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ECOLOGICAL SERVICES

ECOLOGICAL CONSTRUCTION AND MANAGEMENT PLAN
LAND AT CRANLEIGH ROAD
FAREHAM

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ON BEHALF PERSIMMON HOMES

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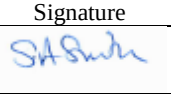
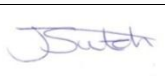
Report prepared by:	Sophie Smith	10.08.16	
Report checked and authorised by:	Jenny Sutch	10.08.16	
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SUMMARY

1. Lindsay Carrington Ecological Services were commissioned by Persimmon Homes to produce an Ecological Construction and Management Plan to a support planning application (planning application Ref: P/15/0260/OA) for land at Cranleigh Road, Fareham.

2. The proposals are for residential development for up to 120 dwellings, together with a new vehicle access from Cranleigh Road, public open space, surface water drainage and landscaping.

3. There are four protected species constraints to be addressed within or prior to the construction period. A main badger sett is present in the centre of the site, to be relocated under licence. Low level bat foraging activity will be maintained through a sensitive lighting scheme. A low population of slow worm and therefore a reptile mitigation strategy is presented, and timing constraints on vegetation clearance due to nesting birds.

4. When complete the development will include enhancements on the residential units including bat and bird box installation, flowering lawn creation and badger corridors, whilst the wildflower meadow public open space to the south will have retained and enhanced hedgerows, artificial badger sett and foraging planting within a 0.28ha dedicated wildlife area, and an attenuation pond.

5. A series of creation and management prescriptions to enhance the value of site have been made, including the construction of a drainage pond, grassland creation and the infill planting of hedgerows.

1.0 INTRODUCTION

Lindsay Carrington Ecological Services were commissioned by Persimmon Homes to produce an Ecological Construction and Management Plan to a support planning application (planning application Ref: P/15/0260/OA) for land at Cranleigh Road, Fareham.

The proposals are for residential development for up to 120 dwellings, together with a new vehicle access from Cranleigh Road, public open space, surface water drainage and landscaping.

The planning application had previously been refused for several reasons, including the lack of an ecological management plan. The Planning Decision Notice from Fareham Borough Council states:

"*had it not been for the overriding reasons for refusal the Council would have sought an Ecological Construction Management Plan and Ecological Management Plan to ensure that all protected species are taken into account during and after construction. These would include alternative provision for habitats and future management and maintenance arrangements*".

This report will detail how the construction phase will be conducted to prevent impacts to ecological features and how the retained features and ecological enhancements on the site will be maintained to provide habitats for the future of the development.

The management plan covers a period of 5 years; however, following the completion of prescriptions established in this plan the long-term vision is to continue low intensity practices with nature conservation as the driving force in management.

Baseline ecological information for the site is provided in Section 2 of this report, Section 3 sets objectives and targets and Section 4 details the construction mitigation whilst Section 5 covers proposed habitat creation and management prescriptions.

2.0 BASELINE INFORMATION

The site lies approximately 350 metres to the north of Portsmouth Harbour SPA, Ramsar and SSSI which is designated for its tidal lagoons, mudflats and salt marshes, and internationally important over-wintering dark-bellied brent goose (*Branta bernicla*). A separate Environmental Statement and Habitat Regulations Assessment report was undertaken. To summarise significant adverse impacts on these sites are not anticipated. The client will provide information leaflets to the new homeowners and the standard financial contribution to the Fareham Solent disturbance mitigation.

The predominant habitat within the site was species-poor semi-improved grassland which was of low botanical value. A species-rich native hedgerow was present running through the centre of the site from south to north, and this qualifies as a Biodiversity Action Plan hedgerow due to it supporting at least five native species of shrub.

The combination of the hedgerows and semi-improved grassland offer potential nesting habitat for a wide range of bird species.

The bat activity surveys recorded fairly constant low levels of activity, mainly by single or small numbers of common and soprano pipistrelle (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*) bats. A sensitive lighting scheme will be implemented to reduce impacts on foraging bats.

A main badger (*Meles meles*) sett was present in the centre of the site, along with well worn paths and foraging signs and a low population of slow worm (*Anguis fragilis*) was recorded on the site.

2.1 Existing features to be retained

The proposed development will include the retention the two hedgerows, however three small sections of the central hedgerow will be removed. The hedgerow contains frequent hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*) and blackthorn *(Prunus spinosa*). An area of grassland of 0.28ha, northwest of site will be left intact and used as a receptor site for reptiles and the creation of the artificial badger sett. This area will be protected by a wooden fence, to stop public walking through.

3.0 AIMS AND OBJECTIVES

3.1 Rationale

The rationale behind this plan is to formulate a management regime that is in the interest of protecting and enhancing the ecology of the site. The land will be enhanced for wildlife and managed in a way that will be sustainable in terms of biodiversity.

Management will be based on an '*adaptive management'* principle whereby the effectiveness of management is monitored, assessed and adapted if necessary. This management plan prescribes management for a period of five years committed via a condition in the planning consent.

3.2 Objectives

The following objectives have been set:

1) To mitigate against the harming of any protected species which may be present on the site, particularly during the construction period.

2) To establish and maintain healthy quality lawn which can be used for amenity but support invertebrates and birds.

3) To introduce and manage species-rich grassland which will be managed for the benefit of local wildlife including reptiles, badgers, invertebrates and birds.

4) To create a drainage pond within the public open space area and a small pond within the wildlife area to enhance the area for wildlife including drinking water for badgers and foraging for bats and reptiles.

5) To enhance and restore hedgerows within the site for the benefit of birds, small mammals (including bats) and invertebrates, and to act as wildlife corridors.

6) To erect bat boxes on retained mature trees and buildings on the site to increase the roosting opportunities for bats on the site.

7) To erect bird boxes on retained mature trees and buildings on the site to increase the nesting opportunities for birds on the site.

8) To install gaps in garden fencing to encourage movement of foraging hedgehogs

9) To introduce log piles and hibernacula around the boundary of the site as habitat for invertebrates, amphibians and reptiles.

4.0 MITIGATION

4.1 Nesting birds

The development will result in a small loss of breeding bird habitat with a small section of the central hedgerow being removed to provide access to the open space section of the development. The following will be implemented:

- Tree or scrub removal works will take place strictly outside of the bird nesting season which is considered to run between March and September.
- Where this is not possible a suitable qualified ecologist should check potential nesting habitat immediately prior to clearance. Where nesting birds are encountered clearance must be postponed until the chicks have fledged.

Enhancement

- Five nesting 1B bird boxes will be installed on retained trees around both the development and northern POS site, and five built-in nest boxes for bird species such as swift (*Apus apus*), house martin (*Delichon urbica*) and house sparrow (*Passer domesticus*) will be installed on the walls of the buildings see appendix III for approximate locations. In addition, wildflower grassland planting, hedgerows, and scrub provide nesting opportunities, the ponds will provide foraging and drinking resources, and log piles create habitat for invertebrates, and therefore providing food sources for birds.

4.2 Badgers

A main badger sett was identified in the centre of the semi-improved grassland. The Protection of Badgers Act 1992 makes it an offence to wilfully take, injure or kill a badger; cruelly mistreat a badger or interfere with a badger sett.

It is not considered possible to design the proposals around the badger sett *in situ*, therefore a badger sett closure (under a Natural England licence) will therefore be required. This will include the following activities:

- A replacement artificial badger sett (Appendix II and V) will be provided in an area to be exclusively dedicated for wildlife to the north of the adjacent public open space, in a location to allow good connectivity to adjacent foraging habitat. The area at the northern end of the open space will be separated using wooden fencing with wooden posts and rails, and this will be planted with a dense hedgerow comprising species listed in Table 5 to dissuade public access to this area.
- The replacement sett will comprise six wooden chambers, three of which will be 1m x1m square and three 2m x 2m square. The chambers will be buried into the ground with at least 1m of soil above them. These will be connected by 300 mm plastic piping. Four entrances will be created and the tunnel length between the

entrances and the chambers will be at least 5m in length. Care needs to be taken to ensure that tunnels slope away from the sett chambers. Three blind tunnels will also be incorporated to allow natural digging of new chambers. The artificial sett will be created prior to the sett closure, aiming to have this in place three to six months prior to the closure.

- The existing sett will be closed with the use of one-way gates. A licence is required from Natural England to allow this, and the licence will only allow such interference with a sett between July and November when badgers are less sensitive in terms of their breeding cycle.
- Once the gates have been in place for twenty one days, with no evidence that badgers have regained access, the sett will be excavated.

A badger buffer strip to allow badger movement around the development will be created approximately 2m wide. This will include suitable scrub planting with badger exclusion fencing on either side, see appendix II for location and appendix V for design.

The most effective specification for badger fencing is for chain link or welded mesh fencing attached to wooden post and rail fences using heavy duty staples. As a minimum standard, this should be at least 1m high above ground with a lower section of 600mm buried below ground; 300mm down into the soil and a further 300mm turned away from the fence in the direction from which badgers will approach.

Within the 2m corridor the current grassland will be oversown with EH1 grass mix and 60 % of the corridor will be planted with scrub (similar species composition to the hedge planting as listed in table 5) to provide cover and foraging for badgers. The EH1 wildflower hedgerow mix is a diverse grassland mix providing habitat for reptile and invertebrates, which will thrive at the base of the hedgerows and native shrub planting.

Table 1. New grassland planting

Common name	Latin name	Planting composition
Yarrow	*Achillea millefolium*	0.5
Agrimony	*Agrimonia eupatoria*	1.2
Common bent	*Agrostis capillaris*	10
Garlic mustard	*Alliaria petiolate*	2.4
Sweet vernal-grass	*Anthroxanthum odoratum*	2
False brome	*Brachypodium sylvaticum*	7
Common knapweed	*Centaurea nigra*	2
Wild basil	*Clinopodium vulgare*	0.4
Crested dog's-tail	*Cynosurus cristatus*	28

Common name	Latin name	Planting composition
Foxglove	*Digitalis purpurea*	0.5
Red fescue	*Festuca rubra*	20
Hedge bedstraw	*Galium album*	2
Wood avens	*Geum urbanum*	2
Perforate St John's wort	*Hypericum perforatum*	1
Oxeye daisy	*Leucantheum vulgare*	1
Ribwort plantain	*Plantago lanceolata*	1
Wood meadow-grass	*Poa nemoralis*	12
Cowslip	*Primula veris*	0.3
Selfheal	*Prunella vulgaris*	1
Red campion	*Silene dioica*	1.7
Hedge woundwort	*Stachys sylvatica*	1
Upright hedge-parsley	*Torilis japonica*	2
Tufted vetch	*Vicia cracca*	1

Badger foraging habitat has also been incorporated into the POS landscaping and within the new and in-filled hedge planting, including planting species such as crab apple (*Malus sylvestris*) and elder (*Sambucus nigra*). The ponds to be installed within the wildlife area and POS will provide drinking water for badgers.

During the creation of the artificial badger sett a watching brief will be maintained to prevent harm to reptiles within the working area.

4.3 Reptiles

As slow worms were recorded within the proposed development site, a mitigation strategy has been devised to prevent harming, injuring or killing individuals during construction.

4.3.1 Mitigation strategy

Exclusion of reptiles

An exclusion exercise with the use of specialist drift fencing will be adopted. Specialist drift fencing will be erected around the perimeter of the construction site taking account of factors such as vehicular and plant access and storage of materials (see Appendix II for

location). Drift fencing (see Appendix IV) essentially forms a barrier which prevents the movement of reptiles.

Once the fence has been erected, artificial refuges, such as those used during the targeted survey will be placed within the area from which the reptiles are to be excluded. The mats will then be visited during suitable weather conditions at an appropriate time of year (between March and early October) and any reptiles encountered will be caught. Visits to the exclusion area will be repeated until it can be demonstrated that no further individuals can be caught. Due to the site supporting a low population of slow worm it is recommended that a minimum of 15 visits are made. If reptiles are still being caught following this period, visits must be continued until there are five consecutive visits where no reptiles are caught before works can begin. Once development is complete the fence can be removed.

Receptor site

Any reptiles encountered during the relocation exercise will be relocated to retained enhanced habitat within the public open space provided as Appendix II. An area of 0.28 hectares in the north of this area will be dedicated exclusively for wildlife to help protect against predation and disturbance, and will be separated to the main area of public open space using wooden fencing and hedging as described below. Any individuals encountered will be relocated to this dedicated wildlife area, although the wider area of public open space will be managed to provide suitable habitat. The following enhancement measures will be conducted within the receptor area prior to the relocation of any reptiles.

- Construction of two hibernacula to be placed away from the mown paths and play areas. These are hibernation sites that can be simply created and composed of logs, bricks and / or rubble which is buried into a depression within the ground. Earth is placed on the surface and grass seeded. A diagram illustrating this is provided in Appendix IV.
- Creation of one pile of logs. This provides additional hibernation sites as well as shelter for reptiles.
- Topographical variation will also be incorporated into the receptor grassland, to create a series of undulations prior to seeding of grassland.
- Enhancement of grassland. Grassland within the receptor site will be over sown with a wildflower grassland seed mix and native shrubs will be planted to form a 1:4 ratio of scrub to grassland. This will be managed on a rotational basis to allow areas of long grass to grow which will provide foraging habitat for reptiles. Areas of shorter grass will provide potential basking area.
- Additional scrub planting will be undertaken within the boundaries of the POS to provide sheltered, screened basking areas between the boundary hedges and the pathways and other public access areas for reptiles to move into. Scrub planting will be as per section 5.5 below, in blocks 10-20 metres long positioned a minimum of 2 metres from the hedge and maintained to keep clear grassland between the two.

- The ponds to be installed within the wildlife area and POS will provide habitat for invertebrate and amphibian prey for reptiles such as grass snake.

Ecological Watching Brief

- Once the translocation exercise is complete an ecological watching brief will be maintained during the site clearance. An experienced reptile handler will work alongside a mechanical digger, stripping the sections of hedgerow to be removed for access, tussocky grassland and any burrows, rubble or log piles within the development zone, searching each bucket for any individuals and safely relocating any animals encountered.

4.4 Bats

Operational mitigation

The masterplan includes the retention of the hedgerows, mature trees and entire western field as public open space. Any breaks in the hedgerows caused by access points will be small in size and mitigated by the creation of archways (see section5.4) and guide bats up and over. In addition, a sensitive lighting scheme will be implemented across the whole development site, with particular attention paid to the key bat use areas such as adjacent to hedges and mature trees, to ensure minimal disturbance to bat foraging and commuting on or across the site.

No new lighting will be implemented within the POS or wildlife area, this section will be maintained as dark foraging. Should any other lighting be installed as part of the development the following will be required:

- Low pressure sodium lighting will be used and light levels should be kept as low as possible (between 1 and 3 lux, with 0 lux on the hedgerows where possible).
- Lighting will be directed to where it is needed (away from mature oaks on site) through the design of the luminaries and by using accessories such as cowls or hoods.
- The height of lighting columns will be kept as short as possible (ideally three metres or less).
- Lighting will be directed away from hedgerows to avoid disturbing bats using the hedgerows as foraging corridors.
- Light sources should emit minimal ultra-violet light, peak higher than 550nm and be of a warm/neutral colour <4,200 kelvin.

Enhancement

- Five ibstock bat box 'c' self cleaning tubes to be installed in the walls of the new buildings. These are unobtrusive and provide excellent roosting facilities for crevice dwelling bats, given that all the bat activity recorded on site was common and soprano pipistrelle this would be a suitable enhancement. See appendix III for approximate locations.
- Four bat boxes, two Schwegler 1FF and two Schwegler 2F bat boxes, will installed on mature trees around the development and POS sites, see appendix III for approximate locations.
- The ponds to be installed within the wildlife area and POS will provide habitat for invertebrate prey for foraging bats.

4.4 Hedgehogs

Operational mitigation

- The masterplan includes the retention of the hedgerows, mature trees and entire western field as public open space. These areas provide suitable foraging habitat for hedgehogs, with the long grassland, scrub, retained hedgerows and garden areas. The ponds have been designed with shallow sloping sides to allow animals such as hedgehogs to escape. Small access holes will also be placed into the gravel boards of the fence panels to allow hedgehog access for foraging into gardens. The POS and wildlife area grassland will be maintained as species-rich long grass to provide cover and insect foraging for hedgehogs.

4.5 Hedgerows

Three small sections of the central hedgerow will be removed, these are approximately 2m, 3m and 8 metres in width and will be located within natural breaks in the hedge where possible. Infill planting will be undertaken on existing hedgerows to increase continuity, providing more robust green corridors for bat commuting and foraging, movement of reptiles, amphibians and small mammals. This will also increase the screening between the development and adjacent wintering bird habitats.

Where gaps are to be created for public footpath access gaps, native hedgerow trees will be planted either side of the gap, managed so that canopy meets overhead of gaps allowing pedestrian passage, i.e. by planting the edges of gaps with hedgerow species that can be managed as archways, supported and guarded by mesh during it's establishment. These will maintain this important hedgerow as an intact hedge and prevent barriers to movement for animals such as bats and small mammals.

5.0 HABITAT CREATION AND MANAGEMENT

The green infrastructure on site will be maintained and managed by Persimmon Homes during construction and a management company going forward.

5.1 Attenuation pond

The attenuation pond will provide a flood buffer in storm events, and therefore will be wet during the winter months and likely to dry out during the summer. When wet the pond will provide a water source for badgers and birds, and the planting of a wet grassland/pond edge seed mix (such as Emorsgate EP1) will increase the species diversity and encourage invertebrate species. An additional small pond will be created as an additional water source for badgers within the wildlife area.

Pond creation

During the creation of the ponds a watching brief will be maintained to prevent harm to reptiles within the working area.

The following should be considered during the construction of the ponds:

- Any spoil from the excavation will be removed from site and sensitively disposed of.
- The sides of the pond will be gently sloping to allow animals to easily exit the pond.
- The pond will be lined using puddle clay in order to prevent water draining through the soil.
- The banks of the pond will be sown with Pond Edge Mixture EP1 from Emorsgate, rate 4g/m², as listed in table 2 below.

Table 2. Pond edge planting

Common name	Latin name	%
Sneezewort	*Achillea ptarmica*	1
Common bent	*Agrostis capillaris*	10
Meadow foxtail (w)	*Alopecurus pratensis*	4
Wild angelica	*Angelica sylvestris*	2
Sweet vernal-grass (w)	*Anthoxanthum odoratum*	1
Quaking grass (w)	*Briza media*	1
Marsh marigold	*Caltha palustris*	0.1
Crested dog's-tail	*Cynosurus cristatus*	32
Tufted hair-grass (w)	*Deschampsia cespitosa*	1
Hemp agrimony	*Eupatorium cannabinum*	0.6
Red fescue (w)	*Festuca rubra*	24

Meadowsweet	*Filipendula ulmaria*	2.6
Water avens	*Geum rivale*	2.4
Meadow barley (w)	*Hordeum secalinum*	1
Yellow iris	*Iris pseudacorus*	4
Greater bird's-foot trefoil	*Lotus pedunculatus*	1
Gypsywort	*Lycopus europaeus*	0.8
Purple loosestrife	*Lythrum salicaria*	0.5
Meadow buttercup	*Ranunculus acris*	2.5
Meadow fescue (w)	*Schedonorus pratensis - (Festuca pratensis)*	6
Water figwort	*Scrophularia auriculata*	0.3
Ragged robin	*Silene flos-cuculi - (Lychnis flos-cuculi)*	0.5
Devil's-bit scabious	*Succisa pratensis*	0.2
Tufted vetch	*Vicia cracca*	1.5

Pond management

The pond will be managed using the following:

- The pond will inspected on a regular basis and any excess floating or emergent vegetation will be removed using hand rakes.
- Early removal of stands of *Typha sp.* and reed (*Phragmites australis*) will avoid the aggressive species out-competing.
- The ponds will be inspected regularly for any invasive species and a targeted species removal will be undertaken if necessary.
- Barley straw bales will be added to the ponds should the water become excessively murky, or to control any blanket weed and duck weed.

5.2 Wildflower meadow

The public open space (POS) existing grassland will be over-sown with a wildflower meadow mix such as Emorsgate EM1 to increase flowering plant and in turn, invertebrate diversity.

Over-sowing will be undertaken in the Spring or Autumn. A sowing rate of 4-5 g seed/m² will be used. Table 3 lists species to be sown.

Table 3. Meadow planting EM1

Common name	Latin name	%
Yarrow	*Achillea millefolium*	0.5
Common bent	*Agrostis capillaris*	8
Common knapweed	*Centaurea nigra*	4.5

Crested dog's-tail	*Cynosurus cristatus*	40
Red fescue	*Festuca rubra*	28
Lady's bedstraw	*Galium verum*	3
Oxeye daisy	*Leucanthemum vulgare*	1
Smaller cat's-tail	*Phleum bertolonii*	4
Salad burnet	*Poterium sanguisorba*	1
Selfheal	*Prunella vulgaris*	3
Meadow buttercup	*Ranunculus acris*	5
Common sorrel	*Rumex acetosa*	0.5
Red campion	*Silene dioica*	1.5

Meadow grassland management

1. Perennial weeds such as creeping thistle (*Cirsium arvense*), spear thistle (*Cirsium vulgare*), common ragwort (*Senecio jacobaea*), broad-leaved dock (*Rumex obtusifolius*) and curled dock (*Rumex crispus*), may need further treatment to keep them under control. Areas of weed species may be removed mechanically: (1) cut at ground level before the flowers open or (2) hand-pulled.

2. A traditional meadow management regime will be implemented. This will involve a main "hay" cut in late August, cutting the "hay" back to approximately 50mm. The 'hay' is left to dry and seeds to shed for 1-7 days before removal into a compost pile in a corner of the site away from the pathways. The re-growth should be mowed back to 50mm in the winter, and again in the spring if this is required. No cutting should be undertaken between spring and late July to August in order to give the mix a chance to flower.

3. The grassland for the paths should be mown during the day when the weather is over 10^{o}C during the reptile active period (March to October) to allow animals to move naturally out of the way.

4. Care will be taken during the management of the site to avoid the hibernacula and other features which reptiles may be resting under during the day (such as logs, compost piles and large tussocks of grass).

5.3 Amenity grassland

The garden lawns will be sown with flowering lawn mix, EL1, as illustrated in table 4 below.

Table 4. Amenity grassland EL1

Common name	Latin name	%

Common bent	*Agrostis capillaris*	8
Crested dog's-tail	*Cynosurus cristatus*	40
Red fescue	*Festuca rubra*	28
Lady's bedstraw	*Galium verum*	3
Rough hawkbit	*Leontodon hispidus*	0.5
Oxeye daisy	*Leucanthemum vulgare*	1
Bird's-foot trefoil	*Lotus corniculatus*	3
Smaller cat's-tail	*Phleum bertolonii*	4
Cowslip	*Primula veris*	1.5
Selfheal	*Prunella vulgaris*	5
Meadow buttercup	*Ranunculus acris*	3
Common sorrel	*Rumex acetosa*	2
Wild red clover	*Trifolium pratense*	1

Sowing of the grassland areas should be undertaken during March to April or September to ensure successful establishment of the plants. Sowing seeds outside of these periods is likely to have a reduced success rate. Grassland areas managed for amenity will be kept short, and will therefore require a seed mix consisting of species which will tolerate frequent mowing. Soil in the area to be sown should be levelled and seed scattered evenly across the surface. The area should be watered as required to ensure successful establishment.

Amenity grassland management

Management may be necessary to prevent infestation by weed species. Disturbing the soil prior to seed sowing can encourage weed growth in the first year. It is therefore recommended to cut the vegetation several times in the first year to prevent the growth and flowering of tall weeds.

The grassland areas managed for amenity can be cut throughout the year once established. This should prevent growth and flowering of weeds. Any bare patches where plants have failed to become established should be reseeded at the appropriate time of year.

5.4 Hedgerows

Any gaps present within the hedgerows will be in-filled with native hedgerow planting as per Table 5, and the new hedgerow within the POS will also use this mix.

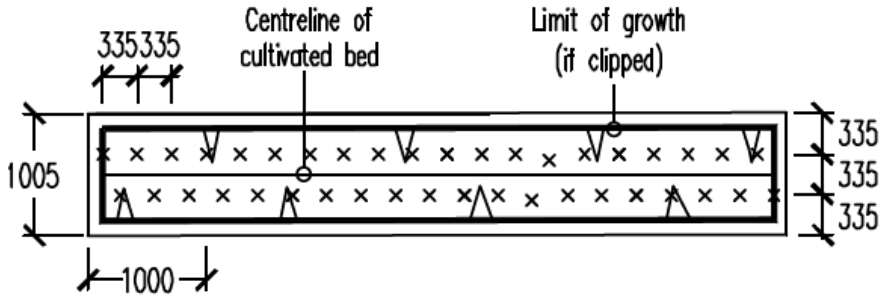
Table 5. New hedgerow planting

Common name	Latin name	Planting composition
Hazel	*Corylus avellana*	10%

Hawthorn	*Crataegus monogyna*	20%
Spindle	*Euonymus europaeus*	10 %
Crab apple	*Malus sylvestris*	10%
Wild plum	*Prunus domestica*	10%
Blackthorn	*Prunus spinosa*	10%
Dog-rose	*Rosa canina*	5 %
Honeysuckle	*Lonicera periclymenum*	5%
Elder	*Sambuca nigra*	8%
Guelder rose	*Viburnum opulus*	10%
Pedunculate oak	*Quercus robur*	2% (standards)

- The hedgerows will be planted between November and March and the infilling planting will be undertaken at the first stages of the scheme to help maintain a screen between the development and the adjacent open space and fields.
- Hedgerow species will be planted as mature fruiting specimens, and will be sourced from British-grown stock.
- New planting will be placed in two staggered rows at a density of six plants per linear feature, with approximately 335mm between plants in the same row, and 335mm between rows (see Diagram 1 below).

Diagram 1: Planting Pattern



- All plants need to be well heeled in after planting and watered in during dry weather. The planted hedgerow will be protected from rodent damage with the use of spiral tree guards. Spiral tree guards will then be removed after 4 years, to allow the trees to continue growth.

Hedgerow management

- There will be an annual inspection of planted specimens. Where any dead plants are encountered these will be removed and replaced.
- Oaks will be managed as standards and left during the flailing of the hedge. Oaks will be inspected on a bi-annual basis for disease or dead sections which may cause a risk to the public.
- The pedestrian gaps planting will be managed so that canopy meets overhead as an series of archways. This will involve training plants across the gap, careful pruning to maintain the gap for pedestrians and care when flailing adjacent to the gaps to prevent damage to the archways. The mesh can be removed once the archways are established.
- Hedgerow management, particularly of hedgerows around the boundary of the open space, will aim to maintain a varied age and structure by flailing on a two-year rotation whereby different sections will be cut in any one-year. Hedgerow management will take place between mid December and early March. This will avoid the bird-nesting season and allow berries to be used for foraging wildlife. Hedgerows should be cut in an "A" shape or a "topped A" shape to create tall bushy hedges with maximum wildlife potential. Standard trees within the hedgerows should be retained.
- To trim the hedge it is best to use reciprocating bar cutters which slice through branches. These leave a neater cut, which has a better chance of healing without infection, than hedges cut by a mechanical flail, which damage branches.
- This management will be maintained for the 5 years covered by this plan and then reviewed, ideally the rotational flailing of hedgerows will be maintained long-term with periodic checks of the health of the hedges and remedial planting where plants have died off.

5.5 Planting shrub and scattered trees

Shrub creation

An area dedicated only to wildlife with no public access will be located north west of the site, see map in appendix II. The shrubs will be planted between October and April. Table 6 details the species composition.

Table 6. New native structure planting (trees and shrubs)

Common name	Latin name	Planting composition
Field Maple	*Acer campestre*	14% (10% 60-80cm bare root, 4% 6-8cm)
Silver birch	*Betula pendula*	14% (10% 60-80cm bare root, 4% 6-8cm girth)
Dogwood	*Cornus sanguinia*	5% 60-80cm bare root
Hazel	*Corylus avellana*	20% 40-60cm bare root
Hawthorn	*Crataegus monogyna*	23% 40-60cm bare root
Bird cherry	*Prunus avium*	5% 60-80cm bare root

Oak	*Quercus robur*	4% (2% 60-80cm bare root, 2% 6-8cm girth)
Rowan	*Sorbus aucuparia*	10% (7% 60-80cm bare root, 3% 6-8cm girth)
Guelder-rose	*Vibernum opulus*	5% 60-80cm bare root

Shrubs will be planted in the winter when they are dormant. Subsequent aftercare will ensure they survive in the long-term, thus providing nesting and foraging habitat for birds and cover as well as foraging for badgers.

Planting of the trees and shrubs will take place using the hole planting method by contractors. Each plant will be supported by stakes and protected using tubex shelters.

Management

Management of the shrub areas will aim to maintain a varied structure, age and botanical diversity thus providing a valuable habitat for birds, butterflies, and small mammals.

- For the first five years weeding will be carried out within a 1 metre radius around each tree to ensure the growth of the shrubs. This will be achieved through a combination of spot spraying with herbicides and through hand-pulling/ using hand tools. Once shrubs begin to grow tubes and stakes will be removed to allow continuous growth.
- The dead wood on trees will be retained where possible and tree surgery works will only take place where there is an over-riding risk to public safety on existing public rights of way or agricultural requirements.
- Ivy on trees will be maintained as foraging habitat for butterflies and birds.

5.6 Natural play log piles

Natural play log piles within the POS will also provide habitat for invertebrates.

Habitat creation

Wood from any trees removed during site clearance should be used to create small piles of approximately 2 m x 1 m x 0.5 m that would provide valuable habitat for many species of invertebrate, as well as creating shelter and basking areas for reptiles. Preference should be given to native broadleaved species rather than species such as pines or cypresses.

Management

There is no management required for the dead wood itself, except to monitor the woodpiles and add to them as necessary.

6.0 TIMETABLE OF WORKS

The proposed timetable of works is presented below in table 8 below.

Table 7: Proposed timetable of works

Management/Mitigation	Prescription	Timing	Time limit
Vegetation clearance	During breeding season with an ecologist checking for nests	March to September – all chicks left to fledge	Ideally undertaken over winter
Reptile mitigation	Fence install, trap and translocate	March to mid October	During active period
	Construction of hibernacula	Prior to reptile translocation	To be completed by Autumn
	Screening scrub planting in POS	Winter	To be completed by Spring
	Supervision of artificial sett, pond and play area creation to prevent impacts on reptiles	Ideally during reptile active period March to October	In suitable warm weather
	Install undulations in receptor area under watching brief	Ideally during reptile active period March to October	In suitable warm weather
Badger mitigation	Artificial sett creation under watching brief	Ideally during reptile active period March to October	Must be created one year before sett closure
	Sett closure (under licence)	Gate installation and monitoring for 21 days minimum	July to Nov
	Foraging and screening planting	Winter	To be completed by Spring
	Installation of badger corridor	During construction phase	-
Shrub planting	Planting of whips with spiral guards	Winter	To be completed by Spring

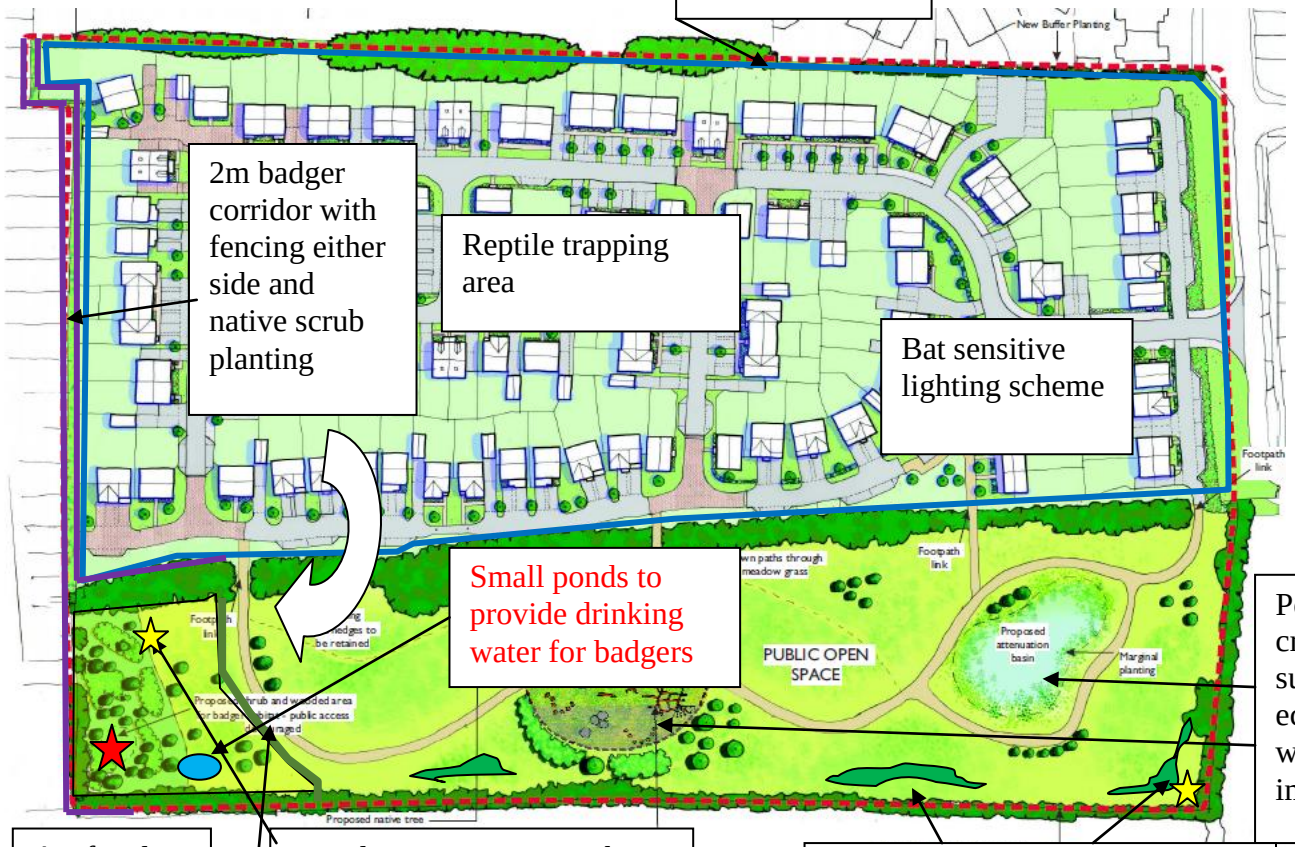
Management/Mitigation	Prescription	Timing	Time limit
	Inspection of whips and replacement of any that have not established	N/A	Ongoing – annually
	Trees will be watered throughout the summer months	Summer	The first year after planting
Amenity Grassland	(a) Prepare soil (b) Sowing of seeds at broadcast rates specified in landscape design (c) Water in seeds and ensure areas are watered during dry periods (d) Mowing for weed control	(a) Prior to sowing of seeds (b) March to April or September (c) During periods of no rain (d) Once seedlings have established	(a) to be completed by March (b) end of April (or September) (c) ongoing (d) ongoing
Grassland/scrub mosaic habitat	Creation of the meadow through surface sowing	Summer	To be completed by autumn
	Hay cut	Late August.	Ongoing
	Planting of shrub/scrub area	Winter	To be completed by March
	Inspection of scrub area and weeding	Tree guards to be removed winter	Ongoing - annual
Construction of drainage pond	Excavation of ponds	N/A	To be completed by Summer
	Line ponds	N/A	To be completed by Summer
	Fill ponds (if natural filling does not occur)	N/A	To be completed by Summer
	Planting/seeding of ponds	March to April or September	To be completed by Autumn

Management/Mitigation	Prescription	Timing	Time limit
Maintenance of ponds	Inspect ponds and estimate percentage cover of blanket weed aquatic / marginal plant species. Note presence of non-native species	September	Ongoing, annually
	Addition of barley straw bales to ponds, as necessary	September	Ongoing, annually
	Inspection of ponds and removal of plant material if over 50% of open water is covered with plants. To be removed using hand rakes. Material to be stacked over 10 metres from pond.	September	Ongoing, annually
	Identify any invasive species. Undertake targeted species removal if required.	September	Ongoing, annually
Hedgerow restoration/creation	Hedgerow planting	Winter, first stage of project	To be completed by Spring
	Hedgerow management	Spiral tree guards to be removed in winter	Cutting every 2-3 years. Ongoing.
		Monitoring of standard oaks for health and public safety	Every 2 years, Ongoing.
		Management of archways in pedestrian gaps and removal of mesh protection	Monthly, Ongoing.
Footpath creation in POS	Mowing	Temperature constraints for reptiles	Ongoing - weekly
Bat roosting habitat	Bat boxes erected in new houses and on mature trees	During construction	-

Management/Mitigation	Prescription	Timing	Time limit
	Annual cleaning of tree boxes	Winter	On going. Annually.
Bird nest box	Bird boxes erected on mature trees or new houses	During construction	-
	Annual cleaning of tree boxes	Winter	On going. Annually.
Log pile creation	Construction of log piles	During construction	-

APPENDIX I: Proposals

APPENDIX II: Mitigation



Reptile fencing

2m badger corridor with fencing either side and native scrub planting

Reptile trapping area

Bat sensitive lighting scheme

Small ponds to provide drinking water for badgers

Pond and play areas created under supervision of ecological clerk of works to prevent impacts on reptiles

Artificial badger sett, screening planting

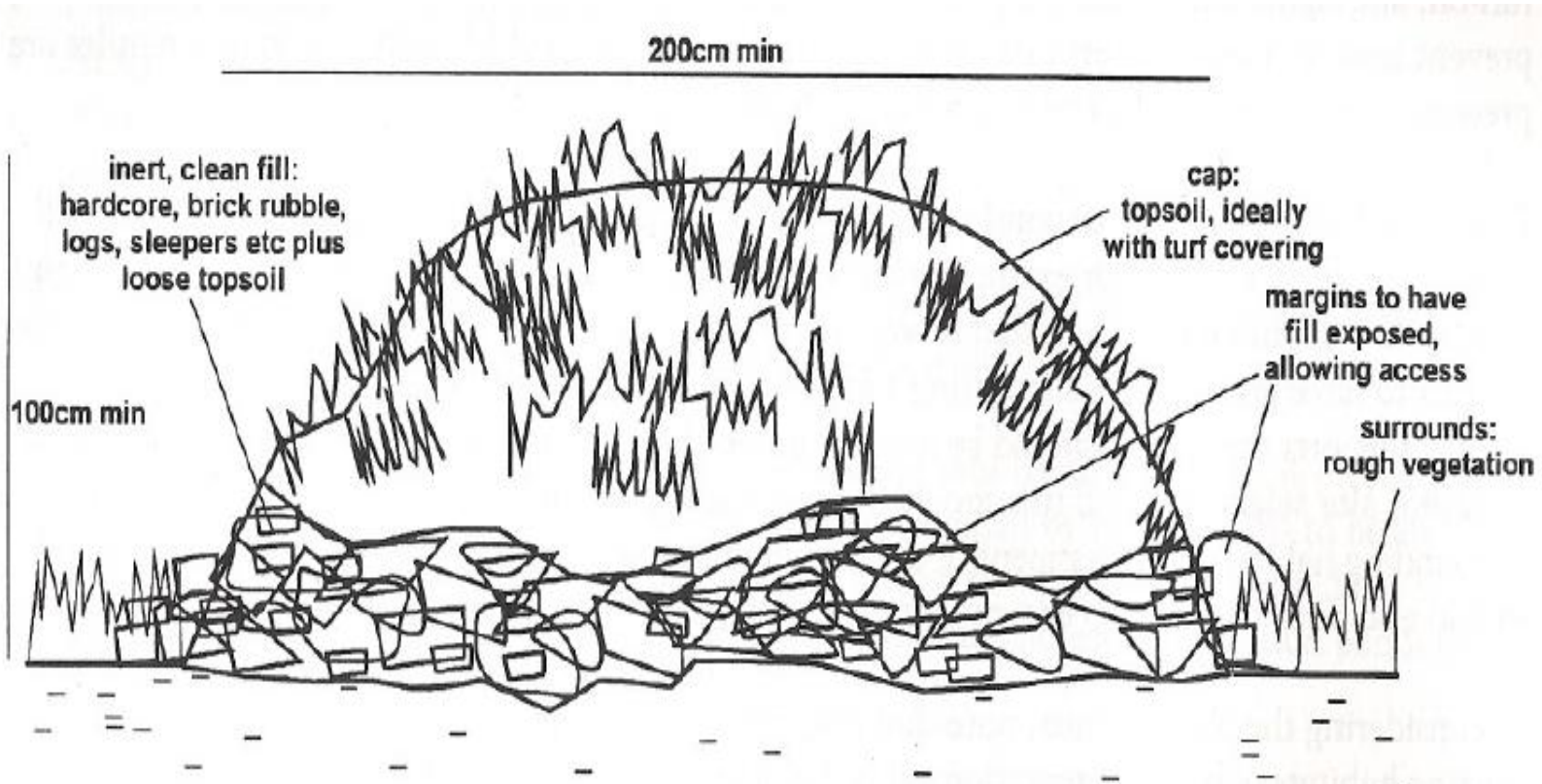
Reptile receptor site, with hibernacula

Wooden post and rail fence and hedging to be instated to separate the POS from the dedicated wildlife area

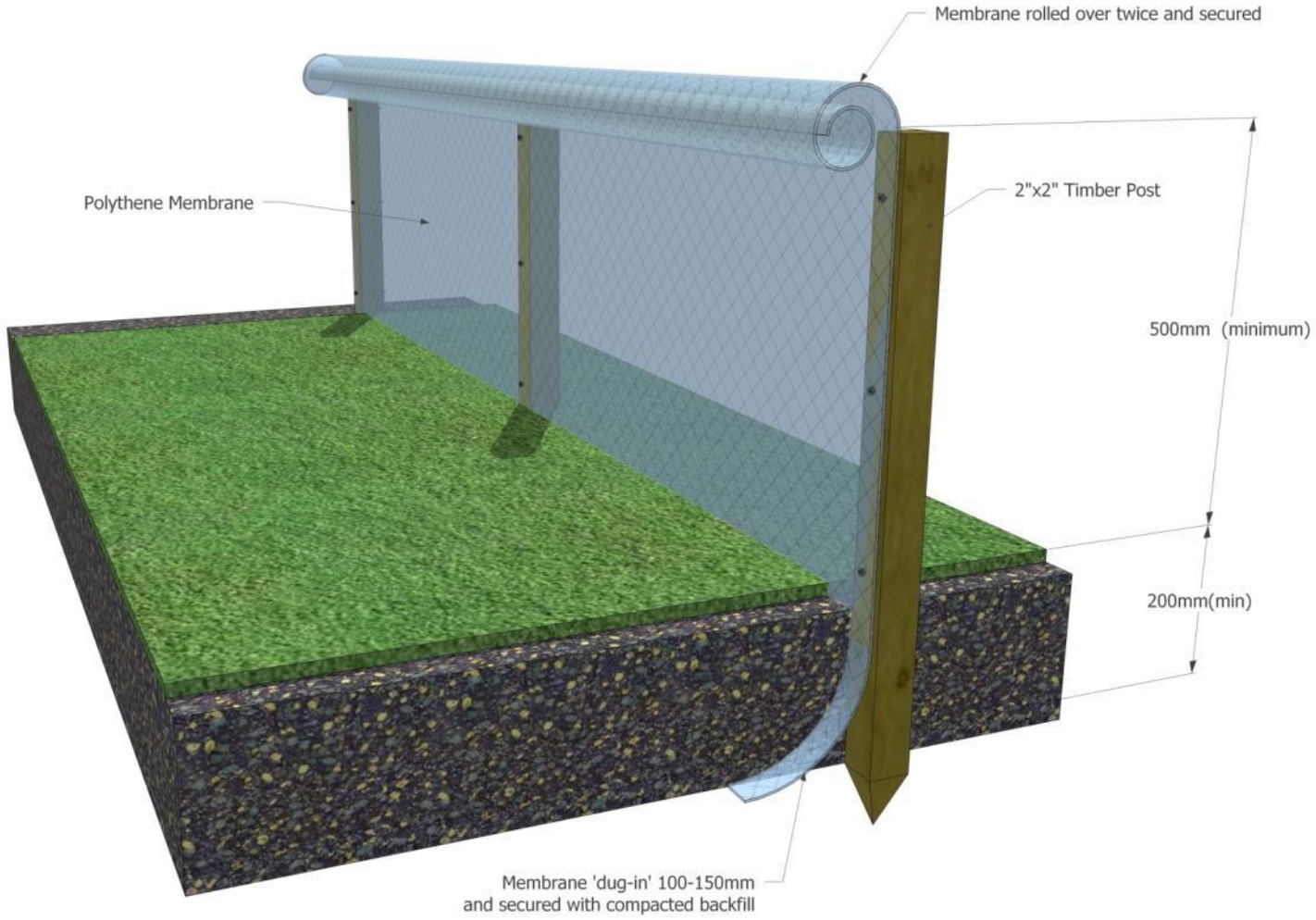
Scrub planting to include badger foraging plants/ fruit trees and cover for reptiles around the perimeter of the POS

APPENDIX III: Ecological enhancement and habitat creation

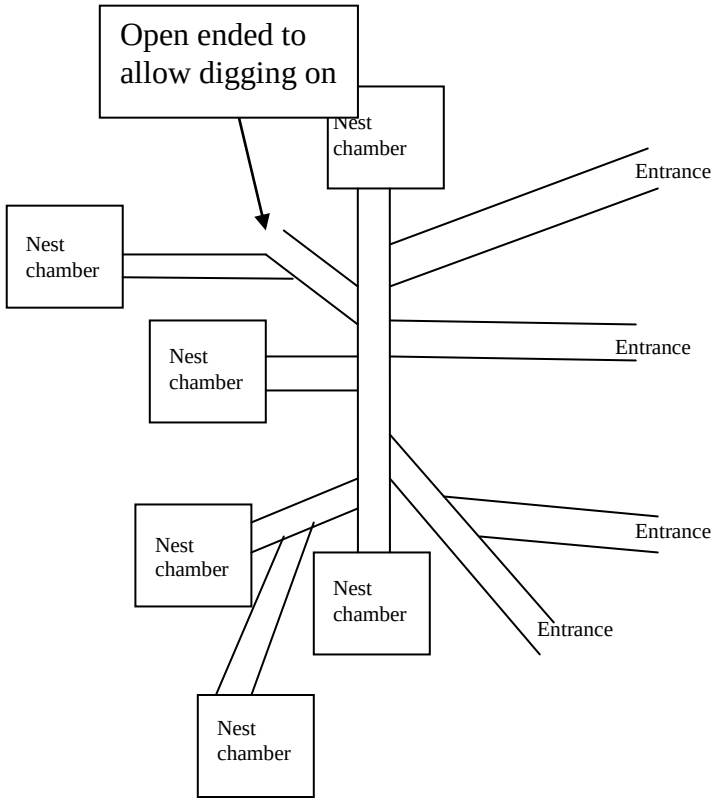
APPENDIX IV: Reptile hibernacula and fencing design



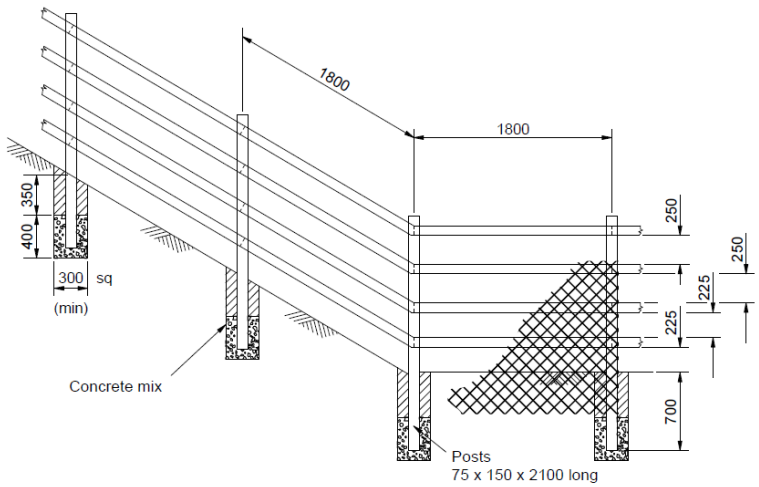
Fencing design



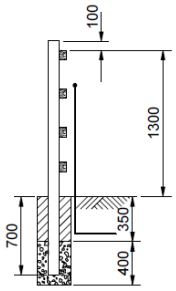
APPENDIX V: Artificial badger sett design and exclusion fencing design



WOODEN POST AND 4 (OR 5) RAIL FENCE



4 RAIL FENCE



Welded mesh stapled to timber fencing.

Lower 300mm - 500mm of chain link dug into the ground and turned away from the road.

For chain link or welded mesh, 2.5mm guage is recommended.

All Dimensions are in millimetres

taken from Design Manual for Road and Bridges