



Firestone Site Wrexham Industrial Estate Ecological Method Statement and Management Plan (TEP Report Ref: 3544.006)

December 2012
Version 3

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Wrexham Industrial Estate
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TEP Report Ref: 3544.006
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EXECUTIVE SUMMARY

Broadway Malyan (of which TEP is part of the consulting team) was commissioned in July 2012 by Wrexham County Borough Council (WCBC) to assist in progressing the development of the former Firestone site on Wrexham Industrial Estate (WIE).

This report provides information on the mitigation strategy for habitats and species on the site, an outline of timing and phasing for mitigation works and a management plan for the long-term protection of the mitigation area.

The former Firestone site is situated to the south-east of the WIE and comprises 44.6 hectares (110 acres) of brownfield land. The proposed development includes an area of approximately 23ha of employment units, including associated new roads and open spaces and an extension of the premises of F Lloyd (Penley), an employer currently operating from a site south of the Firestone site.

The site is of high ecological value for its mosaic of species-rich grassland, dense and scattered scrub which supports a population of the European protected species, great crested newt which could be classed as medium sized, one of the key populations of grizzled skipper (a UKBAP butterfly) on the Wrexham Industrial Estate and in Wales, a good diversity of breeding birds (28 species recorded breeding in 2005) and a number of other UKBAP butterflies and moths (including dingy skipper, cinnabar, latticed heath, small heath, white-letter hairstreak and wall).

Development of the site will result in the loss of approximately 23 hectares of grassland, scattered and continuous scrub and partial loss of the large ditch which crosses the site. These habitats provide foraging, hibernation and breeding habitat for great crested newts and breeding, roosting and foraging habitats for birds, grizzled skippers and other species.

Potential impacts on the flora and fauna due to development of the site will include permanent habitat loss, potential loss of connectivity with other semi-natural habitats and potential injury/ death by machinery during site clearance and construction works.

The mitigation strategy aims to restore and enhance habitats within the mitigation area, prevent accidental killing and injury to protected species, and make recommendations for habitat recreation in the developed area.

Habitat restoration and enhancement recommendations include:

- Fencing the site to prevent unauthorised access;
- Restoration of the two existing ponds and large ditch to improve their suitability as great crested newt breeding ponds;
- Creation of three additional ponds with associated amphibian hibernacula and butterfly scrapes (to make use of excavated materials and reduce vehicle movements);
- Creation of three additional amphibian hibernacula to be associated with the existing waterbodies;
- Removal of scattered scrub from grassland;
- Removal of dense scrub from designated areas; and
- Creation of two butterfly banks which can also be constructed to act as additional amphibian hibernacula

The prevention of accidental killing or injury to protected species primarily relates to great crested newts and breeding birds. Clearance of scrub will require removal outside of the bird breeding season (March to August inclusive).

The strategy for capture, exclusion and translocation of great crested newts from the employment development area will require consultation with CCW and will be based on the use of rigid upright perimeter fencing around the development area, with internal temporary drift fencing used to achieve the required density for pitfall traps. It is suggested that a trap density of 80/ hectare be used in the south eastern third of the site and 50 traps/ hectare in the remainder. Traps will be checked daily and all captured amphibians released into the mitigation area. If the population is classed as small, then trapping will be required for a minimum of 30 nights, but if it is classed as medium, then trapping will be required for a minimum of 60 nights.

Clearance of the vegetation to a height of 150mm will be required to ensure all potential refugia are found, dismantled and cleared of great crested newts.

Short term capture fencing will be removed on successful clearance of the site. Long term exclusion fencing will be retained until development is complete.

The site can then be left with the 150mm high vegetation or scraped of the top 50mm of soil which can be redistributed within the site and then sprayed with herbicide periodically to prevent colonisation of vegetation, until development commences.

Supervision by licenced great crested newt ecologists would be undertaken throughout the fence installation, trapping, translocation and fence removal.

A Welsh Government 'development' licence will be required for clearance of great crested newts from the development site. A CCW 'conservation' licence will be required for management of the mitigation area. Monitoring surveys will need to be undertaken by a licenced ecologist.

Restoration of the existing ponds and creation of the new ponds and hibernacula would be required as a minimum for granting of the development licence, in order that the mitigation area can support a translocated newt population and maintain it at favourable conservation status.

Habitat creation recommendations in the developed area include:

- Native structure woodland planting around development boundary;
- Installation of bird and bat boxes in suitable areas;
- Creation of wildlife corridors of semi-natural habitat through the development site using SUDS, wildflower meadow planting, hedgerows, butterfly banks and hibernacula; and
- Use of SUDS with battered, dropped, wildlife friendly kerbs or no kerbs and avoid the use of gully pots.

Habitat restoration and enhancement works could commence in the autumn and winter of 2013, with final planting up of ponds and seeding of butterfly banks being undertaken in spring 2014. An application for the WG development licence would be submitted in spring 2014 with great crested newt capture and translocation taking place in summer and autumn 2014. The site would be cleared and ready for development by winter 2014.

This clearance of the development site in one operation is compared with a phased process of development which would require a WG development licence and newt clearance and translocation for each phase. This brings with it the risk that the newt population in the mitigation area will reach its carrying capacity and would not be able to act as a mitigation area for further phases of clearance and development.

For these reasons it is recommended that the 23ha development site is cleared of great crested newts in one operation under one WG development licence. This approach does require an ongoing commitment to maintaining the newt perimeter fencing until the whole employment area is developed.

The F Lloyd (Penley) development will also require site clearance and fencing under a newt licence. However, as it is a smaller development and will be built in one pass, it may be possible to commence at an earlier date and not require permanent amphibian fencing post-development. F Lloyd (Penley) and their team should discuss the approach to licencing of this scheme with CCW.

Consultation with Matthew Ellis, CCW has confirmed that further great crested newt surveys should not be required prior to development and mitigation works commencing.

It is recommended that a detailed survey of the grizzled skipper population is undertaken between May and July to determine this species population size and use of the site.

The habitat management plan gives an indicative compartment plan and schedule of works for the activities required to maintain the mitigation area for the benefit of primarily great crested newt and grizzled skipper.

Monitoring of great crested newt, grizzled skipper, breeding birds and other invertebrates (other UKBAP butterflies and moths) should be undertaken for year's one to three and year five post-construction.

It is recommended that the mitigation area be open to the public with a path and interpretation boards installed. Signage must be present however, stating that dogs must be kept on leads and that dog fouling should be cleared up to reduce risks of disturbance and toxicity to great crested newts.

In order to secure the long-term protection of the mitigation area, it is recommended that WCBC takes detailed legal advice for them to fully understand the options available. Based on TEP's experience of other projects, it recommends that WCBC retains the freehold on the land and leases it to a Nature Conservation Organisation (NCO) e.g. North Wales Wildlife Trust on a 99 lease in order for them to manage the land and vegetation. WCBC would retain responsibility for the underground infrastructure.

An approach to an interested NCO is recommended as soon as possible in order for them to be involved in the detailed design and planning of the ecological mitigation package.

It is recommended that funding for management of the mitigation area be obtained by levying an annual service charge on companies who occupy the site. A Managing Agent would be responsible for collecting the service charge and passing on the funds to the NCO. The NCO would need to be comfortable working with a service charge model of funding due to the high levels of accountability required.

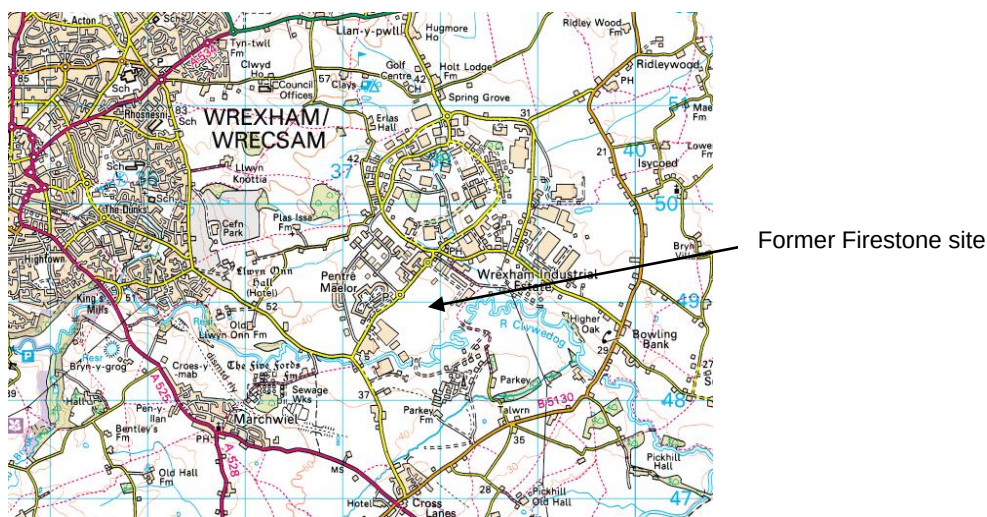
In the short-term it is suggested that capital from the sale of land to F Lloyd (Penley) be used not only to restore and create new habitats, but also to fund the first five years of

management and monitoring for the mitigation area, while levels of occupancy on the development site are low (and hence income from service charges is low).

1.0 INTRODUCTION

- 1.1 Broadway Malyan (of which TEP is part of the consulting team) was commissioned in July 2012 by Wrexham County Borough Council to assist in progressing the development of the former Firestone site on Wrexham Industrial Estate. The commission is divided into two parts: Part 1 requires the preparation of a development framework and indicative masterplan for the site, based on ground condition, utility capacity and ecology; and Part 2, which is conditional on WCBC taking the proposals forward, will require further detailed analysis of landscape and arboriculture and an outline planning application.
- 1.2 This report forms part of the Part 1 ecology requirements and has the following objectives:
- Set out the mitigation strategy for habitats and species on the site, detailing mitigation measures and recommendations for layout;
 - Outline a plan for timing and phasing of mitigation works; and
 - Outline a management plan for the long-term protection of the mitigation area.
- 1.3 The former Firestone site is situated to the south-east of Wrexham Industrial Estate, adjacent to Bridge Road, and comprises 44.6 hectares (110 acres) of brownfield land of high ecological value. The site is bounded by Bridge Road to the north-west, industrial units to the south-west and north-east boundaries and by the River Clywedog floodplain to the south-east. The approximate central grid reference is SJ 378 489 (Figure 1).

Figure 1: Location of former Firestone site and surrounding area



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- 1.4 The general principal for the development proposals are for 50% of the land to be developed and 50% to be retained for ecological mitigation. The majority of the retained land will be in a parcel along the south-eastern boundary of the site, with two corridors running from this area towards Bridge Road.

- 1.5 The site has high ecological value for flora and fauna, supporting a population of great crested newts and a population of grizzled skipper as well as many breeding birds.

2.0 ECOLOGICAL BASELINE

- 2.1 Previous ecological work undertaken in the mid 2000s along with a current desktop study and field surveys indicate that the former Firestone site is of high ecological value with respect to flora and fauna. This is presented in detail in the Firestone Site, Ecological Baseline Assessment of October 2012 (TEP Report 3544.001). A summary of the key findings are presented below.
- 2.2 The majority of the site comprises an intricate mosaic of species-rich modified neutral grassland interspersed with areas of dense continuous and scattered scrub and tall ruderals which creates a diverse range of habitats. The variation in substrate composition and drainage also adds to the range of vegetation communities present. A map (Drawing G3544.003a) and target notes of the habitats recorded from the current Phase 1 habitat survey (2012) are presented in Appendix 1.
- 2.3 The diverse habitat mosaic has been shown to support 28 breeding bird species, great crested newts (*Triturus cristatus*) and a range of UKBAP butterflies, including grizzled skipper (*Pyrgus malvae*). Part of the site (south-eastern boundary) also provides a foraging and commuting habitat for low level usage by bats. Otters are known to forage on the site for amphibians.
- 2.4 Tables 1 and 2 list the species recorded on the site and their legal and conservation status.

Table 1. Legally protected species recorded on the former Firestone site

Legislation	Species
The Conservation of Habitats and Species Regulations 2010 Schedule 2 (European Protected Species)	Great Crested Newt Bats (common pipistrelle, soprano pipistrelle, <i>Myotis</i> sp.) Otter (possible)
The Wildlife and Countryside Act, 1981 (as amended) + Schedules 1 (Birds), 5/6 (Animals)	Great Crested Newt Bats (common pipistrelle, soprano pipistrelle, <i>Myotis</i> sp.) Otter (possible) Breeding birds Barn Owl Adder Slow worm
The Protection of Badgers Act 1992	Badger (probable)
The Natural Environment and Rural Communities Act Section 42 and UKBAP	Great Crested Newt Bats (common pipistrelle, soprano pipistrelle, <i>Myotis</i> sp.) Otter Adder Slow worm Grizzled Skipper Dingy Skipper Cinnabar Latticed Heath Small Heath Wall Shaded Broad-bar White-letter Hairstreak Hedgehog Kestrel Song Thrush Skylark Reed Bunting Bullfinch Grasshopper Warbler Cuckoo Dunnock Lapwing Common Toad

Table 2. Species of local importance recorded on the former Firestone site

Classification	Species
Local Biodiversity Action Plan	Badger Barn Owl Bullfinch Cuckoo Grasshopper Warbler Green Woodpecker Kestrel Lapwing Reed Bunting Skylark Song Thrush Toad Great crested Newt Smooth Newt Adder Slow Worm Grizzled Skipper Prickly Lettuce
Locally Important	Grass Vetchling Bee Orchid

2.5 The key issues for consideration in developing the Method Statement and Mitigation Plan are:

- Maintenance and enhancement of high quality BAP habitats with respect to ponds and open mosaic habitats on previously developed land;
- Protection and maintenance of the great crested newt population at favourable conservation status;
- Protection and maintenance of the locally threatened grizzled skipper population;
- Maintenance and enhancement of suitable breeding habitats for a variety of birds;
- Maintenance of the south-eastern corridor used by bats for commuting and foraging;
- Consideration given to all the species on site which are listed in Section 42 of the NERC Act 2006 and or included within the UKBAP or Wrexham LBAP with respect to conservation of biodiversity.

2.6 Of greatest importance are the great crested newt population and the grizzled skipper population, both of which are described in more detail below.

Great Crested Newt

2.7 Two ponds are present on site within which both male and female great crested newts were recorded during surveys in 2005, although fish were also recorded in one of the ponds. Based on Langton, Beckett & Foster (2001) the survey results suggested a 'low' great crested newt population in the two ponds. No pond surveys for great crested newt have been carried out in 2012 due to the timing of the commission, however great crested newts have been recorded under reptile refugia during the reptile survey in transects C, D, H, I and J (see Drawing 3544.006 in Appendix 1), with a total of nine being recorded at any one time. This might suggest a 'medium' sized newt population. Tadpoles have also been observed in the ditch

which crosses the site. The areas of grassland, scrub and tall ruderal vegetation on site also provide suitable locations for hibernacula and foraging.

- 2.8 The WIE Road Improvement Scheme and other surveys not taken into account in the baseline report have assessed the great crested newt population of WIE and environs as being exceptional and it should therefore be regarded as nationally important (Matthew Ellis, CCW, *pers. comm.*). The population on the Firestone site is part of the wider WIE great crested newt population within which connectivity should be maintained. Development of the site will lead to the loss of up to half of available foraging and hibernating habitat for great crested newts.
- 2.9 Great crested newts and their habitat (aquatic and terrestrial) are afforded full protection by the *Wildlife and Countryside Act 1981* (Section 9, Schedule 5). This Act is the domestic implementation of the *Convention on the Conservation of European Wildlife and Natural Habitats* (the *Bern Convention*) and was amended by the *Countryside and Rights of Way Act 2000*. Great crested newts are also listed on Annex II and Annex IV of the *Conservation of Natural Habitats and Wild Fauna and Flora* (the *Habitats [and species] Directive*). This is transposed into UK law by the *Conservation of Habitats and Species Regulations 2010*.
- 2.10 The great crested newt is UK Biodiversity Action Plan (UKBAP) priority species and is listed on the Wrexham Local Biodiversity Action Plan (LBAP).
- 2.11 The great crested newt is widespread in the south-east and north-west of England but rarer in the south-west of England, Scotland and Wales. It is absent from Ireland. The stronghold for great crested newts in Wales is in Wrexham County Borough and Flintshire.
- 2.12 A Welsh Government (WG) great crested newt licence will be required to facilitate development of the site and appropriate mitigation must be put in place to ensure the continued favourable conservation status of this species.

Grizzled Skipper

- 2.13 Desktop records, from 2012, of grizzled skipper on the former Firestone site were provided by Cofnod. Drawing G3544.011 shows the locations of these records in Appendix 1.
- 2.14 The grizzled skipper adults generally fly from the end of April until mid-June. The eggs are laid singly on food plants such as creeping cinquefoil (*Potentilla reptans*), tormentil (*Potentilla erecta*) and dog rose (*Rosa canina*) next to either bare ground or short vegetation. The larvae then overwinter as pupae, which are formed within cocoons of leaves and silk amongst low vegetation (under 30cm).
- 2.15 A survey of food plants for grizzled skipper (and also dingy skipper) was undertaken in August 2012 (Drawing G3544.004, Appendix 1). Creeping cinquefoil and dog rose were found to be widespread and abundant. Tormentil had a more restricted distribution. Agrimony (*Agrimonia eupatoria*) and bramble (*Rubus fruticosus*) which can also be used as food plants but which weren't included in the survey are also found widely on the site.
- 2.16 Grizzled skippers are listed on Section 42 of the *Natural Environment and Rural Communities Act 2006*. They are listed as a UKBAP Priority Species due to their

marked population decline of 64% over 25 years and are included in the Wrexham LBAP where they are classed as locally threatened.

- 2.17 The population on the former Firestone site is the most important of several other populations on the Wrexham Industrial Estate, which is one of only five populations in Wales (R Hobson, Butterfly Conservation. *pers. comm.*) and could be considered to be of SSSI quality and therefore nationally important (Matthew Ellis, CCW *pers. comm.*). Development of the site may impact on this population, although a key aim of siting the development is to avoid the butterfly's colonies. Any impacts are likely to be mitigated through on-site schemes.

3.0 IMPACT ASSESSMENT WITHOUT MITIGATION

- 3.1 The development design will be undertaken with the high ecological value of the site in mind. As such, a parcel of land along the south-eastern boundary of the site forms the core area for mitigation. This area contains two ponds and part of the ditch that crosses the site and high diversity grassland along with scattered and continuous scrub. This area also contains all the great crested newt records (bar one), grizzled skipper records, many of the other UKBAP butterfly and moth records, retains the area of the site used, at a low level, by bats and is contiguous with the River Clywedog corridor.
- 3.2 Half of the whole site will be developed resulting in the loss of approximately 23 hectares of grassland, scattered and continuous scrub which may provide foraging and hibernation habitat for great crested newts and breeding, roosting and foraging habitats for otter, birds, bats, grizzled skippers and other species.
- 3.3 The loss of this land has the potential to have a negative impact on the great crested newt population, the bird community, and other S42, UKBAP and LBAP species which utilise the site.
- 3.4 The potential impacts on the flora and fauna due to development of the site will include the following:
- Permanent terrestrial habitat loss;
 - Potential loss of connectivity with other semi-natural habitats in WIE
 - Permanent partial loss of the ditch which crosses the site; and
 - Potential injury/death by machinery during site clearance and construction works.
- Great Crested Newts
- 3.5 Great crested newts are strictly protected as a European Protected Species from incidental capture and killing. Mitigation is required to prevent these acts occurring and to ensure that the species is maintained at favourable conservation status, as required by the *Conservation of Habitats and Species Regulations, 2010*. A licence for development will not be issued until this has been demonstrated.
- 3.6 None of the core terrestrial habitat (the area within 50m of a breeding pond) around either pond will be lost to the development of the site, although a proportion of that which is associated with the ditch will be lost. A proportion of the intermediate terrestrial habitat (50 – 250m from a breeding pond) and distant (over 250m) terrestrial habitat will be lost however. The loss of core terrestrial habitat has the greatest impact on great crested newts, but habitat losses up to 250m can still have significant effects.
- 3.7 The mitigation area will retain wildlife corridors to Bridge Road and habitats along Bridge Road will be retained, ensuring habitat links between the mitigation area and surrounding habitats. Habitat links will not therefore be permanently lost. However, loss of terrestrial habitats due to site development will affect newt ranging, foraging and sheltering behaviour and without mitigation this could affect the favourable conservation status of the great crested newt population.
- 3.8 Part of the ditch which crosses the site will be lost to development. Great crested newt tadpoles were observed in the ditch in 2012. This will result in the partial loss of great crested newt breeding habitat.

- 3.9 Without mitigation, amphibians within the site may be at risk of injury or death during site clearance and construction activities. Even when earthworks have been completed, amphibians re-entering the construction footprint could occupy rubble piles etc., the moving of which would also risk the injury or death of amphibians.
- 3.10 Threats to amphibians could continue into the operational phase of the site. There is potential for degradation of newt breeding habitat through nutrient enrichment into the pond (run-off from the development area), pollution, silting and changes to water levels (from inappropriate surface water drainage).
- 3.11 Further operational impacts can occur through the inadvertent 'trapping' of newts along the road network when they can become caught in gully pots.
- Otter
- 3.12 It is possible that otters visit the site from the River Clywedog to forage on the resident amphibian population. Maintenance of the mitigation area adjacent to the River Clywedog corridor will enable otters to continue to use the site for foraging. Development of the site may restrict the area available for foraging but will not significantly affect the otter population in the area.
- Bats
- 3.13 The bat activity recorded on site was all from within the area proposed for retention and mitigation. No trees on site show potential to support bat roosts. As such, development of the site will not significantly affect the bat population in the area.
- Grizzled Skipper
- 3.14 All of the existing locations for grizzled skipper records will be maintained within the proposed area for mitigation, where their food plants are also present. Use of the proposed development area by grizzled skippers is unknown. As such, there is the potential that the population may be affected by development of the site. Further surveys at the appropriate time of year would help inform the status of this species over the site as a whole.
- Birds
- 3.15 It is an offence to intentionally or recklessly, damage or destroy the nests of all wild UK nesting birds under the *Wildlife and Countryside Act 1981* (as amended). As such, all site clearance of vegetation and demolition work should be undertaken outside the bird nesting season (March to August inclusive).

4.0 MITIGATION

Mitigation strategy

- 4.1 The following text sets out the components of a mitigation strategy which can be refined once the approach to and plans for development of the site are progressed.
- 4.2 The general objectives of the mitigation strategy are as follows:
- To protect, restore and enhance the mitigation area to increase its potential to support a diverse range of species, to maintain favourable conservation status for great crested newts and to promote the grizzled skipper population on site;
 - To prevent accidental killing or injury to protected species (primarily great crested newts and birds) prior to and during the proposed re-development, habitat restoration and enhancement works, and;
 - To make recommendations for habitat creation in the developed area as part of the landscaping design to increase connectivity through the development to the wider WIE.

Habitat restoration and enhancement in the Mitigation Area

- 4.3 The recommendations for restoration and enhancement of terrestrial habitats needs to take into account the requirements of great crested newts, grizzled skippers, birds and the many other UKBAP and LBAP species recorded on the site. Habitat restoration and enhancement of the mitigation area will be undertaken prior to exclusion, capture and translocation of great crested newts from the development area. An indicative plan outlining the proposed mitigation approach is shown in Drawing D3544.007 (Appendix 2) and described below.

Site Fencing

- 4.4 The site is currently subject to unauthorised access by motorised vehicles which cause disturbance and damage to the site. It is proposed that the site should be permanently fenced e.g. Post and rail, with only pedestrian access allowed via a kissing gate for example. This will help ensure mitigation works and the future protection of the site are successful.

Aquatic habitats

- 4.5 It is proposed that the two ponds and ditch undergo a restoration management programme to improve their suitability as breeding sites for great crested newt.
- 4.6 Pond 1 would benefit from reprofiling, as it currently has a shallow northern bank which leads to a large proportion of the pond drying out annually. The reprofiling would increase the depth of the pond and create a more defined northern bank. Reprofiling operations would also enable clearance of a percentage of the *Typha* to create approximately 50% open water.
- 4.7 Ideally, Pond 2, the sluice pond should be de-silted and have 50% of the *Typha* swamp removed to create 50% open water, along with clearance of 30% of scrub from the banks. However, an investigation is required as to the source of the water running into the pond via the large culverts beneath the Firestone site (Discussion with UCML has shown that these culverts are not owned or managed by Dee Valley Water). The water appears to be polluted and may not be suitable for creating a great crested newt breeding habitat. In addition, fish were recorded in this pond in the 2005 survey. These would require removal if this pond is to become suitable for

great crested newts. It is recommended that easement rights over the land are investigated within the Welsh Government's legal ownership documents for the Firestone site. This should identify ownership of the culverts and enable discussion to be opened regarding the source of the pollution and how it can be rectified. If removal of the pollution is not possible, a potential option would be to create a reedbed in part of Pond 2 to clean the water and then allow it run into the remainder of the pond which would then be suitable for great crested newts.

- 4.8 The proportion of the ditch remaining in the mitigation area should be cleared of scrub and grassland vegetation in preparation for it to be linked to a SUDS scheme from the development site, to create a permanent waterbody. The SUDS scheme should utilise rainwater run-off from roofs in order to ensure it is clean and uncontaminated as opposed to surface water run-off which may contain pollutants associated with vehicles and road surfaces.
- 4.9 The creation of three new ponds, each of approximately 150m², in the mitigation area would be beneficial in terms of maintaining favourable conservation status of great crested newts, but this needs balancing with the needs of the other species of conservation interest on the site. It is suggested that two ponds could be created in the mitigation area to the south of the developable area which would be within 250m of each other and the existing Pond 2 and ditch. It is anticipated that these ponds would act as breeding ponds for great crested newts. A further pond could be created in the western part of mitigation area. It would be more than 250m from the other new ponds and therefore may not immediately act as a breeding pond, but could be used as a stepping stone habitat to increase connectivity within the WIE metapopulation.
- 4.10 The proposed location of these ponds takes into account the areas suggested for new ponds by the Amphibian and Reptile Conservation (ARC) spatial modelling programme for great crested newts (as discussed in TEP Report Ref: 3544.001 and would help to ensure a strategic and sustainable approach to great crested newt conservation for the WIE.

Great Crested Newt Hibernacula

- 4.11 Six hibernacula for great crested newts can be constructed within the mitigation area, three to be associated with the existing waterbodies being restored, and three to be associated with the newly created ponds. The hibernacula will incorporate inert rubble and logs, depending on materials available, topped with a loose soil mix, using soil excavated from the new pond diggings, and capped with turf. These will be situated on dry ground and will ensure multiple points of ingress around the bases/sides. Minimum dimensions will be 5m (L) x 2m (W) x 1m (H), but where possible, these will be extended into bank features measuring up to 20m in length (see below). Although hibernacula do not have to be located close to ponds, this reduces vehicle movements around the site and reduces the impact of habitat creation works on the site.

Grassland Habitats and Grizzled Skipper

- 4.12 The grassland sward is already diverse in species and has a varied structure, ranging from areas of long grass to those with very sparse vegetation and patches of bare ground. A key aim for restoring and enhancing the grassland habitats will be removal of scrub encroachment. It is recommended that scattered scrub, particularly young growth, be removed from areas of high diversity grassland.

- 4.13 Disturbance will be kept to a minimum in areas known to support grizzled skippers during other mitigation activities in order to maintain suitable their existing breeding habitat areas.
- 4.14 The grassland areas can be further enhanced to benefit grizzled skipper by developing a cutting regime which increases the structural diversity of the sward and encourages their food plants such as creeping cinquefoil, tormentil and agrimony.
- 4.15 There are several areas within the mitigation site where the grass sward is naturally short, due to underlying soil and drainage conditions. These areas should be maintained in their current state and will reduce management costs as they will not require a cutting regime.

Butterfly Scrapes and Banks

- 4.16 In order to compensate for the loss of potentially suitable grizzled skipper and other butterfly breeding habitat to the development site, suitable areas in the mitigation area can be scraped to create patches of bare ground – a habitat favoured by grizzled and dingy skippers. It is suggested that these scrapes are associated with the new ponds as long as the pond and scrape are designed in such a way that the scrape will never become waterlogged. Creating these habitats in close proximity to each other will reduce vehicle movements around the site and therefore impacts to the existing habitats of the mitigation area.
- 4.17 Butterfly banks can be created using spoil from excavation of the new ponds which reduces the costs of having to remove the spoil off-site. These can also act as hibernacula for great crested newts and could be located around the eastern corner of the site opposite the Calypso factory and to the south of the F Lloyd (Penley) site once scrub has been cleared. These would be seeded with a suitable seed mix of species already found on the site including those used by grizzled and dingy skippers as food plants, namely: creeping cinquefoil, agrimony and common bird's-foot trefoil. The seed mix should be sourced from plants of UK provenance and could even be collected from the site itself.

Scrub Habitats

- 4.18 Large areas of continuous scrub, often bramble and patches of scattered scrub are encroaching on the grassland habitats, particularly in the south and east of the site which is included within the mitigation area. Cover has increased since the previous surveys and management were undertaken in the 2000s. Scrub however is an important nesting, roosting and food resource for a wide range of animals, particularly birds. The aim of the management is to maintain a balance between scrub and grassland which has the widest range of benefits for wildlife.
- 4.19 Two approaches are proposed for the scrub on the site. Dense scrub along the south-eastern and south-western boundaries should be cut back by 30% and a graduated edge created between the scrub and adjacent grassland. This can then be managed on a rotational basis to keep the scrub in check. These areas will maintain a dense habitat corridor along the boundaries of the site for a variety of wildlife including breeding birds and bats.
- 4.20 It is proposed that areas of dense scrub within the grassland be cleared and the areas reseeded with a grassland mix, preferably with seed collected from the site in order to re-establish additional grassland in the mitigation area. These areas would require close onwards management to ensure the scrub regeneration was kept in check.

Himalayan balsam

- 4.21 The isolated area of Himalayan balsam will be cleared by hand-pulling and then managed in a similar way on an annual basis.

Prevention of Accidental Killing or Injury to Protected Species

Scrub Clearance from Development Area

- 4.22 Scrub clearance from the development site will need to be undertaken outside of the bird nesting season (March to August inclusive) in order to prevent killing or injury to birds and disturbance to their nests. It is recommended that scrub is cut off at ground level in the winter so as to avoid disturbance or injury to great crested newts which may be hibernating within the root systems.

Great Crested Newt Capture, Exclusion and Translocation from Development Area to Mitigation Area

- 4.23 Rigid upright fencing, such as Herpetosure's rigid plastic fencing will be installed around the perimeter of the area to be developed (see Appendix 3). This should ideally be undertaken in spring, to coincide with the great crested newt migration to breeding ponds, once habitat restoration and enhancement measures are implemented to the satisfaction of the ecologist and once weather conditions are suitable.
- 4.24 A compartmentalised system of temporary drift fencing, using twin woven plastic coated geo-textile, with pitfall traps will be installed, allowing for trapping within individual compartments to be extended if required. Temporary fence and pitfall trap specifications are illustrated in Drawing TEP.FEN.025A in Appendix 3.
- 4.25 Pitfall traps will be installed within the perimeter fencing and drift fencing compartments at a density of 50 - 80 traps/ha to allow capture of amphibians migrating/foraging within the fenced site boundary. To minimise the length of drift fencing required, pitfall traps should be spaced 5m apart. The potential for a medium sized great crested newt population being present indicates that a trapping density of 80 traps/ ha should be used. However, the great crested newts were only recorded in a restricted area in the east of the site and it is suggested that the higher density trapping be used for trapping the south eastern third of the site, while 50 traps/ ha be used for the remainder. This will be determined in consultation with CCW.
- 4.26 The pitfall traps will be fitted with a mammal ladder and cork raft with damp carpet in the base of the buckets. The traps will be checked daily.
- 4.27 All captured amphibians will be released within the Mitigation Area.
- 4.28 In the event that water logging is experienced, where buckets may be forced up by ground water, the buckets shall be staked into the ground. Pitfall traps will be bailed as required to prevent flooding, preventing harm to small mammals and reptiles (if present) that may be caught.
- 4.29 A minimum of 30 trap nights will be undertaken, where trap nights will be defined as those with midnight temperatures above 5°C. However, if it is assumed that a medium sized population of great crested newts is present on the site, a minimum of 60 trap nights may be required. This will be determined in consultation with CCW. If midnight temperatures fall below this minimum level the night will be discounted and

the trapping period extended as required to achieve the required clear period before trap closure. The clear period will be defined as a period of five trap nights, during which no great crested newts are captured. Trapping will be extended as required to achieve this clear period.

- 4.30 Site clearance (i.e. destructive searching of potential refugia) will occur by hand at the end the trapping scheme (after at least 25 or 45 trap nights). This will require the clearing of vegetation from the site to a height of approximately 150mm in order that all potential refugia are found, dismantled and cleared of great crested newts. Suitable refugia components (e.g. logs) will be retained and incorporated into the mitigation area to provide amphibian habitat banks. Once trapping is complete, potential refugia remaining (too large for hand clearance) will be cleared with the aid of machines under supervision by a licenced ecologist.
- 4.31 Short term capture fencing will be removed on successful clearance of the site. Long term exclusion fencing will be retained until development is complete.
- 4.32 At this point the site can either be left with the 150mm high vegetation or scraped of the top 50mm of soil which can be redistributed within the site rather than removed from site at an extra cost. Leaving the vegetation in place will still enable use of the site by wildlife including ground nesting birds and grizzled skipper. Total clearance of the site to bare soil would prevent it's use by wildlife, but would require regular spraying with a herbicide such as glyphosate to prevent recolonisation of vegetation, particularly the food plant species of grizzled skipper and other butterflies. Leaving the vegetation in place will be significantly more cost effective (see TEP Report: 3544.009) and breeding birds could be mitigated against by undertaking final clearance outside the breeding season. If grizzled skipper were found to be using the area, an approach to their mitigation would need to be developed.
- 4.33 Access will be required into the development through the exclusion fencing once development commences. Newt proof access points will be installed as required to permit site traffic during the day. The gates will be weighted (e.g. with sand bags) to ensure a tight fit to the ground level during the night.
- 4.34 Throughout the construction phase fencing will be checked daily during the months February to October inclusive and weekly during the intervening months. Any damage to fencing will be replaced on the same day that the damage is discovered. The use of rigid perimeter fencing, ideally set back from the excavation/construction area, will mean that inspection frequencies and repairs can be downscaled if it becomes apparent that there are no issues that merit daily visits.
- 4.35 If development works are completed during the winter, the long term exclusion fencing will need to remain in place until the onset of warmer weather in spring to avoid disturbing any newts that may be hibernating underground against the fence membrane
- Supervision
- 4.36 The installation of the fencing and traps and the destructive searches will be supervised by a licensed ecologist to ensure that it meets required standards.
- 4.37 A site representative will be trained to inspect the fencing for damage. Inspections will occur daily during the construction period.

- 4.38 Prior to the beginning of construction works onsite a tool box talk will be given by a licensed ecologist detailing the conditions of the licence and emphasising the legal implications of the related Method Statement.
- 4.39 The toolbox talk will include advice on distinguishing great crested newts from other amphibians and identification guides will be provided on site for reference. Site workers will be advised to remain vigilant for great crested newts and if they think they have identified one within the site it should be left in place and the site representative contacted immediately.

Licensing Requirements

- 4.40 A 'development' licence must be obtained from WG under the overriding public interest derogation for great crested newts for all works associated with the development of the site, from the creation and enhancement of habitats within the mitigation area to the exclusion and trapping of newts and finally the removal of newt fencing. This will require the preparation of a detailed method statement specifically for great crested newts which will incorporate the information presented in this document.
- 4.41 In order for the development licence to be granted, the mitigation area must have been restored or enhanced to a level where it is able to receive and support translocated newts and maintain the population at favourable conservation status. The minimum that would be required in order for issue of the licence is likely to be the restoration of the existing waterbodies and the creation of new ponds and hibernacula.
- 4.42 Habitat management within the mitigation area after construction may require a 'conservation' licence granted by CCW as long as the two licencing tests of conservation status and no satisfactory alternative are met. This will require the preparation of a detailed method statement based on the habitat management works being undertaken.
- 4.43 Any surveys undertaken as part of the monitoring programme, post-construction, will need to be undertaken by a licenced ecologist.

Recommendations for Habitat Creation in the Developed Area

Woodland and Scrub Planting

- 4.44 It is recommended that native structure woodland planting would be required around the development boundary to reduce the views of the development from the countryside. This would form part of the 50% ecological mitigation calculation. It would be in a corridor of between 10 – 20m width and comprise native species found on the site such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), alder (*Alnus glutinosa*) and willow (*Salix* spp.) which would managed in an ecologically friendly way. This planting would also mitigate for the loss of scrub to the development and provide additional nesting and foraging habitat for birds.

Bird and Bat Boxes

- 4.45 In order to enhance the mitigation area for birds and bats, boxes could be installed in suitable areas. This would compensate for the loss of breeding habitat for birds and potentially encourage bats to increase their usage of the area.

Integration with hard landscapes

- 4.46 A key aim of the mitigation strategy is to maintain connectivity with other semi-natural habitats in the WIE. Wildlife corridors of semi-natural habitat are to be retained or created between the main mitigation area and Bridge Road, encouraging wildlife to have access across the development site. Wildlife corridors can be recreated using SUDS with adjacent wildflower meadow planting, hedgerows, butterfly banks and hibernacula.
- 4.47 A particular issue for great crested newts is mortality due to standard road design, which uses upright kerbs and gully pot drainage systems. Detailed design of the development area needs to ensure that great crested newts and other wildlife are considered with respect to design of the roads and drainage systems. Standard kerbs and gully pots should be avoided if possible, and be replaced by the use of SUDS along with battered, dropped or wildlife friendly kerbs or no kerbs at all. These measures can reduce great crested newt mortality when crossing developed areas.

Timing

- 4.48 An indication of the timing for habitat creation and great crested newt mitigation works is provided in Table 3. This assumes works commence in 2013 and would result in the whole development site being ready for construction to begin towards the end of 2014. This would be undertaken under one development licence from Welsh Government.
- 4.49 If a phased approach to clearance of the development area of great crested newts is taken, a first phase would be ready for construction towards the end of 2014 under one development licence from WG. Each subsequent phase would require a further development licence application and separate periods of fencing, trapping and translocation to clear the development area of great crested newts. With each phase of great crested newt clearance into the mitigation area, there is a risk that the newt population in the mitigation area will reach its carrying capacity would not be able to act as a mitigation area for further phases of clearance and development. In addition, the costs for successive phases of fencing and trapping will be significantly higher than if one phase of clearance is undertaken.
- 4.50 For these reasons, it is recommended that the whole development site is cleared of great crested newts in one operation under one WG development licence.

Table 3: Programme for Habitat Creation and Mitigation Works for Clearance of the Whole Development Site

MITIGATION AND HABITAT CREATION ACTIVITIES	TIME OF YEAR
Additional survey – grizzled skipper	May - July 2013
Post and rail fencing of mitigation area to exclude unauthorised vehicles	Summer/ Autumn 2013
Scrub encroachment clearance in mitigation area	September 2013 (between bird breeding season and newt hibernation or later if can confirm not a newt hibernation area)

MITIGATION AND HABITAT CREATION ACTIVITIES	TIME OF YEAR
Creation of new ponds	September 2013 (between bird breeding season and newt hibernation or later if can confirm not a newt hibernation area)
Hibernacula construction (from pond diggings and brash)	September 2013 (between bird breeding season and newt hibernation or later if can confirm not a newt hibernation area)
Creation of butterfly scrapes (at same time as ponds dug)	September 2013 (between bird breeding season and newt hibernation or later if can confirm not a newt hibernation area)
Creation of butterfly banks/ hibernacula (from pond diggings and brash)	September 2013 (between bird breeding season and newt hibernation or later if can confirm not a newt hibernation area)
Restoration of existing waterbodies (sluice pond subject to outcome of water source/pollution investigation)	Autumn/ Winter 2013
Scrub clearance (to ground level only) from development area – if required	Winter 2014
Seed butterfly banks and plant up ponds	Spring 2014
WG Licence application	Spring 2014 (allow 30 day determination period)
Exclusion fencing for development area, drift fencing and pitfall traps	Summer 2014 (aim for late July)
GCN trapping and translocation (30 or 60 days trapping)	Summer/ Autumn 2014
Drift fencing and pitfall trap removal	Autumn 2014 (once a 5 day clear period achieved and prior to great crested newt hibernation)
Development can commence	Autumn/ Winter 2014
Exclusion fencing removed	Once development complete, or if this occurs in Winter, then in the following Spring

Requirements for Further Survey and Design

- 4.51 Consultation with Matthew Ellis, CCW has confirmed that further great crested newt surveys should not be required prior to development and mitigation works commencing. Since the presence of great crested newts is known on the site, this provides the basis from which to develop mitigation for this species.
- 4.52 Further work could be undertaken to follow up the initial modelling of great crested newt pond connectivity, undertaken by ARC. This would provide information on how the WIE as a whole could be managed for the benefit of the local great crested newt population by identifying the best locations for new ponds in the area.

- 4.53 It is recommended that a detailed survey of the grizzled skipper population is undertaken between May and July to determine this species population size and use of the site. It will be important to understand whether this species uses the part of the site released for development, despite no desktop records coming from this area, in order to inform development of a mitigation plan for them.

F Lloyd (Penley) Scheme

- 4.54 The proposed F Lloyd (Penley) (FLP) development is also shown on the Indicative Habitat Restoration and Creation Plan (D3544.007). This is a smaller development and it would have a lesser impact on great crested newts and habitats of value than the main 23ha employment development. Nevertheless it will require planning permission and a great crested newt licence, including the clearance of the footprint using fencing and traps, and the creation of compensatory habitat in the ecological mitigation area.
- 4.55 Subject to consultation with CCW, it is possible that the FLP scheme could proceed ahead of the main great crested newt clearance, perhaps in Autumn 2013, provided that surveys for grizzled skippers and newt mitigation plans were put in place and a licence was obtained.
- 4.56 The benefits of an early start on the FLP scheme would be that proceeds from the sale of the land could be used to kickstart the works in the ecological mitigation area.

5.0 MANAGEMENT PLAN

Habitat Management and Maintenance

- 5.1 The habitats within the mitigation area should be placed under long-term management for the benefit of wildlife in general and for great crested newts and grizzled skippers in particular. A draft habitat management brief and management schedule is presented in Appendix 4 and provides recommendations for the ten years following mitigation activities. This is accompanied by an indicative plan showing proposed management compartments and the rotational approach. However, these will be subject to change as a result of monitoring results and longer-term management intentions.

Monitoring

- 5.2 Monitoring of habitat conditions, great crested newt population, grizzled skipper population and other species as deemed necessary should be undertaken within the Mitigation Area for three years post construction and in the fifth year to identify the need for remedial action. This will be a requirement of the CCW licence with respect to great crested newts.

Public Access and Interpretation

- 5.3 It is recommended that the mitigation area, while being fenced, should allow public access. A circular path around the site, with links to the residential area at Pentre Maelor and the surrounding employment areas should be installed, with associated interpretative displays. This will increase the functionality of the site, by providing semi-natural open space to be enjoyed by the local population. Access to open space has been shown to increase people's health and productivity (Green Infrastructure North West) and would be of benefit to local businesses, particularly those occupying the developed Firestone site.
- 5.4 The path should be located away from the ponds and signs erected stating that dogs must be kept on leads and that dog fouling should be cleared up. This will ensure that great crested newts are protected from disturbance and potential toxicity issues.

Mechanism for Ensuring Long-term Protection

- 5.5 The following discussion on the mechanisms available to secure the long-term protection of the mitigation area is based on TEP's experience of other projects with similar requirements. It is recommended that detailed legal advice be sought for WCBC to fully understand the options available to them.
- 5.6 Once WCBC takes ownership of the Firestone site, there are two options which it can consider for the long-term management of the mitigation area for nature conservation. The first is to pass the freehold of the land onto a Nature Conservation Organisation (NCO) who will be managing it. The second is to lease the land to an NCO on a 99 year "piecrust" lease with a break clause at 99 years to allow WCBC to resume the freehold if they wish. Under the lease arrangement, the NCO would only be responsible for the land and vegetation while the WCBC would retain responsibility for maintenance of underground liabilities, such as the large drains which feed into Pond 2.

- 5.7 The second option is recommended. By maintaining the freehold, WCBC will benefit from future flexibility relating to the land. Leasing the land to NCOs is often preferable for the NCO because they do not have to take on the risks associated with underground infrastructure issues. A 99 year lease also meets the licencing tests with respect to great crested newts of ensuring long-term management and favourable conservation status.
- 5.8 TEP has not approached any NCOs about taking on management of the site. However, North Wales Wildlife Trust have expressed an interest in taking on management of the site and would be well placed to do this since they are already present on WIE where they manage a site on Bryn Lane.
- 5.9 It is recommended that potential NCOs are approached as soon as possible. The sooner an NCO is taken on board the better, as they can then be involved in the detailed design and planning of the ecological mitigation package.
- 5.10 With respect to funding of the mitigation area, there are again two basic approaches, namely an endowment based approach or a service charge based approach. The endowment approach is unlikely to be feasible as this entails the provision of a large sum of money (typically the average annual management costs multiplied by 30 years) at the beginning of the tenure, which the NCO then uses for management of the site in perpetuity. In this case, as the site management is likely to be more than £25,000 per annum, it is unlikely that it would be possible to raise this level of finance ahead of development.
- 5.11 Thus, an annual service charge is recommended as the best approach to funding the management of the mitigation area. The amount charged would need to be set for a realistic level of occupancy of the developed area, for example 60%. With a total developable floor space of 96,750m² (main industrial floorspace and serviced plots), 60% occupancy would represent 58,050m². With annual management costs for the mitigation area estimated to be £23,158, this would require an annual management charge of approximately 40p/m² to be levied on businesses occupying the site. It would then follow that in years when occupancy is higher than 60% that the funds would accumulate and be able to pay out in years when occupancy is less than 60%.
- 5.12 It should be noted that not all NCOs can reclaim VAT. This means that when the service charge is calculated it would need to include VAT on the management costs for the mitigation area.
- 5.13 Caution is advised in including F Lloyd (Penley) in the requirement to pay an annual service charge. Our understanding is that they will have bought the land which they develop, rather than leasing it, and it is anticipated that they may be unwilling to effectively 'pay twice' towards management of the mitigation area.
- 5.14 The need for an annual service charge for maintenance of the ecological mitigation area would need to be written into any contract for sale or lease of land or units on the site. Where a sale of land or units takes place the need for the service charge would require covenanting to ensure it was in place in perpetuity.
- 5.15 A Managing Agent would be responsible for collecting the service charge and passing on the funds to the NCO. The NCO would need to be comfortable working with a service charge model of funding due to the high levels of accountability required.

- 5.16 There may be a place for capital funding derived from Section 106 agreements elsewhere on the WIE to provide funding for smaller sub-projects in the mitigation area such as footpaths, interpretative boards and other aspects of long-term management. This will depend on how WCBC intends to develop the site and will be tenable if plots of land are sold off to developers. If WCBC intends to develop the site itself and then lease units to occupying companies then Section 106 agreements are less likely to be a useful method of acquiring funding.
- 5.17 In the short-term it is suggested that capital from the sale of land to F Lloyd (Penley) be used not only to restore and create new habitats, but also to fund the first five years of management and monitoring for the mitigation area, while levels of occupancy on the development site are low. This management could be limited to maintenance of the habitats and then once more funding is available from service charges, and once there is more need, paths and interpretative boards can be installed and maintained.

6.0 REFERENCES

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LANGTON T, BECKETT C & FOSTER J (2001). Great Crested Newt Conservation Handbook. Froglife, Halesworth, Suffolk.

WREXHAM COUNTY BOROUGH COUNCIL (2002). *Wrexham Biodiversity Action Plan*

UK Biodiversity Action Plan. <http://jncc.defra.gov.uk/page-5155>

The Conservation of Habitats and Species Regulations 2010

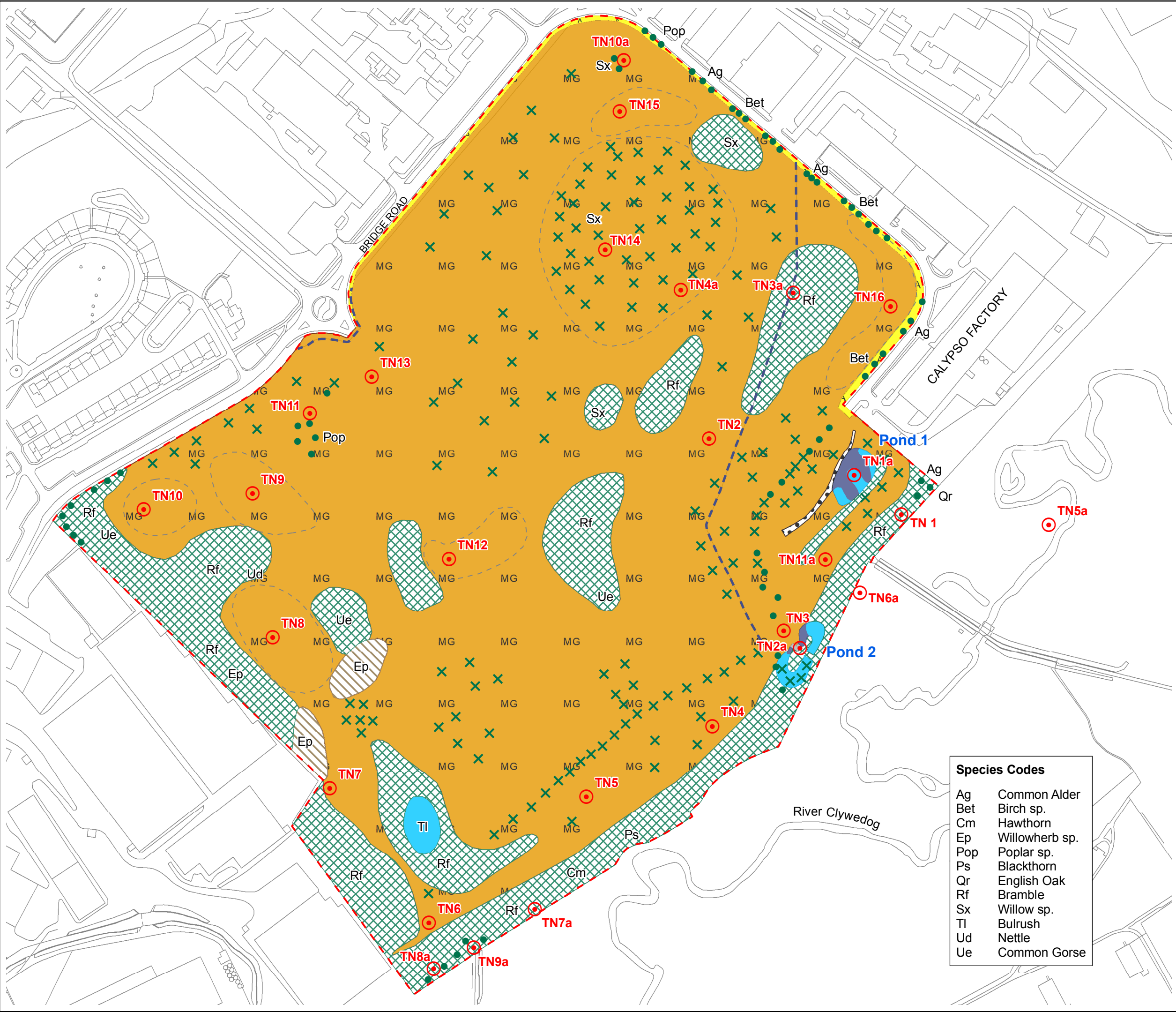
The Natural Environment and Rural Communities Act 2006

BUTTERFLY CONSERVATION. *Creating Scrapes for Butterflies and Moths*. Management Factsheet.

BUTTERFLY CONSERVATION. *Creating a Butterfly Bank*. Management Factsheet.

APPENDIX 1

Ecological Baseline Data



Key

- Survey boundary
- Target notes
- Dense/continuous scrub
- Scattered scrub
- Scattered broad-leaved trees
- MG Modified neutral grassland
- Tall ruderal
- Swamp
- Standing water
- A Amenity grassland
- Bare ground
- Hardstanding
- Dry ditch
- Extent of target noted habitat

Species Codes	
Ag	Common Alder
Bet	Birch sp.
Cm	Hawthorn
Ep	Willowherb sp.
Pop	Poplar sp.
Ps	Blackthorn
Qr	English Oak
Rf	Bramble
Sx	Willow sp.
Tl	Bulrush
Ud	Nettle
Ue	Common Gorse

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Ordnance Survey [100023429]



Rev	Description	Dwn	Appvd	Date
 Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com				
Project: Firestone Site, Wrexham Ecology				
Title: Phase 1 Habitat Survey				
Map No.		G3544.003a		
Scale:		1:3,500 @ A3		Date: 03/09/11
Drawn:	AP	Checked:	ACP	Approved: ACP



Key

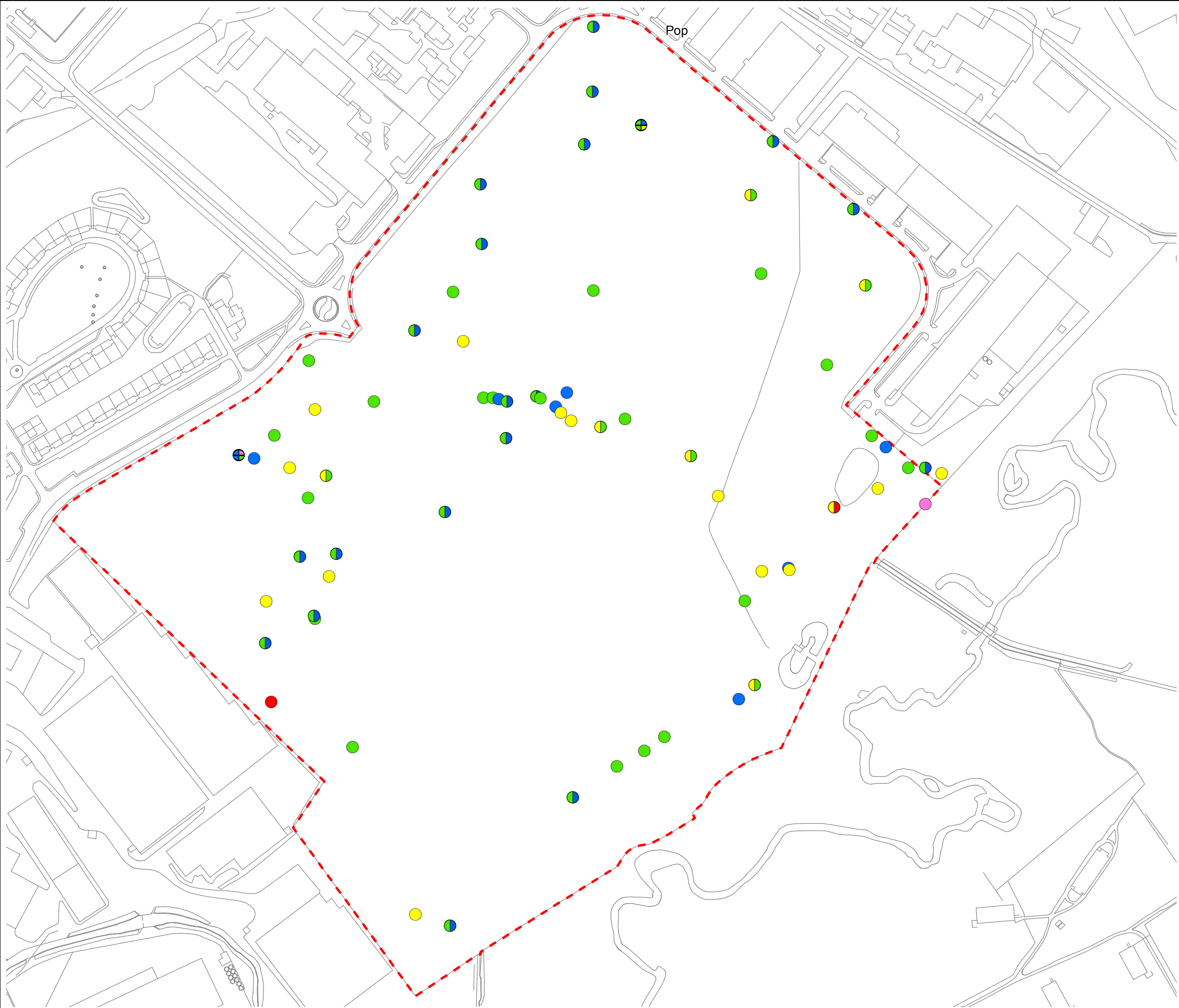
 Survey boundary

A (20) Transect A, 20 refugia

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Ordnance Survey [100023429]



Rev	Description	Dwn	Appvd	Date
		Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com		
Project: Firestone Site, Wrexham Ecology				
Title: Reptile Survey Transects				
Map No. G3544.006				
Scale: 1:3,500 @ A3			Date: 19/09/11	
Drawn: AP		Checked: ACP		Approved: ACP



Key

Survey boundary

Plant Species

- Bird's-foot trefoil
- Bird's-foot trefoil, Greater bird's-foot trefoil and Creeping cinquefoil
- Greater bird's-foot trefoil
- Creeping cinquefoil
- Creeping cinquefoil and Bird's-foot trefoil
- Creeping cinquefoil, Bird's-foot trefoil and Dog rose
- Dog rose
- Dog rose and Creeping cinquefoil
- Dog rose and Tormentil
- Tormentil

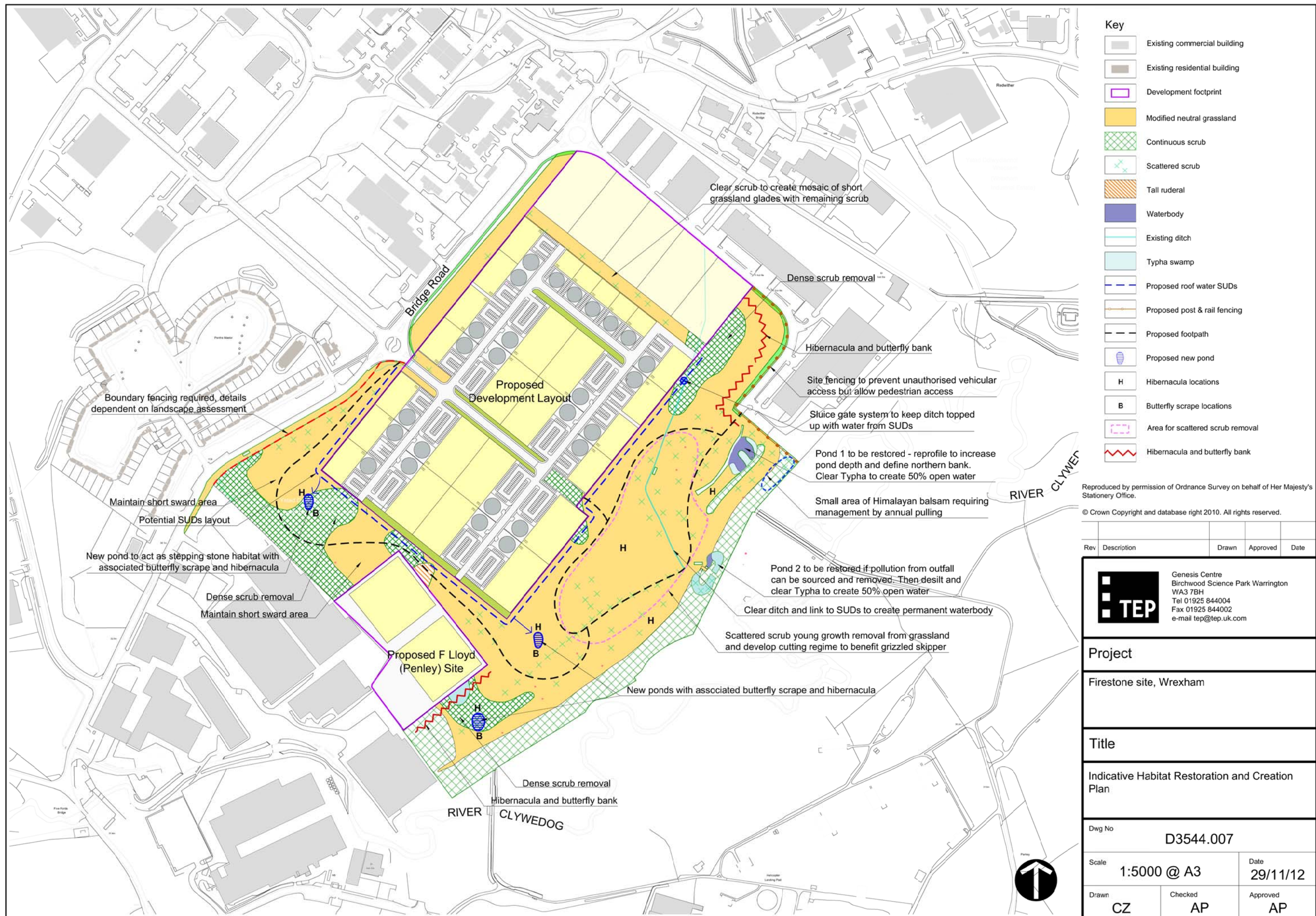
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Ordnance Survey [100023429]



Rev	Description	Dwn	Appvd	Date
		Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com		
Project: Firestone Site, Wrexham Ecology				
Title: Butterfly Food Plants				
Map No.		G3544.004		
Scale: 1:3,500 @ A3			Date: 05/09/11	
Drawn: AP		Checked: ACP		Approved: ACP

APPENDIX 2

Indicative Habitat Restoration and Creation Plan

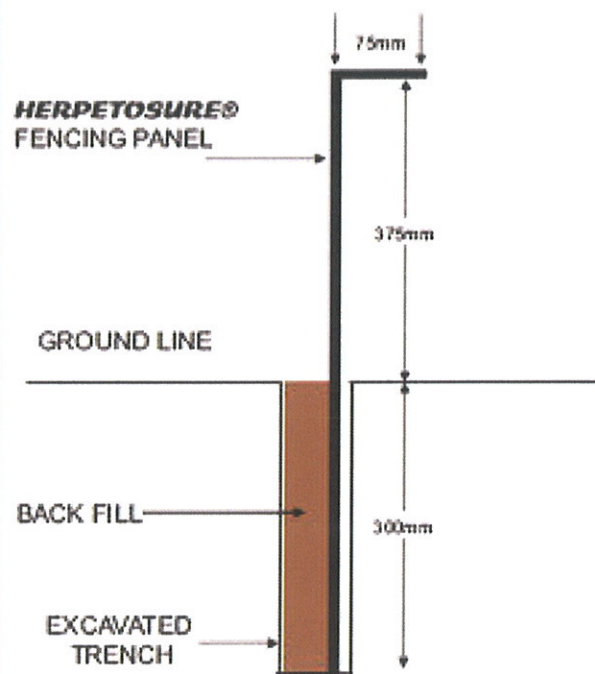


APPENDIX 3

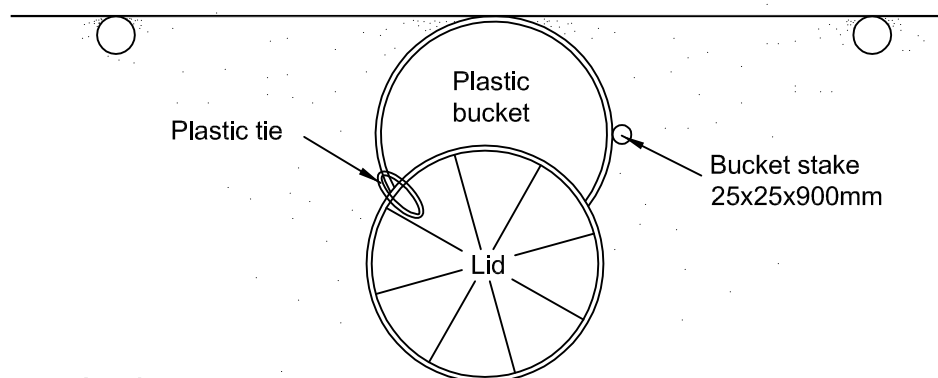
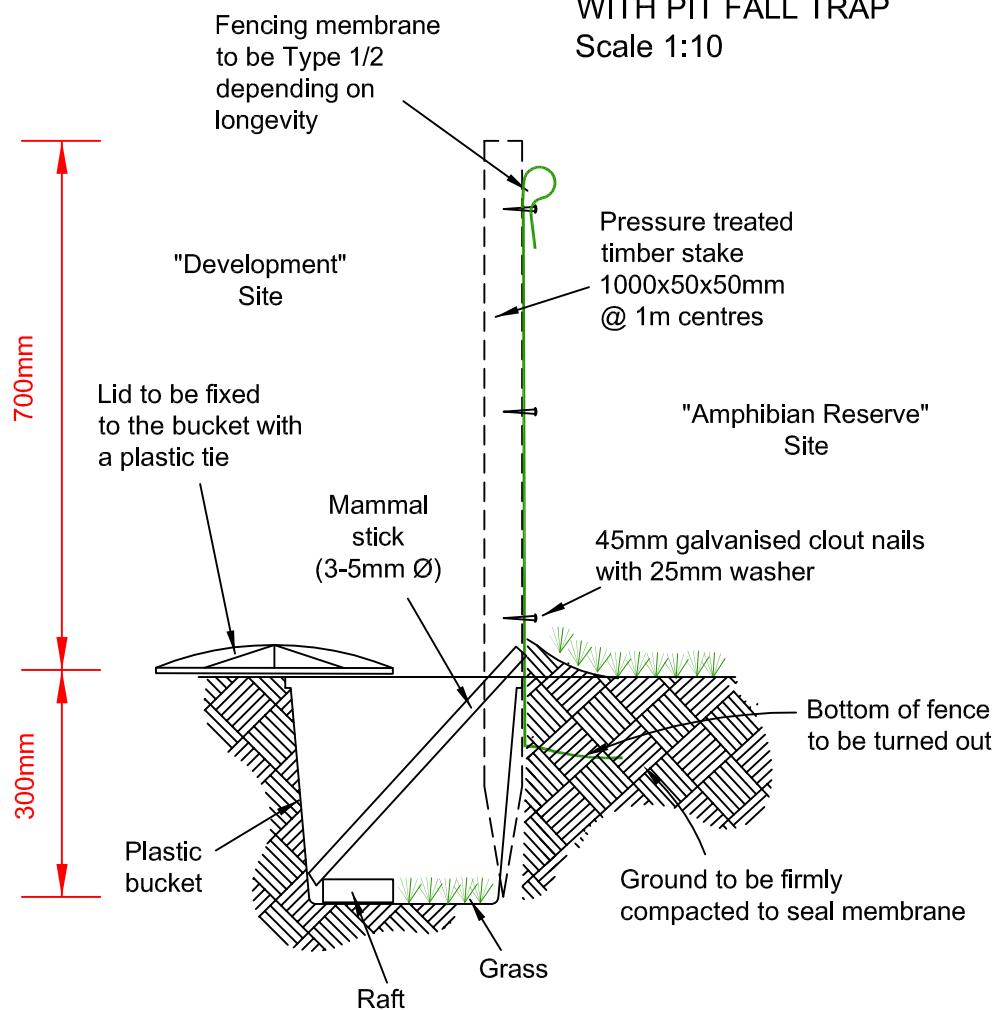
GCN Fencing and Pitfall Trap Layout

Patent Application No: 0425617.8

NOT TO SCALE



VERTICAL TEMPORARY AMPHIBIAN FENCING WITH PIT FALL TRAP Scale 1:10



Fencing Specification

Membrane

Type 1 (3-6 months fence life)

Builders plastic membrane
250µ

Type 2 (6-12 months life)

Builders plastic membrane
300µ

Type 3 (2 years life)

Woven Polypropylene
min 81g/m²
UV stabilised (7yr)
Tensile Strength warp 18
kN/m
Tensile Strength waft 9.5
kN/m

Type 3 available from
suppliers including:
Mytex (UK) 01233 720097
Growing Technologies 01332
853888

A	Labels amended	NH	07/07/11
Revision	Description	Amended by	Date



Project

TEP Details

Title

Temporary Amphibian Fencing and
Pit fall trap

Drwg No TEP.FEN.025A

Scale 1:10 @ A4

Drawn by GDA	Checked by FBH	Date 20/2/01
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Trap Specification

Pit fall trap spacing to be every 10 metres - positions to be marked on site by supervising ecologist

Pit fall traps must be flush with fence and the ground, NOT butted up to a post

Pit fall traps need to be operated with damp cover in the bottom and a stick to act as a small mammal ladder

Bucket stake to be 25mm x 25mm x 90mm, pointed and driven into ground and nailed twice to bucket

The installation of bucket stakes will be directed on site as required

APPENDIX 3

Habitat Management Plan, Management Schedule and Prescription Plan

FIRESTONE SITE MITIGATION AREA HABITAT MANAGEMENT BRIEF

1.0 INTRODUCTION

- 1.1 The former Firestone site is centred around National Grid Reference SJ 378 489 and comprises 44.6 hectares of brownfield land of high ecological value. The release of approximately 23.2 hectares of the site for development will reduce the terrestrial habitats available for great crested newts, grizzled skippers, birds and a wide range of other species. It will also result in the partial loss of a ditch in which great crested newt tadpoles have been observed.
- 1.2 The remaining 21.4 hectares, in the south-east and south-west, of the site has been designated as the mitigation area, which includes grassland, scrub and aquatic habitats.
- 1.3 This habitat management brief outlines the management procedures to be implemented at the mitigation area during the first five years post-construction of the mitigation area.

2.0 CURRENT SITE USE

- 2.1 The site is currently brownfield land upon which a diverse range of habitats and species have established and created an area of high ecological value. The south-east boundary abuts agricultural land on the River Clywedog floodplain, while the south-west boundary is adjacent to an existing industrial site and the north-east boundary is adjacent to the road serving the Calypso factory complex. The north-west boundary lies adjacent to the new development on the site.

3.0 MANAGEMENT INTENTIONS

- 3.1 The principal aims of the management plan are to:
 - Maintain the restored, enhanced and any new aquatic habitats in a condition that are suitable for breeding amphibians (namely great crested newt, a European protected and UKBAP species).
 - Maintain new, enhanced and existing terrestrial habitats in a condition that are suitable for the terrestrial phases of amphibians (in particular great crested newt), grizzled skipper, birds and a wide range of other species present on the site.
 - Containment or eradication of Himalayan balsam.
 - Maintenance of site boundaries, paths, interpretation and litter.
- 3.2 The management of the ponds will focus on maintaining a balance between open water and aquatic vegetation with a margin of emergent vegetation.
- 3.3 Monitoring of the ponds will be necessary for any visible pollution, alien aquatic vegetation (especially invasive), and alien species or fish. Appropriate action will be necessary depending upon the incident.
- 3.4 The margins of the pond should be vegetated to give amphibians cover.

- 3.5 Surrounding grassland should be maintained at a length that provides foraging value for amphibians and provides suitable breeding sites for grizzled skipper and other invertebrates.
- 3.6 Scrub will be managed to reduce encroachment of grassland areas and also to provide shelter and breeding opportunities for birds.
- 3.7 The maintenance of fencing around the site will be important to ensure unauthorised access by vehicles is prevented.
- 3.8 Maintenance of pathways and interpretative displays around the site and litter removal will also be necessary.

4.0 MANAGEMENT CONSIDERATIONS

- 4.1 The site is visible from the surrounding industrial developments and is used by the general public for dog walking.
- 4.2 Management of the habitats must not only be conducive to maintaining the great crested newt population at a favourable conservation status, but must also be sensitive to the needs of grizzled skipper and other species on the site as well as the requirements of adjacent land owners and land uses.
- 4.3 Management should be considered in the context of the character of the local area and should ensure the site remains in keeping with the surrounding Wrexham Industrial Estate.

5.0 MANAGEMENT OPERATIONS

- 5.1 The management operations which will be undertaken in order to fulfil the management intentions are discussed below.

Aquatic Habitats

- 5.2 The waterbodies will be managed to retain at least 35-60% of the surface area as open water. Vegetation in and around the ponds should be assessed to ensure it does not start to choke the open water, with particular attention being given to the prevention of aggressive species such as *Typha latifolia* or invasive species such as *Crassula helmsii*, which will rapidly fill the ponds.
- 5.3 Any removal of 'weeds' should be done in the most sensitive manner possible. Seed heads of *Typha* could be cut before being allowed to flower or foliage could be weed wiped. In the event that invasive species establish, a bespoke treatment and control plan will need to be produced.
- 5.4 General aquatic vegetation control should ideally be implemented between October and March, with the arisings left adjacent to the waterbody for 24 hours to allow any wildlife to return. The arisings can then be removed from site or left in discrete piles.
- 5.5 Marginal vegetation (a 2m margin from the water edge) will be managed on a rotation regime. Each year 1/3 should be strimmed to 150mm on a rotational basis and arisings removed and used sustainably elsewhere on site. This will reduce

disturbance of the microhabitat of the ponds as well as creating a varied structure of vegetation.

- 5.6 Should silting occur within the ponds or other events affect water levels within the two ponds, such that water depth falls below half a metre, de-silting will be required. The optimal time for these works to be undertaken is November to January. The work should be undertaken by a long armed excavator and, where possible, entry and access to the pond should be limited to one point or section of bank. Consideration should be given to temporarily storing the top half or third of a metre of silt, and leaving it adjacent to the pond for 24hrs before disposal. This allows the invertebrate assemblage to repopulate the pond at a higher rate. A membrane should be used to protect the grassland sward from damage during storage of silt.
- 5.7 Fish were recorded as present in the sluice pond in the mid-2000s. Their continued presence requires confirming and then containment or removal if they are still present. Measures will need to be put in place to prevent the establishment of fish in the other waterbodies on site. However, visual inspection will note the presence of fish and removal actions may be implemented if detrimental effects are noted.

SUDS

- 5.8 Should the SUDS be implemented, their management will comprise the annual removal of one third of the bankside vegetation on a three yearly rotation. If the SUDS are designed to be or develop into permanent waterbodies then clearance of aquatic vegetation and de-silting operations would need to be considered as additional management requirements.

Terrestrial Habitats

Tall Grassland

- 5.9 A key aim of the grassland management regime will be to maintain, enhance and create habitats which are suitable for grizzled skippers. This will require the maintenance of a mosaic of short grassland with patches of bare ground for breeding and taller grassland for shelter and roosting and encourage the growth of the grizzled skipper food plants: creeping cinquefoil; tormentil; and agrimony.
- 5.10 The tall grassland area will be divided into three compartments, roughly delineated by the path through the site, which will be subject to a three year rotational cutting regime. The rotation will comprise one year with a late annual cut, one year with two cuts (one early, one late) and a fallow year. A proposed management regime is shown in Table 1.

Table 1. Proposed Tall Grassland Management Regime

	Year 1	Year 2	Year 3
Compartment 1	Fallow	Annual Cut	Two Cuts
Compartment 2	Two Cuts	Fallow	Annual Cut
Compartment 3	Annual Cut	Two Cuts	Fallow

- 5.11 All grass cuttings should be removed to a dedicated area on site for composting. This will reduce costs and also carbon emissions associated with removal of the cuttings off-site. A compost heap on the site could be used as a refugia by reptiles and other animals.
- 5.12 Ongoing scattered scrub management will be required to prevent it encroaching on the grassland sward. This will be achieved as part of the cutting regime for young scrub. More mature scattered scrub will require brushcutting removal.
- 5.13 No fertilisers should be applied to the site, as they will be detrimental to the habitat. Herbicides should not be used for general management practices, unless required to control invasive species. In this event, a bespoke treatment plan should be produced.

Natural Short Sward Grassland

- 5.14 There are two areas of naturally short sward grassland in the west of the mitigation area. These areas will contribute to the structural diversity of the grassland as a whole, while requiring little management. They should be monitored annually growth patterns and cut if necessary to maintain the short sward. Any scrub encroachment should be removed.

Removed Scrub/ Restored Grassland

- 5.15 The areas where dense scrub is removed in order to re-establish grassland cover will require an annual brushcut to keep scrub regrowth in check and reseedling as necessary with a seed mix of species present on the site. The seed mix could be collected from site to ensure its local provenance.

Dense Scrub

- 5.16 A third of the dense scrub along the south-western and south-eastern boundaries of the mitigation area should be cut back on an annual basis to the desired boundary between scrub and grassland. The edge habitat should be graded from grassland and low scrub to high scrub.
- 5.17 Arisings from scrub clearance can be chipped or used to create habitat piles on-site.

Butterfly Banks and Hibernacula

- 5.18 While butterfly banks will tend towards being more sparsely vegetated than the hibernacula, both will require annual removal of tall ruderals and scrub which are establishing on them. An annual cut to 150mm on an annual basis, with removal of the arisings will maintain a short sward. In the case of the butterfly banks, small areas may require scraping on a periodic basis to retain areas of bare ground.

Butterfly Scrapes

- 5.19 Butterfly scrapes can be managed by cutting to 150mm on an annual basis and removing the arisings. Since the aim of a scrape is to maintain about 50% as bare ground, they should be re-scraped periodically to remove vegetation. Any scrub that establishes should be removed, preferably pulled up by the roots at an early stage.

Himalayan Balsam

- 5.20 Himalayan balsam has a restricted distribution within the mitigation area at present. In order to contain or preferably remove this invasive species, it should be hand pulled on an annual basis and the arisings disposed of off-site.

Litter Removal

- 5.21 Site cleansing (litter removal) should be undertaken on a monthly basis. If large items are tipped, care should be taken to check for amphibians which may be hiding in or under the item. Any amphibians found should be returned to suitable cover. In the event that fly-tipping becomes evident, signage shall be installed and the intensity of site cleansing visits shall be increased. All litter should be removed from site and disposed of in an authorised manner. However, it would be prudent to remove any litter as soon as practicable, particularly food and drink packaging to prevent the site appearing unattractive.

Site Boundary Fencing

- 5.22 Site boundary fencing should be checked on a monthly basis and maintained in good order, ensuring that repairs are undertaken as necessary. This is important in order to keep the site inaccessible to vehicular access.

Paths and Interpretative Displays

- 5.23 Paths and interpretative displays created around the site should be checked on a monthly basis and maintained in good order, ensuring that repairs are undertaken as necessary. This is important in order to reduce the risk of accident and injury to the general public.

6.0 MONITORING

- 6.1 The extent of habitats, primarily scrub, grassland, marginal vegetation, aquatic vegetation and open water shall be monitored and the management plan modified as necessary to maintain optimal conservation value for the habitats and species on the site. Scrub control will be implemented to prevent encroachment of grassland and pond margins.
- 6.2 Great crested newt populations will be monitored within the mitigation area on an annual basis during the first three years post-translocation and in the fifth year post-translocation. Monitoring surveys will be carried out by appropriate licensed personnel in accordance with current guidelines for pond survey methods.
- 6.3 Grizzled skipper, breeding bird and other invertebrate (mainly other UKBAP butterflies and moths known from the site) populations will also be monitored within the mitigation area on an annual basis during the first three years and in the fifth year after creation of the mitigation area. Surveys will be undertaken by appropriately experienced personnel.

MANAGEMENT SUMMARY

- Ponds/ Ditch
- Third of bankside vegetation removed annually
 - 5 yearly aquatic vegetation removal
 - 10 yearly de-silting

- SUDS
- Third of bankside vegetation removed annually

- Tall Grassland
- 3 year rotation of annual cut, two cuts per year and 'fallow' year in 3 compartments
 - Scrub will be removed as part of cutting regime

- Natural Short Sward Grassland
- Monitor to ensure naturally short sward retained
 - Remove scrub encroachment

- Removed Scrub/ Restored Grassland
- Annual brushcut to remove scrub regrowth
 - Reseed when necessary to encourage grassland re-establishment

- Dense Scrub
- Third cut back to required boundary annually
 - Grade from grassland to tall scrub

- Butterfly Banks and Hibernacula
- Annual cut to 150mm
 - Periodically scrape small areas to bare earth on butterfly banks

- Butterfly Scrapes
- Annual cut to 150mm
 - 5 yearly rescape of 50%

- Himalayan Balsam
- Hand pull on annual basis

Key

Site Boundary

Development footprint

H

B

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Rev	Description	Drawn	Approved	Date
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WA3 7BH
Tel 01925 844004
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e-mail tep@tep.uk.com

Project

Firestone site, Wrexham

Title

Ecological Mitigation Area: Prescription plan

Dwg No
D3544.008

Scale 1:5000 @ A3	Date 06/12/12
Drawn PL	Checked MW
	Approved AP



Maintenance Costs for Firestone site, Wrexham

Date: 06/12/2012
Document ref: X3544.002

Measures taken from drawing "Indicative Habitat
Restoration and Creation Plan Drawing D3544.007

Landscape Type	Measure	Unit
Development Footprint	232372	m²
<i>Soft Landscape</i>		
Natural Short Sward Grassland	8667	m²
Tall Grass	105240	m²
Removed Scrub / Restored Grassland	33657	m²
Dense Scrub Management	25309	m²
Ponds and Ditch - New and Existing	4142	m²
Butterfly Scrapes	3	no.
SUDS	1,234	lin m
Butterfly banks	2	no.
Hibernacula	6	no.
<i>Hard Landscape</i>		
Fencing	424	lin.m
Footpath (gravel)	1830	lin.m
<i>Invasive Species</i>		
Himalyan Balsam	1170	m²

	Summary of Annual Costs
Inspections and Cleansing	£4,710.00
Specialist surveys	£1,000.00
<i>Soft Landscape</i>	
Natural Short Sward Grassland	£368.35
Tall Grass	£4,688.44
Removed Scrub / Restore Grassland	£841.43
Dense Scrub Management	£632.73
Ponds and Ditch - New and Existing	£2,099.36
Butterfly Scrapes	£32.00
SUDS	£44.44
Butterfly banks and Hibernacula	£120.00
<i>Hard Landscape</i>	
Fencing	£241.50
Footpaths (gravel)	£235.16
<i>Invasive Species</i>	
Himalayan Balsam	£585.00
TOTAL ANNUAL COSTS	£15,598.39

	Summary of Temporary Costs
<i>Soft Landscape</i>	
Natural Short Sward Grassland	£0.00
Tall Grass	£0.00
Removed Scrub / Restore Grassland	£1,682.85
Dense Scrub Management	£0.00
Ponds and Ditch - New and Existing	£0.00
Butterfly Scrapes	£0.00
SUDS	£0.00
Butterfly banks	£0.00
Hibernacula	£0.00
<i>Hard Landscape</i>	
Fencing	£0.00
Footpaths (gravel)	£0.00
TOTAL TEMPORARY COSTS	£1,682.85

Maintenance Schedules

Activity	Measure	Unit	Routine/ Temporary	Years Applicable	Frequency per Year	Unit Rate £	Total per annum £	Comment
<i>Inspections & Cleansing</i>								
Annual risk assessment.	1	no.	R	Every year	1	350	£350.00	
Monthly inspections	1	no.	R	Every year	12	280	£3,360.00	
Fly Tipping to be removed	1	no.	R	Every year	As required	500	£1,000.00	Nominal figure allowed.
<i>Specialist Surveys</i>								
Tree Hazard and Condition Survey Annual inspection of all trees to be carried out by trained arboriculturalists within or adjacent to areas of public access.	1	item	R	Every year	1	500	£500.00	
Inspection of Waterbodies Annual inspection to assess water quality of waterbodies and signs of drying and subsequent colonisation/succession of vegetation.	1	item	R	Every year	1	500	£500.00	
<i>SOFT LANDSCAPE</i>								
<i>Natural Short Sward Grassland</i>	8667	m²						
Annual monitor and cut if necessary	8667	m²	R	Every year	1	0.03000	£260.01	
Remove scrub encroachment as required	433	m²	R	Every 2 years	0.5	0.50000	£108.34	Measure based on approx 5% coverage of total area.
<i>Tall Grassland</i>	105240	m²						
Twice yearly cut (100mm) and removal of arisings to use sustainably on site. Cutting should be avoided between mid-March and August to prevent risk of disturbance to nesting birds.	69458	m²	R	Every year	2	0.03000	£2,083.75	Allowed two thirds of total rough grassland to be cut twice annually.
Annual cut to one third on a three year rotation.	34729	m²	R	Every year	1	0.05	£1,736.46	Allowed one third of total grassland to be cut on a rotational basis. Measure shown is one third of total area.
Remove scrub encroachment as required	5262	m²	R	Every 4 years	0.25	0.50000	£657.75	Measure based on approx 5% coverage of total area.
Annual glyphosate spot spray to noxious weeds throughout grassland areas.	5262	m²	R	Every year	1	0.04	£210.48	Measure based on approx 5% coverage of total area.
<i>Removed Scrub / Restored Grassland</i>	33657							
Annual brush cut of successional growth. Arisings to be chipped and used sustainable on site.	1683	m²	R	Ever year	1	0.5	£841.43	Measure based on approx 5% coverage of total area.
Recultivation - 1x yearly recultivation and seeding of any areas of poor grass establishment.	3366	m²	T	2 to 5	1	0.5	£1,682.85	Estimate 10% of total area each year for 4 years.
<i>Dense Scrub Management</i>	25309	m²						
Yearly brushcutting of 1/3 of scrub back to required edge. Grade from grassland through low scrub to high scrub.	1265.45	m²	R	Every year	1	0.5	£632.73	Estimated for cutting back scrub to 5% of total area.

Activity	Measure	Unit	Routine/ Temporary	Years Applicable	Frequency per Year	Unit Rate £	Total per annum £	Comment
Ponds and Ditch - Existing + Proposed	6	no.						
Hand pull of noxious weeds throughout marginal vegetation.	22	lin m	R	Every year	1	0.5	£10.98	Measure based on approx 5% coverage of total length.
1x yearly strim (150mm) and remove upto 1/3 of bankside vegetation. Strim sections on annual rotation. Remove arisings and use for hibernacula.	145	lin m	R	Every year	1	0.12	£17.38	Allow one third of total length each year.
Clearance of submerged aquatic vegetation to maintain appropriate composition of open water (35-60%).	1036	m²	R	Once every 5 years	0.2	5	£1,035.50	Allow 25% of total area.
De-silt/dredge centre of waterbodies as required to maintain appropriate depth of water. De-silting to be undertaken to centre of waterbody only, allowing water margins to remain un-disturbed.	4142	m³	R	Once every 10 years	0.1	2.5	£1,035.50	
Butterfly Scrapes	2	no.						
1x yearly strim (150mm) and remove arisings and use sustainably elsewhere on site.	2	no.	R	Every year	1	10	£20.00	
Periodic rescrape 50% to bare earth	2	no.	R	Once every 5 years	0.2	30	£12.00	
SUDS	1234	lin m						
1x yearly strim (150mm) and remove upto 1/3 of bankside vegetation. Strim sections on annual rotation as agreed. Remove arisings and use sustainably elsewhere on site.	370	lin m	R	Every year	1	0.12	£44.44	Allow one third total length each year.
Butterfly Banks and Hibernacula	6	no.						
Pulling of tall/ruderal planting to be removed from the hibernaculae.	6	no.	R	Every year	1	5	£30.00	As required.
1x yearly strim (150mm) and remove arisings and use sustainably elsewhere on site.	6	no.	R	Every year	1	10	£60.00	
Periodically scrape small areas to bare earth on butterfly banks.	6	no.	R	Every 2 years	0.5	10	£30.00	
HARD LANDSCAPE								
Fencing	483	lin m						
Repair any damaged fencing.	48.3	lin m	R	Every year	1	5.00	£241.50	Allow for 10% of total length.
Footpaths	1830	lin m						
Bi-annual herbicide spray to edge of footpaths.	92	lin m	R	Every other year	1	0.07	£6.41	Allow 5% of total area.
Repairs.	46	lin m	R	Every year	1	5.00	£228.75	Allow 2.5% of total area.
Himalyan Balsam								
Removal of Invasive Species - Himalayan Balsam: Annual hand pull of plants and disposal off site.	1170	m²	R	Every year	1	0.5	£585.00	

NOTE Glyphosate formulations containing the surfacent Polyethoxylated tallow amine (POEA) should not used within close proximity to waterbodies or other wetland habitats as it can cause high amphibian larvae mortality.