

Maes Emlyn, Rhyl Mitigation and Conservation Plan

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Contents

1.0	Introduction	3
2.0	Avoidance, Mitigation and Restoration.....	4
3.0	Compensation and Enhancement.....	10
4.0	Further Works	16
5.0	Legislation.....	17
6.0	References.....	20
	Appendix A- Further Lighting Guidance	21
	Appendix B- General Biosecurity Measures	23

1.0 Introduction

- 1.1 Enfys Ecology Limited were commissioned by Wales and West Housing to produce a Mitigation and Conservation Plan, which is to be implemented alongside the proposed works at Maes Emlyn, Rhyl, LL18 3SF.
- 1.2 This plan is informed by the findings of a Preliminary Ecological Appraisal (PEA), Preliminary Roost Assessment (PRA), Daytime Bat Walkover and Nesting Bird Assessment of the site conducted in 2025. Previous ecological surveys were undertaken in 2023. All surveys were carried out by Enfys Ecology (Payne, 2023; Askari, 2025).
- 1.3 During the PRA and Daytime Bat Walkover surveys in 2025, there was no evidence of bats observed onsite and the buildings at Maes Emlyn were considered to have negligible to low potential to support roosting bats. The site provided a small area of bat foraging and commuting habitat, with connectivity to the adjacent railway and treeline at the southern border. Overall the site had low potential to support bats as per the Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition) (Collins, 2023).
- 1.4 The Nesting Bird Assessment undertaken in 2025 found no evidence of nesting birds within the buildings or the habitats onsite; however, it was deemed likely that herring gulls could nest on the flat roofs of the buildings and possible that birds could use the building exteriors, trees or hedgerows during the bird nesting season (March – September).
- 1.5 The PEA in 2025 identified the following Phase 1 habitats within the survey area; amenity grassland, hedgerow, buildings, hardstanding, mixed parkland and scattered trees. The native hedgerow onsite was a Habitat of Principal Importance under Environment (Wales) Act 2016. Montbretia and wall cotoneaster species were identified onsite and are listed as invasive non-native species (INNS) under Schedule 9 of the UK Wildlife & Countryside Act.
- 1.6 During the PEA, the site had suitable habitat for sheltering small mammals and common reptiles and amphibians, in the form of rubble and furniture habitat piles. There was no suitable habitat for breeding amphibians or badgers. It was deemed likely that badgers would use the site for foraging on occasion.
- 1.7 The proposed works at Maes Emlyn involve demolition of the existing buildings and construction of a residential development comprising 23 housing units and associate infrastructure.
- 1.8 To reduce the scale of the ecological impact of the works, mitigation, compensation and enhancement measures will be implemented, which are detailed within this plan. In line with Planning Policy Wales, and following the Environment (Wales) Act 2016 and guidance provided in the letter from the Chief Planner in Wales, there is a requirement to ensure that a **net benefit for biodiversity** is also provided in all applications for planning in Wales.

2.0 Avoidance, Mitigation and Restoration

2.1 Proposed Works

2.1.1 The proposed works at Maes Emlyn involve demolition of the existing buildings and construction of a residential development comprising 23 housing units, including flats, bungalows and houses. Associate infrastructure will include an extension of the existing hardstanding road, construction of a cycle shelter, electrical sub-station and bin collection points. Several trees towards the centre of the site will be removed and a Sustainable Drainage Systems (SuDS) feature created. There will be a railway easement of 3 metres from the southern site boundary. The current plans for the proposed works are shown in Figure 2.1 below.



Figure 2.1: Proposed Residential Development for Maes Emlyn, Rhyl
Base image © RLH Architectural Ltd 2025

2.2 The Step-Wise Approach

Development proposals should take green infrastructure into consideration in order to avoid negative impacts on habitats and species, and seek ways to maintain and enhance biodiversity. Impacts on habitats and species should be treated in a step-wise manner (Planning Policy Wales PPW12), by seeking to:

- **Avoid** damage to biodiversity in its widest sense by maintaining the largest possible area of existing habitat supporting biodiversity and functioning ecosystems, particularly Section 7 habitats and species where present, through careful development design and consideration of long-term maintenance and management and ensuring that retained habitats continue to be well connected to adjacent habitats to provide connectivity for key species.
- **Mitigate** or **restore** by identifying measures to address the specific negative effects by repairing damaged habitats and disturbed species. The measures should seek to restore in excess of like for like, accounting for disturbance and time lags for the recovery of habitat and species, and in every case, mitigation or restoration measures should seek to build ecosystem resilience within the site and where possible the wider area.
- As a last resort, off-site **compensation** for unavoidable damage must be provided. This must be of significant magnitude to fully compensate for any loss.
- All development must **deliver a net benefit** for biodiversity and ecosystem resilience from the baseline state (proportionate to the scale and nature of the development proposed).

2.3 Avoidance

2.3.1 Based on the ecological information set out in the Preliminary Ecological Appraisal (Askari, 2025), potential impacts on the following Habitats of Principal Importance for Wales from development should be avoided:

- It is recommended that the native-species hedgerow at the western site boundary is retained as it provides green infrastructure and likely commuting habitat for fauna, including a flight line for foraging bats.

2.3.2 In addition, the following habitats provide a contribution to the green infrastructure provided by the site, and, where possible, should be retained and protected during development:

- Scattered trees
- Amenity grassland

- 2.3.3 With respect to the potential impact of bats from lighting associated with development schemes, the Institute of Lighting Professionals (2023) 'Bats and Artificial Lighting at Night' guidance suggests that the ecological mitigation hierarchy applies to lighting design: impacts to biodiversity should be avoided in the first instance through design and where this has been clearly demonstrated not to be possible, appropriate mitigation needs to be put in place. Compensation is the least desirable option, so all other avenues should first be explored. In parallel, opportunities to design lighting betterment for biodiversity should be sought wherever possible.
- 2.3.4 It is therefore important to integrate avoidance measures into developmental design, by retaining ecologically functional 'darker corridors' within schemes wherever feasible, and in preference to seeking lighting mitigation strategies. Consideration should be given to the lighting effect of a scheme on Key Habitat and Supporting Habitat areas for bats, as well as commuting routes.
- 2.3.5 It is recommended that the southern site boundary of existing parkland, adjacent to the railway line is retained as a 'darker corridor' for commuting wildlife.
- 2.3.6 General biosecurity measures which should be adopted as part of any development project are provided in Appendix E.

2.4 Mitigation

- 2.4.1 This section sets out the likely mitigation measures which could be adopted as part of the project to minimise potential impacts on biodiversity features.
- 2.4.2 The following general mitigation measures should be adopted at all times during the works:
- Working areas should be kept to the minimum required.
 - Works should be avoided within 1 hour of dawn and dusk where possible, in order to avoid disturbance to nocturnal animals. If works during this time are needed, all lighting should be directional and directed away from boundary edges and any surrounding habitat.
 - Storage of fuel must follow best practice. Potential pollutants should be restricted to site compounds and hardstanding areas. Spill kits should be readily available throughout the works.
 - Should it be necessary to have any excavations left open overnight a suitable ramp (such as a plank or branch) must be provided to allow badgers, and other animals to escape the pit. Ramps could be created by grading the slope at the edges or using scaffold boards.

- All materials brought onto site should be stored on hard standing where possible. Materials should be stored on raised pallets or bagged, to prevent amphibians (or other wildlife) from taking refuge beneath them.
- Any terrestrial mammals seen must be allowed to leave the area on their own. If this is not possible e.g. the animal is injured or trapped then an ecologist must be called.
- If at any point in the works an amphibian or reptile is found within the works area all works in the vicinity of the sighting must immediately cease. Common amphibians should be moved from the working area by site workers (wearing gloves) and placed in a nearby hedgerow. Reptiles will usually retreat to a safe area of their own accord. If, at any point, GCN are discovered during the works then works will have to stop and a licence may be required from NRW before they can continue.

2.4.3 It is recommended that the following mitigation measures are adopted during the construction-phase in order to minimise any potential impacts on habitats or species.

2.4.4 ***Amphibians/Reptiles/Hedgehogs***

- a. Care must be taken regarding clearance of any piles of brushwood, rubble, plant material or other 'habitat piles' in the colder months due to the possibility of disturbing hibernating animals including hedgehogs. Such piles should not be disturbed between October and April or when daytime temperatures are below 10°C. Removal of habitat piles should then take place by hand, prior to the works.
- b. It is recommended that the amenity grassland onsite is managed to retain its short sward height prior to the works, to minimise suitability for foraging amphibians that could later be disturbed and impacted by the works.

2.4.5 ***Bats***

- a. **Prior to carrying out the demolition of the buildings, and any work to mature trees on or adjacent to the site, a pre-works check for roosting bats must be carried out by an ecologist, within 24 hours of the works commencing.** If bats or evidence of bats is found then the works must be postponed and a licence may be required from Natural Resources Wales before works can continue.
- b. After avoiding, wherever possible, the potential impacts of Artificial Lighting At Night (ALAN) through scheme designs, a lighting professional should help to select those light sources, lamps, LEDs and their fittings which are most appropriate for the project. Further details regarding lighting designs from ILP (2023) are given in Appendix A.

2.4.6 **Removal of hedgerow/scattered trees**- this has the potential to affect nesting birds, bats and other fauna that could be using these habitat features at the time of works. Removal of trees or hedgerow during the nesting season (March-September inclusive) may impact nesting birds. **If work is necessary during this period, a further survey will be required in order to establish if nests are present, within 48 hours prior to the works commencing.** If any active nests are present all works in the vicinity must cease until all chicks have fledged.

2.5 Restoration

2.5.1 Montbretia and wall cotoneaster species were identified onsite during the PEA (Askari, 2025) and are listed as invasive non-native species (INNS) under Schedule 9 of the UK Wildlife & Countryside Act. Buddleia was also observed at the western site boundary and is considered to be an invasive species. Buddleia is not listed under Schedule 9, as it is considered widely naturalised in the UK. Recommended measures to manage and remove the INNS onsite are provided within the biosecurity risk assessment below in Table 2.1. General site biosecurity measures for the works are provided in Appendix B.

Table 2.1: Biosecurity Risk Assessment

Species	Potential contamination route	Likelihood of risk	Operational Procedure	Controlled Waste
Buddleia	<p>Spread of species via construction machinery/movement of soil.</p> <p>Introduction of seeds via contaminated soil.</p>	<p>Low risk if there are no known requirements to import soil.</p> <p>Moderate if heavy plant is used on site and may spread the existing species present.</p>	<p>Ensure contractors know how to recognise the species.</p> <p>The plants should be cut back to the stump and the cuttings should be disposed of by burning.</p> <p>Stumps should be either dug up and disposed of, or injected with herbicide immediately after being cut.</p> <p>Young plants should be pulled by hand.</p>	No

Species	Potential contamination route	Likelihood of risk	Operational Procedure	Controlled Waste
Montbretia	<p>Spread of species via construction machinery/ movement of soil. Introduction via contaminated soil.</p> <p>Introduction via natural dispersal.</p>	<p>Low risk if there are no requirements to import soil. Montbretia typically spreads slowly if left undisturbed.</p> <p>Moderate risk if heavy plant is used, as montbretia is present adjacent to a building that will be demolished and there is a risk of tracking material out of the site.</p>	<p>Ensure contractors know how to recognise the species.</p> <p>Excavate the plants including their corms and surrounding soil. Removed material should be treated as controlled waste and sent to licenced landfill, or buried on site in waste management areas.</p>	<p>Yes – any plant material or soil</p>
Wall Cotoneaster	<p>Species spread by machinery and movement of soil/plant material.</p> <p>Introduction/spreading via natural dispersal of seeds.</p>	<p>Low risk if there are no requirements to import soil. Wall cotoneaster typically spreads slowly if left undisturbed.</p> <p>Moderate risk if the wall where the plant was found is not going to be retained. The plant is located at the site boundary and there is potential for material to be spread via machinery.</p>	<p>Ensure contractors know how to recognise the species.</p> <p>Young seedlings present to be pulled by hand and the root mass excavated</p> <p>Plants to be removed when not in fruit (not in July – October)</p> <p>Any material from the cotoneaster or containing cotoneaster waste must be chipped/burnt on site, or removed to licensed landfill as controlled waste.</p>	<p>Yes – any plant material</p>

3.0 Compensation and Enhancement

3.1 Compensation

3.1.1 This section of the report identifies which habitats or species features may need to be compensated for as part of the proposed development, and provides information to incorporate the recommended compensation proposals into the scheme design.

3.1.2 Consideration of the development proposals for the site have identified that compensation for the loss of / damage to the following habitats may be required:

- Bat roosting habitat lost as a result of the building demolitions
- Nesting bird habitat within the existing buildings and trees proposed for removal
- Loss of amenity grassland foraging habitat for fauna

3.1.3 The proposed works will result in the destruction of potential roosting features for crevice-dwelling bats, within the existing buildings. The plans for the site indicate that new buildings will be constructed as part of the works, and build in bat boxes are favored over externally mounted boxes. To compensate for the destruction of potential bat roosting features, it is recommended that a minimum of 10 build-in bat boxes will be used. Examples of suitable bat boxes are shown below in Figure 3.1.

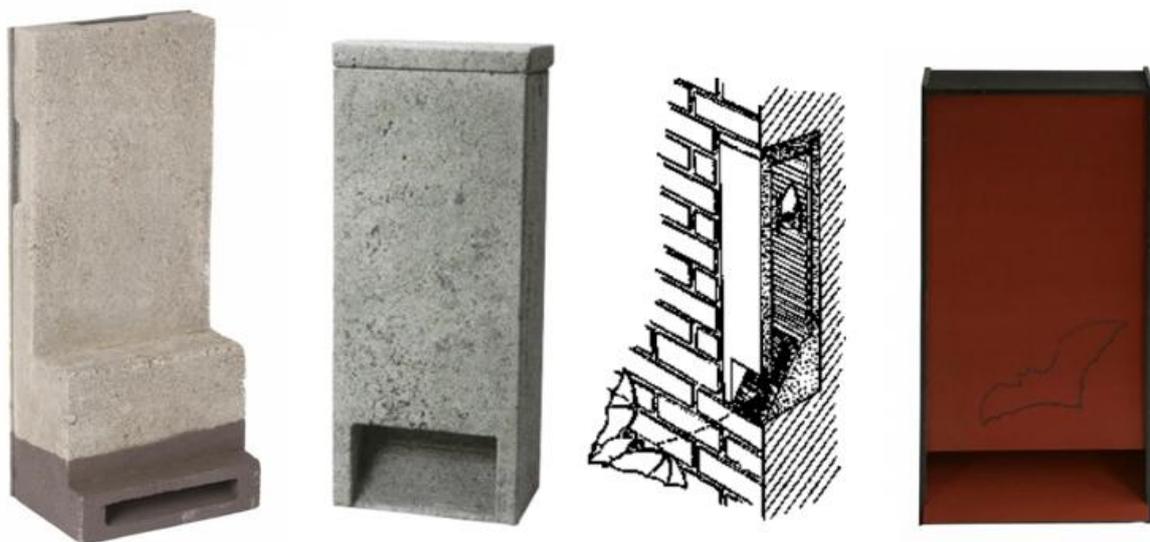


FIGURE 3.1 : EXAMPLES OF SUITABLE BUILD IN BAT BOXES
(LEFT – VIVARA PRO BUILD-IN BAT BOX; CENTRE –1FR SCHWEGLER BAT TUBE; RIGHT – INTEGRATED ECO BAT BOX)

- 3.1.4 The bat boxes will be incorporated into the walls of the new buildings. The proposed locations have been selected to ensure that the boxes are shielded from potential sources of light spillage, safe from predators, such as cats, and provide suitable roosting conditions for bats. Figure 3.5 indicates the proposed locations for inbuilt bat boxes.
- 3.1.5 To compensate for the loss of bird nesting habitat due to the demolition of buildings and proposal to remove several trees, it is recommended that a minimum of 10 built-in bird boxes are incorporated into the design for the new buildings. Examples of suitable bird boxes, with different sized entrances to suit a range of species, are shown below in Figure 3.2. Figure 3.5 shows the proposed locations for bird boxes to be incorporated into the walls of the new buildings.

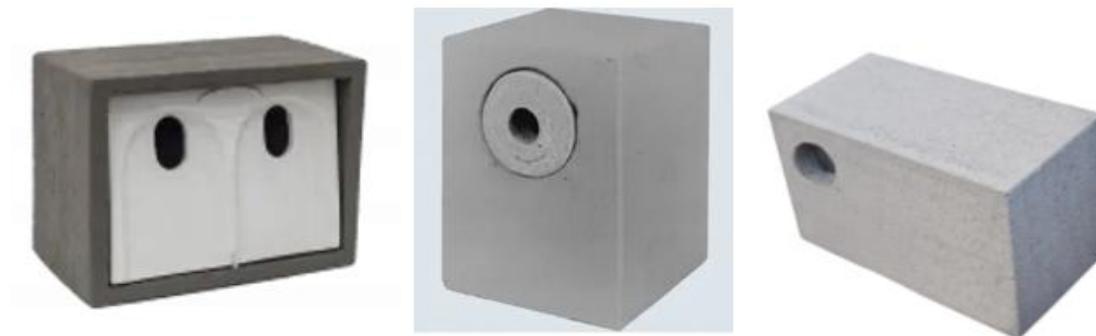


FIGURE 3.2 : EXAMPLES OF SUITABLE BUILT IN BIRD BOXES
(LEFT – VIVARA PRO WOODSTONE HOUSE SPARROW NEST BOX; CENTRE –TYPE 24 SCHWEGLER BRICK NEST BOX; RIGHT – UNITURA INTEGRATED STARLING NEST BOX)

- 3.1.6 It is recommended that the loss of trees is compensated for by supplementary planting of native trees and shrubs within the existing hedgerow at the western site boundary, to fill in the gaps and improve connectivity for wildlife. Planting can take place over a five-year period with tree stakes and rabbit guards used. Suitable species are shown in the list in Table 3.1

TABLE 3.1: RECOMMENDED NATIVE TREE AND HEDGEROW SPECIES

Latin name	Common name
<i>Acer campestre</i>	Field maple
<i>Cornaceae</i>	Dogwood
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Euonymus europaea</i>	Spindle
<i>Ilex aquifolium</i>	Holly
<i>Prunus avium</i>	Wild Cherry
<i>Prunus padus</i>	Bird Cherry
<i>Rosa canina</i>	Dog rose
<i>Sorbus aucuparia</i>	Mountain ash/rowan
<i>Sorbus torminalis</i>	Wild service tree
<i>Viburnum lantana</i>	Wayfaring tree
<i>Viburnum opulus</i>	Guelder rose

3.1.7 The loss of amenity grassland will be compensated for by creating patches of native wildflower meadow 'stepping stones' for invertebrates, located across the site and within the proposed SUDS area. The bare ground should be prepared by using low fertility soil, before a native-species wildflower meadow seed mix is sown. Figure 3.5 shows the location of proposed wildflower stepping stones.

3.2 Enhancement

3.2.1 Planning Policy Wales (PPW12, paragraph 6.4.5) confirms that planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature to provide a **net benefit for biodiversity** and improve, or enable the improvement, of the resilience of ecosystems.

3.2.2 Based on the development proposals provided to EnfyS at this stage in the design process, the following recommendations in relation to providing a net benefit for biodiversity as a result of the proposed development include:

- Hedgerow creation along the eastern border of the new development.
 - The shrubs will comprise at least four different locally-native species as given in Table 3.1
 - A double row of trees and shrubs will be planted
 - Rabbit guards and stakes will be used
 - Any losses will be replaced over a ten-year period

- The southern site boundary will be retained as a 'darker corridor' between the site and the railway line with no artificial lighting, to encourage foraging and commuting bats.
- Hedgehog highways will be installed at any of the site boundaries where fencing would otherwise prevent access for hedgehogs, to enable connectivity between the site and the wider landscape. The highways comprise a gap of at least 13cm x 13cm in the bottom of the fence.
- A reptile and amphibian hibernaculum will be built at the south-eastern corner of the site, away from disturbance, to enhance the area for reptiles and amphibians.
- Swift boxes will be installed on the new buildings to encourage nesting.

3.2.3 The hibernaculum for reptiles and amphibians will be constructed in accordance with the great crested newt mitigation guidelines (English Nature, 2001), and should consist of a core (clean rubble, logs or similar material) and a topsoil cap. The minimum dimensions for the artificial hibernaculum should be one metre long by one metre wide, and one metre high (see Figure 3.3).

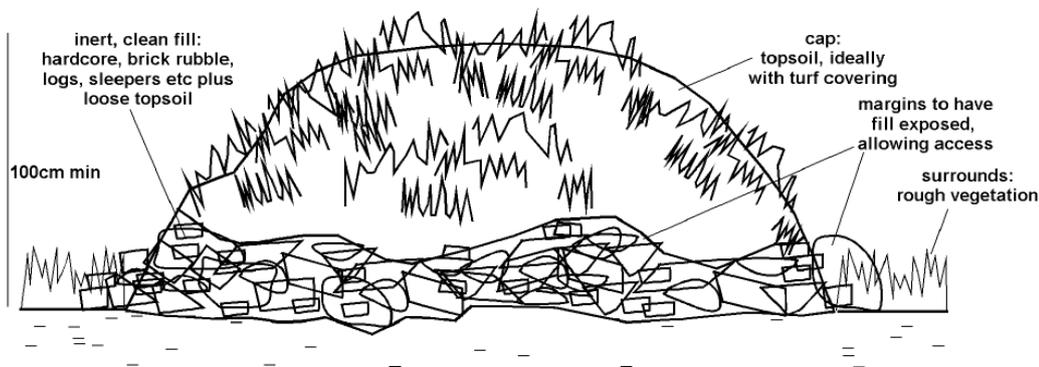


FIGURE 3.3: ARTIFICIAL HIBERNACULUM DESIGN IMAGE ©ENGLISH NATURE 2001

3.2.4 As swifts have been recorded within 1 km of the site, it is recommended that a minimum of two multi-cavity swift boxes, or four single-cavity nest boxes, are installed on the buildings. Swift boxes should be at least 5m high, and grouped together (situated 60 – 100cm apart) as swifts prefer to nest in colonies. To increase the chances of swifts using the boxes they should contain an internal egg cup so the eggs do not move around within the box. There are different types of nest boxes available but the HabiSabi double swift box is recommended as it is multicavity and can be opened up to insert a nest cup before it is erected onto the wall. Ready-to-insert egg cups are available online; it is recommended that an egg cup is used in each of the two cavities of each of the nest boxes. Figure 3.4 provides examples of suitable swift boxes.



FIGURE 3.4 : EXAMPLES OF SUITABLE SWIFT BOXES
(LEFT- HABI-SABI DOUBLE SWIFT BOX; CENTRE – ORLANDO SWIFT BOX; RIGHT –NO. 17 SCHWEGLER SWIFT NEST BOX)

3.2.5 Figure 3.5 below shows the proposed locations for compensation and mitigation measures including the bat and bird boxes, hibernaculum, wildflower stepping stones, hedgerow planting and 'darker corridor', in relation to the current site plan.



FIGURE 3.5 : LOCATION OF PROPOSED SITE MITIGATION AND ENHANCEMENT MEASURES.

Base image © RLH Architectural Ltd 2026.

4.0 Further Works

4.1 Table 4.1 below provides a summary of ecological considerations associated with the proposed development. Note that “pre-construction” means prior to the works phase beginning on site, whereas “immediately prior to clearance” means during the works, but prior (ideally within 48 hrs) to that particular operation (e.g. tree felling, demolition) beginning.

Constraint	Work Stage	Species	Work	Location	When possible
Invasive non-native plants	Pre-construction	Montbretia and wall cotoneaster	Removal of INNS	Site	All year
Any work to existing hedgerow or trees	Immediately prior to clearance	Nesting birds	Nesting bird checks	Site	Nesting bird check required March-September. Work is possible all year.
Demolition of buildings	Immediately prior to clearance	Bats and nesting birds	Bat and nesting bird checks by an ecologist	Existing buildings	All year
Hedgehog access post-construction	Design/pre-construction	Hedgehog	Creation of ‘hedgehog highways’ in fencing	Fencing for site	Pre-planning
Bat & nesting bird features post-construction	Design	Bats and nesting birds	Bat and bird boxes to be implemented	Within new site buildings	Pre-planning
Lighting impacts	Design	Bats	Mitigating the potential impact of lighting on bats including proposer ‘darker corridor’ at southern boundary.	Site	Pre-planning

5.0 Legislation

5.1 *Bats*

The Wildlife and Countryside Act (WCA) 1981 (as amended) forms the key legislation protecting habitats and species in the UK. All UK bat species are fully protected under the 1981 Act through inclusion on schedule 5. All bats are also listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 which transcribes the EC Habitats Directive into UK law. In combination, this legislation makes it an offence to:

- Deliberately or recklessly take, injure or kill a bat;
- Deliberately or recklessly damage or destroy a place or structure used by bats for shelter or protection;
- Deliberately or recklessly obstruct access to a bat roost; or
- Deliberately or recklessly disturb bats while occupying a roost.

Bat roosts are protected under these laws whether the animals are present at the time of survey or not. Under both laws the Welsh Government and D.E.F.R.A. are empowered to issue licences to carry out work to bat roosts for reasons of overriding public interest. It is not illegal to tend to a disabled bat pending recovery.

5.2 *Birds*

Under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000, all wild birds, their nests and eggs are protected during the breeding season (typically March to August inclusive). This makes it an offence to:

- Intentionally kill, injury or take any wild bird.
- Take, damage or destroy the nest of a wild bird included in Schedule ZA1.
- Take, damage or destroy the nest of any wild bird while that nest is in use or being built.
- Take or destroy an egg of any wild bird.

5.3 *Reptiles*

All British reptiles are protected from intentional killing, injuring and sale under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). These are as follows:

- Adder, *Vipera berus*
- Grass snake, *Natrix natrix*
- Smooth snake, *Coronella austriaca*
- Slow worm, *Anguis fragilis*
- Common lizard, *Zootoca vivipara*

- Sand lizard, *Lacerta agilis*

Additional protection applies to smooth snake and sand lizards, for which the following are offences:

- Intentionally or recklessly damaging/destroying a place of shelter/protection
- Intentionally or recklessly disturbing an animal in its place of shelter/protection
- Intentionally or recklessly obstructing access to its place of shelter/protection
- Taking or destroying their eggs
- Possession (live or dead, including derivatives), sale and offering for sale.

5.4 *Biodiversity Net Gain – Relevant sections of legislation*

Section 6 of the Environment (Wales) Act 2016:

Biodiversity and resilience of ecosystems duty

(1) A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.

(2) In complying with subsection (1), a public authority must take account of the resilience of ecosystems, in particular the following aspects—

- (a) diversity between and within ecosystems;
- (b) the connections between and within ecosystems;
- (c) the scale of ecosystems;
- (d) the condition of ecosystems (including their structure and functioning);
- (e) the adaptability of ecosystems.

.... (5) In complying with subsection (1), a public authority other than a Minister of the Crown or government department must have regard to—

- (a) the list published under section 7;
- Section 7 of the Environment (Wales) Act 2016:

Biodiversity lists and duty to take steps to maintain and enhance biodiversity

- (1) The Welsh Ministers must prepare and publish a list of the living organisms and types of habitat which in their opinion are of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales.
- (2) Before publishing a list under this section the Welsh Ministers must consult the Natural Resources Body for Wales (“NRW”) as to the living organisms or types of habitat to be included in the list.
- (3) Without prejudice to section 6, the Welsh Ministers must—
 - (a) take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and
 - (b) encourage others to take such steps.

6.0 References

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Appendix A- Further Lighting Guidance

After avoiding, wherever possible, the potential impacts of Artificial Lighting At Night (ALAN) through scheme designs, if further mitigation measures are required in the form of lighting controls, ILP (2023) recommend that a lighting professional helps to select those light sources, lamps, LEDs and their fittings which are most appropriate for the project. To assist with the decision-making process, ILP (2023) suggest that the following are considered when choosing luminaires:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone et al, 2012).
- Internal luminaires can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered - see ILP (2021) GN01.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.
- Where appropriate, external security lighting should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow. For most general residential purposes, a 1 or 2 minute timer is likely to be appropriate.
- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites.

Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these issues.

- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

Appendix B- General Biosecurity Measures

Biosecurity means taking measures to ensure that good practices are in place to minimise the risk of importing and spreading invasive non-native species (INNS), pests and infectious disease. As non-native species or diseases could be transmitted in any water or material, a good biosecurity routine is essential, even if invasive non-native species are not apparent.

General good-practice biosecurity measures include:

- A toolbox talk detailing the general risks of invasive non-native species (INNS) relevant to the site and the project should be delivered to all workers, showing the various life stages and how to recognise these plants and animals.
- A cleaning station should be set up at the site exits including facilities to wash boots and vehicles.
- **All** footwear of staff leaving site (for **any** reason and no matter for how short a time) should be cleaned (i.e., visually free of soil and debris) before leaving site.
- Soil and vegetation should be washed off with clean water (and brushes). Water (which should not be contaminated with any disinfectant or other pollutants) should then be disposed of by pouring on site to soak away. No water should be disposed of directly into a watercourse.
- The wheels or tracks (and any other part which has come into contact with the soil) of all vehicles which have entered the area must be thoroughly washed and be free of soil and debris before leaving the site.
- No one should remove any soil or vegetation from the working area for any reason.

It may be necessary to produce a site-specific and project-specific Biosecurity Risk Assessment to support the construction-phase of the project, once detailed design works have been completed and timings and construction methods are known. This Biosecurity Risk Assessment should identify the specific biosecurity risks associated with the works and detail operational procedures to minimise the risk of spreading invasive non-native species (INNS) and other biosecurity risks.