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Habitat Creation and Ecological Management Plan

Former WAAF site, Portreath

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Executive summary

- 1. The former WAAF site, 4km to the east of Portreath, has been acquired by Portreath Parish Council with the aim of developing the site as an environmental education facility for local schools. The site currently consists of approximately 1 ha. of blackthorn dominated scrub, substantial boundary hedges to the north and west and patches of open, bracken and rudral scrub dominated areas. The site supports a number of concrete platforms and other relic infrastructure associated with its former use as a military installation. The site has good access from the New Portreath Road to the south and public footpath to the north.
- 2. The existing habitats within the site could be described as having a good to moderate conservation value within a local context. The site supports species rich hedges that are classified as a Local and National Biodiversity Action Plan Habitat. The site supports habitats that could be considered suitable for reptiles and dormice; both groups/species being of local and national conservation importance. The site also supports a number of active badger setts.
- 3. It is proposed that the existing habitats are managed sympathetically to enhance them for species of conservation importance often associated with these habitats such as reptiles and dormice, through a coppicing regime and creation of a reptile/amphibian hibernacula. In addition this report makes suggestions and details the methods involved in creating new habitats with high biodiversity value, such as a network of ponds, creation of wildflower meadow areas and converting the existing air raid shelters into bat hibernation roosts.
- 4. Where possible, suggestions and basic methodologies have been detailed to improve the access/user value of the site using the existing infrastructure, such as the concrete platforms for the placement of covered structures for teaching, constructing hides for badger watching/bird watching or the sighting of pond viewing/dipping platforms.
- 5. Suggestions and methods have been detailed to allow visitors to the site closer access to certain species through the placement of artificial refusia to attract reptiles and amphibians and the installation of bird, bat and dormouse boxes. Where specific licensing is required to handle species such as dormice and bats local conservations bodies and interest groups have been listed who may be able



to help with allowing visitors access to these species through the provision of licensed handlers that can help with checking/monitoring nest boxes.

5. Information and contact details of potential partnering organisations that could assist with setting up the infrastructure required for environmental education, such the Cornwall Wildlife Trust has been listed. In addition the contact details of other local species interest groups, such as the Cornwall Bat Group or Cornwall Mammal Group, that could potentially assist with the management, monitoring of certain species, provision of nest boxes or licensed handlers, have been listed.



Contents

1. Introduction	5
Description of the site	5
Current conservation value of the site	7
Proposed management objectives and ecological enhancements for the site	10
2. Enhancements	10
Boardwalks	10
Bird watching hides and feeding areas	11
Bird feeding areas:	11
Positioning and construction of hides:	12
Install a network of ponds with safe access for pond dipping	13
Pond creation:	13
Pond management:	16
Constructing dipping/viewing platforms:	17
Install shelters for teaching on existing concrete platforms	18
Ecological Enhancements:	19
Environmental Enhancements:	20
Further habitat creation and management	21
Creating areas of wildflower meadow:	21
Hibernacula for reptiles and amphibians:	23
Artificial refusia for allowing children access to reptiles and amphibians:	24
Improving the site for roosting, foraging and hibernating bats:	25
Improving the site for dormice:	28
3. Appendix 1	31



1. Introduction

A Preliminary Ecological Appraisal (PEA) was conducted by The Ecology Co-op upon a plot of land approximately 4km to the east of the Portreath, with the intention of establishing a habitat enhancement plan for the site.

The land is a former Woman's Auxiliary Air force (WAAF) site. Since its use as a WAAF site during the second world war, the land was used for social housing, following this, eventually the land was acquired by Portreath Parish Council during 2014. It was decided by the council that the site should be enhanced as wildlife habitat, with provisions made for access to the site for local school groups for environmental education purposes. An ecological walk over survey was undertaken by Cornwall Habitat Management Services (CHMS) during January 2015¹.

Description of the site

The site is approximately 1 hectare in size and is fringed to the south by pasture land and New Portreath Road, to the west is an access track and to the north is the old railway (Portreath – Devoran mineral tram line) that is now a well used public footpath (Fig. 1). The wider landscape is dominated by pasture and arable land. There is good connective habitat along the well established hedge fringing the footpath to the north, connecting to a small area of woodland to the west.



Figure 1. Google Earth image showing the location of the WAAF site, within the wider landscape. Figure orientated north to south.

¹ CHMS (2015). Ecological Scoping Report.



The site supports eight concrete platforms that used to support structures during the period that the site was used by the WAAF. In addition there are three air raid sheltered and a platform that used to support a machine gun on the site (Fig. 2). All of this infrastructure is now largely inundated by vegetation.



Figure 2. A sketch of the site showing the locations of the former building platforms, air raid shelters and gun platform in relation to the two active badger setts.

The broad scale habitat types within the site were described by CHMS in their 2015 report. The site generally slopes from the northwest to lowest point at the southeast. The site is dominated by blackthorn (*Prunus spinosa*), bramble (*Rubus* sp.) and hawthorn (*Crataegus monogyna*) scrub (Fig. 4). This scrub also supports hazel (*Corylus avellana*) and bracken (*Pteridium aquilinum*) and to a lesser extent oak (*Quercus robur*) and sycamore (*Acer pseudoplatanus*) (Fig. 3)¹. There is a patch of open area to the northwest of the site (Fig. 5). Substantial hedges dominate the north and west boundaries of the site (Figs. 3 & 6).



Current conservation value of the site

Under Section 41 (S41) of the NERC Act (2006) the Secretary of State has published a list of habitats and species which are of principal importance for the conservation of biodiversity in England. Fifty-six habitats of principal importance are included on the S41 list. These habitats, within a local planning context, are referred to National Biodiversity Action Plan Habitats (UK BAP)² and Local Biodiversity Action Plan Habitats, within a county context (Local BAP).

The site, in its current state, supports hedgerows fringing the northern and western fringes of the site. Hedgerows are listed as both UK BAPs and Local BAP Habitats, on account of their importance to biodiversity.

The broad habitats within the site have the potential to support a number of Local and UK BAP species, with the dense scrub and hedgerow areas having the potential to support the following UK BAP species of birds; common cockoo (*Cuculus canorus*), yellow hammer (*Emberiza citrinella*), house sparrow (*Passer domesticus*) bull finch (*Pyrrhula pyrrhula* subsp. *pileata*) starling (*Sturnus vulgaris*). The open area of low level vegetation, to the northwest of the site, currently supports basking habitat for the following Local and UK BAP species of reptiles; slow worm (*Anguis fragilis*), grass snake (*Natrix natrix*), adder (*Vipera berus*), common lizard (*Zootoca vivipara*). Finally the dense scrub and hedges support ideal foraging habitat for the following Local and UK BAP species of small mammals; hedgehog (*Erinaceus europaeus*), dormouse (*Muscardinus avellanarius*) soprano pipistrelle bat (*Pipistrellus pygmaeus*), brown long eared bat (*Plecotus auritus*).

² http://jncc.defra.gov.uk/page-6189





Figure 3. The broad scale habitat map produced by CHMS¹ in January 2015. Figure orientated north to south.





Figure 4. Recently cut ride through the blackthorn dominated scrub within the centre of the site.

Figure 5. Area of bracken dominated habitat towards the northwest of the site.



Figure 6. Boundary wall and hedge upon the northern boundary of the site.



Figure 7. The southeast corner of the site dominated by bramble and tall rural scrub.

The site currently supports three badger setts, with burrows to the southwest, centre and southeast of the site (Fig. 3). Badgers are a UK protected species, however there protection under the 1981 Wildlife and Countryside Act (as amended) is for animal welfare reasons, as opposed to conservation reasons. It is an offence under the UK wildlife legalisation to harm or interfere with badgers and/or there setts.



On account of the habitats within the site, and the potential for populations of certain species such as reptiles and dormice to potentially persist within the site, the site could be considered of high to moderate ecological value within a local context.

Proposed management objectives and ecological enhancements for the site

It is proposed that the existing habitat within the site will be managed and enhanced for wildlife and biodiversity. There is the potential to create new habitats within the site. In addition, the site will be improved for access and environmental education to engage local schools. The following enhancements to the site could be made:

- Install access board walks for pedestrians and wheelchair users.
- Bird watching hides, badger watching hides and bird feeding areas.
- Install a network of ponds with safe access for pond dipping.
- Create various shelters and covered teaching areas sited on existing concrete pads, including composting toilet.
- Further habitat creation and management.
- Produce information boarding.

2. Enhancements

Boardwalks

It is suggested that all of the hides/viewing areas and education areas are accessed via boardwalks to allow access during poor ground conditions and also allow disabled access. It is suggested that the boardwalks are either constructed of treated timber or a mixed recycled composite plastic decking boards. There are a number of companies offering such recycled plastic decking boards³. The advantage of recycled plastic decking boards is there increased durability over wooden decking.

A number of rides have already been cut through the thick blackthorn scrub currently dominating the site. Careful consideration should be given to nesting birds during the construction phase of

³ http://www.kedel.co.uk/recycled-plastic-decking/recycled-mixed-plastic-footpath-planks-165-x-48.html



the walkways, whereby vegetation clearance should not be undertaken during the bird breeding season (April-September). All species of British bird are protected during the breeding season under UK and EU wildlife and protected species legislation.

Bird watching hides and feeding areas

Feeding stations will help attract birds to the site, particularly in the winter during periods of cold weather when foraging for natural food sources for many species can become harder. The installation of hides and/or hide screens can allow visitors to the site, closer access to feeding birds.

Bird feeding areas:

The positioning of the feeding stations and the hides is important to maximise the number of birds and species to the feeding stations:

- The feeding stations should be positioned in areas of cleared vegetation to allow unimpeded views of the birds, however the feeders should not be positioned to far from natural cover. It would be prudent to position the feeders no more than 1-2m from the edge of vegetation. If feeders are too exposed a number of the more skittish species such as the smaller passerines (tits, warblers, finches etc) will be more reluctant to spend time on the feeders on account of predation risk from species such as sparrow hawks.
- The RSPB give some useful information upon the positioning of bird tables and feeders⁴, positioning a bird table on a metal pole as opposed to wooden pole will help to discourage predators such as domestic cats, and grey squirrels that will impact the biodiversity of the site if they are encouraged. A number of companies produce more robust bird feeders that will be more difficult for squirrels to destroy and access the food⁵.
- Using a number of different types of feeders, food types and varying the positioning of the food and/or feeders will increase the diversity of the species attracted to the site. By using a mix of seeds and speciality seed mixes, dried and live meal worms and fat balls will attract different species of birds. The RSPB have produced a useful online guide

 ⁴ http://www.rspb.org.uk/birds-and-wildlife/read-and-learn/helping-birds/feeding/birdtables/howtoposition.aspx
 ⁵ http://www.nbbs.com/title/200175/defender-metal-seed-feeder



detailing what food types are most likely to attract each species of more common garden birds⁶.

 Positioning a feeding station close to one of the ponds would help allow views of birds when they come to the water to drink and/or species that feed on flying invertebrates that are attracted water, such as swallows and house martins. It would also allow views of aquatic species of birds, such as moorhens, from the hides.

Positioning and construction of hides:

- The hides can take the form of shed like, enclosed structures, or more simple screens, or a combination of both. The advantage of the enclosed structures is that they are weather proof and will contain noise a little more effectively, that would otherwise scare birds and other wildlife. The advantage of the screens is that they would be cheaper, quicker and easier to construct and can be constructed of natural materials such as woven willow or hazel poles to create hurdles. A combination of the two structures could be used throughout the site and used in areas close to the birds feeding stations/ponds and the badger watching areas close to one of the setts.
- The Norfolk Coast Partnership have a comprehensive online guide, detailing designs, specifications and considerations for constructing hides⁷. This guide covers important considerations such as avoiding visual impacts that could be caused by structures situated in natural settings, the provision of varying height viewing hatches for children or wheelchair users and screening around the approach and hide access points.
- The positioning of the badger hide, in particular, should be if possible positioned downwind of the general prevailing wind. This will allow the badgers to be, initially, less wary of the hide and its occupants. It may take the badgers a number of months to become completely comfortable with the hide, particularly when occupied. So viewing badgers behaving naturally around the sett may take many months to achieve. Given that there are multiple setts upon the site, it maybe that different setts are used at different times of the year by the badgers.

⁶ http://shopping.rspb.org.uk/which-bird-food?birdfood-intro

⁷ http://www.norfolkcoastaonb.org.uk/mediaps/pdfuploads/pd000536.pdf



- It could be adventurous to contact conservation NGOs within the area, such as the RSPB⁸ or the Cornwall Wildlife Trust⁹, who would have representatives and volunteers who maybe experienced in designing and building hides. The Wildlife Trusts in particular will often be keen to become engaged with local school groups, and could be a good initial source of labour and expertises when setting up the infrastructure upon the site, such as hides, ponds and access walkways.
- Local timber merchants could be a potential source of sponsorship through the provision of materials for constructing hides.
- There are a number of useful websites that detail how to acquire the materials and instructions on how to build willow/hazel hurdles that can be used as screens¹⁰.

Install a network of ponds with safe access for pond dipping.

Pond creation:

Ponds and wetlands are some of the UK's most threatened habitats, with 50% of ponds having been lost within the last 100 years, due to development and intensification of agriculture. Eighty percent of the remaining ponds are currently in a poor ecological state as a result of pollution or mismanagement. Two thirds of freshwater aquatic life are supported by ponds¹¹. Ponds are listed under Section 41 (S41) of the NERC Act (2006) and are defined as UK BAP Habitats, in recognition of their value to biodiversity. The design of a pond can greatly influence its value to biodiversity. The specifications detailed below have been developed by The Freshwater Habitats Trust¹², Froglife¹³ and The Amphibian and Reptile Conservation Trust¹⁴ to improve ponds for biodiversity.

• A small network of ponds or varying depths and sizes are widely regarded as being of greater value to wildlife as opposed to a single large pond.

⁸ http://www.rspb.org.uk/groups/cornwall

⁹ http://www.cornwallwildlifetrust.org.uk/who-we-are/contact-us

¹⁰ http://www.lowimpact.org/lowimpact-topic/hurdles/

¹¹ http://freshwaterhabitats.org.uk/habitats/pond/

¹² http://freshwaterhabitats.org.uk/

¹³ http://www.froglife.org/

¹⁴ http://www.arc-trust.org/



• The ideal position for the pond/network of ponds/wetland area within the site, would be within the southwest corner, where the site drains naturally to its lowest point (Fig. 8).



Figure 8. The proposed location of the ponds/wetland areas within the lowest point of the site within southeast corner.

- Where possible, ponds should include shallow sloping slides as the marginal areas support the greatest biodiversity. The marginal pond slopes should be shallow with less than 1:5 (12°) sloping sides. These sloping sides will be substantial to take into account the seasonal water level fluctuations.
- Depending on the composition of the ground, the ponds may need to be lined to prevent them from completely drying up annually. Covering the desired area with a bentonite clay powder up to 50cm from the base of each pond, which is worked into the substrate, should create a water tight seal without the need for any inorganic materials such as concrete and plastic liners.
- All nutrient rich top soil should be removed from the vicinity of the proposed pond(s). The
 nutrient poor sub soil should be made into a bund parts of the edge of the pond(s) to
 promote floral diversity. If the topsoil is to be retained upon the site, it must not be stored
 upslope of the pond, to avoid the leaching of nutrients into the pond(s).



If a network of ponds are to be put in it could be possible to incorporate varied vegetated underwater hummocks along the base of the pond. (see below, Fig. 9) within the largest pond. The hummocks and bars will encourage some of the UK's rarest submerged plants that need minimal soils to root into. These species do well rooted in bare clay or sand at the bottom of new ponds, but not in the dark organic-rich silts that build up as ponds age. Hummocks and bars keep mineral substrates exposed on the pond bottom for longer. Organic sediments slip off the top of the bars, filling up the low troughs between them and leaving the bar-top sediment-free for plants to establish on (Fig. 9).



Figure 9. Organic sediments don't accumulate on top of submerged shoals and bars – so uncommon submerged stonewort and pondweed species can thrive. Reproduced from information supplied by the Freshwater Habitats Trust.

- Some conservation NGOs suggest that natural colonisation by aquatic plants is the most effective way of producing a natural wildlife pond, whist other authorities on the subject promote planting ponds out with native aquatic species. One of the greatest threats to ponds is the infestation of non native aquatic, so plants should be sourced from a reputable supplier that can guarantee that the plants are not contaminated with non-native invasive species. Appendix 1 details a pond plant species list, for native species that will promote biodiversity. The sourcing of local native species from a reputable source could be carried out with the co-operation of Cornwall Wildlife Trust.
- If a bung is to be constructed using the nutrient poor subsoil excavated from the pond(s), it should be seeded with a native seed mixture in the early spring or early autumn at a minimum rate of 3 grams per square metre (see creating wildflower meadow area for



detailed instructions). A number of suppliers produce wildflower seed mixes for conservation planting schemes¹⁵.

Pond management:

- In the early years, blanket weed and duck weed can cover ponds in warm weather. This
 needs to be pulled out carefully. Once the pond has settled down, these weeds will
 usually be kept in check by pond animals. Other plants can also threaten to take over
 and these are best thinned out regularly. Do not clear more than one third in any one
 year. When clearing out ponds, leave any plants and debris along the edge for a few
 days before removing as this allows any trapped wildlife to return to the water.
- The pond banks should be managed so that the colonising, rapidly growing trees such as willow and alder do not spread and inundate the ponds. These species can be periodically coppiced every 5 years and the removed timber stacked as habitat piles around the margins of the pond. Habitat piles will provide hibernacula for reptiles and amphibian species and will promote invertebrate diversity.
- Every five years 25% of the aquatic vegetation should be removed to slow the natural sedimentation process of the pond, encourage colonisation by a variety of aquatic plants and create open water areas for breeding amphibians. This management should take place in late summer and focus upon faster growing species. The dredged material should be left upon the bank for a week to allow aquatic species where possible to migrate back to the water, then the material should be removed and composted or piled up as habitat piles for reptiles and amphibians. After the first three years of management, all of these management practices may be reviewed and tailored so that they best suit the progress of the pond.
- The wildflower bung should be mowed seasonally during September. The cuttings should be left in situ for two weeks to allow seed dispersal then removed and composted or piled up as habitat piles away from the meadow area to avoid nutrient over enrichment.
- Whilst aquatic and marginal vegetation are still establishing, pond edges are particularly susceptible to colonisation by invasive alien plant species such as New Zealand swamp-stonecrop (*Crassula helmsii*), parrot's-feather (*Myriophyllum aquaticum*), floating

¹⁵ http://www.wildflower.org.uk/wildflower-meadow-seed-mixes/



pennywort (*Hydrocotyle ranunculoides*) and water primrose (*Ludwigia grandiflora*). These species should be monitored for and removed if found. A survey of the pond by a suitably qualified ecologist should be conducted every two years. It may be possible to involve organisations such as the Cornwall Wildlife Trust or the local branch of The Reptile and Amphibian Conservation Trust to monitor the amphibian populations within the pond(s) and the health of the pond(s) in general. The monitoring of the amphibians within the pond is also be a good way of allowing visitors and children using the site to become involved and see newts and frogs at close quarters.

 One of the greatest challenges, if the site receives large volumes of visitors, is discouraging people from releasing fish into the pond. At no point should native or nonnative species of fish be introduced into the pond. An information sign warning against the illegal introduction of non-native species could be erected to discourage the release of unwanted animals or plants. Fish will quickly remove most of the aquatic amphibian and invertebrate fauna within the pond(s).

Constructing dipping/viewing platforms:

The Fresh Water Habitats Trust have produced a good information booklet, available online that deals with constructing and managing ponds with public access¹⁶. This publication gives some useful information on sighting and construction of pond dipping platforms.

- Good viewing platforms will be located close to the pond margin to provide visitors with a sense of connection to the pond whilst retaining low vegetation height in front of the platform allowing views across the open water and have good barriers to prevent people falling or jumping into the water and provide a ramp, rather than steps to allow wheelchair access.
- Good dipping platforms will lie as close to the water as possible. Leaning over barriers or reaching down to get nets into the water will increase the risk of falling in. The platform should only extend over shallow water, as this is where the majority of pond life is found. Dipping in deeper water is generally less productive, unless the pond supports abundant submerged vegetation.

¹⁶ http://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/PUBLICACCESS.pdf



- Where possible, include at least two platforms to alternate dipping between years giving the pond a chance to recover and be large enough to ensure that the majority of the site is not always disturbed, so that an interesting range of animals is maintained for the dipping exercise.
- The most durable material to construct the dipping/viewing platform with would be to use • recycled plastic decking and joists. There are a number of companies that supply the materials¹⁷,¹⁸ and others that will supply the materials and construct the platform¹⁹,²⁰.

Install shelters for teaching on existing concrete platforms

Figure 2 shows the location of approximately 12 concrete platforms that formed the foundations of the infrastructure positioned upon the land within the past. Once cleared of vegetation some of these areas could provide the foundations for teaching/covered areas for local school use.

- Integrating permanent or semi permanent infrastructure on the site such as the • construction of teaching space and other associated facilities such as a composting toilet will require a significant financial outlay. There are a number of funding opportunities for integrating conservation and environmental education. The Esmee Fairbairn Foundation²¹ is one of the largest grant giving bodies for such projects. Other NGOs with an emphasis on environmental education and conservation, such as the Cornwall Wildlife Trust could be good partner organisations in such projects.
- Consideration should be given to the advantages and disadvantages of proposed . structures. For example semi permanent structures such as yurts could be advantageous as they are easy to erect, or move, or pack away over the winter. Timber structures such as cabins, could be advantageous if a more permanent presence is required within the site and are more secture. The logistics of planning issues should also be considered given that mobile structures such as yurts would

¹⁷https://www.compositedecking.co.uk/?gclid=CPz4teW839ACFUu-7QodBBcHhw

¹⁸http://www.recycledplasticbuildingmaterials.co.uk/plastic-decking.html ¹⁹http://www.thewilddeckcompany.co.uk/product-portfolio/pond-dippingplatforms/?gclid=COuv5Zm939ACFe277QodTD4JMQ

¹⁰http://www.hideouthouse.com/portfolio-item/dipping-pond-and-platform/

²¹http://esmeefairbairn.org.uk/



most likely be considered permitted development and permanent structures below a certain size²².

- The sighting of the teaching areas should take into consideration the location of the badger setts within the site. Legislation dictates that disturbance should not be allowed to take place within 30m of the entrance of a badger sett²³. Disturbance could be defined as regular and consistent use of an area by people, or construction being undertaken within 30m of the sett entrance.
- If resources allow for a more permanent structure(s) to be produced for the site, then ecological enhancements can be added to the structure itself to allow for a true 'living classroom'. In addition environmental enhancements could be made to reduce the potential environmental impact of the structure, For example:

Ecological Enhancements:

• Installation of a green roof. Green roofs can take many forms to include natural wildflower meadow, sedum roofs in more exposed locations or roofs supporting deadwood habitat piles or combinations of a number of different habitats. Greenroof.org²⁴, provides a wealth of information on the design, construction and value of green roofs. The advantages of green roofs is that it can improve the aesthetics of a building by allowing it to blend more easily into the surrounding natural environment. The green roof will improve biodiversity within the local area and also improve the thermal insulation properties of the building to a certain extent.

• Bat roosting features can be incorporated into the design of the building. For example integrated bat access tiles can be incorporated into the roof²⁵. These will provide potential roosting habitat for crevice roosting species such as pipistrelle bats. If access tiles are used it is important to not use modern breathable roofing membranes within the construction of the roof, as these material will entangle and kill bats. Bitumen roofing felt should be

²²https://www.cornwall.gov.uk/environment-and-planning/planning/planning-advice-and-guidance/do-i-need-planning-consent-or-building-regulations/

²³https://www.gov.uk/guidance/badgers-protection-surveys-and-licences

²⁴http://livingroofs.org/

²⁵http://www.nhbs.com/title/176457/bat-access-tile-set



used. Wall integrated bat boxes could be integrated into the construction of the building²⁶, or boxes could be hung upon the exposed wall²⁷. These wall roosting features should preferably fitted upon a south facing wall as high up as possible and not illuminated by external lighting.

• Bird nesting features could be fitted to exposed walls, such as tit boxes²⁸ or artificial swallow or martin nests²⁹. These boxes could be fitted with wireless nest box cams, allowing images and footage of activity within the nest boxes to be watched within the classroom³⁰.

• Bug boxes could be fitted to the external aspects of the classroom structure³¹.

• All of the artificial wildlife nesting/roosting boxes/habitat can be bought off the shelf from the many wildlife enhancement companies as listed below. However, many of these can be constructed from scrap wood etc, with many designs and plans online³². Local wildlife interest groups, for example, the Cornwall Bat Group³³, could help with acquiring boxes, fitting the boxes and through licensed bat handlers, could check the boxes periodically.

Environmental Enhancements:

• The energy requirements of the building could be met through the use of solar panels used to charge a battery bank that could power low wattage items such as LED lighting, laptops and water pumps for taps.

• Rainwater collection run through a filter could provide the water requirements for the building.

²⁶http://www.nhbs.com/title/173248/1fe-schwegler-bat-access-

panel?bkfno=183033&ca_id=1495&gclid=CJaq_6zG5NACFYi17QodUvoJEw

²⁷http://www.nhbs.com/title/158636/1ff-schwegler-bat-box-with-built-in-wooden-rear-

panel?bkfno=174821&ca_id=1495&gclid=CKG11crG5NACFSa-7QodDbAM6Q

²⁸http://www.nhbs.com/title/174850/1sp-schwegler-sparrow-terrace

²⁹http://www.nhbs.com/title/195378/house-martin-nests

³⁰http://www.nhbs.com/title/198026/wireless-nest-box-camera-kit

³¹http://www.nhbs.com/title/173585/bug-box

³²http://www.bats.org.uk/pages/bat_boxes.html#Making%20your%20own

³³http://www.bats.org.uk/pages/cornwall_bat_group.html



• Heating requirements could be met through the provision of a wood burning stove; a carbon neutral heating source. Fuel wood could be sourced from the site through, through a coppice regime.

• Composting loos are a good low tech and low impact way of dealing with human waste that don't require an input of water. There are many useful designs and information online³⁴.

Further habitat creation and management

A number of habitat creation and management strategies could be undertaken to enhance the biodiversity of the site and improve the visitor and/or environmental education value of the site. Currently the site is dominated by predominantly blackthorn scrub, a locally valuable habitat, however if some of this area is cleared and other habitats are encouraged the biodiversity of the site will improve.

Creating areas of wildflower meadow:

There is an area to the northwest of the site (Fig. 10) that is less densely scrubbed over, that at the moment appears to be dominated by bracken (Fig. 5). This area would make an ideal wildflower meadow area, improving the site for a number of seed dependent birds, invertebrates such as butterflies and moths and reptiles. Intern, the increase in invertebrate diversity will attract insectivores such as bats and some species of birds.

Lowland wildflower meadow is considered a threatened habitat nationally, with a 97% loss of lowland meadow within the UK between 1930 and 1980 according to the recently published 2016 State of Nature Report. This loss has mostly been attributed to the intensification of agriculture³⁵. A small wildflower rich bund is suggested as part of the pond area, however, the following steps could be taken to develop a more extensive wildflower meadow habitat within the northwest of the site:

 For the establishment of perennial wildflowers it is often necessary to have a soil or planting medium low in nutrients. Soil fertility can be reduced by removing the topsoil (approximately the upper 20 cm) to reveal the subsoil. The upper surface should be broken up to a firm, fine tilth using a rake.

³⁴https://info.cat.org.uk/sites/default/files/documents/CompostingToiletDesign_4page.pdf

³⁵http://www.bats.org.uk/data/files/State_of_Nature_UK_report_2016.pdf



- The waste, nutrient rich topsoil can be piled to create a south facing bank, despite this area inevitably being less species diverse for floral species due to the nutrient content, it will provide a good habitat for basking reptiles.
- All site/ground preparation works should be undertaken in dry (preferably still) weather conditions so as not to damage the soil structure or to lose soils as windblown dust.
- It is most likely that the soil conditions are slightly acid, therefore the seed mix should correspond to these soil conditions. The following mix should suit the soil at this site well³⁶
- A wildflower meadow seed mix should be in the ratio 4:1 (grass seed:wildflower seed). It should be sown in September/October in calm, dry weather, by machine or hand at a rate of 2–5 g m⁻². If sowing by hand, mixing the seed with damp sand or sawdust helps to ensure it is evenly distributed, and allows the sower to see where they have already sown. After sowing it can be helpful to lightly roll or tread the soil surface. Raking should be avoided as it can concentrate seed distribution or bury the seed too deep. If there is a prolonged dry period, the seeded area may be lightly watered. Birds and other seed predators should be kept off the land as much as possible.



Figure 10. The proposed location of the wildflower meadow areas within the northwest corner of the site.

³⁶http://www.meadowmania.co.uk/wildflower-seed-for-most-soil-types.htm



- Wildflower meadows require continuing annual maintenance, and in this case, as a result of the size of the plot, mowing should be undertaken. The emerging meadow needs to be cut in the first year in order to maintain a vegetation height of 100–150 mm, in the late summer. After a week or two (to allow seed dispersal), the cuttings will need to be removed to avoid nutrient input, that will retain plant diversity.
- The cuttings can be piled up towards the edge of the meadow and as the rotting vegetation accumulates over the years, this habitat pile will be used by small mammals, invertebrates, reptiles and amphibians. In addition, the cuttings can be used to construct a hibernacula (see below).

Hibernacula for reptiles and amphibians:

A hibernacula will provide a winter refusia for the reptiles and amphibians that will most likely be attracted to the site after the construction of the pond(s) and the wildflower meadow, that will provide basking and foraging areas for the reptiles (Fig. 11). The hibernacula(s) should be positioned close to the ponds and/or on the periphery of the wildflower meadow and can be constructed largely of the waste materials and arisings from the construction of the pond, management of the meadow and the coppicing/clearing of areas of the site to create rides and walkways. The RSPB produce a useful guide detailing the conduction of hibernacula features³⁷. This is summarised below:

- Orientate the hibernacula on an east-west axis, so that one side is south facing. Dig a trench between 600-900mm deep and 1.5 to 3m long. The hibernacula must be free-draining, so avoid digging a straight-sided pit. Cover this trench with coarse rubble to the level of the trench and use 20mm shingle to top the rubble and loosely fill any gaps. Place logs and coppiced material from the site at right angles across the trench.
- The RSPB instructions suggest that PVC waste piping is used to allow animals access to the internal areas of the structure, however, opposed to putting plastic in the ground, this can be created using natural materials such as branches and brash from the site.
- Cover the trench with a mix of soil and rubble, brash or branches and clippings from the meadow areas each year.
- Plant or allow vegetation to grow naturally on the north side of the mound for extra shelter and prevent vegetation from encroaching onto the south facing side of the

³⁷http://www.rspb.org.uk/get-involved/community-and-advice/garden-advice/reptiles_amphibians/hibernacula.aspx



mound. Periodic thinning also helps prevent a thick root matt developing, making it hard for reptiles and insects to burrow into the surface.

 Maintain sparse vegetation cover on the south facing side to give the animals somewhere to bask. It also provides basking space for insects and for solitary bees and wasps to nest. It may also provide a place for house sparrows to dust bathe and feed on insects and seeds.



Figure 11. A photograph (Left) and diagram of a hibernacula (Right), that could be used by reptiles, amphibians and small mammals as winter refugia. The structure can be constructed of the waste material and arisings from other habitat creation and management within the site.

Artificial refusia for allowing children access to reptiles and amphibians:

All reptiles and amphibians within the UK are largely cryptic animals and very difficult to spot during the course of their natural life cycles. A method that will allow these species to be observed at close quarters is to position artificial refusia within areas of habitat that will be frequented by these species. Reptiles and amphibians tend to inhabit the margins between dense vegetation (i.e the blackthorn or bramble scrub within the site) and the open pond margins and/or meadow areas:

- Artificial refusia can be constructed from small, 1x1m sheets of corrugated metal or 1x1m sheets of bitumen roofing felt (Fig. 12).
- The refusia work through absorbing heat from sunlight, during spring or summer mornings. The reptiles will exploit these surfaces by either basking on the surface or sheltering beneath the refusia to warm up. Once the reptiles have gained sufficient body temperature they will then leave the refusia to hunt within undergrowth and long grass.





Figure 12. (Left) corrugated metal sheeting (right) bitumen roofing felt with a pair of common lizards basking on the surface. Both materials if positioned correctly can attract reptiles.

• If the refusia are checked, by carefully lifting during the morning, before the ground temperature becomes too high, the reptiles and sometimes amphibians can be watched at close quarters, whist still in a state of torpor.

Improving the site for roosting, foraging and hibernating bats:

Bats are of high conservation importance and many of our 17 species within the UK are National and Local BAP species. Bats are often easy to observe a close quarters when foraging over open or vegetated areas and make an ideal group of animals to enthuse children.

The creation of ponds, wildflower meadow and the existing blackthorn scrub will create an ideal matrix of habitats that will attract a diversity of flying insects, during the summer months, that will intern provide ideal forage for bats. The following management will further improve the site for bats:

 A number of the durable, woodcreate boxes made by Schwegler could be erected upon larger trees to improve the roosting opportunities for bats. The advantage of these boxes is that they are durable and will last many decades, however they are relatively expensive³⁸ (Fig. 13). Alternatively, handmade boxes made of untreated scrap timber or ply can be constructed for very little financial outlay. The local bat group could help with the construction, positioning and monitoring of the boxes³⁹, with

³⁸http://www.nhbs.com/browse/subject/900/bat-boxes

³⁹http://www.bats.org.uk/pages/cornwall_bat_group.html



licensed bat handlers from the bat group being able to potentially show the children using the site, the bats at close quarters.

- The Bat Conservation Trust have some useful published guidelines online describing how to build bat boxes and where to position them within the landscape⁴⁰.
- During warm summer evenings bats will most likely be able to be observed foraging over the ponds and vegetated areas within the site. The ultra sonic calls that bats make can be made audible to the human ear through the use of a bat detector. Bat walks across the site with a bat detector would be a good method of allowing the children using the site to be able to get close to nature and engage with these species.
- There are three disused air raid shelters spread across the site (Figs. 2 & 14). Currently, there is no evidence to suggest that these are being used by roosting bats. However, if a few minor modifications are made, either some or all can be made into bat hibernacula. Bats will often use underground structures similar to these as hibernation roosts, whereby a consistently low temperature is maintained throughout the winter, with very little fluctuation. The following basic, cheap modifications can be made to one or all of the air raid shelters in an attempt to improve their hibernating potential for bats:

• If modifications are made to more than one, or indeed all three of the shelters, due to the shelters all having slightly different aspects and locations within the site, there is more chance that at least one of the shelters will be used by bats.

• Squeeze boxes constructed of ply could be installed within the corners and on the ceilings of the shelters, to provide potential, small, cryptic spaces that mimic cracks in rock that bats would use in a more natural cave setting⁴¹.

• The floors of the shelters should be covered with a few inches of sand and gravel to help regulate the temperature and humidity within the shelters.

⁴⁰http://www.bats.org.uk/pages/bat_boxes.html#Making%20your%20own

⁴¹https://www.wildcareshop.com/ply-wedge-bat-box.html



• The most likely reason that the shelters appear to be currently not occupied by bats, could be that there is too much draft within the structure. This could be overcome by fitting the shelter with a locked door and just leaving an access hole of approximately 5x5cm. The door should be locked to avoid people accessing the structure and subsequently committing an offence under UK/EU wildlife legislation, if bats do begin to occupy the structures. If bats do eventually occupy the structure, access should only be undertaken under the supervision of a licensed bat worker.

• Care must be taken, when working in, or accessing the shelters, as the shelters currently support a population of the invasive false widow spider (*Steatoda nobilis*). This species is thought to be able to inflict a bite to humans, with the symptoms similar to a wasp or bee sting.





Figure 13. (Left) A purpose constructed woodcreate bat box made by Schwegler (right) handmade timber bat boxes.







Figure 14. (Left) The entrance to one of the air raid shelters (no. 9; Fig. 2) within the site. (Right) the internal aspects of the air raid shelter.

Improving the site for dormice:

The blackthorn scrub and species rich hedgerow habitats within the site support ideal habitat for dormice. Dormice occupy a UK stronghold within the southwest of England, so there is a reasonable chance that dormice already occupy the site. In addition, dormice are attractive charismatic species that would appeal to school groups using the site. The species is also of high conservation importance being both UK and Cornwall BAP Species. Given all of these aspects it would advantageous to manage the site positively for dormice. The following steps can be taken to manage the site to improve it for dormice:

- Dormice appear to thrive in a woodland/scrub environment where coppicing regimes are undertaken, giving a varied age structure to the woody vegetation. sections of the site could be coppiced on a 5-10 year cycle to create this varied age structure. Groups such as the British Trust for Conservation Volunteers⁴² could potentially help with the coppicing of the site. The Cornwall Mammal Group could also potentially help manage the site for dormice.
- Dormouse nest boxes could be distributed across the site within the hedges and scrub habitat, to first confirm the presence of dormice within the site and if present, could be used for monitoring the dormice within the site. The boxes can be deployed at a reasonably high density (the site could support at least 50-80 boxes) (Fig. 15).

⁴² http://www.tcv.org.uk/





Figure 15. Timber dormouse nest boxes.

- Boxes can be purchased commercially⁴³, but could also be constructed from untreated scrap ply or timber⁴⁴ (Fig. 15). The Peoples trust for Endangered Species have a dormouse box grant⁴⁵, whereby they can often supply boxes or cover the cost of boxes.
- If dormice are discovered using the boxes within the site, checking the boxes becomes a licensable activity, therefore the boxes can only be checked under the supervision of a Natural England Dormice License holder. The Cornwall Mammal Group may potentially be able to help with this, or The Peoples Trust for Endangered Species could suggest a local dormouse license holder who could help. When in the company of a license holder, school groups could be able to experience dormice in the hand and at close quarters.
- A number of the boxes could be fitted with nest box cameras so that the activity of the dormice using the boxes can be watched from the classroom/teaching areas.
- If dormice are indeed present upon the site, then the site could become part of the National Dormouse Monitoring Program, that is administered by the Peoples Trust for

⁴³ http://www.nhbs.com/browse/subject/923/dormouse-boxes

⁴⁴ https://ptes.org/wp-content/uploads/2014/12/Box_specification_front_fixing.pdf

⁴⁵ https://ptes.org/campaigns/dormice/



Endangered Species⁴⁶. Monitoring could be overseen by a local, licensed dormouse specialist, involving the school groups or other site visitors.

Produce information boarding

Clear, concise information is often one of the greatest assets of a site promoting conservation and environmental education. Information boarding can be produced for each of the specific areas or habitats created or managed within the site. As well as educating the visitors and users of the site as to the species they could encounter and the habitats that are within the site, information boarding can also display the logos of partner organisations involved in managing the site such as The Wildlife Trust.

⁴⁶ https://ptes.org/campaigns/dormice/#ndmp



3. Appendix 1

Recommended submerged native plants: Spiked water-milfoil (*Myriophyllum spicatum*) Whorled water-milfoil (*M. verticillatum*) Curled pondweed (*Potamogetoncrispus*) Hornwort (*Ceratophyllumdemersum*) Water starwort (*Allitrichestagnalis*) Common spike-rush (*Eleocharispalustris*) Willow moss (*Fontinalisantipyretica*) Marestail (*Hippurus vulgaris*) Water violet (*Hottoniapalustris*) Water crowfoot (*Ranunculusaquatilis*)

Recommended floating native plants:

White water lily (*Nymphaea alba*) Ivy-leaved duckweed (*Lemnatrisulca*) Frogbit (*Hydrocharismorsusranae*) Water soldier (*Stratiotes aloides*)

Recommended emergent native plants:

Yellow iris (*Iris pseudacorus*) Meadowsweet (*Filipendula ulmaria*) Purple loosestrife (*Lythrum salicaria*) Rushes (*Juncus spp*) Sedges (*Carex spp*) Greater spearwort (*Ranunculus lingua*)

Water mint (Menthaaquatica)

Water forget-me-not (Myosotis scorpioides)

