



**DALCOUR
MACLAREN**

Global Centre of Rail Excellence

Reptile Mitigation Strategy – Phase 1A

Client: Ove Arup & Partners Ltd

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1 Introduction

1.1 Commission

- 1.1.1 Dalcour Maclaren (DM) have been commissioned by Ove Arup & Partners Ltd (Arup) on behalf of their client Global Centre of Rail Excellence (GCRE) Ltd, to produce a Reptile Mitigation Strategy (RMS) for Phase 1A of the GCRE project, which sits in the Counties of Neath Port Talbot and Powys.

1.2 Background

- 1.2.1 The RMS has been prepared to partially discharge Condition 16, of the planning consents P2021/0381 (Neath Port Talbot Council (NPTC) and 21/0559/OUT (Powys County Council (PCC), which relate to the site clearance and development of infrastructure associated with GCRE.

- 1.2.2 Condition 16 in each of the above planning applications states that:

'No development shall take place in any phase of development as identified in condition 7 (including demolition, ground works, site or vegetation clearance) until a scheme for the conservation of reptiles has been submitted to and approved in writing by the Local Planning Authority. This will include but is not limited to the following:

- *Location of any Receptor Sites to be used and detail of landownership/control of the site;*
- *Suitability of Receptor Sites for reptiles that will include estimated existing populations presented based on up-to-date survey information*
- *Enhancement measures to be implemented on Receptor Sites;*
- *Re-location methodologies and timing;*
- *Monitoring proposals; and*
- *Details of any necessary agreement with landowner.*

- 1.2.3 Condition 16 which requires the production of a RMS, relates to the Project's Environmental Statement¹ which was produced as part of an EIA application (under the Town and County Planning (Environmental Impact Assessment (Wales) Regulations 2017 ('The EIA Regulations')), and

¹ Arup (2021) GCRE: Environmental Statement. Welsh Government.

specifically the Ecology Chapter (Chapter 7) which details the Ecological Impact Assessment (EclA), in line with the Guidelines for Ecological Impact Assessment in the UK and Ireland ('the CIEEM Guidelines')².

1.3 Objectives / Purpose of this document

- 1.3.1 The purpose of this document is to detail a Mitigation Strategy for reptiles occurring within the Phase 1A Site, comprising information on Receptor Sites including enhancements and landowner details, methodologies for the translocation of reptiles, and post construction monitoring.
- 1.3.2 This document will be submitted to and approved by NPTC and PCC as the relevant Local Planning Authorities (LPAs). Once NPTC and PCC have reviewed the RMS and provided a written response in support of the document, condition 16 of the outline planning consents (P2021/0381 and 21/0559/OUT) can be formally discharged.
- 1.3.3 As this document will only cover a small part of the GCRE Site and proportion of the wider GCRE development, it is anticipated that the LPA will partially discharge planning condition 16. Once the RMS for each phase of the development has been submitted it will be possible to fully discharge planning condition 16.

1.4 Legislation

- 1.4.1 Common reptile species receive partial protection under the Wildlife and Country Act 1981 (as amended). Common reptile species include adder (*Vipera berus*), common lizard (*Zootoca vivipara*), grass snake (*Natrix helvetica*), and slow worm (*Anguis fragilis*). Under this legislation, it is an offence to:
 - Intentionally or recklessly kill or injure reptile species; and
 - Sell, offer or advertise for sale, possess or transport for the purposes of sale these animals, whether alive or dead, or any part thereof.
- 1.4.2 The Environment (Wales) Act 2016 includes a duty on all public authorities to have regard to the conservation of biodiversity in the exercise of their functions. This duty applies to government bodies, local authorities and statutory undertakers. The Act also requires lists to be published of Habitats and Species considered to be of Principal Importance for the Conservation of Biological Diversity. These are referred as Section 7

² CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1. Chartered Institute of Ecology and Environmental Management.

habitats and species after the sections of the Act which require the publication of lists in each devolved area. All common reptiles are listed as a Section 7 Species.

- 1.4.3 All four common reptile species are listed as UK Biodiversity Action Plan (UKBAP) Priority Species. Action Plans exist for each UK BAP Priority Species to demonstrate the UK's commitment to help reduce or halt the significant losses in global biodiversity³.

³ The UKBAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in July 2012. The UK list of priority species, however, remains an important reference source and has been used to help draw up statutory lists of priority species.

2 Phase 1A Site

- 2.1.1 The earthworks and construction for GCRE are proposed over numerous phases and this document relates to the initial phase, Phase 1A (as shown in Appendix A).
- 2.1.2 The Phase 1A Site is located within the area of the Washery of the operational Celtic Energy site. This initial phase will create storage sidings in addition to providing the associated drainage.
- 2.1.3 The storage sidings will be initially required for the passive storage of up to 250 Train Cars for varying periods. This storage function will provide vital revenue for the project and enable its overheads to be covered over the first 2 years or so before the GCRE comes into service fully.
- 2.1.4 In order to facilitate the earthworks and creation of storage sidings, demolition of some of the existing structures (existing washery buildings) and removal of the existing track bed will be required within phase 1a.
- 2.1.5 In line with the earthworks required, approximately 100,000m³ of material will need to be moved to create a suitable profile for the sidings and ensure efficient drainage. This will result in a surplus of c.50,000m³ of fill materials which will be temporarily stored within the phase 1A area until it can be redistributed at a later date to another phase of the operations.

2.2 Desktop review

- 2.2.1 A suite of ecological surveys were undertaken to inform the ES¹ which included reptile surveys within the Project boundary undertaken between June and October 2019.
- 2.2.2 Reptile surveys of the wider GCRE site recorded peak counts of 17 common lizard and 2 slow worm¹. As acknowledged in the reptile survey limitations, in accordance with best practice guidance⁴ seven survey visits are only enough to confirm presence / likely absence, and twenty visits are required to complete an accurate population assessment. Therefore, it was considered likely that a higher number of reptiles were present within the wider site. As such peak counts were considered to be a minimum number, and an 'excellent' population of common lizard and 'good' population of

⁴ Froglife (1999). Reptile survey, An introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife advice sheet 10

slow worm allowed for based on the presence of optimal habitat within the Site.

- 2.2.3 No reptile surveys were undertaken within the Phase 1A Site during the 2019 surveys, although they were undertaken in similar habitats within the wider GCRE project site including adjacent habitats within the Washery. Common lizard were recorded in the northern corner of Gorsllwyn SINC, to the north of the Phase 1A Site boundary and also within the Onwlllyn coal washery SINC, to the east of the Phase 1A boundary.

2.3 Updated Baseline – Presence and Population size

Presence / absence and population size

- 2.3.1 Reptile presence / absence surveys were undertaken within the Phase 1A area in June 2022, following best practice survey methodology⁴, as detailed within the separate survey report (DM 2022) (Appendix B).
- 2.3.2 Records of common lizard were scattered across the Phase 1A Site, associated with refugia within the grassland to the west, north and east (around the sites periphery and in undisturbed areas). The highest total number of common lizard recorded, on one survey visit, was four.
- 2.3.3 In accordance with guidance⁴ 20 visits are required to accurately assess population size, using the maximum count per site visit. Since only seven site visits were completed for presence / absence surveys, the maximum count per survey visit has been used to provide a minimum population size rather than actual and the actual population size is considered to be larger. The presence / absence survey (based on the maximum count of four individuals) suggests that at least a low population of common lizard is present; however, given that the assessment is based on a reduced survey effort, it is possible that a good population of common lizard is present within the Phase 1A Site.
- 2.3.4 Additionally, the survey report acknowledges that surveys were completed at a sub-optimal time of year, due to the project programme, which also makes it likely that the numbers of common lizard within the Phase 1A Site, are likely to be higher than those recorded.

3 Receptor Site

- 3.1.1 A location immediately north of the Phase 1A Site (see Appendix C) is proposed for use as a Receptor Site for any reptiles that will be displaced during the sites trapping and relocation exercise (which is further discussed below in Section 4). The Receptor Site also occurs within an area of the Gorsllwyn Meadow Site of Importance for Nature Conservation (SINC) under GCRE Ltd ownership, which forms part of the Phase 1A mitigation strategy for habitats, notable plants, and other protected species such as breeding birds, foraging bats and notable mammals. These mitigation measures in addition to the reptile mitigation measures detailed within this document are detailed within separate documents including the Phase 1A drainage strategy⁵, Ecological Protection Plan (EPP)⁶ and Ecological Management and Monitoring Plan (EMMP)⁷, in accordance with the ES requirements. These documents should therefore be read alongside this Reptile Mitigation strategy.

3.2 Baseline – Presence, Population Size and Habitat Suitability

Presence / Absence and Population Size

- 3.2.1 Reptile presence / absence surveys were undertaken of the Receptor Site in June 2022 following best practice survey methodology⁴ as detailed within the separate report (DM 2022).
- 3.2.2 A single common lizard was recorded within grassland in the western part of the Receptor Site. It is considered likely that higher numbers of common lizard are present within the Receptor Site, since surveys were undertaken at a sub-optimal time of year.
- 3.2.3 In accordance with guidance⁴, peak counts indicate a low population is present; however, since only seven visits rather than 20 were undertaken (which is required to accurately determine population size), and additionally the survey was undertaken at a sub-optimal time of year; it is considered possible that a good population of common lizard is present within the Receptor Site.

Habitat Suitability

- 3.2.4 The adjacent Receptor Site is divided into two parcels of land with varying suitability to support reptiles (See Plan 3). The eastern most parcel is a

⁵ Arup (2022) Phase 1A drainage strategy

⁶ Dalcour Maclaren (2022) Ecological Protection Plan

⁷ To be produced

horse grazed field with a range in topography (note range in topography is not as great as that of the Phase 1A Site). The centre of this area is a boggy depression with higher lying areas surrounding it. The areas of higher ground result in south facing slopes that are occupied with short turf grassland to the east and northeast, providing potential basking opportunities for reptile species. A small grass bank occurs to the east running northeast to southwest. Surrounding this are trees, scrub and a small stream to the north and dry ditch. Within the low-lying wet grassland habitats of the site there is a range of sward heights with some waterlogged, heavily poached ground along the southern boundary. Some areas of the grassland support tall and tussocky wet meadow habitats and other areas shorter sward heights occur, creating ecotones throughout the site. An area of scrubby woodland occurs to the western most extent of the parcel, this area is less suitable for reptiles as it is well shaded by the trees.

- 3.2.5 The habitats of the site are suitable for a range of reptile species. Immediately adjacent to the north eastern boundary is an offsite hedgerow, creating edge habitat and may also offer potential for hibernation opportunities within the root plates. Scrub and trees to the west of the site are likely too wet to support hibernation opportunities.



Photo 1: Grass bank to the eastern most corner



Photo 2: Boggy ground with varying sward heights across the land

- 3.2.6 The western parcel supports a small stream running through the land and a pond, within the Phase 1A Site, lies immediately south of this parcel. The site is marshy and swampy in parts and is largely occupied with tall and tussocky vegetation throughout. Higher lying grassland habitats occur to the western most extent on ground that slopes from north to south with scrub and scattered trees along the northern boundary creating edge habitats suitable for basking. Grassland to the western extent is heavily

grazed with short swards which have heights of limited suitability for use by reptiles. To the northern extent of the site significant edge habitats are created by a diversity of short and tall sward heights. To the centre of the parcel tall swampy and marshy habitats are fairly uniform and therefore of less value to reptile species. To the western most extent of the parcel there is scrubland and a greater diversity of sward height with some dead wood and brash piles throughout presenting good quality reptile habitat.



Photo 3: Range of sward height to the north



Photo 4: Uniform grassland in the centre of the site

3.3 Enhancements

- 3.3.1 The Receptor Site supports a number of habitats and features that are suitable for reptile species. One common lizard was recorded within the western most portion of the Receptor Site on the edge of a dense section of tall rush habitat. Habitats within the Receptor Site comprised wet meadow and marshy grassland with streams and swampy areas along with some scrub and small trees and off-site hedgerows located immediately adjacent. Many of the habitats of the site have some suitability to support reptiles, however this could be enhanced through a number of measures.
- 3.3.1 It is considered that the Receptor Site may not be at carrying capacity as very low numbers of reptiles were recorded during the current survey compared to what was expected by the surveyor given the habitats present. However, the sub optimal timing of the survey and lack of full population estimate surveys (as discussed in survey limitations above) may have contributed to the low numbers observed. Therefore, a precautionary approach will be followed in accordance with the assumption that higher numbers are present within the Receptor Site and further enhancements are required to increase the carrying capacity of the site for reptiles.

- 3.3.2 The habitat enhancement works (as outlined below) will be undertaken prior to the translocation of reptiles to ensure the Receptor Site is of sufficient carrying capacity to receive further individuals.
- 3.3.3 These habitats will be retained and enhanced through the following measures to increase the carrying capacity of the Receptor Site prior to any translocation event (See Appendix D).

Warmth and basking opportunities

- 3.3.4 A number of south facing slopes are already present within the Receptor Site (See red arrow on Appendix D). At least one of these slopes will be retained and enhanced. At present, the areas of sloping ground within the site are limited in their suitability for basking reptiles due to the short grassland (approximately 5cm height) habitats occupying them. Enhancement measures will include allowing areas of grassland of taller sward heights to grow on top of the slopes and/or scrub, where limited shelter opportunities currently occur close to the slope. A large island of taller sward will be created to eastern parcel (See Appendix D). Although a taller sward could be created in the western part of the site where slopes are present, it is acknowledged this already has value for fungi and invertebrates and will need to be left as a short sward. This will enhance low and moderate habitats.
- 3.3.5 Further banks and basking opportunities will also be created, in south facing situations along the northern boundaries of the Receptor Site. Creation of further basking opportunities will be achieved through translocation of sleeper wood piles from the Phase 1A Site to the Receptor Site. These will be translocated to south facing and sunny situations within the Receptor Site, including along the northern boundary and will be used within and around the sloping ground areas to further enhance these habitats. Approximate locations are shown in Appendix D.
- 3.3.6 Brash piles will also be created from any arisings resulting from the site clearance operations and located within sunny locations around the Receptor Site (See Appendix D).

Structural diversity

- 3.3.7 A diversity of vegetation height is important for common lizard, known to be present within the site. The Receptor Site supports some areas of high structural diversity in sward heights creating a mosaic of heights including short turf (5-10cm), intermediate (10-30cm) and taller rush stands (50cm +). However, some areas within the Receptor Site form large expanses of uniform vegetation of consistent height, such as the central portion of the western most parcel, which is occupied with an extensive area of tall rush.

This area will be improved for reptiles by creating a more diverse sward height, similar to the higher suitability areas existing within the site. Management will be undertaken using grazing and/or mowing regimes. Currently the Receptor Site is grazed by a mixture of horses and sheep. The recommended stocking units for management by grazing for reptiles is 0.2 livestock units per ha is recommended as a maximum (IE 1 cow per 5 ha). Introduction of cow grazing would be useful to create diversity within dense rush swards through trampling, if this possible. If this is not possible however, manual cutting should aim to achieve similar structural diversity.

- 3.3.8 The central portion of the western parcel forms a large tract that is uniformly tall and dominated by rushes. This area will be managed to create a greater diversity of sward heights and greater total edge habitat similar to the habitat found to the north of this parcel. Consideration will need to be given to the grazing regime currently in place on both parcels of the Receptor Site in order to achieve this. Introduction of cow grazing will be useful to create diversity within dense rush swards through trampling, alternatively (where this is not possible) this could be achieved through topping some areas of rush sward.
- 3.3.9 Much of the narrow central area has habitat that was once of better quality and is becoming shaded by scrub. Scrub will be actively managed to ensure scrubland does not take over grassland habitats of the Receptor Site.
- 3.3.10 Scrub and grassland management will look to create a scalloped formation wherever possible to increase the total area of ecotones within the site.

Hibernation opportunities

- 3.3.11 Hibernation features will also be constructed within the Phase 1A Receptor site, however the siting of any such features should be considered carefully with respect of the topography of the Receptor Site. Much of the Receptor Site is low lying and occupied with wet habitats on waterlogged grounds and therefore too wet to support an underground hibernacula feature. Hibernacula features will therefore be constructed on areas of higher lying ground within the Receptor Site and utilise an “above-ground” design (See Appendix E), see Appendix D for proposed locations. Hibernacula features will always be positioned on a south facing aspect in full or partial sun.

Breeding opportunities and wetland creation

- 3.3.12 Grass snake egg laying heaps (RAVON and ARG, 2019) will also be created within the Receptor Site (See Appendix D and Appendix F). Although no grass snakes were recorded during the surveys, it is possible they occur within the surrounding area. A grass snake egg laying heap will be constructed within 400m of the pond/ditch. Egg laying heaps will be constructed in a sunny situation and in close proximity to tall vegetation (See Appendix D for suggested location).

Other Habitat Creation

- 3.3.13 The creation of scrapes throughout grassland areas will increase edge habitats and habitat heterogeneity. See Appendix D.

3.4 Precautionary Method of Working

- 3.4.1 It is acknowledged that some of the above enhancements will need to be undertaken following a Precautionary Method of Working (PMoW) due to the known presence of common lizard (and potentially other reptiles) with the Receptor Site.
- 3.4.2 Activities to be included within the PMoW will include the creation of scrapes; placement of wood sleepers; grassland cutting; and hibernacula creation. All of these activities will require some disturbance to suitable reptile habitats which could potentially harm any reptiles that may be present.
- 3.4.3 A programme is set out in Section 5, detailing how the majority of enhancements will be created prior to trapping of reptiles from the Phase 1A area into the adjacent Receptor site (i.e. planned in early September 2022). Some enhancements such as scrape creation, and creation of egg laying piles, will be created early the following year, prior to reptiles emerging from hibernation (February 2023). All enhancements will be completed within the reptile active season (March to October).
- 3.4.4 Prior to any of these activities commencing during the reptile active season, a Suitably Qualified Ecologist (SQE) will walkover the area to confirm the absence of reptiles, or other wildlife (including nesting birds if any works are undertaken during the bird nesting season). Where possible the SQE will advise on the micro-siting of features to avoid potential habitat for reptiles or other wildlife, therefore minimising disturbance.
- 3.4.5 Where grassland needs to be cut back, this will be done in two stages (similarly to the approach followed within the Phase 1A site as detailed in Section 4 below); first to 150mm above ground, before clearing all

vegetation down to the ground. The SQE will check ahead of each stage of clearance.

- 3.4.6 A destructive search may be required where digging is required (for example the creation of hibernacula), if the ground remains suitable for reptiles further to vegetation clearance for example it has an uneven surface or supports tree roots. The SQE will advise on this on site. This will follow the method set out in 4.7 using a small excavator with toothed bucket to sensitively strip the soil. This will be completed under supervision of the SQE.
- 3.4.7 In the event any reptiles are found within the works areas, these will be removed using gloved hands, and carefully transferred to a suitable lidded container or cloth bag and transported to adjacent habitats with the Receptor Site.

3.5 Long-term Site Management

- 3.5.1 The EMMP⁸ will detail the long-term management which will be undertaken on the Receptor Site.
- 3.5.2 Sympathetic management of grassland areas within the Receptor Site will be required to ensure a varied structure is maintained and to encourage floral diversity within the sward. The removal of arisings will also be required to ensure areas do not become nutrient rich.
- 3.5.3 Scrub will be actively managed to ensure scrubland does not take over grassland habitats of the Receptor Site. Scrub and grassland management will look to create a scalloped formation wherever possible to increase the total area of ecotones within the site. Brash piles will be created from collected scrub.
- 3.5.4 In the event that the Receptor Site is continued to be grazed, the recommended stocking units for management by grazing for reptiles is 0.2 livestock units per ha which, is recommended as a maximum (i.e. one cow per 5 ha). Introduction of cow grazing will be considered (where possible) as this would be useful to create diversity within dense rush swards through trampling.
- 3.5.5 Management of wetland / open water habitats for example scrapes will be required to ensure they do not become silted up, and areas of open water are maintained. Additionally, overshading will be avoided and therefore scrub / tree removal may be required in areas adjacent.
- 3.5.6 Detailed management including timing of management to ensure adverse impacts to protected species are avoided, will be detailed with the EMMP.

4 Trapping and Translocation

- 4.1.1 Due to the required clearance of suitable reptile habitat within the Phase 1A area, the implementation of a reptile trapping and relocation programme, in accordance with best practice guidance⁸, will be undertaken by a SQE prior to any clearance or construction.
- 4.1.2 The recommended⁸, minimum ‘core’ trapping period for a site of more than 10 ha, supporting a ‘medium’ or ‘good’ population of common lizard is 26 days between March and September. The core trapping period will be followed by 5 days with no reptile captures or observation to ensure that the population within the Site has been substantially depleted. Therefore, at least 31 days of trapping will be required for the Phase 1A Site.
- 4.1.3 Details of the trapping and translocation of reptiles, which are detailed below have been taken from the separate Ecological Protection Plan (EPP) which has been produced for Phase 1A to discharge condition 13.
- 4.1.4 This Method Statement applies to the “reptile trapping area”, shown in Appendix G. The figure illustrates the areas of the site that support habitat suitable for reptiles and which are likely to be subject to construction activity or could be disturbed by construction activity.
- 4.1.5 The Receptor Site to which any reptiles within the Phase 1A Site will be translocated to is detailed above in Section 3.

4.2 Equipment / Machinery

- 4.2.1 The following equipment / machinery will be required:
- Standard reptile exclusion fencing (flexible polythene or rigid polypropylene fencing). Wooden stakes for support. Fittings (nails / screws and washers).
 - Mini-digger and mobile trenching unit for fence installation
 - 10 - 14 tonne excavator with toothed digging bucket for destructive searches.
 - 400 artificial reptile refuges. This equates to approximately 100 refugia per hectare of suitable reptile habitat (as recommended for

⁸ Natural England (2011) Reptile mitigation guidelines. Natural England Technical Information Note TIN102. First edition 9 September 2011.

a site with a population of more than 50 reptiles per ha⁹). Materials to be used are as follows:

Table 1 Materials required

Material and size	Number
Corrugated metal sheets (0.5 m x 0.5 m)	100
Thick roofing felt (0.5 m x 0.5 m)	200
Thick roofing felt (0.5 m x 1 m)	100
Total	400

4.3 Timing and location

- 4.3.1 The reptile translocation should be carried out during the active season for reptiles (mid-March to October) in suitable weather conditions¹⁰.
- 4.3.2 Translocation will commence after a minimum of 10 days from the placement of refugia (to allow the refugia to “bed-in”). This can take place prior to installation of the reptile fence.
- 4.3.3 Trapping within the Site will take place for a minimum of 31 trap days at each placed refugia. Trapping will, therefore, need to commence in early spring to complete before the end of autumn (noting that trapping during the summer months (mid-June to mid-August) is unlikely to be suitable). Subject to weather conditions the trapping programme will begin on the 1st March 2023.
- 4.3.4 The location of reptile exclusion fencing, and areas in which artificial reptile refuges will be placed are identified in Appendix G. The reptile exclusion fencing will generally follow the western, boundary, run parallel, but approximately 20 m north of the northern boundary, and along the eastern boundary of the Site.
- 4.3.5 Reptiles will be released into suitable habitats (areas of dense vegetation or a hibernacula (if present / artificially provided)) within the Receptor Site for Phase 1A.

⁹Herpetofauna Groups of Britain and Ireland (1998) Evaluating Local Mitigation/Translocation programmes: Maintaining Best Practice and Lawful Standards. HGBI advisory notes for Amphibian and Reptile Groups

¹⁰ Foster, J. and Gent, T. (1996). Reptile Survey Methods. English Nature

4.4 Working Method Reptile exclusion fencing

- 4.4.1 A SQE will give a toolbox briefing talk to the fencing team before fencing commences.
- 4.4.2 Fencing is to be installed in the indicative location as shown in Appendix G. The length of fencing will need to be approximately 1.9 km and will be installed by a wildlife fencing contractor. The final location of the fencing will be agreed in consultation with the SQE who will sign off the installation once complete.
- 4.4.3 Fencing along the southern boundary of the Site is considered unnecessary. The Site is bounded to the south by a significant extent of bare ground. This provides an effective barrier to reptile movement so recolonization of the site by reptiles during the construction period is unlikely to occur from this area.
- 4.4.4 Prior to fence installation, woody vegetation (scrub and small trees) will be removed from the proposed fence route following a check by the SQE Ecologist for nesting birds. If any vegetation cannot be removed because of bird nesting activity, the fencing will be routed around the vegetation.
- 4.4.5 The fence will be installed to approximately 0.7 m above ground level with a return on the upper outside edge that faces away from the main development site. It will be either self-supporting or supported by wooden stakes. The fence will be buried at least 100 mm into the ground and backfilled tightly. Herptile fencing specification is provided in Appendix H.
- 4.4.6 The fence is to prevent reptiles from moving into the construction areas from the land to the west, north and east of the Site during and after trapping and translocation.
- 4.4.7 Since the area immediately north of the Phase 1A Site within the Gorsllwyn Meadows SINC will be used as the reptile Receptor Site, then one-way exclusion fencing will be used. One-way fencing will be angled away from the Site at approximately 45 degrees such that reptiles can climb the fencing to escape the Site, but cannot re-enter. One-way fencing can be used along the northern boundary. The western boundary abuts a road and areas of spoil, so is unsuitable for one-way fencing. Additionally, the eastern boundary is unsuitable for one-way fencing – since the adjacent area will be developed in future phases.

4.5 Reptile refugia placement and selective vegetation removal

- 4.5.1 Reptile refugia placement and selective vegetation removal will commence in spring or autumn when reptiles are most likely to use refugia. Placement of reptile refugia will target suitable reptile habitat, primarily at the western, northern and eastern boundaries of the Site.
- 4.5.2 As soon as it is possible to mobilise a team of contractors, clearance of scrub and woody vegetation to a height of 150 mm above ground will take place to allow further placement of refugia.
- 4.5.3 The SQE will check vegetation immediately prior to its clearance to ensure that no nesting birds are affected.
- 4.5.4 Vegetation at the edge of suitable habitat may be progressively managed to assist in moving of reptiles into smaller defined areas of suitable habitat and high density of reptile refuges (as set out below).

4.6 Reptile trapping

- 4.6.1 Translocation will commence after a minimum of 10 days from the placement of refugia (to allow the refugia to “bed-in”). This can take place prior to installation of the reptile fence.
- 4.6.2 Trapping within the Site will take place for a minimum of 31 trap days at each placed refugia. Two visits will be undertaken per day where possible, to take advantage of particularly suitable weather conditions. Trapping will continue until the numbers of reptiles being captured have been depleted to a negligible level (this will be demonstrated by a low steady level on a depletion curve to be produced and analysed by the SQE on an on-going basis).
- 4.6.3 If the trapping results from a particular group of refugia clearly indicate that further trapping is unlikely to be beneficial in the area (i.e. no reptiles have been recorded for at least 15 consecutive days), the refugia will be relocated to another area with higher levels of activity. This will increase the density of trapping in areas with higher numbers of reptiles. It will also permit the area with low trapping levels to be destructively searched (if necessary) and stripped of vegetation (see below).
- 4.6.4 Any reptiles captured will be carefully transferred to a suitable lidded container or cloth bag and transported to the Receptor Site where the animal(s) will be carefully released amongst dense vegetation (or to a hibernacula if present / provided), as guided by the Project Ecologist.

4.7 Destructive search for reptiles

- 4.7.1 Once trapping results suggest there are a negligible number of reptiles remaining within a specified area of the Site, a destructive search of the area can be undertaken. Under strict supervision of the SQE, woody vegetation (stumps, roots, etc.) and areas of grassland to be removed will be systematically stripped using an excavator with a toothed digging bucket, leaving bare soil. Any remaining reptiles disturbed during this process will be carefully captured and transported to the receptor area in cloth bags or lidded plastic buckets.
- 4.7.2 Grassland areas in which no reptiles have been recorded for at least 15 consecutive days (or 5 consecutive days following the 26-day core trapping period) can be trimmed down to 150 mm above ground level. The progression of vegetation management will occur from the Site centre, or edges of suitable habitat (where they abut bare or sparsely vegetated ground) and work towards the reptile fence. Reptile refugia will be moved as necessary to increase the density of refugia within areas of continued reptile presence. If one-way fencing is installed, this method of vegetation management will encourage movement of reptiles out of the Site.

4.8 Maintenance and retention of reptile-proof fencing and adjacent vegetation

- 4.8.1 Once the Site has been destructively searched and cleared of vegetation, the reptile fencing must remain in place until completion of construction of Phase 1A.
- 4.8.2 The reptile fencing should be inspected regularly by the SQE and Principal Contractor and either patched as necessary (in the case of minor wear and tear) or rectified by the fencing contractor in the case of more extensive damage. Monitoring will be undertaken not only during the trapping period, but also construction i.e. until the fencing is no longer required.
- 4.8.3 Vegetation which occurs immediately adjacent to the fencing left in situ until the end of construction, will also be kept short through regular maintenance to ensure that there is no risk of reptiles being able to re-enter the exclusion area via tall/unmanaged vegetation which creates a 'bridge' over the fencing.

5 Programme for Delivery of Mitigation and Enhancements

5.1.1 The activities as set out in Section 3 and 4, which detail enhancements within the Receptor Site, and the trapping and relocation of reptiles from the Phase 1A site, are detailed below in Table 2, along with an indicative programme.

Table 2 programme for delivery of enhancements and trapping / relocation

Stage of Reptile Mitigation	Timing
Enhancements	
Creation of basking opportunities including relocation of railway wood sleepers	Summer 2023
Increase structural diversity through grassland management (further management to be undertaken post completion of the works in Phase 1A)	Summer 2023
Scrub removal	September 2023
Creation of hibernacula	Early September 2022
Grass snake egg laying piles	September 2023
Scrapes creation	Summer 2023
Trapping, relocation and Destructive Searching	
Initial grassland clearance to facilitate reptile fencing installation (subject to bird nesting checks)	Mid-September 2022
Installation of fencing (under ECoW)	Mid-September 2022
Laying out of refugia by ecologist	Mid-September 2022
Trapping and Relocation of reptiles from Phase 1A to the adjacent Phase 1A receptor area by ecologist	March-May 2023 subject to weather and captures
Further vegetation clearance as required to maintain short sward height, and encourage reptiles to use mats - under ECoW	Continue as necessary March-May 2023
Destructive searching	April-May as necessary
Monitor fencing	Duration of construction (2023 onwards)
Maintain areas within the construction site as unsuitable for reptiles	
Maintenance of vegetation adjacent to fencing to ensure a bridge isn't created for reptiles to re-enter the construction site	

6 Monitoring

- 6.1.1 As outlined in the ES Ecology Chapter (Chapter 7)¹ monitoring is required post construction for habitats and species present within the site:

‘Reptile monitoring within receptor areas will be required in years 1, 3 and 5 post construction of each phase of development.’

- 6.1.2 The construction programme for Phase 1A is planned in 2023. Therefore, post construction monitoring will commence in 2024, with year 1 monitoring, and subsequent monitoring in 2026 and 2028.

6.2 Methods

- 6.2.1 The reptile monitoring surveys of the Receptor Site will follow best practice guidelines⁴, using artificial refugia placed in representative areas of suitable habitat for reptiles.
- 6.2.2 A minimum density of between 5 and 10 refugia per hectare will be used, and more should be used in good habitats. The refugia will comprise bitumen roofing felt cut to dimensions of approximately 0.5m wide by 1m long. The refugia will be left in place for at least 10 days before the capture period, to allow them to ‘bed in’ and for reptiles to encounter them.
- 6.2.3 Further to the refugia ‘bedding in’, seven visits will be undertaken to confirm presence / absence.
- 6.2.4 During each survey, the area around each refuge will be first checked by an SQE from a suitable distance before it was approached. Each refuge will be approached slowly to check for basking reptiles; each refuge will then be lifted and the area beneath checked for reptiles. Where possible, a photograph will be taken of any reptile observed. Once checked, the refuge will be replaced in its original location. The order in which all refuges were checked will be altered during each survey visit. Incidental records of reptiles that are not under mats will also be recorded during the surveys.
- 6.2.5 All surveys will be completed by SQE who have the relevant experience for undertaking such surveys.

6.3 Timing

- 6.3.1 The monitoring survey will be within the optimal time of year for reptile activity which is April and May, and September. In order to find reptiles, the best to search when air temperatures are between 9 °C and 18 °C.

6.4 Reporting

- 6.4.1 A monitoring survey report will be produced following the completion of annual surveys, in each year post construction i.e. 1, 3 and 5. These reports will detail survey methods, any limitations and findings including estimated population sizes. Where remedial measures may be required to the Receptor Site to make it more suitable for reptiles this will also be detailed within the report.
- 6.4.2 The annual reports will be shared with the LPA ecologists for their review and confirmation on any remedial measures that may be required to the Receptor Site.

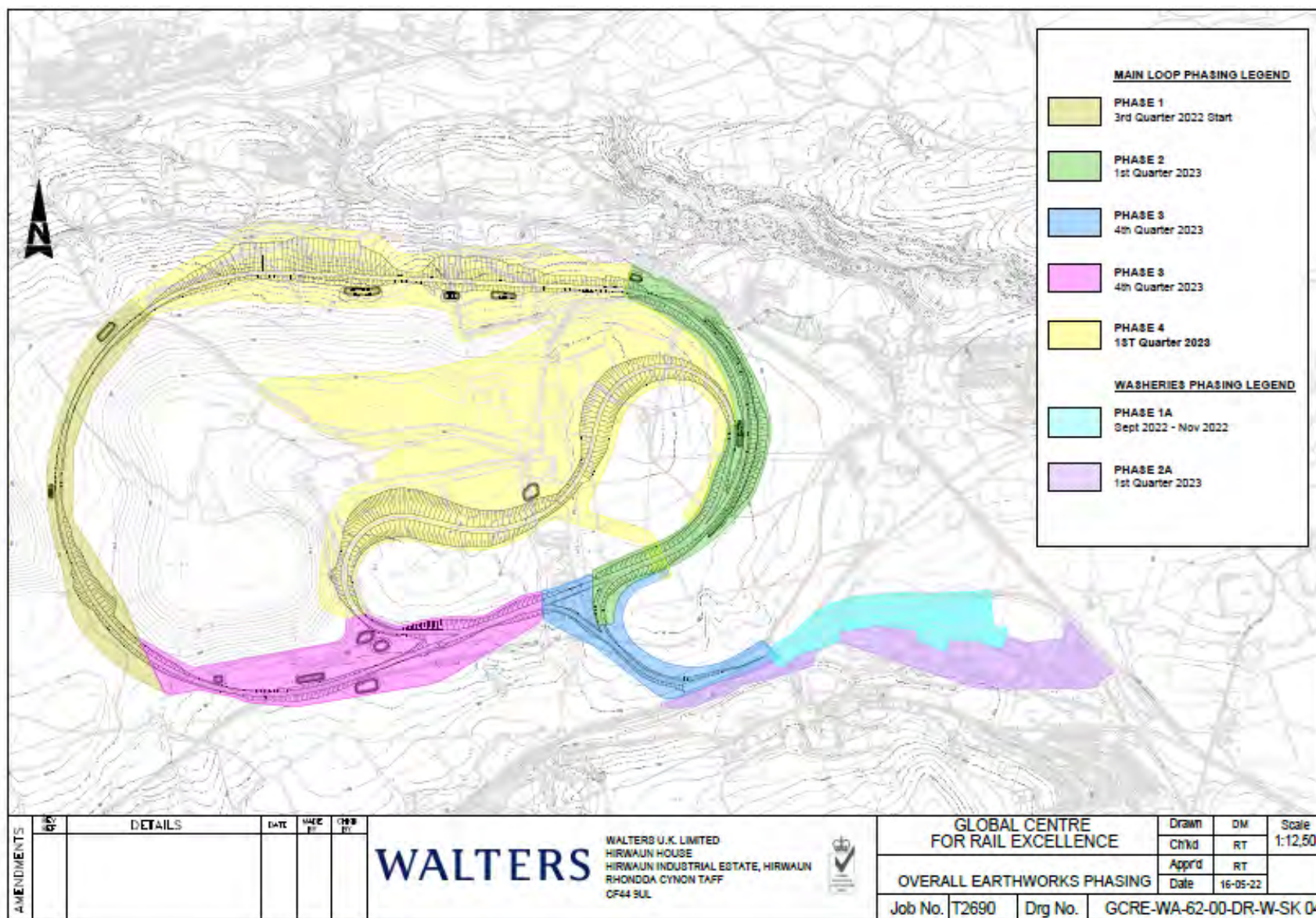
7 Landowner agreement

- 7.1.1 As detailed in paragraph 3.1.1, the receptor area is under ownership of GCRE Ltd, in perpetuity. It will be their responsibility to ensure the enhancements detailed within Section 3 are implemented prior to any trapping and relocation of reptiles to the receptor area. GCRE Ltd will need to ensure that the Receptor Site will be protected for the duration of construction, in accordance with the EPP⁷ and also during the GCRE operation.
- 7.1.2 GCRE Ltd will be responsible for organising the trapping and translocation of reptiles prior to any site clearance within the Phase 1A area, and for organising the monitoring as detailed in Section 5. GCRE Ltd will share the reports with the LPA and address any remedial measures that may be required.

Appendices

Appendix A

Phase 1A boundary



Appendix B
Reptile Survey Report



**DALCOUR
MACLAREN**

Reptile Surveys: GCRE – Phase 1A

GCRE: Phase 1A and Adjacent Receptor Site
Reptile Survey Report
September 2022



Project Details

Project Name	GCRE Planning Conditions
Scheme Number	21006904
Report Number	1

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Date	September 2022

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1 Executive Summary

- 1.1.1 North-south Ecology Ltd were commissioned by Dalcour Maclaren (DM) to undertake a reptile presence / absence survey and habitat suitability assessment of the Phase 1A site within Onllwyn washery, Neath and adjacent proposed Receptor Site; to confirm the presence or likely absence of reptiles and their relative populations sizes (if found to be present within the site), in addition to identifying opportunities for habitat enhancements for reptiles. The work was undertaken to inform a reptile mitigation strategy for proposed Phase 1A works, which are part of the GCRE project.
- 1.1.2 Site visits were undertaken between the 30th May and 22nd June 2022.
- 1.1.3 The Phase 1A Site is situated at Onllwyn, Neath, South Wales centred at grid reference: SN 84606 10635. The Site is located within an active coal washery and distribution site in daily use. Immediately adjacent to the northern boundary of the site is the proposed “Receptor Site” comprising fenced horse and sheep grazed fields; which is proposed for relocation of reptiles prior to clearance and construction works commencing.
- 1.1.4 Refugia surveys confirmed the presence of a low population of common lizard within the Phase 1A Site and found a low population of common lizard within the Receptor Site.
- 1.1.5 The Habitat Suitability assessment found that some areas of the Phase 1A site supported a range of habitats with some which were highly suitable to support a range of reptile species; however, a large proportion of the Phase 1A site was of low suitability owing to large expanses of frequently disturbed hardstanding occupying much of the site footprint. The Receptor Site was considered to support moderate suitability for reptile species overall, with some areas within the receptor site supporting low and high suitability. There is scope to enhance the receptor site for reptiles to achieve overall high suitability across the habitats.
- 1.1.6 Recommendations are provided with regard to enhancing habitats of the Receptor Site for reptile species.

2 Introduction

2.1 Site Location

- 2.1.1 The Phase 1A Site is situated at Onllwyn, Neath, South Wales centred at grid reference: SN 84606 10635. The site boundary is shown in Plan 1.
- 2.1.2 The Site is an active coal washery and distribution site in daily use. Immediately adjacent to the northern boundary of the site is the proposed “Receptor Site” comprising fenced horse and sheep grazed fields; which is proposed for relocation of reptiles prior to clearance and construction works commencing.

2.2 Scope of works

- 2.2.1 North-south Ecology Ltd were commissioned by Dalcour Maclaren (DM) to undertake a reptile presence / absence survey and habitat suitability assessment of the Phase 1A Site within Onllwyn washery, Neath and adjacent proposed Receptor Site; to confirm the presence or likely absence of reptiles and their relative populations sizes (if found to be present within the site), in addition to identifying opportunities for habitat enhancements for reptiles. The work was undertaken to inform a reptile mitigation strategy for proposed works within Phase 1A of the Washery.
- 2.2.2 This report contains the results of the reptile presence / absence survey and habitat suitability assessment and makes recommendations with regard to the possible enhancement measures that could be implemented within the Receptor Site, to inform future reptile mitigation strategies for proposed works within the Phase 1A Site.

2.3 Legislation & Planning Policy

- 2.3.1 All species of reptile that occur within South Wales are protected under the Wildlife and Countryside Act 1981 (as amended), as such they are protected from killing and injuring. All four species occurring within South Wales are additionally listed under Section 7 of the Environment Wales Act (2016). The following species can be found in South Wales: Adder (*Vipera berus*), grass snake (*Natrix natrix*), Slow-worm (*Anguis fragilis*) and common/viviparous lizard (*Zootoca vivipara*).
- 2.3.2 The national policy framework for biodiversity is set out in Planning Policy Wales (Edition 9 November 2016) (PPW9) and supplemented by Technical Advice Note 5: Nature Conservation and Planning (2009) (TAN 5). The framework presents the aims of Welsh Government for the conservation enhancement of biodiversity. It notes the importance of the planning process in achieving biodiversity related objectives and

emphasises the importance of mitigating and/or compensating unavoidable biodiversity losses in addition to enhancing sites for biodiversity wherever possible.

2.3.3 The Neath Port Talbot Council's planning policy is set out in the Neath Port Talbot Local Development Plan (2011-2026). The following most relevant Strategic Policies are:

“Policy SP15 Biodiversity and Geodiversity Important habitats, species and sites of geological interest will be protected, conserved, enhanced and managed through the following measures: 1. The identification of the following Internationally and Nationally designated sites within the County Borough to enable their protection: (a) Special Areas of Conservation (SACs) and Ramsar Sites; (b) Sites of Special Scientific Interest (SSSIs); (c) National Nature Reserves (NNRs). 2. The identification and protection of sites of regional and local importance; 3. The protection of important natural heritage features”;

- “Policy EN6 Important Biodiversity and Geodiversity Sites Development proposals that would affect Regionally Important Geodiversity Sites (RIGS), Local Nature Reserves (LNRs), Sites of Importance for Nature Conservation (SINCs), sites meeting SINC criteria or sites supporting Local Biodiversity Action Plan (LBAP) or S42(6) habitats or species will only be permitted where: 1. They conserve and where possible enhance the natural heritage importance of the site; or 2. The development could not reasonably be located elsewhere, and the benefits of the development outweigh the natural heritage importance of the site. Mitigation and/or compensation measures will need to be agreed where adverse effects are unavoidable.”; and

“Policy EN7 Important Natural Features Development proposals that would adversely affect ecologically or visually important natural features such as trees, woodlands, hedgerows / field boundaries, watercourses or ponds will only be permitted where: 1. Full account has been taken of the relevant features in the design of the development, with measures put in place to ensure that they are retained and protected wherever possible; or 2. The biodiversity value and role of the relevant feature has been taken into account and where removal is unavoidable, mitigation measures are agreed.”

3 Methodology

3.1 Presence / absence

- 3.1.1 Reptile presence / absence surveys using artificial refugia were undertaken following the methodology set out by Gent & Gibson (1998) and Froglife (1999) Advice Sheet 10. Bitumen roofing felt cut to dimensions of approximately 0.5m wide by 1m long were deployed in suitable locations around the Phase 1A Site and adjacent Receptor Site at a minimum density of 10 mats per hectare within suitable habitats only (See Plan 1 for locations). A total of ninety-five refugia were deployed on the 30th May 2022 and left to “bed in” for a period of one week, prior to any survey visits commencing. Subsequently, a total of seven survey visits were undertaken. Survey visits comprised a visual inspection of the artificial refugia, on top and beneath for basking reptiles along with a visual search of any naturally occurring refugia within the site such as metal sheeting, debris and wood piles (See Photo 1 and 2 below). Seven survey visits were made between 06/06/2022 and 22/06/2022 on non-consecutive days in good weather conditions (See Table 1 below). As far as practicably possible, surveys were undertaken under the recommended optimal weather conditions for reptile surveys as described by Froglife (1999) which include no rain, low wind and air temperatures between 8°C and 18°C. Records of the weather conditions and any reptiles or other notable species observed within the site and under the refugia were made.

	
Photo 1: Sheet metal debris	Photo 2: Old sleepers, wood and brash piles

3.2 Population Assessment

3.2.1 Seven survey visits were undertaken to confirm presence / likely absence of reptiles within the site. Relative population size estimates can be made using the criteria set out in Table 1 below from Froglife (1999) where twenty survey visits are undertaken. Therefore, the maximum number of adult individuals seen during one survey event was used to determine the minimum population score. The true population size is likely to be considerably larger than the minimum that can be deduced from the currently available survey data. The minimum population assessment score was determined for the Phase 1A Site and the immediately adjacent Receptor Site.

Table 1: Relative reptile population classification criteria (Froglife, 1999)

Species	Low Population Score 1	Good Population Score 2	Exceptional Population Score 3
Adder	<5	5-10	>10
Grass Snake	<5	5-10	>10
Common lizard	<5	5-20	>20
Slow-worm	<5	5-20	>20

3.3 Habitat Suitability Assessment

- 3.3.1 The Phase 1A and adjacent Receptor Site were subject to a habitat suitability assessment undertaken by an experienced ecologist on the 22nd June 2022 in good, dry weather conditions. Survey methodology was adapted from the Reptile Habitat Management Handbook (Edgar et al. 2010). The following attributes were taken into consideration when ranking habitats for their suitability to support reptiles: Warmth, structural complexity; and habitat connectivity, available habitat, habitat structure, topography, prey availability, breeding habitat and hibernation habitat. A note of any specific features (such as potential hibernaculum) were recorded and target noted.

3.4 Constraints

- 3.4.1 A data search for reptiles was not undertaken as a part of this study; although it is noted that a full data search with the relevant local biological records centre (Biodiversity Information Service for Powys & Brecon Beacons National Park) was undertaken in 2018 as part of the GCRE project's ES¹.
- 3.4.2 Reptile surveys are optimal between from April to May and within the month of September (Froglife, 1999); and sub-optimal in the months of June to August. Therefore, the current survey was undertaken in a sub-optimal month for reptile surveying. This was due to the requirement to obtain survey data before the September, to support the completion of the reptile mitigation strategy for Phase 1A which is required as soon as possible by the client.
- 3.4.3 Owing to the time of year the surveys were undertaken and the need to undertake the surveys as soon as possible, two of the survey visits were undertaken in suboptimal weather conditions where temperatures during the survey rose to approximately 20 °C by the end of the survey. Guidance (Froglife, 1999) dictates that surveys should be undertaken on days when air temperatures are between 8°C and 18°C. This is not considered to significantly impact the overall survey results as the majority of survey visits were undertaken within the recommended weather conditions and reptiles were recorded during visits despite higher air temperatures; however, conclusions and recommendations are made in light of this.
- 3.4.4 During the final survey visit some interference with the refugia by livestock was noted in the Receptor Site. This only affected approximately

¹ Arup (2020) Global Centre of Rail Excellence Environmental Statement

four mats of a total of ninety-five; therefore, this was not considered to have significantly impacted the survey results.

- 3.4.5 As discussed in section 3.2 seven survey visits were undertaken to confirm presence / likely absence of reptiles within the Phase 1A site (as detailed in 3.1) rather than 20 which is recommended to accurately assess population size. Therefore, the maximum number of adult individuals seen on one survey visit has been used as an indication of the minimum population size and the true population size is likely to be larger than this. Conclusions and recommendations are made in light of this

4 Results

4.1 Field Survey Results

- 4.1.1 Common lizard was recorded on all but one survey visit, see Table 2 and Plan 2. A maximum count of four common lizards was recorded on any one survey event. No other reptile species were recorded during the surveys. Other species recorded during the surveys under refugia or in the general area included vole species (*Microtus* sp), common frog (*Rana temporaria*), common toad (*Bufo bufo*), drinker moth caterpillars (*Euthrix potatoria*), and horse leech (*Haemopsis sanguisuga*).

Table 2: Reptile Survey Results

Date	Time of survey	Weather (start-end)	Results	Total no. of common lizard seen
06/06/2022	17:00-19:00	Temp: 18.5-18°C Cloud: 40%-40% Wind: 1-0 Rain: 0-0 Sunny	<u>Phase 1A Site:</u> 1x common lizard under mat 26 2x common lizards under mat 38	3
			<u>Receptor Site:</u> None	
08/06/2022	17:00-19:00	Temp: 15-15°C Cloud: 100%-70% Wind: 3-1 Rain: 0-0 Intermittent sun	<u>Phase 1A Site:</u> 1x common lizard under mat 14 2x toads under mats 18 and 29 1x vole under mat 69	1
			<u>Receptor Site:</u> None	
12/06/2022	17:00-19:00	Temp: 17-18°C Cloud: 30%-20% Wind: 0-0 Rain: 0-0	<u>Phase 1A Site:</u> 1x lizard seen close to mat 7 1x male lizard under mat 38 1x female lizard under mat 25 1x female lizard under mat 34 1x vole under mat 19	4
			<u>Receptor Site:</u> None	
14/06/2022	17:30-19:30	Temp: 19°C-18°C Cloud: 10%-10% Wind: 2-1	<u>Phase 1A Site:</u> 2 x lizards seen close to mat 37 1 x lizard under mat 62 1 x lizard under mat 94	4
			<u>Receptor Site:</u> None	

17/06/2022	08:15-10:00	Temp: 19-20°C Cloud: 50%-50% Wind: 2-1 Rain: 0-0 Intermittent sun	<u>Phase 1A Site:</u> 1 x lizard under mat 22 1 x lizard under mat 64 1 x frog under mat 62	2
			<u>Receptor Site:</u> None	
19/06/2022	09:00-11:00	Temp: 13-14°C Cloud: 60%-50% Wind: 2-1 Rain: 0-0	<u>Phase 1A Site:</u> 1 x lizard on top of mat 22 1 x lizard under mat 95	3
			<u>Receptor Site:</u> 1 x lizard under mat 80	
22/06/2022	08:50-10:30	Temp: 17-20°C Cloud: 15%-10% Wind: 1-0 Rain: 0-0	<u>Phase 1A Site:</u> No reptiles recorded	0
			<u>Receptor Site:</u> No reptiles recorded	

4.2 Population Assessment

- 4.2.1 The maximum count of adult lizards seen on any one occasion within the Phase 1A Site was four individuals. Therefore, the Phase 1A Site is considered to support at least, a low population of common lizards.
- 4.2.2 The maximum count of adult lizards seen on any one occasion within the Receptor Site was one individual. Therefore, the Receptor Site is considered to have at least, a low population of common lizards.
- 4.2.3 However, given the sub-optimal time of year, the hot weather conditions of some of the survey events and the survey effort being limited to only seven visits (as discussed in survey limitations) it is considered that the population is likely to be larger than this given the high suitability of habitats available within the Phase 1A Site (further discussed in 4.3).

4.3 Habitat Suitability Assessment

- 4.3.1 A Habitat Suitability Assessment was undertaken of the Phase 1A site and the adjacent Receptor Site. Features of note for reptiles were recorded and target noted (See Plan 3). The habitats and their suitability for reptiles are described and ranked below

Phase 1A site

- 4.3.3 Within the Phase 1A site there is a varying topography and a range of habitats including water bodies, marshy grassland, neutral grassland, hardstanding and bare ground (including spoil tips and rail infrastructure), trees and scrub. See Table 3 below for summary of habitats present on the Phase 1A site and their relative suitability to support reptiles.
- 4.3.4 The neutral and marshy grassland of the site were noticeably important for a range of invertebrates during survey visits. Good invertebrate populations are important for reptile species such as common lizard. Habitats to the north of the site supported high quality reptile habitat with scrub habitats lining the site boundary that are south facing and a rail line with a mixture of wet ditch and neutral grassland habitats with multiple wood piles comprising old rail sleepers along its extent. Varying sward heights occur particularly within the grassland habitats to the east of Phase 1A Site where there is significant edge habitats created by grassland patches of varying sward heights along with interspersed scrub patches. Some scrub habitats also occur along the boundaries (particularly the northern boundary) creating ecotones suitable for reptiles. The root plates of the scrub and small tree species will likely provide suitable hibernation opportunities and basking opportunities are frequent throughout the site, including piles of debris and old damaged rail sleepers along the northern boundary of the site (See photos 3 and 4).



Photo 3: Rail infrastructure bordered by scrub habitats.



Photo 4: Old rail sleepers and grassland edge and scrub ecotones.

- 4.3.5 A number of water bodies including ponds and wet ditches occur within the Phase 1A Site. Frogs and toads were found during the field surveys indicating amphibians are present within the site. Some of the water

bodies within the site are steep sided and therefore less likely to support herptiles, however a number of ponds are accessible. It is considered that the site has suitability for grass snake which require waterbodies with good amphibian populations to be present. A pond is also located along the northern boundary where the Phase 1A Site lies adjacent to the Receptor Site.

- 4.3.6 Large areas of the Phase 1A Site are comprised of tarmacked hardstanding that is in frequent use by heavy plant. These areas are considered to have low suitability for reptiles.

Table 3: Phase 1A Site habitat suitability for reptiles

Habitat Type	Warmth	Structural diversity	Connectivity	Prey availability	Other features
Grassland	High - Range of microclimates created through range in sward height, ant hills present.	High - Range of sward heights and scrub presence.	Moderate connectivity to the north.	High invertebrate diversity.	Significant basking potential: Old rail sleepers, and debris throughout grassland areas.
Ponds/water bodies	Moderate – some ponds within the site support sloping ground.	NA	Moderate -Many ponds set within/adjacent to further suitable habitat grassland.	Likely to be Moderate/High : Amphibians recorded within the site and likely good invertebrate populations.	Some ponds are steep sided and therefore less likely to be suitable.
Scrub	High - Scrub lining northern boundary immediately adjacent to rail line ballast creating a south facing ecotone.	Moderate - Scrub interspersed through grassland areas contributing to structural diversity.	Moderate - Scrub habitats along the northern boundary are well connected to off-site suitable habitats.	Moderate – Invertebrate assemblages associated with scrub habitats.	Hibernacula potential within the root systems of scrub and small trees.
Hardstanding	High	Negligible	NA	Negligible	In frequent use, highly disturbed
Ditches	Low/Moderate – Ditch running along the	Moderate – Ditch edge and ditch interior and	High – Run immediately adjacent to the	High – Insect assemblages associated with	NA



	northern boundary (south facing) but tall spoil tips to south.	associated vegetation.	offsite suitable habitats.	ditches and associated vegetation.	
Bare Ground (including rail ballast and spoil tips)	High – Spoil and ballast materials support high heat capacity.	Low – Homogenous throughout extent.	Moderate – Occur in close vicinity of other suitable habitats such as grassland and scrub.	Low – Limited bare earth within the site, largely ballast and spoil which are less valuable to invertebrate assemblages.	NA

Receptor Site

- 4.3.7 The adjacent Receptor Site is divided into two parcels of land with varying suitability to support reptiles (See Table 4 for summary and Plan 3). The eastern most parcel is a horse grazed field with a range in topography (note range in topography is not as great as that of the Phase 1A site). The centre of this area is a boggy depression with higher lying areas surrounding it. The areas of higher ground result in south facing slopes that are occupied with short turf grassland to the east and northeast, providing potential basking opportunities for reptile species. A small grass bank occurs to the east running northeast to southwest. Surrounding this are trees, scrub and a small stream to the north and dry ditch. Within the low-lying wet grassland habitats of the site there is a range of sward heights with some waterlogged, heavily poached ground along the southern boundary. Some areas of the grassland support tall and tussocky wet meadow habitats and other areas shorter sward heights occur, creating ecotones throughout the site. An area of scrubby woodland occurs to the western most extent of the parcel, this area is less suitable for reptiles as it is well shaded by the trees.
- 4.3.8 The habitats of the site are suitable for a range of reptile species. Immediately adjacent to the northeastern boundary is an offsite hedgerow, creating edge habitat and may also offer potential for hibernation opportunities within the root plates. Scrub and trees to the west of the site are likely too wet to support hibernation opportunities.



Photo 5: Grass bank to the eastern most corner



Photo 6: Boggy ground with varying sward heights across the land

- 4.3.9 The western parcel supports a small stream running through the land and a pond, within the Phase 1A site, lies immediately south of this parcel. The site is marshy and swampy in parts and is largely occupied with tall and

tussocky vegetation throughout. Higher lying grassland habitats occur to the western most extent on sloping ground that slopes from north to south with scrub and scattered trees along the northern boundary creating edge habitats suitable for basking. Grassland to the western extent is heavily grazed with short swards heights of limited suitability for use by reptiles. To the northern extent of the site significant edge habitats are created by a diversity of short and tall sward heights. To the centre of the parcel tall swampy and marshy habitats are fairly uniform and therefore of less value to reptiles species. To the western most extent of the parcel there is scrubland and a greater diversity of sward height with some dead wood and brash piles throughout presenting good quality reptile habitat.



Photo 7: Range of sward height to the north



Photo 8: Uniform grassland in the centre of the site

Table 4: Receptor Site Reptile Suitability (Both parcels) (See plan 3)

Habitat Type	Warmth	Structural diversity	Connectivity	Prey availability	Other features
Grassland	Low to Moderate - Range of microclimates created through range in sward heights and some south facing slopes.	Moderate- Range of sward heights and scrub presence across parcel but some large areas uniform.	High connectivity to suitable habitats north.	High invertebrate diversity due to water features and range of habitats present.	NA
Running water and wet ditches	Negligible - Set within tall swamp vegetation.	Low - Set within predominantly tall swamp vegetation, some limited diversity in sward height along stream.	High connectivity with further suitable habitat grassland within the receptor site.	Considered to be Moderate/High: Amphibians recorded nearby and likely good invertebrate populations.	NA
Scrub	Moderate- edge habitats to the east and west created by scrubland.	Moderate - Scrub interspersed through grassland areas contributing to structural diversity. Scrub to the east becomes dense and shaded along the southern boundary.	High connectivity to other suitable reptile habitats in the area	Moderate - Invertebrate assemblages associated with habitat type	Hibernacula potential within the root systems of scrub and small trees on high lying ground.

5 Discussion and Recommendations

- 5.1.1 Peak counts during the presence/absence survey indicate a low population of common lizard is present within the Phase 1A Site. It is considered possible that a good population occurs given the suboptimal time of year the surveys were undertaken in addition to the survey effort comprising seven survey visits only. Detailed plans for the Phase 1A Site are not available at the time of writing, therefore the following mitigation and enhancement measures are advised:

5.2 Mitigation

- 5.2.1 A detailed mitigation strategy should be devised and agreed with the Local Planning Authority Ecologist. The strategy should include the following principles:
- A toolbox talk should be delivered to all on site contractors immediately prior to any works commencing. The toolbox talk should include the legal protection afforded to reptiles (and any other protected species that may occur), reptile species that may be encountered and working methodologies to minimise risk of harm to reptiles.
 - Site clearance should be undertaken when reptiles are active (between April and September), before the hibernation period. Any above ground vegetation works should be undertaken in the autumn, outside of the nesting bird season (March to August inclusive).
 - Works should take a staged approach to vegetation clearance comprising two cuts of the grassland areas to be carried out 48 hours apart. The 1st cut will take the vegetation down to approximately 150mm height using hand tools only. Works should be supervised by an ecologist who should check the area prior to works commencing and collect and translocate any reptiles as needed throughout the works.
 - The 2nd cut should be undertaken 48 hours later using hand-strimmers. The vegetation should be cut to approximately 50mm.
 - Removal of scrub and trees should be undertaken outside of the nesting bird season (March – August inclusive) to avoid the potential for impact to nesting birds, or alternatively be carried out following a nesting bird check by a suitably experienced ecologist no more than 24 hours prior to works commencing.
 - Grubbing out of roots of trees and shrubs must not be undertaken during reptile hibernation period (November – March inclusive). Following the above ground cutting, tree and shrub roots should be extracted using a small excavator under the supervision of an experienced ecologist who

will stop the works, and remove any reptiles which are found during the operation. This must be completed before the start of the reptile hibernation period (i.e., before November).

- A record of the number of reptiles encountered and translocated during the works should be made available to the planning authority ecologist on completion of the works.
- The removal of any debris, wood piles etc that may be used by reptiles should be subject to a search by an ecologist prior to removal. Where possible removal should be undertaken by hand.

5.3 Enhancement of the Receptor Site

- 5.3.1 The Receptor Site supports a number of habitats and features that are suitable for reptile species. One common lizard was recorded within the western most portion of the Receptor Site on the edge of a dense section of tall rush habitat. Habitats within the Receptor Site comprised wet meadow and marshy grassland with streams and swampy areas along with some scrub and small trees and off-site hedgerows located immediately adjacent. Many of the habitats of the site have some suitability to support reptiles, however this could be enhanced through a number of measures.
- 5.3.2 It is considered that the Receptor Site may not be at carrying capacity as very low numbers of reptiles were recorded during the current survey compared to what was expected by the surveyor given the habitats present. However, the sub optimal timing of the survey and lack of full population estimate surveys (as discussed in survey limitations above) may have contributed to the low numbers observed. Therefore, a precautionary approach will be followed in accordance with the assumption that higher numbers are present within the Receptor Site and further enhancements are required to increase the carrying capacity of the site for reptiles.
- 5.3.3 The habitat enhancement works (as outlined below) will be undertaken prior to the translocation of reptiles to ensure the Receptor Site is of sufficient carrying capacity to receive further individuals.
- 5.3.4 These habitats will be retained and enhanced through the following measures to increase the carrying capacity of the Receptor Site prior to any translocation event (See Plan 4).

Warmth and basking opportunities

- 5.3.5 A number of south facing slopes are already present within the Receptor Site (See red arrow on Plan 4). At least one of these slopes will be retained

and enhanced. At present, the areas of sloping ground within the site are limited in their suitability for basking reptiles due to the short grassland (approximately 5cm height) habitats occupying them. Enhancement measures will include allowing areas of grassland of taller sward heights to grow on top of the slopes and/or scrub, where limited shelter opportunities currently occur close to the slope. A large island of taller sward will be created to eastern parcel (See Plan 4). Although a taller sward could be created in the western part of the site where slopes are present, it is acknowledged this already has value for fungi and invertebrates and will need to be left as a short sward. This will enhance low and moderate habitats.

- 5.3.6 Further banks and basking opportunities will also be created, in south facing situations along the northern boundaries of the Receptor Site. Creation of further basking opportunities will be achieved through translocation of sleeper wood piles from the Phase 1A Site to the Receptor Site. These will be translocated to south facing and sunny situations within the Receptor Site, including along the northern boundary and will be used within and around the sloping ground areas to further enhance these habitats. Approximate locations are shown in Plan 4.
- 5.3.7 Brash piles will also be created from any arisings resulting from the site clearance operations and located within sunny locations around the Receptor Site (See Plan 4).

Structural diversity

- 5.3.8 A diversity of vegetation height is important for common lizard, known to be present within the site. The Receptor Site supports some areas of high structural diversity in sward heights creating a mosaic of heights including short turf (5-10cm), intermediate (10-30cm) and taller rush stands (50cm +). However, some areas within the Receptor Site form large expanses of uniform vegetation of consistent height, such as the central portion of the western most parcel, which is occupied with an extensive area of tall rush. This area will be improved for reptiles by creating a more diverse sward height, similar to the higher suitability areas existing within the site. Management will be undertaken using grazing and/or mowing regimes. Currently the Receptor Site is grazed by a mixture of horses and sheep. The recommended stocking units for management by grazing for reptiles is 0.2 livestock units per ha is recommended as a maximum (IE 1 cow per 5 ha). Introduction of cow grazing would be useful to create diversity within dense rush swards through trampling, if this possible.
- 5.3.9 The central portion of the western parcel forms a large tract that is uniformly tall and dominated by rushes. This area will be managed to

create a greater diversity of sward heights and greater total edge habitat similar to the habitat found to the north of this parcel. Consideration will need to be given to the grazing regime currently in place on both parcels of the Receptor Site in order to achieve this. Introduction of cow grazing will be useful to create diversity within dense rush swards through trampling, alternatively (where this is not possible) this could be achieved through topping some areas of rush sward.

- 5.3.10 Much of the narrow central area has habitat that was once of better quality and is becoming shaded by scrub. Scrub will be actively managed to ensure scrubland does not take over grassland habitats of the Receptor Site.
- 5.3.11 Scrub and grassland management will look to create a scalloped formation wherever possible to increase the total area of ecotones within the site.

Hibernation opportunities

- 5.3.12 Hibernation features will also be constructed within the Phase 1A Receptor site, however the siting of any such features should be considered carefully with respect of the topography of the Receptor Site. Much of the Receptor Site is low lying and occupied with wet habitats on waterlogged grounds and therefore too wet to support an underground hibernacula feature. Hibernacula features will therefore be constructed on areas of higher lying ground within the Receptor Site and utilise an “above-ground” design (See Appendix 1), see Plan 4 for proposed locations. Hibernacula features will always be positioned on a south facing aspect in full or partial sun.

Breeding opportunities and wetland creation

- 5.3.13 Grass snake egg laying heaps (RAVON and ARG, 2019) will also be created within the Receptor Site (See Plan 4 and Appendix 2). Although no grass snakes were recorded during the surveys, it is possible they occur within the surrounding area. A grass snake egg laying heap will be constructed within 400m of the pond/ditch. Egg laying heaps will be constructed in a sunny situation and in close proximity to tall vegetation (See Plan 4 for suggested location).

Other Habitat Creation

- 5.3.14 The creation of scrapes throughout grassland areas will increase edge habitats and habitat heterogeneity. See Plan 4.

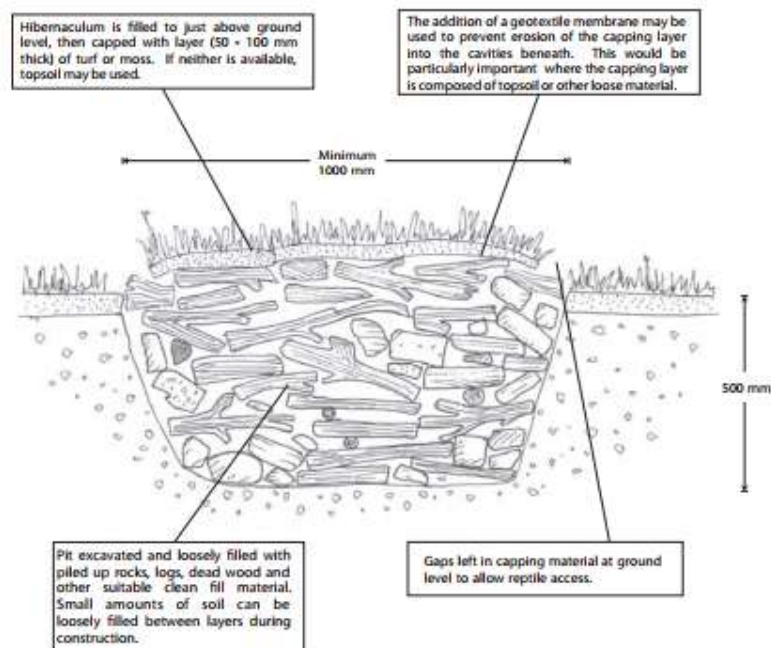
6 References

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 - Sewell D., Griffiths R.A., Beebee J.C., Foster J., and Wilkinson J.W.(2013) Survey protocols for the British herpetofauna. V1. Published online ([Survey protocols for the British herpetofauna.pdf \(narrs.org.uk\)](#))

Appendix 1: Hibernaculum Design (from DRMB, 2005 Volume 10)

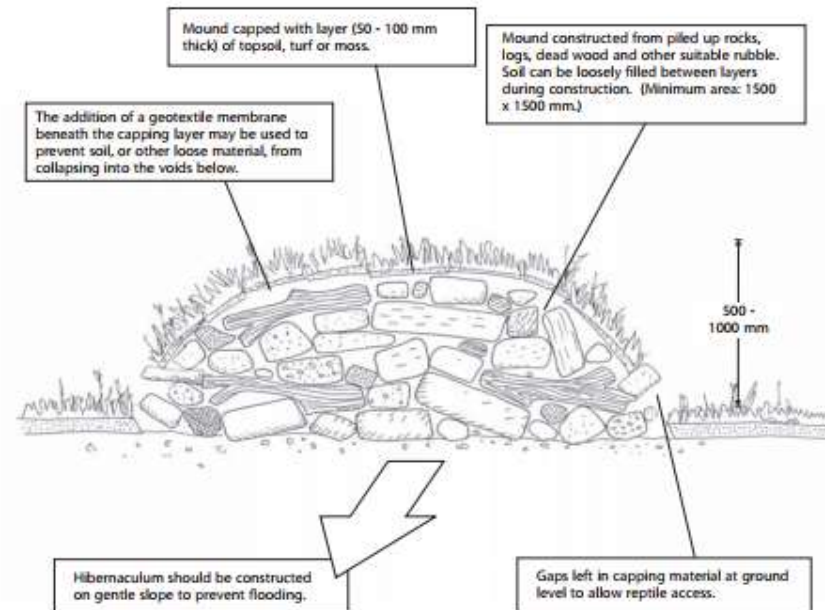
Hibernaculum on free-draining ground

Where ground conditions allow, the hibernaculum should be incorporated into a shallow pit. This design is more likely to remain frost-free, and will be less obtrusive and thus unlikely to be subject to interference.



Hibernaculum on impermeable ground

Where ground conditions are impermeable, then an 'above-ground' or mounded design should be utilised in order to prevent the hibernaculum from flooding. This design should also be used if it is not possible to excavate a pit for any other reason.



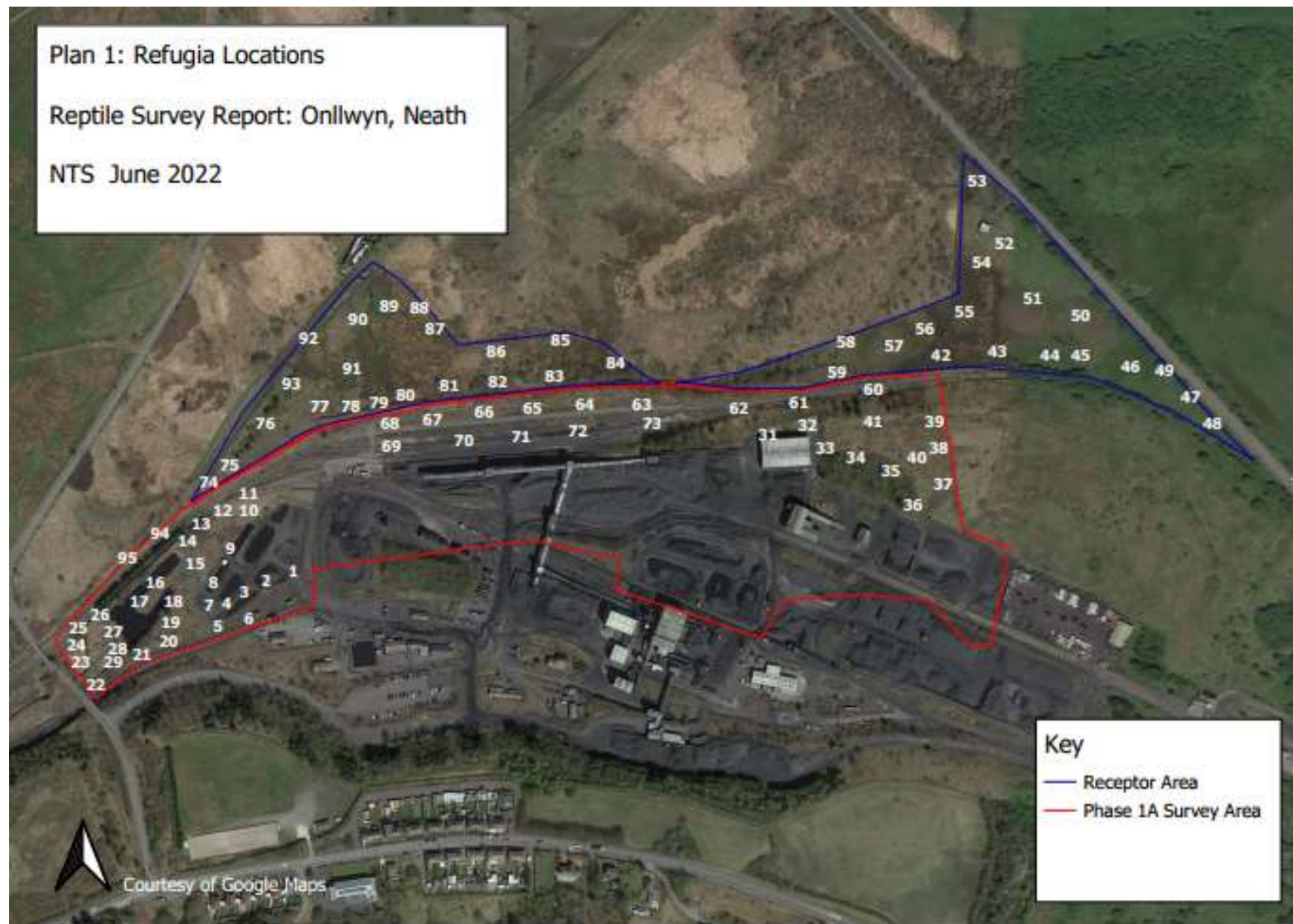
Appendix 2: Grass Snake Egg Laying Heap Design (RAVON & ARG UK, 2019)

How to create a grass snake egg-laying heap



- **Where:** In a sunny spot, adjacent to tall vegetation, away from busy roads and no more than 400m from a water body. Female grass snakes become habituated to using a successful heap for several years, so when refreshing a heap, ensure you always use the same location.
- **When:** Mid-March to late April
- **Materials:**
 - One third fresh horse manure
 - One third vegetation (leaves, clippings) or compost
 - One third large sticks or branches
- **Instructions:**
 - Clear the ground where you want the heap
 - Create a base layer of leaves and clippings
 - Lay the largest sticks/branches on top of this
 - Place half of the horse manure on top of the sticks and branches.
 - Add another layer of smaller sticks.
 - Mix the remaining manure with the vegetation/compost and add this to the heap. Add some branches and smaller sticks to keep these layers well ventilated.
 - Ensure that the egg-laying heap is not too compacted, so the animals can easily get into it, and to prevent it from overheating.

Plan 1: Refugia Locations

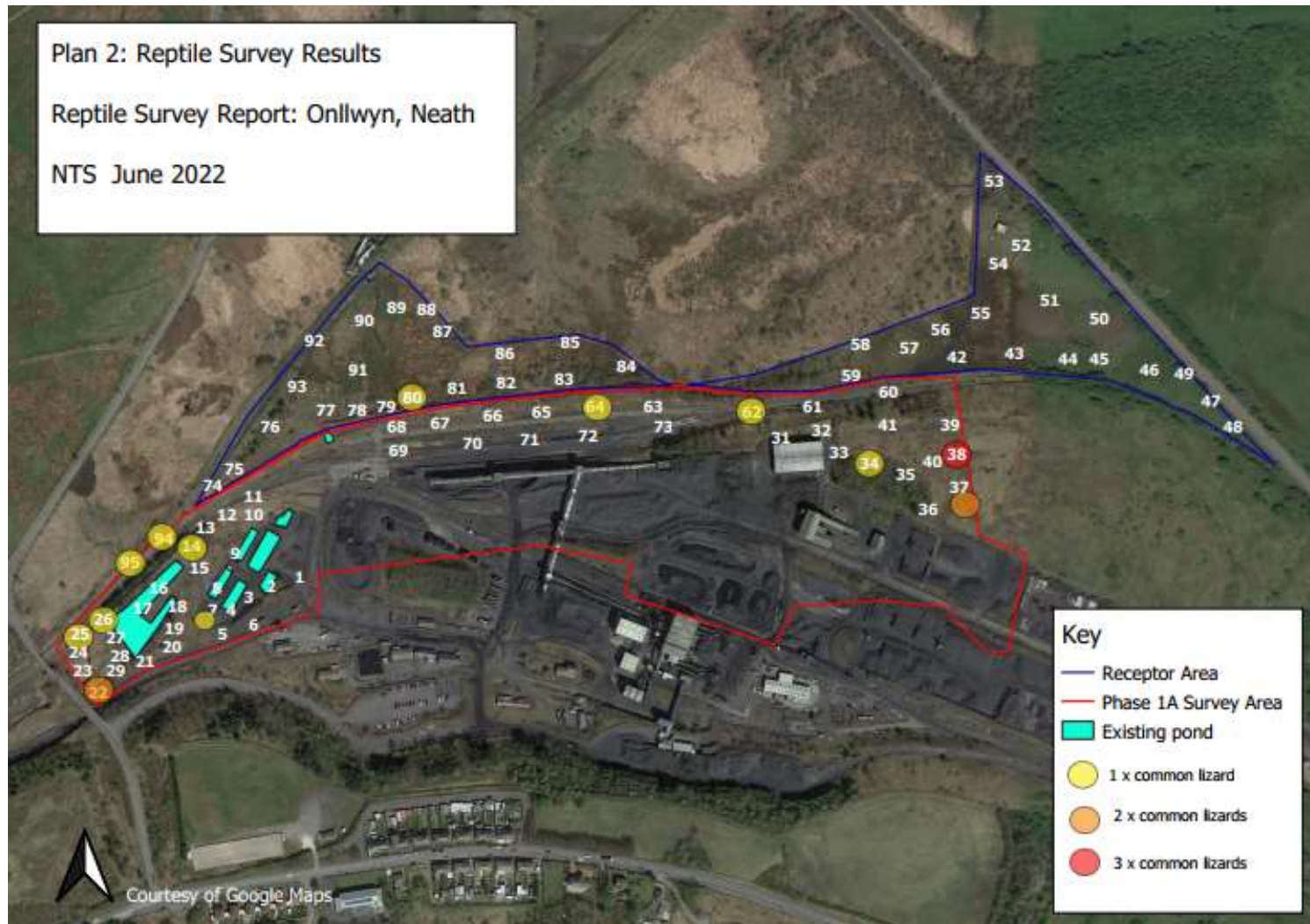


Plan 2: Reptile Survey Results

Plan 2: Reptile Survey Results

Reptile Survey Report: Onllwyn, Neath

NTS June 2022

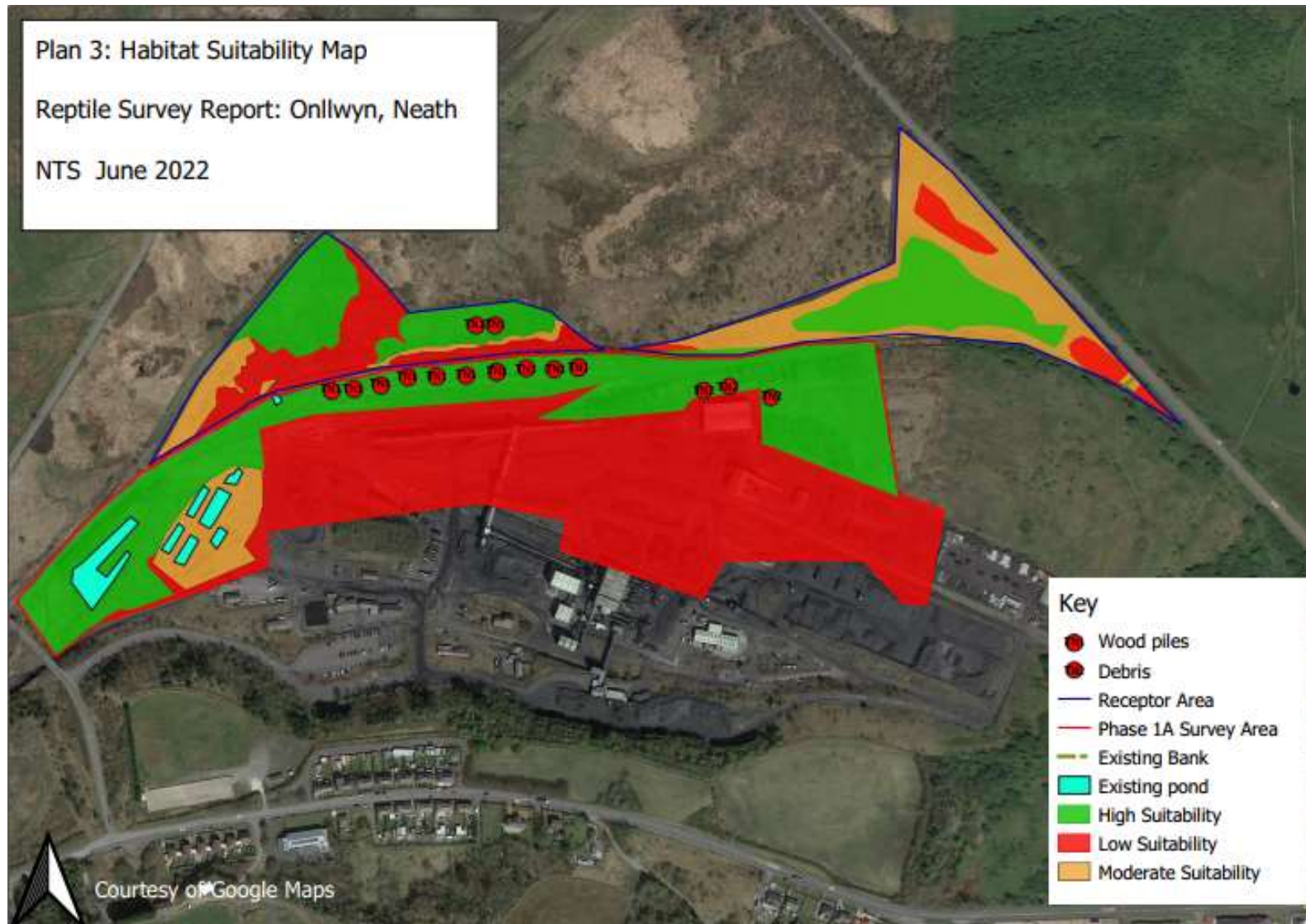


Plan 3: Habitat Suitability Map

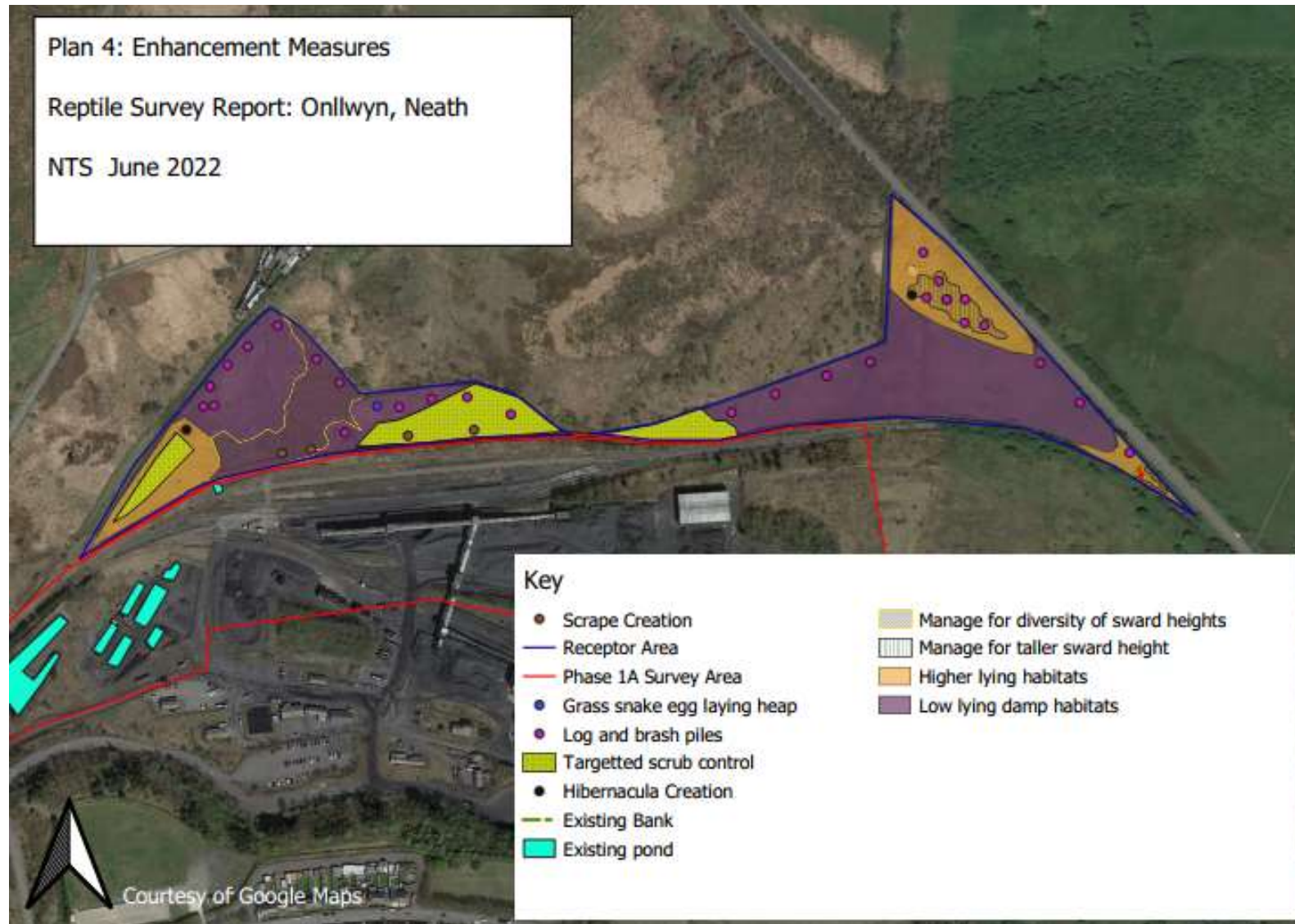
Plan 3: Habitat Suitability Map

Reptile Survey Report: Onllwyn, Neath

NTS June 2022



Plan 4: Locations of Enhancement Features





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Appendix C

Reptile Receptor Location Plan / Habitat Suitability

Plan 3: Habitat Suitability Map

Reptile Survey Report: Onllwyn, Neath

NTS June 2022

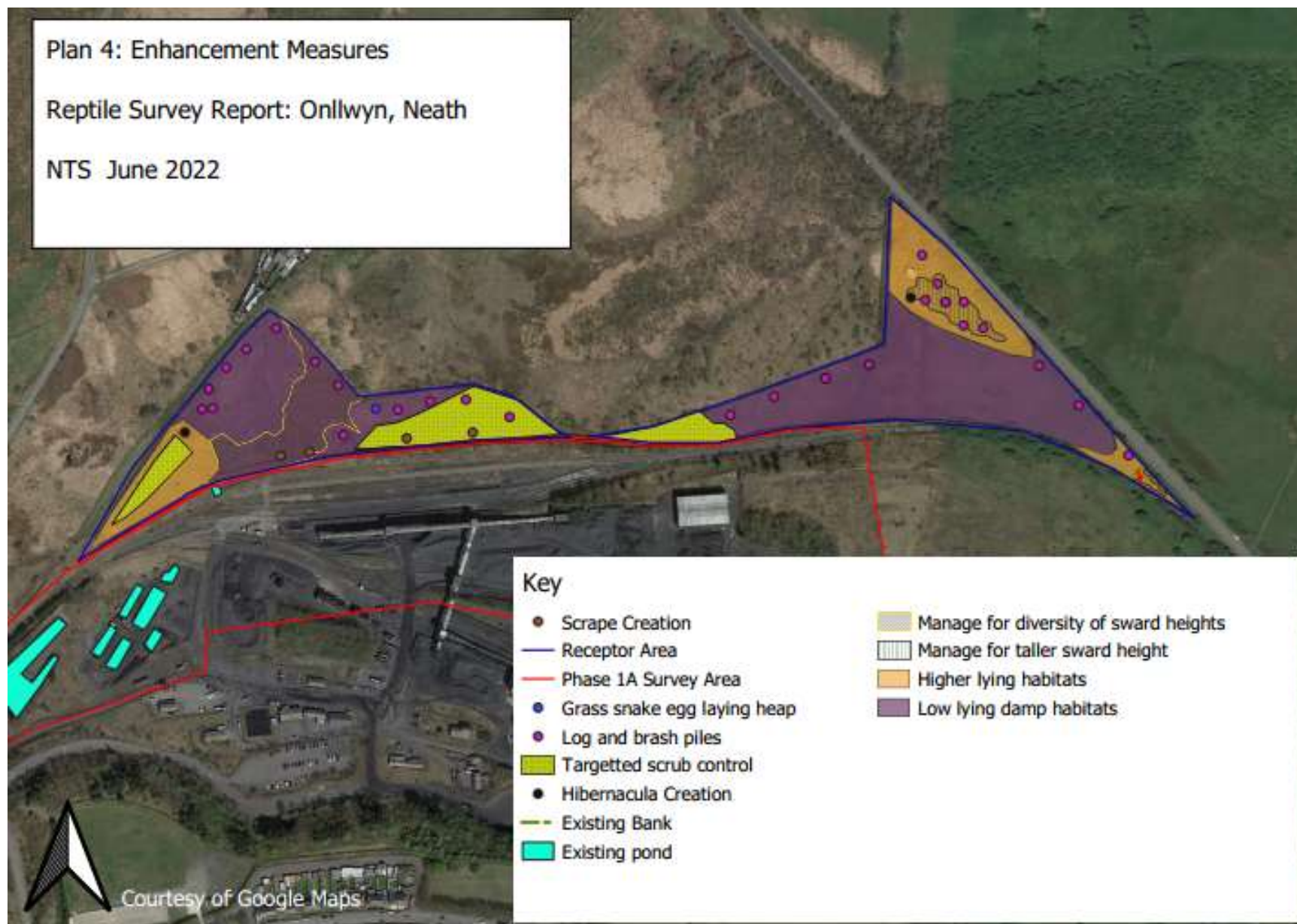


Appendix D
Reptile Receptor Enhancement Plan

Plan 4: Enhancement Measures

Reptile Survey Report: Onllwyn, Neath

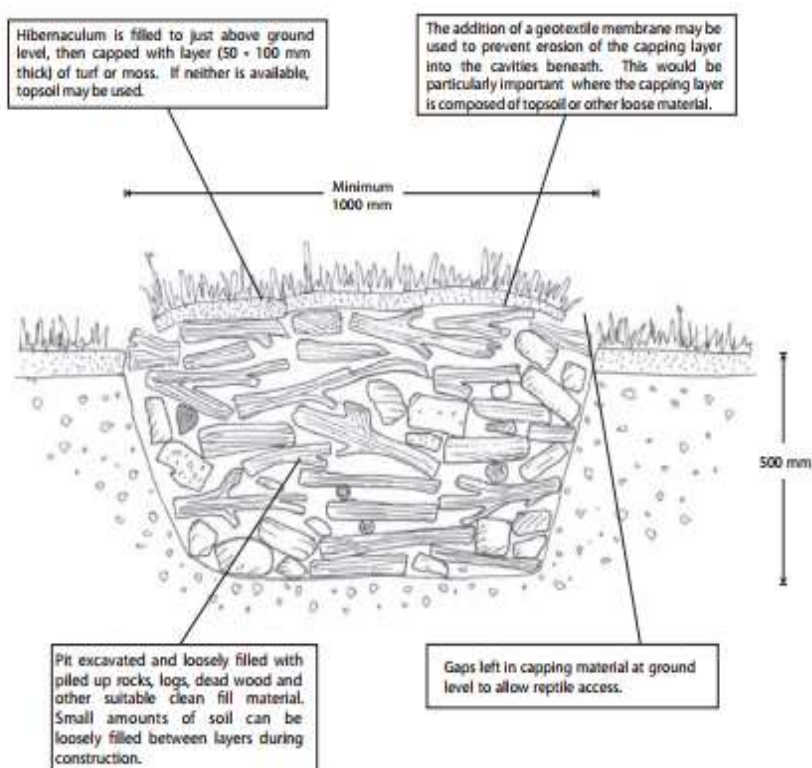
NTS June 2022



Appendix E
Reptile Enhancements - Hibernaculum

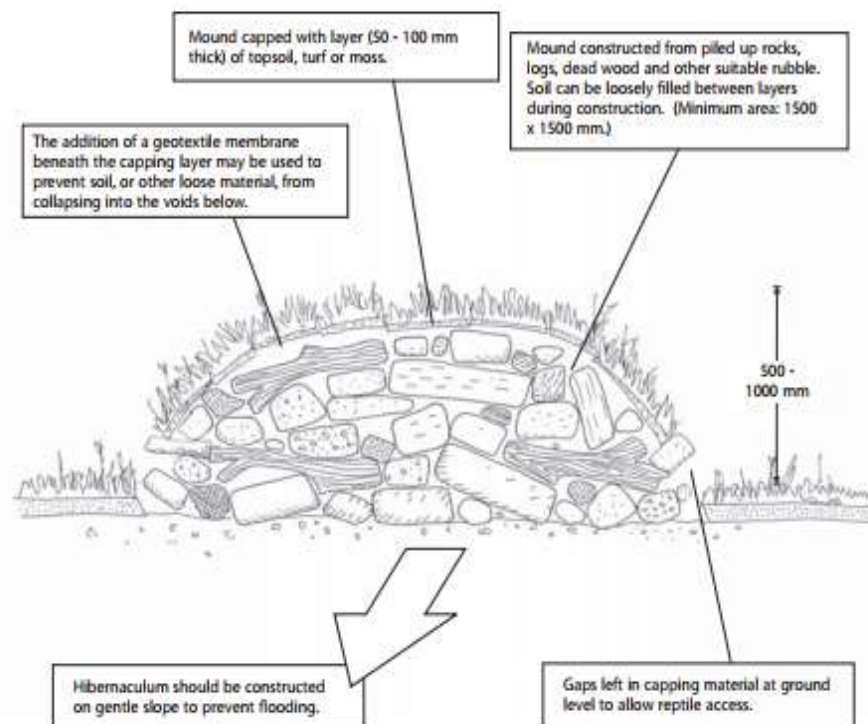
Hibernaculum on free-draining ground

Where ground conditions allow, the hibernaculum should be incorporated into a shallow pit. This design is more likely to remain frost-free, and will be less obtrusive and thus unlikely to be subject to interference.



Hibernaculum on impermeable ground

Where ground conditions are impermeable, then an 'above-ground' or mounded design should be utilised in order to prevent the hibernaculum from flooding. This design should also be used if it is not possible to excavate a pit for any other reason.



Appendix F

Egg Laying Habitat

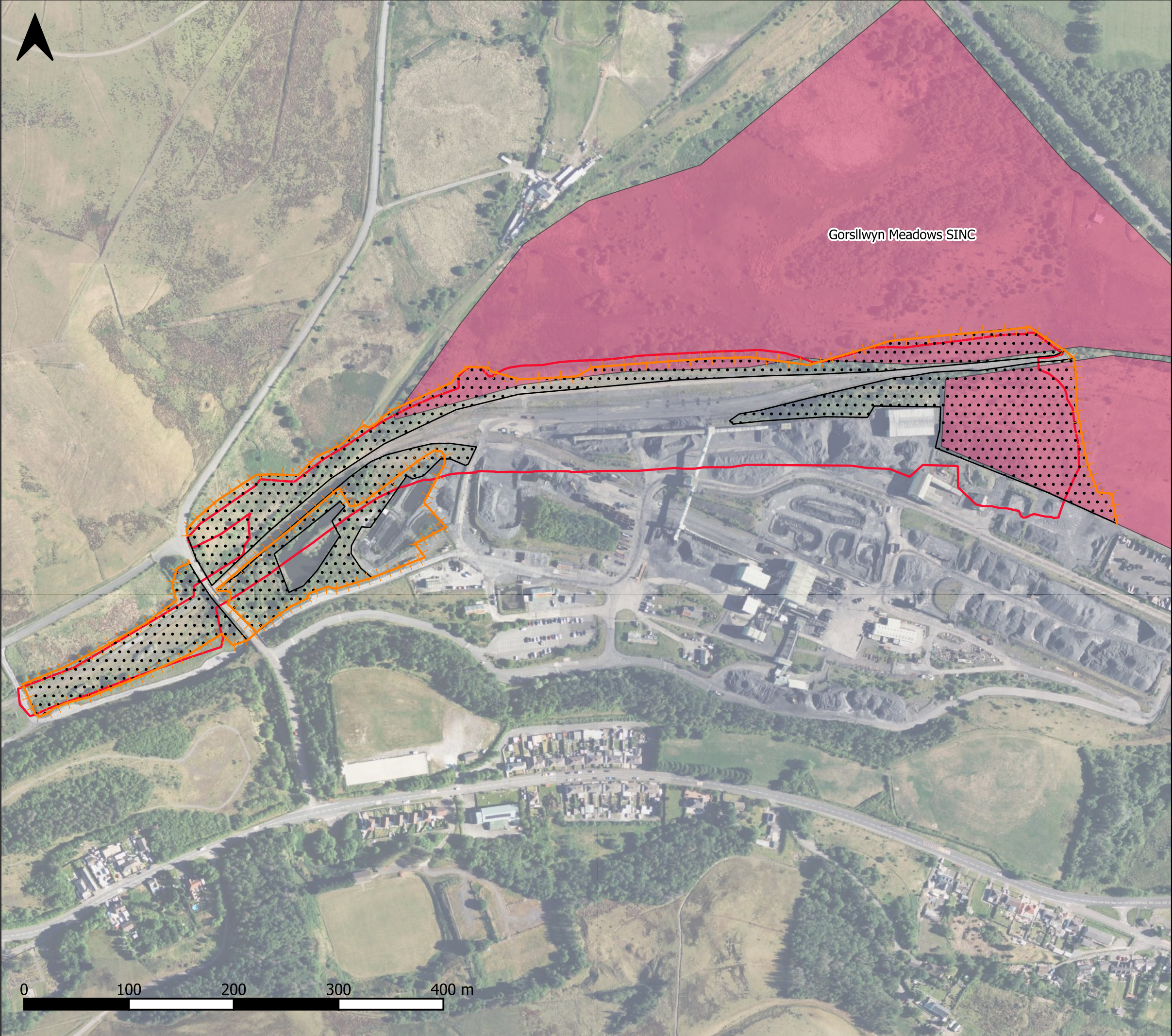
How to create a grass snake egg-laying heap



- **Where:** In a sunny spot, adjacent to tall vegetation, away from busy roads and no more than 400m from a water body. Female grass snakes become habituated to using a successful heap for several years, so when refreshing a heap, ensure you always use the same location.
- **When:** Mid-March to late April
- **Materials:**
 - One third fresh horse manure
 - One third vegetation (leaves, clippings) or compost
 - One third large sticks or branches
- **Instructions:**
 - Clear the ground where you want the heap
 - Create a base layer of leaves and clippings
 - Lay the largest sticks/branches on top of this
 - Place half of the horse manure on top of the sticks and branches,
 - Add another layer of smaller sticks.
 - Mix the remaining manure with the vegetation/compost and add this to the heap. Add some branches and smaller sticks to keep these layers well ventilated.
 - Ensure that the egg-laying heap is not too compacted, so the animals can easily get into it, and to prevent it from overheating.

Appendix G

Reptile Fencing Plan



- Legend
- Phase 1A Site
 - Reptile Exclusion Fence
 - Reptile Refugia Areas

BSG | ecology

OFFICE: Newport
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JOB REF: P21-913

PROJECT TITLE
Ecological Protection Plan
Phase 1A

DRAWING TITLE
Figure 3: Location of reptile exclusion fencing
and reptile refugia placement

DATE: 06.02.2023	CHECKED: OG	SCALE: 1:3,000
DRAWN: GL	APPROVED: OG	VERSION: 1.0

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No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

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Sources: GCRE Ltd

Appendix H

Reptile Fencing Specification

ANNEX B DESIGN OF REPTILE-PROOF FENCING

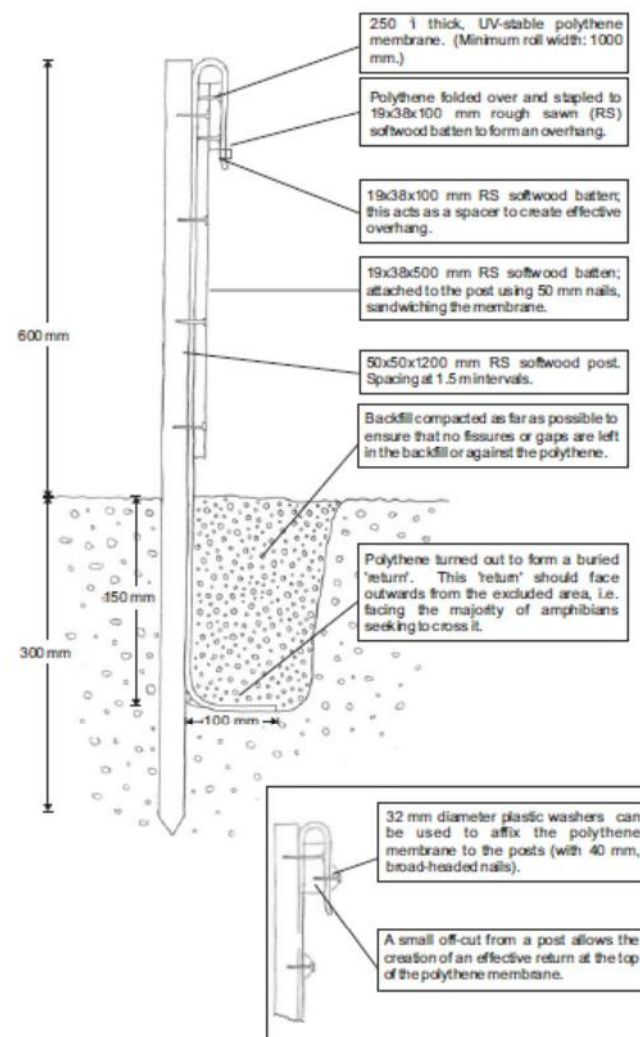
Temporary Reptile Fence

This is a standard temporary fence design which can be utilised in situations where it is necessary to create a reptile-proof barrier for periods usually not exceeding a single season. Although this design will effectively prevent the passage of reptiles in either direction, the 'returns' on the fence should face outwards, i.e. facing the direction from which the majority of any reptiles are expected to approach. It can be constructed from relatively inexpensive materials, but is easily damaged or vandalised, and will degrade over time. Fences of this type are less appropriate in windy situations where damage will be more frequent. Also if placed close to areas where plant operate regularly and/or earthworks are taking place, a membrane fence of this kind is usually best protected by a more robust fence, for example a wooden paling fence.

Care needs to be taken when undertaking the necessary maintenance works to ensure that vegetation does not grow over the fence. If undertaken mechanically, this can easily damage the membrane.

The use of a nail gun is recommended to attach the battens securely to the posts. Not only is this advantageous for speed, but prevents any loosening of the posts which can be associated with the repeated impacts of a hammer.

Some practitioners prefer the use of flexible plastic washers to hold the membrane in place, as an alternative to softwood battens. (An example of this is shown inset.) The result is similar in strength and durability to that of the previous design, but precludes the use of a nail gun, as the washers require a large headed nail and cannot withstand the force produced by the gun.



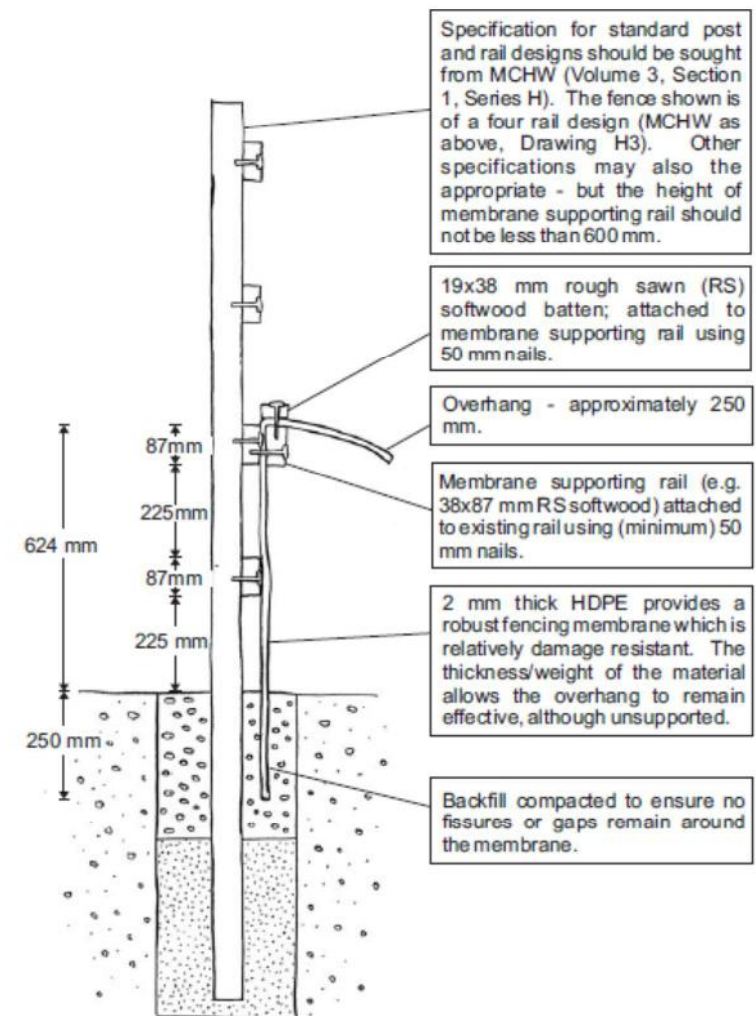
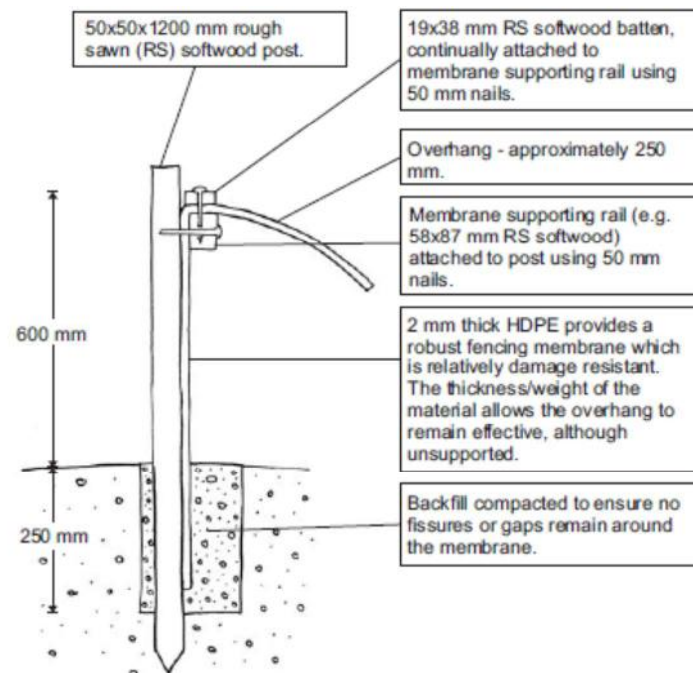
ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

Semi-permanent Reptile Fencing: Free-standing or attached to boundary fences

2 mm thick HDPE sheeting is a material which has been used to create effective semi-permanent reptile barriers. Although the membrane material is relatively expensive, these fences can be easy to install, potentially buried using a modified plough rather than a trench. The use of this kind of membrane also produces a more robust fence than the lighter-weight membranes and generally do not need to be protected by additional fences (however they tend to be marginally less robust than part-buried 'half-pipe' designs).

This fence design can be used in conjunction with timber post and rail highway boundary fencing, or as a stand-alone fence. The diagrams below show both of these alternatives. (It is also possible to install the membrane clear of the post footings due to the flexible nature of the materials.)

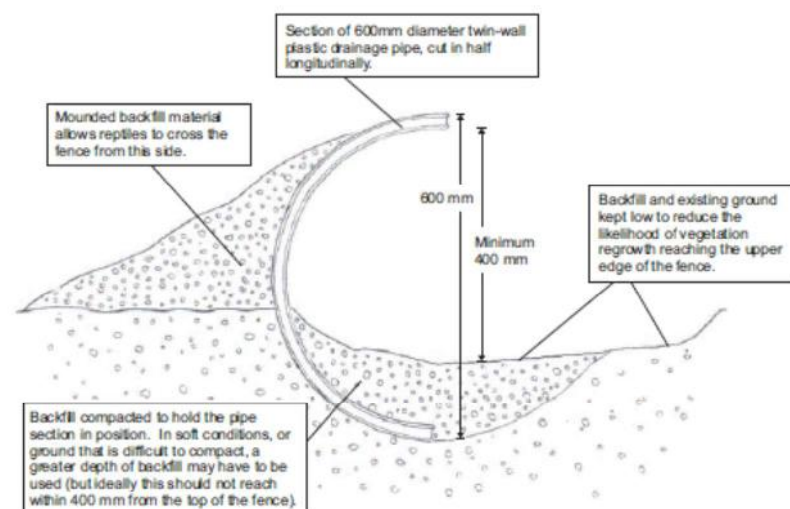


ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

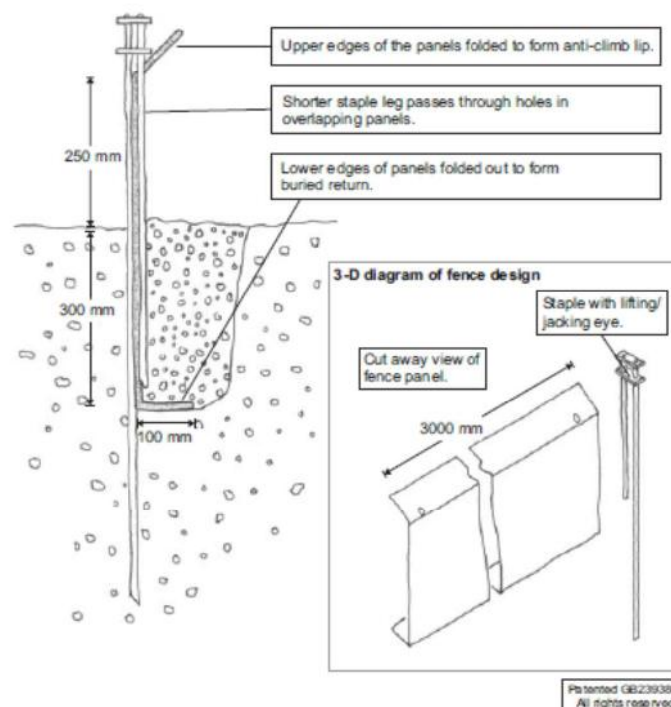
Semi-permanent One-way Reptile Fence

This fence design, utilising twin-wall plastic drainage pipe, is more cost-effective than that of the permanent solution overleaf, but is comparably robust when well constructed. It is also a more effective design than temporary membrane fences in situations where damage is likely to occur, and generally does not require a second protective fence except in areas where plant is operating very close to the fence. In addition, this design is more effective in allowing reptiles to negotiate the fence in one direction and is far less visually obtrusive. It can be useful as a short section in a longer membrane fence where animals (such as badgers) may damage a membrane fence, or in strategic locations to allow the one-way movement of reptiles. In addition, it represents a more robust alternative where a temporary fence is required to cross particularly difficult ground conditions.



Modular Reptile Fence Design

This type of reptile fencing is a new design, but provides a versatile system which is easy to install. It may be used as a vertical (as shown) or angled, one-way design, and is constructed from ready-made polypropylene sheets held in place by galvanised steel staples. Three grades of sheeting are available, which are suitable for temporary installation, semi-permanent installation and permanent installation respectively. Panels are also available in different sizes – the diagram shows a fence suitable for the exclusion of slow-worms, but a larger size may be more suitable for other species.

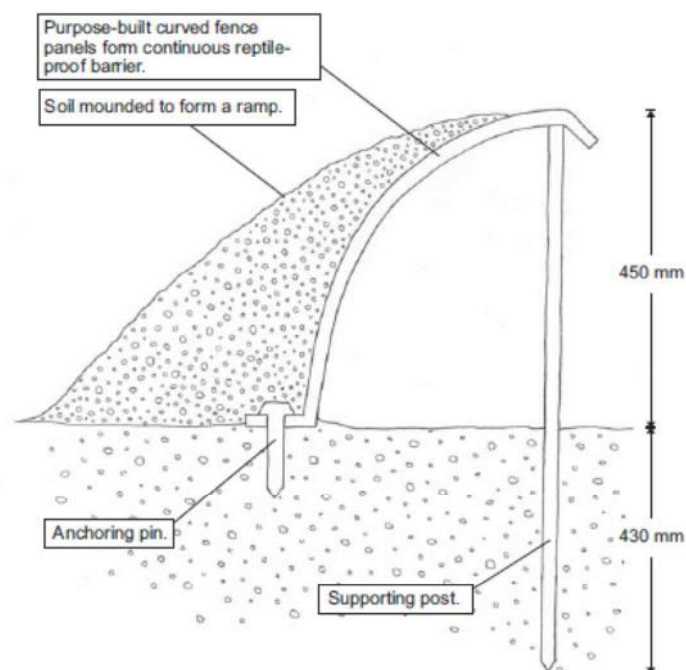


ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

Permanent One-way Reptile Fence

This type of fencing design is designed to be used in those few situations where a permanent reptile-proof barrier is required. It is constructed using purpose-built moulded plastic panels, with anchoring pins and supports. This design also allows reptiles to cross in one direction by climbing up the mounded ramp. Once vegetation has grown over the soil ramp this design has a very low visual impact. Regular maintenance is required to ensure that vegetation does not grow up in front of the fence and compromise the integrity of the barrier (this is important for all fence designs, but is of particular importance for fences which are to remain *in situ* for long periods).



General Notes on Reptile Fencing

- All reptile fences must be checked regularly and maintained to ensure they remain fully effective throughout their working life.
- All fence designs require some degree of backfilling of trenches or spaces beside the fence membrane, or mounding of earth. The substrate used for this should be friable and, in the case of back-fill, firmly compacted to prevent the formation of any gaps or fissures which reptiles may use to find a route beneath the fence, or as a refuge. Where available substrates are not sufficiently loose or able to be compacted, additional materials should be imported to ensure a reptile-proof barrier is maintained.
- In all fence designs, all timber should be untreated rough sawn (RS) softwood obtained from a renewable source.
- Modular fencing panels and 'half-pipe' fencing may be re-used or recycled (provided they are appropriately installed), providing a significant cost saving on, for example, phased development sites.
- The precise fence design and specifications should be 'tailored' to the reptile species concerned. For example, where common lizards need to be excluded, the taller fence options need to be chosen, with an effective top return throughout, and particular effort needs to be directed at avoiding vegetation falling against or over the fence. Where slow-worms alone are concerned, lower fencing options can be considered, and most attention needs to be given to the compaction of backfill and the maintenance of an effective below-ground barrier, particularly on uneven surfaces.
- The majority of these reptile-proof fencing solutions are equally applicable as temporary, semi-permanent and permanent fencing in the context of mitigation schemes for amphibians.
- Permanent one-way fencing should be in place before the road opens.

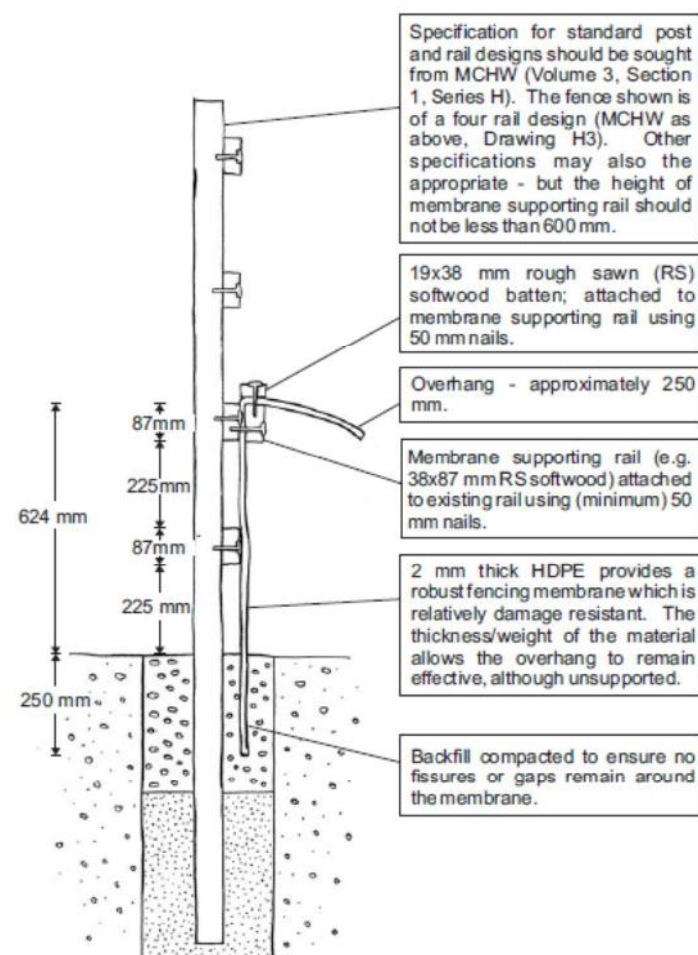
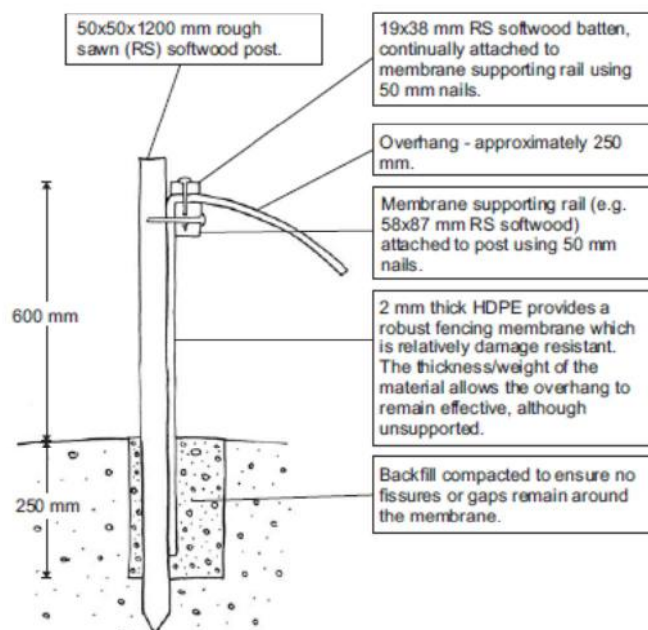
ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

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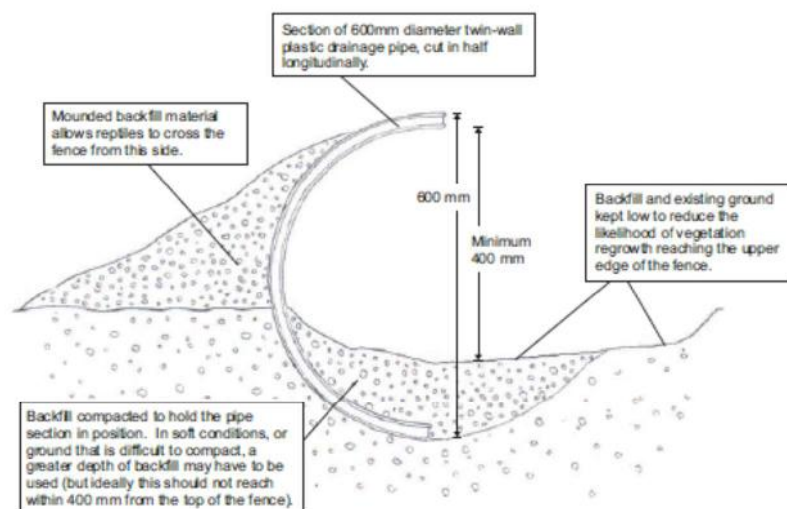


ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

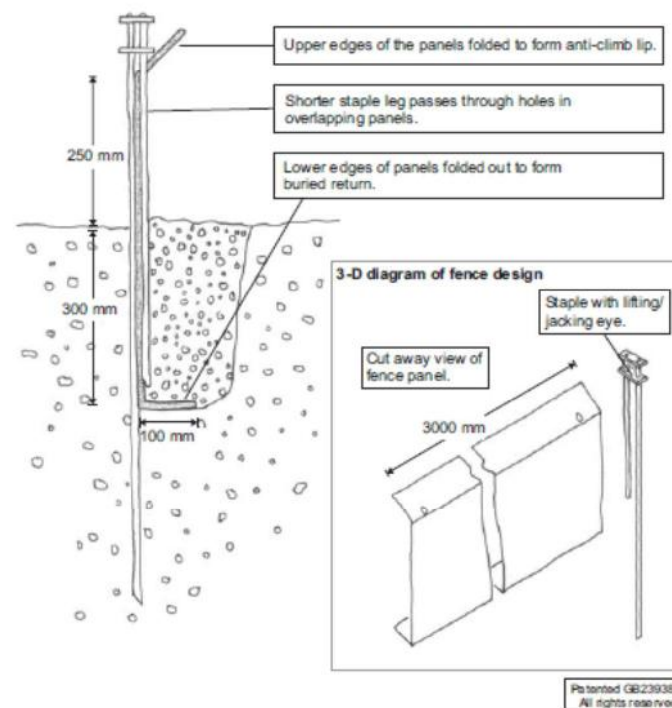
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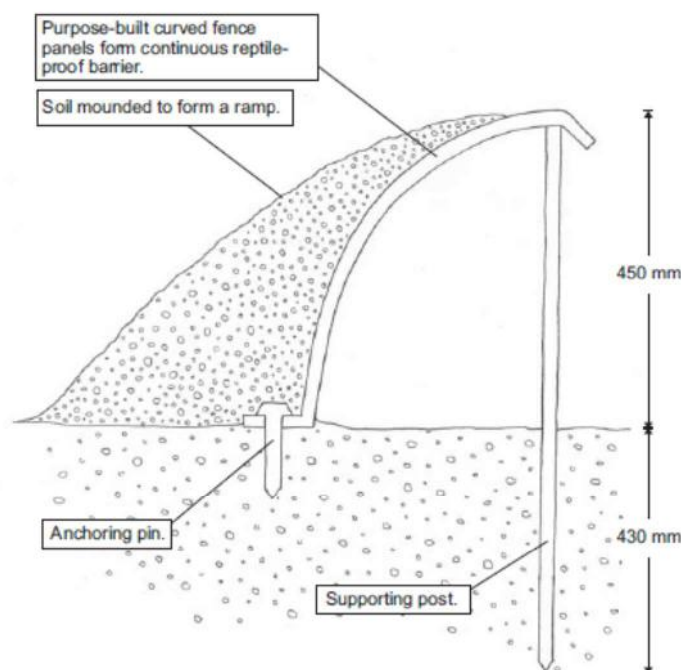


ANNEX B DESIGN OF REPTILE-PROOF FENCING

VOLUME 10 SECTION 4
PART 7 HA 116/05

Permanent One-way Reptile Fence

This type of fencing design is designed to be used in those few situations where a permanent reptile-proof barrier is required. It is constructed using purpose-built moulded plastic panels, with anchoring pins and supports. This design also allows reptiles to cross in one direction by climbing up the moulded ramp. Once vegetation has grown over the soil ramp this design has a very low visual impact. Regular maintenance is required to ensure that vegetation does not grow up in front of the fence and compromise the integrity of the barrier (this is important for all fence designs, but is of particular importance for fences which are to remain *in situ* for long periods).



General Notes on Reptile Fencing

- All reptile fences must be checked regularly and maintained to ensure they remain fully effective throughout their working life.
- All fence designs require some degree of backfilling of trenches or spaces beside the fence membrane, or mounding of earth. The substrate used for this should be friable and, in the case of back-fill, firmly compacted to prevent the formation of any gaps or fissures which reptiles may use to find a route beneath the fence, or as a refuge. Where available substrates are not sufficiently loose or able to be compacted, additional materials should be imported to ensure a reptile-proof barrier is maintained.
- In all fence designs, all timber should be untreated rough sawn (RS) softwood obtained from a renewable source.
- Modular fencing panels and 'half-pipe' fencing may be re-used or recycled (provided they are appropriately installed), providing a significant cost saving on, for example, phased development sites.
- The precise fence design and specifications should be 'tailored' to the reptile species concerned. For example, where common lizards need to be excluded, the taller fence options need to be chosen, with an effective top return throughout, and particular effort needs to be directed at avoiding vegetation falling against or over the fence. Where slow-worms alone are concerned, lower fencing options can be considered, and most attention needs to be given to the compaction of backfill and the maintenance of an effective below-ground barrier, particularly on uneven surfaces.
- The majority of these reptile-proof fencing solutions are equally applicable as temporary, semi-permanent and permanent fencing in the context of mitigation schemes for amphibians.
- Permanent one-way fencing should be in place before the road opens.



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