

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])

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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

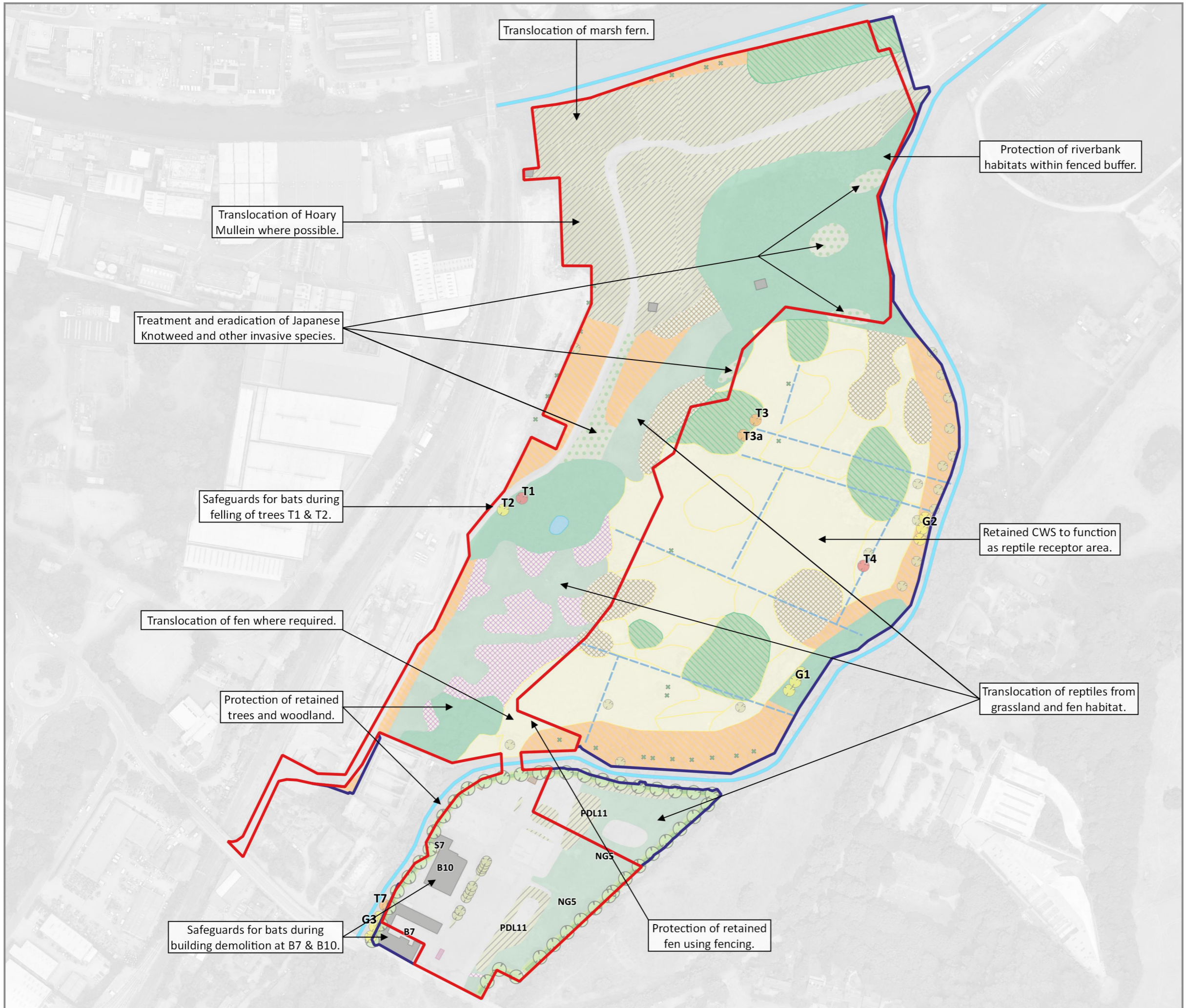
- 7.1.1 The proposed development will be delivered under three phases, comprising (i) May Gurney land in the south, (ii) Yare Bridge, Wensum Bridge and the Spine Road, and (iii) Wensum Edge and Marsh Reach. Further information is provided at Annex 6592/EAP1.
- 7.1.2 This Environmental Action Plan, including 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

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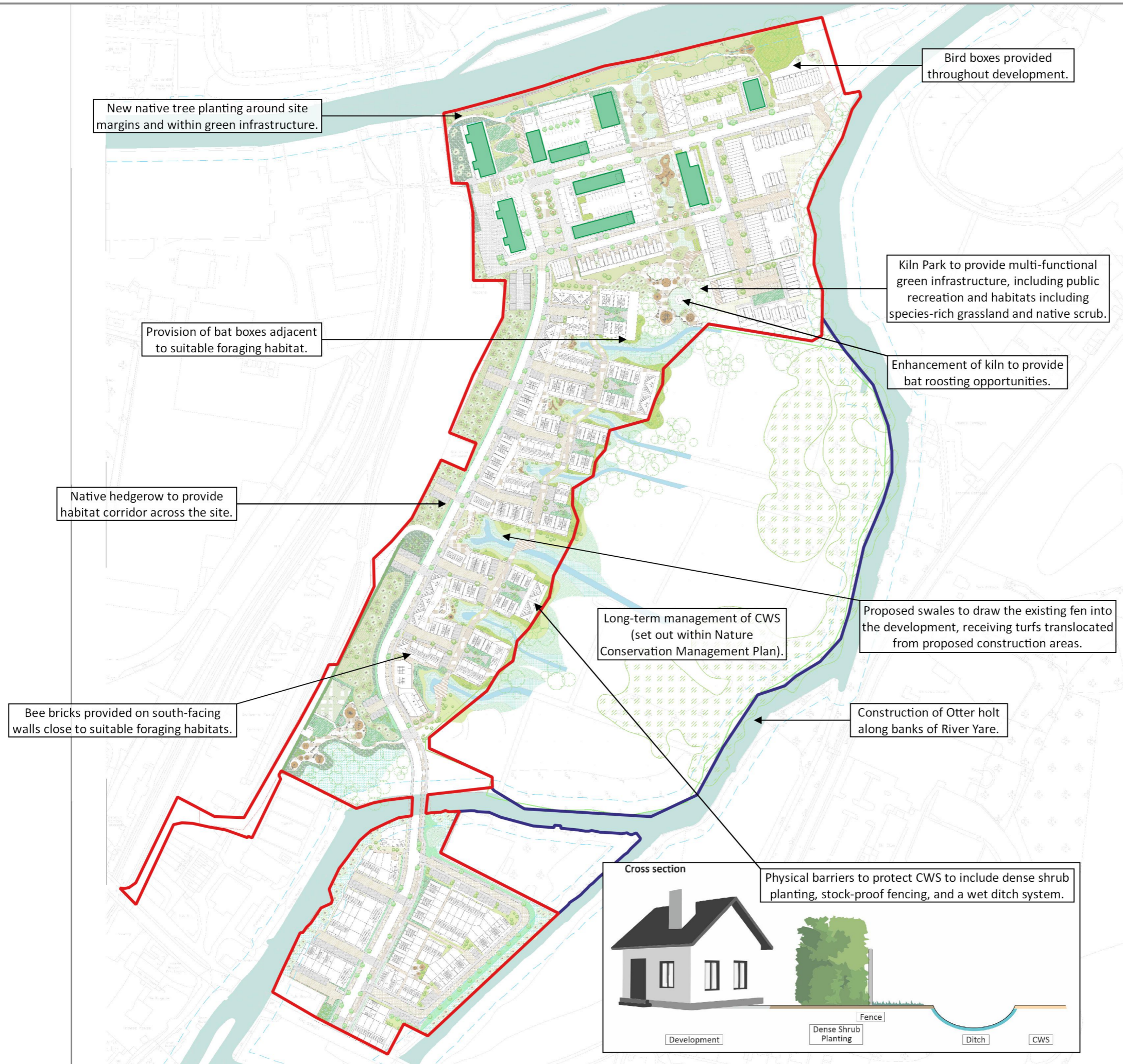
**Land at Deal Ground and
 May Gurney
 Ecological Safeguards and Mitigation**

PROJECT	
TITLE	
DRAWING NO.	6592/EAP1
REV	A/JP
DATE	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	PROJECT
Ecological Compensation and Enhancements	TITLE
6592/EAP2	DRAWING NO.
B/AM	REV
June 2023	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



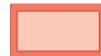
Phase 1



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

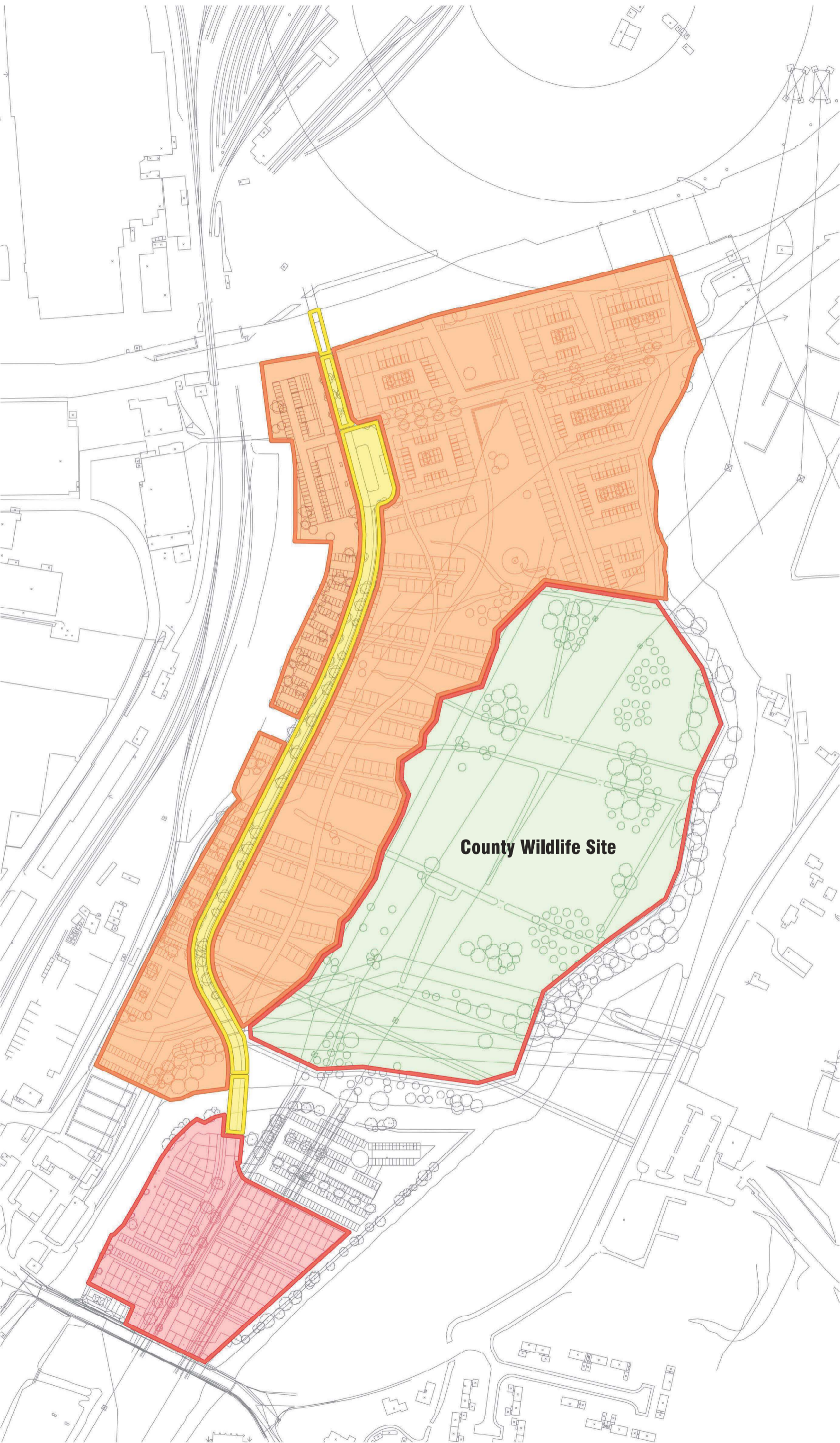


Phase 2



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:

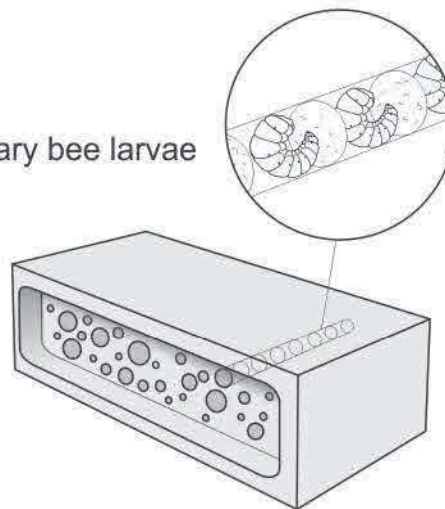
Small block - 6.5cm x 7cm x 10.5cm

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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