aquatic species which is Nationally Scarce.

4.1.2 In addition, previous surveys of the survey area in 2000 and 2003 recorded Bee Orchid *Ophrys apifera* and Hoary Mullein *Verbascum pulverulentum* in the northern area of grassland (NG1). Hoary Mullein was also recorded in tall ruderal vegetation in 2009. Bee Orchid is somewhat local in its distribution but has no formal conservation designation, while Hoary Mullein is Nationally Scarce. These species were not rerecorded in 2022, although Hoary Mullein could have been overlooked in the tall ruderal vegetation, where the similar species Great Mullein *Verbascum thapsus* occurred frequently.

4.2 Overview

4.2.1 The habitats and ecological features present within the survey area are described below and evaluated in terms of whether they constitute an important ecological feature and their level of importance, taking into account the status of habitat types and the presence of rare plant communities or individual plant species of elevated interest. The likely effects of the proposals on the habitats and ecological features are then assessed. The value of habitats for the fauna they may support is considered separately in Chapter 5 below.

4.2.2 The following habitats/ecological features were identified within or adjacent to the survey area:

- Eutrophic floodplain fen;
- Species-poor neutral grassland;
- Tall ruderal vegetation;
- Dry woodland;
- Wet woodland;
- Scrub and Bramble;
- Tree lines;
- Scattered trees and shrubs;
- Rivers and banks;
- Ephemeral pond;
- Colonising vegetation on previously developed land;
- Amenity planting;
- Hardstanding;
- Buildings and structures;
- Invasive species.

- 4.2.3 In addition, a number of invasive plant species and species of conservation importance were recorded within the survey area. The locations of these habitat types and features are illustrated on Plan 6592/ECO3 and described further below.

4.3 Priority Habitats

- 4.3.1 Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 places duties on public bodies to have regard to the conservation of biodiversity in the exercise of their normal functions. In particular, Section 41 of the NERC Act requires the Secretary of State to publish a list of habitats which are of principal importance for conservation in England. This list is largely derived from the 'Priority Habitats' listed under the former UK Biodiversity Action Plan (BAP), which continue to be regarded as priority habitats under the subsequent country-level biodiversity strategies.

- 4.3.2 Of the habitats within the survey area, the eutrophic floodplain fen, wet woodland, and River Yare are considered to qualify as Priority Habitats and therefore constitute important ecological features. This is discussed further in the relevant habitat sections below.

- 4.3.3 At the local level, the Norfolk Biodiversity Partnership has produced Habitat Action Plans for Priority Habitats represented in the county, including fens and wet woodland. These are referred to in the relevant sections below.

4.4 Eutrophic Floodplain Fen

Description

- 4.4.1 An area of fen intersected with a drainage ditch system, which forms the majority of Carrow Abbey Marsh CWS, is located in the centre and east of the Deal Ground land, while two very small areas were recorded at the margins of the May Gurney land.
- 4.4.2 The fen habitat is somewhat variable in its vegetation types, the majority being dominated by Greater Pond Sedge *Carex riparia* (see Photograph 1), while Reed Sweet-grass *Glyceria maxima*, Reed Canary-grass *Phalaris arundinacea* and Common Reed *Phragmites australis* are locally dominant. At the southern end, the fen becomes drier and transitions into tall ruderal vegetation (see Photograph 2). The vegetation is consistently tall and dense, with no evidence of recent management or access, albeit small deer (Muntjac *Muntiacus reevesi* or Chinese Water Deer *Hydropotes inermis*) were noted which cause some very small-scale and localised disturbance. The fen has been broadly categorised into 17 compartments, which are described in turn below, albeit the transitions between these compartments is typically gradual and indistinct.
- 4.4.3 **F1** is dominated by dense Greater Pond-sedge with frequent Hemp-agrimony *Eupatorium cannabinum*. Other species noted in this area include Tufted Vetch *Vicia cracca*, Wild Angelica *Angelica sylvestris*, Creeping Thistle *Cirsium arvense*, Common Nettle *Urtica dioica*, Marsh Woundwort *Stachys palustris*, Amphibious Bistort *Persicaria amphibia*, Orange Balsam *Impatiens capensis*, Meadowsweet *Filipendula ulmaria*, Great Willowherb *Epilobium hirsutum*, Common Skullcap *Scutellaria galericulata*, Water Mint *Mentha aquatica*, and Hop *Humulus lupulus*.
- 4.4.4 **F2** is dominated by Reed Canary-grass, but otherwise supports similar species to F1, with a somewhat higher localised prevalence of Creeping Thistle.

- 4.4.5 **F3** is again dominated by Greater Pond-sedge and supports a number of additional species including Green Figwort *Scrophularia nodosa* (in the north), Purple Loosestrife *Lythrum salicaria*, and Common Meadow-rue *Thalictrum flavum*.
- 4.4.6 **F4** supports dominant Greater Pond-sedge but with a greater tall ruderal component, particularly Common Nettle which is locally abundant, in addition to Hemp-agrimony, Creeping Thistle, Hedge Bindweed *Calystegia sepium*, Orange Balsam, Meadowsweet, Common Meadow-rue, and Water Forget-me-not *Myosotis scorpioides*.
- 4.4.7 **F5** is dominated by Reed Sweet-grass in a notably wetter community which includes Amphibious Bistort, Marsh Woundwort, Meadowsweet, and Gypsywort *Lycopus europaeus*. Common Nettle and Reed Canary-grass are locally abundant in the east.
- 4.4.8 **F6** is an extensive, very tall and dense area dominated by Greater Pond-sedge, with Amphibious Bistort, Great Willowherb, Marsh Woundwort, Common Nettle, Hemp-agrimony, Creeping Thistle, and Common Meadow-rue. Reed Canary-grass and Reed Sweet-grass are locally frequent. The dominance of Greater Pond-sedge is somewhat reduced to the east, where the sward is slightly more open with greater species diversity.
- 4.4.9 **F7** is dominated by dense Common Reed with locally frequent Reed Canary-grass and Greater Pond-sedge. Other species in this area include Orange Balsam, Hop, Water Mint, Common Nettle, Amphibious Bistort, Marsh Woundwort, Hemp-agrimony, Common Skullcap, Gypsywort, and Meadowsweet.
- 4.4.10 **F8** comprises a small area dominated by Greater Pond-sedge, with Common Valerian *Valeriana officinalis*, Hemp-agrimony, Purple Loosestrife, and Marsh Woundwort.
- 4.4.11 **F9** is another small area, dominated by Reed Sweet-grass with abundant Greater Pond-sedge, in addition to other species as recorded in F8.
- 4.4.12 **F10** is a small area in the west of the fen which supports dominant Wood Small-reed *Calamagrostis epigejos* with Creeping Cinquefoil *Potentilla reptans*, Water Mint, Common Nettle, Bramble *Rubus fruticosus* agg., Creeping Thistle, Hemp-agrimony, and Jointed Rush *Juncus articulatus*.
- 4.4.13 **F11** is a small area of dominant Reed Sweet-grass which supports a relatively diverse range of herbaceous species, including frequent Water Mint, in addition to Amphibious Bistort, Hemp-agrimony, Creeping Thistle, Marsh Horsetail *Equisetum palustre*, and Jointed Rush.
- 4.4.14 **F12** comprises a relatively large area in the south of the fen, dominated by Greater Pond-sedge which reaches a comparatively lower sward height of approximately 1 m, in a more diverse sward with locally abundant Marsh Woundwort, Hemp-agrimony, and Reed Canary-grass. Other species include Amphibious Bistort, Common Meadow-rue, Creeping Thistle, Wild Angelica, Hedge Bindweed, Hop, Jointed Rush, Soft Rush *Juncus effusus*, and Hairy Sedge *Carex hirta*.
- 4.4.15 **F13** comprises a small area of fen - tall ruderal transition vegetation dominated by Creeping Thistle with abundant Greater Pond-sedge and Hemp-agrimony. Other species recorded here include Marsh Woundwort, Common Nettle, Wild Angelica, and Marsh Horsetail.
- 4.4.16 **F14** is dominated by Wild Angelica to approximately 1 m height, in addition to Creeping Thistle, Common Nettle, Green Figwort, Water Mint, Common Couch *Elymus repens*, and False Oat-grass *Arrhenatherum elatius*.

- 4.4.17 **F15** comprises a small riparian area in the south-west of the fen, on very damp ground which is likely to be inundated by the adjacent River Yare for parts of the year. Common Reed is dominant with locally abundant Common Nettle in a species-poor sward, in addition to Himalayan Balsam *Impatiens glandulifera*, Orange Balsam, and Hedge Bindweed.
- 4.4.18 **F16** comprises a small area adjoining the northern boundary of the May Gurney land, along the River Yare. This area is dominated by Reed Sweet-grass.
- 4.4.19 **F17** lies offsite to the south-east of the May Gurney land, comprising a back channel supporting a dense stand of Greater Pond-sedge.
- 4.4.20 The **ditches** are similarly dominated by Greater Pond-sedge but support a number of species which are otherwise restricted in the fen, including Water Dock *Rumex hydrolapathum*, Bulrush *Typha latifolia*, Purple Loosestrife, Bittersweet *Solanum dulcamara*, and Gypsywort.

NVC Survey Results

- 4.4.21 The eutrophic floodplain fen habitat within the survey area is considered to represent a mosaic of four swamp and fen NVC communities, which are described in turn below. The NVC manual specifically highlights that these communities frequently occur as patchy mosaics¹⁶. This was reflected during the 2022 survey, where the communities occurred as mosaics with intermediate and transition stages frequently encountered. Nevertheless, an attempt has been made to partition the fen into NVC community types. Quadrat data, including percentages of each species recorded, grid references, sward height, and Ellenberg wetness values, are provided in Annex 6592/4. MAVIS output for the quadrats is presented at Annex 6592/5.
- 4.4.22 **S5 *Glyceria maxima* swamp**: this community is characterised by dense and tall cover of Reed Sweet-grass, and was somewhat scarcely represented, being confined to F5, F9 and F11. Coverage of Reed Sweet-grass in the five quadrats recorded in this community was at least 85%. Meadowsweet was the next most frequent species, recorded in three of the five quadrats at low abundance (10% or less). Few other species were recorded in these quadrats (range of species richness 5 to 7). This community was associated with the wettest parts of the fen, with Ellenberg wetness values of 9.6 to 9.9. MAVIS analysis of the quadrat data strongly supported their identification as S5, with a score of 64.79% for this community.
- 4.4.23 **S6 *Carex riparia* swamp**: This community is characterised by an overwhelming dominance of Greater Pond-sedge. This was the most widespread community recorded in the fen, and included areas F1, F3, F4, F6, F8 and F12. The dominance of Greater Pond-sedge was somewhat variable in the 10 quadrats recorded in this community, ranging from 60% in F12 and the eastern part of F6, to 90% in F3 and the western part of F6. Other frequently recorded species in these quadrats, albeit at a lower abundance, included Amphibious Bistort, Marsh Woundwort (both recorded in 8 of 10 quadrats), Hemp-agrimony, and Meadowsweet (both in 7 of 10 quadrats). Species richness was generally low but somewhat variable, ranging from 4 species (in the west of F6) to 9 species (in the east of F6) per quadrat. This community was associated with drier parts of the fen, with Ellenberg values of 7.4 to 8.4. Analysis of quadrat data using MAVIS strongly supported the classification as S6, with a score of 53.97%.

¹⁶ Rodwell, JS (ed.) (1995) British Plant Communities Volume 4: Aquatic communities, swamps and tall-herb fens. Cambridge University Press.

- 4.4.24 **S26 *Phragmites australis-Urtica dioica* tall-herb fen:** Typically, Common Reed and Common Nettle are characteristically prominent in this community, along with other tall herb species in a patchier sward. Within the survey area, this community was represented by F7 and F15. Specifically, the *Epilobium hirsutum* sub-community S26d is considered to be most closely represented within the survey area, because this sub-community has dominant patches of Reed Sweet-grass and Greater Pond-sedge, with herb species including Great Willowherb and Bittersweet. Parts of the fen also show some affinity to the *Filipendula ulmaria* 26a sub-community, given the prevalence of Meadowsweet, albeit at low abundance, and local frequency of Hemp-agrimony.
- 4.4.25 In the six quadrats recorded in this community, Common Reed varied from 60% coverage in F15, to 95% coverage in F7. Amphibious Bistort was the next most frequent species, recorded in four of the six quadrats, while Common Nettle was recorded in two of the six quadrats, one of which was at 40% coverage (in F15). The quadrats were notably species-poor, with a range of three to five species recorded per quadrat. This community was associated with wetter parts of the fen, with Ellenberg values ranging from 8.4 to 9.8. MAVIS analysis of the quadrat data returned a highest score for S26 (51.99%), closely followed by S4 (51.84%). The latter is the *Phragmites australis* swamp and reed-beds community, characterised by overwhelming dominance of Common Reed. In places (e.g. parts of F7 where Common Reed is heavily dominant), the vegetation is indeed tending towards the S4 community.
- 4.4.26 **S28 *Phalaris arundinacea* tall-herb fen:** this community is typically dominated by Reed Canary-grass, and was relatively scarcely represented within the survey area, primarily by area F2. This area shows some affinity to the *Epilobium hirsutum-Urtica dioica* S28b sub-community, given the occurrence of Great Willowherb and Common Nettle.
- 4.4.27 Reed Canary-grass was strongly dominant in all five quadrats representative of this community, with at least 70% quadrat coverage. Two other species were recorded in all five quadrats, namely Greater Pond-sedge (5-20% abundance) and Amphibious Bistort (5-10% abundance). Marsh Woundwort was recorded at low abundance in four of the five quadrats. Species richness in these quadrats was somewhat variable, ranging from 4 to 8 species per quadrat. This community was associated with a similar level of wetness to the S6 community, with Ellenberg values between 8.0 and 8.2. Analysis of the quadrat data using MAVIS produced highest scores for S6 (50.08%), closely followed by S28 and S28b (48.35%, 45.45%), indicating the complex intermediate nature of the communities.
- 4.4.28 **Other communities.** At the margins of the fen, particularly in F13 and F14, the fen transitions into tall ruderal vegetation and does not readily classify as any NVC community. This is supported by the MAVIS analysis of quadrat Q17 (in fen area F13), where all matches were less than 35%, with a mix of open vegetation and swamp communities returned. This indicates the transition of these areas from swamp vegetation to tall ruderal communities as the fen dries. In addition, area F10 was distinct in character compared with the remainder of the fen, comprising a drier area with dominant Wood Small-reed. This area does not readily classify as any NVC community.

Summary of Habitat Changes Since 2009

- 4.4.29 In general the dominance of Reed Sweet-grass appears to have declined since the previous survey work, replaced by an increased dominance of Greater Pond-sedge. This could reflect a gradual drying of the fen, given that the latter species and its principal plant communities are associated with somewhat lower water levels. This is unsurprising given the lack of management and the consequent build-up of vegetation detritus at ground level. In addition, the area of fen habitat has slightly declined as a result of woodland and scrub

encroachment, particularly at the margins of the fen, again a consequence of the lack of management.

- 4.4.30 In terms of NVC communities, although the four communities identified above were recognised as part of the mosaic of communities during the previous survey, much of the fen was previously attributed to the S24b *Phragmites australis* – *Peucedanum palustre* tall-herb fen community, which is a somewhat richer community. However, the previous survey report does note that the fen habitats “represent a rather intermediate phase between these two community types [S24b and S26d] and choosing between the two may be rather arbitrary.” The NVC key to fen communities specifically highlights the difficulty in separating S24 and S26 along the Yare Valley, but notes that the frequency of Common Meadow-rue and Marsh Pea *Lathyrus palustris* is usually diagnostic. In this case, Marsh Pea was not recorded at all, while Common Meadow-rue was only recorded in four of 27 quadrats across the fen, all with an abundance of 5% or less. By contrast, Common Meadow-rue was previously noted to be locally common in the fen during the 2009 surveys. Furthermore, in 2022 the S24 community was not returned in the top 10 matches for any of the communities, nor all quadrats combined, according to MAVIS. As such, the latest survey results demonstrate that the fen habitat is not currently a good match for S24, which indicates a degradation in floristic diversity in the absence of management.

Evaluation

- 4.4.31 The habitat conforms to the Priority Habitat ‘lowland fens’. In the national context, the NVC communities represented are widely distributed across the lowlands, and are well represented in the Norfolk Broads, particularly in eutrophic conditions with seasonal waterlogging. The principal fen communities present at the survey area are typical of the Norfolk Broads and are well represented in the local area. Fen habitat has declined substantially on a national level, with Norfolk now a major stronghold for the habitat type, supporting approximately 5,000 ha¹⁷.
- 4.4.32 The fen habitat appears to be well-established feature and likely formed productive grazing marsh historically, when it would have been subject to regular management. Nevertheless, with the cessation of management in recent decades, it appears likely that the habitat has degraded, possibly exacerbated by the input of industrial effluent from past industrial activities at the survey area, in the form of the Coleman’s Factory previously located to the northwest and also the build-up of organic matter. Nevertheless, the fen habitat represents a semi-natural habitat community that reflects the eutrophic substrate, typical of the Yare Valley. Also in keeping with other Yare valley fens, the fen is relatively dry in nature and has established over a relatively low water table level, but appears to be slowly drying out, as discussed above. In addition, its hydrological connection to the River Yare is somewhat interrupted by the banks of the Yare, which are raised above the fen according to Lidar data and also evidenced by the drier tall ruderal vegetation with mature trees.
- 4.4.33 As with most fen habitats, and especially those which are drier in nature, there is a constant threat of eventual succession into scrub and woodland in the absence of management. This threat is specifically stated in the UK and Norfolk Habitat Action Plans for lowland fen^{18,19}. The threat of drying in the absence of management is clearly indicated by the trends towards drier plant communities and the noticeably higher cover of Willow scrub and woodland, particularly at the margins, compared with 2009. Nevertheless, this encroachment is occurring slowly, and much of the central parts of the fen remain

¹⁷ <https://www.norfolkbiodiversity.org/assets/Uploads/Fens-HAP3.pdf>

¹⁸ <https://webarchive.nationalarchives.gov.uk/ukgwa/20110303150139/http://www.ukbap.org.uk/UKPlans.aspx?ID=18>

¹⁹ <https://www.norfolkbiodiversity.org/assets/Uploads/Fens-HAP3.pdf>

unaffected even by scattered scrub. It is however possible that this process could accelerate as the colonising scrub and woodland begins to take up more water and deposit more organic matter.

- 4.4.34 Overall, on the basis of the habitat's qualification as a CWS, supporting a Priority Habitat albeit in deteriorating condition, this habitat is considered to be an important ecological feature, of value at the county level.

4.5 Species-poor Neutral Grassland

Description

- 4.5.1 Areas of neutral grassland were recorded on higher and drier ground towards the west of the Deal Ground land (see Photograph 3), and in the eastern part of the May Gurney land. These were compartmentalised into four areas, NG1-5 (see Plan 6592/ECO3), which are described in turn below.
- 4.5.2 **NG1** largely comprises a very short sward with patches of bare ground, apparently caused by heavy Rabbit grazing. However, some taller sward patches are present, in addition to scattered Bramble with colonising scrub species including Buddleia *Buddleia davidii*, Sycamore *Acer pseudoplatanus*, Hawthorn *Crataegus monogyna*, and Silver Birch *Betula pendula*. The sward itself is dominated by Red Fescue *Festuca rubra*, in addition to Yorkshire-fog *Holcus lanatus*, Creeping Cinquefoil, Common Ragwort *Jacobaea vulgaris*, Wild Parsnip *Pastinaca sativa*, Creeping Thistle, Selfheal *Prunella vulgaris*, Yarrow *Achillea millefolium*, Common Centaury *Centaureum erythraea*, Jointed Rush, Common Prickly Sedge *Carex muricata* ssp. *lamprocarpa*, and Hairy Sedge. Bryophytes are locally abundant in the sward with occasional lichens.
- 4.5.3 **NG2** lies adjacent to the south of NG1, but grazing pressure is relaxed here such that the sward is, for the most part, much taller with a higher prevalence of encroaching Bramble and scrub with tall ruderal species such as Green Alkanet *Pentaglottis sempervirens*, Creeping Thistle, and Great Mullein. The grassland sward is dominated by False Oat-grass and Yorkshire-fog, with other species including Creeping Bent *Agrostis stolonifera*, Glaucous Sedge *Carex flacca*, and Ground-ivy *Glechoma hederacea*.
- 4.5.4 **NG3** is located in the south-western corner of the Deal Ground land, comprising a tall and dense grass-dominant sward, with False Oat-grass and Creeping Bent particularly prevalent, in addition to frequent Cock's-foot *Dactylis glomerata*. Other species recorded here included Ribwort Plantain *Plantago lanceolata*, Creeping Cinquefoil, Perforate St John's-wort *Hypericum perforatum*, and Black Medick *Medicago lupulina*. Some encroaching Hawthorn, Bramble, and Ivy *Hedera helix* was also noted.
- 4.5.5 **NG4** lies adjacent to the north of NG3, occupying a larger area with a more variable sward structure apparently resulting from moderate levels of Rabbit grazing. Red Fescue is dominant in this area, while local damp patches support Jointed Rush. The species composition is otherwise similar to NG3, in addition to Yarrow, Creeping Thistle, Common Ragwort, Glaucous Sedge, and Wood Small-reed.
- 4.5.6 **NG5** is located in the east of the May Gurney land. The sward is variable in nature, ranging from apparently recently established and relatively open short sward grassland to rank grassland largely comprising coarse grasses and robust herb species. This variation, together with the continued presence of numerous ruderal species reflecting earlier successional stages, combines to give a relatively long list of recorded species. However, in any one location the diversity of the sward was recorded to be low to moderate, with approximately

nine species per square metre. The grass species recorded include Cock's-foot *Dactylis glomerata*, Yorkshire Fog, False Oat-grass, Barren Brome *Anisantha sterilis*, Perennial Ryegrass *Lolium perenne*, Red Fescue, Creeping Bent, Tall Fescue *Festuca arundinacea*, Soft Brome *Bromus hordeaceus* and Wood Small-reed. Herb species include Wild Carrot *Daucus carota*, Red Bartsia *Odontites vernus*, Common Ragwort, Red Clover *Trifolium pratense*, Ribbed Melilot, a Tare *Vicia* sp., Crane's-bill, Ribwort Plantain, Creeping Buttercup *Ranunculus repens*, Creeping Cinquefoil, Common Mallow *Malva sylvestris*, Teasel, Mugwort, Canadian Fleabane, Colt's-foot *Tussilago farfara*, Spear Thistle, Creeping Thistle, Black Knapweed *Centaurea nigra*, Yarrow (including cultivars), Hawkbit *Leontodon* sp., Hawkweed Oxtongue *Picris hieracioides*, Smooth Hawk's-beard *Crepis capillaris*, Germander Speedwell *Veronica chamaedrys* and Hemp-agrimony. Scrub, in the form of Bramble and young Buddleia, is scattered throughout most of this grassland area.

Summary of Habitat Changes Since 2009

- 4.5.7 The grassland in the Deal Ground land was noted to be similar in structure and species composition to the description in 2009, albeit its extent has reduced as a result of Bramble and scrub encroachment.
- 4.5.8 In the May Gurney land, the extent of grassland has increased since the 2009 survey work, expanding southwards into former developed land. The sward structure and composition remains similar to the previous description.

Evaluation

- 4.5.9 The habitat is not considered to represent Priority Habitat on account of its relatively low species diversity and scarcity of unimproved indicator species. Two notable plant species, namely Bee Orchid and Hoary Mullein, have previously been recorded from the grassland in 2000 and 2003, but were not rerecorded in 2009, nor during the current 2022 survey, probably because of heavy Rabbit grazing and/or scrub encroachment.
- 4.5.10 The grassland occupies areas mapped as the Priority Habitat 'Open Mosaic Habitat' on the MAGIC database. However, the grassland is not considered to currently qualify as this Priority Habitat, because it does not support any significant areas of unvegetated, loose bare substrate, which is required under the fourth criterion of the Priority Habitat definition.
- 4.5.11 Therefore, this habitat is not considered an important ecological feature.

4.6 Tall Ruderal Vegetation

Description

- 4.6.1 Tall ruderal vegetation was recorded at various locations across the survey area, particularly along the road which runs through the survey area and along the banks of the River Yare and River Wensum.
- 4.6.2 The tall ruderal vegetation recorded along the road within the survey area was noted to be dense and tall, typically dominated by Weld *Reseda luteola* with locally abundant Creeping Thistle and Creeping Bent. A number of other tall ruderal species were recorded, including Canadian Fleabane *Erigeron canadensis*, Broadleaved Dock *Rumex obtusifolius*, Perforate St John's-wort, Great Mullein, Common Nettle, and Green Alkanet. In addition, Bramble and Buddleia were noted to be encroaching in places.
- 4.6.3 A substantial area of tall ruderal vegetation was also recorded along the bank of the River Yare on the eastern margin of the survey area (see Photograph 4). Here, the vegetation was

dominated by Common Nettle, which was very dense in places but sparser under tree cover, with locally abundant Creeping Thistle in addition to Hemp-agrimony, Common Ragwort, Hedge Bindweed, Giant Hogweed *Heracleum mantegazzianum*, Bramble, and False Oat-grass.

- 4.6.4 A band of tall ruderal vegetation was also noted along part of the River Wensum banks in the north of the survey area, where Mugwort *Artemisia vulgaris* was dominant in addition to Great Mullein, Creeping Thistle, and Perforate St John's-wort.
- 4.6.5 A small area dominated by Common Nettle with colonising Sycamore was recorded on the west side of grassland NG1.

Summary of Habitat Changes Since 2009

- 4.6.6 The areas occupied by tall ruderal vegetation have substantially changed since the previous survey work, as a result of woodland regrowth in areas previously recorded as tall ruderal vegetation (e.g. W4), and colonisation of this habitat in other parts of the survey area. However, the species composition of the habitat remains similar to the previous descriptions.

Evaluation

- 4.6.7 This habitat does not represent any Priority Habitat type. The habitat has recently developed and supports a low to moderate range of common plant species. As such, the habitat is not considered to represent an important ecological feature.

4.7 Dry Woodland

Description

- 4.7.1 Five areas of dry woodland were recorded within the survey area, in addition to one recently felled woodland. These were typically young in nature and dominated by non-native tree species (see Photograph 5). The woodland areas are described in Table 4.1 below.

Table 4.1. Descriptions of dry woodland (for locations, see Plan 6592/ECO3).

Woodland	Structure	Woody species	Ground flora
W1	Semi-mature to mature, dense canopy structure over a sparse to moderate understorey and a moderate ground flora.	White Poplar <i>Populus alba</i> dominant with Pedunculate Oak <i>Quercus robur</i> , Ash <i>Fraxinus excelsior</i> , Sycamore, Goat Willow <i>Salix caprea</i> , Elder <i>Sambucus nigra</i> . Much Sycamore regeneration.	Dominated by ruderal species, especially Common Nettle, with Bramble, Spear Thistle <i>Cirsium vulgare</i> , Green Alkanet, Ground-ivy <i>Glechoma hederacea</i> .
W2	Recently felled woodland on made ground, now comprising 'previously developed land' (PDL8)		
W4	Young, dense canopy with little ground flora. Canopy largely continuous. Some dense impenetrable thickets of Buddleia and Common Nettle. Ride and glade present in south-west. Ground appears	Sycamore dominant, locally abundant Silver Birch, scattered mature Hybrid Black Poplar <i>Populus x canadensis</i> . Also Buddleia, White Willow <i>Salix alba</i> ,	Largely bare ground but frequent Common Nettle, sometimes forming dense stands. Also Ground-ivy, Herb-Robert <i>Geranium robertianum</i> , Sand Sedge <i>Carex arenaria</i> . Rides and

	to be previously developed with rubble piles.	Goat Willow, Hawthorn, Dog-rose <i>Rosa canina</i> agg..	glades are dominated by Creeping Bent. Localised stands of Japanese Knotweed <i>Reynoutria japonica</i> .
W5	Young, dense canopy with little ground flora	Sycamore dominant, plus Goat Willow, Crack Willow <i>Salix fragilis</i> , Elder, Wild Privet <i>Ligustrum vulgare</i> , Hawthorn, Buddleia.	Largely bare ground, occasional Bramble thickets, locally abundant Common Nettle, plus Green Alkanet, Ivy, Wood Avens <i>Geum urbanum</i> , Herb-Robert, Garlic Mustard <i>Alliaria petiolata</i> .
W7	Young, dense canopy on steep bank with much rubble and broken concrete. Ground flora largely bare.	Sycamore dominant with Goat Willow (locally dominant in east), Beech <i>Fagus sylvatica</i> , Buddleia, Hawthorn, Dog-rose.	Large bare ground, localised stands of Japanese Knotweed and Bramble.
W11	Mature but somewhat open canopy with moderate understorey and dense ground flora	Mix of Horse Chestnut <i>Aesculus hippocastanum</i> , White Willow, Silver Birch, Sycamore, Ash, Elder.	Dominated by Garlic Mustard and Common Nettle.

4.7.2 Subsequent update tree survey work in June 2023 has recorded that much of woodland W4 and a small part of woodland W1 have since been felled (see Plan 6592/ECO3).

Summary of Habitat Changes Since 2009

4.7.3 The 2022 survey work found that the extent of woodland had substantially increased since the previous survey, with many areas previously recorded as scattered trees and shrubs having since developed into woodland. One small area of woodland on previously developed land, W2, had since been felled. The structure and species composition of the remaining woodland W1 is similar to previously described. However, the update tree survey work in June 2023 identified that much of woodland W4 and a small part of woodland W1 have since been felled.

Evaluation

4.7.4 The dry woodland is not considered to represent UK Priority Habitat, because it is dominated by non-native species and does not represent a recognisable semi-natural NVC community type. The dry woodlands are comprised of a limited diversity of tree species, typically dominated by non-native species such as Sycamore. Much of the woodland appears to have colonised previously developed land. The woodlands are young in age and lack a complex structure, while woodland ground flora species are poorly represented and primarily limited to typical early colonists of secondary woodland. The habitat is therefore not considered to represent a feature of ecological importance.

4.8 Wet Woodland

Description

- 4.8.1 Six areas of wet woodland were recorded within the survey area. These were all young in nature and dominated by Willow species, much of which has recently colonised historically open fen, which is reflected in the ground flora (see Photograph 6). The areas of wet woodland are described in Table 4.2 below.

Table 4.2. Descriptions of wet woodland (for locations, see Plan 6592/ECO3).

Woodland	Structure	Woody species	Ground flora
W3	Mature, very open canopy over a moderate ground flora. Almost devoid of any understorey layer.	White Willow dominant with Sycamore, Lombardy Poplar <i>Populus nigra 'italica'</i> , Weeping Willow <i>Salix babylonica</i> .	Dominated by ruderal species, especially Common Nettle, with Ground-ivy, Spear Thistle, Canadian Fleabane, Bramble.
W6	Dense, mature, continuous canopy over dense ground flora.	White Willow dominant with Sycamore.	Greater Pond-sedge dominant, plus Bramble.
W8	Mature canopy, somewhat open in places, over sparse understorey and dense ground flora.	White Willow dominant with Alder <i>Alnus glutinosa</i> , Hawthorn, Raspberry <i>Rubus idaeus</i> , Blackcurrant.	Greater Pond-sedge dominant with other fen species.
W9	Very dense, semi-mature to mature canopy over dense ground flora.	White Willow dominant with Sycamore, Hawthorn, Blackcurrant <i>Ribes nigrum</i> .	Greater Pond-sedge dominant with Reed Sweet-grass, Hemp-agrimony, Common Nettle, Bittersweet.
W10	Mature and dense canopy with shrubby expanding margins, dense ground flora.	White Willow dominant with Grey Willow <i>Salix cinerea</i> . Osier <i>Salix viminalis</i> dominant at the margins.	Greater Pond-sedge dominant with Hemp-agrimony.
W12	Moderately dense canopy with moderately dense understorey and margins, over dense and relatively diverse ground flora.	White Willow dominant with Sycamore, Silver Birch	Including Greater Pond-sedge, Hemp-agrimony, Jointed Rush, Water Mint

Summary of Habitat Changes Since 2009

- 4.8.2 The extent of wet woodland has substantially increased since the previous survey, particularly around the margins of the fen.

Evaluation

- 4.8.3 The habitat represents the UK Priority Habitat 'wet woodland'. The Norfolk BAP for wet woodland²⁰ notes that this habitat type is particularly well represented in East Anglia, and

²⁰ <https://www.norfolkbiobiodiversity.org/assets/Uploads/Wet-woodlands-HAP2.pdf>

its area is increasing in fenland because of the cessation of active management and degradation of open fen.

- 4.8.4 The wet woodlands were all dominated by White Willow, with a poor diversity of other species. The woodlands are young in age and lack a complex structure. The ground flora is dominated either by ruderal species (in the case of W1) or by fen vegetation, particularly Greater Pond-sedge. As such, although representing Priority Habitat, the woodland is a poor example of the habitat type. Nevertheless, its interest (except W1) is somewhat elevated by its association with adjacent fen habitat, while it has potential for restoration to fen habitat. The habitat is considered to represent a feature of ecological importance, and is of importance at the local level.

4.9 Scrub and Bramble

Description

- 4.9.1 Areas of continuous scrub within the survey area can be broadly characterised into (i) Buddleia scrub with scattered young Sycamore and Bramble on drier ground adjacent to grassland, and (ii) Willow scrub within (or at the margins of) the fen. The latter areas include various Willow species, including Goat Willow, White Willow, Grey Willow, and Osier. The ground flora in these areas comprises bare ground where the canopy cover is dense, or otherwise fen vegetation dominated by Greater Pond-sedge. Further information on the areas of scrub within the survey area is set out at Table 4.3 below.

Table 4.3. Descriptions of scrub (for locations, see Plan 6592/ECO3).

Scrub	Woody species	Ground flora
S1	Buddleia dominant with abundant young Sycamore, plus Bramble, Snowberry <i>Symphoricarpos albus</i> , Goat Willow, Silver Birch	Negligible cover
S2		
S3	Very dense, impenetrable Goat Willow to 5 m high	Fen vegetation dominated by Greater Pond-sedge
S4	Very dense White Willow to 5 m high	
S5	Dense Grey Willow to 6 m high	Largely bare, occasional Greater Pond-sedge and Common Nettle
S6	Very dense, impenetrable Goat Willow to 5 m high	Some remnants of Common Reed, otherwise bare ground
S7	Bramble and Buddleia scrub	Negligible

- 4.9.2 In addition, dense Bramble thickets were recorded in the south-west of the Deal Ground land and in the May Gurney land, where they are encroaching into the adjacent grasslands (see Plan 6592/ECO3). Few other species were noted in these Bramble thickets, limited to scattered young to semi-mature trees, predominantly comprising Sycamore with Ash, Goat Willow, White Willow, and False Acacia *Robinia pseudoacacia*.

Summary of Habitat Changes Since 2009

- 4.9.3 This habitat has expanded in area since the previous survey, particularly around the margins of the fen.

Evaluation

- 4.9.4 Scrub does not represent Priority Habitat. The scrub habitat is species-poor, comprising species which are common in the local area. In places, the scrub habitat acts to form an ecotone of value to birds and invertebrates and may also have a buffering effect on the fen, while scrub habitat in the wetter parts of the fen has potential value in terms of restoration to fen. Nevertheless, at present the habitat is not considered to represent an important ecological feature.

4.10 Tree Lines

Description

- 4.10.1 The 2022 survey work recorded a line of riverside trees along the western, northern and eastern boundaries of the May Gurney land, dominated by young to semi-mature Sycamore. Also recorded were rare to occasional Holly *Ilex aquifolium*, Alder *Alnus glutinosa*, Silver Birch *Betula pendula*, Ash *Fraxinus excelsior*, White Willow and a Poplar, probably Grey Poplar *Populus x canescens*. Ivy *Hedera helix* was frequent within the treeline and dense growth was present on three, relatively mature, trees on the riverbank adjacent to building B7. Also recorded were Common Nettle *Urtica dioica*, Cleavers, Nipplewort *Lapsana communis* and very occasional Angelica *Angelica sylvestris*. The tree line was widened somewhat at the northeastern corner of the May Gurney land, but covered too small an area to be considered as woodland.
- 4.10.2 Subsequent update tree survey work in June 2023 recorded that the tree line at the margin of the May Gurney site has since been felled.

Summary of Habitat Changes Since 2009

- 4.10.3 The tree line adjacent to the River Yare was recorded to remain in a similar condition to 2009, although update tree survey work in June 2023 identified that this has since been felled.

Evaluation

- 4.10.4 The tree line was dominated by non-native Sycamore and was therefore not considered to qualify as the Priority Habitat 'hedgerows'. A moderate mix of species was present, including some native species, but these were only occasional to rare and no very mature specimens were present. The ground flora was dominated by ruderal vegetation with little botanical interest. As such, this habitat was not (and is not) considered to represent an important ecological feature.

4.11 Scattered Trees and Shrubs

Description

- 4.11.1 A number of scattered trees and shrubs are present throughout the Deal Ground land, particularly at the boundaries. These include mature Weeping Willows and Lombardy Poplars at the northern boundary of the survey area on the bank of the River Wensum. Along the eastern boundary, on the bank of the River Yare, scattered trees include semi-mature to mature specimens of White Willow, Sycamore, and Ash, in addition to scattered shrubs including Elder. Occasional trees and shrubs are present in drier parts of the fen, particularly towards the south, including Pedunculate Oak, Ash, Hawthorn, and

Blackcurrant. Scattered young trees and shrubs were also recorded along the western boundary of the survey area, primarily comprising Sycamore, Silver Birch, and Buddleia.

- 4.11.2 A line of 15 young to semi-mature Beech *Fagus sylvatica* was recorded to the east and south of building B10 in the May Gurney land. It is understood from tree survey work undertaken in June 2023 that these have since been felled.

Summary of Habitat Changes Since 2009

- 4.11.3 Much of the habitat previously recorded as trees and scrub has since developed into woodland, as described above. Otherwise, the scattered trees remain in similar condition to the previous description in 2009.

Evaluation

- 4.11.4 The scattered trees within the survey area include a high proportion of non-native species including some mature specimens, particularly along the River Yare. The trees and scrub are also slowly encroaching into the fen habitat, which threatens its future viability. As such, although the more mature trees are of some ecological interest, overall the scattered trees and shrubs are not considered to represent an important ecological feature.

4.12 Rivers and Banks

Description

- 4.12.1 **River Wensum** flows along the northern boundary of the survey area in an easterly direction (see Photograph 7). The River itself is approximately 10m in width with a slow steady flow of water which accommodates frequent boating traffic. The site-side riverbanks in this area are formed by concrete canalised sections with metal sheet piling present, offering few if any opportunities for a naturalised bankside flora to develop. Thus the bankside vegetation is largely limited to tall ruderal vegetation or sparse vegetation on previously developed land, with occasional Lombardy Poplar and Weeping Willow present which overhang the river.
- 4.12.2 **River Yare** flows along the western and northern boundaries of the May Gurney land, briefly passing within the survey area, before flowing northwards along the eastern boundary of the Deal Ground land (see Photograph 8). The river itself is more natural in character than the River Wensum, measuring approximately 6-10m in width, and supports some aquatic vegetation likely due to the much reduced boating traffic. The banks support a mixture of tall ruderal vegetation with scattered trees, especially in the south and the central portion of the stretch along the Deal Ground land, while dense woodland in the form of W4 (albeit much of this has since been felled) and W11 abut the river in the southern and northern sections of the Deal Ground land. The bankside vegetation is thus generally characteristic of drier soils than the main part of the fen, such that there is no distinct community of emergent vegetation along the river aside from occasional Reed Sweet-grass, Greater Pond Sedge, and Purple Loosestrife. However, two small pockets of riverine swamp were recorded along the river, on the north and south banks (F15 and F16).
- 4.12.3 The opposite bank of the River Yare from the Deal Ground land forms part of The Broads, in the form of Whitlingham Park, and is bordered by grassland fields and in places woodland located on steeply sloping banks. Nevertheless, along the eastern riverbank (off-site) the banks themselves are in places canalised with sections of metal sheet piling present.

- 4.12.4 In the southern part of the survey area, adjacent to the May Gurney land, the riverbank is variable with some areas of stone walling or metal sheet piling but predominantly comprising heavily shaded steep banks supporting sparse vegetation largely dominated by Ivy. The eastern boundary of the May Gurney land lies adjacent to a man-made channel which feeds into the River Yare at the north-eastern corner of the May Gurney land. This channel supports a steep, Ivy-dominated bank beneath the marginal tree belt.

Summary of Habitat Changes Since 2009

- 4.12.5 The rivers and their associated banks were recorded to be in similar condition to the descriptions in 2009, albeit with a higher cover of trees and shrubs where woodland has developed.

Evaluation

- 4.12.6 The River Wensum is heavily modified with straight, built canalised banks within an urban context, with built land also on its north bank. The River supports frequent boat traffic such that little emergent or aquatic vegetation is present. As such, the section of the River Wensum adjacent to the survey area is not considered to represent an important ecological feature.
- 4.12.7 The River Yare is, by contrast, largely semi-natural in that it supports meandering, unbuilt banks (for the most part) with shallows and aquatic vegetation. The banks of the river are well vegetated by woodland, scattered trees, tall ruderal vegetation, and, to the east, parkland (including Whitlingham CWS) and rural gardens, while the fen habitat within the survey area is in close proximity, contributing to a wide riparian corridor. Nevertheless, its ecological value is somewhat limited by the prevalence of invasive plant species along its banks, particularly Giant Hogweed, while Himalayan Balsam is also present in the south of the May Gurney land. On the basis of its semi-natural characteristics, this section of the River Yare is considered to represent the UK Priority Habitat 'rivers', and does represent an important ecological feature which is of value at the local to county level.

4.13 Ephemeral Ponds

Description

- 4.13.1 A single ephemeral pond (P1) has previously been recorded within the Deal Ground land, specifically within woodland W1. This was revisited and found to comprise a completely dry depression within the woodland, largely devoid of vegetation save for some Reed Sweet-grass and Greater Pond Sedge.

Summary of Habitat Changes Since 2009

- 4.13.2 Pond P1 was previously noted to be an ephemeral feature which likely dries out annually, such that the habitat remains similar to the previous description.
- 4.13.3 An additional ephemeral pond (P2) was previously recorded in the east of the May Gurney land. This pond was not re-recorded in 2022 and is presumed to have been infilled either naturally or through site clearance works.

Evaluation

- 4.13.4 The pond is unlikely to meet the criteria for the Priority Habitat 'ponds'. The pond is highly ephemeral in nature, being completely dry at the time of survey in September 2022, and is likely to hold water for only a few months of the year. The pond supports very little

emergent or wetland vegetation. As such, it is not considered to represent an important ecological feature.

4.14 Colonising Vegetation on Previously Developed Land

Description

4.14.1 This habitat was recorded most extensively in the north of the Deal Ground land, in addition to smaller areas in the May Gurney land. This habitat comprised areas of previous industrial land which now support varying levels of recolonising vegetation, largely on flat, compacted gravel substrate (see Photographs 9 and 10). Given the various stages of vegetation colonisation, these were compartmentalised into 11 areas (see Plan 6592/ECO3), described in Table 4.4 below.

4.14.2 The colonising vegetation in these areas largely comprised annual and tall ruderal species, especially Weld, in addition to Perforate St John's-wort, Great Mullein, Spear Thistle, Common Nettle, Canadian Fleabane, Vervain *Verbena officinalis*, Black Horehound *Ballota nigra*, Ground-ivy, Sticky Groundsel *Senecio viscosus*, Scentless Mayweed *Tripleurospermum inodorum*, Bristly Ox-tongue *Helminthotheca echioides*, Great Willowherb, Common Knotgrass *Polygonum aviculare*, Large-flowered Evening-primrose *Oenothera glazioviana*, Square-stalked Willowherb *Epilobium tetragonum*, Common Ragwort, Nipplewort, Ribbed Melilot *Melilotus officinalis*, Black Medick, Hare's-foot Clover *Trifolium arvense* and Teasel. Grasses were occasionally recorded, including Creeping Bent, Yorkshire-fog and Cock's-foot, while Biting Stonecrop *Sedum acre* was also occasional. In places, very young and low Buddleia shrubs were noted to be colonising, whilst low creeping Bramble was also noted.

4.14.3 Areas of this habitat were compartmentalised into 11 areas, based on the proportion of vegetation cover, vegetation structure, and species composition. These are described in Table 4.4 below.

Table 4.4. Descriptions of colonising vegetation on previously developed land.

Area	Percentage vegetation cover	Botanical characteristics	Topographical variation
PDL1	30 – 50 %	Low diversity, abundant Weld.	Negligible
PDL2	5 %	Largely devoid of vegetation.	Negligible
PDL3	50 – 90 %	Locally abundant Creeping Bent in south with higher vegetation cover developing into grassland with tall ruderal, otherwise similar to PDL1, plus locally frequent low Bramble.	Negligible
PDL4	30 %	Similar to PDL1, but with locally abundant very young and low Buddleia.	Negligible
PDL5	50 – 80 %	Locally abundant Buddleia up to 1 m tall with locally abundant Canadian Fleabane.	Negligible
PDL6	70 – 80 %	Merges into tall ruderal TR2 and similar in character and species composition, but sparser over stonier	Negligible

		ground. Weld dominant with abundant Canadian Fleabane and frequent Spear Thistle and Great Mullein.	
PDL7	50 %	Abundant Canadian Fleabane with frequent Perforate St John's-wort. Locally abundant young Buddleia.	Negligible
PDL8	50 %	Dominant Perforate St John's-wort and Canadian Fleabane, locally abundant Creeping Cinquefoil and young Buddleia. Marsh Fern <i>Thelypteris palustris</i> noted in north.	Uneven with several small undulations plus higher (to 1m) mounds, variable substrate including sandy ground
PDL9	5 %	Largely devoid of vegetation.	Negligible
PDL10	10 – 40 %	Abundant Canadian Fleabane, low species diversity	Negligible
PDL11	50 – 90 %	Mix of species including Canadian Fleabane, Bristly Oxtongue, Mugwort, Ragwort, Hare's-foot Clover. Merging into adjacent grassland.	Negligible

Summary of Habitat Changes Since 2009

- 4.14.4 The majority of this habitat was previously recorded as 'derelict industrial area / hardstanding' which supported little vegetation. Ruderal species have since begun to colonise, albeit the process is slow because of the nutrient-poor, compacted nature of the substrate. Part of this habitat area (PDL8) was previously recorded as woodland (W2) which has since been cleared.

Evaluation

- 4.14.5 The colonising vegetation comprises distinct compartments with varying degrees of vegetation cover, but any such cover is heavily dominated by annual and biennial ruderal species, with poor representation of other vegetation types such as mosses, lichens, inundation species, and flower-rich grassland. The habitat supports a low to moderate plant species diversity.
- 4.14.6 This habitat has been assessed for its potential qualification as the UK Priority Habitat 'open mosaic habitats on previously developed land' ('OMH'). The criteria for this Priority Habitat are somewhat open in that they require habitats to contain 'some vegetation' along with bare ground to qualify. Further guidance is available from Buglife²¹, who states that "Not all brownfields will support open mosaic habitats, particularly where hardstanding areas dominate, providing only limited opportunities for vegetation or exposed friable

²¹ Buglife (2020) Identifying open mosaic habitat. <https://cdn.buglife.org.uk/2020/01/Identifying-open-mosaic-habitat.pdf>

material.” Furthermore, the Norfolk BAP for OMH²² sets out five criteria for examples of ‘high nature conservation value’, which are taken from JNCC’s 2007 review of the UK BAP²³:

- Rich and/or large examples of habitats, which demonstrate mosaics of bare ground, pioneer communities, flower-rich grassland and other habitat patches;
- Areas that have retained bare ground and pioneer communities over an extended period, demonstrating arrested succession;
- Threatened areas that support either the last remaining examples where the habitat was formerly widespread/extensive, or rare/ specialised types of this habitat;
- Presence of UK BAP priority species or Red Data Book/List species;
- Importance for an exceptional assemblage of key species groups.

4.14.7 The habitat within the survey area is unlikely to meet any of the above criteria, on account of its poor diversity of habitats, recent origin, absence of a wider threatened area of the habitat type, and lack of evidence of any UK Priority Species or exceptional assemblage of species. Furthermore, the majority of this habitat is dominated by flat gravel substrate with low levels of early colonising vegetation cover. In addition, with the exception of PDL8, the habitat supports very little topographical diversity such as hummocks and seasonal pools which are associated with OMH, while the substrate is also relatively homogenous. The habitat has developed in the past ten years, since the previous survey when these areas were largely devoid of vegetation or comprised denser vegetation cover (as with PDL8).

4.14.8 As such, the habitat is not considered to qualify as OMH Priority Habitat due to the lack any significant spatial variation in its communities, instead, the habitat comprises homogeneous early successional ruderal vegetation.

4.14.9 One notable plant species, Marsh Fern *Thelypteris palustris*, was recorded within this habitat, which was limited to PDL8 and is more characteristic of open or wooded fen rather than previously developed land.

4.14.10 The colonising vegetation habitat is therefore not considered to represent an important ecological feature.

4.15 Amenity Planting

Description

4.15.1 A small, brick-built raised bed in the south of the May Gurney land supports amenity planting comprising Mexican Orange *Choisya ternata* and Wall Cotoneaster *Cotoneaster horizontalis*. Also recorded was Gorse *Ulex europaeus*, although it is unclear whether this formed part of the amenity planting scheme or is a natural colonist.

Summary of Habitat Changes Since 2009

4.15.2 The amenity planting is largely unchanged since 2009.

²² Chittenden, SJ (2012) Norfolk Biodiversity Action Plan: Open Mosaic Habitats on Previously Developed Land. Norwich City Council. <https://www.norfolkbiobiodiversity.org/assets/Uploads/Open-mosaic-habitats-on-previously-developed-land-HAP2.pdf>

²³ Biodiversity Information and Reporting Group (June 2007) Report on the Species and Habitat Review. JNCC. <https://data.jncc.gov.uk/data/bdd8ad64-c247-4b69-ab33-19c2e0d63736/UKBAP-Species-HabitatsReview-2007.pdf>

Evaluation

- 4.15.3 The amenity planting covers a very small area, surrounded by hardstanding, which is dominated by non-native species. This habitat is therefore not considered to represent an important ecological feature.

4.16 **Hardstanding and Bare Ground**

Description

- 4.16.1 The majority of the May Gurney land comprises hardstanding in the form of tarmac or concrete roadways and parking areas. Numerous cracks in the hardstanding have been colonised by plant species including abundant Buddleia *Buddleja davidii* and frequent Canadian Fleabane. Also recorded were Garden Parsley *Petroselinum crispum*, Yorkshire Fog, Common Ragwort, Bittercress *Cardamine* sp., Mugwort, Bristly Oxtongue, Spear Thistle, Annual Meadow-grass *Poa annua*, Dandelion *Taraxacum* agg., a Crane's-bill *Geranium* sp., Wild Clematis *Clematis vitalba* and Bramble. In shaded locations various mosses *Bryophyta* were noted.
- 4.16.2 Bare ground was also recorded in the May Gurney land in the form of compacted stone, the outer, vegetated margins of which are described under 'colonising vegetation on previously developed land'. A substantial area of bare earth was also recorded within the grassland in the May Gurney land, apparently formed by repeated movement of tracked vehicles to and from two large bonfires and probably also as a result of intentional clearance of vegetation.
- 4.16.3 Other areas of hardstanding within the May Gurney land include the footprint of recently demolished buildings or part buildings, covered in demolition debris at the time of survey.
- 4.16.4 In the Deal Ground land, a 5 m wide metalled road runs northwards through the survey area from the public road Bracondale, which is in reasonably good condition and is almost entirely devoid of vegetation.

Summary of Habitat Changes Since 2009

- 4.16.5 Areas of hardstanding have decreased in extent, particularly within the north of the Deal Ground land, where these areas have been recategorized as colonising vegetation on previously developed land. The remaining hardstanding in the May Gurney land appears to have been gradually colonised by vegetation in cracks.

Evaluation

- 4.16.6 The hardstanding and bare ground habitat is largely devoid of vegetation, albeit vegetation is gradually colonising via cracks in hardstanding. As such, at present this habitat is not considered to represent an important ecological feature.

4.17 **Buildings and Structures**

Description

- 4.17.1 Six buildings or structures were previously recorded within the Deal Ground land, in addition to five within the May Gurney land. Of these, three were recorded to remain standing within Deal Ground, and two within the May Gurney land, during the current survey. These are described in turn below. Building numbers are retained from the previous report.

- 4.17.2 **Building B2** is a small structure of rendered brickwork construction, supporting a flat concrete roof. It was noted to be in a state of disrepair with a number of holes present in the walls with the windows and doors missing. Internally the structure was noted to house pipework and was very light and airy in nature with smooth concrete internal walls.
- 4.17.3 **Building B4** is a historic brick kiln comprising of a conical, vaulted ceiling structure with access gained via a small open porchway/doorway (see Photograph 11). The kiln comprises a double layer cavity wall which extends part way up the structure to a height of 3-4m, continuing as a single thickness wall up to the apex. The kiln was noted to be in a poor state of repair, with numerous large cracks present in the brickwork of the outside walls, which were noted to have been colonised in places by Buddleia scrub. Upon internal inspection no obvious cracks or gaps in the brick work were observed. Nevertheless, it appears that the internal structure is subject to disturbance on occasion by people with rubbish and debris recorded from the base of the kiln.
- 4.17.4 **Building B6 - Coleman's Subway Tunnel** is present adjacent to the northwest of the survey area and forms a now blocked off subway tunnel beneath the Lafage Aggregates supply railway line (see Photograph 12). The tunnel is of a brick and metal girder construction. The brick walls are in moderate condition with very few cracks or crevices present. Supporting metal girders form the tunnel roof and span between the brick walls, with slight gaps forming where heavy corrosion has taken place. The tunnel is relatively dank in nature, however was noted to be moderately well lit with daylight penetrating to a fair depth within the tunnel. At time of the April 2009 survey the tunnel was noted to be flooded with water to a depth of 20cm, however in August 2009 and September 2022 water was noted to be absent.
- 4.17.5 **Building B7**, which lies partly outside of the site (red line) boundary, comprises a two-storey structure of brick construction under a slate-tiles roof. The roof is hipped with multiple ridges. The building has a single-storey extension to the north, appearing to be of similar construction, albeit some elevations have been rendered. The building is no longer in use and, while generally appearing to be in good condition, there has been some vandalism. Windows facing south on to Bracondale Road have been boarded up, but the majority of unboarded windows within and immediately adjoining the site boundary have been broken. The roof very largely appears to be in good condition, with no slipped or raised tiles over most pitches. However, localised damage has occurred within the site, with tiles missing in a number of locations. The building is largely unvegetated but grass, probably Yorkshire-fog, was noted in some of the guttering. Damage to internal ceilings revealed that at least part of the roof structure comprised wooden beams, apparently of relatively recent construction, with wooden boards below the tiles, but no lining.
- 4.17.6 **Building B10** is largely a two-storey structure, with one part being single-storey. It appears to have been constructed as a flat-roofed, brick-built single-storey structure, with a flat-roofed second-storey extension subsequently added to the northern and eastern parts of the building. In places the upper storey extends beyond the lower; where this is the case the upper storey is supported by pillars. The walls of the upper storey are of corrugated panel construction, with a fascia board at the top. Building B10 is also no longer in use and has also been subject to vandalism, with many broken windows. Other than this, the building appeared to be in reasonable condition.
- 4.17.7 In addition, two metal tanks, presumed to have formerly contained oil, are present in the north of the May Gurney land.

Summary of Habitat Changes Since 2009

- 4.17.8 Five of the 11 buildings or structures remain standing since the previous survey. The three remaining structures in the Deal Ground land remain in similar condition to the previous descriptions. The two remaining buildings within the May Gurney land are deteriorating in condition due to their lack of occupation, exacerbated by vandalism.

Evaluation

- 4.17.9 The buildings and structures are largely devoid of vegetation and are inherently of negligible ecological value. As such, they do not form important ecological features. Potential for the buildings to support faunal species such as roosting bats and Barn Owl is discussed below in Chapter 5.

4.18 Invasive Species

Description

- 4.18.1 Several stands of Japanese Knotweed were recorded within the survey area. These were located in three parts of woodland W4, to the west of grassland NG1/2, and within woodland W7.
- 4.18.2 Giant Hogweed was recorded as scattered individuals in several parts of the fen, but was primarily associated with tall ruderal vegetation on the banks of the River Yare, particularly the area to the south of woodland W1. Elsewhere within the fen, the species was mainly recorded within ditches with isolated specimens noted elsewhere.
- 4.18.3 Himalayan Balsam was recorded in one part of the survey area, namely fen F15 where it was associated with the bank of the River Yare.

Summary of Changes Since 2009

- 4.18.4 Japanese Knotweed was recorded in the same locations during the previous survey, but appears to have expanded its range in the area to the west of grassland NG1/2.
- 4.18.5 Giant Hogweed was also recorded during the previous survey work, and its extent appears to be relatively unchanged, albeit it may have slightly encroached further westward into the fen.
- 4.18.6 Himalayan Balsam was not recorded during the previous survey work, although it has been recorded more historically in 2000 and 2003.

Evaluation

- 4.18.7 Japanese Knotweed, Giant Hogweed and Himalayan Balsam are listed under Schedule 9 Part II of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to cause to grow in the wild any plant listed on the schedule.

4.19 Rare, Scarce and Notable Plants

Description

- 4.19.1 One plant species of conservation importance was recorded within the survey area, namely Marsh Fern, which was recorded close to the River Wensum in an area of felled woodland (W2), now occupied by colonising vegetation (PDL8). This species is listed as Nationally

Scarce, meaning that it has been recorded in fewer than 100 hectads (10 x 10 km squares) in Britain. In addition, although not listed on the list of Rare and Scarce Plants in Norfolk, the species is included on the older 'Norfolk Rare Plants List', which was obtained from NBIS but is of unknown origin (*pers. comm.*). The species is characteristic of 'open or recently wooded fen or open carr'²⁴. Although the species declined prior to 1930 because of drainage, its recent national distribution is noted to be relatively stable. Norfolk is a significant stronghold for Marsh Fern.

- 4.19.2 Another species with a restricted national distribution recorded within the survey area was Green Figwort, which was recorded near the margins of the fen habitat. This species is relatively uncommon nationally, but not enough to warrant a conservation designation (either locally or nationally), and one of its national strongholds is the Norfolk broads. The BRC Online Atlas notes that its status as a native species is uncertain given that it was not recorded in Britain prior to 1840, and appears to be expanding in range²⁵.

Summary of Changes Since 2009

- 4.19.3 Marsh Fern is not known to have been previously recorded within the survey area. Only a very small quantity was recorded within the survey area, within the former woodland W2, as such it may have either been overlooked or represent a recent colonist.
- 4.19.4 Green Figwort was also recorded during the previous survey work in 2009. On both occasions, the species was recorded in the fen habitat. Its distribution in 2022 was substantially less than in 2009, although it may have been overlooked to some extent in 2022 given the later timing of the survey and the very tall and dense structure of the habitat.
- 4.19.5 The Nationally Scarce species Hoary Mullein was recorded in the survey area in 2009, mainly within areas of tall ruderal vegetation, with smaller quantities in the grassland. This species is also included on the Norfolk Rare Plants List, but is not in the more recent lists of Rare and Scarce Plants in Norfolk. Hoary Mullein was not rerecorded within the survey area in 2022, possibly because much of the areas previously recorded as tall ruderal vegetation has since succeeded to scrub or woodland. Nevertheless, this species could be present within the previously developed land in low numbers, given that it is difficult to distinguish from Great Mullein, which occurred frequently, without close inspection of all specimens.

Evaluation

- 4.19.6 Marsh Fern is considered to represent an important ecological feature, on account of its Nationally Scarce status. However, its known extent within the survey area is limited to one small patch, while the species has not previously been recorded within the survey area, such that it is likely to either be a recent colonist or has for some time only occurred as a very small population. As such, this species is considered to be of importance at the local level. Green Figwort, although of some ecological interest, has no conservation designation and is expanding its national range, such that it is not considered to represent an important ecological feature.

4.20 Habitat Evaluation Summary

- 4.20.1 On the basis of the above, the following habitats within and adjacent to the survey area are considered to form important ecological features:

²⁴ BRC plant atlas: <https://plantatlas.brc.ac.uk/plant/thelypteris-palustris>

²⁵ <https://plantatlas.brc.ac.uk/plant/scrophularia-umbrosa>

Table 4.5. Evaluation summary of habitats and species forming important ecological features.

Habitat	Level of Importance
Eutrophic Floodplain Fen	County
Wet Woodland	Local
River Yare	Local to county
Nationally Scarce Plants	Local

4.20.2 Other habitats present within the survey area are not considered to form important ecological features, albeit the presence of invasive plant species should be noted as unfavourable features within the survey area.

5 Faunal Use of the Survey Area

5.1 Overview

- 5.1.1 Specific survey work was undertaken in 2009 and 2010 for bats, Badger, Water Vole, Otter, breeding birds, Great Crested Newt, reptiles, and invertebrates.
- 5.1.2 During the update survey work in 2022, general observations were made of any faunal use of the survey area with specific attention paid to the potential presence of protected or notable species. Specific update survey work was undertaken in respect of Badgers, bats, and Desmoulin's Whorl Snail.
- 5.1.3 In this section, for each species group, the findings of the 2009 survey work are summarised, followed by an update assessment in 2022 to evaluate any changes in habitat conditions for the relevant species since 2009.
- 5.1.4 Update Phase 2 survey work for bats (activity survey comprising walked transects and static detectors), Badger, Water Vole, Otter, reptiles, and breeding birds, is being undertaken in 2023. The results of these surveys will be reviewed separately when available.

5.2 Priority Species

- 5.2.1 Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 places duties on public bodies to have regard to the conservation of biodiversity in the exercise of their normal functions. In particular, Section 41 of the NERC Act requires the Secretary of State to publish a list of species which are of principal importance for conservation in England. This list is largely derived from the 'Priority Species' listed under the former UK Biodiversity Action Plan (BAP), which continue to be regarded as priority species under the subsequent country-level biodiversity strategies.
- 5.2.2 During the previous survey work undertaken, the Priority Species Soprano Pipistrelle *Pipistrellus pygmaeus*, Noctule *Nyctalus noctula*, Grass Snake *Natrix helvetica*, Cuckoo *Cuculus canorus*, Dunnock *Prunella modularis*, Song Thrush *Turdus philomelos*, Grasshopper Warbler *Locustella naevia*, Linnet *Linaria cannabina*, Bullfinch *Pyrrhula pyrrhula*, and Reed Bunting *Emberiza schoeniclus* were recorded within the survey area, in addition to 16 moth species listed under the UK BAP for research purposes only. The survey area also has potential to support other Priority Species such as Hedgehog *Erinaceus europaeus* and Harvest Mouse *Micromys minutus*, while the rivers adjacent to the survey area could support Priority Species of fish such as Brown Trout *Salmo trutta* and Smelt *Osmerus eperlanus*. This is discussed further below.

5.3 Bats

- 5.3.1 **Legislation.** All British bats are classed as European Protected Species under the Conservation of Habitats and Species Regulations 2017 (as amended) and are also listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). As such, both bats and their roosts (breeding sites and resting places) receive full protection under the legislation (see Annex 6592/6 for detailed provisions). If proposed development work is likely to result in an offence a licence may need to be obtained from Natural England which would be subject to appropriate measures to safeguard bats. Given all bats are protected species, they are considered to represent important ecological features. A number of bat species are also considered S41 Priority Species.

5.3.2 Background Records. No specific records of bats from within the survey area were returned from the desktop study. The closest 6-figure or greater resolution bat records were located from Whitlingham Lane Tunnel (also known as Trowse Tunnel), which is located approximately 50 m east of the survey area boundary. This is a known hibernation roost with records of Daubenton's Bat *Myotis daubentonii*, Natterer's Bat *Myotis nattereri*, and Brown Long-eared Bat *Plecotus auritus*. Other bat species recorded in the local area include Barbastelle *Barbastella barbastellus* (auditory records only), Serotine *Eptesicus serotinus* (auditory records only), and Nathusius' Pipistrelle *Pipistrellus nathusii*.

5.3.3 Survey Results and Evaluation

Buildings

Summary of previous surveys

5.3.4 Eleven built structures were previously identified within the survey area in 2009, named B1 to B11. No evidence of roosting bats was found in any of the structures following external and internal inspection surveys. Buildings B1 to B3, B5 and B9 to B11 were assessed as having negligible to low value for roosting bats. Buildings B4 (the former kiln) and B6 (former Colemans Subway Tunnel) were assessed as having an increased likelihood of bat use, with potential to be of moderate value for roosting bats including for hibernation. Building B7 was considered to have low bat potential, while B8 had low to moderate bat potential.

5.3.5 Further dusk/dawn survey work was undertaken in July and August 2010 to assess the presence or likely absence of roosting bats in Buildings B4, B6, and B7. These comprised two dusk surveys plus a dawn survey at Building B4, a single dusk with dawn survey at Building B6, and a dawn survey at Building B7. Building B8 was not subject to further survey because this had been previously demolished in relation to the consented development of the May Gurney offices.

5.3.6 One *Myotis* bat was recorded returning to Building B7 on the dawn survey of 19th August 2010, specifically to a masonry gap on the southern aspect of the building (outside of the red-line boundary). No further evidence of roosting bats was recorded in any of the buildings.

2022 update

5.3.7 As described in Section 4 above, the 2022 survey identified that buildings B1, B3, B5, B8, B9 and B11 have since been demolished. The remaining buildings B2, B4, B6, B7 and B10 were inspected and re-assessed for any evidence of, or potential for, roosting bats.

5.3.8 Building B2 is a small structure in a state of advanced disrepair, with a light and airy interior lacking any suitable sheltered opportunities for roosting bats. As such, building B2 was considered to have negligible potential for roosting bats.

5.3.9 Building B4 comprises the former kiln previously identified as having potential for roosting bats. The 2022 survey confirmed this, and the building was recorded to be in similar condition to that reported in 2010, with numerous cracks in the exterior brickwork. The cavity wall was identified as continuing to offer potential for roosting bats, while the surrounding habitat, comprising woodland, represents favourable foraging and commuting habitat. The building is however subject to disturbance from unauthorised public use, with much graffiti and a makeshift camp recorded within. As such, this building is considered to offer moderate potential for roosting bats.

- 5.3.10 Building B6 comprises the former Colemans Subway Tunnel. Although the tunnel appears to be in sound condition, potential opportunities for bats are present in cavities where horizontal girders adjoin the supporting walls. These cavities are likely to remain cool year-round, and as such are unlikely to offer potential for maternity roosts, but could present opportunities for hibernating bats. However, the structure is subject to significant disturbance from the rail line above, which is in regular use and creates loud noise and heavy vibration when trains are passing. Overall, the structure is considered to have moderate potential for roosting bats.
- 5.3.11 Building B7 offers some opportunities for bats in the form of access to roof voids either at locations where the roof has been damaged by vandalism or, less probably through broken windows and access via a damaged ceiling. A boarded window on the southern elevation of B1, outside the red-line boundary, also offers minor roosting potential behind the boarding due to a small gap between the two boards which have been put in place. The portion of this building outside of the red-line boundary is considered to have high potential for roosting bats, on the basis of the previous *Myotis* roost recorded in 2010, while the remainder of the building has low potential.
- 5.3.12 Building B10 was noted to have a small hole which could provide access to a potential roosting site in the fascia of the upper storey, on the western elevation near the southwestern corner. In addition, a ventilation grill high on an eastern elevation may also offer a potential access opportunity for bats. These features are considered to represent low potential for roosting bats.

Trees

Summary of previous surveys

- 5.3.13 The previous survey work identified seven trees with roosting bat potential within the survey area, in addition to two tree groups which supported dense ivy cover. All of the trees were assessed as having low or moderate potential, except for one (T4) which had high potential.
- 5.3.14 Further dusk/dawn survey work was undertaken in July and August 2010 to assess the presence or likely absence of roosting bats in trees T1 and T2. These comprised two dusk surveys plus a dawn survey. Possible evidence of roosting bats was recorded at tree T1, comprising a possible Soprano Pipistrelle emergence in July 2010, with at least five Soprano Pipistrelle possibly emerging in August 2010. No evidence of roosting bats was recorded at tree T2.

2022 update

- 5.3.15 The 2022 survey produced similar findings to the previous survey, albeit two of the willow trees previously identified as having bat potential (T5 and T6) have since collapsed and now offer negligible potential. One additional tree and one additional tree group were identified which were not reported in the previous survey. The update results of the tree assessment work undertaken at the survey area are illustrated on Plan 6592/ECO5 and summarised in Table 5.1 below:

Table 5.1. Tree inspection results (see Plan 6592/ECO5, tree numbers are consistent with the previous survey work undertaken for the outline planning application).

Tree No.	Species	Age	Potential Roost Features	Suitability
T1	White Poplar	Semi-mature	Dense covering of Ivy	High (given previous potential roost record)
T2	Ped. Oak	Mature/Dying	Dense covering of Ivy	Low
T3	White Willow	Semi-mature	Woodpecker and rot holes	Medium
T3a	White Willow	Semi-mature	Lifting bark	Medium
T4	Crack Willow	Mature	Collapsed trunk, large splits, broken limbs, rot holes	High
T7	Sycamore	Semi-mature	Hollows and dense covering of Ivy	Medium
G1	Horse Chestnut	Mature	Covering of Ivy	Low
G2	Horse Chestnut	Mature	Covering of Ivy	Low
G3	Sycamore	Semi-mature	Dense covering of Ivy	Low

- 5.3.1 Subsequent update tree survey work in June 2023 has recorded that trees T7 and G3 have since been felled.

Foraging and Commuting

Summary of previous surveys

- 5.3.2 A series of six transect activity survey visits were undertaken at the Deal Ground land in August 2009, July 2010, and August 2010. These six visits comprised four dusk surveys and two dawn surveys. The survey work recorded a moderate level of foraging activity, attributable to Common Pipistrelle, Soprano Pipistrelle, Noctule, and *Myotis* species including Daubenton's Bat. Soprano Pipistrelle and Common Pipistrelle were the most frequently recorded species. The greatest levels of activity were associated with the River Yare corridor along the eastern margin of the survey area, which provides connectivity to the adjacent Whitlingham Country Park, where known roosts are present. Groups of trees and scrub around the fen margins were also subject to regular use. More occasional activity was recorded in the fen habitat and along the River Wensum.

2022 update

- 5.3.3 Since the previous survey work, tree and scrub cover has generally increased across the survey area, particularly around the margins of the fen including along the River Yare corridor. As such, this riparian corridor is likely to remain the area of highest value for bats within the survey area. Areas of wet woodland around the margins of the fen are similarly likely to be of relatively higher value for bats in the context of the survey area. Otherwise, there is unlikely to be any significant change in bat activity patterns across the survey area. The previously developed land in the northern parts of the survey area remain exposed and with scarce plant cover, such that these areas are unlikely to support more than sporadic bat activity, while the River Wensum corridor remains in similar condition and is unlikely to be of high significance to foraging bats given its open and exposed nature.

5.4 Badger

5.4.1 **Legislation.** Badger receive legislative protection under the Protection of Badgers Act 1992 (see Annex 6592/6 for detailed provisions), and as such should be assessed as an important ecological feature. The legislation aims to protect the species from persecution, rather than being a response to an unfavourable conservation status, as the species is in fact common over most of Britain. It is the duty of planning authorities to consider the conservation and welfare impacts of development upon Badger and issue permissions accordingly.

5.4.2 Licences can be obtained from Natural England for development activities that would otherwise be unlawful under the legislation. Guidance on the types of activity that should be licensed is laid out in the relevant best practice guidance.^{26, 27}

5.4.3 **Background Records.** No specific records of Badger were returned within the survey area, with the closest records at 6-figure or greater resolution recorded approximately 500 m from the survey area boundary.

5.4.4 Survey Results and Evaluation

Summary of previous surveys

5.4.5 Previous surveys recorded no evidence of Badger within the survey area, albeit suitable habitats were present including for setts within the numerous earth embankments.

2022 update

5.4.6 No evidence of Badger, such as setts, latrines, or foraging activity, was recorded during the 2022 update survey. However, suitable habitat remains present particularly in the form of steep embankments which are particularly prominent along the western margin of the fen and around the margins of woodland W4. The lack of Badger activity could be explained by the isolation of the survey area, being surrounded by rivers and areas of built development, which limits opportunities for colonisation by this species.

5.5 Water Vole

5.5.1 **Legislation.** Water Vole is fully protected under the Wildlife and Countryside Act 1981 (as amended). Water Vole is also a S41 Priority Species. As such, this species is considered to represent an important ecological feature. The legislation affords protection to individuals of the species and their breeding sites and places of shelter (see Annex 6592/6 for detailed provisions). There is no provision under the Act for licensing what would otherwise be offences for the purpose of development. Such activities must be covered by the defence in the Act that permits otherwise illegal actions if they are the incidental result of a lawful operation and could not reasonably be avoided.

5.5.2 If, despite all reasonable efforts, properly authorised development will adversely affect Water Vole and there are no alternative habitats nearby, Natural England may issue a licence to trap and translocate Water Vole for the purpose of conservation. To issue such a licence, Natural England would need to be assured there is no reasonable alternative to the development and that there are no other practical solutions that would allow Water Vole to be retained at the same location. NE would also require assurance that the actions would make a positive contribution to Water Vole conservation.

²⁶ English Nature (2002) 'Badgers and Development'

²⁷ Natural England (2011) 'Badgers and Development: A Guide to Best Practice and Licensing', Interim Guidance Document

5.5.3 Background Records. Two records of Water Vole were recorded along the River Yare at the eastern boundary of the survey area, dated 2005 and 2007. No further information is available for these records, aside of the location 'Trowse Meadows'. It is therefore likely that these records relate to Trowse Meadows CWS, which forms part of Whitlingham Country Park and flanks the eastern side of the River Yare. All other 6-figure or greater resolution Water Vole records were located at least 1 km from the survey area boundary.

5.5.4 Survey Results and Evaluation

Summary of previous surveys

5.5.5 Survey work for Water Vole was undertaken along the river banks and within the ditches in the fen in the Deal Ground land in 2009. No evidence of this species was recorded, which is consistent with previous surveys undertaken in 2000 and 2003. The apparent absence of this species was explained by the limited open water in ditches within the survey area, and the scarcity of grass cover along the river banks.

2022 update

5.5.6 The fen ditches within the survey area remain of similar or lower quality for Water Vole compared with 2009, and likely support less water. Indeed, during the update survey work in 2022, the ditches were completing lacking in open water. Furthermore, the ephemeral pond within woodland W1 was completely dry during the 2022 survey. In terms of the riverbanks, the River Wensum remains unsuitable for Water Vole because of its built canalised banks. The River Yare offers some opportunities for Water Vole, albeit its banks are likely to be suboptimal given that the ground vegetation is either sparse below a dense tree canopy cover, or comprises dense tall ruderal vegetation with a negligible component of emergent vegetation. Where the River Yare abuts the May Gurney land, much of the banks are constructed of stone or sheet piling, which is unsuitable for burrowing by this species. Overall, the survey area is considered to be of value to Water Voles at a negligible or local value.

5.6 Otter

5.6.1 Legislation. Otter is fully protected under the Wildlife and Countryside Act 1981 (as amended) and is a European Protected Species under the Conservation of Habitats and Species Regulations 2017 (as amended). Such legislation affords protection to individuals of the species and their breeding sites and places of rest (see Annex 6592/6 for detailed provisions). Otter is also a S41 Priority Species. On this basis, Otter is considered to represent an important ecological feature.

5.6.2 Background Records. The closest specific record of Otter relates to the River Yare adjacent to the south of the survey area, dated 2012 and with a location description 'just east of Trowse'. The species has been recorded in various locations further afield, particularly within Whitlingham Great Broad some 400 m north-east of the survey area, and along the River Wensum, including further west into Norwich.

5.6.3 Survey Results and Evaluation

Summary of previous surveys

5.6.4 Survey work in 2009 for Otter along the banks of the River Yare and River Wensum within the survey area found no evidence of use by Otter, although the dense vegetation along the River Yare corridor was identified as potentially suitable habitat for Otter. The species was

considered unlikely to occur elsewhere within the survey area, e.g. within the fen, because of the lack of year-round standing water.

2022 update

- 5.6.5 The 2022 assessment concluded that the potential for Otter to occur within the survey area remains similar to 2009, with potential habitat limited to the dense undisturbed vegetation along the River Yare corridor. The interior of the fen is unlikely to be regularly used by Otter given the lack of year-round standing water. The River Wensum banks remain of poor suitability for this species given their built nature. As such, the survey area is considered to be of negligible to local value for Otter, with any interest likely focussed on the River Yare and its banks.

5.7 Other Mammals

- 5.7.1 **Legislation.** A number of other UK mammal species do not receive direct legislative protection relevant to development activities but may receive protection against acts of cruelty (e.g. under the Wild Mammals (Protection) Act 1996). In addition, a number of these mammal species are S41 Priority Species and should be assessed as important ecological features.

- 5.7.2 **Background Records.** No specific records of other mammals were returned from within or adjacent to the survey area. A number of records of Hedgehog *Erinaceus europaeus* (Priority Species) was returned from the search area, the closest located approximately 0.4 km south-east of the survey area. One record of the Priority Species Polecat *Mustela putorius* was returned from the search area, located 50 m west of the survey area within Carrow Works, in 2015. Other Priority Species of mammal recorded further afield comprised single records of Harvest Mouse and Brown Hare *Lepus europaeus*.

5.7.3 Survey Results and Evaluation

Summary of previous surveys

- 5.7.4 The survey work in 2009-2010 recorded no evidence of other protected or Priority Species of mammal. However, the survey area was considered to have some potential to support the Priority Species Harvest Mouse within the fen habitat and Hedgehog *Erinaceus europaeus* within marginal areas of scrub and woodland.

2022 update

- 5.7.5 The update habitat assessment concurred with the previous assessment, in that the survey area is likely to support a range of common mammal species, while the Priority Species Harvest Mouse could be present within the fen habitat and Hedgehog could utilise the drier parts of the woodland and scrub habitats. Polecat has also been recorded in the local area and could use the drier woodland and scrub habitats. The previous assessment for the survey area is considered to remain appropriate, i.e. the survey area is of value to other mammals at the local level.

5.8 Amphibians

- 5.8.1 **Legislation.** All British amphibian species receive a degree of protection under the Wildlife and Countryside Act 1981 (as amended). Great Crested Newt is protected under the Act and is also classed as a European Protected Species under the Conservation of Habitats and Species Regulations 2017 (as amended). As such, both Great Crested Newt and habitats

utilised by this species are afforded protection (see Annex 6592/6 for detailed provisions). Great Crested Newt is also a S41 Priority Species, as are Common Toad *Bufo bufo*, Natterjack Toad *Epidalea calamita*, and Pool Frog *Pelophylax lessonae*. As such, these species should be assessed as important ecological features.

5.8.2 Background Records. The only amphibian species returned from the NBIS data search comprised Common Frog *Rana temporaria*, which was recorded from the fen habitat within the survey area in 2015 (peak count 1). No records of Great Crested Newt were returned by NBIS for the search area.

5.8.3 Survey Results and Evaluation

Summary of previous surveys

5.8.4 Pond P1 and sections of the ditch system within the fen habitat were subject to presence / absence survey for Great Crested Newt in spring 2009. No evidence of Great Crested Newts was recorded, while amphibian records were limited to Common Frog.

2022 update

5.8.5 No standing water was recorded within the survey area during the 2022 survey, although the pond and the ditches within the fen are expected to support water seasonally and potentially for long enough to support early breeding species such as Common Frog. Even in early spring, the waterbodies are all small in size and therefore suboptimal for Great Crested Newt, while this species was not previously recorded during specific surveys. As such, the presence of breeding Great Crested Newt within the survey area is considered unlikely.

5.8.6 A review of OS maps and aerial imagery identified one additional waterbody within 250 m of the survey area, comprising Whitlingham Little Broad, located some 80 m east of the survey area. This is a large lake which has a high likelihood of fish presence. Furthermore, the waterbody is separated from the survey area by the River Yare, which is likely to represent a dispersal barrier to Great Crested Newt. As such, it is considered unlikely that Great Crested Newt would enter the survey area from this pond. Therefore, the survey area is considered to be of negligible value to Great Crested Newt, while the presence of common amphibian species is of negligible interest.

5.9 Reptiles

5.9.1 Legislation. All six species of British reptile are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), which protects individuals against intentional killing or injury. Sand Lizard *Lacerta agilis* and Smooth Snake *Coronella austriaca* receive additional protection under the Conservation of Habitats and Species Regulations 2017 (as amended); refer to Annex 6592/6 for detailed provisions. All six reptile species are also S41 Priority Species. As such, all reptile species should be assessed as important ecological features.

5.9.2 Background Records. Information returned from NBIS included two species of reptile, namely Common Lizard *Zootoca vivipara* and Grass Snake. Grass Snake was recorded within the fen habitat within the survey area in 2015, with a peak count of 1. The closest Common Lizard records are located approximately 0.6 km north-east of the survey area, within Carey's Meadow on the north side of the River Wensum.

5.9.3 Survey Results and Evaluation

Summary of previous surveys

- 5.9.4 Survey work undertaken in April to August 2009 recorded a low population of Grass Snake in grassland and fen habitat across both the Deal Ground and May Gurney land, although the population was considered to represent a good size within the fen habitat. No other reptile species were recorded.

2022 update

- 5.9.5 The survey area remains of similar suitability for reptiles since the 2009 survey. In addition to Grass Snake, suitable habitat remains present for other common reptile species such as Common Lizard and Slow-worm. However, the likelihood of colonisation is limited by the isolation of the survey area, including river barriers to the east and north and a busy public road to the south.
- 5.9.6 Favourable habitat for Grass Snake remains centred on the fen habitat, given that this species is particularly associated with wetland habitat. The gradual drying out of the fen and encroachment of woodland and scrub since the previous survey work suggests that the habitat may have slightly declined in quality for this species, albeit much remains highly suitable. Overall, the previous evaluation is considered to remain appropriate, with the survey area of low to moderate value for reptiles in the local context.

5.10 Birds

- 5.10.1 **Legislation.** All wild birds and their nests receive protection under Section 1 of the Wildlife and Countryside Act 1981 (as amended) in respect of killing and injury, and their nests, whilst being built or in use, cannot be taken, damaged or destroyed. Species included on Schedule 1 of the Act receive greater protection and are subject to special penalties (see Annex 6592/6 for detailed provisions).
- 5.10.2 **Conservation Status.** The conservation importance of British bird species is categorised based on a number of criteria including the level of threat to a species' population status²⁸. Species are listed as Green, Amber or Red. Red Listed species are considered to be of the highest conservation concern being either globally threatened and or experiencing a high/rapid level of population decline (>50% over the past 25 years). A number of birds are also S41 Priority Species. Red and Amber listed species and priority species should be assessed as important ecological features.
- 5.10.3 **Background Records.** No specific records of birds were returned from within the survey area boundary. A high number of bird records were returned from the surrounding area, many of which were waterfowl species recorded within Whitlingham Country Park to the east. A number of species potentially associated with fen and associated wet scrub and woodland were recorded in the local area, including Marsh Harrier *Circus aeruginosus*, Sparrowhawk *Accipiter nisus*, Cetti's Warbler *Cettia cetti*, Grasshopper Warbler, Willow Warbler *Phylloscopus trochilus*, Reed Bunting, and Nightingale *Luscinia megarhynchos*.

²⁸ Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) 'Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man' British Birds 108, pp.708-746

5.10.4 Survey Results and Evaluation

Summary of previous surveys

5.10.5 Breeding bird survey undertaken at the Deal Ground land in 2009 recorded a total of 53 species, of which 26 were considered to be breeding or probably breeding within the survey area, and 7 possibly breeding. The remaining 20 species were observed flying over or foraging at the survey area, but presumed to be breeding elsewhere. A good density of breeding birds was recorded within the survey area overall, with the fen habitat in particular supporting a significant assemblage of birds, in contrast to the drier areas of woodland, scrub, ruderal and grassland habitats which supported a much reduced diversity of species.

5.10.6 Notable species recorded within the fen included the Schedule 1 species Cetti's Warbler and the RSPB red-listed species Grasshopper Warbler and Cuckoo, while the red-listed species Linnet was recorded within scrub. In addition, the Schedule 1 species Barn Owl *Tyto alba* and Kingfisher *Alcedo atthis* were recorded as non-breeding individuals, recorded hunting over the fen and along the River Yare, respectively. Amber-listed species included Sedge Warbler *Acrocephalus schoenobaenus*, Willow Warbler and Reed Bunting, all of which were recorded in the fen habitat.

2022 update

5.10.7 Habitats within the survey area remain in similar condition for breeding birds. The increase in woodland habitat at the expense of tall ruderal and fen may have slightly improved the condition of the survey area for woodland bird species, however these are likely to be focussed on common species given the young nature of the woodland with poor structural diversity. The survey area remains suitable for species recorded breeding in the fen such as Cetti's Warbler, Grasshopper Warbler and Cuckoo. The fen habitat is considered to remain the area of greatest interest for birds within the survey area.

5.10.8 The buildings within / adjacent to the survey area also represent opportunities for nesting birds, including the subway tunnel (B6) which contained old Swallow or House Martin nests on the supporting steel girders. The remaining buildings in the May Gurney land (B7 and B10) have been vandalised which presents opportunities for birds to access these for nesting, potentially including Swallow and House Martin.

5.10.9 Overall, the previous evaluation is considered to remain appropriate, i.e. the assemblage of breeding birds associated with the fen is of high value at the local level, while the assemblage associated with the remainder of the survey area is of low to moderate value at the local level.

5.11 Fish

5.11.1 **Legislation.** A number of fish species are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Some fish species are listed on Annex 2 of the Habitats Directive, which means the conservation of these species require the designation of Special Areas of Conservation to protect their most important habitats. A number of fish species are also S41 Priority Species. Where such species are present, they should be assessed as important ecological features.

5.11.2 **Background Records and Assessment.** No data on fish was returned for the search area by NBIS. A previous search of fisheries data held by the Environment Agency for the Rivers Yare and Wensum in the vicinity of the survey area found records of Bullhead *Cottus gobio* upstream along the River Yare, but no other protected or red data book species, for records

dated between 1994 and 2008. This search was updated in 2022, to cover the period between 2008 and 2022.

- 5.11.3 The closest EA sample point on the River Wensum was New Mills Yard, located approximately 2.4 km north-west of the survey area (upstream). Nine species of fish have been recorded at this sample point since 2008, including the UK Priority Species Brown Trout *Salmo trutta* and Smelt *Osmerus eperlanus*.
- 5.11.4 The closest EA sample location on the River Yare comprised Cooper Lane, located approximately 2.0 km south-west of the survey area (upstream). Twelve species have been recorded at this location, including the UK Priority Species European Eel *Anguilla anguilla* and the Annex 2 species Bullhead. This species is also a qualifying feature of the River Wensum SAC, which lies approximately 5.4 km north-west of the survey area.
- 5.11.5 As such, the Rivers Wensum and Yare adjacent to the survey area have potential to support these Priority Species and Annex 2 species of fish, and as such are considered to be of local level to fish.

5.12 Desmoulin's Whorl Snail

- 5.12.1 **Legislation and Conservation Status.** Desmoulin's Whorl Snail is listed on Annex 2 of the Habitats Directive, which means the conservation of this species requires the designation of Special Areas of Conservation. As such, for species listed under Annex 2 it is the conservation of their supporting habitat that is the principal factor determining their survival, with the protection and management of sites considered to be the most appropriate action to maintain habitat suitable to support the species and hence maintain the favourable conservation status of the species.
- 5.12.2 In the UK, SAC sites have been selected to represent the population strongholds of Desmoulin's Whorl Snail, whereby the selected sites represent the largest populations present under a range of ecological conditions, including floodplain and wetlands. Indeed, The Broads SAC, located approximately 5.4 km east of the survey area, has been designated for supporting the main stronghold population of Desmoulin's Whorl Snail in East Anglia, while the River Wensum SAC located 5.4 km upstream (north-west) of the survey area has Desmoulin's Whorl Snail listed as a secondary reason for designation.
- 5.12.3 In this regard, smaller populations of this species are known to exist outside SACs where this species has been identified as being present, have often been designated as local conservation sites, as is the case within the survey area in the form of Carrow Abbey Marsh CWS.
- 5.12.4 Desmoulin's Whorl Snail is also listed as Nationally Scarce and a Priority Species.
- 5.12.5 **Background Records.** No records of Desmoulin's Whorl Snail were returned by NBIS for the search area.
- 5.12.6 **Survey Results and Evaluation**
- Summary of previous surveys*
- 5.12.7 Survey work for invertebrates undertaken in 2009 recorded the presence of Desmoulin's Whorl Snail in sedge-dominant vegetation and the ditches within the fen habitat.

2022 update

- 5.12.8 Update survey work was undertaken in October 2022 for Desmoulin's Whorl Snail, to evaluate the current distribution of this species within the fen habitat. The species was recorded at 40 of the 78 samples taken. The distribution of the species was patchy within the fen, and concentrated on the south-central part of the fen (see Plan 6592/ECO6).
- 5.12.9 Moisture levels varied across the survey area with patches of drier and damp ground (Levels 1 and 2), characterised by patches of Common Nettle and Water Mint which are indicators of the drying of marsh habitat, and wetter ground (Levels 4 and 5) with standing water in ditches, characterised by the hydrosere vegetation. Desmoulin's Whorl Snail was found in highest abundance in samples with higher moisture levels (between levels 3 and 5). There was a dramatic decrease in abundance when the moisture levels were between 1 and 2.
- 5.12.10 Given the relatively high population of this species, albeit patchily distributed within the fen, which is associated with the County Wildlife Site, the survey area is considered to be of value to this species at the county level.

5.13 Other Invertebrates

5.13.1 **Legislation.** A number of invertebrate species are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). In addition, Large Blue Butterfly *Maculinea arion*, Fisher's Estuarine Moth *Gortyna borellii lunata* and Lesser Whirlpool Ram's-horn Snail *Anisus vorticulus* receive protection under the Conservation of Habitats and Species Regulations 2017 (as amended); refer to Annex 6592/6 for detailed provisions. A number of invertebrates are also S41 Priority Species. Where such species are present, they should be assessed as important ecological features.

5.13.2 **Background Records.** Two invertebrate records were returned by NBIS adjacent to the survey area. Firstly, Bulrush Veneer Moth *Calamotropha paludella* (Nationally Scarce) was recorded adjacent to the east of the survey area, within Trowse Meadow, dated 2014. The Cinnabar Moth *Tyria jacobaeae* was recorded adjacent to the south of the survey area, which is a common species listed on the UK BAP for research purposes only. The next nearest invertebrate records relate to moth light-trapping undertaken in Trowse Churchyard, approximately 130 m south-east of the survey area. These comprise a number of UK Priority Species. Further afield, a number of Nationally Rare and Nationally Scarce species have been recorded within Carey Meadow and in parks within Norwich to the north-west of the survey area, primarily comprising Hymenoptera species.

5.13.3 Survey Results and Evaluation

Summary of previous surveys

5.13.4 Survey work for terrestrial invertebrates undertaken at the Deal Ground land in 2009 identified a total of 592 species of invertebrates. This assemblage included 17 Priority Species, one Nationally Rare RDB3 species (Twin-spotted Wainscot Moth *Archana geminipuncta*, associated with reedbeds), 14 Nationally Notable species, and 30 Nationally Local species. These species of conservation interest were primarily associated with wetland and ruderal habitats, which supported 40% and 42% of the species of conservation interest within the survey area, respectively. Woodland habitat was of comparatively lower interest, supporting 26% of the species of conservation interest within the survey area. Accordingly, the previous assessment concluded that the fen and its marginal scrub habitats, together with the ruderal habitats along the northern and western margins of the fen, represented the areas of greatest invertebrate interest within the survey area.

2022 update

- 5.13.5 During the Desmoulin's Whorl Snail survey, all additional mollusc species were recorded and showed a depauperate mollusc community, with between zero and four mollusc species found at each sample location. Other than Desmoulin's Whorl Snail, a total of nine mollusc species were found across the whole fen.
- 5.13.6 In terms of other invertebrates, the European Chinch Bug *Ischnodemus sabuleti* was found in very high abundance throughout the survey area, with thousands of individuals turning up in each sample. This species does not have any conservation designation and is commonly encountered in high numbers in wetland habitat.
- 5.13.7 The condition of habitats for invertebrates remains similar to the situation in 2009, albeit a gradual drying of the fen appears to have taken place at the expense of floristic diversity, while the area of open fen has slightly decreased because of tree and scrub encroachment (as described in Section 4 above). As such, any change in the invertebrate community associated with the fen is likely to represent an overall slight decline in conservation interest.
- 5.13.8 The ruderal habitats have substantially declined since the previous survey work, most notably the area to the north of the fen which now largely comprises closed-canopy woodland (albeit update tree survey work in June 2023 identified that much of this has been recently felled, which could allow tall ruderal vegetation to regenerate). However, tall ruderal habitat was recorded at a greater extent along the eastern and southern margins of the fen, adjacent to the River Yare. These areas are likely to be of particular importance for invertebrates, along with the fen and associated wet scrub and wet woodland habitats. Overall, the evaluation for invertebrates is considered to be unchanged from the previous assessment, i.e. the woodland assemblage is of value at the local level, the ruderal assemblage of value at the local to county level, and the wetland assemblage of value at the county level.

5.14 Summary

- 5.14.1 On the basis of the above, a summary of the evaluation of fauna is provided below:

Table 5.2. Evaluation summary of fauna forming important ecological features.

Species / Group	Supported by or associated with the survey area	Level of Importance
Bats – Roosting	Potential habitat in the form of trees and buildings	Local
Bats – Foraging / Commuting	Confirmed presence within survey area	Local
Water Vole	Could occur sporadically along River Yare	Negligible to Local
Otter	Could occur sporadically along River Yare	Negligible to Local
Other mammals	Potential for Harvest Mouse, Hedgehog and Polecat	Local
Reptiles	Confirmed presence within survey area	Local
Birds	Confirmed presence of species of conservation interest within survey area	Local
Fish	Potential for Priority Species adjacent to survey area	Local
Desmoulin's Whorl Snail	Confirmed presence within survey area	County

Species / Group	Supported by or associated with the survey area	Level of Importance
Other Invertebrates	Confirmed presence of species of conservation interest within survey area	Woodland assemblage – Local Ruderal assemblage – Local to County Wetland assemblage - County

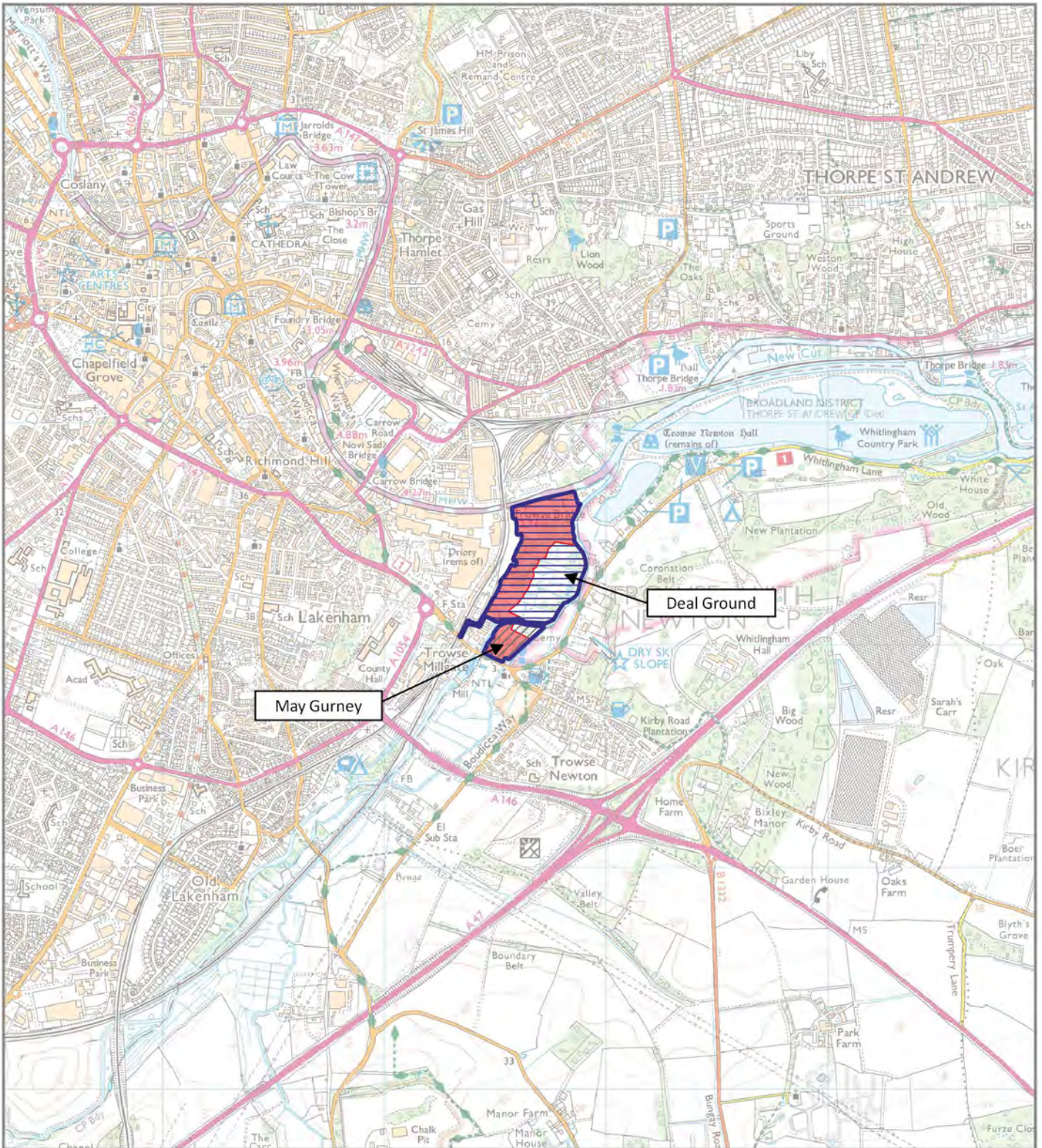
5.14.2 Other fauna supported by the survey area include non-priority species of mammals and non-protected amphibian species. These species do not form important ecological features.

6 Conclusions

- 6.1.1 Aspect Ecology has carried out a Baseline Ecological Appraisal of the survey area, based on the results of a desktop study, Phase 1 habitat survey and a number of protected species surveys.
- 6.1.2 A number of statutory ecological designations are present in the vicinity of the survey area, most notably The Broads SAC / Broadland SPA, which lies approximately 5.4 km east of the survey area.
- 6.1.3 Part of the survey area itself is designated as a non-statutory CWS, named 'Carrow Abbey Marsh'. The CWS is designated for its tall fen and tall herb vegetation with young woodland and willow carr, and for the presence of Desmoulin's Whorl Snail *Vertigo moulinsiana*.
- 6.1.4 The Phase 1 habitat survey confirmed that the survey area supports a number of Priority Habitats of ecological importance, namely, eutrophic floodplain fen irreplaceable habitat and wet woodland, in addition to the River Yare which lies adjacent to the east of the survey area. The Nationally Scarce species Marsh Fern was recorded in one small location within the survey area, while Hoary Mullein (also Nationally Scarce) was previously recorded in tall ruderal vegetation and could remain present.
- 6.1.5 The habitats within the survey area remain suitable for a range of protected species previously recorded within the survey area, including Grass Snake and breeding birds, while certain features within the survey area have potential to support roosting bats, Water Vole, and Otter. Desmoulin's Whorl Snail was recorded within the fen habitat, while the overall invertebrate assemblage associated with the fen is considered to be of county value.

Plan 6592/ECO1:

Site Location



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Key:

- Site Boundary
- Survey Area
- Deal Ground
- May Gurney



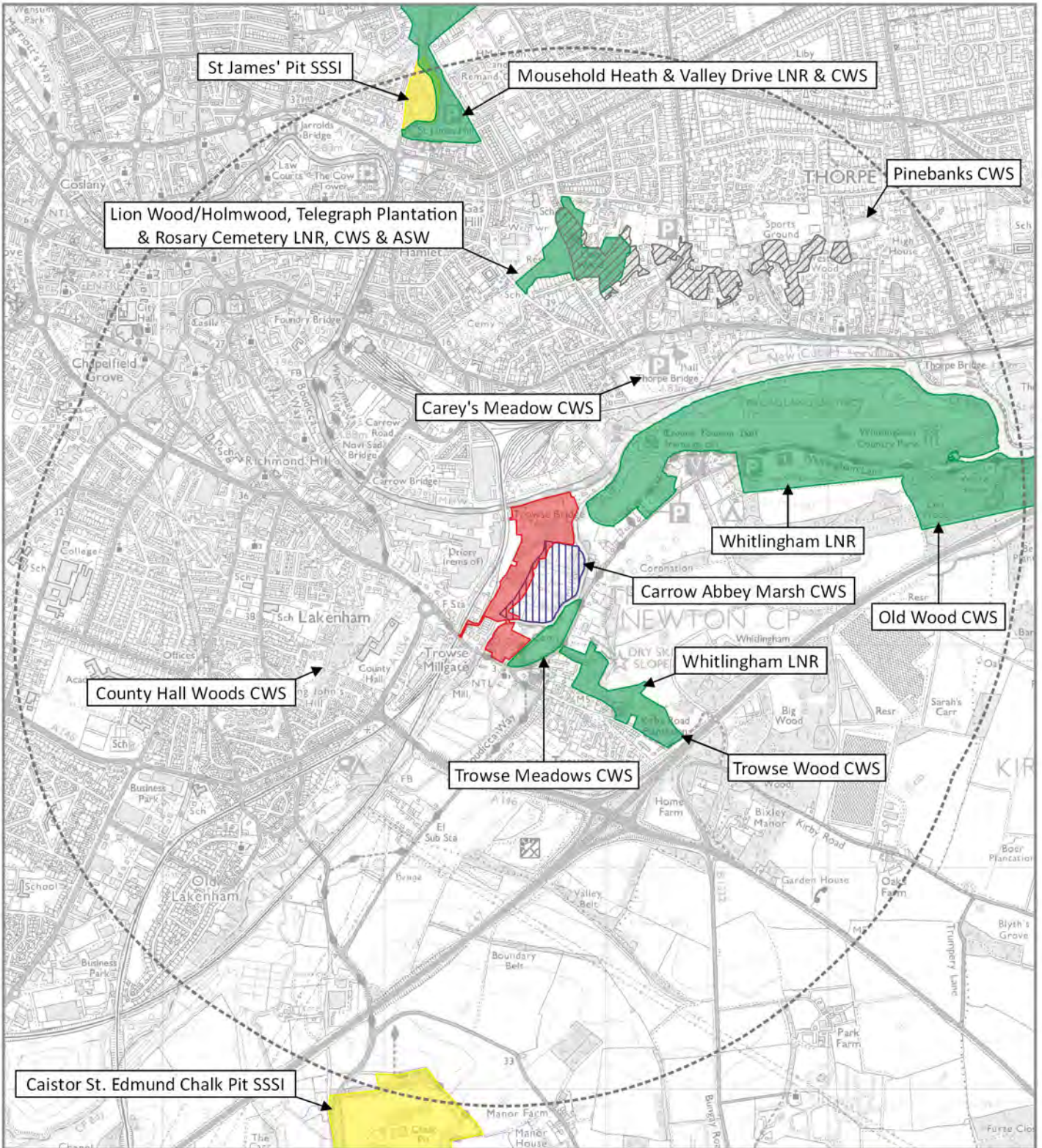
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Deal Ground, Norwich	PROJECT
Site Location	TITLE
6592/ECO1	DRAWING NO.
B/BG	REV
December 2022	DATE



Plan 6592/ECO2:

Ecological Designations



Key:

- Site Location
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- County Wildlife Site (CWS)
- Ancient Semi Natural Woodland (ASW)
- 2km Study Area



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**Land at Deal Ground and
 May Gurney
 Ecological Designations**

6592/ECO2

B/JP

June 2023

PROJECT
 TITLE
 DRAWING NO.
 REV
 DATE



Plan 6592/ECO3:

Habitats and Ecological Features



Key:

- Site Boundary
- Survey Area
- County Wildlife Site
- Bramble
- Building/Structure
- Fen
- Hardstanding
- Japanese Knotweed
- Neutral Grassland
- Pond
- Previously Developed Land
- Scattered Japanese Knotweed
- Scrub
- Tall Ruderal
- Dry Woodland
- Wet Woodland
- Other Structure
- Amenity Planting
- Line of Trees
- Watercourse
- Ditch
- Scattered Scrub
- Tree
- Recently Felled Tree

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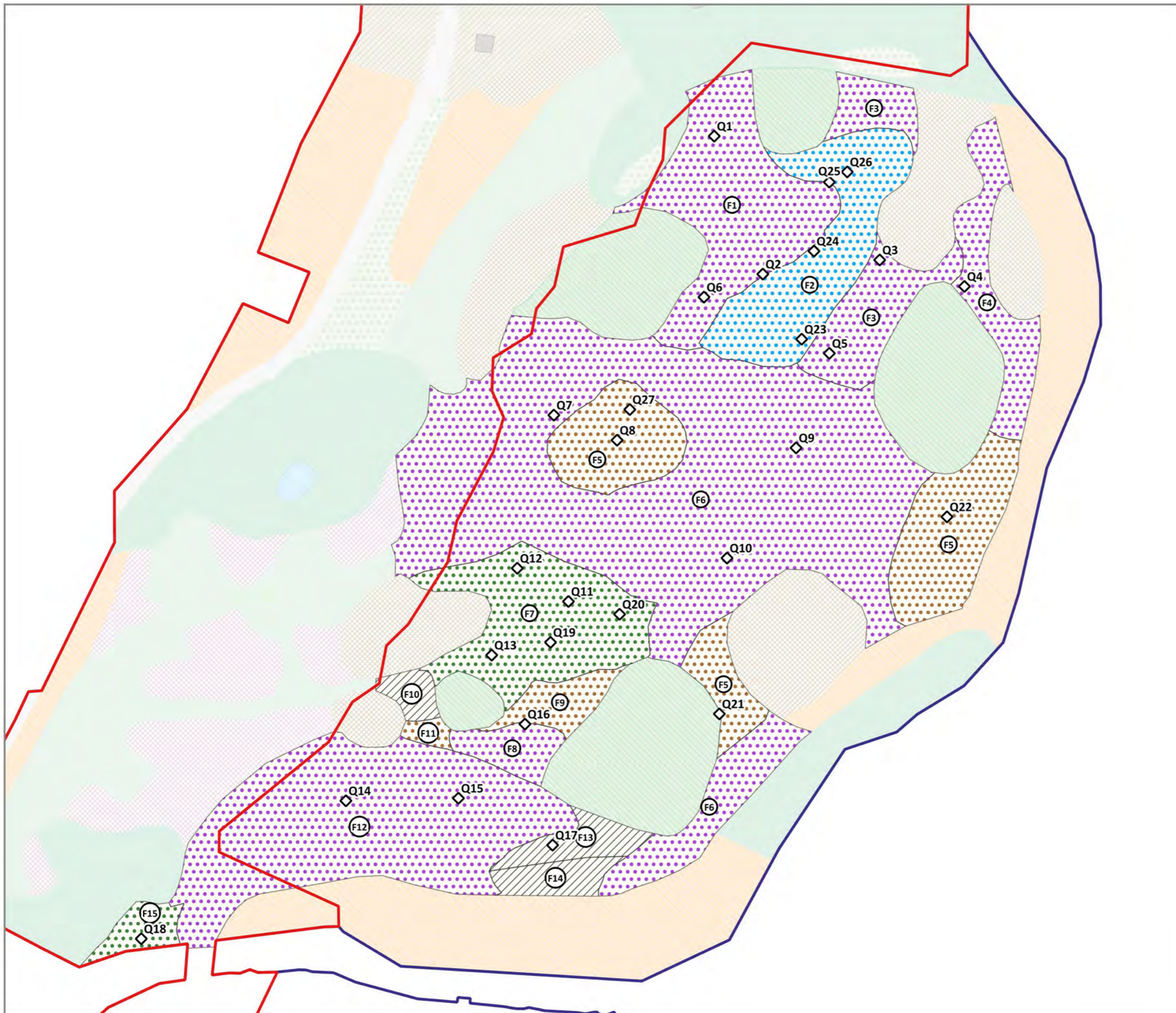
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<p>Land at Deal Ground and May Gurney Habitats and Ecological Features</p>	<p>PROJECT TITLE DRAWING NO. REV DATE</p>
<p>6592/ECO3</p>	<p>D/AM June 2023</p>



Plan 6592/ECO4:

NVC Survey Plan



- Key:
- Site Boundary
 - Wider Survey Area
 - Quadrat Location
- NVC communities**
- S5 *Glyceria maxima* swamp
 - S6 *Carex riparia* swamp
 - S26 *Phragmites australis-Urtica dioica* tall-herb fen
 - S28 *Phalaris arundinacea* tall-herb fen
 - Non-swamp communities



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Deal Ground, Norwich PROJECT

NVC Survey Plan TITLE

6592/ECO4 DRAWING NO.

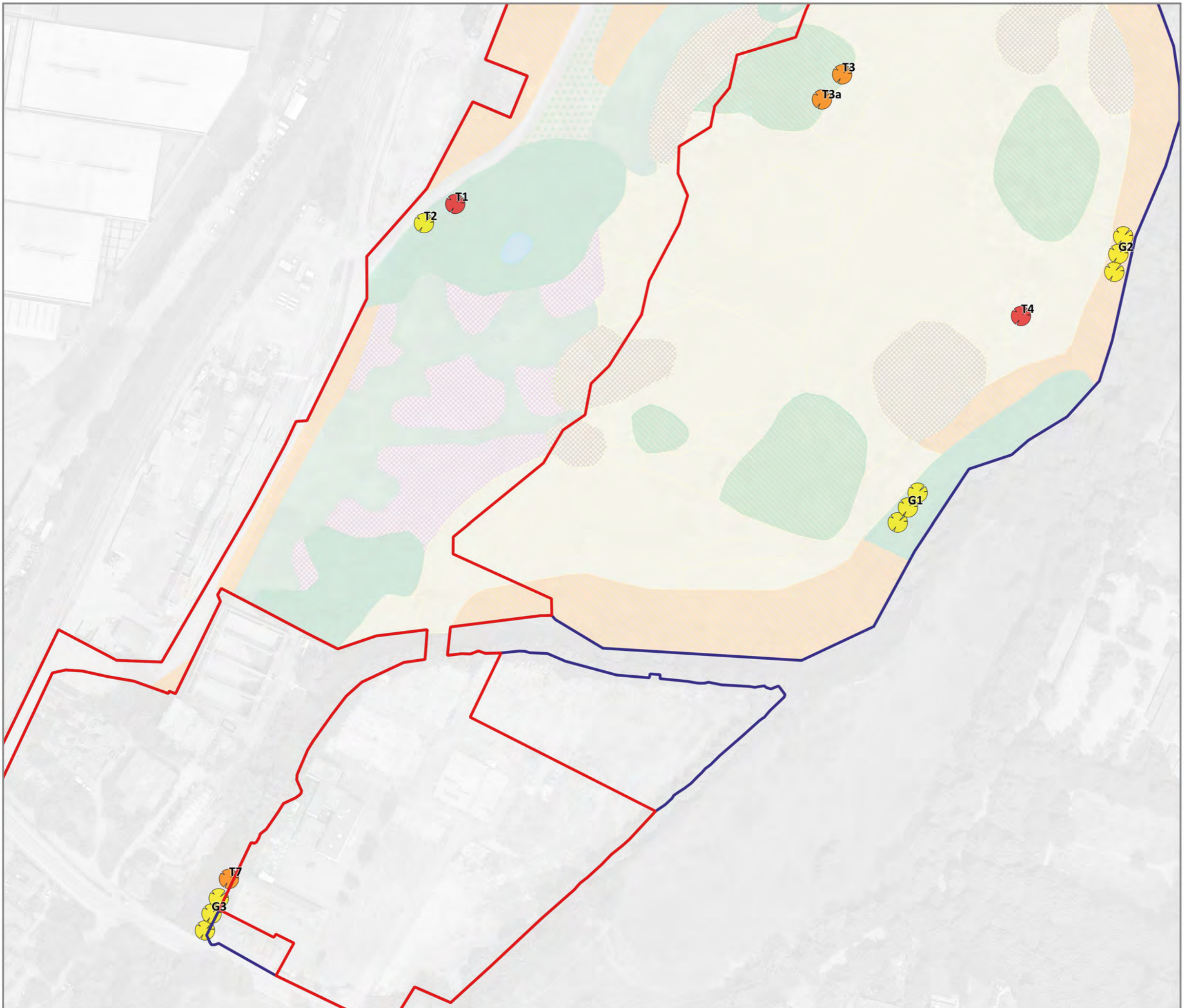
B/JP REV

January 2023 DATE



Plan 6592/ECO5:

Trees With Bat Potential



- Key:
- Site Boundary
 - Wider Survey Area
 - Tree with Low Bat Roosting Potential
 - Tree with Moderate Bat Roosting Potential
 - Tree with High Bat Roosting Potential



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Deal Ground, Norwich PROJECT

Trees with Bat Potential TITLE

6592/EC05 DRAWING NO.

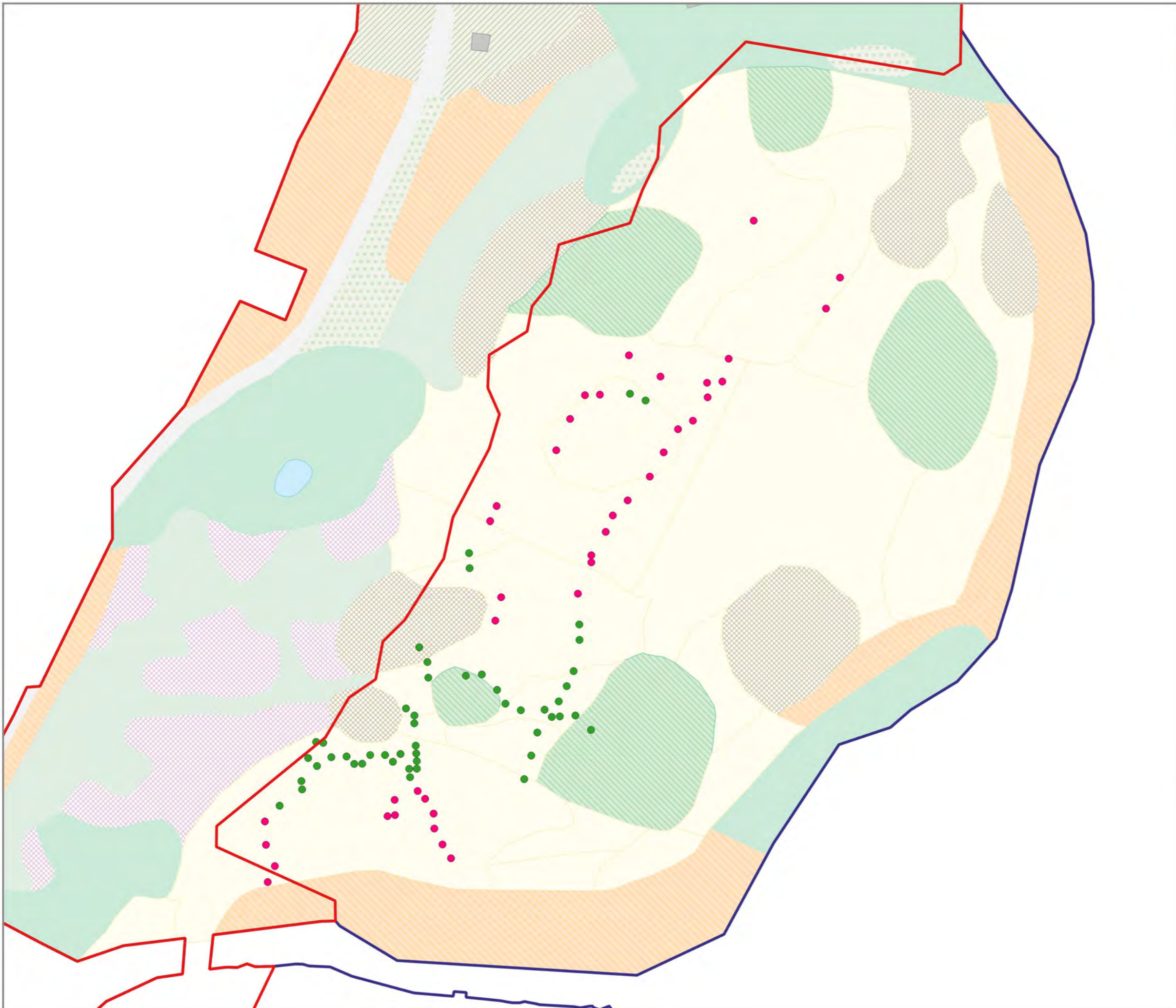
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January 2023 DATE



Plan 6592/ECO6:

Desmoulin's Whorl Snail Survey



- Key:
- Site Boundary
 - Wider Survey Area
 - Vertigo moulinsiana Present
 - Vertigo moulinsiana Absent

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Deal Ground, Norwich	PROJECT
Demoulin's Whorl Snail Survey	TITLE
6592/ECO6	DRAWING NO.
B/JP	REV
January 2023	DATE



Photographs

Photograph 1: A typical view of the central fen (F6)



Photograph 2: Drier part of the fen in the south (F13)



Photograph 3: Neutral grassland (NG1)



Photograph 4: Tall ruderal with scattered tree cover along River Yare



Photograph 5: Dry woodland (W4)



Photograph 6: Wet woodland (W10)



Photograph 7: River Wensum, looking east



Photograph 8: River Yare, looking east at the south margin of Deal Ground



Photograph 9: Well vegetated previously developed land (PDL8)



Photograph 10: Sparsely vegetated ground (PDL2)



Photograph 11: The old kiln (B4)



Photograph 12: Former Colemans Subway Tunnel (B6)



Annex 6592/1:

Evaluation Methodology

Evaluation Methodology

1. The evaluation of ecological features and resources is based on professional judgement whilst also drawing on the latest available industry guidance and research. The approach taken in this report is based on that described by the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (2018)¹.

Importance of Ecological Features

2. Ecological features within the site/study area have been evaluated in terms of whether they qualify as 'important ecological features'. In this regard, CIEEM guidance states that *"it is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable"*.
3. Various characteristics contribute to the importance of ecological features, including:
 - Naturalness;
 - Animal or plant species, sub-species or varieties that are rare or uncommon, either internationally, nationally or more locally, including those that may be seasonally transient;
 - Ecosystems and their component parts, which provide the habitats required by important species, populations and/or assemblages;
 - Endemic species or locally distinct sub-populations of a species;
 - Habitat diversity;
 - Habitat connectivity and/or synergistic associations;
 - Habitats and species in decline;
 - Rich assemblages of plants and animals;
 - Large populations of species or concentrations of species considered uncommon or threatened in a wider context;
 - Plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities; and
 - Species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.
4. As an objective starting point for identifying important ecological features, European, national and local governments have identified sites, habitats and species which form a key focus for biodiversity conservation in the UK, supported by policy and legislation. These are summarised by CIEEM guidance as follows:

Designated Sites

- Statutory sites designated or classified under international conventions or European legislation, for example World Heritage Sites, Biosphere Reserves, Wetlands of International Importance (Ramsar sites), Special Areas of Conservation (SAC), Special Protection Areas (SPA);

¹ CIEEM (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine', Chartered Institute of Ecology and Environmental Management, Winchester

- Statutory sites designated under national legislation, for example Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserves (LNR);
- Locally designated wildlife sites, e.g. Local Wildlife Sites (LWS).

Biodiversity Lists

- Habitats and species of principal importance for the conservation of biodiversity in England and Wales (largely drawn from UK BAP priority habitats and priority species), often referred to simply as Priority Habitats / Species;
- Local BAP priority species and habitats.

Red Listed, Rare, Legally Protected Species

- Species of conservation concern, Red Data Book (RDB) species;
- Birds of Conservation Concern;
- Nationally rare and nationally scarce species;
- Legally protected species.

5. In addition to this list, other features may be considered to be of importance on the basis of local rarity, where they enable effective conservation of other important features, or play a key functional role in the landscape.

Assigning Level of Importance

6. The importance of an ecological feature should then be considered within a defined geographical context. Based on CIEEM guidance, the following frame of reference is used:
 - International (European);
 - National;
 - Regional;
 - County;
 - District;
 - Local (e.g. Parish or Neighbourhood);
 - Site (not of importance beyond the immediate context of the site).
7. Features of 'local' importance are those considered to be below a district level of importance, but are considered to appreciably enrich the nature conservation resource or are of elevated importance beyond the context of the site.
8. Where features are identified as 'important' based on the list of key sites, habitats and species set out above, but are very limited in extent or quality (in terms of habitat resource or species population) and do not appreciably contribute to the biodiversity interest beyond the context of the site, they are considered to be of 'site' importance.
9. In terms of assigning the level of importance, the following considerations are relevant:

Designated Sites

10. For designated sites, importance should reflect the geographical context of the designation (e.g. SAC/SPA/Ramsar sites are designated at the international level whereas SSSIs are designated at the national level). Consideration should be given to multiple designations as appropriate (where an area is subject to differing levels of nature conservation designations).

Habitats

11. In certain cases, the value of a habitat can be measured against known selection criteria, e.g. SAC selection criteria, 'Guidelines for the selection of biological SSSIs' and the Hedgerows Regulations 1997. However, for the majority of commonly encountered sites, the most relevant habitat evaluation will be at a more localised level and based on relevant factors such as antiquity, size, species-diversity, potential, naturalness, rarity, fragility and typicalness (Ratcliffe, 1977). The ability to restore or re-create the habitat is also an important consideration, for example in the case of ancient woodland.
12. Whether habitats are listed as priorities for conservation at a national level in accordance with Sections 41 and 42 of the Natural Environment and Rural Communities Act (NERC) 2006, so called 'Habitats of Principal Importance' or 'Priority Habitats', or within regional or local Biodiversity Action Plans (BAPs) is also relevant, albeit the listing of a particular habitat under a BAP does not in itself imply any specific level of importance.
13. Habitat inventories (such as habitat mapping on the MAGIC database) or information relating to the status of particular habitats within a district, county or region can also assist in determining the appropriate scale at which a habitat is of importance.

Species

14. Deciding the importance of species populations should make use of existing criteria where available. For example, there are established criteria for defining nationally and internationally important populations of waterfowl. The scale within which importance is determined could also relate to a particular population, e.g. the breeding population of common toads within a suite of ponds or an otter population within a catchment.
15. When determining the importance of a species population, contextual information about distribution and abundance is fundamental, including trends based on historical records. For example, a species could be considered particularly important if it is rare and its population is in decline. With respect to rarity, this can apply across the geographic frame of reference and particular regard is given to populations where the UK holds a large or significant proportion of the international population of a species.
16. Whether species are listed as priorities for conservation at a national level in accordance with Sections 41 and 42 of the Natural Environment and Rural Communities Act (NERC) 2006, so called 'Species of Principal Importance' or 'Priority Species', or within regional or local Biodiversity Action Plans (BAPs) is also relevant, albeit the listing of a particular species under a BAP does not in itself imply any specific level of importance.
17. Species populations should also be considered in terms of the potential zone of influence of the proposals, i.e. if the entire species population within the site and surrounding area were to be affected by the proposed development, would this be of significance at a local, district, county or wider scale? This should also consider the foraging and territory ranges of individual species (e.g. bats roosting some distance from site may forage within site whereas other species such as invertebrates may be more sedentary).

Annex 6592/2:

CWS Citation

**County Wildlife Site
(Ref No: 1455)**

Site Name: Carrow Abbey Marsh

District: Norwich

Grid Reference: TG 247073

Area: 7.9 ha

Site Description:

This site comprises a mosaic of mainly tall fen and tall herb vegetation, with large areas of young woodland and willow carr. The site lies within a meander of the River Yare and there are a number of derelict drains crossing the marsh.

The fen vegetation is largely composed of reed sweet-grass (*Glyceria maxima*) and meadowsweet (*Filipendula ulmaria*) with some reed canary-grass (*Phalaris arundinacea*), great willowherb (*Epilobium hirsutum*), angelica (*Angelica sylvestris*) and marsh woundwort (*Stachys palustris*). Water forget-me-not (*Myosotis scorpioides*) and water chickweed (*Myosoton aquaticum*) were also noted growing near the drainage ditches.

The ditches themselves are choked with reed sweet-grass. Some contain bulrush (*Typha latifolia*), greater pond-sedge (*Carex riparia*), bittersweet (*Solanum dulcamara*), brooklime (*Veronica beccabunga*) and water-cress (*Nasturtium officinale*). Desmoulin's whorl snail (*Vertigo moulinsiana*) is known to occur in some of these ditches.

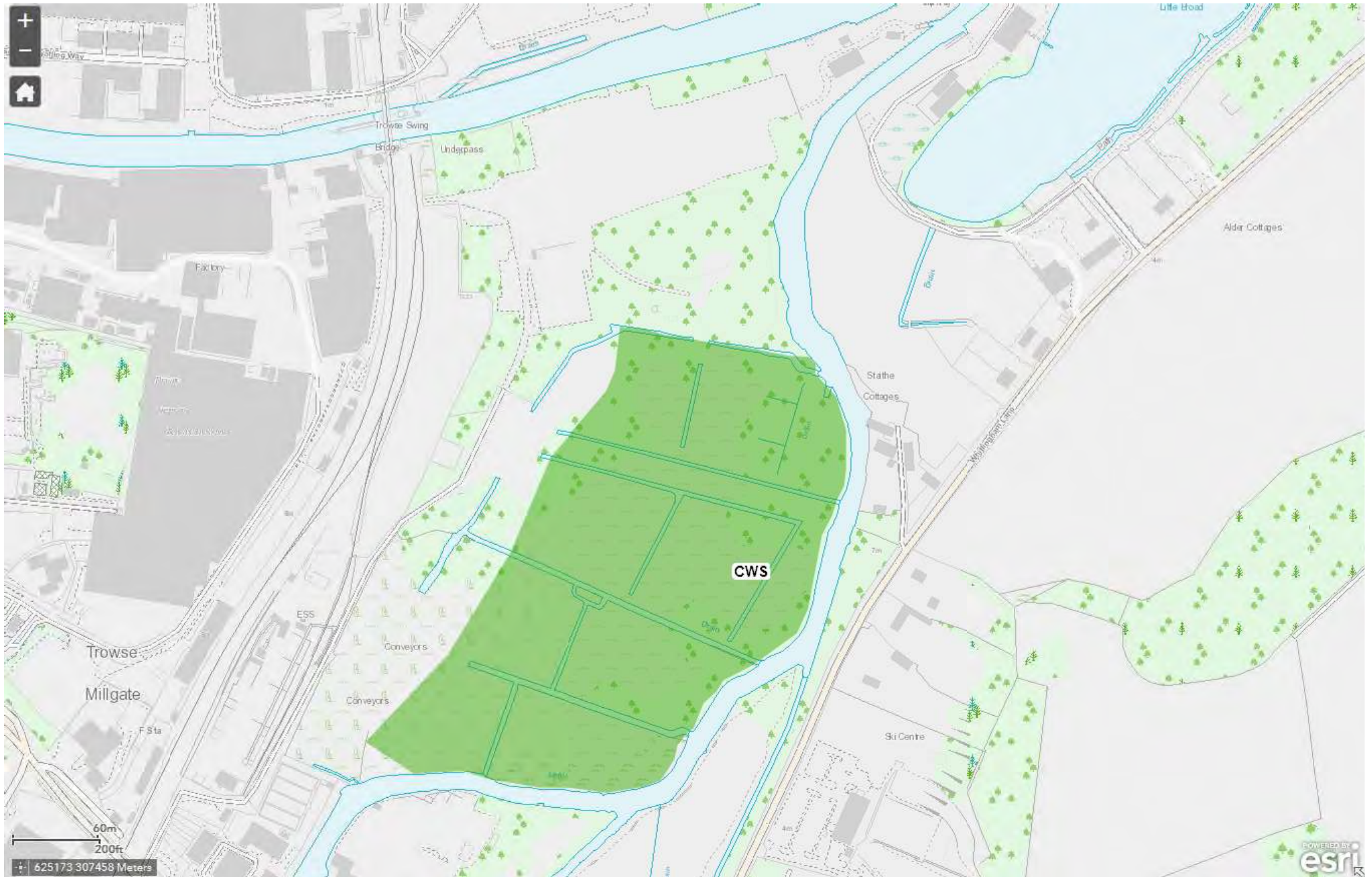
The areas of tall herb are mainly composed of nettles (*Urtica dioica*) and great willow-herb.

To the north of the site is a block of scrub, composed mainly of crack willow (*Salix fragilis*), sallow (*Salix cinerea*), occasional hawthorn (*Crataegus monogyna*) and some alder (*Alnus glutinosa*). This area also includes a derelict brick furnace. Where the land is drier and had been more disturbed in the past, elder (*Sambucus nigra*), silver birch (*Betula pendula*) and downy birch (*Betula pubescens*) occur, with thickets of bramble (*Rubus* spp.). Open areas are dominated by reed sweet grass, hoary willow-herb and nettles. Green figwort (*Scrophularia umbrosa*) is also known to occur in this area.

There are a few willow (*Salix* spp) and hawthorn bushes scattered throughout the site. An area of willow, sycamore (*Acer pseudoplatanus*) and elder borders the river in places.

Annex 6592/3:

CWS Boundary (Norwich Local Plan)



Annex 6592/4:

NVC Quadrat Data

Quadrat data from NVC survey undertaken in 2022. Numbers for each species represent percentage cover. 'Fen area' refers to Plan 6592/ECO3. Quadrats are colour coded according to their NVC community.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27
Grid reference (preceded by TG)	24757 07428	24776 07374	24805 07384	24844 07372	24802 07343	24753 07365	24701 07314	24719 07309	24789 07306	24762 07263	24700 07246	24680 07259	24670 07225	24613 07168	24657 07169	24683 07198	24693 07157	24533 07114	24693 07230	24720 07241	24759 07202	24848 07279	24796 07347	24796 07383	24802 07410	24809 07414	24724 07321
Sward height (cm)	90	90	90	110	90	120	170	70	90	110	180	0	190	120	100	70	70	180	180	190	160	150	170	150	150	150	120
Fen area	F1	F2	F3	F4	F3	F1	F6	F5	F6	F6	F7	F7	F7	F12	F12	F9	F13	F15	F7	F7	F5	F5	F2	F2	F2	F2	F5
Main NVC community	S6	S28	S6	S6	S6	S6	S6	S5	S6	S6	S26	S26	S26	S6	S6	S5	Not classified	S26	S26	S26	S5	S5	S28	S28	S28	S28	S5
Ellenberg value wetness	7.9	8.0	8.1	7.4	8.1	8.1	8.3	9.8	8.0	8.3	9.6	9.6	9.5	8.4	8.2	9.6	7.1	8.4	9.8	9.6	9.9	9.6	8.1	8.2	8.2	8.0	9.9
<i>Angelica sylvestris</i>		5							5								2						2				
<i>Calystegia sepium</i>				2					10	10				20				5									
<i>Carex riparia</i>	80	5	90	65	85	75	90		70	60		20		65	60					20			10	20	5	15	
<i>Cirsium arvense</i>	5			2				1									60						5			2	
<i>Epilobium hirsutum</i>						5		1																	1		
<i>Equisetum palustre</i>													10	10		1	30										
<i>Eupatorium cannabinum</i>	10	1	5		5	5				2	1			2	2		30						5				
<i>Filipendula ulmaria</i>	1		1	1			10	10	5	2					1					1	1		1			1	2
<i>Galium aparine</i>																											1
<i>Glyceria maxima</i>								85											2		90	90					90
<i>Humulus lupulus</i>											10		5									1					1
<i>Impatiens capensis</i>												1															
<i>Lycopus europaeus</i>									5																		
<i>Lythrum salicaria</i>														5		2											
<i>Persicaria amphibia</i>		5	5		5	5	20	10	5	25	10	10		20	10				5	20	5	5	10	10	10	5	10
<i>Phalaris arundinacea</i>		90		5		15									5	15							80	70	90	80	
<i>Phragmites australis</i>											80	80	95					60	95	70							
<i>Rumex conglomeratus</i>																	5										
<i>Scrophularia auriculata</i>																					1						
<i>Scutellaria galericulata</i>																5											
<i>Solanum dulcamara</i>													5														1
<i>Stachys palustris</i>	5	2	5		5	1	5		15	2	5		5		15	5	5				5	2	10	5		5	
<i>Thalictrum flavum</i>			1	1					5						1					2							
<i>Urtica dioica</i>		3		30	2				2	10							5	40	5			10				2	
<i>Vicia cracca</i>			2																							2	
Number of species	5	7	7	7	5	6	4	5	9	7	5	4	5	6	7	7	7	3	5	4	5	6	8	4	4	8	5

Annex 6592/5:

NVC MAVIS Output

MAVIS output for all quadrats and subsets of quadrats according to their NVC community categorisation. For each category, the top ten communities are presented along with their percentage score.

Area categorised as:	All quadrats		S5		S6		S26		S28	
Top 10 matching communities / sub-communities	OV26	58.82	S5	64.79	S6	53.97	S26	51.99	S6	50.08
	S26	58.47	S5a	52.52	S5	45.61	S4	51.84	S28	48.35
	S6	56.85	S26	46.13	M27b	44.67	S4a	49.72	S28b	45.45
	OV26b	54.05	OV26	45.45	OV26b	44.23	S26d	49.38	S28a	42.96
	S5	53.18	S26d	42.9	S26	43.72	S5	47.17	S26	40.25
	S26d	51.22	S6	38.06	OV26	43.37	S6	40.82	OV26	40.11
	M27b	49.16	S5b	37.89	S26a	40.69	S26a	40.57	M27b	38.89
	OV26d	47.01	S28	36.12	S26d	38.3	S26b	40.07	S5	37.19
	S26b	43.64	S4	35.23	S26b	38.04	OV26	39.1	S26b	35.93
	S4	42.43	OV26b	35.09	OV26d	37.95	S4b	38.1	OV26d	34.57

Annex 6592/6:

Legislation Summary

LEGISLATION SUMMARY

1. In England and Wales primary legislation is made by the UK Parliament, and in Scotland by the Scottish Parliament, in the form of Acts. The main piece of legislation relating to nature conservation in the UK is the Wildlife and Countryside Act 1981 (as amended).
2. Acts of Parliament confer powers on Ministers to make more detailed orders, rules or regulations by means of secondary legislation in the form of statutory instruments. Statutory instruments are used to provide the necessary detail that would be too complex to include in an Act itself¹. The provisions of an Act of Parliament can also be enforced, amended or updated by secondary legislation.
3. In summary, the key pieces of legislation relating to nature conservation in the UK are:
 - Wildlife and Countryside Act 1981 (as amended)
 - Protection of Badgers Act 1992
 - Hedgerows Regulations 1997
 - Countryside and Rights of Way (CROW) Act for England and Wales 2000
 - Natural Environment and Rural Communities Act 2006
 - Conservation of Habitats and Species Regulations 2017
4. A brief summary of the relevant legislation is provided below. The original Acts and instruments should be referred to for the full and most up to date text of the legislation.
5. **Wildlife and Countryside Act 1981 (as amended)**. The WCA Act provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs) identified for their flora, fauna, geological or physiographical features. The Act contains strict measures for the protection and management of SSSIs.
6. The Act also refers to the treatment of UK wildlife including protected species listed under Schedules 1 (birds), 5 (mammals, herpetofauna, fish, invertebrates) and 8 (plants).
7. Under Section 1(1) of the Act, all wild birds are protected such that it is an offence to intentionally:
 - Kill, injure or take any wild bird;
 - Take, damage or destroy the nest of any wild bird whilst in use* or being built;
 - Take or destroy an egg of any wild bird.

* The nests of birds that re-use their nests as listed under Schedule ZA1, e.g. Golden Eagle, are protected against taking, damage or destruction irrespective of whether they are in use or not.
8. Offences in respect of Schedule 1 birds are subject to special, i.e. higher, penalties. Schedule 1 birds also receive greater protection such that it is an offence to intentionally or recklessly:
 - Disturb any wild bird included in Schedule 1 while it is building a nest or while it is in, on or near a nest containing eggs or young;
 - Disturb dependent young of such a bird.

¹ <http://www.parliament.uk/business/bills-and-legislation/secondary-legislation/statutory-instruments/>

9. Under Section 9(1) of the Act, it is an offence to:
 - Intentionally kill, injure or take any wild animal included in Schedule 5.
10. In addition, under Section 9(4) it is an offence to intentionally or recklessly:
 - Obstruct access to, any structure or place which any wild animal included in Schedule 5 uses for shelter or protection; or
 - Disturb any wild animal included in Schedule 5 while occupying a structure or place which it uses for that purpose.
11. Under Section 13(1) it is an offence:
 - To intentionally pick, uproot or destroy any wild plant listed in Schedule 8; or
 - Unless the authorised person, to intentionally uproot any wild plant not included in Schedule 8.
12. The Act also contains measures (S.14) for preventing the establishment of non-native species that may be detrimental to native wildlife, prohibiting the introduction into the wild of animals (releases or allows to escape) and plants (plants or causes to grow) listed under Schedule 9.
13. **Protection of Badgers Act 1992.** The Act aims to protect the species from persecution, rather than being a response to an unfavourable conservation status, as the species is in fact common over most of Britain. It should be noted that the legislation is not intended to prevent properly authorised development. Under the Act it is an offence to:
 - Wilfully kill, injure, take, possess or cruelly ill-treat* a Badger, or attempt to do so;
 - To intentionally or recklessly interfere with a sett# (this includes disturbing Badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it).

* the intentional elimination of sufficient foraging area to support a known social group of Badgers may, in certain circumstances, be construed as an offence

A sett is defined as “any structure or place which displays signs indicating current use by a Badger”. Natural England advice (June 2009) is that a sett is protected so long as such signs remain present, which in practice could potentially be for some time after the last actual occupation by Badger. Interference with a sett includes blocking tunnels or damaging the sett in any way
14. Licences can be obtained from the Statutory Nature Conservation Organisation (SNCO) for development activities that would otherwise be unlawful under the legislation, provided there is suitable justification. The SNCO for England is Natural England.
15. **Hedgerows Regulations 1997.** ‘Important’ hedgerows (as defined by the Regulations) are protected from removal (up-rooting or otherwise destroying). Various criteria specified in the Regulations are employed to identify ‘important’ hedgerows for wildlife, landscape or historical reasons.
16. **Countryside and Rights of Way (CROW) Act for England and Wales 2000.** The CROW Act provides increased measures for the management and protection of SSSIs and strengthens wildlife enforcement legislation. Schedule 12 of the Act amends the species provisions of the WCA 1981, strengthening the legal protection for threatened species. The Act also introduced a duty on Government to have regard to the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity.

17. **Natural Environment and Rural Communities Act 2006.** Section 41 of the NERC Act requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as local planning authorities, in implementing their duty under Section 40 of the Act, to have regard to the conservation of biodiversity in England, when exercising their normal functions. 56 habitats and 943 species of principal importance are included on the S41 list. These are all the habitats and species in England that were identified as requiring action in the UK Biodiversity Action Plan (BAP).
18. **Conservation of Habitats and Species Regulations 2017 (as amended).** The Regulations enact the European Union's Habitats Directive (92/43/EEC) in the UK. The Habitats Directive was designed to contribute to the maintenance of biodiversity within member states through the conservation of sites, known in the UK as Special Areas of Conservation (SACs), containing habitats and species selected as being of EC importance (as listed in Annexes I and II of the Habitats Directive respectively). Member states are required to take measures to maintain or restore these natural and semi-natural habitats and wild species at a favourable conservation status.
19. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs)² classified under Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive). These sites constitute the Natura 2000 network. The Regulations impose restrictions on planning decisions likely to significantly affect SPAs or SACs.
20. The Regulations also provide protection to European Protected Species of animals that largely overlaps with the WCA 1981, albeit the provisions are generally stricter. Under Regulation 43 it is an offence, *inter alia*, to:
 - Deliberately capture, injure or kill any wild animal of a European Protected Species;
 - Deliberately disturb any wild animals of any such species, including in particular any disturbance likely to impair their ability to survive, to breed or reproduce, to rear or nurture their young, to hibernate or migrate, or which is likely to affect significantly their local distribution or abundance;
 - Deliberately take or destroy the eggs of such an animal;
 - Damage or destroy a breeding site or resting place of such an animal.
21. Similar protection is afforded to European Protected Species of plants, as detailed under Regulation 47.
22. The Regulations do provide a licensing system that permits otherwise illegal activities in relation to European Protected Species, subject to certain tests being fulfilled.

² Special Protection Areas (SPAs) are protected sites classified in accordance with Article 4 of the EC Directive on the Conservation of Wild Birds (79/409/EEC) (aka the Birds Directive), which came into force in April 1979. SPAs are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.

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Environmental Statement Addendum – Chapter 09: Ecology Appendix 9.2

Land At Deal Ground and May Gurney,
Norwich

Shadow
Habitats Regulations Assessment
(including an Appropriate Assessment)

June 2023

Quality Management	
Client:	Serruys Property Company Ltd
Project:	Land at Deal Ground and May Gurney, Norwich
Report Title:	Shadow HRA including Appropriate Assessment
Project Number:	1006592
File Reference:	1006592- HRA.vf TS/AB
Date:	16/06/2023

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Legal Guidance

The information set out within this report in no way constitutes a legal opinion on the relevant legislation. The opinion of a legal professional should be sought if further advice is required.

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Contents

Text:

1. Introduction and Background.....	1
2. Legislation and Assessment Methodology.....	2
3. Local Guidance and Policies	9
4. Stage 1: Screening for Likely Significant Effects	10
5. Stage 2: Appropriate Assessment.....	23
6. Conclusions.....	27

Annexes

Annex 6592/HRA1	Ecological designations in relation to the site
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1. Introduction and Background

- 1.1.1. Aspect Ecology is advising Serruys Property Company Ltd in respect of ecological matters relating to land at Deal Ground and May Gurney, Trowse, Norwich (for location, see Annex 6592/HRA1). The site is in receipt of outline planning permission (ref. 12/00875/O [Norwich City Council] and 2011/0152/O [South Norfolk Council]) for mixed development, including up to 670 residential dwellings and commercial uses with landscaping and biodiversity enhancements. The site is also allocated for residential-led mixed use development under the emerging Greater Norwich Local Plan (Policy GNLP0360). Part of the Deal Ground site is allocated under Policy R9 of Norwich City Council's adopted Local Plan (November 2014), while the May Gurney site is included as an existing commitment, on the basis of the existing outline consent, under Policy DM1.5 of South Norfolk's adopted Local Plan (October 2015).
- 1.1.2. A number of European designations are located within the site surrounds, and as such, the proposed development will need to be subject to a Habitats Regulations Assessment (HRA) under the Conservation of Habitats and Species Regulations 2017 (as amended). On this basis, this document sets out a Shadow Habitats Regulation Assessment (including an Appropriate Assessment) of the proposed development, identifying whether the specific proposals for the site are likely to result in an adverse effect on integrity of any international designations. This document forms part of the reserved matters submission for development of 670 residential dwellings at the site.

2. Legislation and Assessment Methodology

2.1. Legislation

2.1.1. All areas in England classified as Special Areas of Conservation (SACs) or Special Protection Areas (SPAs), collectively known as European sites, receive statutory protection under the Conservation of Habitats and Species Regulations 2017 (the Regulations). These Regulations transpose into UK legislation the ‘Habitats Directive’ 1992 (92/43/EEC) and the ‘Birds Directive’ 2009 (2009/147/EC). National planning policy in the form of the National Planning Policy Framework (NPPF) explicitly sets out that listed Ramsar sites should be considered in the same way, as if they had been classified or designated as SACs or SPAs.

2.1.2. The Regulations impose a duty on Local Planning Authorities (competent authorities) to carefully consider whether any proposals may have a significant effect on a European designation, either alone or in combination with other plans or projects. In most circumstances, permission may only be granted for a plan or project to proceed if it has been ascertained that it will not have an adverse effect on the integrity of any such designation.

2.1.3. The process for assessment is set out at regulation 63(1):

“A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site,

must make an appropriate assessment of the implications of the plan or project for that site in view of that site’s conservation objectives”.

2.1.4. Following this assessment, regulation 70(3) outlines when planning permission can be granted:

“... outline planning permission must not be granted unless the competent authority is satisfied (whether by reason of the conditions and limitations to which the outline planning permission is to be made subject, or otherwise) that no development likely adversely to affect the integrity of a European site or a European offshore marine site could be carried out under the permission, whether before or after obtaining approval of any reserved matters.”

2.2. Assessment Methodology

2.2.1. Guidance on the process and procedures for assessment are contained in a number of documents, principally:

- Habitats Regulations Assessments: Protecting a European site (Gov.uk)¹ – government standing advice on HRA;

¹ Habitats Regulations Assessments: Protecting a European site. February 2021
<https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>

- National Planning Policy Framework (NPPF) and the accompanying ODPM/DEFRA Circular (ODPM 06/2005, DEFRA 01/2005);
- Managing Natura 2000 sites 'The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission. Nov 2018;
- Assessment of plans and projects significantly affecting Natura 2000 sites. European Commission November 2001.

2.2.2. As set out within government standing advice and as laid out within the flow chart (Figure 1) within ODPM circular 06/2005 (see Appendix 5), the procedure for assessment is an ordered process following a number of key stages as discussed below.

Stage 1 :Screening

- 2.2.3. Box 1 of the flow chart is not of relevance to development proposals and hence the first stage is to identify whether the proposals will result in any 'likely significant effect' on the internationally important features of the European sites, either alone or in combination with other plans or projects (box 2 of the flow chart).
- 2.2.4. In line with the Court of Justice of the European Union (CJEU) ruling (People over Wind, Peter Sweetman v Coillte Teoranta, Case C-323/17, dated 12 April 2018), mitigation measures intended to avoid or reduce the harmful effects of a plan or project on a European site should not be taken into account at this screening stage, and instead these must be considered as part of an Appropriate Assessment (Stage 2).
- 2.2.5. Where it is considered that a plan or project will result in no such 'likely significant effects', no further assessment is necessary and permission should not be refused under the assessment.
- 2.2.6. If any 'likely significant effects' are identified or where it remains unclear whether effects will be significant, the assessment procedure should follow on to Stage 2 (box 3 of the flow chart).
- 2.2.7. In reaching this decision, the plan or project should be considered 'likely' to have an effect if the competent authority is unable on the basis of objective information to exclude the possibility that it could have significant effects on any European designation, either alone or in combination with other plans or projects. The test of significance is therefore set at a relatively low bar, with significant effects considered as any negative effects, i.e. effects that are neither negligible nor inconsequential, but which are capable of having an adverse effect².
- 2.2.8. If the proposal can be screened out for effects from it alone, it should then be screened for any potential for it to combine with any other proposals planned or underway. If, in combination the proposal could have a significant effect on a European designation, it is necessary to progress to Stage 2.

² Case C-258/11: Judgment of the Court (Third Chamber) of 11 April 2013 and Opinion of the Advocate General dated 22nd November 2012. Peter Sweetman and Others v An Bord Pleanála. Reference for a preliminary ruling: Supreme Court - Ireland

Stage 2: Appropriate Assessment

- 2.2.9. Should it be determined that a plan or project could result in 'likely significant effects' on a European site, as set out on the flow chart, the Competent Authority should proceed to the next stage within flow chart boxes 3 and 4 onwards. This requires an 'Appropriate Assessment' of the likely effects of the plan or project to be undertaken by the Competent Authority.
- 2.2.10. Under Appropriate Assessment, it is necessary to determine whether the proposals, either alone or in combination with other projects or plans, will result in any adverse effects on the integrity of the European designation as defined by the conservation objectives and status of the relevant SAC/SPA. The precautionary principle should be applied, and the focus should be on objectively demonstrating, with supporting evidence, that there will be no adverse effects on the integrity of the European site. Where this is not the case, adverse effects must be assumed.
- 2.2.11. It is the policy of the government that Ramsar sites should be treated in the same way as European designations.
- 2.2.12. In carrying out the Appropriate Assessment, under Regulation 63(3) it is necessary for the Competent Authority to consult with the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specifies. In England this body is Natural England.
- 2.2.13. If it is considered that the proposal will not adversely affect the integrity of the designation, either alone or in combination with other projects, permission can be granted. If this cannot be ascertained, or there is uncertainty, the assessment procedure should follow on to Stage 3.

Stage 3: Derogations: allow exceptions

- 2.2.14. Should a proposal fail the integrity test, in certain circumstances, a project may still be able to proceed under a derogation.
- 2.2.15. Under Stage 3, it is necessary to assess if there are alternative solutions and whether there are imperative reasons of overriding public interest. If these tests are passed, authorisation may be granted subject to compensation measures being secured.
- 2.2.16. Further details on the above process can be found in Government Guidance on Habitats Regulations Assessments³.

2.3. Case Law

- 2.3.1. The approach to undertaking Habitats Regulation Assessment has been informed and distilled through a number of court rulings. Accordingly, this assessment takes into account all such case law, and in particular highlights the following as being pertinent:

³ Habitats regulations assessments: protecting a European site. Government Guidance.
<https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>

The need for no reasonable scientific doubt

2.3.2. It has been established that the competent authority may grant permission for a project following an appropriate assessment *“only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects”*⁴ (our emphasis). In addition, case law advises that the decision maker should be ‘certain beyond reasonable scientific doubt’⁵ that no adverse effects will arise on the integrity of the designation.

2.3.3. The application of this test is further clarified by case law which advises that in reaching a conclusion, what is required is ‘reasonable certainty’ rather than ‘absolute certainty’⁶ and that the risk should be ‘real’ (identifiable) rather than ‘hypothetical’ or ‘fanciful’⁷.

The need for no lacunae

2.3.4. It has been established that the *assessment “cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the protected site concerned”*⁸ and that the assessment must *“unequivocally demonstrate why the protected habitat types and species are not adversely affected”*⁹.

The need to take into account conservation objectives

2.3.5. It is relevant that *“where such a plan or project is likely to undermine the conservation objectives of the site concerned, it must necessarily be considered likely to have a significant effect on the site”*¹⁰

Any mitigation measures must be sufficiently certain

2.3.6. Where mitigation measures are proposed (under an Appropriate Assessment), *“it is only when it is sufficiently certain that a measure will make an effective contribution to avoiding harm, guaranteeing beyond all reasonable doubt that the project will not adversely affect the integrity of the area, that such a measure may be taken into consideration when the appropriate assessment is carried out.”*¹¹

The need to assess cumulative effects

2.3.7. It has been established that not only does the project or plan in question need to be considered, but cumulative effects from other relevant projects have to be assessed. In particular *“MN2000 makes clear that the phrase “in combination with other plans*

⁴ C-127/02 Landelijke Vereniging tot Behoud van de Waddenzee & Another v Staatssecretaris van Landbouw (“Waddenzee”) [2005] 2 CMLR 31 at [59]

⁵ T.C. Briels & others v Minister van Infrastructuur en Milieu C-521/12 [2014]

⁶ WWF UK Ltd And RSPB V SoS for Scotland

⁷ Boggis V Natural England & Waveney District Council [2009] Ewca Civ 1061 and R (Morge) v Hampshire County Council (2011)

⁸ C-258/11 Sweetman v An Bord Plenala [2014] PTSR 1092 at [44]

⁹ C-461/17 Holohan v An Bord Plenala [2019] Env LR 16 per AG Kokott at [30]

¹⁰ Judgment of the Court (Grand Chamber) of 7 September 2004, Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij, Case C-127/02

¹¹ C-164/17 Grace & Sweetman v An Bord Plenala at [51]

or projects” in Article 3 (3) refers to cumulative effects caused by the projects or plans that are currently under consideration together with the effects of any existing or proposed projects or plans. When impacts are assessed in combination in this way it can be established whether or not there may be, overall, an impact which may have significant effects on a Natura 2000 site or which may adversely affect the integrity of a site”.¹²

The Assessment should be commensurate with the stage of planning

2.3.8. Advice from the Secretary of State confirms that Appropriate Assessments can be required at every stage of the planning process, from the allocation stage to the detailed, Reserved Matters or condition stage¹³. At each planning stage very different levels of detail are available, and *‘each appropriate assessment must be commensurate to the relative precision of the plans at any particular stage and no more’¹⁴* (our emphasis).

2.3.9. These principles are well established. An example, is the case of Commission v UK C-6/04 (2005) and the opinion of Advocate General Kokott¹⁵, which related to a complaint from the Commission that the United Kingdom had failed to transpose adequately various provisions of the Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (‘the Habitats Directive’). It discusses the detail required within an Appropriate Assessment at paragraph 49:

“The United Kingdom Government is admittedly right in raising the objection that an assessment of the implications of the preceding plans cannot take account of all the effects of a measure. Many details are regularly not settled until the time of the final permission. It would hardly be proper to require a greater level of detail in preceding plans or the abolition of multi-stage planning and approval procedures so that the assessment of implications can be concentrated on one point in the procedure. Rather, adverse effects on areas of conservation must be assessed at every relevant stage of the procedure to the extent possible on the basis of the precision of the plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure”.

2.3.10. In line with the judgement of R (Barker) v Secretary of State & Bromley LBC (2006-7) (European Court and House of Lords) [2007]¹⁶ 1 A.C. 470 and Wingfield, R v Canterbury City Council [2019] EWHC 1974 (Admin)¹⁷, AA can be required at the Reserved Matters and discharge of conditions stages.

2.3.11. This appropriateness of this approach has also been confirmed by the Wellington Appeal Decision 2022¹⁸ in which these precise issues were considered by a Planning Inspector.

¹² European Commission DG Environment (November 2001) ‘Assessing Projects Under the Habitats Directive: Guidance for Competent Authorities, September 2011’

¹³ Statement made by George Eustice Secretary of State for Environment, Food and Rural Affairs. 20 July 2022. <https://questions-statements.parliament.uk/written-statements/detail/2022-07-20/hcws258>

¹⁴ Feeney v Secretary of State for Transport & Ors [2013] EWHC 1238 (Admin)

¹⁵ Opinion of Advocate General Kokott June 2005. Case C-6/04 <https://curia.europa.eu/juris/liste.jsf?language=en&num=C-6/04>

¹⁶ <https://publications.parliament.uk/pa/ld200607/ldjudgmt/jd061206/barker-1.htm>

¹⁷ <http://www.bailii.org/ew/cases/EWHC/Admin/2019/1974.html>

¹⁸ Planning Inspectorate Appeal Ref: APP/W3330/W/22/3296248

Consultation

- 2.3.12. The Competent authority, in reaching their judgement, must take account of the view of the appropriate nature conservation body (Natural England), with “*great / considerable*” weight attached to such views and that a departure from these views requires “*cogent and compelling reasons*”¹⁹.

2.4. Other Relevant Guidance and Opinions of Weight

- 2.4.1. In addition to the interpretation of legislation that has emerged through the above case law, relevant guidance is also available from a number of other sources, as outlined below:

The Precautionary Principle

- 2.4.2. The precautionary principle is a core principle of EU environmental law. The European Commission²⁰ sets out that “*the classic definition of ‘a precautionary approach’ comes from the 1992 Rio Declaration on Environment and Development, which states that: ‘Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation’ (UNEP 1992).*”
- 2.4.3. Following on from the above definition, guidance sets out that “*Non-discrimination means that comparable situations should not be treated differently, and that different situations should not be treated in the same way, unless there are objective grounds for doing so*” and “*Consistency means that measures should be of comparable scope and nature to those already taken in equivalent areas in which all scientific data are available*”²¹.
- 2.4.4. In addition, this guidance also sets out that “*Proportionality means tailoring measures to the chosen level of protection. Risk can rarely be reduced to zero*”. And “*It is also necessary to clarify a misunderstanding as regards the distinction between reliance on the precautionary principle and the search for zero risk, which in reality is rarely to be found*”²².
- 2.4.5. Finally, this guidance also further clarifies that “*measures based on the precautionary principle must not be disproportionate to the desired level of protection and must not aim at zero risk, something which rarely exists.*”²³

Re-use of an existing HRA

- 2.4.6. If a project has already been assessed by the competent authority or a different competent authority, then there may be no need to repeat the assessment. In this

¹⁹ Shadwell Estates v Breckland DC [2013] EWHC 12 (Admin)

²⁰ European Commission Science for Environment Policy (September 2017) ‘Future Brief: The Precautionary Principle: decision-making under uncertainty

²¹ Commission of the European Communities (2.2.200) ‘Communication from the Commission on the precautionary principle’

²² Ibid footnote 13

²³ Ibid footnote 13

regard guidance²⁴ is provided as to when it is appropriate to adopt this approach, namely when:

- There is no new information or evidence that may lead to a different conclusion
- The assessments already done are relevant, thorough and correct
- The conclusions are rigorous and robust
- There is no new case law that changes the way an HRA should be carried out or interpreted.

²⁴ Habitats Regulations Assessments: protecting a European site. Gov.uk. <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>

3. Local Guidance and Policies

3.1.1. This report has taken account of the following documents which are relevant to the local and regional context:

- Habitats Regulations Assessment of Greater Norwich Regulation 19 Draft Plan for Greater Norwich Development Partnership (The Landscape Partnership Ltd, December 2020). Hereafter referred to as the 'Local Plan HRA';
- Natural England's letter to planning authorities dated 16 March 2022: Advice for development proposals with the potential to affect water quality resulting in adverse nutrient impacts on habitats sites;
- Norfolk Green Infrastructure and Recreational impact Avoidance and Mitigation Strategy (GIRAMS): Habitats Regulations Assessment Strategy Document (Place Services, March 2021);
- Visitor surveys at European protected sites across Norfolk during 2015 and 2016 (Footprint Ecology, 2016);
- Policy 3 (Environmental Protection and Enhancement) of the emerging Greater Norwich Local Plan.

4. Stage 1: Screening for Likely Significant Effects

4.1. Details of the Project

Site location	The site is located in Trowse, south-east Norwich, within an urban-edge context. The site is bound by the River Wensum to the north, beyond which lies industrial and former industrial land with a railway depot. The River Yare cuts through the site and bounds the site to the east, beyond which lies parkland (including Whitlingham Country Park) and residential development within the boundary of the Norfolk Broads Authority. An asphalt plant and railway line lies to the west of the site, with more dense development beyond this.
National grid reference	TG 247 074
Site description	The site comprises a number of different habitats, primarily comprising former industrial land in the north and south. Small areas of fen are present in the centre-east of the site, which extend offsite into Carrow Abbey Marsh CWS. Woody vegetation including wet and dry woodland, scrub, scattered trees, and Bramble thickets, is present in various locations across the site. In addition, relatively small areas of species-poor neutral grassland and tall ruderal vegetation are present in parts of the site.
Description of the proposals	The proposals are for a residential-led development of up to 670 residential units, in addition to landscaping and ecological enhancements. The site is in receipt of outline planning permission (ref. 12/00875/O [Norwich City Council] and 2011/0152/O [South Norfolk Council]) and is now subject to a reserved matters application.

4.2. Designations and Impact Pathways

European designations that could be affected by the proposals	Based on a review of the Habitats Regulations Assessment (HRA) of the Greater Norwich Local Plan (December 2020) ²⁵ , a number of European designations are to be considered in terms of potential effects (in order of their proximity to the site): <ul style="list-style-type: none"> • River Wensum SAC, located 5.4 km to the north-west of the site; • The Broads SAC, located 5.5 km to the east of the site; • Broadland SPA and Ramsar, located 5.5 km to the east of the site; • Norfolk Valley Fens SAC, located 11.3 km to the south-west of the site; • Breydon Water SPA and Ramsar, located 18.7 km to the east of the site.
Initial screening of impact pathways	Based on a review of the HRA of the Greater Norwich Local Plan, a number of potential impact pathways have been identified in

²⁵ The Landscape Partnership Ltd (December 2020). Habitats Regulations Assessment of Greater Norwich Regulation 19 Draft Plan for Greater Norwich Development Partnership.

	<p>relation to European designations. Those relevant to the proposed development are:</p> <ul style="list-style-type: none"> • Increased recreational pressure; • Increased pressure on water resources (i.e. abstraction); • Water quality pollution impacts (incl. nutrient sensitivity); • Air quality pollution impacts. <p>Urbanisation impacts such as cat predation, fly-tipping, and lighting, are scoped out of further assessment. These impacts are only relevant where a proposed development lies in close proximity (i.e. within 1 km) of a European designation, according to the draft Local Plan HRA. As such, the site is considered to be suitably separated from European designations to avoid impacts associated with urbanisation.</p> <p>Comments provided by Natural England dated 13 October 2022, in respect of ES Scoping, scoped in a single issue, namely nutrient sensitivity.</p>
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4.2.1. On this basis, further detail is set out below in relation to relevant European designations and whether a likely significant effect may occur as a result of the proposed development, either alone or in combination with other plans and projects.

4.3. River Wensum SAC

European site interest features	<p>The River Wensum SAC is designated on the basis of the Annex I habitat 'Water courses of plain to montane levels' with <i>Ranunculus</i> vegetation, and its population of the Annex II species White-Clawed Crayfish <i>Austropotamobius pallipes</i>.</p> <p>In addition, the following Annex II species are present as qualifying features, but are not a primary reason for site selection:</p> <ul style="list-style-type: none"> • Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i>; • Brook Lamprey <i>Lampetra planeri</i>; • Bullhead <i>Cottus gobio</i>.
Conservation objectives of the European site	<p>The conservation objectives for the SAC are to:</p> <p><i>"Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of qualifying natural habitats and habitats of qualifying species</i> • <i>The structure and function (including typical species) of qualifying natural habitats</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely</i> • <i>The populations of qualifying species, and,</i>

	<ul style="list-style-type: none"> • <i>The distribution of qualifying species within the site."</i>
Condition of European site	The most recent condition assessments for the component Sites of Special Scientific Interest (SSSI) closest to the site state that the component SSSI relating to the main River corridor is in 'unfavourable no change' condition. This is because hydrology, turbidity, siltation and phosphate targets are not being met, albeit mechanisms are in place to address these issues. The closest component SSSIs adjacent to the main river channel are in favourable condition.
Threats	A Site Improvement Plan (SIP) has been produced by Natural England in relation to River Wensum SAC (dated October 2014). This identifies prioritised issues (pressures or threats) affecting the designation, of which the following are potentially relevant to nearby developments: <ul style="list-style-type: none"> • Siltation • Invasive species • Water pollution • Water abstraction.
Screening of likely significant effects	
Habitat fragmentation and loss	The site is located 5.4 km from this designation at its nearest point, such that no functional habitat will be lost as a result of the proposals. Although the site supports a population of the Annex II species Desmoulin's Whorl Snail, this population is not considered to be functionally linked to the SAC given the distance between the site and the SAC and the intervening barriers. In any event, the area in which this species was recorded during the most recent survey will be retained under the proposals, while the outline planning consent requires a management plan to improve the condition of the fen habitat within the site (under Condition 8d).
Increased recreational pressure	The River Wensum SAC is scoped out of further assessment regarding recreational pressure in the Local Plan HRA, because the aquatic interest of the SAC is not affected by bankside recreation and public access to the river is in any case very limited, while boating is also very limited within the SAC.
Increased pressure on water resources (i.e. abstraction)	The Local Plan HRA sets out that there will be no impact on European sites from water abstraction arising from the Local Plan, because no increase in abstraction and no new abstraction is proposed according to Anglian Water's Water Resource Management Plan 2019 (which remains the most recent version). Instead, Anglian Water will manage demand by supplying less water per customer and by transferring water from other areas. Furthermore, Policy 2 of the emerging Greater Norwich Local Plan requires a high standard of water efficiency for new housing developments.
Water quality pollution impacts (incl. nutrient sensitivity)	The site lies outside of Natural England's nutrient neutrality catchment for River Wensum SAC (2021), and indeed lies well downstream of the SAC. As such, the proposed development is not considered to result in any likely significant effects relating to water quality at the River Wensum SAC.
Air quality pollution impacts	The SAC is well separated from major roads in the vicinity of the site, such that any local increase in traffic would not result in

	significant air quality impacts at the SAC.
Conclusion – could the proposed development result in a likely significant effect?	
Alone	
No likely significant effects are identified as a result of habitat fragmentation and loss, recreational pressure, water abstraction, water quality, and air quality.	
In combination with other plans or projects	
No likely significant effects are identified as a result of any of the above pathways in combination with other plans and proposals.	

4.4. The Broads SAC

European site interest features	<p>The Broads SAC is designated on the basis of the following Annex I habitats:</p> <ul style="list-style-type: none"> • Oligo-mesotrophic waters, with particular Charophyte interest; • Eutrophic lakes, which support relict vegetation of Fenland flora; • Transition mires; • Calcareous fens; • Alkaline fens; • Alluvial forests including large blocks of Alder woodland. <p>In addition, the SAC is designated for its populations of the following Annex II species:</p> <ul style="list-style-type: none"> • Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i>; • Ramshorn Snail <i>Anisus vorticulus</i>; • Fen Orchid <i>Liparis loeselii</i>. <p>The presence of Otter <i>Lutra lutra</i> is also a qualifying feature, but not a primary reason for site selection.</p>
Conservation objectives of the European site	<p>The conservation objectives for the SAC are to:</p> <p><i>“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of qualifying natural habitats and habitats of qualifying species</i> • <i>The structure and function (including typical species) of qualifying natural habitats</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely</i> • <i>The populations of qualifying species, and,</i> • <i>The distribution of qualifying species within the site.”</i>
Condition of European site	<p>The most recent condition assessments for the component Sites of Special Scientific Interest (SSSI) closest to the site state that the SSSIs are largely in 'unfavourable no change' condition. The reasons for the unfavourable condition of the closest component SSSI to the</p>

	site are focussed on poor water quality because of high nutrient inputs, which reduces botanical species diversity of fen vegetation.
Threats	<p>A Site Improvement Plan (SIP) has been produced by Natural England in relation to both The Broads SAC and Broadland SPA (dated July 2018). This identifies prioritised issues (pressures or threats) affecting the designation, of which the following are potentially relevant to nearby developments:</p> <ul style="list-style-type: none"> • Water pollution • Invasive species • Siltation • Inappropriate water levels • Hydrological changes • Water abstraction • Public access • Air pollution.
Screening of likely significant effects	
Habitat fragmentation and loss	The site is located 5.5 km from this designation at its nearest point, such that no functional habitat will be lost as a result of the proposals. Although the site supports a population of the Annex II species Desmoulin's Whorl Snail, this population is not considered to be functionally linked to the SAC given the distance between the site and the SAC and the intervening barriers. In any event, the area in which this species was recorded during the most recent survey will be retained under the proposals, while the outline planning consent requires a management plan to improve the condition of the fen habitat within the site.
Increased recreational pressure	<p>The Local Plan HRA states that public usage of The Broads SAC is almost entirely restricted to well managed nature reserves, and the site is well removed from the potentially sensitive locations identified in the HRA, which are restricted to the east coast. The Local Plan HRA states that few residents travel further than 5 km to visit the SAC. The closest part of the SAC to the site is managed by RSPB (Surlingham Church Marsh), and has only a small car park associated with the village church which accommodates less than 15 vehicles, such that the potential for increased recreational pressure is limited.</p> <p>In terms of boat traffic, the Local Plan HRA states that the number of boating licences issued by the Broads Authority is declining.</p>
Increased pressure on water resources (i.e. abstraction)	The Local Plan HRA sets out that there will be no impact on European sites from water abstraction arising from the Local Plan, because no increase in abstraction and no new abstraction is proposed according to Anglian Water's Water Resource Management Plan 2019 (which remains the most recent version). Instead, Anglian Water will manage demand by supplying less water per customer and by transferring water from other areas. Furthermore, Policy 2 of the emerging Greater Norwich Local Plan requires a high standard of water efficiency for new housing developments.
Water quality pollution impacts	The site lies within the nutrient neutrality catchment for this SAC according to Natural England. Component SSSIs of the SAC are

(incl. nutrient sensitivity)	<p>currently in poor condition because of water pollution, including the component SSSI unit closest to the site (Yare Broads and Marshes SSSI).</p> <p>Following Annex E of Natural England's letter to planning authorities regarding nutrient neutrality (dated 16 March 2022), the proposals would create a source of water pollution, and there is hydrological connectivity to the SAC via the Rivers Yare and Wensum. In the absence of mitigation, the proposals will result in an increase in nitrogen and phosphorous from surface water and wastewater into these watercourses. The Nutrient Budget Calculation Record prepared by Stance for the proposed development set out a budget of 51.88 kgTP/yr and 1515.75 kgTN/yr, including a precautionary buffer of 20%. Part of the SAC is in unfavourable condition due to water nutrient levels (as set out above). Therefore, following the guidance in Annex E of the Natural England letter, a likely significant effect of the proposals alone cannot be ruled out.</p>
Air quality pollution impacts	<p>The distance of the site to the SAC precludes any impacts from local road traffic. A section of the SAC lies adjacent to approximately c. 1.2 km of the A47, some 16.2 km east of the site. At this distance, the site is considered unlikely to result in an increase of traffic exceeding recognised thresholds (i.e. increase in daily traffic flows on 1,000 AADT), particularly given that major destinations served by this route are limited to the town of Great Yarmouth.</p>
Conclusion – could the proposed development result in a likely significant effect?	
Alone	
<p>Yes, a likely significant effect cannot be ruled out in relation to water quality (nutrient sensitivity) pollution impacts (in the absence of mitigation).</p>	
<p>No likely significant effects are identified as a result of habitat fragmentation and loss, increased recreational pressure, water abstraction, or air quality.</p>	
In combination with other plans or projects	
<p>Yes. Whilst predicted increases in recreational pressure arising from the proposed development are minimal, the SAC is recognised to be potentially sensitive to increased recreational pressure resulting from regional growth (as set out in the Norfolk GIRAMS). As such, further assessment of potential for recreational disturbance is necessary and an Appropriate Assessment is required.</p>	
<p>No in-combination effects are anticipated with regard to habitat fragmentation/loss, water abstraction, or air quality.</p>	

4.5. Broadland SPA and Ramsar Site

European site interest features	<p>Broadland SPA is designated on the basis of the following species:</p> <ul style="list-style-type: none"> • Great Bittern <i>Botaurus stellaris</i> (breeding); • Bewick's Swan <i>Cygnus columbianus bewickii</i> (non-breeding); • Whooper Swan <i>Cygnus cygnus</i> (non-breeding);
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	<ul style="list-style-type: none"> • Wigeon <i>Anas penelope</i> (non-breeding); • Gadwall <i>Anas strepera</i> (non-breeding); • Shoveler <i>Anas clypeata</i> (non-breeding); • Marsh Harrier <i>Circus aeruginosus</i> (breeding); • Hen Harrier <i>Circus cyaneus</i> (non-breeding); • Ruff <i>Philomachus pugnax</i> (non-breeding). <p>Broadland Ramsar site is designated on the basis of the following criteria:</p> <ul style="list-style-type: none"> • Criterion 2: supports a number of rare species and habitats, including calcareous fens, alkaline fens, alluvial forests, Desmoulin's Whorl Snail, Otter, and Fen Orchid; • Criterion 6: supports species/populations at international level of importance, including Bewick's Swan, Wigeon, Gadwall, and Shoveler.
Conservation objectives of the European site	<p>The conservation objectives for the SPA are to:</p> <p><i>"Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of the habitats of the qualifying features;</i> • <i>The structure and function of the habitats of the qualifying features;</i> • <i>The supporting processes on which the habitats of the qualifying features rely;</i> • <i>The population of each of the qualifying features; and</i> • <i>The distribution of the qualifying features within the site."</i>
Condition of European site	<p>The most recent condition assessments for the component Sites of Special Scientific Interest (SSSI) closest to the site state that the SSSIs are largely in 'unfavourable no change' condition. The reasons for the unfavourable condition of the closest component SSSI to the site are focussed on the poor water quality because of high nutrient inputs, which reduces botanical species diversity of fen vegetation, which are not relevant to the SPA interest features but are relevant to Criterion 2 of the Ramsar site.</p>
Threats	<p>A joint Site Improvement Plan (SIP) for Broadland SPA and The Broads SAC has been produced by Natural England (dated July 2018). This is summarised above in relation to The Broads SAC.</p>
Screening of likely significant effects	
Habitat fragmentation and loss	<p>The site is located 5.5 km from this designation at its nearest point, and no functional habitat will be lost as a result of the proposals. None of the qualifying species of the SPA were recorded during breeding bird surveys at the site, while the habitats present are unlikely to support significant numbers of qualifying bird species during winter. Therefore, no loss or fragmentation of functional habitat is anticipated under the proposals.</p>
Increased recreational pressure	<p>The assessment above in relation to The Broads SAC is equally applicable to the Broadland SPA and Ramsar, given that they follow the same boundary in the proximity of the site.</p>
Increased pressure on water resources	<p>The assessment above in relation to The Broads SAC is equally applicable to the Broadland SPA and Ramsar, given that they follow</p>

(i.e. abstraction)	the same boundary in the proximity of the site.
Water quality pollution impacts (incl. nutrient sensitivity)	Water quality pollution impacts in relation to increased nutrients are not relevant to the interest features of the SPA, but could impact habitats of interest within the Ramsar site (Criterion 2). The boundary and interest features of the Ramsar are similar to The Broads SAC. As such, the water quality pollution impacts set out above for The Broads SAC are applicable to Broadland Ramsar.
Air quality pollution impacts	Given that the boundary of Broadland SPA and Ramsar overlaps with The Broads SAC in proximity to the site, the above assessment for The Broads SAC is equally applicable to Broadland SPA and Ramsar.
Conclusion – could the proposed development result in a likely significant effect?	
Alone	
<p>Yes, a likely significant effect cannot be ruled out in relation to water quality pollution impacts (incl. nutrient sensitivity) on Broadland Ramsar site (in the absence of mitigation).</p> <p>No likely significant effects are identified as a result of habitat fragmentation and loss, increased recreational pressure, water abstraction, or air quality.</p> <p>No likely significant effects are identified for any of the above pathways in relation to Broadland SPA.</p>	
In combination with other plans or projects	
<p>Yes. As for The Broads SAC, whilst predicted increases in recreational pressure arising from the proposed development are minimal, Broadland SPA is recognised to be potentially sensitive to increased recreational pressure resulting from regional growth (as set out in the Norfolk GIRAMS). As such, further assessment of potential for recreational disturbance is necessary and an Appropriate Assessment is required.</p> <p>No in-combination effects are anticipated with regard to habitat fragmentation/loss, water abstraction, or air quality.</p>	

4.6. Norfolk Valley Fens SAC

European site interest features	<p>Norfolk Valley Fens SAC is designated on the basis of the Annex I habitat 'alkaline fens', and its populations of the Annex II species Narrow-mouthed Whorl Snail <i>Vertigo angustior</i> and Desmoulin's Whorl Snail.</p> <p>In addition, the following Annex I habitats are present as qualifying features, but are not a primary reason for site selection:</p> <ul style="list-style-type: none"> • Northern Atlantic wet heaths with <i>Erica tetralix</i>; • Dry heaths; • Semi-natural dry grasslands and scrubland facies on calcareous substrates; • Molinia meadows; • Calcareous fens; • Alluvial forests.
Conservation	The conservation objectives for the SAC are to:

<p>objectives of the European site</p>	<p><i>“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of qualifying natural habitats and habitats of qualifying species</i> • <i>The structure and function (including typical species) of qualifying natural habitats</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely</i> • <i>The populations of qualifying species, and,</i> • <i>The distribution of qualifying species within the site.”</i>
<p>Condition of European site</p>	<p>The most recent condition assessments for the component Sites of Special Scientific Interest (SSSI) closest to the site are variously described as ‘unfavourable no change’, ‘unfavourable recovering’, and ‘favourable’. The reasons for the unfavourable conditions include water abstraction and inappropriate scrub control.</p>
<p>Threats</p>	<p>A Site Improvement Plan (SIP) has been produced by Natural England in relation to The Broads SAC (dated October 2014). This identifies prioritised issues (pressures or threats) affecting the designation, of which the following are potentially relevant to nearby developments:</p> <ul style="list-style-type: none"> • Inappropriate water levels • Hydrological changes • Water pollution • Water abstraction • Invasive species • Air pollution.
<p>Screening of likely significant effects</p>	
<p>Habitat fragmentation and loss</p>	<p>The site is located 11.3km from this designation at its nearest point, and no functional habitat will be lost as a result of the proposals. As such it is considered that no habitat loss or fragmentation will be caused by the proposals.</p>
<p>Increased recreational pressure</p>	<p>The SAC is located well beyond the median distances travelled by car to the sites, which is 3 to 6 km, as reported in the Local Plan HRA. As such, no significant increase in visitor numbers arising from the proposed development is anticipated.</p>
<p>Increased pressure on water resources (i.e. abstraction)</p>	<p>The Local Plan HRA sets out that there will be no impact on European sites from water abstraction arising from the Local Plan, because no increase in abstraction and no new abstraction is proposed according to Anglian Water’s Water Resource Management Plan 2019 (which remains the most recent version). Instead, Anglian Water will manage demand by supplying less water per customer and by transferring water from other areas. Furthermore, Policy 2 of the emerging Greater Norwich Local Plan requires a high standard of water efficiency for new housing developments.</p>
<p>Water quality pollution impacts</p>	<p>Norfolk Valley Fens SAC lies over 10km to the west of the site and the site has no hydrological connection to this SAC.</p>

(incl. nutrient sensitivity)	
Air quality pollution impacts	The component SSSIs closest to the site are well separated from major roads, such that any local increase in traffic would not result in significant air quality impacts at the SAC.
Conclusion – could the proposed development result in a likely significant effect?	
Alone	
No likely significant effects are identified as a result of habitat fragmentation and loss, recreational pressure, water abstraction, water quality, and air quality.	
In combination with other plans or projects	
Yes. Whilst predicted increases in recreational pressure arising from the proposed development are minimal, the designation is recognised to be potentially sensitive to increased recreational pressure resulting from regional growth (as set out in the Norfolk GIRAMS). As such, further assessment of potential for recreational disturbance is necessary and an Appropriate Assessment is required.	
No in-combination effects are anticipated with regard to habitat fragmentation/loss, water abstraction, or air quality.	

4.7. Breydon Water SPA and Ramsar Site

European site interest features	<p>Breydon Water SPA is designated on the basis of the following species:</p> <ul style="list-style-type: none"> • Bewick's Swan <i>Cygnus columbianus bewickii</i> (non-breeding); • Avocet <i>Recurvirostra avosetta</i> (non-breeding); • Golden Plover <i>Pluvialis apricaria</i> (non-breeding); • Lapwing <i>Vanellus vanellus</i> (non-breeding); • Ruff <i>Philomachus pugnax</i> (non-breeding); • Common Tern <i>Sterna hirundo</i> (breeding); • Waterbird assemblage. <p>Broadland Ramsar site qualifies on the basis of the following criteria:</p> <ul style="list-style-type: none"> • Criterion 5: internationally important waterfowl assemblage; • Criterion 6: internationally important numbers of Bewick's Swan and Lapwing over winter.
Conservation objectives of the European site	<p>The conservation objectives for the SPA are to:</p> <p><i>“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of the habitats of the qualifying features;</i> • <i>The structure and function of the habitats of the qualifying features;</i> • <i>The supporting processes on which the habitats of the qualifying features rely;</i> • <i>The population of each of the qualifying features; and</i>

	<ul style="list-style-type: none"> • <i>The distribution of the qualifying features within the site.</i>"
Condition of European site	The most recent condition assessments for the component Sites of Special Scientific Interest (SSSI) closest to the site state that the SSSIs are largely in favourable condition.
Threats	<p>A Site Improvement Plan (SIP) has been produced by Natural England in relation to The Broads SAC (dated March 2018). This identifies prioritised issues (pressures or threats) affecting the designation, of which the following are potentially relevant to nearby developments:</p> <ul style="list-style-type: none"> • Public access/disturbance; • Hydrological changes.
Screening of likely significant effects	
Habitat fragmentation and loss	The site is located 18.7 km from this designation at its nearest point, and no functional habitat will be lost as a result of the proposals. As such it is considered that no habitat loss or fragmentation will be caused by the proposals.
Increased recreational pressure	The Local Plan HRA reports that this designation is not an attractive site for recreation because access requires either a boat trip or a substantial walk from the nearest parking point to enter. In addition, there are a few circular walk opportunities. The median distance travelled by car is 12 km, well beyond the distance of the site to the SPA.
Increased pressure on water resources (i.e. abstraction)	The Local Plan HRA sets out that there will be no impact on European sites from water abstraction arising from the Local Plan, because no increase in abstraction and no new abstraction is proposed according to Anglian Water's Water Resource Management Plan 2019 (which remains the most recent version). Instead, Anglian Water will manage demand by supplying less water per customer and by transferring water from other areas. Furthermore, Policy 2 of the emerging Greater Norwich Local Plan requires a high standard of water efficiency for new housing developments.
Water quality pollution impacts (incl. nutrient sensitivity)	Water quality pollution impacts in relation to nutrient increases are not relevant to the SPA and Ramsar interest features.
Air quality pollution impacts	The designation is well separated from major roads and lies a substantial distance from the site, such that no significant decrease in air quality is expected.
Conclusion – could the proposed development result in a likely significant effect?	
Alone	
No likely significant effects are identified as a result of habitat fragmentation and loss, recreational pressure, abstraction, water quality, and air quality.	
In combination with other plans or projects	
Yes. Whilst predicted increases in recreational pressure arising from the proposed development are minimal, the designations are recognised to be potentially sensitive to increased recreational pressure resulting from regional growth (as set out in the Norfolk GIRAMS). As such, further assessment of potential for recreational disturbance is necessary and an Appropriate Assessment is required.	

No in-combination effects are anticipated with regard to habitat fragmentation/loss, water abstraction, or air quality.

4.8. Other European Designations: In-combination Only Assessment

<p>Additional European designations that could be affected by the proposals in combination with other proposals</p>	<p>Based on a review of the Norfolk Green Infrastructure and Recreational impact Avoidance and Mitigation Strategy (GIRAMS), the site lies within the zone of influence of a number of coastal European designations which are to be considered in terms of potential effects in combination with other proposals:</p> <ul style="list-style-type: none"> • Winterton-Horsey Dunes SAC (c. 26.7 km east of the site); • Great Yarmouth and North Denes SPA (c. 27.5 km east of the site); • North Norfolk Coast SAC and SPA (c. 39.2 km north of the site); • The Wash and North Norfolk Coast SAC (c. 39.4 km north of the site).
<p>European site interest features</p>	<p>The above designations support sensitive coastal habitats such as sand dunes and the Annex II species Harbour Seal <i>Phoca vitulina</i>. The SPAs are designated for seven breeding bird species and four non-breeding species, in addition to the overall waterbird assemblage.</p>
<p>Conservation objectives of the European sites</p>	<p>The conservation objectives for the SACs are to:</p> <p><i>“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of qualifying natural habitats and habitats of qualifying species</i> • <i>The structure and function (including typical species) of qualifying natural habitats</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely</i> • <i>The populations of qualifying species, and,</i> • <i>The distribution of qualifying species within the site.”</i> <p>The conservation objectives for the SPAs are to:</p> <p><i>“Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of the habitats of the qualifying features;</i> • <i>The structure and function of the habitats of the qualifying features;</i> • <i>The supporting processes on which the habitats of the qualifying features rely;</i> • <i>The population of each of the qualifying features; and</i>

	<ul style="list-style-type: none"> • <i>The distribution of the qualifying features within the site.</i>"
Screening of impact pathways	<p>Recreational disturbance: the site lies within the zone of influence for recreational pressure in relation to the above designations, according to the Norfolk GIRAMS. This reflects anticipated strategic growth across the region and the substantial distances travelled by visitors to these coastal designations, combined with the sensitivity of the interest features (habitats and species). However, the designations are considered to be sufficiently removed from the site that an effect from the development alone is not considered likely, given that any visits to these designations would be very occasional rather than any regular access.</p>
Conclusion – could the proposed development result in a likely significant effect?	
In combination with other plans or projects	
<p>Yes. Whilst predicted increases in recreational pressure arising from the proposed development itself are considered to be negligible, the designations are recognised to be potentially sensitive to increased recreational pressure resulting from regional growth (as set out in the Norfolk GIRAMS). As such, further assessment of potential for recreational disturbance is necessary and an Appropriate Assessment is required.</p>	

4.9. Appropriate Assessment

4.9.1. In light of the above conclusions, the following designations are taken forward for further consideration at Stage 2 via Appropriate Assessment.

- The Broads SAC and Broadland Ramsar site;
- In-combination effects on The Broads SAC, Broadland SPA and Ramsar, Norfolk Valley Fens SAC, Breydon Water SPA and Ramsar, Winterton-Horsey Dunes SAC, Great Yarmouth and North Denes SPA, North Norfolk Coast SAC and SPA, The Wash and North Norfolk Coast SAC.

5. Stage 2: Appropriate Assessment

5.1.1. As set out in the sections above, the potential has been identified for:

- Water quality (including nutrient sensitivity) effects on The Broads SAC and Broadland Ramsar site;
- In-combination recreational effects on The Broads SAC, Broadland SPA and Ramsar, Norfolk Valley Fens SAC, Breydon Water SPA and Ramsar, Winterton-Horsey Dunes SAC, Great Yarmouth and North Denes SPA, North Norfolk Coast SAC and SPA, The Wash and North Norfolk Coast SAC.

5.1.2. This section assesses the potential effects of, and mitigation requirement for, the above effects and designations.

5.2. Water Quality (Including Nutrient Sensitivity) Effects

5.2.1. This section assesses the potential effects of, and mitigation requirement for, water quality (including nutrient sensitivity) effects on The Broads SAC and Broadland Ramsar site.

Do the proposals, in-combination with other relevant plans and projects have the potential to affect the integrity of the European designation, given the sites' conservation objectives?	
Water quality	
<p>The component SSSIs of The Broads SAC in closest proximity to the site are in unfavourable condition, with the latest condition assessments citing poor water quality as a reason. For example, the condition assessment for the component SSSI unit closest to the site (Yare Broads and Marshes SSSI, Unit 16 'RSPB') undertaken in August 2018 states:</p> <p><i>"Although much of the RSPB managed land is favourable the impact of poor quality river water on the fen is holding back the site from achieving all it could, and negatively impacting riverside fen communities as well as connected ditches and waterbodies. Areas of fen in a c.20m wide strip adjoining the river and connected ditches clearly show the impact of nutrient rich water flowing onto the site: these areas are species poor fen with abundant <i>Urtica dioica</i>, <i>Typha latifolia</i> and <i>Calystegia sepium</i>."</i></p> <p>The proposals could increase levels of water-borne nitrogen and phosphorous at the SAC in the absence of mitigation, which could result in the deterioration of the designated Annex I habitats, and/or inhibit restoration of habitats to favourable condition, through eutrophication. As such, an adverse effect on the integrity of the designations cannot be ruled out. Therefore, mitigation measures are required.</p>	
Proposed avoidance and/or mitigation measures (following the flow-chart in the guidance for Appropriate Assessment in Annex E of Natural England's letter to planning authorities regarding nutrient neutrality (dated 16 March 2022))	
Mitigation to ensure no hydrological connectivity	Mitigation to avoid hydrological connectivity between the site and the designations is not feasible in this case, given that the Rivers Yare and Wensum lie adjacent to the site and flow directly into the designations.

<p>Mitigation that would avoid adverse effects</p>	<p>Mitigation is being designed to provide certainty that the proposals would avoid adverse effects by achieving nutrient neutrality in line with Natural England's guidelines.</p> <p>Mitigation will be provided via the purchase of off-site nutrient neutrality credits which are being brought forward by Norfolk Environmental Credits Ltd²⁶ as a joint venture of Anglian Water, North Norfolk District Council, Breckland District Council, Norwich City Council and South Norfolk and Broadland District Councils. The applicant has registered for this scheme.</p> <p>The River Wensum SAC & Broads SAC Nutrient Budget Calculator (v1.1) has been used to calculate the credits required to be offset (51.88 kgTP/yr and 1515.75 kgTN/yr, including a 20% precautionary buffer) and these will be purchased prior to occupation of the scheme.</p>
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Conclusion – with the implementation of mitigation, will the proposals in-combination with other plans or projects avoid an adverse effect on integrity of a European designation?

The implementation of the above mitigation measures are capable of achieving nutrient neutrality at the site throughout construction and occupation in perpetuity, provided that suitably worded planning conditions and/or legal agreements are imposed requiring contributions to an appropriate strategic credit scheme.

Following the implementation of mitigation, it considered that an adverse effect as a result of water quality would be avoided, and the proposed development, alone and in-combination with other plans and projects, would not result in an adverse effect on the integrity of The Broads SAC and Broadland Ramsar site, in view of the designation's conservation objectives.

Therefore, it is considered that no further assessment is required and proceeding to Stage 3 is not necessary.

5.3. Recreational Pressure In-combination Effects

5.3.1. This section assesses the potential effects of, and mitigation requirement for, recreational pressure arising from the proposed development in combination with other plans and projects, on The Broads SAC, Broadland SPA and Ramsar, Norfolk Valley Fens SAC, Breydon Water SPA and Ramsar, Winterton-Horsey Dunes SAC, Great Yarmouth and North Denes SPA, North Norfolk Coast SAC and SPA, The Wash and North Norfolk Coast SAC.

²⁶ <https://www.norfolkenvironmentalcredits.co.uk/>

Do the proposals, in-combination with other relevant plans and projects have the potential to affect the integrity of the European designation, given the sites' conservation objectives?

Recreational pressure (in-combination with other proposals)

A series of visitor surveys were undertaken at European protected sites across Norfolk, including Broadland SPA and The Broads SAC, in 2015 and 2016 (Footprint Ecology 2016). The subsequent analysis predicted visitor increases of up to 28% at the designations arising from future growth in Norwich and South Norfolk, respectively. Although recreational pressure has not been directly linked to adverse effects on the interest features of the designations, recreational pressure can result in disturbance to breeding birds (e.g. Little Terns) and non-breeding birds (e.g. wintering wildfowl and waders), as well as causing habitat damage to the sensitive habitats. This can occur through damage to soils and vegetation by trampling, disturbance to sensitive species e.g. ground-nesting birds and wintering waterfowl by off-lead dogs, eutrophication from dog fouling, littering, and preventing appropriate management such as grazing. There is clear evidence of recreational pressure resulting in a significant adverse impact on bird species at other SPAs (such as Thames Basin Heaths SPA and Dorset Heathlands SPA).

On this basis, given that information is not available to demonstrate that increased visitor pressure from new housing would not have an adverse effect on the interest features of the designations, a precautionary approach has been advocated, with contributions towards strategic mitigation required for all new residential developments in current site allocations within Norwich City and South Norfolk Councils. Strategic mitigation in Norfolk is delivered via the Norfolk Green Infrastructure and Recreational impact Avoidance and Mitigation Strategy (GIRAMS), dated March 2021. The GIRAMS was developed by all Norfolk LPAs, in addition to Natural England and Forestry Commission. The strategy includes measures to deliver appropriate green infrastructure within new developments or a contribution towards offsite green infrastructure, in addition to a contribution to an avoidance and mitigation strategy at the designations. The requirement for relevant new developments to contribute to the GIRAMS is set out in Policy 3 of the Greater Norwich Local Plan.

Proposed avoidance and/or mitigation measures

Recreational impact
Avoidance and Mitigation
Strategy (RAMS)

The Norfolk GIRAMS includes a per-dwelling tariff to fund a combination of hard and soft mitigation measures at the designated sites. This will increase their resilience to greater visitor numbers. The tariff is calculated as a proportionate sum of the full costs of the Norfolk-wide RAMS mitigation package as apportioned to the predicted growth outlined in the Local Plan. The concept of RAMS has been endorsed by Natural England and has been implemented for other European designations across England which are sensitive to recreational pressure.

The Norfolk RAMS package funds items such as governance, site rangers, signage and interpretation boards, monitoring of SPA birds, visitor monitoring, communication and training such as a website, talks and promotional materials, a dog project, water sports zonation, development of codes of conduct, and fencing of sensitive areas.

	<p>On this basis, mitigation is proposed by way of a financial contribution through payment of the relevant RAMS tariff²⁷ in accordance with Policy 3 of the Greater Norwich Local Plan.</p>
<p>Green Infrastructure provision</p>	<p>As the RAMS tariff exists to specifically mitigate the in-combination effects of new developments across Norfolk on protected sites, an additional Green Infrastructure contribution is also required under the GIRAMS to deliver mitigation at a more local level. This will secure adequate provision of Suitable Alternative Natural Green Space (SANGs). A SANG is a semi-natural area of greenspace located away from the designation, with the aim of providing an alternative area for recreation, to divert residents away from the sensitive designations. The use of SANGs as mitigation for recreational pressure is well established, having formed a key element of the mitigation strategy adopted at Thames Basin Heaths SPA and Dorset Heathlands SPA, and developed on the basis of various studies which provide evidence supporting the principle of alternative open space provision.</p> <p>In addition, Policy 3 of the Greater Norwich Local Plan requires all residential development to provide green infrastructure equating to a minimum of 2 hectares per 1,000 population to reflect Natural England's Accessible Natural Greenspace Standard. The proposed development exceeds this by providing a total of 3.75 ha of informal green space within the site, which is equivalent to 2.5 ha per 1000 population.</p>

Conclusion – with the implementation of mitigation, will the proposals in-combination with other plans or projects avoid an adverse effect on integrity of a European designation?

Yes.

Following the implementation of mitigation including financial contributions to RAMS and provision of onsite green infrastructure, it considered that an adverse effect as a result of recreational disturbance would be avoided, and the proposed development, alone and in-combination with other plans and projects, would not result in an adverse effect on integrity of the above designations in view of the sites' conservation objectives.

Therefore, it is considered that no further assessment is required and proceeding to Stage 3 is not necessary.

²⁷

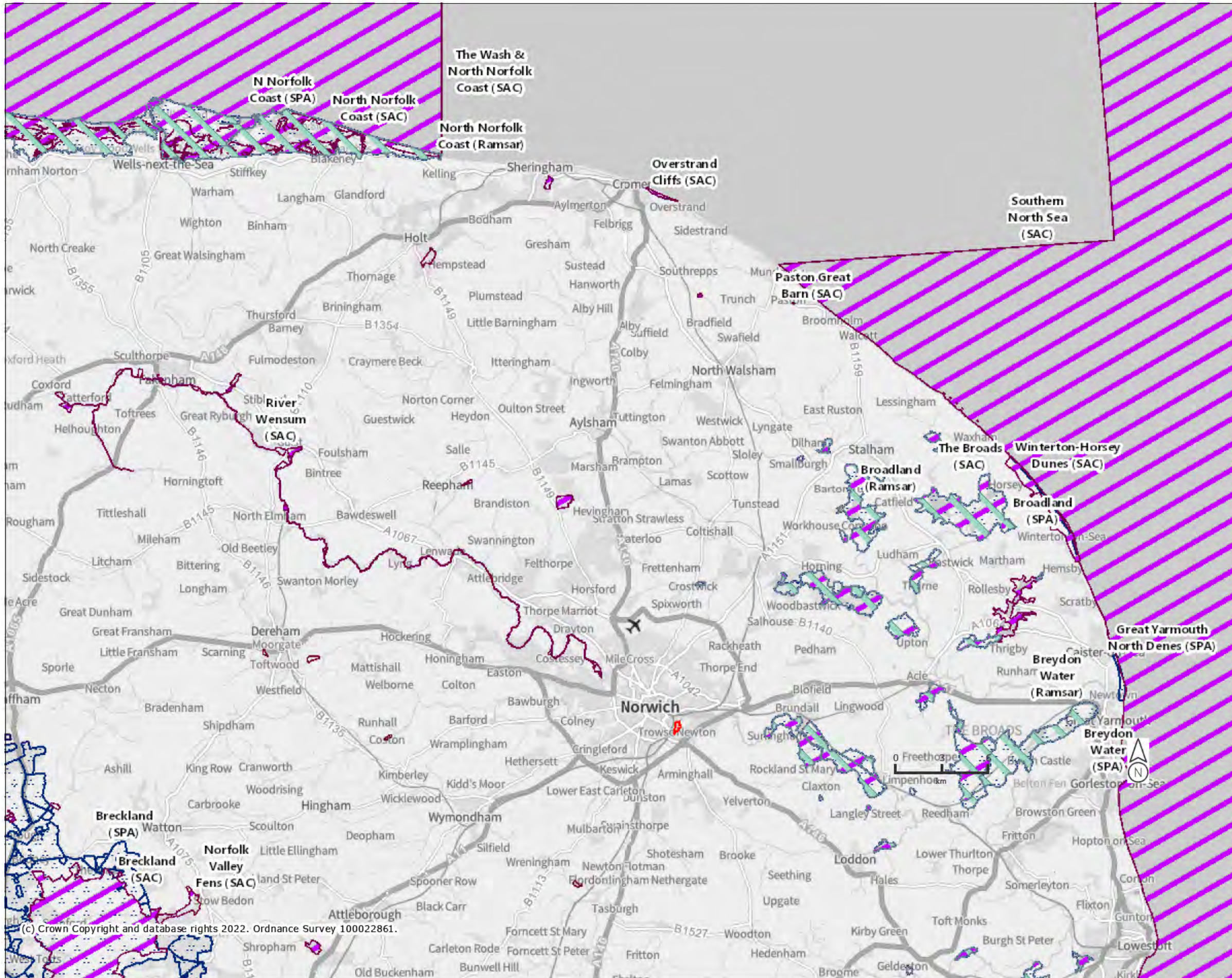
https://www.norwich.gov.uk/info/20017/planning_applications/3864/recreational_access_mitigation_strategy_rams_tariff

6. Conclusions

- 6.1.1. This document provides information to inform a Habitats Regulations Assessment of the proposed development, given the presence of a number of European designations within the site surrounds.
- 6.1.2. A screening exercise has been undertaken to identify whether the proposed development could result in a likely significant effect on European designations, both alone and in-combination with other plans and projects (Stage 1). The screening exercise has concluded that in the absence of mitigation, the potential for a likely significant effect arising from the development alone cannot be ruled out in relation to water quality at The Broads SAC and Broadland Ramsar site. In addition, the potential for recreational disturbance at a number of Norfolk SACs, SPAs, and Ramsar sites has been identified in combination with other plans and projects. Therefore an Appropriate Assessment is required.
- 6.1.3. The Appropriate Assessment (Stage 2) has concluded that, in view of the designations' conservation objectives, following the implementation of mitigation measures comprising contributions to a nutrient neutrality credit scheme, contributions to a Recreational impact Avoidance and Mitigation Strategy, and delivery of accessible Green Infrastructure, the proposed development would have no effect on the integrity of the surrounding European designations either alone or in-combination with other plans and projects.

Annex 6592/HRA1:

European Designations in Relation to the Site



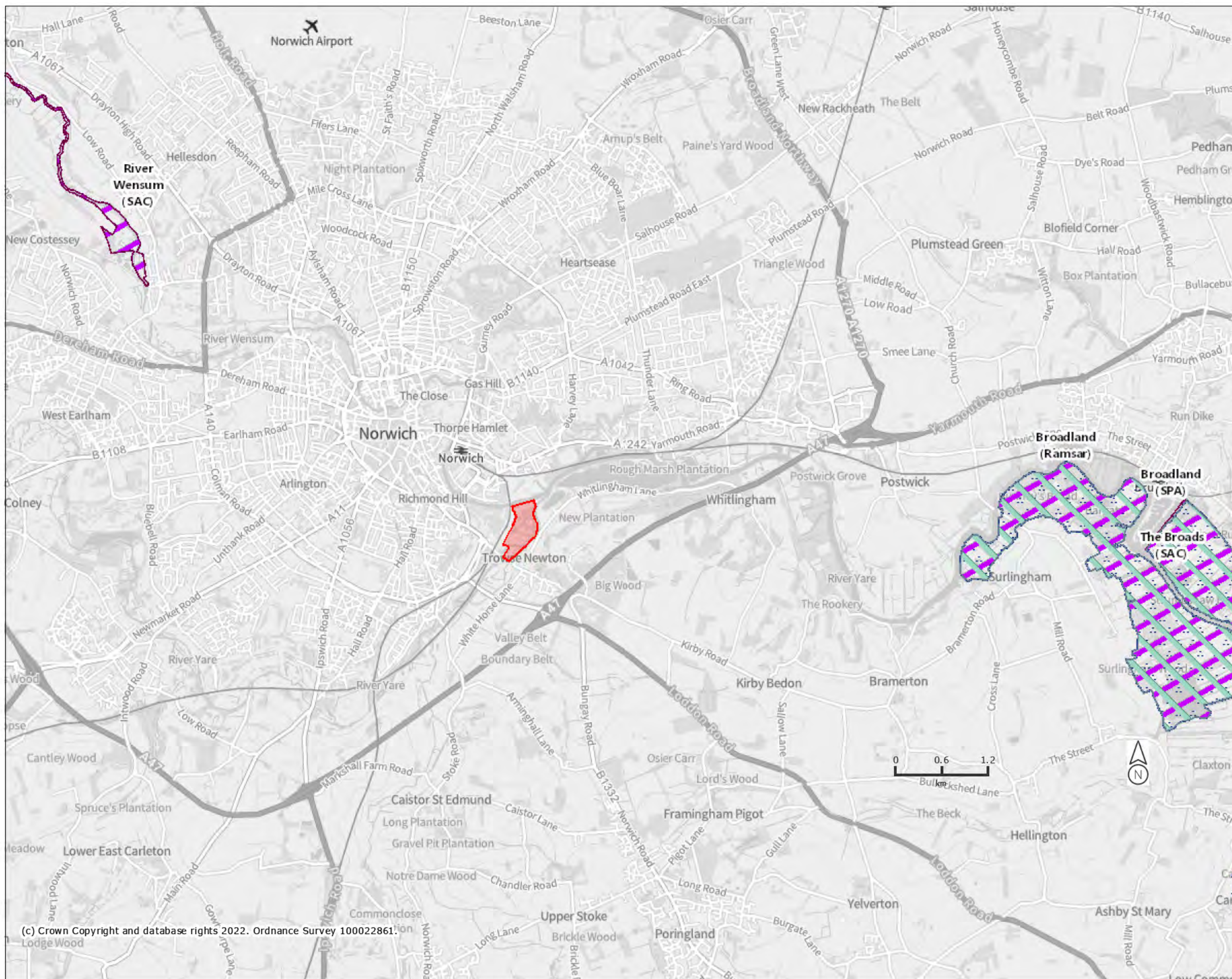
Legend

-  Ramsar Sites (England)
-  Proposed Ramsar Sites (England)
-  Special Areas of Conservation (England)
-  Possible Special Areas of Conservation (England)
-  Special Protection Areas (England)
-  Potential Special Protection Areas (England)

Projection = OSGB36
 xmin = 557800
 ymin = 291100
 xmax = 684800
 ymax = 353800

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Legend

-  Ramsar Sites (England)
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-  Special Protection Areas (England)
-  Potential Special Protection Areas (England)

Projection = OSGB36
 xmin = 613300
 ymin = 301500
 xmax = 638700
 ymax = 314000



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Environmental Statement Addendum – Chapter 09: Ecology Appendix 9.3

Land at Deal Ground and May Gurney, Norwich

Environmental Action Plan

(to address requirements of Condition 8a-c of 12/00875/O
[Norwich City Council] and Condition 38a-c of 2011/0152/O
[South Norfolk Council])

June 2023

Quality Management	
Client:	Serruys Property Company Ltd
Project:	Land at Deal Ground and May Gurney, Norwich
Report Title:	Environmental Action Plan
Project Number:	ECO-6592
File Reference:	6592 EAP vf /TS/AB
Date:	16/06/2023

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Contents

Text:

1	Introduction	4
2	Ecological Constraints	6
3	Aims and Objectives	10
4	Ecological Mitigation Measures.....	11
5	Ecological Compensation and Enhancements	23
6	Physical Measures to Safeguard CWS.....	28
7	Phasing Plan.....	29
8	Conclusions	30

Plans:

Plan 6592/EAP1	Ecological Safeguards and Mitigation
Plan 6592/EAP2	Ecological Compensation and Enhancements

Annexes:

Annex 6592/EAP1	Development Phasing
Annex 6592/EAP2	Example Specifications of Faunal Enhancement Features

1 Introduction

1.1 Background and Proposals

- 1.1.1 Aspect Ecology is advising Serruys Property Company Ltd regarding ecological matters in respect of proposed development of land at Deal Ground and May Gurney, Norwich, centred at grid reference TG 247 074 (see red line boundary on Plan 6592/EAP1), hereafter referred to as the 'site'. The proposed development lies within a larger landholding which notably includes the Carrow Abbey Marsh County Wildlife Site (CWS) to the east (see blue line boundary on Plan 6592/EAP1), which is proposed for retention and ecological enhancement. This larger area comprises the 'survey area'.
- 1.1.2 The site is split into two main parcels, comprising the 'May Gurney' land (Phase 1 of the development) which forms the southern part of the site, to the south of the River Yare, and the larger 'Deal Ground' land to the north of the River Yare, which comprises Phases 2 and 3 (see Annex 6592/EAP1).
- 1.1.3 The site is in receipt of outline planning permission (ref. 12/00875/O [Norwich City Council] and 2011/0152/O [South Norfolk Council]) for mixed development, including residential and commercial uses with landscaping and biodiversity enhancements. This document forms part of the reserved matters submission for development of 670 residential dwellings at the site.

1.2 Planning Conditions

- 1.2.1 Condition 8, parts a to c of outline planning permission 12/00875/O (Norwich City Council) and Condition 38, parts a to c of outline planning permission 2011/0152/O (South Norfolk Council) require the production of an Environmental Action Plan. The full wording of the condition is as follows (as amended on 8 March 2023 under non-material amendment application 23/00183/NMA [Norwich City Council]):

"Prior to commencement of the spine road and/or together with the submission of any reserved matters for any phase as approved under condition 14 (whichever is earlier), a Framework Environmental Action Plan (FEAP) covering the site and the adjacent County Wildlife Site (CWS) shall be submitted to and agreed in writing by the local planning authority. For each phase, a detailed EAP shall include the following:

- a) Detailed scheme of ecological and protected species mitigation and enhancement, informed by the Ecological Report received by the local planning authority 13 April 2013, up dated ecology surveys and hydrological information;*
- b) Physical measures, in the form of a wet ditch system, to safeguard the long term ecological functioning of the CWS;*
- c) A phasing plan for the implementation of the ecological and protected species mitigation and enhancement measures;*

... The agreed Framework EAP Plan shall be updated prior to the commencement of each phase. The development shall be undertaken in accordance with the approved EAP and the land shall be managed in accordance with the agreed Nature Conservation Management Plan thereafter. Any subsequent variations to the EAP shall first be approved in writing by the local planning authority."

- 1.2.2 Information to inform part d of the above conditions, i.e. the Nature Conservation Management Plan, is provided under separate cover.

1.3 Site Overview

1.3.1 The site is located in Trowse, south-east Norwich, within an urban-edge context. The site is bound by the River Wensum to the north, beyond which lies industrial and former industrial land with a railway depot. The River Yare intersects the site (separating the Deal Ground and May Gurney land) and runs adjacent to the east of the Deal Ground land, beyond which lies parkland (including Whitlingham Country Park) and residential development within the boundary of the Norfolk Broads Authority. An asphalt plant and railway line lies to the west of the site, with more dense development beyond this.

1.3.2 The site itself comprises a number of different habitats, primarily comprising former industrial land partly colonised by grassland, tall ruderal vegetation and scrub. Woody vegetation including wet and dry woodland, scrub, scattered trees, and Bramble thickets, is present in various locations across the site, particularly towards the centre. In addition, small areas of fen habitat are present in the east of the site, which extend off-site to the east within the same landholding. These areas largely fall within the boundary of Carrow Abbey Marsh CWS.

1.4 Extent of the EAP

1.4.1 This Environmental Action Plan covers the entire application site in addition to adjacent retained habitats within Carrow Abbey Marsh CWS which fall within the same landownership (the 'survey area'), as shown at Plan 6592/EAP1.

1.5 Purpose of the Report

1.5.1 This report contains information to address parts a, b and c of the above conditions, comprising a scheme of ecological and protected species mitigation and enhancement, including physical measures to safeguard the long-term functioning of the CWS. The report is informed by update survey work carried out in 2022 and previous ecological surveys at the site, which are set out in Aspect Ecology's Baseline Ecological Appraisal for the site.

2 Ecological Constraints

- 2.1.1 Ecological survey work was previously carried out at the site and the adjoining CWS (together referred to as the 'survey area') by Aspect Ecology in 2008 to 2009. This included an extended Phase 1 habitat survey in addition to specific survey work for plant communities (NVC). Subsequently, an update habitat and NVC survey of the same survey area was undertaken in August and September 2022 (for the Deal Ground site and CWS) and November 2022 (for the May Gurney site) to confirm the current extent of habitats within the survey area and identify any changes since the previous surveys. The full findings of these surveys are set out in the Baseline Ecological Appraisal for the site. Further update faunal surveys are being undertaken in 2023, the results of these surveys will be reviewed when available and should any revisions to the EAP be necessary, an update will be provided.
- 2.1.2 An overview of habitat constraints identified within / adjacent to the site during the completed survey work are set out in Table 2.1 below.

Table 2.1 Habitats, designations and plant species representing ecological constraints within or adjacent to the site.

Habitat type / feature	Description
Eutrophic floodplain fen (mostly designated as Carrow Abbey Marsh CWS)	<p>An area of fen habitat intersected with a drainage ditch system is present in the centre and east of the survey area, largely falling outside of the application site boundary. The majority of this habitat falls within the CWS designation. The fen habitat is somewhat variable in its vegetation types, the majority being dominated by Greater Pond Sedge <i>Carex riparia</i>, while Reed Sweet-grass <i>Glyceria maxima</i>, Reed Canary-grass <i>Phalaris arundinacea</i> and Common Reed <i>Phragmites australis</i> are locally dominant. At the southern end, the fen becomes drier and transitions into tall ruderal vegetation. The vegetation is consistently tall and dense, with no evidence of recent management or access.</p> <p>In the absence of management, the fen is gradually drying with encroachment of trees and scrub at the margins. This is evidenced by the change of vegetation types since the previous survey in 2009, with a shift to less wet, species poorer communities.</p>
Wet woodland (mostly designated as Carrow Abbey Marsh CWS)	Six areas of wet woodland were recorded within the survey area, one of which (W3) wholly lies within the application site, and one of which (W8) partially falls within the application site. All of these woodlands are young in nature and are dominated by Willow species, much of which has recently colonised historically open fen, which is reflected in the ground flora.
River Yare	The River Yare flows along much of the boundaries of the survey area, briefly passing within the application site where a bridge is proposed between the May Gurney and Deal Ground parts of the site. Much of the river is natural in character, measuring approximately 6-10m in width, and supports some aquatic vegetation. The banks support a mixture of tall ruderal vegetation with scattered trees, especially in the south and the central portion of the stretch along the Deal Ground land, while dense woodland in the form of W4 and W11 abut the river in the southern and northern sections of the Deal Ground land. In the southern part of the survey area, adjacent to the May Gurney land, the riverbank is variable with some areas of stone walling or metal sheet piling but predominantly comprising heavily shaded steep banks supporting sparse vegetation largely dominated by Ivy.

Habitat type / feature	Description
Nationally Scarce plant species	One plant species of conservation importance was recorded within the survey area, namely Marsh Fern <i>Thelypteris palustris</i> , which was recorded close to the River Wensum in an area of felled woodland (formerly W2), now occupied by colonising vegetation (PDL8). This species is listed as Nationally Scarce, albeit Norfolk is a significant stronghold. Its known extent within the application site is limited to one small patch, while the species has not previously been recorded within the survey area, such that it is likely to either be a recent colonist or has for some time only occurred as a very small population. Previously, Hoary Mullein <i>Verbascum pulverulentum</i> has been recorded within the site, but this was not re-recorded in 2022.
Invasive plant species	Three invasive plant species listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) were recorded within the survey area. These comprise Japanese Knotweed <i>Reynoutria japonica</i> , Giant Hogweed <i>Heracleum mantegazzianum</i> , and Himalayan Balsam <i>Impatiens glandulifera</i> . Japanese Knotweed in particular forms dense stands in parts of the application site and appears to have expanded its extent since 2009. Giant Hogweed and Himalayan Balsam were only recorded in the fen habitat and along the banks of the River Yare.

2.1.3 In addition to the habitat and plant community surveys, specific faunal surveys were undertaken at the survey area in 2008 to 2009 for bats (tree and building inspection surveys, emergence/re-entry surveys and manual activity surveys), Badger *Meles meles*, Water Vole *Arvicola amphibius*, Otter *Lutra lutra*, breeding birds, Great Crested Newt *Triturus cristatus*, reptiles, and invertebrates. The bat inspection survey and Badger survey work was updated in 2022, while specific survey work was undertaken for Desmoulin's Whorl Snail *Vertigo moulinsiana*. In addition, the update survey in 2022 also included an assessment of any change in the site's likely value for fauna. These findings are set out in the Baseline Ecological Appraisal for the site, while Table 2.2 below summarises the faunal constraints within and adjacent to the site.

Table 2.2. Faunal species representing ecological constraints within or adjacent to the site.

Faunal species	Description
Bats (roosting)	A number of buildings are present within the site offering bat roosting potential. No evidence of roosting bats has been recorded within the application site itself, although one <i>Myotis</i> bat was recorded returning to roost within an off-site part of Building B7 in August 2010. Numerous trees within the application site have been identified as providing bat roosting potential, particularly within the southern and central parts of the application site, occurring as individual scattered trees, tree groups or within woodland areas. Possible evidence of roosting bats was recorded in one of these trees (T1), comprising a possible Soprano Pipistrelle <i>Pipistrellus pygmaeus</i> emergence in July 2010, with at least five Soprano Pipistrelle possibly emerging in August 2010.

Faunal species	Description
Bats (foraging and commuting)	The survey work recorded a moderate level of foraging activity, attributable to Common Pipistrelle <i>Pipistrellus pipistrellus</i> , Soprano Pipistrelle, Noctule <i>Nyctalus noctula</i> , and <i>Myotis</i> species including Daubenton's Bat <i>M. daubentonii</i> . Soprano Pipistrelle and Common Pipistrelle were the most frequently recorded species. The greatest levels of activity were associated with the River Yare corridor along the eastern margin of the survey area, which provides connectivity to the adjacent Whitlingham Country Park, where known roosts are present. Groups of trees and scrub around the fen margins were also subject to regular use. More occasional activity was recorded in the fen habitat and along the River Wensum. Update habitat assessment in 2022 concluded that there is unlikely to be any significant change in bat activity patterns across the survey area.
Water Vole	Survey work for Water Vole was undertaken along the river banks and within the ditches in the fen in the Deal Ground land in 2009. No evidence of this species was recorded, which is consistent with previous surveys undertaken in 2000 and 2003. The apparent absence of this species was explained by the limited open water in ditches within the survey area, and the scarcity of grass cover along the river banks. The 2022 habitat assessment concluded that the site remains of poor suitability for Water Vole, albeit the species is known to occur along the River Yare at Whitlingham Country Park, and may therefore occur sporadically along the Yare corridor.
Otter	Survey work in 2009 for Otter along the banks of the River Yare and River Wensum within the survey area found no evidence of use by Otter, although the dense vegetation along the River Yare corridor was identified as potentially suitable habitat for Otter. The species was considered unlikely to frequent other habitats within the survey area, e.g. within the fen, because of the lack of year-round standing water. Habitat assessment in 2022 concluded that there was no significant change to the previous assessment, with any interest focussed along the River Yare corridor.
Other mammals (including Priority Species)	The Priority Species Harvest Mouse <i>Micromys minutus</i> could be present within the fen habitat and Hedgehog <i>Erinaceus europaeus</i> could utilise the drier parts woodland and scrub habitats. Polecat <i>Mustela putorius</i> has also been recorded in the local area and could use the drier woodland and scrub habitats.
Reptiles	Survey work undertaken in April to August 2009 recorded a low population of Grass Snake <i>Natrix natrix</i> in grassland and fen habitat across both the Deal Ground and May Gurney land, although the population was considered to represent a good size within the fen habitat. No other reptile species were recorded. Habitat assessment in 2022 concluded that the suitability of the survey area remains similar to 2009, with slightly reduced suitability due to tree and scrub encroachment.

Faunal species	Description
Birds	<p>Breeding bird survey undertaken at the Deal Ground land in 2009 recorded a total of 53 species, of which 26 were considered to be breeding or probably breeding within the survey area, and 7 possibly breeding. The remaining 20 species were observed flying over or foraging at the survey area, but presumed to be breeding elsewhere. A good density of breeding birds was recorded within the survey area overall, with the fen habitat in particular supporting a significant assemblage of birds, in contrast to the drier areas of woodland, scrub, ruderal and grassland habitats which supported a much reduced diversity of species.</p> <p>Notable species recorded within the fen included the Schedule 1 species Cetti's Warbler <i>Cettia cetti</i> and the RSPB red-listed species Grasshopper Warbler <i>Locustella naevia</i> and Cuckoo <i>Cuculus canorus</i>, while the red-listed species Linnet <i>Carduelis cannabina</i> was recorded within scrub. In addition, the Schedule 1 species Barn Owl <i>Tyto alba</i> and Kingfisher <i>Alcedo atthis</i> were recorded as non-breeding individuals, recorded hunting over the fen and along the River Yare, respectively. Amber-listed species included Sedge Warbler <i>Acrocephalus schoenobaenus</i>, Willow Warbler <i>Phylloscopus trochilus</i> and Reed Bunting <i>Emberiza schoeniclus</i>, all of which were recorded in the fen habitat.</p> <p>Update habitat assessment in 2022 concluded that the previous evaluation remains appropriate, albeit there could be a minor change in the bird assemblage, reflecting the higher prevalence of scrub and woodland at the expense of fen and tall ruderal vegetation. However, this is not likely to significantly alter the conservation importance of the assemblage.</p>
Fish	<p>Fisheries data held by the Environment Agency for the Rivers Wensum and Yare in the vicinity of the site include records of three UK Priority Species and one Annex 2 species. These species could occur within the stretches of river adjacent to the application site, potentially including the section of the River Yare which passes through part of the application site.</p>
Desmoulin's Whorl Snail	<p>Survey work for invertebrates undertaken in 2009 recorded the presence of Desmoulin's Whorl Snail in sedge-dominant vegetation and the ditches within the fen habitat. Update survey work in October 2022 recorded this species in approximately half of the sample points taken within the fen. The distribution of the species was patchy and concentrated on the south-central part of the fen.</p>
Other invertebrates	<p>Survey work for terrestrial invertebrates undertaken at the Deal Ground land in 2009 identified a total of 592 species of invertebrates. This assemblage included 17 Priority Species, one Nationally Rare RDB3 species (Twin-spotted Wainscot Moth <i>Archanara geminipuncta</i>, associated with reedbeds), 14 Nationally Notable species, and 30 Nationally Local species. These species of conservation interest were primarily associated with wetland and ruderal habitats, which supported 40% and 42% of the species of conservation interest within the survey area, respectively. Woodland habitat was of comparatively lower interest, supporting 26% of the species of conservation interest within the survey area.</p> <p>Update habitat assessment in 2022 identified that the condition of habitats for invertebrates remains similar to the situation in 2009, albeit the gradual drying of the fen and associated reduction in floristic diversity may have reduced the value of this habitat for invertebrates. The distribution of ruderal habitats within the site has shifted since 2009, with the majority now located along the River Yare banks, which are likely to be of particular importance for invertebrates. Overall, the value of the site for invertebrates is likely to be unchanged since the previous assessment.</p>

3 Aims and Objectives

3.1.1 The overarching aims of the Environmental Action Plan are to protect the existing ecological interest of the site where possible, restore degraded habitats to good condition, and create new features of ecological importance within the site which complement the ecological functionality of the wider landscape.

3.1.2 To achieve these aims, the following objectives are proposed:

- Protection and, where appropriate, restoration of habitats of ecological importance, namely fen, wet woodland, and the River Yare corridor;
- Where possible, safeguarding of faunal populations together with the protection and enhancement of features of faunal importance, including structures and trees with bat roost potential, suitable breeding bird habitat, and the River Yare corridor;
- Mitigation and compensation measures for losses of important ecological habitats, including translocation of fen turfs and Nationally Scarce plant species where these will be lost to development, in addition to replacement planting / seeding;
- Mitigation and compensation measures for faunal species, to include safeguards during removal of buildings and vegetation to protect bats, breeding birds, and reptiles;
- Habitat enhancements, including the provision of new wildflower meadow, tree planting, and swales;
- Faunal enhancements, including the provision of specific features for roosting bats, Otter, nesting birds, and reptiles.

3.1.3 In addition, long term ecological management of the site and the adjacent CWS is proposed. These measures are set out within a separate Nature Conservation Management Plan.

4 Ecological Mitigation Measures

4.1.1 This section sets out measures to avoid and/or minimise harm to habitats, important ecological features, and populations of important faunal species. These measures are illustrated in summary at Plan 6592/EAP1. Following this, the next section sets out compensation and enhancement measures, such as habitat creation.

4.2 Habitats and Plants

4.2.1 The following mitigation measures have been identified to protect existing habitats or mitigate harm to habitats and species at the construction stage. Further detail on measures to protect habitats during construction (e.g. from water- or air-borne pollution, hydrological changes, and disturbance from noise, vibration, and light) will be set out within the Construction Method Statement and the Construction and Environmental Management Plan for the development, as required under separate planning conditions (e.g. Conditions 42 and 43 of Norwich City Council's outline planning permission).

Protection of retained trees and woodland

4.2.2 All trees and woodland to be retained within the proposed development, such as woodland W5, will be protected during construction in line with standard arboriculturalist best practice (BS5837:2012) or as otherwise directed by a suitably competent arboriculturalist. This will involve the use of protective fencing or other methods appropriate to safeguard the root protection areas of retained trees.

Protection of retained fen

4.2.3 Within the application site boundary, temporary construction fencing will be used to protect retained fen within the application site from temporary encroachment during construction and levelling works. Further details as to the location of the temporary construction fencing will be set out within the Construction and Environmental Management Plan (required under separate planning conditions).

4.2.4 With regard to the fen outside of the application site but within the wider landholding to the east of the site, prior to the occupation of the first dwellings, a permanent fence will be erected to demark the boundary of the development where it abuts the retained CWS. The fence will serve a dual purpose to both deter people and pets from entering the sensitive CWS habitats, while also keeping livestock within the retained CWS (see Plan 6592/EAP2). The fence specification will comprise a suitable livestock-proof design and will be subject to ongoing maintenance, as set out within the Nature Conservation Management Plan. Additional 'soft' deterrents including a wet ditch system and barrier shrub planting will also be provided prior to completion of the development, as set out in the separate section relating to physical barriers below.

Protection of rivers and riverbank habitats

4.2.5 Temporary construction fencing will also be erected to protect the Rivers Yare and Wensum from disturbance, e.g. water-borne pollutants and excessive siltation. The fencing will be installed as far from the rivers as possible, and where appropriate will include an undisturbed vegetated buffer zone between the construction area and the river. In particular, a 10m buffer zone is provided at the eastern margin of the Wensum Riverside part of the development in the Deal Ground land, where it lies adjacent to the River Yare.

- 4.2.6 Further details as to the location of the temporary construction fencing will be set out within the Construction and Environmental Management Plan (required under separate planning conditions). Access beyond this fence will only be permitted for necessary landscape works, which will minimise the use of heavy machinery and avoid the creation of extensive areas of bare ground. These measures will seek to protect these important ecological habitats and their associated fauna.

Fen translocation

- 4.2.7 To mitigate the loss of parts of the fen to the development, turfs will be translocated from the areas to be lost into newly created, pre-prepared swales within the Marsh Reach development. The methodology for the translocation has been designed in accordance with best practice guidance¹. The objectives of fen translocation will be to:

- Maintain the identified NVC communities / sub-communities;
- Maintain the presence of 'lowland fens' Priority Habitat;
- Maintain the ecological value, including species diversity, of the habitat.

- 4.2.8 In the summer prior to translocation, an NVC survey of the habitats to be translocated should be undertaken by a suitably qualified ecologist. This will involve identifying and mapping each NVC community or sub-community by collecting quadrat data, together with an overall plant species list of the fen to be translocated. Prior to translocation, the area of turfs that require translocation will be clearly and accurately marked using posts or temporary fencing.

- 4.2.9 Translocation of turfs will be undertaken in autumn or early winter, on the basis that this falls within the dormant season for vegetation growth but prior to any substantial waterlogging which would result in excessive ground disturbance.

- 4.2.10 Prior to commencement of translocation, the receptor site will be prepared by removing any vegetation or topsoil. The landform of the receptor site will be designed to ensure an appropriate hydrological regime for the establishment of fen, i.e. comprising a similar elevation and water table to the donor area, taking account of the depth of turfs to be translocated.

- 4.2.11 Turfs will be dug to 40 cm depth, which has previously been used for similar habitat types. The width of turfs will be as large as practically possible to reduce drying around the edges. Turfs will be neatly cut with a guillotine attachment, and lifted with a fork or plate attachment depending on ground conditions. Ideally, turfs will be directly transferred to the receptor area. If this is not possible, turfs will be loaded onto a flat trailer for transportation to the receptor area. Turfs should be placed in the receptor area on the same day as their removal where possible. Should this not be feasible, turfs will be translocated in no more than 2 days.

- 4.2.12 Turfs will be arranged within the swales according to their preferred hydrological conditions as indicated by their location in the donor habitat and their NVC community type. For example, turfs belonging to the S5 or S26 community, which are associated with wetter conditions, will be placed in the central, lower parts of the swales, while turfs representing the S6 community, which prefer relatively drier conditions, will be placed on slightly higher ground adjacent to the central deeper part of the fen.

¹ Anderson P (2003) Habitat translocation: a best practice guide. CIRIA C600.

- 4.2.13 When laying in the receptor area, turfs will be as tightly fitted as possible. Any gaps between turves will be filled with subsoil from the donor area. Where possible, turves will be aligned in the same pattern as their original position in the donor site, i.e. neighbouring turves should be laid adjacent to each other.
- 4.2.14 The translocation will be undertaken by a suitably qualified contractor, who ideally has experience in habitat translocation. The translocation will be supervised by a suitably qualified and experienced ecologist.
- 4.2.15 The translocated turfs will be subject to a period of aftercare followed by long-term management, which is set out within the separate Nature Conservation Management Plan.

Plant translocation

- 4.2.16 In addition to the translocation of fen turfs, where possible Marsh Fern will be translocated to the same receptor site as the fen turfs, i.e. to the newly-created swales. Translocation of Marsh Fern to the proposed fen habitat is considered to be the most appropriate option, given that this species is typically associated with open fen or carr².
- 4.2.17 The translocation of Marsh Fern will be undertaken at the same time as the fen translocation set out above. The translocation will be preceded by a survey by a suitably qualified ecologist to identify any specimens of Marsh Fern within the site. Any such specimens will be marked, e.g. using posts, and their locations recorded using GPS. The process for translocating the Marsh Fern will mirror the fen translocation set out above. However, the turf depth and size of turfs may need to be reduced when translocating from previously developed land (which is where this species was recorded), to avoid translocating high quantities of stony substrate which would be detrimental to the establishment of the fen. This will be decided on the ground at the discretion of the supervising ecologist.
- 4.2.18 In addition, where possible representative specimens of Hoary Mullein will be translocated into retained open space. This species was not recorded within the site in 2022, such that it might no longer be present. Nevertheless, an update survey will be undertaken by a suitably qualified ecologist in the summer prior to translocation to establish whether the species is present within the site, and if so, to map its distribution.
- 4.2.19 If Hoary Mullein is found to be present in reasonable quantities, translocation will be undertaken by collecting seeds in dry conditions in September. This is considered to be preferable to translocation of plants, given that the species establishes well and quickly from seeds³. Collected seeds will then be stored in refrigeration and subsequently used within a flower mix for the establishment of tall herb planting along woodland edges within Kiln Park (as discussed under 'Habitat Creation' below).
- 4.2.20 Should Hoary Mullein not be recorded during the update survey work, if possible seeds of the species will be sourced from a UK supplier⁴ and included in the sowing mix for the tall herb vegetation within Kiln Park. This habitat will be subject to ongoing low intensity rotational management as set out within the Nature Conservation Management Plan.

² <https://plantatlas.brc.ac.uk/plant/thelypteris-palustris>

³ <https://plantatlas.brc.ac.uk/plant/verbascum-pulverulentum>

⁴ e.g. <https://www.wildgardenseeds.co.uk/WF%20Indivl%20Seeds/WF%20Seeds%20M%20to%20Z.htm> [accessed 3 March 2023]

Invasive species

- 4.2.21 The invasive species Japanese Knotweed, Giant Hogweed and Himalayan Balsam were recorded within the Deal Ground site.
- 4.2.22 Prior to the commencement of development, an update invasive species survey will be undertaken during the appropriate season to map the distribution of invasive species within the site, to inform the scope of works to be undertaken by the appointed contractor.
- 4.2.23 During the previous surveys, the distribution of invasive plant species was limited to the Deal Ground site (Phases 2 and 3), with no evidence of invasive species recorded in the May Gurney site (Phase 1). Japanese Knotweed was by far the most widespread of the three invasive species recorded.
- 4.2.24 **Japanese Knotweed.** Removal of Japanese Knotweed from proposed development areas will initially comprise a targeted herbicide spraying programme in accordance with the latest advice from the Environment Agency, Defra, and Natural England⁵. This should be undertaken by (or under the close supervision of) a contractor holding a certificate of competence for herbicide use. A Control of Substances Hazardous to Health (COSHH) assessment must be undertaken prior to starting work. Currently, glyphosate is recommended to treat this species. Herbicide should be applied within the period July to October, and repeated annually for at least three years until the plants completely stop regrowing (or until development activities require off-site removal, as set out below). After this three-year period, the site should be monitored for at least two years during the growing season to identify any regrowth. Glyphosate can be sprayed onto foliage or by stem injection. Spraying should be undertaken during dry and calm weather conditions.
- 4.2.25 It is recommended that the above spraying programme is initiated as soon as possible (noting that planning consent is not required for this activity), to avoid the need to excavate and bury or otherwise dispose of Japanese Knotweed if possible. Nevertheless, should this not be achieved and construction activities need to commence in the areas occupied by Japanese Knotweed prior to successful eradication by herbicide spraying, then any remaining plants will need to be excavated and securely buried on-site, if feasible, or alternatively removed for off-site disposal. The procedure for excavation and burial/disposal should follow the latest Environment Agency guidelines. Current guidelines stipulate that Japanese Knotweed should be buried to a depth of at least 5 metres, or at least 2 metres if sealed with a geotextile membrane, or off-site disposal using a registered waste carrier to an authorised landfill site⁶.
- 4.2.26 **Himalayan Balsam.** Mechanical control, such as hand-pulling or cutting, is recommended to control this species, because these methods are effective and the proximity of the plant to a watercourse (namely the River Yare) poses risks associated with herbicide use. In order to be effective, plants should be pulled between May and July (before the seed-pods ripen) or cut between March and May. Ideally, multiple visits should be undertaken within this period to remove newly emerging seedlings. Hand-pulling should aim to pull up the root system, while cutting should be as close to ground level as possible. This procedure should be repeated annually until no new regrowth emerges (likely two to three years). As for the Japanese Knotweed control, it is recommended that these measures are implemented as soon as possible to allow successful eradication prior to commencement of construction in this area.

⁵ <https://www.gov.uk/guidance/prevent-japanese-knotweed-from-spreading>

⁶ <https://www.gov.uk/guidance/prevent-japanese-knotweed-from-spreading>

- 4.2.27 **Giant Hogweed.** This species was recorded sparsely within the fen habitat, but is more prevalent within the off-site CWS along the River Yare. As such, the update survey work will confirm whether this species is present within the proposed development areas. If so, any removal is likely to be limited to a very low number of plants, which can be excavated for on-site burial or off-site disposal as required, following the procedure for Japanese Knotweed set out above.
- 4.2.28 **Invasive species within the CWS.** In addition, the invasive species Japanese Knotweed, Giant Hogweed and Himalayan Balsam were recorded outside of proposed built development areas but within open space or within the off-site CWS to be brought into management. A strategy for the control, removal, and ongoing monitoring of invasive species from these parts of the site is set out within the Nature Conservation Management Plan.

4.3 Bats

Buildings

- 4.3.1 No buildings or structures proposed for demolition have been recorded to support evidence of roosting bats. However, buildings B7 and B10 (see Plan 6592/EAP1) have been assessed as supporting low potential to support bats. Therefore, demolition of these buildings will be undertaken using a precautionary approach, as follows.
- 4.3.2 Demolition of buildings B7 and B10 will be preceded by a contractor briefing by an ecologist, who will explain the working procedure and what to do if bats are encountered. Demolition will then proceed initially using hand tools, during favourable weather conditions within spring or autumn under ecological supervision, until no potential roost features remain (which will be decided at the discretion of the supervising ecologist). At this point, mechanical demolition may proceed without ecological supervision. Should any evidence of bats be encountered, works on that building will be suspended. Consideration will be given to the need to undertake works under a European Protected Species (EPS) development licence, and a licence application will be made to Natural England as required.

Trees

- 4.3.3 Two trees (T1 and T2) with potential to support roosting bats are anticipated to require removal under the proposals. Both of these trees lie within the Marsh Reach part of the development. Of these trees, T1 was identified as having high potential to support roosting bats, primarily on the basis of previous possible emergences / entries of up to five Soprano Pipistrelle bats in July/August 2010. Tree T2 is identified as having low potential for roosting bats. Prior to removal of these trees, an update bat survey will be undertaken of tree T1. This will comprise a climbed inspection survey using an endoscope, or emergence/re-entry surveys carried out during the appropriate survey window. Should any evidence of bats be encountered, a Natural England licence will be applied for. This will require appropriate safeguards during felling, in addition to the provision of replacement roost opportunities such as bat boxes. If no further evidence of bats is encountered, the trees will be felled according to a 'soft felling' methodology under ecological supervision, as follows:
- 4.3.4 **Tree T1 (high potential):** This tree will be felled during the spring or autumn to avoid the main bat breeding and hibernation periods, and will be subject to inspection prior to felling in the form of climbing inspections, with use of an endoscope, to ensure that bats are absent and that no evidence of a roost (e.g. droppings) is present. Following detailed inspection, the tree will be felled, ideally the same day as the inspection. If this is not possible, any potential roosting features will be inspected again immediately prior to felling.

- 4.3.5 Should features remain which cannot be fully investigated (e.g. numerous crevices behind Ivy), the tree will be subject to an emergence / dawn re-entry survey immediately prior to felling to confirm absence of roosting bats.
- 4.3.6 Felling will then proceed under a precautionary approach. This will involve measures such as 'soft-felling' of sections of the tree identified as providing bat roosting opportunities (e.g. areas supporting crevices behind Ivy), by lowering and cushioning these sections to reduce any potential effects caused by hard impact with the ground, followed by leaving the felled sections on the ground for a period of at least 24 hours to allow any bats, should these be present, to escape. This will be undertaken under the supervision of a suitably qualified ecologist.
- 4.3.7 If any evidence for the presence of roosting bats is recorded, works on that tree will be suspended and consideration will be given to the need to undertake works under a European Protected Species (EPS) development licence, and a licence application will be made to Natural England as required.
- 4.3.8 **Tree T2 (low potential):** Given the lower likelihood of bat presence, no timing restrictions are proposed regarding soft felling of this tree, albeit work will be timed for spring or autumn where practicable. Soft felling will involve lowering sections of the tree to the ground, followed by leaving the felled sections on the ground for a period of at least 24 hours to allow any bats, should these be present, to escape. In the unlikely event that any evidence for the presence of roosting bats is recorded, works on that tree will be suspended and consideration will be given to the need to undertake works under a European Protected Species (EPS) development licence, and a licence application will be made to Natural England as required.

Lighting

- 4.3.9 Light-spill onto retained and newly created habitat, in particular boundary vegetation and retained woodland, will be minimised in accordance with good practice guidance⁷ to reduce potential impacts on light-sensitive bats (and other nocturnal fauna) and to maintain connective 'dark corridors' across the site. This may be achieved through the implementation of a sensitively designed lighting strategy, with consideration given to the following key factors:
- **Light exclusion zones:** ideally lighting should be avoided along marginal habitat features, such as along the eastern boundary of the Deal Ground site where it adjoins the fen, and along the banks of the River Yare. Light exclusion zones or 'dark buffers' may be used to provide interconnected areas free of artificial illumination to allow bats to move around the site;
 - **Appropriate luminaire specifications:** consideration should be given to the type of luminaires used, in particular luminaries should lack UV elements and metal halide and fluorescent sources should be avoided in preference for LED luminaries. A warm white spectrum (ideally <2,700K) should be adopted to reduce the blue light component;
 - **Light barriers / screening:** new planting (e.g. hedgerows and trees) or fences, walls and buildings can be strategically positioned to reduce light spill;

⁷ Bat Conservation Trust and Institute of Lighting Professionals (2018) 'Guidance Note 08/18: Bats and artificial lighting in the UK'; Stone, E.L. (2013) 'Bats and lighting: Overview of current evidence and mitigation guidance.'; ILP (2011) 'Guidance notes for the reduction of obtrusive light' Institution of Lighting Professionals, GN01:2011.

- **Spacing and height of lighting units:** increasing spacing between lighting units will minimise the area illuminated and allow bats to fly in the dark refuges between lights. Reducing the height of lighting will also help decrease the volume of illuminated space and give bats a chance to fly over lighting units (providing the light does not spill above the vertical plane). Low level lighting options should be considered for any parking areas and pedestrian / cycle routes, e.g. bollard lighting, handrail lighting or LED footpath lighting;
- **Light intensity:** light intensity (i.e. lux levels) should be kept as low as possible to reduce the overall amount and spread of illumination;
- **Directionality:** to avoid light spill lighting should be directed only to where it is needed. Particular attention should be paid to avoid the upward spread of light so as to minimise trespass and sky glow;
- **Dimming and part-night lighting:** lighting control management systems can be used, which involves switching off/dimming lights for periods during the night, for example when human activity is generally low (e.g. 12.30 – 5.30am). The use of such control systems may be particularly beneficial during the active bat season (April to October). Motion sensors can also be used to limit the time lighting is operational.

4.4 Other Mammals

4.4.1 Although no other protected mammal species have been recorded within the site, there is potential for the Priority Species Harvest Mouse, Hedgehog, and Polecat to occur within the proposed development area. As such, safeguards will be implemented during clearance of scrub, woodland, fen and grassland habitats to minimise the risk of harm to these species. The following procedure will be implemented:

- A watching brief should be maintained for Hedgehog and other mammals throughout any clearance works;
- Any piles of material already present on site, particularly vegetation/leaves, etc. and any areas of dense scrub or hedgerows, shall be dismantled/removed by hand and checked for Hedgehog prior to the use of any machinery/disposal;
- Any trenches left open overnight should be provided with a means of escape, e.g. gently graded ramp or a roughened plank, in order to allow animals to escape should they enter the trench. This is particularly important if the trench fills with water;
- Any material to be disposed of by burning, particularly waste from vegetation clearance and tree works, should not be left piled on site for more than 24 hours in order to minimise the risk of Hedgehogs occupying the pile. If this cannot be avoided, material should be stored within a container such as a skip to prevent animals from gaining access. Any material which has been stored on the ground overnight should be moved prior to burning to allow a thorough check for any animals which may have been occupying the pile;
- Any temporarily exposed open pipes or open drains should be blanked off at the end of each working day so as to prevent mammals gaining access as may happen when contractors are off-site;
- In the event that an injured mammal is found, the animal should be wrapped carefully in a towel and taken to a local vet immediately, for Hedgehogs the British Hedgehog Preservation Society (BHPS) should also be phoned (01584 890 801).

4.5 Breeding Birds

4.5.1 To avoid a potential offence under the relevant legislation, no clearance of suitable vegetation (such as scrub, woodland, trees, and tall fen) will be undertaken during the bird nesting season (1st March to 31st August inclusive). If this is not practicable, any potential nesting habitat to be removed should first be checked by a competent ecologist in order to determine the location of any active nests. Any active nests identified would then need to be cordoned off (minimum 5m buffer) and protected until the end of the nesting season or until the birds have fledged. These checking surveys would need to be carried out no more than three days in advance of vegetation clearance.

4.6 Reptiles

4.6.1 Although the majority of reptile habitat associated with the fen will be retained, approximately 0.153 ha of fen and 1.55 ha of grassland will require removal under the proposals. As such, a reptile translocation exercise is proposed, in addition to the creation of new habitats within the site such as fen habitat (supported by translocated turves) and wildflower meadow.

4.6.2 The translocation strategy for the site has been closely guided by the Herpetofauna Groups of Britain and Ireland (HGBI) advisory note entitled "Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards" 1998. In particular, the design gives consideration to the following main elements:

- Timing of Exercise
- Duration of Exercise
- Extent of Exercise
- Capture Method
- Location of Refugia
- Size of Refugia
- Density of Refugia
- Trapping Procedure
- Data Collection
- Animal Welfare
- Destructive Search
- Reptile Exclusion Fencing
- Receptor Site

Timing of Exercise

4.6.3 Translocation would be undertaken over a series of visits within the period March/April and September/October (with the suitability of March and October dependant on weather conditions). These visits will be carried out during suitable weather conditions (between 9-

18°C, and avoiding windy or rainy conditions), and generally during the morning and late afternoon when reptiles are most likely to be basking.

Duration of Exercise

- 4.6.4 The aim of any translocation exercise is to remove a significant proportion of the reptiles from the affected areas. Under the HGBI recommended methodology (e.g. refugia laid at a density of 50/ha and checked once daily), translocation effort for a 'low' population of common reptiles should continue for a minimum of 60 days.
- 4.6.5 However, it is proposed that a high refugia density is employed, and accordingly a reduced exercise duration may be achievable. As such, should five consecutive days of no or very few reptile sightings be achieved (in suitable weather conditions), this level of effort would be considered sufficient to comply with the requirement to expend 'reasonable effort' to avoid harm to reptiles, and as such the translocation exercise may be considered complete. Otherwise, the exercise will continue to 60 days, at which point the results will be analysed to determine if the significant majority of reptiles have been captured, in order to inform a decision as to whether the exercise should be extended to 90 days or beyond.
- 4.6.6 This level of effort will ensure that a significant majority of the reptile population is translocated, which in combination with the proposed habitat enhancement measures, will ensure the long-term conservation of the population.

Extent of Exercise

- 4.6.7 The translocation exercise is to be undertaken within all areas of favourable reptile habitat within the site which is to be removed under the proposals, in particular, the grassland and fen habitats.
- 4.6.8 Areas of suboptimal habitat, such as the sparsely vegetated previously developed land, will be subject to a destructive search during the active reptile period (see 'Destructive Search' section below). Areas which are considered to be of negligible reptile potential due to the sparse ground vegetation cover or heavy shading, such as closed canopy woodland or dense scrub, will not be subject to any constraints, although contractors will be briefed to stop works and contact an ecologist if any reptiles are encountered.

Capture Method

- 4.6.9 In areas subject to a translocation exercise, trapping will take place utilising squares of roofing felt, which act as artificial refugia. Refugia are favoured as reptiles are ectothermic (cold blooded), and will preferentially use such refugia to raise their body temperature at certain times of day. Reptiles typically take advantage of the fact these refugia warm up more quickly than the surrounding areas and retain heat longer. Hence by checking these refugia at appropriate times of day reptiles can be seen and captured by hand.

Location of Refugia

- 4.6.10 The refugia will be placed in a grid arrangement throughout the grassland and fen habitat proposed for removal.

Size of Refugia

- 4.6.11 Refugia will be 50 x 50 cm in size, which is the typical size for trapping of reptiles for translocation exercises and monitoring purposes.

Density of Refugia

- 4.6.12 HGBI guidelines specify a trapping density for low populations of common reptiles of 50 refugia per hectare. By increasing the density of refugia a corresponding increase in trapping effort on the site can be attained.
- 4.6.13 It is therefore proposed that a density of at least 100 refugia/ha of suitable habitat is employed, exceeding the HGBI guidelines by a factor of at least 2, with a corresponding increase in trapping effort.

Trapping Procedure

- 4.6.14 Refugia will be checked in the morning as they are heating up, but before they become too hot, and once again as they are cooling down in the afternoon/evening but before they have become cold. These are the prime two times of the day to catch reptiles, although the best trapping times vary daily depending on weather conditions on that particular day. On days with inclement weather conditions or cooler temperatures, particularly earlier or later in the season, a single mid-day check can be more effective and this will be undertaken where appropriate on the ground. Checking the refugia twice a day where appropriate represents an increase in survey effort.

Data Collection

- 4.6.15 Standard recording forms will be used to keep detailed records of the data collected throughout the exercise, which will include:
- Date of trapping visit;
 - Visit number of the day;
 - Time of visit;
 - Weather (cloud cover/rain/sun/wind strength);
 - Temperature;
 - Species captured;
 - Status of individual captured (adult/juvenile);
 - Individuals seen but escaped capture; and
 - Other - general observations.

Animal Welfare

- 4.6.16 The welfare of the captured animals is paramount at all times throughout the exercise. Upon capture, animals will be placed into individual cloth bags providing them with a soft, darkened environment in which they are temporarily held until the trapping round is completed. Upon completion of the round (or sooner if possible), trapped animals will be transferred into the on-site receptor area.

Destructive Search

- 4.6.17 In areas subject to the translocation exercise, once it has been demonstrated that the majority of reptiles have been removed and that reasonable effort has been undertaken in

accordance with the guidance, a destructive search will be undertaken of areas where reptiles have been recorded. Areas of suboptimal habitat such as previously developed land will be subject to a destructive search without undergoing the full translocation exercise, due to the lower risk of encountering reptiles.

4.6.18 A destructive search is a further capture method that can be used to locate and capture any few reptiles that remain on the site. It is important to note that, in areas of favourable habitat, reasonable effort will already have been demonstrated by the translocation exercise and the use of a destructive search (which is a capture method in its own right) constitutes further trapping effort still.

4.6.19 The destructive search will comprise a systematic search of the areas of potentially suitable habitat, the searching and removal by hand of any refugia, blocks or rubbish and translocation of any reptiles that are found. Where dense vegetation cover is present, once the supervising ecologist gives consent a carefully controlled and ecologically supervised vegetation strip of reptile habitat will be carried out. This creates controlled and directed disturbance which causes reptiles to endeavour to escape, allowing them to be captured by the supervising ecologist. Once the vegetation has been physically removed and refugia dismantled, these areas can be released for construction.

Exclusion Fencing

4.6.20 Following vegetation clearance along the proposed fence line, exclusion fencing will be erected along the edge of the receptor area, where it borders the proposed development site, to prevent reptiles re-entering the proposed development site. This will be installed prior to commencement of translocation.

4.6.21 The fence design will form a vertical barrier above ground with an overlap on top to prevent animals climbing over and will be buried in the ground where possible, secured with an underlap at the base to prevent animals from moving under. Alternatively, the fence will be weighed down above ground if conditions do not allow easy burial.

4.6.22 The exclusion fencing will be maintained throughout the translocation exercise and construction operations to prevent reptiles re-entering. This will include maintenance of habitats either side of the fence through cutting or herbicide treatment to prevent tall vegetation developing which could assist reptiles in climbing the fence. Upon completion of construction, the fencing will be removed to allow reptiles to colonise newly created habitats within the site.

Receptor Site

4.6.23 The HGBI guidelines' preferred solution is for reptiles to be kept on site, where possible, or relocated to a receptor site within close proximity of the donor site.

4.6.24 It is proposed that the on-site receptor area comprises the area of CWS to be retained and enhanced under the proposals (outside of the red-line boundary, but within the ownership blue line boundary). The receptor area is currently partly suitable for reptiles, although much is covered by dense scrub and woodland which offers limited opportunities, while the fen comprises a uniform, dense tall structure with very few basking opportunities. As such, it is considered that the introduction of favourable management to improve structural diversity and the provision reptile enhancements in the form of habitat (deadwood) piles CWS, as set out within the Nature Conservation Management Plan, will considerably increase the carrying capacity for reptiles. Enhancements would be completed prior to the commencement of translocation, and should include:

- Scrub/tree coppicing to increase open areas for reptiles;
- Management of the fen through low intensity livestock grazing to enhance structural diversity;
- Creation of hibernacula, basking and shelter opportunities through the provision of log piles using arisings from management, in both shaded and unshaded areas.

4.7 Invertebrates

- 4.7.1 The lighting safeguards set out above for bats will reduce impacts to nocturnal invertebrates from the proposed development.

5 Ecological Compensation and Enhancements

- 5.1.1 This section sets out measures to compensate for harm to important ecological features as a result of the development, in addition to opportunities for enhancement to provide overall benefits to habitats and fauna. These measures are illustrated on Plan 6592/EAP2.
- 5.1.2 A key aspect of the ecological compensation and enhancement scheme for the proposed development is the introduction of favourable management to the retained Carrow Abbey Marsh CWS. These measures, which include tree thinning/coppicing and low intensity livestock grazing, are set out within a separate Nature Conservation Management Plan. Instead, this section of the EAP focusses on new habitat creation within the development site itself, in addition to faunal enhancements within the wider landholding (including the adjacent CWS).

5.2 Habitats

Swales

- 5.2.1 New swales are included within the 'Marsh Reach' development, with the aim of drawing the existing fen into the area of built development, providing a soft interface between the extensive and naturalistic fenland and the built development.
- 5.2.2 The swales will have a gently sloping bank profile to a maximum depth of 1 m. This will encourage a diversity of bankside vegetation including aquatic species, marginal species, through to tall ruderal species associated with the drier upper banks. Establishment of fen vegetation within the swales will be facilitated by the translocation of fen habitat, as set out above, in addition to vegetation planting with some areas of natural colonisation.
- 5.2.3 A 3m buffer 'garden' strip will be created adjacent to each residential property that faces onto the swale habitats as an informal space, to provide a soft transition between the built development and the swale habitat. The 3m buffer will be separated from the swale habitat by a low fence and low native shrub hedging to discourage public access, while allowing views across the swale.
- 5.2.4 Each swale will comprise three broad habitat zones, comprising (i) a central base supporting seasonal standing water, (ii) fen margins adjacent to the base, and (iii) marshy grassland / tall herb vegetation transition on the banks.
- 5.2.5 The central base and fen margins will receive translocated turfs, as set out above. These will be positioned according to their preferred hydrological conditions indicated by their NVC community, as described above.
- 5.2.6 The bankside vegetation will be seeded with a native damp wildflower grassland mix, such as Emorsgate EM8 or similar. This will be seeded in early spring or autumn, avoiding waterlogged periods, according with the supplier's instructions.

Kiln Park

- 5.2.7 Kiln Park will comprise a new area of public open space centred around the retained historic kiln feature. The Park will be multi-functional, providing opportunities for public open space, in addition to landscape and biodiversity benefits. This will be achieved through the creation of a range of habitats including wetland meadow, trees and scrub, and amenity grassland, in addition to hard surfacing to facilitate public recreation.

- 5.2.8 **Wetland meadow grassland.** New areas of wildflower meadow will be seeded with an appropriate mix of grasses and wildflowers, including a wetland mix such as Emorsgate EM8 in the southern part of the site which will provide a soft transition into the fen habitat to the south. The soil will be prepared for sowing by treatment of weeds and harrowing and rolling to produce a medium tilth and firm surface⁸, then seeded with an appropriate seed mix in accordance with the supplier's instructions, preferably during the spring to avoid waterlogged periods during the winter.
- 5.2.9 **Trees and shrubs.** Where appropriate, existing trees and shrubs will be retained within Kiln Park, which will be supplemented by new native tree and shrub planting, to enhance structural diversity and to provide breeding habitat for birds such as Cetti's Warbler. These will be designed as small pockets to maximise the area of scrub edge, which is of particular value to invertebrates and reptiles. The retention and creation of this habitat will aim to maximise structural diversity, by including denser areas of vegetation in addition to more scattered woody vegetation cover. Planting will comprise a diverse range of native species appropriate to the local area, such as Hawthorn, Grey Willow, and Wild Privet. These will be subject to appropriate aftercare to ensure successful establishment.
- 5.2.10 Where appropriate, newly created areas of tree and/or shrub planting will be underseeded with native woodland ground cover mix, while tall herbaceous vegetation will be created through seeding and/or natural colonisation at the margins and in some more open areas of tree cover. The methodology for soil preparation and seeding will follow the approach for the species-rich grassland described above. These areas will be subject to infrequent management to provide a nectar source for invertebrates and year-round shelter for invertebrates and other fauna.
- 5.2.11 **Amenity grassland.** Parts of Kiln Park will be seeded with amenity grassland to fulfil its function as public open space. Where appropriate, such as at the peripheries of the amenity grassland, a flowering lawn mix could be seeded to maximise opportunities for invertebrates.

Tree Planting

- 5.2.12 The proposals include new tree planting, comprising native trees, formal / structural trees, and feature trees, dependent on the landscape context. Native tree planting will be undertaken around the margins of the development, within Kiln Park, and along the margins of the proposed swales. These will comprise species appropriate to the local context and habitat conditions, for example Willow species within damper habitats and Pedunculate Oak and Silver Birch in the drier habitats.

Native Thickets

- 5.2.13 Native thicket planting is proposed along parts of the site margins. This will include native shrub species appropriate to the local area, such as Hawthorn, Willow, Wild Privet, and Dog-rose.

Native Hedgerow

- 5.2.14 Native hedgerow planting is proposed in parts of the site, such as along the proposed Spine Road. This will aim to provide habitat connectivity across the site. The native hedgerow planting will comprise a diverse range of woody species appropriate to the local area, such as Hawthorn, Willow, Wild Privet, and Pedunculate Oak.

⁸ If the soil has a high weed load a herbicide could be applied to re-growth before seeding with the wildflower mix

Green Roofs

- 5.2.15 Green roofs will be provided on flat-roofed buildings within the Wensum Edge phase of the development (see Plan 6592/EAP2). These will improve habitat connectivity across the site, particularly for invertebrates. The green roofs will be seeded with a suitable low-maintenance, hardy and drought-tolerant species mix, such as *Sedum*, *Sempervivum*, and mosses.

5.3 Bats

- 5.3.1 In addition to any bat boxes required under any Natural England development licences (if required), a series of at least 30 bat boxes will be installed on suitably sized and healthy trees along the River Yare (within the adjacent CWS) or on new buildings within the site. The trees along the River Yare corridor lie within high quality bat foraging habitat and will not be subject to any significant light-spill with a very low risk of any increase in light-spill in the foreseeable future. Therefore, this area represents a highly suitable location for bat boxes to maximise the likelihood of occupation by bats. Boxes installed on buildings will be sited in close proximity to green infrastructure.
- 5.3.2 All boxes will be sited as high up as possible in sheltered wind-free areas that are exposed to the sun for part of the day, facing a south-east, south or south-westerly direction. Boxes comprise a variety of designs including crevice and cavity types, subject to supplier availability, and will be constructed of highly durable materials such as 'woodcrete' or similar (see Annex 6592/EAP2 for examples).
- 5.3.3 In addition, the retained historic kiln structure (building B4) will be enhanced by:
- Installation of at least seven bat bricks in addition to roughed timbers attached to the wall within the built structure during renovation works to provide new opportunities for bats;
 - The incorporation of partial boarding at the roof to improve shelter and limit airflow, while allowing bat access via the roof by leaving a gap of around 500 mm;
 - The provision of a metal grilles at the circular openings and the main ground entrance to deter the public from entering. The size of the gaps in the grille will be at least 450 mm to allow bats to enter (as recommended by the *Bat Workers' Manual, Vol 3*). The grille will be of a suitably heavy-duty and long-lasting design (e.g. galvanised steel).
- 5.3.4 Prior to the commencement of enhancement works to the Kiln, the building will be subject to an internal inspection survey by a suitably qualified ecologist, to search for any evidence of current use by bats. Should any evidence be found, the requirement for further survey work (e.g. dusk emergence and dawn re-entry surveys) and Natural England licensing will be considered, given that there could be a risk of an offence by unlicensed roost modification. Should no evidence of bats be encountered, or the risk of an offence considered to be negligible, as a safeguard to minimise the risk of disturbance to any bats already using the kiln, the above enhancement measures will be carried out during April, September or October. This timing will avoid the sensitive hibernation and maternity periods of bats.
- 5.3.5 In addition, to ensure the kiln is not isolated from the surrounding environment, connective habitat to the kiln (such as trees and scrub) will be retained / created to increase the potential discovery of the kiln by bats. Lighting will be minimised in the vicinity of the kiln.

5.4 Otter

- 5.4.1 To enhance opportunities for Otter along the River Yare corridor, a holt will be constructed along the bank of the River Yare, outside of the red-line site boundary (within the adjacent retained CWS). The holt will be constructed from natural materials, i.e. logs and brush, avoiding the need to import artificial materials such as plastic, to ensure it is in keeping with the semi-natural habitat surroundings. The holt will be sited as close to the river as possible but on top of the bank to minimise flooding, surrounded by dense vegetation cover, and away from areas which could be subject to public disturbance.
- 5.4.2 Timber and brush for the holt construction will be sourced from within the site or CWS (i.e. areas of thinned woodland and scrub undertaken under the Nature Conservation Management Plan) where possible. The holt will comprise at least four interconnected chambers, each measuring approximately one square metre, with a height of at least 25 cm. The chambers will be dark and reasonably dry, leading to one or two entrances facing towards the river bank, in addition to one or two entrances facing the land. The entrances into the holt and between chambers will measure between 15 and 20 cm width. The walls of the holt will be constructed with larger logs (30 – 40 cm diameter), with reasonably straight poles (3 – 15 cm diameter) used to create the roof. Larger quantities of brush will be used to top the roof, to hide the logs and improve water-proofing.

5.5 Breeding Birds

- 5.5.1 The proposals present an opportunity to enhance nesting opportunities for hole-nesting species. As such, nest boxes will be provided on new buildings and trees as appropriate to the box specification. These will include nest boxes designed specifically for species of conservation concern recorded within the site, including:
- House Martin (e.g. Vivara Pro WoodStone House Martin Nest)
 - Swift (e.g. Vivara Pro WoodStone Swift Nest Box)
 - Song Thrush (e.g. Vivara Pro Barcelona WoodStone Open Nest Box).
- 5.5.2 A total of at least 20 of the above nest boxes will be provided within the site.
- 5.5.3 In addition, five Sparrow terraces will be provided on new buildings within the site to provide opportunities for this UK Priority Species. These could comprise the Vivara Pro WoodStone House Sparrow Nest Box or similar.
- 5.5.4 The precise specifications of all of the above bird nest boxes will be subject to supplier availability and alternative models with a similar purpose will be selected if necessary. Wherever possible, boxes constructed of 'woodstone' or similar materials will be selected to ensure the boxes are highly durable.
- 5.5.5 The provision of new tree, shrub and hedgerow planting within the site will provide nesting and foraging opportunities for birds in the long-term, as these habitats mature.

5.6 Invertebrates

- 5.6.1 The approach to enhancing the site and its surrounds for invertebrates is focussed on (i) re-introduction of favourable ecological management to the fen, to arrest and reverse the decline in habitat condition for the benefit of invertebrates including Desmoulin's Whorl Snail, and (ii) creation of new habitats within the site such as species-rich native wildflower

meadow, fen, and green roofs, which will enhance habitat connectivity across the site. A long-term management plan for the site will be implemented to ensure that the site provides structural and floristic diversity for invertebrates, in addition to suitably damp condition for specialist invertebrates associated with fen.

- 5.6.2 In addition, at least 10 'bee bricks' or similar will be incorporated within the proposed development thereby increasing nesting opportunities for declining populations of non-swarming solitary bee populations. Ideally, bee bricks should be located within suitable south-facing walls (where architectural design allows), located at least 1m off the ground. The bricks should be unobstructed by vegetation, though within close vicinity of nectar and pollen sources.

6 Physical Measures to Safeguard CWS

- 6.1.1 The fen habitat is potentially sensitive to disturbance from regular public use, albeit access will naturally be discouraged because of its wet hydrological conditions, especially in the winter. Nevertheless, there remains potential for disturbance from the public and their pets during the summer months. This could be problematic not only for the ecological condition of the habitat, but also in terms of disturbance to livestock (especially from dogs) which will be introduced into the fen as part of the Nature Conservation Management Plan.
- 6.1.2 As such, to deter public and domestic pets from entering the fen, three layers of deterrent will be applied, as set out below and on Plan 6592/EAP2.

6.2 Dense shrub planting

- 6.2.1 As an initial measure to deter access by public and pets into the grazed CWS area, dense native shrub planting will be introduced around the perimeter of the proposed development site, where it abuts the retained CWS. This will include a mix of native shrub species, including a high proportion of thorny species such as Blackthorn, Hawthorn, and Dog-rose. The planting will be carried out at a suitable time of year (e.g. October to February) and subject to suitable protection to encourage successful establishment. This will develop into a dense natural thorny barrier which will further deter any access by the public and pets, provide a landscaped screening against the new fence, in addition to providing ecological benefits in its own right.

6.3 Stock-proof Fencing

- 6.3.1 Secondly, a stock-proof post and wire fence will be installed around the perimeter of the area of the CWS that will support livestock. This will be installed on the internal (grazed) side of the dense shrub planting, to avoid livestock damaging the new planting and to allow the planting to provide a screening function when viewed from the development side.
- 6.3.2 The primary purpose of the fence will be to ensure that livestock are contained within the intended area, but the fence will have a secondary function of deterring access by public and domestic pets (especially while the shrub planting is developing). The fence will be regularly inspected and maintained under the Nature Conservation Management Plan for the site.

6.4 Wet Ditch System

- 6.4.1 A wet ditch system will be created on the internal (grazed) side of the fence and shrub planting. This will be designed to support permanent standing water (except during prolonged dry periods), representing a further deterrent to access by public and their pets. In addition, the ditch system is likely to provide ecological benefits, including habitat for wetland species such as Desmoulin's Whorl Snail.

6.5 Gates and Signage

- 6.5.1 The only exception to the above physical measures will be the gated access into the grazed area of the CWS, which will be required for livestock to be moved into and off the CWS, and for regular welfare inspections of livestock by the farmer. At these locations, signage will be installed on the gates explaining that unauthorised access is prohibited at all times due to the presence of livestock and sensitive wildlife. The gates will be securely locked at all times whenever the gate is closed.

7 Phasing Plan

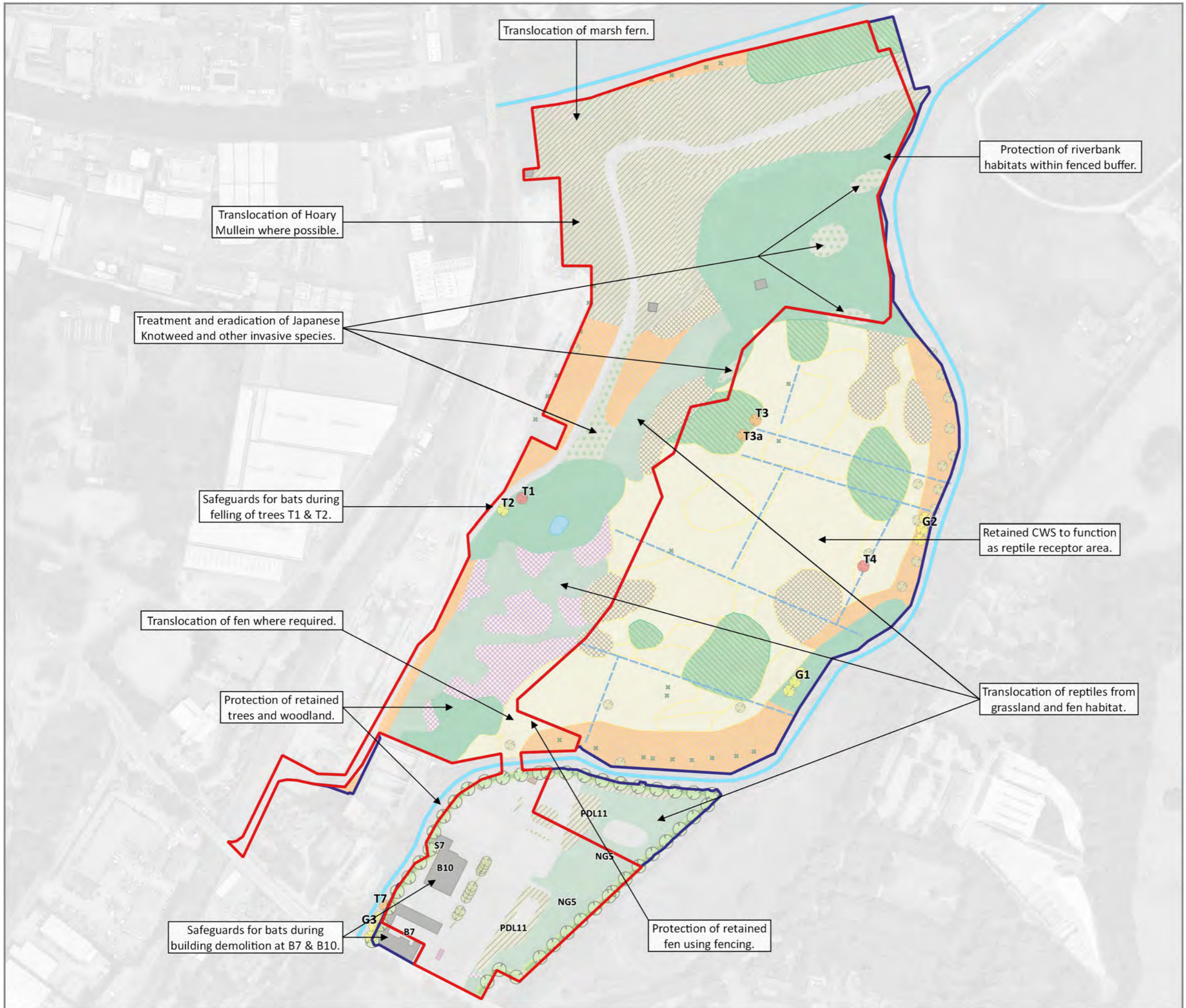
- 7.1.1 The proposed development will be delivered under three phases, comprising (i) May Gurney land in the south, (ii) Yare Bridge, Wensum Bridge and the Spine Road, and (iii) Wensum Edge and Marsh Reach. Further information is provided at Annex 6592/EAP1.
- 7.1.2 This Environmental Action Plan, including both mitigation and compensation/ enhancement measures, will be undertaken in a phased process in accordance with the three development phases. However, some activities may be brought forward for efficiency, for example, the reptile translocation could be undertaken as one combined exercise for all phases. If this is the case, appropriate measures will be put in place to avoid impacts from any delay in bringing forward future phases. For example, following the reptile translocation exercise and destructive search, the stripped vegetation will be regularly managed to clear vegetation and minimise the risk of reptiles re-entering the site. Should this management not take place, the requirement for an additional translocation exercise will be considered.

8 Conclusions

- 8.1 This Environmental Action Plan (EAP) sets out ecological and protected species mitigation, compensation and enhancement measures to address Condition 8a-c of outline planning permission 12/00875/O [Norwich City Council] and Condition 38d of outline planning permission 2011/0152/O [South Norfolk Council]. The EAP covers the development site itself in addition to adjacent land within Carrow Abbey Marsh CWS, which is within the same ownership. A separate Nature Conservation Management Plan (NCMP) has been produced to address part d of the conditions.
- 8.2 Ecological survey work at the site has identified that the site supports a number of ecological constraints, including lowland fen, wet woodland, a semi-natural river corridor, notable and invasive plant species, and a number of protected faunal species such as bats, breeding birds, and reptiles, in addition to a notable invertebrate assemblage.
- 8.3 Ecological mitigation measures are set out to minimise harm to these important ecological features. These measures include:
- Protection of important retained habitats (fen, trees/woodland, and river corridors);
 - Translocation of fen and notable plants which would otherwise be lost to the development;
 - Control and eradication of invasive plant species;
 - Safeguards to protect bats and breeding birds during building demolition and removal of vegetation;
 - Translocation of reptiles from habitats to be lost to development.
- 8.4 In addition, compensation and enhancement measures are proposed to compensate for harm to important ecological features and provide an overall betterment of the site in ecological terms, when considered in the context of the accompanying NCMP. These compensation and enhancement measures include:
- Creation of new habitats including swales, wildflower meadow, native tree and shrub planting, and green roofs;
 - Bat roost opportunities including a restored kiln structure;
 - Creation of an Otter holt along the River Yare;
 - Bird nesting opportunities;
 - Opportunities for invertebrates through diverse habitat creation and bee bricks.
- 8.5 In addition, this EAP sets out physical measures to safeguard the retained CWS from disturbance from the public or domestic pets, including (i) native thorny shrub planting, (ii) stock-proof fencing, and (iii) a wet ditch system.
- 8.6 In conclusion, following the implementation of this EAP and the associated NCMP, it is considered that the proposed development will avoid a significant harm to biodiversity, while an overall enhancement to biodiversity can be delivered in the long-term.

Plan 6592/EAP1:

Ecological Safeguards and Mitigation



Key:
 Site Boundary
 Survey Area

P:\Project\Aspect Ecology Projects\ECO 6550\1006592\Graphics\2022 onwards\GIS\6592 ECO1 3.0.gxd



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Land at Deal Ground and
 May Gurney
 Ecological Safeguards and Mitigation

6592/EAP1

A/JP

May 2023



Plan 6592/EAP2:

Ecological Compensation and Enhancements



Key:

- Site Boundary
- Survey Area
- Green Roof



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Land at Deal Ground and
 May Gurney
 Ecological Compensation and
 Enhancements

PROJECT	6592/EAP2
TITLE	B/AM
DRAWING NO.	June 2023
REV	
DATE	



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Annex 6592/EAP1:

Development Phasing

Phasing Strategy – to be read in conjunction with Drawing 19103-SBR-ZZ-XX-DR-A-80004 Rev 8

MAY GURNEY		
Pre-commencement: 0 – 6 months. Pre-construction: 0 – 6 months.		
Phase		
1	Road, landscaping and 60-80 Units	Construction: 48 months. Sales: 18 – 72 months.

DEAL GROUND		
Pre-commencement: 3 – 18 months. Pre-construction: 3 – 18 months.		
Phase		
2	Yare Bridge	Construction: 12 months.
2	Wensum Bridge	Construction: 12-18 months.
2	Spine Road	Construction: 12-18 months
3	Wensum Edge: 400-450 Units and Landscaping	Construction (post road completion): 60 months. Sales: 18 – 72 months.
3	Marsh Reach: 160-200 Units and Landscaping	Construction (post road completion): 60 months. Sales: 18 – 72 months.

GENERAL NOTES	
<ul style="list-style-type: none"> - The specific details of phases 2 and 3 on green infrastructure and surface water drainage features to be delivered will be specified through the individual applications for the approval of details reserved by condition (conditions 2, 15 and 33 NCC and conditions 4, 8, 26 SNDC). The details required for the above conditions will be submitted concurrently. - The significance of the environmental effects of the green infrastructure and surface water drainage features will also be assessed under the details of the conditions referred above. 	

Figured dimensions only are to be taken from this drawing. All dimensions are to be checked on site before any work is put in hand.

Key



Phase 1



Phase 2 - Wensum bridge (to be delivered under a separate application)

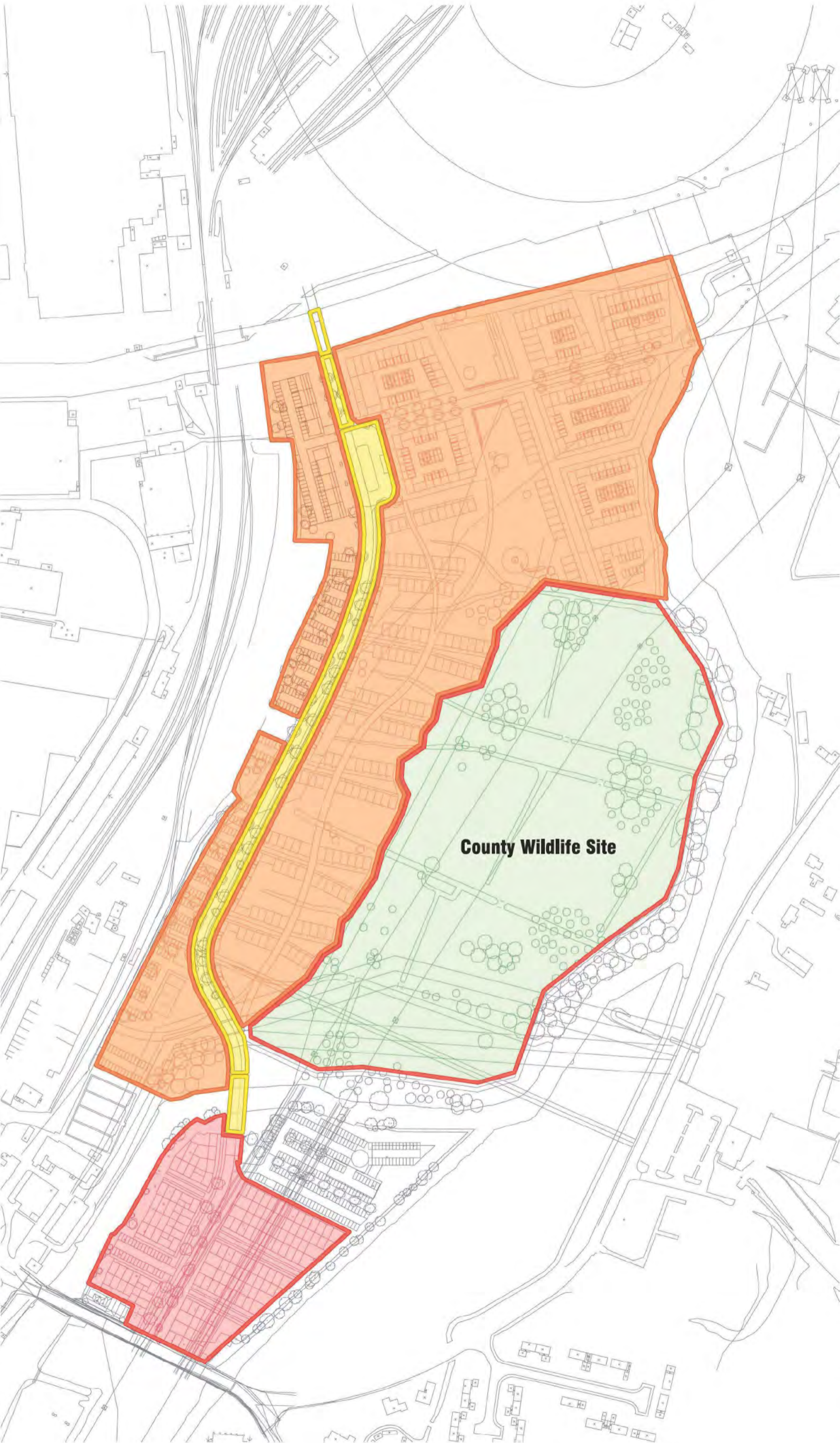


Phase 2



Phase 3

SuDS to be delivered in each individual phase as part of each Reserved Matters Application



County Wildlife Site

Rev 8	For Planning	17.01.2022	LF/BJC
Rev 7	For Planning	17.01.2022	LF/BJC
Rev 6	For Planning	19.11.2021	LF/BJC
Rev 5	For Planning	19.11.2021	LF/BJC
Rev 4	For Planning	16.11.2021	LF/BJC
Rev 3	For Planning	20.09.2021	LF/BJC
Rev 2	For Planning	14.09.2021	LF/BJC
Rev 1	First Issue	31.08.2021	LF/BJC
Revision	Description	Date	Drawn/Checked



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Client's Name
Serruys Property Company Ltd

Job Title
May Gurney

Drawing Title
Norwich City Council
Discharge of Condition 14
Phasing Strategy
Application Number: 12/00875/0

Scale
1:1250 @ A1

Job No
19103

Drawing No
19103-SBR-ZZ-XX-DR-A-80005

Status
PLANNING

Rev
8

Annex 6592/EAP2:

Example Specifications of Faunal Enhancement Features

Bat Boxes

Schwegler bat boxes are made from 'woodcrete' and have the highest rates of occupation of all types of box. The 75% wood sawdust, clay and concrete mixture is ideal, being durable whilst allowing natural respiration and temperature stability. These boxes are rot and predator proof and extremely long lasting. Boxes can be hung from a branch near the tree trunk or fixed using 'tree-friendly' aluminum nails.



1FD Bat Box

A larger than standard bat box, with two additional roughened wooden panels inside to be used by the bats as perches.

Woodcrete construction, 16cm diameter, height 36cm.

2FN Bat Box

A large bat box featuring a wide access slit at the base as well as an access hole on the underside. Particularly successful in attracting Noctule and Bechstein's bats.

Woodcrete construction, 16cm diameter, height 36cm.



1FQ Bat Box for Buildings

Designed specifically to be fitted on the external wall of a house, barn or other building. Equally appealing to bats as a roost or a nursery, it features a special porous coating to help maintain the ideal temperature inside as well as a roughened front panel to enable the bats to land securely.

Woodcrete construction, 35cm diameter, height 60cm.

1WQ Bat Box for Buildings

A sophisticated bat box designed for the safe hibernation of bats in winter as well as for roosting, forming colonies and raising their young during summer. The insulation not only protects the bats in winter but also prevents overheating during summer.

Woodcrete construction, 38cm diameter, height 58cm.



Bee Brick

Bee Brick

The bee brick has been designed to create a safe, all year round, nesting site for solitary bees, who face massive decline due to loss of habitat. The bee Brick can be built into a wall or structure but can also be placed as a standalone feature in your garden.

Solitary Bees are non-aggressive, child and pet friendly. They are a vital part of our biodiversity.

Dimensions:

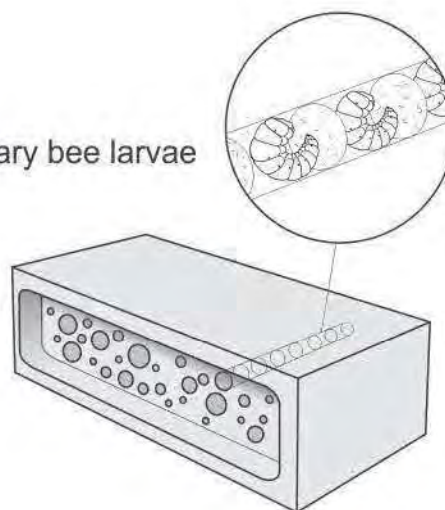
Small block - 6.5cm x 7cm x 10.5cm

Large block - 10.5cm x 10.5cm x 10.5cm

Brick - 21.5cm x 10.5cm x 6.5cm



Solitary bee larvae



ecology • landscape planning • arboriculture

aspect

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Environmental Statement Addendum – Chapter 09: Ecology Appendix 9.4

Land at Deal Ground and May Gurney, Norwich

Nature Conservation Management Plan

(to address requirements of Condition 8d of 12/00875/O
[Norwich City Council] and Condition 38d of 2011/0152/O
[South Norfolk Council])

June 2023

Quality Management	
Client:	Serruys Property Company Ltd
Project:	Land at Deal Ground and May Gurney, Norwich
Report Title:	Nature Conservation Management Plan
Project Number:	ECO-6592
File Reference:	6592 NCMP vf /TS/AB
Date:	16/06/2023

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Contents

Text:

1	Introduction	4
2	Ecological Constraints	6
3	Aims and Objectives	10
4	Management Activities	12
5	Implementation and Management Structure	20
6	Monitoring	21
7	Conclusions	23

Plans:

Plan 6592/NCMP1 Management Compartments

Annexes:

Annex 6592/NCMP1 Management Prescriptions

1 Introduction

1.1 Background and Proposals

- 1.1.1 Aspect Ecology is advising Serruys Property Company Ltd regarding ecological matters in respect of proposed development of land at Deal Ground and May Gurney, Norwich, centred at grid reference TG 247 074 (see red line boundary on Plan 6592/NCMP1). The proposed development lies within a larger landholding which notably includes Carrow Abbey Marsh CWS (see blue line boundary on Plan 6592/NCMP1), the majority of which is proposed for retention and ecological enhancement. This larger area comprises the 'survey area'.
- 1.1.2 The site is split into two main parcels, comprising the 'May Gurney' land which forms the southern part of the site, to the south of the River Yare, and the larger 'Deal Ground' land to the north of the River Yare.
- 1.1.3 The site is in receipt of outline planning permission (refs. 12/00875/O [Norwich City Council] and 2011/0152/O [South Norfolk Council]) for mixed development, including residential and commercial uses with landscaping and biodiversity enhancements. This document forms part of the reserved matters submission for development of 670 residential dwellings at the site, and relates to management of part of the application site and the wider landholding, hereafter referred to as the 'management area' (see Plan 6592/NCMP1).

1.2 Planning Conditions

- 1.2.1 Condition 8, part d of outline planning permission 12/00875/O (Norwich City Council) and Condition 38, part d of outline planning permission 2011/0152/O (South Norfolk Council) are relevant to the Nature Conservation Management Plan. The full wording of part d of the condition is as follows (as amended on 8 March 2023 under non-material amendment application 23/00183/NMA [Norwich City Council]):

"Prior to commencement of the spine road and/or together with the submission of any reserved matters for any phase as approved under condition 14 (whichever is earlier), a Framework Environmental Action Plan (FEAP) covering the site and the adjacent County Wildlife Site (CWS) shall be submitted to and agreed in writing by the local planning authority. For each phase, a detailed EAP shall include the following:...

- d) *A comprehensive Nature Conservation Management Plan relating to land inside the red line boundary depicted on drawing number 1565/NCMF2 (9.16 chapter 9 Ecology). The Plan shall include details of management responsibilities, plan review arrangements, funding, a schedule of management actions covering all phases of development (construction and long-term operation) and include provisions for any unforeseen cessation in management.*

The agreed Framework EAP Plan shall be updated prior to the commencement of each phase. The development shall be undertaken in accordance with the approved EAP and the land shall be managed in accordance with the agreed Nature Conservation Management Plan thereafter. Any subsequent variations to the EAP shall first be approved in writing by the local planning authority."

- 1.2.2 A separate Environmental Action Plan has been produced to address parts a to c of the above conditions.

1.3 Site Overview

- 1.3.1 The site is located in Trowse, south-east Norwich, within an urban-edge context. The site is bound by the River Wensum to the north, beyond which lies industrial and former industrial land with a railway depot. The River Yare intersects the site (separating the Deal Ground and May Gurney land) and runs adjacent to the east of the Deal Ground land, beyond which lies parkland (including Whitlingham Country Park) and residential development within the boundary of the Norfolk Broads Authority. An asphalt plant and railway line lies to the west of the site, with more dense development beyond this.
- 1.3.2 The survey area comprises a number of different habitats, primarily comprising former industrial land in the north and south, and an area of fenland in the east. Woody vegetation including wet and dry woodland, scrub, scattered trees, and Bramble thickets, is present in various locations across the survey area. In addition, relatively small areas of species-poor neutral grassland and tall ruderal vegetation are present in parts of the survey area.

1.4 Purpose of the Report

- 1.4.1 This report sets out a management plan of the CWS and adjacent green infrastructure within the proposed development site, hereafter referred to as the 'management area' (see Plan 6592/NCMP1), and hence aims to inform part d of the relevant conditions described above.

2 Ecological Constraints

- 2.1.1 The ecological constraints of the management area are informed by a suite of ecological survey work, most recently in 2022. This most recent survey work included plant community (NVC) survey and specific survey work to map the population of Desmoulin's Whorl Snail *Vertigo moulinsiana*. The findings of this survey work are set out within Aspect Ecology's Baseline Ecological Appraisal for the site.
- 2.1.2 The habitats and species of interest within the management area are summarised in Table 2.1 below.

Table 2.1 Habitats and plant species representing ecological constraints within the site and the adjacent CWS (together referred to as the 'survey area').

Habitat type / feature	Description
Eutrophic floodplain fen (mostly designated as Carrow Abbey Marsh CWS)	<p>An area of fen habitat intersected with a drainage ditch system is present in the centre and east of the survey area, and dominates the management area. The majority of this habitat falls within the CWS designation. The fen habitat is somewhat variable in its vegetation types, the majority being dominated by Greater Pond Sedge <i>Carex riparia</i>, while Reed Sweet-grass <i>Glyceria maxima</i>, Reed Canary-grass <i>Phalaris arundinacea</i> and Common Reed <i>Phragmites australis</i> are locally dominant. At the southern end, the fen becomes drier and transitions into tall ruderal vegetation. The vegetation is consistently tall and dense, with no evidence of recent management or access.</p> <p>In the absence of management, the fen is gradually drying with encroachment of trees and scrub at the margins. This is evidenced by the change of vegetation types since the previous survey in 2009, with a shift to less wet, species poorer communities.</p>
Wet woodland (mostly designated as Carrow Abbey Marsh CWS)	Six areas of wet woodland were recorded within the survey area, five of which lie within the management area. All of these woodlands are young in nature and are dominated by Willow species, much of which has recently colonised historically open fen, which is reflected in the ground flora.
River Yare	The River Yare flows along much of the boundaries of the survey area. Much of the river is natural in character, measuring approximately 6-10m in width, and supports some aquatic vegetation. The banks support a mixture of tall ruderal vegetation with scattered trees, especially in the south and the central portion of the stretch along the Deal Ground land, while dense woodland in the form of W4 and W11 abut the river in the southern and northern sections of the Deal Ground land. In the southern part of the survey area, adjacent to the May Gurney land, the riverbank is variable with some areas of stone walling or metal sheet piling but predominantly comprising heavily shaded steep banks supporting sparse vegetation largely dominated by Ivy.
Nationally Scarce plant species	One plant species of conservation importance was recorded within the survey area, namely Marsh Fern <i>Thelypteris palustris</i> , which was recorded close to the River Wensum in an area of felled woodland (formerly W2), now occupied by colonising vegetation (PDL8). This species is listed as Nationally Scarce, albeit Norfolk is a significant stronghold. Its known extent within the application site is limited to one small patch, while the species has not previously been recorded within the survey area, such that it is likely to either be a recent colonist or has for some time only occurred as a very small population. Previously, Hoary Mullein <i>Verbascum pulverulentum</i> has been recorded within the site, but this was not re-recorded in 2022.

Habitat type / feature	Description
Invasive species	Three invasive plant species listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) were recorded within the survey area. These comprise Japanese Knotweed <i>Reynoutria japonica</i> , Giant Hogweed <i>Heracleum mantegazzianum</i> , and Himalayan Balsam <i>Impatiens glandulifera</i> . Japanese Knotweed in particular forms dense stands in parts of the application site and appears to have expanded its extent since 2009. Giant Hogweed and Himalayan Balsam were only recorded in the fen habitat and along the banks of the River Yare.

2.1.3 In addition to the habitat and plant community surveys, specific faunal surveys were undertaken at the survey area in 2008 to 2009 for bats (tree and building inspection surveys, emergence/re-entry surveys and manual activity surveys), Badger *Meles meles*, Water Vole *Arvicola amphibius*, Otter *Lutra lutra*, breeding birds, Great Crested Newt *Triturus cristatus*, reptiles, and invertebrates. The bat inspection survey and Badger survey work was updated in 2022, while specific survey work was undertaken for Desmoulin's Whorl Snail *Vertigo moulinsiana*. In addition, the update survey in 2022 also included an assessment of any change in the site's likely value for fauna. These findings are set out in the Baseline Ecological Appraisal for the site, while Table 2.2 below summarises the faunal constraints in relation to the management area. Update Phase 2 faunal surveys are being undertaken in 2023. The results of these surveys will be reviewed when available and should any revisions to this NCMP be necessary, an update will be provided.

Table 2.2. Faunal species representing ecological constraints in relation to the management area.

Faunal species	Description
Bats (roosting)	Numerous trees within the survey area have been identified as providing bat roosting potential, occurring as individual scattered trees, tree groups or within woodland areas.
Bats (foraging and commuting)	The survey work recorded a moderate level of foraging activity, attributable to Common Pipistrelle <i>Pipistrellus pipistrellus</i> , Soprano Pipistrelle, Noctule <i>Nyctalus noctula</i> , and <i>Myotis</i> species including Daubenton's Bat <i>M. daubentonii</i> . Soprano Pipistrelle and Common Pipistrelle were the most frequently recorded species. The greatest levels of activity were associated with the River Yare corridor along the eastern margin of the survey area, which provides connectivity to the adjacent Whitlingham Country Park, where known roosts are present. Groups of trees and scrub around the fen margins were also subject to regular use. More occasional activity was recorded in the fen habitat and along the River Wensum. Update habitat assessment in 2022 concluded that there is unlikely to be any significant change in bat activity patterns across the survey area.
Water Vole <i>Arvicola amphibius</i>	Survey work for Water Vole was undertaken along the river banks and within the ditches in the fen in the Deal Ground land in 2009. No evidence of this species was recorded, which is consistent with previous surveys undertaken in 2000 and 2003. The apparent absence of this species was explained by the limited open water in ditches within the survey area, and the scarcity of grass cover along the river banks. The 2022 habitat assessment concluded that the site remains of poor suitability for Water Vole, albeit the species is known to occur along the River Yare at Whitlingham Country Park, and may therefore occur sporadically along the Yare corridor.

Faunal species	Description
Otter <i>Lutra lutra</i>	Survey work in 2009 for Otter along the banks of the River Yare and River Wensum within the survey area found no evidence of use by Otter, although the dense vegetation along the River Yare corridor was identified as potentially suitable habitat for Otter. The species was considered unlikely to frequent other habitats within the survey area, e.g. within the fen, because of the lack of year-round standing water. Habitat assessment in 2022 concluded that there was no significant change to the previous assessment, with any interest focussed along the River Yare corridor.
Other mammals (including Priority Species)	The Priority Species Harvest Mouse <i>Micromys minutus</i> could be present within the fen habitat and Hedgehog <i>Erinaceus europaeus</i> could utilise the drier parts woodland and scrub habitats. Polecat <i>Mustela putorius</i> has also been recorded in the local area and could use the drier woodland and scrub habitats.
Reptiles	Survey work undertaken in April to August 2009 recorded a low population of Grass Snake <i>Natrix natrix</i> in grassland and fen habitat across both the Deal Ground and May Gurney land, although the population was considered to represent a good size within the fen habitat. No other reptile species were recorded. Habitat assessment in 2022 concluded that the suitability of the survey area remains similar to 2009, with slightly reduced suitability due to tree and scrub encroachment.
Birds	<p>Breeding bird survey undertaken at the Deal Ground land in 2009 recorded a total of 53 species, of which 26 were considered to be breeding or probably breeding within the survey area, and 7 possibly breeding. The remaining 20 species were observed flying over or foraging at the survey area, but presumed to be breeding elsewhere. A good density of breeding birds was recorded within the survey area overall, with the fen habitat in particular supporting a significant assemblage of birds, in contrast to the drier areas of woodland, scrub, ruderal and grassland habitats which supported a much reduced diversity of species.</p> <p>Notable species recorded within the fen included the Schedule 1 species Cetti's Warbler <i>Cettia cetti</i> and the RSPB red-listed species Grasshopper Warbler <i>Locustella naevia</i> and Cuckoo <i>Cuculus canorus</i>, while the red-listed species Linnet <i>Carduelis cannabina</i> was recorded within scrub. In addition, the Schedule 1 species Barn Owl <i>Tyto alba</i> and Kingfisher <i>Alcedo atthis</i> were recorded as non-breeding individuals, recorded hunting over the fen and along the River Yare, respectively. Amber-listed species included Sedge Warbler <i>Acrocephalus schoenobaenus</i>, Willow Warbler <i>Phylloscopus trochilus</i> and Reed Bunting <i>Emberiza schoeniclus</i>, all of which were recorded in the fen habitat.</p> <p>Update habitat assessment in 2022 concluded that the previous evaluation remains appropriate, albeit there could be a minor change in the bird assemblage, reflecting the higher prevalence of scrub and woodland at the expense of fen and tall ruderal vegetation. However, this is not likely to significantly alter the conservation importance of the assemblage.</p>
Fish	Fisheries data held by the Environment Agency for the Rivers Wensum and Yare in the vicinity of the site include records of three UK Priority Species and one Annex 2 species. These species could occur within the stretches of river adjacent to the survey area.
Desmoulin's Whorl Snail	Survey work for invertebrates undertaken in 2009 recorded the presence of Desmoulin's Whorl Snail in sedge-dominant vegetation and the ditches within the fen habitat. Update survey work in October 2022 recorded this species in approximately half of the sample points taken within the fen. The distribution of the species was patchy and concentrated on the south-central part of the fen.

Faunal species	Description
Other invertebrates	<p>Survey work for terrestrial invertebrates undertaken at the Deal Ground land in 2009 identified a total of 592 species of invertebrates. This assemblage included 17 Priority Species, one Nationally Rare RDB3 species (Twin-spotted Wainscot Moth <i>Archanara geminipuncta</i>, associated with reedbeds), 14 Nationally Notable species, and 30 Nationally Local species. These species of conservation interest were primarily associated with wetland and ruderal habitats, which supported 40% and 42% of the species of conservation interest within the survey area, respectively. Woodland habitat was of comparatively lower interest, supporting 26% of the species of conservation interest within the survey area.</p> <p>Update habitat assessment in 2022 identified that the condition of habitats for invertebrates remains similar to the situation in 2009, albeit the gradual drying of the fen and associated reduction in floristic diversity may have reduced the value of this habitat for invertebrates. The distribution of ruderal habitats within the site has shifted since 2009, with the majority now located along the River Yare banks, which are likely to be of particular importance for invertebrates. Overall, the value of the survey area for invertebrates is likely to be unchanged since the previous assessment.</p>

3 Aims and Objectives

3.1 Scope of the Management Plan

3.1.1 This management plan incorporates areas of the retained Carrow Abbey Marsh CWS and adjoining green infrastructure within the proposed development, as indicated in principle on drawing number 1565/NCMF2, which was included within Chapter 9 of the Environmental Statement for the outline planning application. The boundary of the management area has since been refined according to the detailed design of the reserved matters application, as set out at Plan 6592/NCMP1.

3.2 Requirement for Management

3.2.1 Before the development of a management plan, it is first necessary to consider whether any management is required or whether the existing situation is acceptable. The fen habitat which dominates the management area is essentially a successional stage, such that in the absence of management, it would be expected to develop into wet woodland. As such, continual management is required to maintain fen habitat. The fen within the management area has not been managed for many years, such that it is in a gradual transition towards scrub and woodland, especially in the east of the fen where the extent of woody vegetation has substantially increased since the previous survey work in 2009. As such, under a 'do nothing' scenario, the fen is predicted to eventually be lost to scrub and ultimately wet woodland. Therefore, intervention through appropriate restoration and ongoing management is considered necessary to maintain the presence of fen habitat, and reverse and arrest the recent trend of succession to scrub and woodland.

3.3 Aims and Objectives of Management

3.3.1 The management aims and objectives have been designed to deliver a balanced approach to enhancing the value of the CWS for the habitats and faunal populations of interest. Such a balanced approach is appropriate given the differing habitat preferences of each species. For example, Desmoulin's Whorl Snail and Grass Snake favour more open habitats, while many breeding birds such as Cetti's Warbler favour scrubby vegetation. Therefore, the management plan seeks to provide habitat diversity to cater for a variety of species, while focussing on the existing and historic fenland interest.

3.3.2 The overarching aim of the management plan is to arrest and reverse the ecological decline in condition of the CWS, restoring and creating a good example of the Priority Habitat 'lowland fens' which is representative of the local area and supports a diversity of associated habitats such as wet woodland, scrub, and tall ruderal vegetation.

3.3.3 To achieve this aim, the following objectives are proposed:

- Restoration of the fen through the introduction of sensitive ecological management in the form of low-density livestock grazing, to arrest and reverse the decline in its condition and secure the continued presence of the Priority Habitat 'lowland fen' in perpetuity;
- Maintain and enhance habitat diversity through the retention of wet woodland, scrub, tall ruderal vegetation, and fen habitats, in addition to the creation of new habitats such as wildflower meadow within Kiln Park;

- Localised clearance of woody vegetation where fen vegetation remains present below the canopy to restore fen habitat where this has recently been colonised by trees or shrubs;
- Provision of suitable access and infrastructure within and throughout the fen for livestock;
- Establishment of new habitats including swales to draw the fen out into the built development, in addition to a variety of habitats within Kiln Park for multi-functional use;
- Control and eradication of non-native invasive plant species;
- Control of access into the CWS by the public and pets;
- Monitoring of management operations and identification of any remedial measures or alterations required to achieve the above aims and objectives.

3.4 Guidance and Information Sources

3.4.1 This management plan has been informed by a number of guidance documents relating to habitat management, and more specifically lowland fen management, for nature conservation. These include the following publications:

- The Fen Management Handbook, (2011), editors: A. McBride, I. Diack, N. Droy, B. Hamill, P. Jones, J. Schutten, A. Skinner, and M. Street. Scottish Natural Heritage, Perth.
- Fen Management Strategy (undated). Broads Authority.
- Managing Habitats for Conservation (1995), editors: W.J. Sutherland, D.A. Hill. Cambridge University Press.

3.4.2 In addition, the management plan is informed by a Nature Conservation Management Framework (Aspect Ecology, September 2010) for the area, which is included at Appendix 9.16 of the ES chapter for the outline application.

4 Management Activities

4.1 Management Components

4.1.1 To address the above aims and objectives, the following management components are identified for which management activities will be specifically tailored. The management components are informed by the Nature Conservation Management Framework submitted for the outline planning application, while a separate component has been specified for invasive species, given their prevalence across the management area. The locations of each of the spatial components (A to F) are shown on Plan 6592/NCMP1.

- **Component A:** Fen habitat and associated ditch system;
- **Component B:** Woodland;
- **Component C:** Scrub;
- **Component D:** River bank (River Yare);
- **Component E:** Swales;
- **Component F:** Kiln Park;
- **Component G:** Invasive species;
- **Compartment H:** General management procedures.

4.1.2 Specific management prescriptions relating to each component are set out below and are also set out in the corresponding management sheets (see Annex 6592/NCMP1) which should be handed over to the management contractor, together with Plan 6592/NCMP1 showing the locations of each component A to F.

4.2 Component A: Fen Habitat and Associated Ditch System

4.2.1 Management of the fen habitat and ditch system will focus on the following management activities, described in turn below.

Low intensity grazing regime

4.2.2 **Rationale.** Grazing is proposed as the primary form of fen management to interrupt the process of succession to scrub and woodland. Low grazing densities of livestock will promote structural diversity within the fen vegetation (vegetation height and density) and can encourage the appropriate seral stages of succession to develop into a mosaic of habitats across the fen. In addition, this will ensure that large quantities of organic matter do not accumulate within the fen, which can smother the germination of some plant species, although areas of decaying vegetation will still be available for a range of invertebrates and also as egg laying sites for Grass Snake.

4.2.3 **Livestock type.** Cattle are typically preferred for conservation management of fens, because they provide a variable sward when stocked at low to moderate densities. An appropriate breed of cattle will be used that are well suited to wetland conditions with low maintenance requirements, for example, a lighter traditional breed or single sucker beef cattle.

- 4.2.4 **Stocking density.** Initially, a low density of 2 or 3 cattle should be introduced to monitor their activity and effects on the fen and minimise the risks of any harmful effects such as excessive poaching. Depending on ongoing outcomes, the stocking density could be slightly increased up to a likely maximum of 8 cattle (equating to approximately 2 per hectare) to provide a suitable diversity of vegetation.
- 4.2.5 **Grazing period.** A relatively late grazing period is favoured for fen management. This should be timed to coincide with the driest season and avoid prolonged grazing during wet periods, to minimise poaching which can cause lasting damage. Typically, a grazing period from July to October is suitable for conservation management of fens, although there should be flexibility depending on annual weather conditions.
- 4.2.6 **Extent of livestock access.** The livestock will have access to the entire CWS where it falls outside of the proposed development site, including drier parts in the south, and areas of tree cover which are especially prevalent in the east (see Plan 6592/NCMP1). This is important for welfare purposes, for example during periods of high temperatures or unexpected flooding. Access across ditches will be provided by a series of culverted bridges to be installed under the proposed development (see Plan 6592/NCMP1). Stock-proof fencing will be installed along the top of the banks of the River Yare to prevent erosion from livestock poaching, with the exception of small drinking bays if required.
- 4.2.7 **Containment.** A stock-proof fence, alongside gates for access, will be installed around the intended grazing area prior to the introduction of any livestock. The fence will not only prevent livestock from entering the proposed development site, but will also exclude livestock from the vast majority of the river banks (with the exception of drinking points if required) by installing fence at least 2m from the banks of the River Yare.
- 4.2.8 The fencing adjacent to the proposed development site will be accompanied by further physical measures to deter access by the public and pets, including thorny shrub planting and a wet ditch system (as set out within the Environmental Action Plan). The fencing will be subject to regular (at least monthly) inspection by the appointed management company to ensure it remains stock proof. Any damage to the fence will be repaired at the earliest opportunity and consideration will be given to moving livestock off the site should any fencing vulnerabilities be identified, until these have been repaired.
- 4.2.9 **Welfare.** The livestock will have unrestricted access to a reliable source of fresh drinking water. Drinkers should preferentially be sited in drier parts of the fen (e.g. in the south) to minimise poaching. If necessary, livestock will also be provided access to small parts of the River Yare for drinking, although the majority of the banks will be fenced off to prevent erosion and siltation. Cattle handling facilities will be installed adjacent to the access gate into the CWS, as required. Livestock should be regularly checked, especially initially when welfare checks should be undertaken by the farmer at least daily to ensure the cattle adjust to the site conditions.

Ditch restoration

- 4.2.10 The existing ditch network across the fen will be restored to provide the wet and humid conditions favoured by Desmoulin's Whorl Snail, with dense emergent vegetation. To achieve this, selective clearance of decaying vegetation will be undertaken along approximately 30% of the total ditch length, to deepen the ditches and provide open water habitat.

- 4.2.11 In addition, the opportunity will be taken to re-profile selected sections of a number of ditches, with long sloping banks to encourage the development of transitional vegetation communities.
- 4.2.12 The above work will be undertaken using light machinery in late summer or autumn following a period of dry weather, to minimise ground disturbance from machinery movement. Machinery will follow the same access tracks into and out of the fen to minimise disturbance. The work will be supervised by a suitably qualified ecologist, at least initially, to ensure that damage to existing habitats is minimised.

4.3 Component B: Woodland

- 4.3.1 Management of the woodland will focus on maintaining the areas of woodland within the CWS, and enhancing its value through selective coppicing. Livestock will also have access to the majority of the woodland, thereby helping to control its expansion into the adjacent fen and improving structural diversity.
- 4.3.2 **Rationale.** Coppicing is a common management technique for willow woodland, which has the benefit of controlling the expansion of the woodland into the adjacent fen, while benefitting fauna such as invertebrates and birds (including Grasshopper Warbler, Sedge Warbler and Reed Bunting) through the rotation cycle. This management activity prevents the development of extensive areas of closed-canopy woodland which tend to be less favoured by fenland bird species and would eventually lead to the loss of a fen ground flora.
- 4.3.3 **Coppicing cycle.** Coppicing will be undertaken on a 10 year rotational cycle, focussing on younger specimens. Mature specimens will be retained as 'standard' trees, in recognition of their value for fauna particularly as they begin to provide dead and decaying wood, and to minimise the risk of damaging trees with bat roost potential. In addition, any trees with cavities, crevices or dense Ivy cover will be retained given that these could provide potential bat roost features. If at risk of canopy failure, selected pollarding of mature trees will be undertaken.
- 4.3.4 To provide habitat diversity, no more than 30% of any one woodland area will be coppiced during any one cycle, with coppiced blocks scattered across several small compartments rather than concentrating in one particular area. Hand tools will be used for coppicing, because of the relatively small area and the difficulties associated with machinery access, which would likely cause substantial ground disturbance.
- 4.3.5 Cut wood should be partly disposed of off-site, and partly retained to provide habitat piles within the management area which will benefit species such as Grass Snake and saproxylic invertebrates. The habitat piles will be sited in a variety of situations, including open and sunny locations and more shaded and sheltered positions, to maximise opportunities for a wide range of fauna.
- 4.3.6 **Timing.** The 10 year coppicing cycle should be undertaken outside of the bird nesting season, i.e. avoiding the period March to August inclusive, and also avoid particularly wet periods to minimise damage to vegetation. As such, the early autumn period (September and October) is likely to be optimal.

4.4 Component C: Scrub

- 4.4.1 Management of the scrub habitat will comprise retention of some scrub, particularly around the margins of the wet woodland and on drier ground, in addition to small-scale coppicing of selected areas to re-invigorate the fen ground flora.

- 4.4.2 **Rationale.** Scrub is of value to a variety of fauna, particularly birds such as Cetti's Warbler, while scrub edge is recognised as a valuable habitat for invertebrates. However, the extent of scrub within the management area has increased in recent years and threatens the conservation value of the fen. As such, small-scale coppicing will be introduced to restore the fen vegetation which persists below the scrub but which would eventually be lost through shading without management intervention.
- 4.4.3 **Coppicing.** The coppicing regime will follow the methodology for the wet woodland (Area B) set out above, i.e. comprising a 10 year cycle. The areas to be coppiced will focus on retaining scrub around wet woodland and on drier ground, and maximising the length of scrub edge. Coppicing will be timed to be undertaken during the autumn period, as for the wet woodland. Cut wood should be partly disposed of off-site, and partly retained to provide habitat piles in a variety of situations within the management area to benefit faunal species.
- 4.4.4 In addition, livestock will have access to areas of scrub, which will likely cause some localised small-scale disturbance which will enhance structural diversity, breaking up extensive areas of dense scrub which are of limited wildlife value and restricting the encroachment of scrub into adjacent fen habitat.

4.5 Component D: River Bank (River Yare)

- 4.5.1 Management of the River Yare banks will seek to maintain and manage vegetated buffer strips adjacent to the river channel to help reduce the effects of soil erosion. In addition, woody vegetation will be managed to ensure a diversity of microhabitats is available along the riverbank, including more shaded areas contrasted with more open areas to encourage the growth of aquatic and marginal vegetation.
- 4.5.2 **Rationale.** The banks of the River Yare were identified as an important ecological feature during the ecological surveys, primarily on the basis of the relatively undisturbed habitats, which includes unbuilt banks (for the most part) with shallows and aquatic vegetation. The river corridor is also of value for a variety of fauna, including invertebrates, breeding birds, and potentially Otter. However, the ecological value of the river corridor is threatened by the presence of invasive plant species, including Giant Hogweed and Himalayan Balsam. Therefore, management will aim to preserve and enhance the ecological value of the river corridor through a 'light touch', low intensity management regime, with the exception of invasive plant species which will be subject to control measures.
- 4.5.3 **Tree and shrub management.** To maintain open areas along the river banks, small-scale selective coppicing or pollarding of young trees and shrubs will be undertaken on a 10 year rotation. This work will only be applied to a small proportion of trees and shrubs, e.g. 20 to 30%, to avoid damaging any existing ecological interest. The stumps of trees or shrubs will be left in place and untreated to allow regrowth and to maintain faunal interest associated with the stumps.
- 4.5.4 **Rotational management of bankside vegetation.** Management of the bankside herbaceous vegetation will be undertaken according to a long rotation. This will involve annual cutting a section of tall ruderal vegetation, totalling no more than 25% of the bank length in any one year, to increase habitat diversity. This will be undertaken on a rotational basis, with a different section cut in each year. Some areas of permanently uncut vegetation will be retained to allow establishment of trees and shrubs, further increasing habitat diversity, while providing permanent areas of cover for species such as Otter. Cutting will be undertaken in late summer or autumn, avoiding the bird breeding season. This work will be undertaken using hand-held machinery such as brushcutters, to avoid disturbance to the

river banks. The cut material should be removed and either stacked into a designated area or removed off-site.

4.6 Component E: Swales

4.6.1 New swales will be provided within the 'Marsh Reach' development, with the aim of drawing the existing fen into the area of built development, providing a soft interface between the extensive and naturalistic fenland and the built development. The swales will be designed to have a gently sloping bank profile, encouraging a diversity of bankside vegetation including aquatic species, marginal species, through to tall ruderal species associated with the drier upper banks. Establishment of fen vegetation within the swales will be aided by translocation of fen habitat from the small areas where fen is to be lost under the proposals, supplemented by additional planting. Details of the translocation process are set out in the Environmental Action Plan for the site.

4.6.2 **Rationale.** Management of the swales will aim to manage and maintain vegetation within the swales to encourage a diversity of vegetation and prevent succession to scrub and woodland. Given the more urban context (compared with the fen described above), management will also aim to deliver a high aesthetic value, in addition to biodiversity value. This will be achieved through rotational cutting rather than grazing. Rotational cutting will allow some areas of tall vegetation to remain year-round.

4.6.3 **Monitoring of vegetation establishment.** During the establishment phase of both the translocated fen turfs and sown vegetation, the vegetation will be regularly monitored for the first five years by the management contractor. Consideration will be given to supplemental watering if required. Should any areas of translocated or seeded vegetation fail to establish, supplemental sowing will be undertaken. Consideration will be given to the reasons for failure, and the seeding mix adapted to more appropriate conditions if considered necessary.

4.6.4 **Rotational cutting.** Annual cutting will be undertaken in late summer (e.g. September), on a rotational basis. No more than one third of each swale should be cut each year. Cutting should be undertaken with small machinery or hand tools (e.g. brushcutters) to minimise ground disturbance, and should preferably be undertaken following a period of reasonably dry weather. The cut material should be removed and either stacked into a designated area where this would not disrupt amenity value, or be removed off-site.

4.6.5 **Visual amenity.** If deemed necessary to improve visual amenity of the swales, a boundary strip (e.g. 1 or 2 metres) at the interface with the built development can be subject to regular mowing during the growing season. This could help residents to understand that the low intensity management of the swale interior is an intentional part of the management regime rather than an area which has been neglected.

4.7 Component F: Kiln Park

4.7.1 Kiln Park will comprise a new area of public open space to the north of the fen. In addition to providing areas of public open space, the park will provide landscape and biodiversity benefits through the creation of habitats including wetland meadow, trees and scrub, and amenity grassland, in addition to hard surfacing to facilitate public recreation.

4.7.2 **Rationale.** The rationale for management of Kiln Park is to deliver multifunctional open space for the benefit of public recreational use, landscape amenity, and biodiversity benefits. As such, the management prescriptions will vary from areas of more intensively mown amenity grassland for recreational use, to taller-sward wetland meadow managed

on a rotation allowing patches of ruderal and herb species to develop to provide a source of nectar and an undisturbed refuge for fauna, to areas of trees and scrub subject to minimal intervention.

- 4.7.3 **Amenity grassland.** Management of the amenity grassland will aim to provide recreational use and a high level of amenity through regular cutting (e.g. once every two weeks) using machinery during the growing season. Erosion (e.g. through excessive trampling) will be monitored with any grassland turfs reinstated and/or protected through temporary fencing where necessary.
- 4.7.4 **Wetland meadow.** For the first year after sowing, areas of wetland meadow will be managed according to the same regime as the amenity grassland, to prevent competitive species from becoming highly dominant. Following this first year, cutting will be undertaken on an annual basis in late summer (e.g. August or September), on a rotational basis, with no more than one third of the total area of meadow cut in any one year. In addition, some areas of rarely cut grassland (e.g. once every five years) will be allowed to develop to encourage tall herbs to establish. Depending on the sward establishment, an additional spring cut may be considered if competitive grasses become dominant. Arisings from cutting will be removed and either piled into designated areas at the edge of scrub, or removed off-site.
- 4.7.5 **Trees and shrubs.** Areas of new tree and shrub planting will be subject to appropriate protection and aftercare to encourage successful establishment, with any failed specimens replaced as necessary. Management of established or retained scrub will be limited to cutting at the margins to prevent scrub encroaching into adjacent habitats, while allowing some areas to develop into a dense structure.

4.8 Component G: Invasive Species

- 4.8.1 Three invasive plant species were recorded within the management area, namely Japanese Knotweed, Himalayan Balsam and Giant Hogweed. These three species are listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended), and have potential to outcompete native flora. Therefore, the entire management area will be subject to annual monitoring for these species, with appropriate control measures implemented to prevent their further spread, and ideally to eradicate them from the site.
- 4.8.2 In addition, the proposed development adjacent to the management area will increase the risk of other invasive species becoming established, particularly from unauthorised disposal of garden waste. Therefore, management will include annual monitoring and removal of any other identified invasive species.
- 4.8.3 Control and eradication of the three invasive species identified on site will be undertaken according to best practice measures, as set out for each species in turn below.
- 4.8.4 **Japanese Knotweed.** Current best practice guidance from the Environment Agency, Defra, and Natural England advocates the use of approved herbicides to control and eradicate Japanese Knotweed¹. This should be undertaken by (or under the close supervision of) a contractor holding a certificate of competence for herbicide use. A Control of Substances Hazardous to Health (COSHH) assessment must be undertaken prior to starting work. Any application of herbicide near water (within 5 m) will require approval from the Environment Agency.

¹ <https://www.gov.uk/guidance/prevent-japanese-knotweed-from-spreading>

- 4.8.5 Currently, glyphosate is recommended to treat this species. Herbicide should be applied within the period July to October, and repeated annually for at least three years until the plants completely stop regrowing. After this three-year period, the site should be monitored for at least two years during the growing season to identify any regrowth. Glyphosate can be sprayed onto foliage or by stem injection. Spraying should be undertaken during dry and calm weather conditions.
- 4.8.6 **Himalayan Balsam.** Mechanical control, such as hand-pulling or cutting, is recommended to control this species, because these methods are effective and the proximity of the plant to a watercourse (namely the River Yare) poses risks associated with herbicide use. In order to be effective, plants should be pulled between May and July (before the seed-pods ripen) or cut between March and May. Ideally, multiple visits should be undertaken within this period to remove newly emerging seedlings. Hand-pulling should aim to pull up the root system, while cutting should be as close to ground level as possible. This procedure should be repeated annually until no new regrowth emerges (likely two to three years).
- 4.8.7 **Giant Hogweed.** A combination of chemical and mechanical control is typically required for large stands of this species, which is particularly prevalent along the River Yare. Given the dense and tall stand of this species, mechanical cutting is initially recommended, because of the difficulties in efficiently applying herbicide to all plants in such a dense and tall stand. Therefore, the plants should be cut to ground level (e.g. using brushcutters) in March or April. Appropriate PPE should be worn bearing in mind the toxicity of this plant. Following cutting, follow-up spot herbicide treatment using glyphosate (or other approved herbicide) should be undertaken in May or June. Cutting and/or herbicide application should continue over multiple visits during the spring and early summer annually, until regrowth has ceased. This is likely to take between five and ten years.
- 4.8.8 **Fencing and signage.** Where stands of invasive species are located in proximity to publicly accessible areas, such as footpaths and roads, consideration will be given to the installation of temporary fencing and signage. This will (i) discourage the public from entering the area, which could exacerbate the spread of the species and, in the case of Giant Hogweed, could pose health hazards, and (ii) increase awareness about the need for vegetation management, given that extensive areas of cut or dying vegetation could otherwise lead to public concern.

4.9 Component H: General Management Procedures

- 4.9.1 Other general management procedures will be undertaken throughout the management area, including maintenance of faunal enhancements, removal of litter, maintenance of public access and infrastructure, and weed control. Methods for the creation of faunal enhancements and infrastructure such as physical barriers are set out in the Environmental Action Plan for the site, while this section relates to the ongoing management and maintenance of such features once created.
- 4.9.2 **Maintain habitat piles and hibernacula.** A series of habitat piles and hibernacula will be created throughout the management area using the arisings from woodland and scrub coppicing. These will be maintained and/or supplemented through the periodic creation of new features, using arisings from management. This could include small scattered piles of cut fen / grassland vegetation, and piles of woody vegetation from management of trees and shrubs. Any new features created will be sited in a variety of situations, including open and sunny locations and more shaded and sheltered positions, to maximise opportunities for a wide range of fauna.

- 4.9.3 **Maintain Otter holt adjacent to River Yare.** The Otter holt which is to be created along the River Yare (as set out in the Environmental Action Plan) will be subject to annual inspection by the management contractor to ensure it remains in place and fit for use. This will include checking that the entrance holes are free of obstruction and that the structure has not collapsed. Should the Otter holt become damaged, a replacement holt will be provided in a suitable alternative location, following the procedure for the holt creation set out in the Environmental Action Plan, while also considering any design improvements which could increase the longevity of the Otter holt.
- 4.9.4 **Maintain kiln building to provide features for roosting bats.** The kiln building is proposed for enhancement to provide bat roosting opportunities, as set out within the Environmental Action Plan. This will be subject to an annual inspection from the ground by the management contractor. The inspection will include checking the integrity of the structure, the condition of the metal grille at the entrance to the kiln, and any public disturbance. Where the grille has become damaged or people have gained access, suitable repair measures will be arranged to deter further public access.
- 4.9.5 **Maintain bat and bird boxes within the CWS.** Bat and bird boxes will be subject to annual inspection from the ground by the management contractor, to ensure they remain securely fixed in place and remain suitable for occupation. Should any boxes become damaged, dislodged or removed, these will be replaced in a similar location.
- 4.9.6 **Litter removal.** The site will be regularly inspected for litter and dumped items, with suitable removal off-site as required.
- 4.9.7 **Maintain public access and associated infrastructure.** Public access infrastructure such as paths and litter bins, for example within Kiln Park, will be regularly inspected and maintained to provide a high amenity and ensure safe public access. Surfaced pathways will be maintained through regular removal of any colonising weeds by hand, removal of litter, mud and plant debris by hand removal or use of a high-pressure spray, and inspection and repair of any defects in surfacing.
- 4.9.8 **Maintain fencing, gate, and access bridges across fen.** Livestock infrastructure such as stock-proof fencing, the access gate, bridges across the ditches, and drinking facilities will be regularly inspected and repaired as necessary to ensure the safe containment and welfare of livestock, unhindered access by the farmer, and to deter public access into the fen. This will include inspections and repairs as necessary.
- 4.9.9 **Weed management.** Newly created habitats in particular pose a risk of weed establishment, from both native (e.g. Common Ragwort) and non-native weed species. The presence and extent of such species will be monitored at least annually, and more frequently during the establishment phase of newly created habitats. Where any such species become dominant, or invasive non-native species are identified, these will be subject to suitable control measures depending on the species in question. This could include more regular cutting and/or spot treatment of herbicides. In general, the use of herbicides will be restricted to the minimum quantity and frequency necessary, and consideration will be given to alternative control measures such as cutting or hand weeding.

5 Implementation and Management Structure

5.1 Management Responsibilities

Serruys Property Company Limited owns the entirety of the management area. The landowner's nominated Landscape Maintenance Contractor will be responsible for the overall ongoing maintenance operations of the site, including areas of landscape planting within the development. Consideration will be given to developing an agreement with local conservation grazing organisations to provide grazing services within the CWS.

5.2 Plan Period

5.2.1 This management plan addresses a period of 20 years from commencement of management activities. The 20 year period is considered sufficient to deliver the aims and objectives of this management plan, including the creation of new habitats and restoration of existing habitats. Within this period, the plan will be subject to periodic review, as set out under the monitoring section below, whilst a full review will be undertaken at the end of this 20-year period, to identify ongoing management requirements.

5.3 Funding

5.3.1 Implementation of the measures set out under this Management Plan will initially be funded by Serruys Property Company Limited or any subsequent landowner who takes on responsibility for the site. In the long term, management will be handed over to an appointed management company or other body, to be funded by an annual charge from the residents of the proposed development or by dividends from an invested sum.

5.4 Schedule of Management Actions

5.4.1 A schedule of management actions covering all phases of development (construction and long-term operation) is provided in Annex 6592/NCMP1.

6 Monitoring

6.1 Requirement for Monitoring

6.1.1 A five-year programme of ecological monitoring was proposed under the outline application, to inform the success of the management plan. This is considered appropriate given that the first five years are likely to be critical in the success of the management plan, following which new habitats should be established and favourable management should be introduced to the existing habitats. The monitoring visits will therefore identify how the management plan should be adapted going forward, to suit the dynamic conditions on site.

6.2 Monitoring Methodology: Years 1-5

6.2.1 For the first five years after the commencement of this management plan, monitoring will be undertaken by a suitably qualified ecologist. One visit should be undertaken per year, within the optimal season for botanical work (May to September inclusive). Each visit should include an update extended Phase 1 habitat survey, in order to map the distribution of habitats within the monitoring area and any changes from the baseline situation. Particular attention will be given to the progress of establishment of new habitats, including identification of any failed areas which may require reseeding / replanting.

6.2.2 In addition, the monitoring visit will assess the suitability of management measures in retained habitats, including the woodland, scrub, and fen. This will include recording the proportion of woodland and scrub subject to management, and the success of ground flora regrowth in managed areas. Grazing levels in the fen will also be monitored, by measuring the minimum and maximum sward height and the approximate percentage coverage of short-sward versus long-sward vegetation.

6.2.3 Monitoring visits will also include mapping the distribution of invasive plant species, including Himalayan Balsam, Japanese Knotweed, and Giant Hogweed, and the apparent success of control measures for these species. Faunal enhancement features such as bat boxes and bird boxes will be inspected from the ground to ensure they remain in place and fit for purpose. Any adverse impacts on habitats or fauna, e.g. from recreational pressure, will be identified to inform suitable management measures going forward.

6.3 Monitoring Methodology: Years 5-20

6.3.1 Following the initial monitoring phase, routine monitoring will be undertaken by the appointed management body at least annually until the end of the 20 year plan period. This will involve monitoring the ongoing success of management operations to achieve the objectives specified in this plan, with any remedial measures identified. In addition, a full update Phase 1 habitat and invasive species survey, following the methodology set out above, will be undertaken every five years (i.e. in years 10 and 15).

6.4 Plan Review

6.4.1 This NCMP will be subject to review every five years, following the corresponding ecological monitoring visit. The review will include an appraisal of the effectiveness of the management prescriptions in delivering the specified aims, and objectives. The review will consider whether the current management prescriptions remain appropriate, or whether any amendments should be introduced in order to meet the objectives. The findings of the review, and any proposed changes to the management prescriptions, will be submitted to the LPA.

6.5 Provisions for Unforeseen Cessation in Management

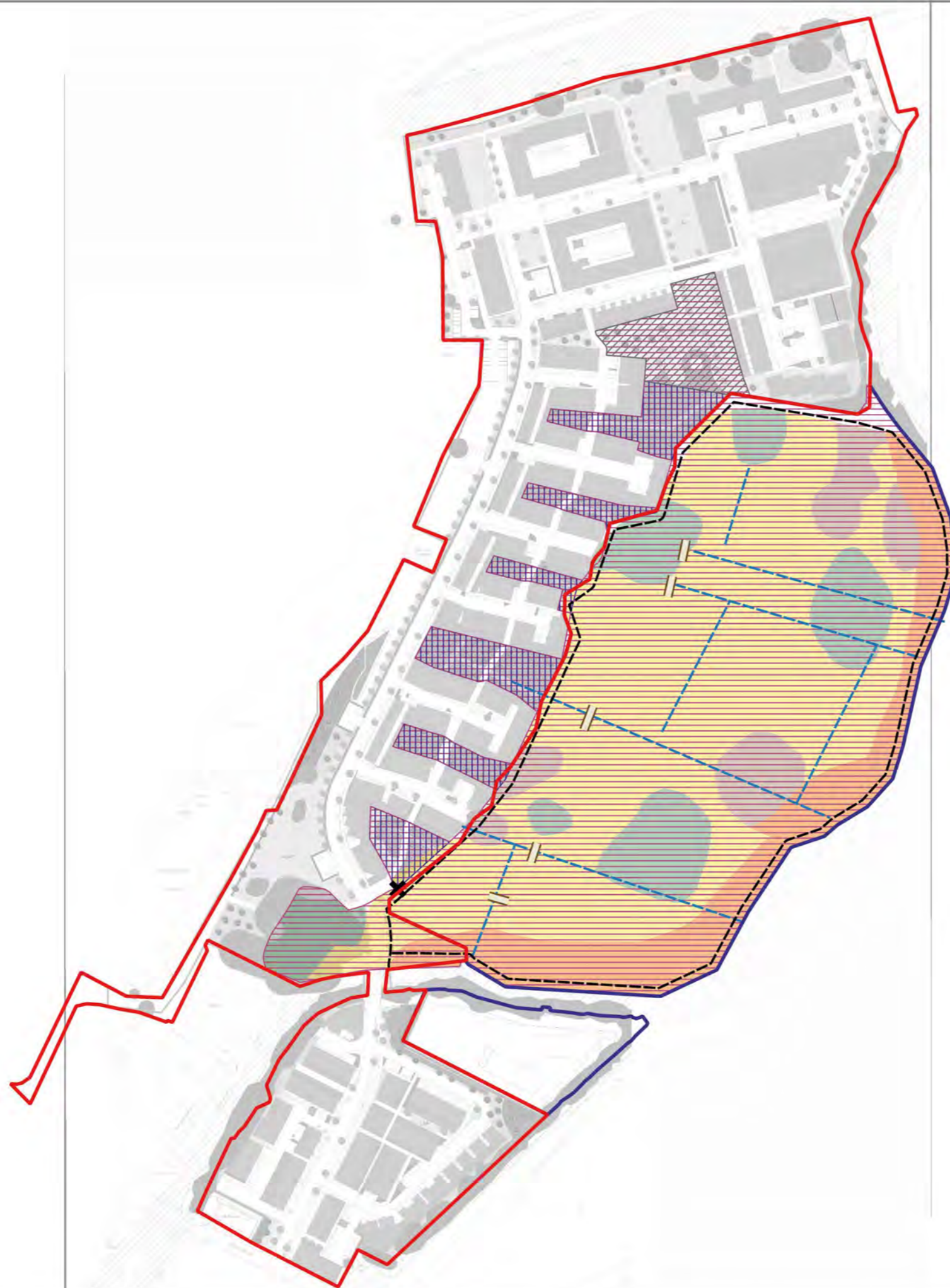
- 6.5.1 Should any of the monitoring visits identify that any part of the management activities contained within this management plan have unexpectedly ceased, remedial actions will be proposed. This will be guided by the management activity in question. For example, if proposed habitats have failed to establish, this may require reseeding or replanting followed by an appropriate aftercare period. Alternatively, cessation of management of existing habitats may simply require re-commencement of the planned management activities without further amendment. Any such remedial measures will be reported within the 5-year review to be prepared by the appointed ecologist, or sooner in the form of an interim review if considered necessary by the appointed ecologist.

7 Conclusions

- 7.1.1 Aspect Ecology has produced a Nature Conservation and Management Plan to address Condition 8d of outline planning permission 12/00875/O (Norwich City Council) and Condition 38d of outline planning permission 2011/0152/O (South Norfolk Council). The Management Plan builds on the Nature Conservation Management Framework Plan produced for the outline application (Appendix 9.16 of the Environmental Statement).
- 7.1.2 The management plan covers the retained parts of the Carrow Abbey Marsh County Wildlife Site (CWS), in addition to areas of green infrastructure within the proposed development site, which together form the management area. The overarching aim of the management plan is to arrest and reverse the ecological decline in condition of the CWS, restoring and creating a good example of the Priority Habitat 'lowland fens' which is representative of the local area and supports a diversity of associated habitats.
- 7.1.3 The identified management components include the fen habitat, wet woodland, scrub, river bank, proposed swales, the proposed Kiln Park, and invasive species. For each of the respective management components, this plan identifies specific management prescriptions and monitoring activities (see Annex 6592/NCMP1).
- 7.1.4 A programme of monitoring is proposed to ensure the management operations are kept under review and amended to meet the management objectives where appropriate.
- 7.1.5 Following the implementation of this plan, it is concluded that the ecological condition of the CWS will be fully restored to a favourable condition in the long-term.

Plan 6592/NCMP1:

Management Compartments



- Key:
-  Site Boundary
 -  Survey Area
 -  Management Area
 -  Compartment A: Fen & Ditches
 -  Compartment B: Woodland
 -  Compartment C: Scrub
 -  Compartment D: River Bank
 -  Compartment E: Swales
 -  Compartment F: Kiln Park
 -  Stock Proof Fence
 -  Bridge
 -  Ditches
 -  Livestock Access Gate



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Land at Deal Ground and
 May Gurney
 Management Compartments

6592/NCMP1



B/AM

June 2023

PROJECT
 TITLE
 DRAWING NO.
 REV
 DATE

Annex 6592/NCMP1:

Management Prescriptions

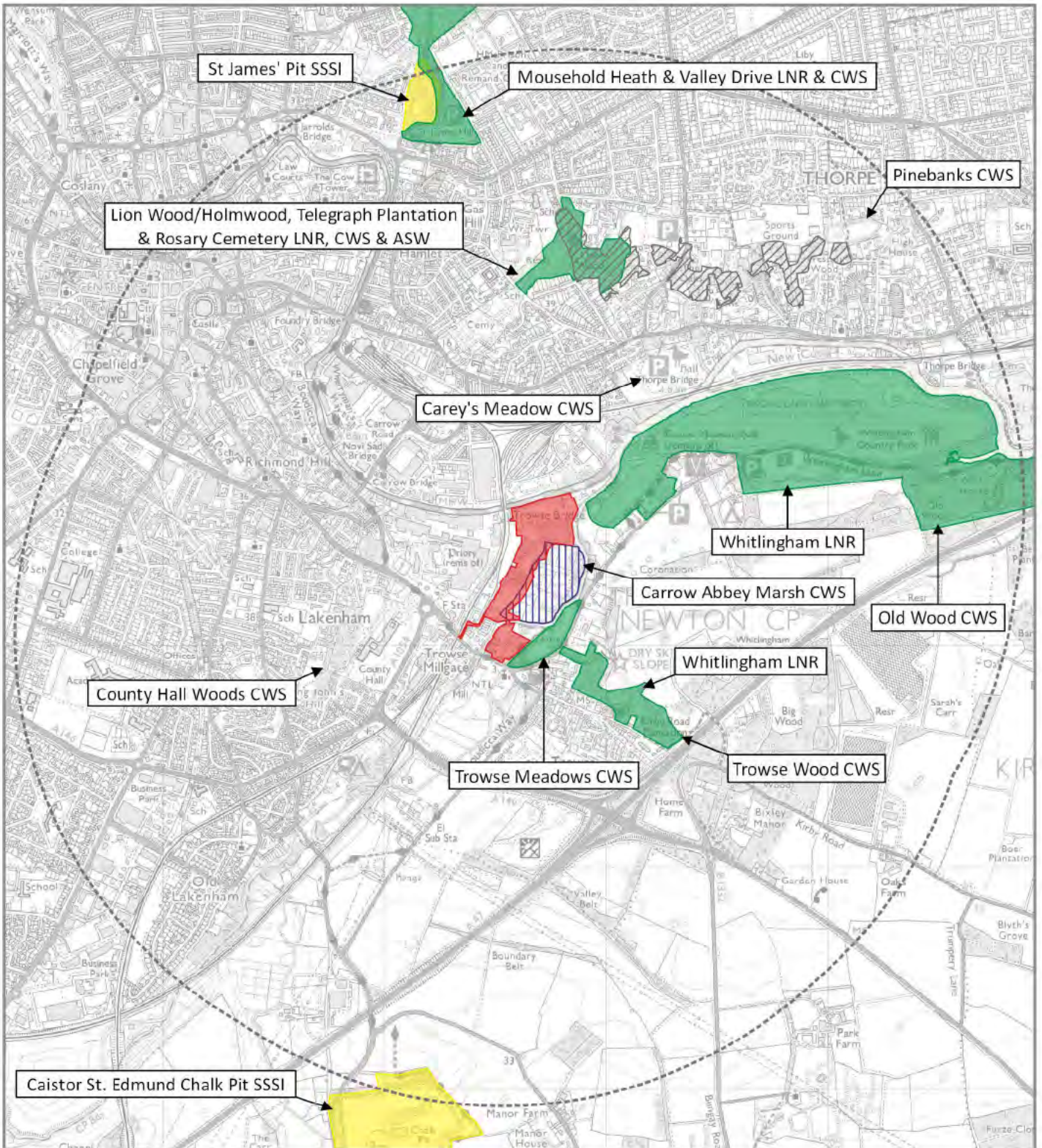
Habitat / Activity	Frequency	Initial Management (Construction Phase)												Ongoing Management											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A. Fen habitat and associated ditch system																									
Installation of stock-proof fence around grazing area, bordered by thorny shrub planting and wet ditch system	-	█	█	█	█	█	█	█	█	█	█	█	█	█	█										
Provision of suitable livestock infrastructure such as drinking sources and bridges over ditches	-	█	█	█	█	█	█	█	█	█	█	█	█	█											
Grazing by low density of suitable livestock (e.g. light traditional cattle breed)	Continuous grazing in late summer, depending on weather conditions																			█	█	█	█		
Monitoring of stock-proof fencing	At least monthly															█	█	█	█	█	█	█	█	█	
Ditch restoration	Once, during dry weather							█	█	█															
B. Woodland and C. Scrub																									
Rotational coppicing (up to 30%)	10-year cycle																								
Grazing by low density of suitable livestock (e.g. light traditional cattle breed)	Continuous grazing in late summer, depending on weather conditions																				█	█	█	█	
D. River Bank (River Yare)																									
Selective coppicing or pollarding	10-year cycle																								
Rotational cutting of up to 25% of bankside herbaceous vegetation	Annually																								
E. Swales																									
Monitoring of vegetation for first five years	At least twice per year																								
Watering during prolonged dry periods for first five years	As required, up to twice per month																								
Supplemental sowing / planting of failed vegetation where necessary	As required																								
Rotational cutting of up to a third of vegetation in each swale	Annually																								
If deemed appropriate, regular mowing of 1-2m boundary strip for visual amenity	Up to twice per month																								

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Key:

- Site Location
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- County Wildlife Site (CWS)
- Ancient Semi Natural Woodland (ASW)
- 2km Study Area



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**Land at Deal Ground and
 May Gurney
 Ecological Designations**

Figure 9.1

B/JP

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Key:

- Site Boundary
- Survey Area
- County Wildlife Site
- Bramble
- Building/Structure
- Fen
- Hardstanding
- Japanese Knotweed
- Neutral Grassland
- Pond
- Previously Developed Land
- Scattered Japanese Knotweed
- Scrub
- Tall Ruderal
- Dry Woodland
- Wet Woodland
- Other Structure
- Amenity Planting
- Line of Trees
- Watercourse
- Ditch
- Scattered Scrub
- Tree
- Recently Felled Tree

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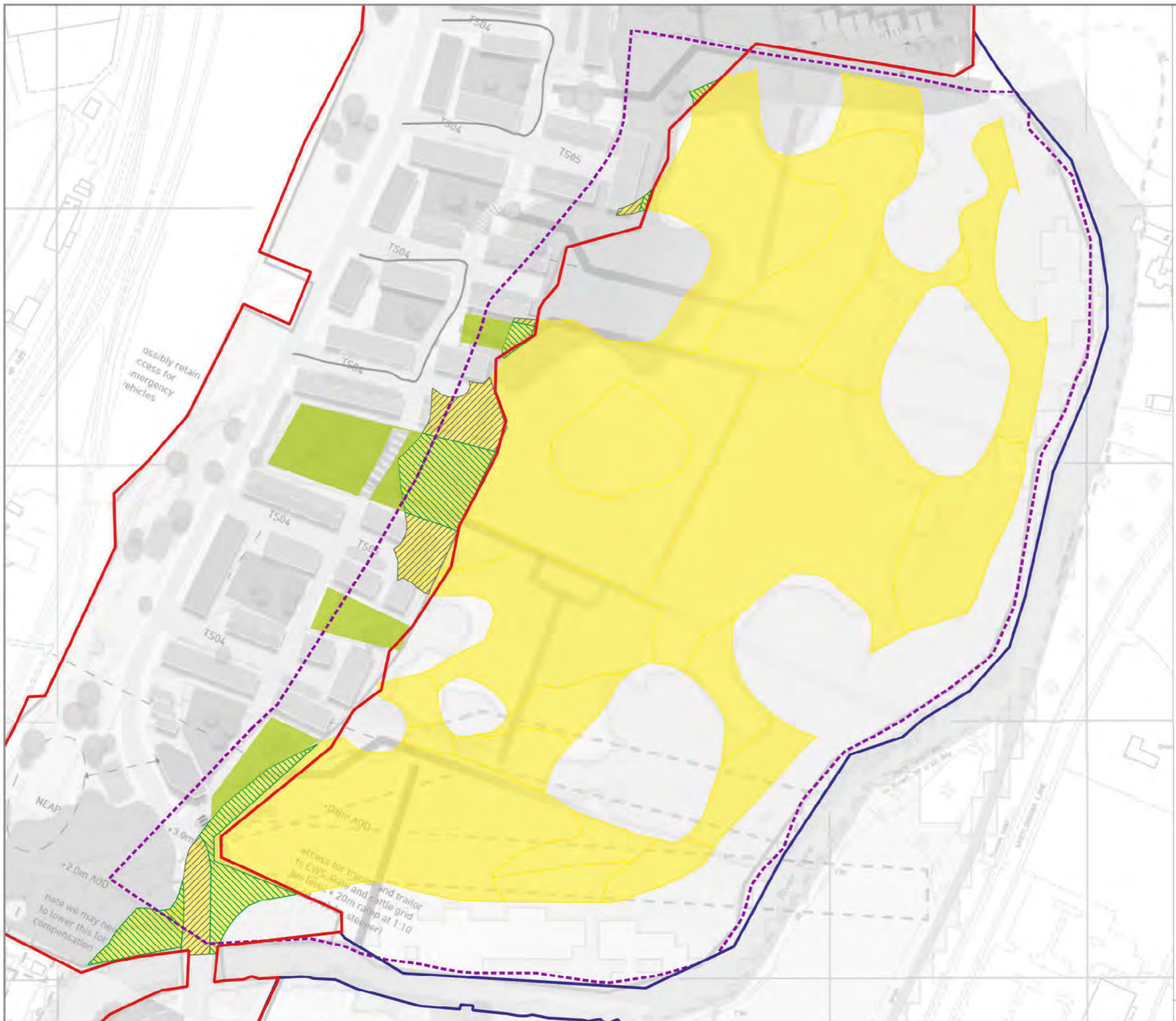
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Land at Deal Ground and
 May Gurney
 Habitats and Ecological Features



Figure 9.2
 D/AM
 June 2023

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- Key:
- Site Boundary
 - Survey Area
 - County Wildlife Site
 - Fen
 - Within CWS: 45825m²
 - Outside CWS: 783m²
 - On-Site Fen Retained
 - Within CWS: 1733m²
 - Outside CWS: 607m²
 - On-Site Fen Lost
 - Within CWS: 1350m²
 - Outside CWS: 176m²
 - Fen Creation
 - Within CWS: 1010m²
 - Outside CWS: 1433m²



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Land at Deal Ground and
 May Gurney
 Fen Retention and Losses

Figure 9.3



C/JP
 June 2023

PROJECT	
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DATE	

Notes