



**LAKE LANE, BARNHAM, SUSSEX:
ECOLOGICAL MITIGATION AND
ENHANCEMENT PLAN**

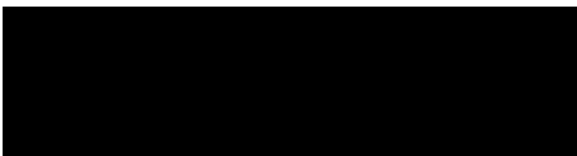
**RELATING TO DISCHARGE OF
CONDITIONS 17, 18 AND 19 OF
OUTLINE PLANNING PERMISSION
BN / 16 / 12**

April 2017

Our Ref: JSL2477_871a

RPS

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QUALITY MANAGEMENT

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1 INTRODUCTION

1.1 Outline planning permission, reference BN/16/12, for the development of the land adjacent to Lake Lane, Barnham, Sussex (Ordnance Survey grid reference SU965 045) was granted on appeal in October 2013.

1.2 Condition 17 of the planning permission requires that:

“Prior to the commencement of development full details of ecological enhancement measures shall be submitted to and approved in writing by the local planning authority. These shall include details of an ecological management plan for the construction phase of the development. The approved details shall thereafter be implemented prior to the first occupation of the development hereby approved. “

1.3 Condition 18 of the planning permission requires that:

“Prior to the commencement of development or preparatory works on site, a detailed mitigation and translocation plan for reptiles supporting the reserved matters applications(s) identifying timings and exclusion strategy and features to be employed to improve the receptor site(s) shall be submitted to and approved in writing by the local planning authority. Mitigation shall then be implemented in accordance with the approved details and timing of the works under the supervision of an Ecological Clerk of Works unless otherwise agreed in writing by the local planning authority.”

1.4 Condition 19 of the permission also requires that:

“Prior to the commencement of development or preparatory works on site, and in accordance with the Bat Survey, an Ecological Clerk of Works will be commissioned to undertake a final check for bats and oversee the ‘soft-felling’ of trees that have an identified potential for use by bats. Should protected bat species be present, work must stop and Natural England informed. A licence may be required from Natural England may be required before works can recommence NE will advise. Prior to the commencement of development or preparatory works on site a scheme showing a bat-sensitive lighting strategy produced in liaison with the consultant ecologist shall be submitted for approval along with a detailed plan showing how additional roosting features will be provided on existing mature trees. The development shall be carried out in accordance with the approved details.”

- 1.5 This report provides details of the ecological enhancement measures to be included within the final scheme, so as to address the requirements of Condition 17. It is split into sections detailing mitigation / enhancement measures for habitats and then for the various protected species.
- 1.6 This report also sets out the methods of mitigation with respect to reptiles so as to address the requirements of Condition 18 and provides the information required to address the requirements of Condition 19 with respect to bats.
- 1.7 The inclusion of all issues relating to ecology within this single document also therefore provides details of how ecology will be managed during construction to ensure compliance with the requirements of Condition 17.

The site and setting

- 1.8 The site is located to the east of Barnham Village within West Sussex and covers an area of 6.8 ha. The site formerly comprised a series of glass houses with mature trees and grassland around the boundaries along with a hedgerow dividing the nursery from an arable field.
- 1.9 A railway lies to the immediate south of the site while further glass houses are located to the east. A new residential development is being constructed to the west while existing houses are located to the north.
- 1.10 The wider area is largely rural in nature.
- 1.11 The final development will consist of up to 107 residential dwellings with associated soft and hard landscaping, open space, SUDs ponds and natural habitats.

2 HABITATS

2.1 In order to enhance the biodiversity on-site, the following habitats will be created, maintained and/or enhanced:

- SUDs Balancing Ponds;
- Hedgerows and linear tree lines; and
- Tussocky wildflower grassland.

SUDS Balancing Ponds

2.2 The drainage scheme for the site requires the creation of two balancing ponds (to form part of a Sustainable Urban Drainage Scheme (SUDS)). These are shown on Figure 1 (entitled Ecological Enhancement) attached. These will be planted with a suitable wet meadow seed mix and be allowed to develop a longer sward height. This will provide foraging opportunities for reptiles, invertebrates, amphibians, birds and bats.

Hedgerows and linear tree lines

2.3 The development retains as many linear features as possible within the final development, in order to safeguard the use of this habitat by fauna species. In particular, the mature tree belts / woodland to the west of the site are to be retained to maintain habitat connectivity around the site perimeter. To further enhance the biodiversity on-site, the development will also include the planting of new native tree species groups, including field maple *Acer campestre*, common hazel *Corylus avellana* and common hawthorn *Crataegus monogyna*. A significant new, species-rich hedgerow is to be planted along the southern boundary of the site to create a further green corridor linking the east and west of the site.

2.4 The planting is designed to respond to and to enhance the local environment. With a strong emphasis on biodiversity, the plants bounding the scheme are native and will be of local provenance and comprise shrub, multi-stemmed and standard trees.

Wildflower grassland

2.5 The boundaries of areas of public open space adjacent to tree lines/woodland will be planted with wildflower grassland allowed to develop a tussocky structure to provide habitat for reptiles and other species such as invertebrates and the birds/bats that feed on them, post development. An area of similar grassland will also be planted through the central public open space to support birds and invertebrates. Approximately 5 m of grassland from



the edge of the woodland/tree line will be left uncut with the only management necessary being occasional cutting of scrub by hand to ensure encroachment of such habitat is limited to less than 30% of the total cover. This will be particularly important within the Reptile Enhancement Area to the west of the site (see further below).

Other habitat enhancements

- 2.6 Log piles and hibernacula will be created near to the SUDS features to support local populations of invertebrates, reptiles and amphibians.

3 BATS

- 1.1 The previous ecology surveys of the site (Lizard Landscape Design 2012) have identified very little habitat on site to support bat roosting other than a stand of ivy-clad alder *Alnus glutinosa* within the tree lines to the west of the site. The January 2012 survey states (page 2 of the Summary) that “Should development activities need to remove the existing Alder located at TN16 then detailed phase 2 dusk / dawn bat activity emergence surveys would be required before any tree felling could take place”. These trees are, however, to be retained within the final development. Therefore, the requirement of Condition 18 (that soft felling of trees with an identified potential for use by bats should be checked for bats by a suitably-licensed ecologist) is not relevant. Should this change, the requirements of the condition will be implemented in full prior to felling.
- 1.2 The surveys also identified very little habitat suitable for foraging/commuting bats other than the tree lines along the western/northern site boundaries, all of which are to be retained within the final scheme.
- 1.3 Notwithstanding this, a number of enhancements are proposed in order to encourage bat species onto site.

Habitat Enhancements

- 1.4 Planting of native tree species will be undertaken including along the western boundary to strengthen this boundary feature as a corridor for movement/foraging by bats.
- 1.5 The planting of a species-rich hedgerow along the southern boundary will improve east-west connectivity for bats, providing an enhanced commuting/foraging corridor along this boundary.
- 1.6 Areas of wildflower grassland tussocky grassland will be planted adjacent to the treelines/woodland and within areas of public open space. These will be maintained with a tall sward height to encourage flowering and provide foraging habitat for a range of species including invertebrates, which in turn will provide a food source to foraging bats.
- 1.7 Bat boxes will be attached to some of the retained mature trees to enhance the roosting potential of the site (Figure 1). These will be positioned in locations where they cannot be tampered with and away from light spillage of streetlamps.
- 1.8 Two types of bat boxes will be erected in order to accommodate the requirements of different bat species:

- Schwegler bat box 2F – a general purpose box, particularly attractive to the smaller British bats. A simple design with a narrow entrance slit on the front. These will be erected on mature trees in the retained tree lines along the northern and western boundary;
- Schwegler bat tube 1FE – the box has a narrow crevice-like internal space which is attractive to pipistrelle and long-eared bats. It is integrated into the building to ensure longevity.

Bats and lighting

- 1.9 Condition 18 requires the production of a bat-sensitive lighting strategy. The only bat foraging corridor identified on site is the tree line along the western/northern boundaries of the site, all of which is to be retained and will be unlit (see Figure 2 for the lux plan of lighting on site).
- 1.10 Furthermore, the mitigation measures used within the lighting design to minimise light spill more generally include:
- Utilising the lowest lux level (1.4klm) luminaire available for the MiniLuma which conforms to the lighting requirements for adopted roads and in turn minimises the light output onto adjacent areas.
 - Luminaries have been set at 0° inclination to minimise light spill onto areas outside of highway adoption extents.
 - Luminaries have been dimmed to ensure minimum light output on to these areas.
 - Luminaries have been fitted with back louvres, where necessary, to prevent backwards light spill.

4 BIRDS

Nesting birds

- 4.1 The tree lines, scrub and ruderal vegetation on site offer some foraging and nesting habitat for common species of birds. Some vegetation potentially used by nesting birds will be cleared. Therefore, in order to protect bird nests and to comply with the law protecting them, hedge, tree or scrub removal should take place outside of the breeding bird season, which is generally considered to be from March to August inclusive.
- 4.2 If this timeframe is not possible then, prior to removal, such vegetation will first be checked for the presence of nesting birds by an experienced ecologist. If any nest is found, it will be left undisturbed with an appropriate buffer until the chicks had fledged (usually around six weeks).

Habitat Enhancements

- 4.3 As already described above, many additional trees and shrubs will be planted across the site, along with areas of wildflower grassland and a hedgerow along the southern boundary, which will provide suitable habitat for foraging and nesting birds.
- 4.4 The development will also incorporate a range of bird boxes to enhance the nesting opportunities within the development. The location of these bird boxes is shown on Figure 1.
- 4.5 The Schwegler type 1B and 2H will be included across the development.
- Schwegler type 1B – This box can be attached to trees, walls and buildings, it contains an oval entrance, making it a good box for redstarts, marsh/blue and coal tits, as well as pied flycatcher and sparrows.
 - Schwegler type 2H – A good box to attach climbing shrubs. This box is also used to encourage nesting inside, typical species include robins.
- 4.6 Boxes will be placed on trees or buildings around the site. Each box will be placed as high as possible up the trees to ensure they are safe from predators etc.

5 REPTILES

- 5.1 A survey of the site in spring 2012 (Lizard Landscape Design June 2012) found small populations of slow-worm *Anguis fragilis*, grass snake *Natrix natrix* and common lizard *Zootoca vivipara* along the southern side of a hedgerow located to the north of the southern arable field. The spring 2012 survey did not find reptiles along the western site boundary, but did identify that, subject to some enhancement measures such as clearance of dock/nettle, reptiles could potentially use this area of the site as it was contiguous with the habitat beside the hedgerow where reptiles were found in the spring 2012 and close to a previously identified population noted to have been off site to the west (date of this identification unknown) (see survey dated January 2012 (6.2.1) and survey dated June 2012 (4.1.1 and 5.4)). The hedgerow that divided the former plant nursery from the small arable field to the south is no longer present.
- 5.2 A walk-over of the site was undertaken during October 2016 to identify areas of potentially suitable reptile habitat. Areas were identified adjacent to the railway along the southern boundary and along the western boundary (see Figure 3 attached). Much of the site was subject to colonisation by tall ruderal species, although the extent of vegetation cover at the time of the site walk-over made these areas sub-optimal with respect to reptiles.

Mitigation strategy

- 5.3 Condition 18 of the outline permission requires that “a detailed mitigation and translocation plan” be submitted for approval for reptiles “identifying timings and exclusion strategy and features to be employed to improve the receptor sites”.
- 5.4 As noted the hedgerow area where reptiles were previously (2012) recorded in small numbers is no longer present. The following therefore focuses on appropriate clearance / protection of areas of the site that are currently potentially suitable for reptiles.
- 5.5 The areas of potential reptile habitat on site to be cleared comprise a strip of longer grassland along the southern boundary approximately 10 m wide adjacent to the railway line and a similar width of longer grassland along the western boundary of the site (see Figure 3).
- 5.6 In order to facilitate the development, the grassland along the southern boundary will be cleared although that along the western side will be retained (see Figure 3). Given the

small area of grassland to be cleared along the southern boundary, no exclusion strategy or translocation will be necessary. Instead the works will be undertaken using sensitive clearance techniques and under Ecology Clerk of Works (ECoW) supervision.

- 5.7 Sensitive clearance comprises hand strimming, conducted in two phases, a first cut to 15 cm, and a second cut (24 hours later) to ground level. The strimming will be undertaken from east to west to encourage any reptiles present into the suitable habitat to be retained areas along the western boundary. This will be undertaken at a time of year and in suitable weather conditions when reptiles are active (e.g. spring to autumn 2017). This process will encourage any reptiles that are present to move into any adjacent connecting habitat. Any logs etc within the area to be cleared will be checked by hand by the ECoW and moved out of the area into the retained habitat.
- 5.8 In order to prevent reptiles entering the site, post clearance, reptile-proof fencing (see Appendix 1 for specification) will be erected along the western boundary, beside the existing tree protection fence (Figure 4). Once development is complete, this fencing will be removed. Fencing erection and removal will be undertaken under ECoW supervision.

Habitat Enhancements

- 5.9 The site will be enhanced for reptiles through the creation of hibernacula, rough grassland margins, scrub, and open basking areas with a particular emphasis on the Reptile Enhancement Areas (REA) towards the western and northern boundaries beside the proposed SUDS balancing ponds (Figure 1).
- 5.10 The landscaping for the development will use native planting to provide high-quality landscaping and to promote nature conservation by attracting local wildlife. The proposed native planting ties in with the existing vegetation on the site, enhancing the existing western tree belt and strengthening wildlife corridors by filling in gaps to aid wildlife movement and habitat permeability. The site layout will enable reptile movement along the whole western site boundary and the wildflower grassland areas will ensure the site delivers adequate habitat to maintain any population of reptiles on site.
- 5.11 The grassland to the west that is to be retained will be subject to a suitable management regime through rotational mowing on a three-year basis (i.e. only a third will be cut of this area in any one year).

Other Enhancements

- 5.12 Hibernacula will be created on site within the REA adjacent to the proposed balancing pond along the western side of the site and within the REA near to the other balancing pond to the north. See the locations on Figure 1. These will be created prior to clearance of the potential reptile habitat on site as described above. The design of the hibernacula will as far as possible mimic natural conditions frequently used by reptiles to hibernate (Appendix 2) and will be orientated east/west to ensure that one bank of the hibernacula is facing south.
- 5.13 The materials used to build the inert, clean fill of the hibernacula will include one or more of brick, rubble, hardcore, logs, sleepers, etc. The hibernaculum will be built sufficiently large so that the centre of it remains frost free. Therefore, the dimensions of the hibernacula will be approximately 1 m high and 2 m wide by 4 m long. The inert, clean fill material will be piled up, leaving spaces between the rubble for any reptiles to be able to access the hibernaculum. A dense layer of straw will be added on top as well as mixed into the bulk of the rubble for insulation purposes. The hibernacula will then be covered by topsoil, ideally with a turf covering.
- 5.14 The hibernacula will be constructed in such a way that reptiles within them will have different exit points and can therefore exit them freely, as the hibernacula could otherwise act as a trap. Existing building rubble on site will be used as materials towards the creation of the hibernacula.
- 5.15 Log piles will also be created in these locations (at least three in both the REA and to the north near the second balancing pond). These will provide further foraging opportunities for reptiles.

6 INVERTEBRATES

- 6.1 Enhancements will be included within the final scheme to support local populations of invertebrates, which in turn will provide a food source for bats, reptiles and birds.
- 6.2 The following enhancements have been included within the final scheme:
- A mixture of native tree species is to be incorporated within the landscaping scheme. Species will include those known to support a wide range of invertebrate species such as silver birch *Betula pendula*;
 - Tussocky grasslands will be created which will provide a range of flowering habitats to support invertebrates; and
 - Log piles and dead wood features will be created around the development, within areas of shrub planting and meadow areas.

7 GENERAL

7.1 Although no badgers were found during surveys to support the planning application, given the rural nature of the site, it is likely that this species may be in the area and therefore the following general precautions will be observed during construction:

- Tree protection fencing will be retained to protect the mature features along the western site boundary to ensure the trees/woodland are not impacted during construction:
- Construction to be limited to the hours from dawn to one hour before sunset;
- Care to be taken when constructing deep vertical sided trenches (>1.5m), as these could act as 'pitfall traps'. Therefore, daily inspection of such trenches will be carried out; and
- Where trenches are to be left overnight, access ramps will be provided to allow animals (including badgers) to escape. In addition, such excavations will be inspected each morning to ensure that animals are not trapped.

8 REFERENCES

Froglife, (1999) *Reptile Survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

Lizard Landscape Design (2012). *Eric Wall Nursery, Lake Lane, Barnham, West Sussex: Ecology Phase 1 Habitat Survey Report (January 2012) and Protected Species Assessment (June 2012)*: Lizard Landscape Design Unpublished Report.



FIGURE 1

Ecology Enhancements



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Key

- BIRD BOX (SCHWEGLER 1B)
- BIRD BOX (SCHWEGLER 2H)
- BAT BOX (SCHWEGLER 2F) ATTACHED TO MATURE TREES
- BAT TUBE (SCHWEGLER 1FE)
- HIBERNACULA/ LOG PILES
- RETAINING MATURE TREE LINE
- REPTILE ENHANCEMENT AREAS
- SUDS FEATURE
- SPECIES RICH HEDGE
- TREE GROUP PLANTING



A	Amendment to legend & updated base plan	25.04.17	JL	NB
Rev	Description	Date	Initial	Checked



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Title Ecological Enhancement

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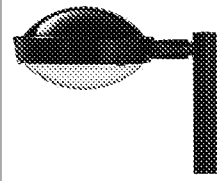


FIGURE 2

Lux plan for Lighting Strategy

Luminaire Schedule		Label	Arrangement	Description	Lumens	Wattage	S/P Ratio	Total MF
Symbol	Qty							
	27	DW400 - 12LED-300mA	SINGLE	DW400, Direct Entry, 12 x 4K 300mA Light Engine 2.5/25 Array, 6m TLS	1175	12	1.50	0.748

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Min/Avg	Min/Max
Roadway 01	Illuminance	Lux	1.59	4.7	0.3	0.19	0.06
Roadway 02	Illuminance	Lux	1.77	4.7	0.3	0.17	0.06
Roadway 03	Illuminance	Lux	1.75	4.7	0.3	0.17	0.06



DW400, Direct Entry, 12 x 4K 300mA Light Engine 2.5/25 Array, 12821 Finish, Mayflower GLC GMS.
6m TLS PSX Column to suit about.





FIGURE 3

Potential reptile habitat present on site October 2016

Document Path: P:\2400 Series\JSL2477 - Lake Lane, Barnham\Tech\GIS\JSL2477_Fig3 (Reptile habitat present on site).mxd



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Legend

- Application boundary
- Reptile habitat (to be retained)
- Reptile habitat on site (to be removed)

Rev	Description	Date	Initial	Checked



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on Site (October 2016)

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Figure Number	Rev
3	-



FIGURE 4

Reptile Fence Location

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Legend

- Application boundary
- Location of reptile exclusion fence

Rev	Description	Date	Initial	Checked



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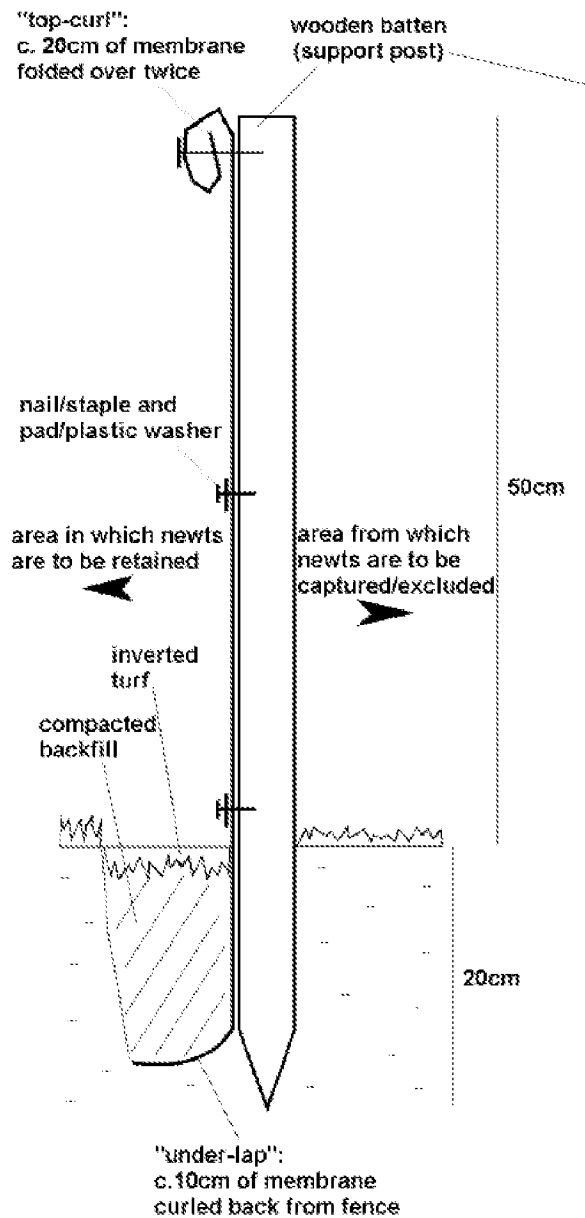
Client Redrow Homes
Project Lake Lane, Barnham
Title Reptile Fence Location

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Figure Number	Rev
4	-

APPENDIX 1

Reptile fencing specification



CROSS-SECTION

APPENDIX 2

Hibernacula specification (English Nature 2001)

