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Habitat Creation and Management Plan and Outline Mitigation Proposals

**Land off Horndean Road,
Emsworth**

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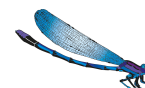
Summary:

- 1. The Ecology Co-op has been commissioned by Chidden Farms to outline ecological mitigation, compensation and enhancement measures at land off Horndean Road in Emsworth, where it is proposed to build up to 140 new homes and create a new flood abatement wetland with a 20,000 cubic metre holding capacity.**
- 2. Pre-construction work including reptile fencing, habitat manipulation and establishment of a receptor site is outlined in section 2.**
- 3. Enhancement measures to maximise the potential biodiversity gain from the creation of the new wetland is outlined in section 3.**
- 4. Following the installation of reptile fencing, trapping visits would take place from as early as mid March with a target of up to 60 visits or until 15 visits have been made under suitable weather conditions, without identifying reptile presence.**
- 5. Post-construction management operations for the wetland, pond and other 'green features' have been outlined in section 4.**

This report has been prepared by Azure Ecology, with all reasonable skill, care and diligence within the terms of the Contract with the client.

We disclaim responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



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1 INTRODUCTION

1.1 Background

The Ecology Co-op has been commissioned by Chidden Farms to outline mitigation works at a site on Horndean Road in Emsworth. Following surveys at this site by Azure Ecology through 2013, it was determined that a low population of common lizards (*Zootoca vivipara*) was present, whilst some limited bat activity was recorded during a survey in September and a National Vegetation Classification survey concluded that whilst no high value plant communities were present, there was some value in a variety of flowering plants for pollinating insects. The enhancement of the value of the site for foraging and roosting bats is a material consideration of this document as well as ensuring that the common lizard population is protected and the value of some of the grassland for pollinating insects is retained or enhanced.

This document has been written in order to demonstrate the ecological mitigation and enhancement measures for implementation during the construction of a large housing development of up to 140 new homes and the creation of a new flood abatement wetland designed to hold up to 20,000 cubic metres of water.



Figure 1 – the Horndean Road site as shown from aerial imagery on an east-west axis. The site lies to the west of Horndean road, which runs along the top of the picture.



Figure 2. The proposed plan for Horndean Road.

This document outlines all mitigation and compensation measures necessary to ensure that wildlife and particularly reptiles and bats are protected at the Horndean Road site. All of the prescribed mitigation and habitat creation measures within this document will be implemented into the site development in full through a series of 'prescriptions' outlined within a full Mitigation Statement to be submitted with a full planning application, or in order to release a planning condition.

1.2 Rationale

Reptiles

Slow Worms, Adder, Grass Snakes and Common Lizards are protected against intentional killing or injuring and trade under part of subsection 9(1) and all of subsection 9(5) of the Wildlife and Countryside Act 1981. Destruction of known habitats whilst reptiles are present may therefore lead to an offence.

British bats (*Vespertilionidae* and *Rhinolophidae*) are listed on *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and receive full protection under *Section 9*. These species are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, etc.) Regulations 1994* which gives them full protection under *Regulation 39*. Protection was extended by the *Countryside and Rights of Way Act 2000* (the CRow Act). Under the above legislation it is an offence to:

- kill, injure or take an individual;
- possess any part of an individual either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by these species for shelter, rest, protection or breeding;
- intentionally or recklessly disturb these species whilst using any place of shelter or protection; or
- sell or attempt to sell any individual.



Bats

All species of British bat are included as priority species in the *UK Biodiversity Action Plan* and as species of principal importance for the conservation of biological diversity in England under *Section 74 of the Countryside and Rights of Way (CROW) Act 2000*.

All species of bird are protected under *Section 1 of the Wildlife and Countryside Act 1981* (as amended). Protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. Under the above legislation it is an offence to intentionally:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

Birds

Certain species are listed on *Schedule 1 of the Wildlife and Countryside Act 1981* (as amended) and receive protection under *Sections 1(4) and 1(5)*. The protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. There are special penalties where the offences listed above are committed for any *Schedule 1* species and it is also an offence to intentionally or recklessly:

- disturb any such bird when it is building its nest or while it is in or near a nest containing dependant young; or
- disturb the dependant young of any such birds



2 PRE-CONSTRUCTION MITIGATION MEASURES

2.1 On-site Conservation Areas

The layout of the proposed development areas has been designed to be sympathetic to the greatest features of interest upon the site at present. As such, the existing pond and grassy buffers around it will be retained and enhanced, the mature oak trees bordering the wet ditch at the south western corner of the site will be retained and the creation of the new flood abatement wetland offers great opportunity to create a new wildlife friendly habitat. Specific enhancements to the pond, grassland and wetland are outlined in section 3.

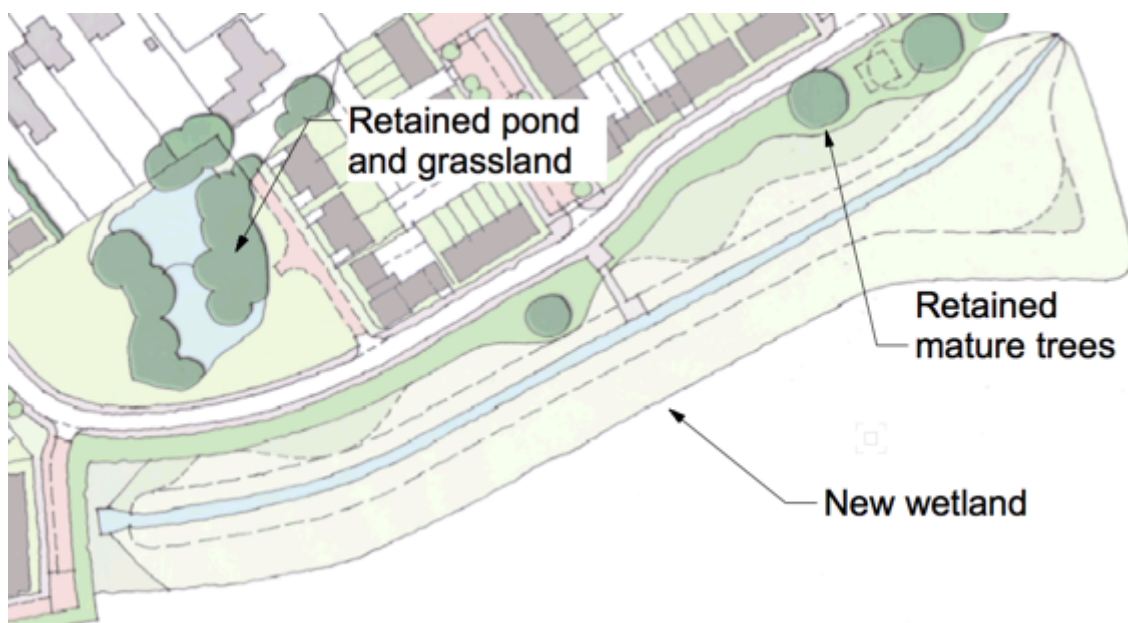


Figure 3 – Habitats within the site boundary that will be a focus for conservation effort.

2.2 Reptile fencing

The construction zone would need to be fenced in order to ensure that there is an impassable barrier between the development and the wider farmed landscape for reptiles. Some natural barriers to movement will be used to reduce the total area that would need to be fenced, including Horndean Road and Southleigh Road to the north and east as well as the arable fields surrounding the suitable habitat for reptiles. A semi-permanent polypropelene material that is tough and stabilised against ultraviolet light should be installed to a depth of not less than 20cm below ground and supported by stakes every 2 metres fixed with clout nails and washers. The fencing should be backfilled with earth and tightly compacted to make sure that it acts as an impassable barrier. The advantage of the semi-permanent fence is that it is less susceptible to damage by dogs, deer, foxes and other animals as well as any accidental damage by construction staff and is suitable for developments where fencing may need to remain in-situ over a long period of time.



Figure 4 – an example of the semi-permanent fencing material that is recommended.

The reptile fencing will be strategically placed to utilise the physical barriers within the site such as roads and arable fields and would need to remain in-situ until all construction work deemed a risk to reptiles has been completed – i.e. earthworks and associated landscaping. Figure 5 below shows the proposed route of the reptile fence on aerial imagery (to make it easier to see). This fence line has used the arable fields which are unsuitable habitat for reptiles and the two roads to encompass both the residential and flood abatement wetland construction, whilst also protecting the two proposed conservation areas around the south and middle of the site described in section 2.1.

Construction method:

1. At least 24 hours prior to the construction of the reptile fence, the fence route would be strimmed (using brush-cutters where necessary) of vegetation to a height of not more than 5cm and a two metre width, with all cuttings raked off and removed. This will ensure that reptiles are discouraged from the fencing construction zone. The strimming process will be completed in two passes, with the grass cut to a height of 10-15cm on the first pass, to reduce the risk of harming reptiles during the strimming process. The strimming process will be overseen by a suitably qualified ecologist who will also conduct a thorough hand search prior to strimming to check for any evidence of ground-nesting birds. If nesting birds are found then strimming will have to wait until the nesting birds and chicks have fledged and moved on.
2. The managed construction zone will not be allowed to grow taller than 5cm prior to the construction of the fence and materials will not be



stored along the fencing route, which could otherwise attract reptiles to them as refugia.

3. The entire length of the fence will first be established by excavating a 20cm wide and 20cm deep trench, overseen under watching brief by a suitably qualified ecologist. Excavated earth will be piled on the outside edge of the trench so that it is easily backfilled once the fence has been installed.
4. Excavation work for the fencing trench will be carried out by an excavator not larger than 0.8 tons in weight to minimize ground disturbance.
5. Fence stakes will be positioned every 2 metres and will be sunk into the ground to a depth of at least 30cm to ensure that they are secure.
6. The fencing material (which is supplied in 100kg rolls) will be rolled out along the outside edge of the trench and will be lifted into place when each full roll has been unraveled or cut into manageable sections.
7. The fencing sheet will be attached to the stakes using 2 clout nails and plastic washers at the top and 15cm from the bottom of each stake.
8. Once fixed the excavated earth will be backfilled along the trench and trodden in to ensure that it is lightly compacted to prevent animals from digging into it.
9. After establishment, reptile fence checks would be undertaken every week to look for any signs of damage. Once construction has commenced, the fence checks and maintenance will become the responsibility of the works contractor.

In order to prevent reptiles from migrating around the entrances to the site, the fence will have 'cut backs' on each of its ends (Fig. 6). This is where the fence loops back on itself, so that any animals travelling along the edge of the fence are guided away from the site entrance. In addition to this the grassy cover around the edge of the fencing will be monitored regularly to ensure that the grass is kept short and unsuitable for reptiles to deter them away naturally where necessary. The roads bordering the site and the arable fields will be used as effective 'impassable barriers' to reptiles, by tying off the fencing at the edges of these hard surfaces and creating the cut backs to deter any reptiles from trying to travel around the edge of the fence, as shown below in figure 6.



Figure 5. The recommended route for reptile barrier fencing, using Horndean and Southleigh Road as natural barriers to movement. The arable fields, which are unsuitable for foraging reptiles would further be used as natural barriers where reptiles might otherwise migrate along grass buffer strips.



Figure 6. 'Cut backs' used to guide animals away from the end of fencing sections.



Habitat Manipulation

Habitat manipulation techniques will be used to help reduce the impact of the reptile fencing installation and also to help focus the reptile trapping effort following the first 30 trapping visits. By slowly strimming tall grass on a day when the temperature is above 9 degrees Celsius and reptiles are mobile, grassy areas can be very slowly strimmed in two passes. The idea is to strim the grass the first time to a height of approximately 10-15cm, which is low-risk to most reptiles and then rake off the cuttings. A second pass is then made aimed to take the grass height down to below 5cm having already disturbed this ground and encouraged reptiles to move away. The now very short grass is much less likely to support reptiles as it offers very little cover from predators and all cuttings are again removed.

Prior to the installation of the reptile fencing this method can be employed before March, when daily temperatures are regularly below 6 degrees and reptiles are usually inactive underground or within hibernacula, safely away from the grassy area being strimmed. A watching brief by a suitably qualified ecologist will be undertaken to ensure that the digging activity required for the fencing does not cause any harm to reptiles and ground disturbance is minimised.



2.3 Reptile Translocation Strategy

In line with current guidelines outlined by the Amphibian and Reptile Group UK (ARGUK), a target total of 60 translocation visits will be made between mid March and October, with 'tins' (which can be bitumen and or corrugated metal sheets) placed at a density of not less than 100 per hectare of suitable habitat in line with ARGUK guidelines. Translocation visits will be undertaken as long as the air temperature is between 9 degrees and 18 degrees in the morning or mid afternoon in the absence of wet or very windy weather. All captured reptiles will be placed into a large smooth-sided bucket with some green hay at the bottom and then released onto the approved receptor sites. All translocation details would be recorded into a table such as the example below and submitted to the council upon request as evidence of the work undertaken.

Date	Start Time/finish of Survey	Air Temperature & refugia temperature °C	Weather Notes	Species Total	Notes
31/05/2013	10:15/11:15	15/25	100% high and light cloud cover, 5-10 mph wind	2M 3F 1 Juv Slow Worm 1M Common Lizard	

Table 1 – The table format that should be used to document the translocation process

Although the target no of trapping checks is 60 visits, this should be used as a guide, with the total no of visits cut shorter if there is an early drop in captured numbers and at least 10 visits in suitable weather conditions are made without identifying any reptile presence within the construction zone. Although the construction zone will be declared free of reptiles following 10 clear visits, an ecologist must still be present during the initial construction phases to undertake a 'watching brief' of all initial ground works. This watching brief would be carried out to ensure that stripping of surface vegetation is undertaken carefully and under observation with construction halted if any wildlife is identified within the construction zone. Site staff must be briefed prior to the commencement of construction on the importance of protecting the reptile fencing and contacting an ecologist in the event that any reptiles or other wildlife is identified within the construction zone.

Reptile receptor site

An area of grassland identified on another field owned by Chidden Farms, bordering Bartons Road has been identified as a suitable receptor site for reptiles. This field corner was reverted from arable land approximately 6 years ago and this suggests that the reptile population present is likely to be expanding (given its recent colonisation since reversion from arable habitat).



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Previous surveys by the Ecology Co-op in 2014 has already identified a very small population of both common lizards and slow worms upon this field corner and connecting habitat, which means that no receptor site surveys will be necessary as the translocation of reptiles will take place within two years from the date of the original survey (in summer 2014). An updated survey should be undertaken if development takes place after this time, as this establishing population may be subject to change quite quickly and a base line measurement of the population is necessary in order to establish that any future translocation and new habitat management has been successful.



Figure 6 – the proposed receptor site (outlined in blue), which will act to accept all reptiles captured from Horndean Road. The green circles represent hibernacula to be built as enhancements for the site.



Figure 7. The proposed receptor site shown in proximity to the donor site where all reptile will be captured.



Figure 8. The proposed receptor site.

The receptor site near Bartons Road was surveyed in 2014 to establish the population of both slow worm and common lizard present. The survey results are shown below:

Date	Start Time of Survey	Air Temp / Refugia Temp °C	Weather Notes, cc = cloud cover	Species Total
01.09.2014	09.15	17	80% cc, 0-5 mph, hazy	2 Male common lizards
04.09.2014	11.25	18	60% cc, 0-5 mph, hazy	0
05.09.2014	11.25	17	90% cc, 0-5 mph, humid & hazy	3 Female slow worms
08.09.2014	11.15	18	0% cc, 0-5 mph	0
09.09.2014	09.15	16	0% cc, 0-5 mph	0
30.09.2014	10.30	16	30% cc, 0-5mph, hazey	1 Male slow worm, 4 Female slow worms, 3 Juvenile slow worms
01.10.2014	10.45	17	5% cc, 0-5mph	0

Table 2 – Results from reptile surveys on field near Bartons Road.



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Peak numbers of five adult and three juvenile slow worms and 2 common lizards were identified indicating a low population size for both species. This could be a sign of a growing population following the reversion of this land from arable use six years ago.

The Ecology Co-operation has agreed to build three new hibernacula for reptiles at the receptor site (see figure 6) to help improve the value of this land for reptiles. The design of these hibernacula will follow ARGUK guidance and an illustration of the design is provided in Figure 9 below. Each hibernacula would have an area of at least three square metres.

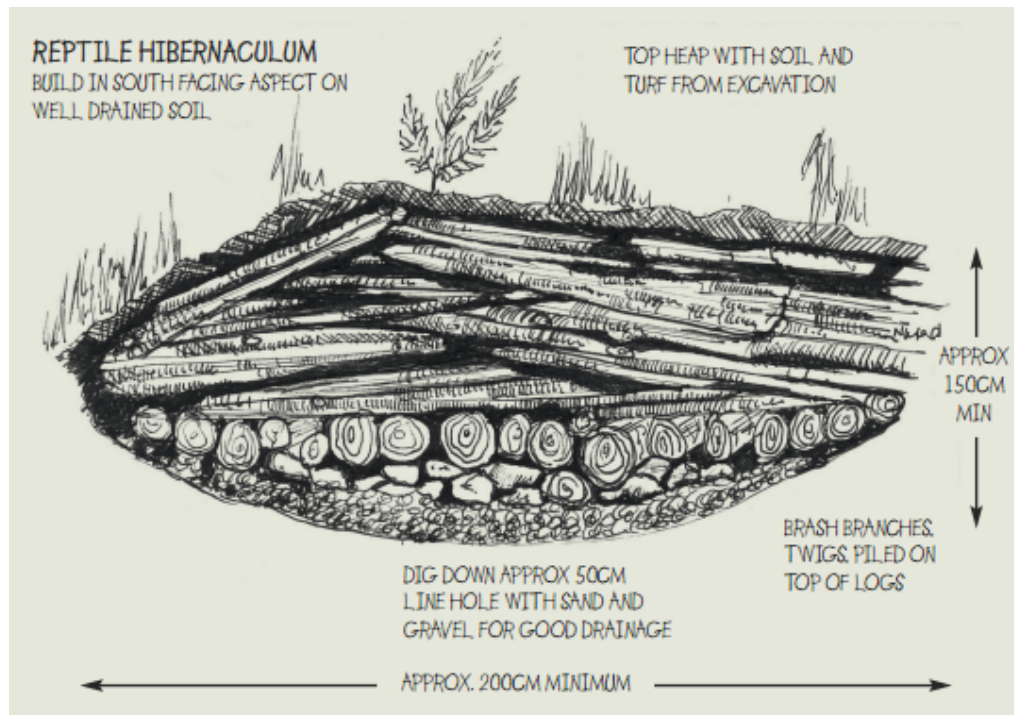


Figure 9. Illustrates how to build reptile hibernacula. Image taken from the 'Reptile Habitat Management Guidelines' by Herefordshire Amphibian and Reptile Team and the Herefordshire Nature Trust.



3 CONSTRUCTION PHASE MITIGATION MEASURES

3.1 Pond Enhancement Measures

The pond lying between the two development areas is proposed for enhancements in order to reduce the effect of pollution from drainage water entering the pond from Horndean Road, as well as increasing light levels, removing detritus and providing a planting plan.

Timing

The work to improve the ponds should commence around the end of July/early August, which is the time when the pond is expected to hold little water and there would be the least disturbance to the fauna associated with it. The major work required to excavate detritus from the pond should be completed by September, although completing the outline planting proposals should be flexible through to the following spring.

Pond enhancement scheme

To ensure that the pond remains healthy, a planting scheme is proposed to ensure that the pond is well oxygenated and that a natural filtering system ensures that the pond is not adversely affected by suspended sediments and possible pollutants that might be entering the pond from drainage sources:

1. Following completion of the pond dredging to remove detritus and increasing overall holding capacity, the base of the pond will be assessed for any permeability issues that might explain why the pond dries out in the summer. A layer of bentonite clay could be added to the base of the pond to create an impermeable barrier.
2. A channel will be created where the Horndean Road drainage water enters the pond. The channel will be designed to be at least 2 metres wide and three metres long and should have a depth of not more than 30cm water when the pond is full. This channel will be planted with common reed (*Phragmites australis*) at a density not less than five rhizomes per square metre. Further detail can be provided by a specialist sustainable drainage engineer.
3. Plug planting of some pond edge plants would be undertaken to speed up the restoration of the pond as well as to incorporate new species of wildlife interest. Planting species such as branched bur-reed (*Sparganium erectum*), purple loosestrife (*Lythrum salicaria*), water forget-me-not (*Myosotis palustris*), meadowsweet (*Filipendula ulmaria*) as well as aquatic plants such as hornwort (*Ceratophyllum demersum*) and broadleaved pondweed (*Potamogeton natans*).
4. As the pond is presently heavily shaded on all sides, some thinning of the surrounding tree canopy should be undertaken, so that at least 50% of the pond is not shaded between 10am and 3pm in the summer.



The pond edge planting area will cover a total of 88 square metres, creating a valuable new habitat.

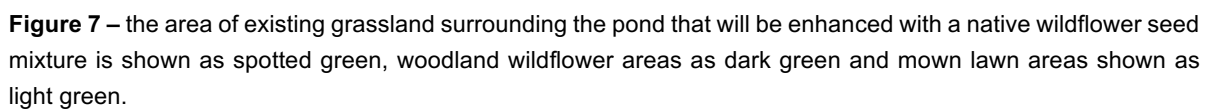
3.2 *Grassland Enhancement*

A wide area of existing grassland borders the southern, western and northern margins of the pond and will be retained through the development. The floristic interest associated with this area of grassland is moderate and using a light harrow and seeding method could easily be enhanced to support as much as twice the number of wildflower and grass species that are currently present. Some of this grassland will be mown regularly so it has amenity value for residents, whilst other areas will be enhanced through seeding and managed with a cut-and-gather management regime in the autumn and early spring.

The harrow and seeding method to establish this grassland would be employed after the reptile trapping and translocation phase has been completed to minimize the risk of harming any common lizards.

The sowing process is best undertaken between late August and mid October during mild and wet weather best suited to seedling establishment. The process of harrowing the grassland should aim to create approximately 50% bare ground, so that the existing grassland diversity is still retained. Immediately following harrowing, a suitable seed mixture should be sown across the ground at a density of four grams per square metre. A suitable seed mixture should include at least 13 wildflower species, four grass species and all seeds must be of native British origin. If possible, seed from a local donor site would be ideal, but Emorsgate Seeds mixture EM4 would be suitable.

Around the trees bordering the pond an area of woodland wildflowers will be sown so that species best adapted to low light levels (Emorsgate seeds EW1) will be incorporated following the thinning and removal of some of the trees bordering the pond. In total, this new area of woodland wildflower planting will cover 2219 square metres (see Figure 7).



The flood abatement wetland at the western boundary of the site presents a significant opportunity to create valuable habitat for wildlife, particularly some wading birds, foraging bats, a variety of invertebrates and plants.

1. Native hedgerow

18



2. Dry grassland mixture

Around the top of the banks bordering the wetland, where the ground will remain relatively dry throughout the year will be a wildflower meadow mixture. A recommended mixture for this would be a clay soils mix, which includes grasses and wildflowers that are best suited to the ground conditions, such as Emorsgate seeds mixture EM4, containing six different grasses and 16 wildflower species. This combination of grasses and wildflowers will offer good cover for small mammals and reptiles, whilst the wildflowers will provide a good nectar source for pollinating insects.

3. Wetland mixture

Within the main body of the wetland basin the planting will need to be tailored towards those species that can cope with waterlogged soils as the water levels rise within the wetland during periods of prolonged rainfall. In order to ensure healthy and quick establishment of vegetation it is suggested that this area should be sown late in August, well before the risk of any heavy rainfall that could see water levels rise and any scattered seed or young seedlings washed away. It is also recommended to use a combination of seeding and plug planting, with an Emorsgate seeds wetland mixture (EM8) and plug planting to include the following plugs – 80 hard rush, 20 wild angelica, 100 great burnet (*Sanguisorba officinalis*), 50 marsh foxtail (*Alopecurus geniculatus*) 50 purple looserife (*Lythrum salicaria*) and 50 marsh mallow (*Althaea officinalis*). This combination has been selected for its combined value for binding soil (great burnet), value for pollinating insects and for its regional provenance within Hampshire, although alternatives could be chosen of similar value, particularly if a local donor site is available.

4. The central drainage channel

The central drainage channel should remain wet for the majority of the year, with the flow of water typically only drying up in the hottest and driest times of the year.

In order to retain the seed bank within the existing drainage channel, it is recommended that sections of the vegetation along it are stripped and stored so that they can be transferred to the new channel once completed. This should be done by taking at least 1.5 metre width strips of the vegetation in and alongside the existing draining channel to a length of not less than 2 metres and should be done every 20 metres along the existing channel, so that a total of approximately 15 'grabs' are made. In order to ensure that the transferred material is not washed away once it has been transferred to the new central drainage channel, it could be either weighted down, or laid over the top of a short drainage pipe positioned in the middle of the channel so that water flowed under the transferred material. The specific details for this should be included within a construction method statement.

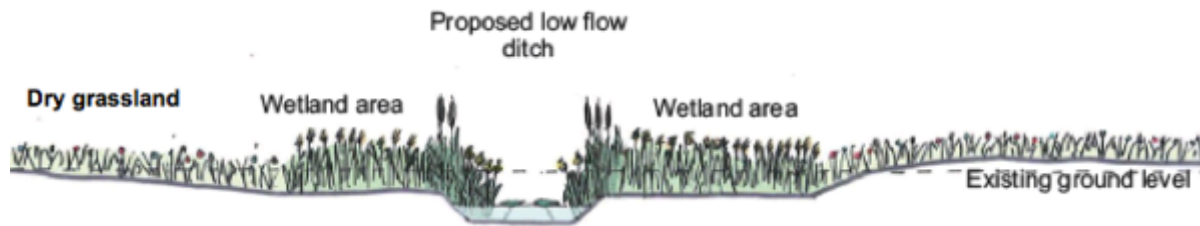


Figure 8 – a diagram of the proposed wetland profile, with dry grassland seeding outlined in point 2, wetland seeding and planting in point 3 and vegetation transfers for the low flow ditch in point 4.

The implementation of the above prescriptions will result in the creation of 7094 square metres of new wet grassland habitat and 8765 square metres of dry grassland habitat (between the wetland site and grassland area surrounding the pond).

3.4 *Habitat Connectivity Measures*

Herpetofauna Tunnel

In order to ensure that the road separating the pond and seeded species-rich grassland with the wetland and wider farmland to the west does not become an impassable barrier for reptiles and amphibians, it is recommended that a guided passage is created under the road. The design would include a 60cm (minimum) wide tunnel under the road, with branches and/or large stones or rubble laid on top to create a refuge for reptiles and amphibians. This would allow safe migration for amphibians breeding in the pond that spend their terrestrial life in the wider landscape to the west and would reduce the isolation effect that would otherwise prevent natural migration for reptiles between favorable habitats.

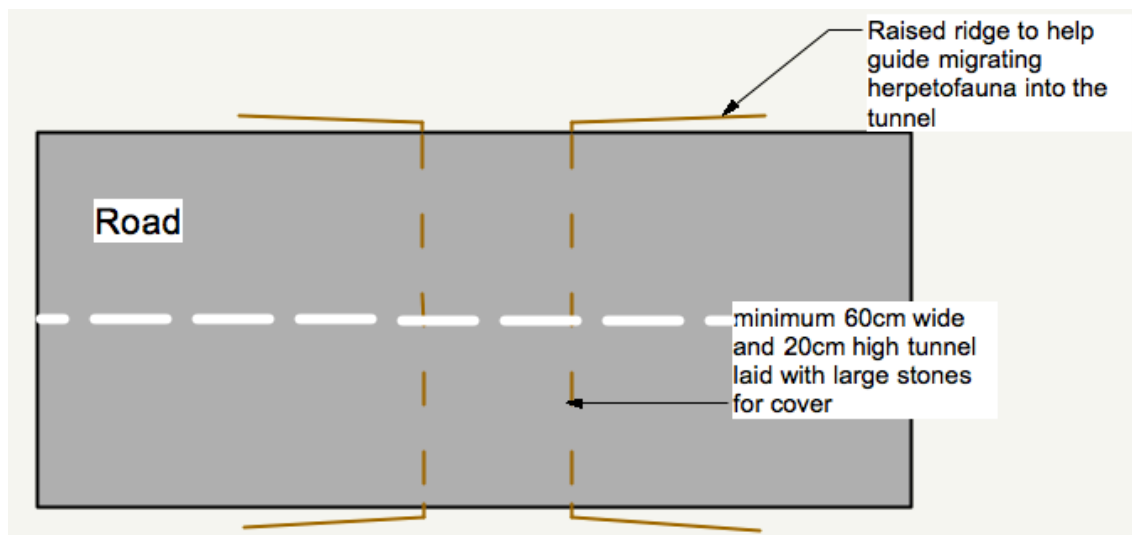


Figure 9 – a recommended tunnel under the road running between the pond and the wetland.



3.5 Enhancements for bats

Improved bat flight paths

Within the site landscaping an improved flight path for foraging and commuting bats will be created along the western boundary. At present the wet ditch along the western boundary has four mature oak trees along the edge of it, which during a bat survey assessment in September 2013 showed no signs of activity by foraging and commuting bats. By creating a row of native trees, hedging and shrubs along the western boundary an improved flight line could be created for the benefit of these nocturnal animals. Because bats tend to navigate using such natural features, this new flight line could connect any bat roost within homes and mature trees to the south of the site to favorable foraging ground to the north of Southleigh Road. Figure 10 below shows how any roosting bats in properties along Horndean Road or to the south of the site could commute or forage across retained habitat.



Figure 10 – Flight paths that could be created or improved through appropriate landscape planting as shown from the existing site and proposed layout.

The specific planting and landscaping plan for this enhancement is too detailed and large to be included within this document and therefore the landscape plan produced by terra firma should be consulted for this detail.

New bat roosting habitat

In order to provide a net positive benefit for bats within the development, a number of bat boxes should be erected in suitable locations across the site. These would be best situated on the mature oak trees bordering the pond and along the western boundary as well as

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some of the properties. As such, recommended enhancements are outlined below:

1. A total of 5 Schwegler woodcrete bat boxes would be hung on suitable mature trees within the site boundaries. The boxes would be hung by a suitably qualified ecologist to ensure that this positioning is most suitable, but generally locations above 3 metres in the most southeasterly facing aspect of a tree is best, using a mixture of 2F, 2FN, 1FF and 1FS bat boxes.
2. In line with Biodiversity Positive: Eco-towns biodiversity worksheet (Town and Country Planning Association, 2009), a total of 3 new dwellings will incorporate access suitable for serotine bats (*Eptesicus serotinus*). Access will consist of a series of 25mm gap at the top of gable end brick walls or under fascia boarding leading to the area at the top of the cavity wall. These roosting points will be adjacent to areas of open green space, allowing serotines to emerge into an area of suitable foraging habitat.
3. A total of 20 new residential dwellings in close proximity to boundary hedgerows and standing water (such as around the site centre) will incorporate features suitable for common and soprano pipistrelles. New roosting features will include 5 Schwegler 1FR bat tubes, 5 Schwegler 2FR bat tubes and 10 bat access tiles, which can be designed to match the roof tiles proposed for use within the construction design. Roofs where access tiles are installed will not use a Tyvek type underlay, which has a tendency to fray and trap bats.



Schwegler 1 FD



Schwegler 1FS



Schwegler 1FF



Bat Tube 1FR/2FR



Bat access tile example



The specific location for roosting locations should be submitted with any future detailed planning submission.

External lighting

Bright external lighting can have a detrimental impact upon foraging and commuting bats, but importantly can also cause bats to be fooled into thinking that the light is from the sun, causing them to remain in their roosts for longer. Guidelines issued by the Bat Conservation Trust should be incorporated into the lighting scheme at the Horndean Road development and the following measures must be implemented into the site design:

1. No 'upward pointing' or bare bulb lights will be installed anywhere on the development.
2. All external lights upon lamp-posts will not be more than 3.5 metres in height and will have shields installed to focus light towards footpaths and roads only. No light will be allowed to emit light past horizontal (90 degrees from the ground).
3. A no-light zone must be established to protect the mature oak trees on the southwestern boundary and the pond around the site centre from any artificial light. No lamp posts or other artificial lights should be positioned within this area.
4. Any pedestrian ground lighting will not exceed 3 lux.
5. No external lights will be installed on new buildings above a height of 2 metres and all external lights will have shields to prevent light splash beyond horizontal.



An example of suitable downward shielded street lighting



3.6 Enhancements for Nesting Birds

In light of concerns made by the public about declining house martins (*Delichon urbicum*) within the Borough, enhancements will be made within the site design in order to support this species. Already, the new wetland feature will help to create improved foraging habitat as there will be much higher invertebrate prey available, but in order to ensure that suitable nesting habitat is also available no less than 8 artificial nest boxes specific to house martins will also be incorporated into the development. Schwegler 9A nest boxes would be ideal for this purpose and can either be installed around the soffits of the new properties or built onto a stand-alone bird house.

The nest boxes must be installed at heights not less than 3 metres and in clusters of not less than 2 boxes within 1 ft of each other (which encourages social nesting). The boxes should be installed towards the outside edge of the development and should not be situated on the exposed side (facing the prevailing wind).



The Schwegler 9A nest box

Additional bird boxes for some common nesting birds will also be provided, including three 1SP Schwegler 'sparrow terrace' boxes for positioning near to the soffit boards of new properties in any location and five Schwegler 1B nest boxes for installing at least 3 metres high on trees bordering the pond near the middle of the site.



The sparrow terrace and general purpose nest boxes



4 POST CONSTRUCTION MANAGEMENT

To ensure that the new wetland and the retained pond and grassland around the site centre at the Horndean Road development are managed properly in the future, it is important that the following management operations are committed to in order to ensure that the value of these features is not adversely affected.

4.1 Management Plan Operations

The following management operations must be included within any long-term site management plan.

1. The habitat links under the road between the pond and the wetland should be checked each year to ensure that it is working properly.
2. Bat boxes on trees would be inspected to check they had not become detached or damaged each year.
3. The grassland across the wetland and around the pond should be cut and gathered each year between mid August and the end of September. This is important to ensure that the grass does not become rank and coarse, which would lead to the development of poor grassland diversity. Grass cuttings should be collected and composted or used to build hibernacula that will support hibernating reptiles and amphibians on a patch of ground that will remain dry throughout the year.
4. If bulrush (*Typha spp*) begins to establish within the wetland, then it should be removed where possible to ensure that it does not start to take over the drainage channel.
5. All planted hedgerows must only be cut outside the bird nesting season (1st March to 31st August) and where possible hedges shouldn't be cut until February, so that valuable winter food associated with fruiting hedge trees is retained for over-wintering birds.

4.2 Post-construction Reptile Monitoring

In line with best practice it is important that the future reptile receptor site on Bartons Road is monitored following the translocation process. It is advised that two monitoring surveys at one year and three years following the translocation process should be undertaken in order to establish if the receptor site has been effective in supporting the translocated reptile population. If there is evidence of a reduction in the reptile population, then it would mean further habitat enhancements or other measures may be necessary.