



Wrexham Prison

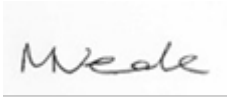
Addendum to Ecological Mitigation Strategy and Habitat Management Plan

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1 Introduction

This addendum report has been prepared by ENVIRON to respond to consultation comments and discussions that have been held with regard to the Environmental Statement (ES) and accompanying Habitat Management Plan (HMP), which accompanied the planning application submitted by the Ministry of Justice (MoJ) ('the Applicant') for a new Prison to be built on the former Firestone site at Wrexham Industrial Estate (WIE).

This addendum report confirms proposals already set out in the HMP and provides additional information to supplement the original HMP. It does not replace the original HMP and both reports should be read to understand the full range of mitigation which is to be implemented as part of the proposed development.

Information included within the addendum is arranged in the following sections:

- Section 2: Implementation and Delivery of the HMP;
- Section 3: Clarification of Mitigation Measures;
- Section 4: Additional Supporting Information;
- Section 5: Erratum; and
- Section 6: References.

2 Implementation and Delivery of the HMP

The Applicant has developed the HMP to cover both the Ecology Area and the land set aside for ecological mitigation within the application site. The HMP covers a minimum period of 25 years starting from winter 2013/2014. Works required in years one to five will be procured and funded by the Applicant, the MoJ. From year six, WCBC will be responsible for procuring and funding the ongoing management of the Ecology Area as required by the HMP.

In addition, the HMP requires that an ecological compliance audit will be undertaken, by a third party, appointed by MoJ, to assess whether ecological avoidance, mitigation and compensation schemes have been implemented in accordance with derogation licences and the HMP.

3 Clarification of Mitigation Measures

3.1 Lepidoptera Mitigation

A number of comments have suggested that there may be insufficient mitigation included within the HMP to off-set the loss of land to the Prison and that there may be insufficient time between the enhancement work being carried out in the Ecology Area and the clearance of the application site for the Ecology Area to be established and attractive to grizzled skipper and other species of butterfly and invertebrates. To respond to these issues, the following provides clarification of the measures included in the HMP.

3.1.1 Habitat Creation and Turf/Plant Translocation

The HMP explains at paragraph 3.9 that the creation of new butterfly habitat will be supported by the appropriate translocation of turfs of viable early successional habitat from the Prison site to areas within the Ecology Area. In addition, the creation of habitat will be supported by using plug plants collected from within the Prison area and seeding with seeds either collected from the site or sourced from a reputable seed merchant. Key locations where these techniques will be employed include areas cleared of scrub and an area close to the northern boundary of the Ecology Area adjacent to Bridge Road.

3.1.2 Captive Breeding Programme

Mindful that it may take some time for the new butterfly habitat to establish, the MoJ will explore jointly with WCBC, the potential to undertake a captive grizzled and dingy skipper breeding programme during the initial creation of the Ecology Area.

3.2 Badgers

Some anecdotal evidence of badger activity on the Firestone site has been noted in recent months, although no evidence of badger setts has been found on the site.

In the event that a badger sett is found during scrub clearance in January / February 2014 a licence would be obtained from NRW to 'exclude' badgers from the sett, prior to sett destruction. Sett closure involves fitting of one-way badger gates to all sett entrances and monitoring these over a period of three weeks to ensure that animals have not returned, prior to sett destruction. As there are unlikely to be any main setts, construction of an artificial sett nearby is unlikely to be required. As suitable badger habitat exists offsite, the provision of additional habitat is unlikely to be required.

There is a risk that badgers will trample the amphibian proof fencing where it bisects their runs. Amphibian proof fencing will be lower in locations where badger activity indicates a run is present. This will allow badgers to cross the fencing without damaging it.

During construction of the perimeter fence, impacts on badgers would be avoided by designing excavations to include escape ramps (i.e. in the trenches across fields) which would provide a means of escape for badgers if they were to fall in and become trapped. It is likely that once constructed, the perimeter fence will exclude badgers from the site and further mitigation will not be required.

3.3 Timing of Works

Following discussions with NRW and WCBC, some minor changes are proposed to the anticipated timings and delivery of certain elements of the Habitat Creation and Mitigation Works. As a result some minor revisions to Table 2 of the HMP have been made. It should be noted that whilst the works to be carried out are considered to be fixed, some flexibility is to be retained on the actual timings to ensure work is carried out at the optimum time for both species and habitats. The amended Table 2 is provided below.

Table 2: Estimated Programme for Habitat Creation and Mitigation Works			
Activity	Time of Year	Responsibility	Prerequisite
Install Perimeter Fencing	Winter 2013 /14	MoJ	Work will be carried out using reasonable avoidance measures by a contractor with a valid conservation licence for GCN
Creation of New Ponds			
Hibernacula Construction			
Scrub Clearance / Check for Badger Setts			
Creation of Elements of New Butterfly Habitat			
Erect Bat and Bird Box			
Obtain EPS Licence	Spring 2014	MoJ	Planning Permission
Exclusion and Translocation of GCN from Development Area to Ecology Area	Spring 2014	MoJ	Planning Permission and EPS Licence
Translocation of turf to create additional Butterfly Habitat	Summer 2014	MoJ	Planning Permission
Clearance of Development Area	Summer 2014	MoJ	Planning Permission and EPS Licence

3.4 Ecological Mitigation Monitoring Reports

Regular reports are to be provided to review the implementation of the works prescribed by the HMP and to identify what works are planned in the forthcoming months. Initially these will be timetabled for every three months, with the frequency to be reviewed on an annual basis. The following will be provided with a copy of the Ecological Mitigation Monitoring Report:

- the principal site contractor;
- the ecological works contractor;
- WCBC biodiversity officer;
- NRW; and
- Ecological compliance auditor.

A "Directory" of contacts will be circulated with each report and will be updated as necessary to facilitate any discussions that may be necessary and arise from the monitoring reports.

3.5 Weather Station

In order to provide additional accurate data for the Firestone site, MoJ will install an on-site mini-weather station or data logger. This will enable great crested newt (GCN) trapping to be undertaken when weather and temperature conditions are within the acceptable range for this activity. It will also provide local site conditions to inform monitoring and management activities.

4 Additional Supporting Information

Some additional information has been requested by NRW to assist its consideration of the planning submission.

4.1 Great Crested Newt Status

Information is provided below on the historical and current status of GCN at the former Firestone site and in the wider WIE. This includes review of some additional historic monitoring reports which have been provided by NRW, subsequent to the submission of the planning application.

GCN and their habitats (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. GCN 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.

Section 42 of the Natural Environment and Rural Communities Act 2006 lists GCN as a species of principle importance. The GCN is also listed on the Wrexham Biodiversity Action Plan (LBAP).

4.1.1 Regional Status

The GCN is widespread in the south-east and north-west of England but is rarer in the south-west of England, Scotland and Wales. It is absent from Ireland. The stronghold for GCN in Wales is in the northeast, predominantly in Wrexham and Flintshire due to the retention of a higher density of ponds than many other areas over the course of its decline across the UK in the 20th century. The GCN Species Action Plan for Wrexham states that an estimated 500 ponds in Wales are known to support GCN. Of these, 400 are within north-east Wales and of these, 200 are within Wrexham County Borough. A review completed by CCW (Population Review, Wrexham Industrial Estate) identified the northeast of Wales as one of the most important regions for GCN in the UK and makes an important contribution to the European population.

4.1.2 Suggested Historic Status at the Firestone Site

Prior to development of the Royal Ordnance Factory (ROF) and then the WIE as a whole, the land to the east of Wrexham was agricultural and supported a high density of ponds. Maps produced by NRW (22 October 2013, Annex A) indicate that 17 ponds were located within the boundary of the present day Firestone site and that a further 4 ponds were located in close proximity to the Firestone boundary, leading to a total of 21 ponds in the local area.

Although no detailed records for GCN are available for the site from this period, given the site's historic pond density and that the region is still a stronghold for this species in the present day, it is assumed the site will have supported GCN.

4.1.3 Considered Status at the Firestone Site

Following demolition and clearance of the Firestone factory site, GCN were recorded as still being present on the site in 1994. The dispersed nature of the ROF buildings and review of historical aerial photography of the Firestone factory (ES report, North Wales Prison Technical Appendices Volume 3c) indicates that vegetation was still present on the site once it was developed and it is presumed that GCN will have remained present on the site since this time but at reduced population levels due to the loss of the ponds.

Additional desktop records, as presented in TEP Report 3544.001 (December 2012)), indicate that GCN were also recorded in 1998 on the Firestone site. A summary of these records are provided in Table 1. Based on Langton, Beckett & Foster (2001) the number of GCN recorded in Pond 1 in April 1998 suggest a 'medium' population.

Table 4.1: Great Crested Newt Data Records (Cofnod) on the Firestone Site			
Grid Reference	Date of Record	Number of GCN recorded	Comments
SJ37774898	1994	No information	Within Firestone site
SJ3816348910	1994	No information	Spectrum Industrial Estate – immediately adjacent to Firestone site
SJ381492	April 1998	1	Drainage ditch adjacent to Firestone site
SJ381489	April 1998	16	Core site pond (Pond 1) on Firestone site
SJ381487	May 1998	1	Sluice pond (Pond 2) on Firestone site

4.1.4 Current Status at the Firestone Site

GCN surveys of the two ponds which are now present on the Firestone site were undertaken by Middlemarch Environmental Ltd in 2005 (Phase 2 Surveys – Former Firestone Site June 2005, Report Ref: rtmme2712a). The maximum number of GCN recorded in Ponds 1 and 2 was six (by torching) and two (bottle trapping), respectively. Fish were also recorded in Pond 2. Based on Langton, Beckett & Foster (2001) these survey results suggest a 'low' population on GCN on the Firestone site.

No pond surveys for great crested newt were carried out by TEP in 2012 as the commission was granted outside of the spring survey period and no additional GCN surveys were undertaken as part of the MoJ planning submission. The reptile survey which was undertaken in August and September 2012 as part of the TEP Ecological Assessment (TEP Report Ref 3544.001) recorded a peak count of nine GCN under refugia located in the areas around Pond 1 and the ditch which traverses the site. GCN larvae have also been observed in the ditch which crosses the site (Emma Broad, pers. comm.). This again suggests a 'low' population of GCN on the site. The areas of grassland, scrub and tall ruderal vegetation on site provide suitable locations for hibernacula, foraging and commuting for GCN.

It was noted during the 2012 assessment that the presence of bulrush in both ponds could lead to the reduction in suitability of the ponds for breeding GCN as it spreads fast and will quickly reduce areas of open water. In addition, the apparent low level pollution and presence of fish in Pond 2 reduces its suitability as breeding habitat for GCN.

This was corroborated by the Phase 1 Habitat Assessment carried out as part of the MoJ submission which noted that the condition of the ditch and two ponds are expected to decline as they become choked with reedmace and bramble, and that the terrestrial habitats will also decline in ecological value as the grassland succeeds to dense scrub.

4.1.5 Long Term Prospects – Without Mitigation

CCW's Population Review Wrexham Industrial Estate reviews GCN survey data undertaken by AMEC for the WIE Road Improvement Scheme and other historical data. The analysis of data (collated from surveys of 150 ponds undertaken between 2000 and 2009) indicates that pond senescence is considered to be one of the main threats to GCN in a high pond density landscape, which will lead to a population decline in the wider landscape due to a reduction in suitable breeding habitat.

The apparent reduction in population size of GCN in the ponds on the Firestone site correlates with this general view that GCN populations are declining across WIE, and can be attributed to pond senescence and the loss of suitable breeding habitats. This is in light of the fact that, when in original agricultural use, 21 ponds were present in the Firestone area, a percentage of which were presumed to have supported GCN.

Middlemarch Environmental Ltd also undertook studies of GCN at the landscape scale on WIE in the following reports:

- Wrexham Industrial Estate – Master Planning Summary (Firestone & 6 Other Sites). September 2005. Middlemarch Environmental Ltd;
- Wrexham Industrial Estate – Ecological Implications for Future Development. December 2005. Middlemarch Environmental Ltd;
- Wrexham Industrial Estate – Great Crested Newt Strategy. July 2007. Middlemarch Environmental Ltd; and
- Wrexham Industrial Estate – Green Wedges with Emphasis on Great Crested Newt – Brief Letter and Drawings. September 2007. Middlemarch Environmental Ltd.

These reports brought together information on GCN ponds on Welsh Assembly Government land and the wider area of the WIE. They emphasised the need for sustainable development of WIE while also ensuring protection and enhancement of ecological issues, particularly GCN. The south of WIE was identified as having the greatest ecological importance, with the Firestone site being the largest site with high ecological value. The Strategy report suggested the creation of a GCN reserve on the south of the Firestone site with the creation of additional ponds and the need for long-term management.

It can therefore be concluded that on the Firestone site, unless action is taken to maintain and enhance the current breeding and terrestrial habitats, the GCN population is likely to continue to decline, and possibly be lost, and Favourable Conservation Status (FCS) will not be achieved.

4.1.6 Future Targets for FCS With Mitigation

FCS for a species is defined in Article 1 of the Habitats Directive is when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The mitigation scheme for the Firestone site will include habitat creation, enhancement and financing to ensure the long-term FCS of GCN when the new Prison is developed as a result of the following:

- Breeding habitat will be increased from two existing ponds and one ditch by creating an additional five ponds, producing up to seven waterbodies on site;
- 18.6 ha of terrestrial habitat will be managed to maximise biodiversity, in particular invertebrates (log piles invertebrate refuges will also increase invertebrates on the site) on which GCN prey, therefore providing ranging and foraging habitat;
- Hibernation opportunities will be increased on the site by the creation of approximately 25 hibernacula;
- The habitats created within the mitigation area will aid in increasing the range of GCN on the site and therefore within WIE;
- The habitats created within the mitigation area will aid in increasing the connectivity between GCN on the site and other populations of the WIE metapopulation; and
- Long-term surveillance monitoring will ensure that the Habitat Management Plan (HMP) is regularly updated to maintain FCS of GCN and other wildlife and habitats.

4.2 ARC Spatial Modelling

At the request of NRW, MoJ commissioned Amphibian and Reptile Conservation (ARC) to carry out spatial modelling to predict the likely impact of the proposed Prison development on the spatial distribution of GCN on WIE. The full report is available in Annex B.

The ARC model is designed to show the potential value of GCN populations in locations throughout WIE and the wider landscape, utilising existing data from previous modelling and surveys. This baseline can be used as a reference against which theoretical development scenarios can be compared in order to assess their relative impacts on GCN metapopulations in the localised area around WIE and at a proposed development site.

A total of three model scenarios were run:

- Baseline model: the current state, with no development simulated;
- Post development model: with the development of the area described by the building footprint simulated, but with no habitat enhancement measures; and
- Mitigation model: the same as the Post-development model and with the five new ponds proposed by the HMP.

The modelled impacts of the development at the Firestone site on the wider GCN population network was shown to be minimal, with no loss of ponds and the loss of only one link to the wider network. This link is considered to be of low importance for connectivity as it connects two ponds that are over 800m apart with unsuitable habitat, such as roads, in between. In future, there is likely to be renewed connectivity via the landscape planting around the perimeter of the new Prison. The addition of the ponds to the GCN population network, as a

means of mitigation, has been shown to compensate more than adequately for this minor loss in connectivity.

Some limitations of the modelling have been identified by ENVIRON:

- the model does not consider the River Clywedog to be a physical barrier to the wider population network but in reality fast flows are likely to prevent GCN from crossing the river at times. However, there are feasible crossing points nearby including a small ford and two private farm tracks that cross the river via old bridges. The river is also likely to be crossable at times of low flow, in areas of pooled water and in locations of dense riparian and marginal vegetation. Therefore, it is considered that connectivity will be maintained and improved as a result of the development and habitat enhancements; and
- the modelling also assumed complete impermeability throughout the development site, although in reality the landscaped habitats around the perimeter of the site are likely to offer limited opportunities for movement by GCN.

Any modelling of the natural environment will never be able to account for all of the natural variables and whilst these limitations have potentially introduced slight inaccuracies, it is considered that they will not have had a significant impact on the overall conclusions of the modelling.

In summary, the modelled impacts of the proposed Prison of the Firestone site on the wider GCN population network appears to be minimal, with no loss of ponds and the loss of only one link that possesses a low importance value. Whilst the modelled impacts may represent a relatively conservative estimate, the addition of five ponds to the network, as a means of mitigation, is likely to compensate more than adequately for the minor loss in connectivity.

4.3 Compliance with Habitats Directive

Information is supplied below demonstrating how the HMP implemented by the MoJ scheme will ensure that compliance with the Habitats Directive is achieved.

4.3.1 Habitats Directive Article 2.2

Article 2.2 states that measures will be taken to maintain or restore species at FCS. This will be achieved by:

- the restoration and enhancement of the two existing ponds;
- the creation of five new ponds;
- the creation of 25 hibernacula and 15 refuge features; and
- increasing the amount of optimal foraging habitat (mainly by scrub clearance and grassland creation) in the mitigation area and the long-term management of the site as a nature reserve.

These measures will increase the suitability of the site for GCN with the aim of increasing the GCN population to achieve FCS. Measures to maintain the population will be provided through the long-term management intentions for the site.

4.3.2 Habitats Directive Article 10

Article 10 requires the management of features of the landscape which are of major importance for wild fauna and flora. This includes features which, due to their function as stepping stones (such as ponds), are essential for the migration, dispersal and genetic exchange of wild species.

Each of the new ponds will be located within 250 m of one another or one of the existing two ponds. This distance is the commonly accepted 'interpond' distance within which GCN may move between ponds within and between seasons, thereby allowing a metapopulation structure to establish. The new ponds will act as stepping stones to increase the range and population size of GCN within the mitigation area itself and also to increase connectivity within the WIE metapopulation. ARC modelling has demonstrated that the inclusion of new ponds in the mitigation area will increase connectivity with the northwest of the WIE.

4.3.3 Habitats Directive Article 12

Article 12 requires strict protection of listed species prohibiting deliberate capture, killing or disturbance of the animals and preventing deterioration or destruction of their breeding and resting places.

Construction of the new Prison has the potential to disturb, kill or injure GCN or to disturb, damage, destroy or obstruct their habitats. Creation of the new ponds and other improvements to the habitats such as scrub clearance and grassland creation may also cause destruction of potential resting places.

The Prison site will be cleared of GCN, in order to prevent deliberate killing of individuals, using standard measures, including vertical amphibian fencing and pitfall traps, under a Derogation Licence.

Work within the Ecology Area will either be carried out using reasonable avoidance measures by a contractor with a valid conservation licence, or may be included within the Derogation Licence.

The existing ponds (Ponds 1 and 2) are within the mitigation area and will not be lost, but will be enhanced and managed to improve their suitability for GCN.

4.3.4 Habitats Directive Article 15

Article 15 requires the prevention of incidental capture and killing of listed species.

Exclusion and removal of GCN from the construction areas, using standard measures, will prevent incidental killing of individuals by moving vehicles during the construction works.

During operation of the Prison, the avoidance of vertical kerb stones and gully pots within the MoJ site will reduce incidental GCN entrapment and mortality when crossing through developed areas.

4.3.5 Habitats Directive Article 16

Article 16 states that, provided there is no satisfactory alternative and the derogation is not detrimental to the maintenance of species at FCS, then derogation from Articles 12-15 can be made for imperative reasons of overriding public interest.

The Firestone site has been selected as the location for a new prison for North Wales and the North West, in accordance with a process set out in the Planning Statement and

Environmental Statement. It will meet strategic needs for new prison places and will improve the economic well-being of the area as it will create an estimated 1,000 new jobs.

The site is the preferred option for the proposed development including meeting imperative reasons of overriding public interest with respect to socio-economic factors. In addition, through securing the long term management of the Ecology Area, the proposed development will result in the creation of a mitigation area which will be managed for the benefit of a range of wildlife including GCN. This will enable the current vulnerable GCN population to grow to an exceptional GCN population with FCS. It will also increase the connectivity of GCN within the WIE.

A Derogation Licence will be acquired, which will secure all the GCN mitigation requirements for the MoJ site and which will enable trapping and translocation of GCN and the creation of new habitats within the mitigation area.

5 Erratum

Some minor errors within the HMP have been brought to ENVIRON's attention and are corrected below.

5.1.1 Table 1

Some incorrect areas were provided in Table 1. A correct version is provided below with the changes provided in bold.

Table 1: Habitat Losses and Gains Table		
Habitat Type	Ecology Area	MOJ Demise
Species Rich Neutral Grassland	10 to 13.0 ha (3 ha gain)	21.0 to 0.7 ha (20.3 ha loss)
Bare Ground	0.5 to 3.1 ha (2.6 ha gain)	0.5 to 0.7 ha (0.2 ha gain)
Dense and Scattered Scrub	7.4 to 1.7 ha (6.1 ha loss)	4.0 to 0 ha (4 ha loss)
Trees	0.3 ha (No change)	0.1 to 0 ha (0.1 ha loss)
Ditch	0.2 ha (No change)	0.5 to 0 ha (0.5 ha loss)
Pond	0.2 to 0.3 ha (0.1 ha gain)	n/a
Building and Hardstanding	n/a	0 ha to 12.5 ha (12.5 ha gain)
Landscape short mown grass	n/a	0 ha to 11.2 ha (11.2 ha gain)
Landscape Tree and Shrub Planting	n/a	0 ha to 1.0 ha (1.0 ha gain)

5.1.2 Himalayan Balsam

Within Table 2 of the HMP it incorrectly states that work to remove Himalayan balsam will be carried out in the winter months of 2013/2014. Due to the perennial nature of Himalayan balsam this is best removed by hand pulling in the summer months. This will be carried out as part of the annual works included within the HMP.

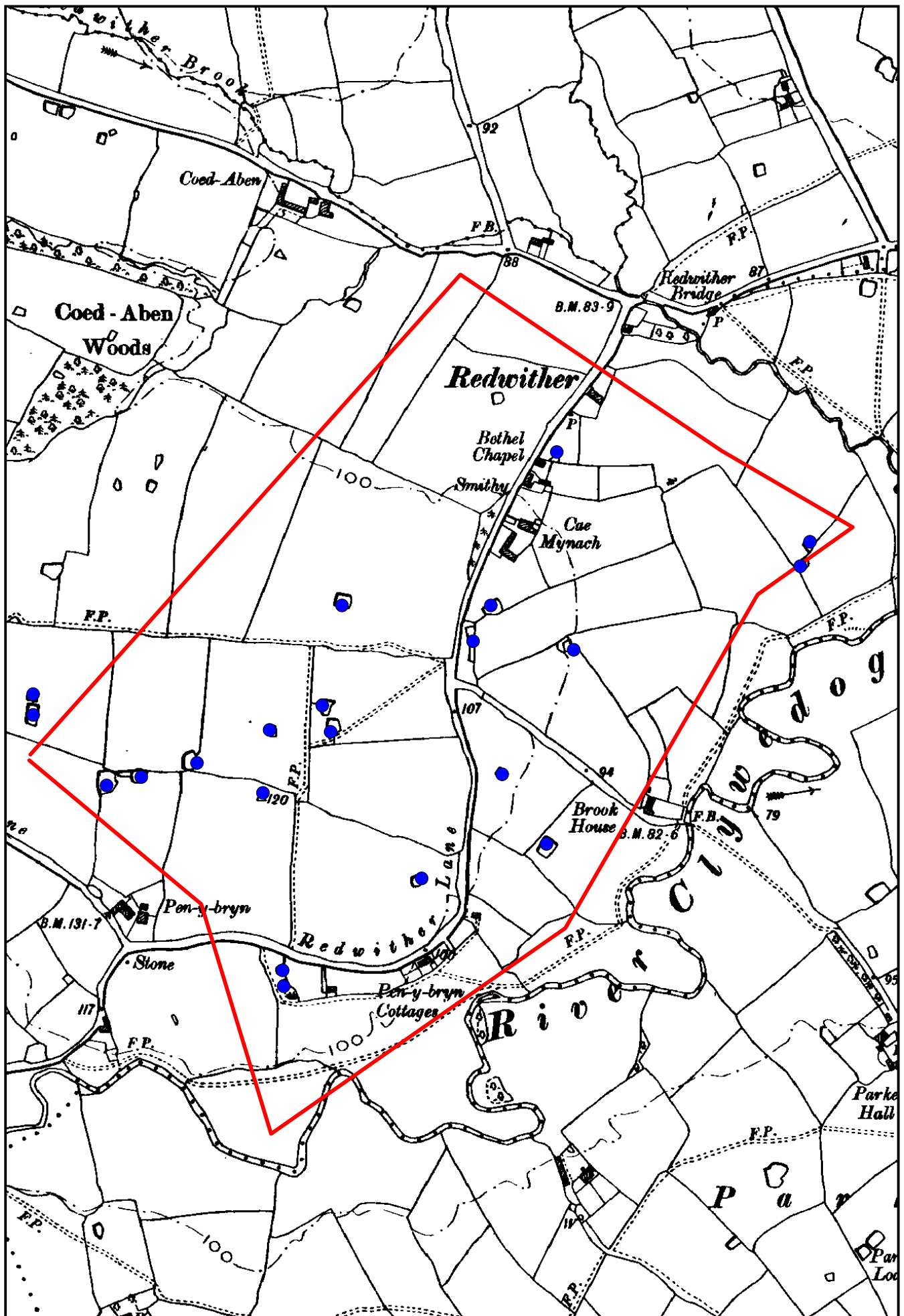
5.1.3 Biosecurity Risk Assessment

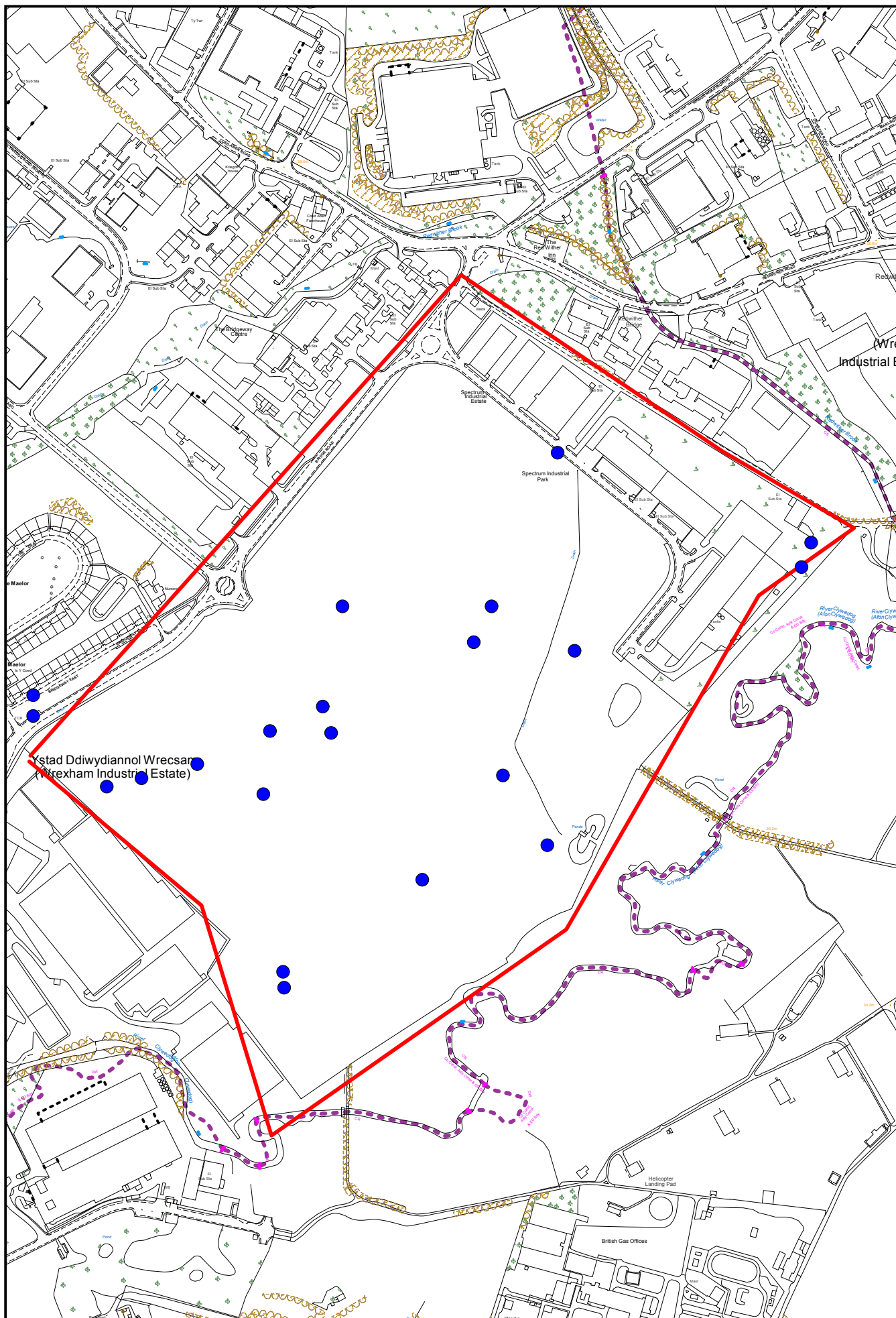
The Biosecurity Risk Assessment proforma was omitted from the HMP submitted as part of the ES and is therefore included in Annex C.

6 References

- Amphibian and Reptile Conservation (November 2013). *Firestone GCN Modelling: Comparative Impact Modelling to Inform Planning*.
- English Nature (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough
- Langton T, Beckett C & Foster J (2001). *Great Crested Newt Conservation Handbook*. Froglife, Halesworth, Suffolk.
- Wrexham County Borough Council (2002). *Wrexham Biodiversity Action Plan*
- Wrexham County Borough Council (2003). *Great Crested Newt Species 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*
- TEP (2012) *Firestone Site, Ecological Baseline Assessment*, December 2012, Report 3544.001
- Countryside Council for Wales (CCW) (no year). *Population Review Wrexham Industrial Estate*
- Pilot EC Investigation 1126/10/ENV1 – Protection of great crested newts

Annex A: Historic Pond Distribution Maps (supplied by NRW)





Annex B: ARC Modelling Report



Firestone GCN Modelling:

Comparative impact modelling to inform planning.

D.H. Fletcher & J.W. Wilkinson

November 2013

amphibian and reptile
conservation



Firestone GCN Modelling

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Executive summary

North Wales is a known hotspot for Great Crested Newts (GCNs). Previous ARC work (i.e. Arnell & Wilkinson, 2013) has trialled high resolution (25m) modelling to quantify a number of GCN attributes (e.g. distribution, habitat suitability, importance of metapopulations, etc.) in Anglesey, NE Wales and Powys.

Wrexham industrial estate is located within the boundaries of the aforementioned modelling work. The present work aims to use existing outputs from previous high resolution modelling (Anglesey and NE Wales), namely the resistance surface and the cleaned presence location data, in a comparative analysis. The overarching premise of the work is that a baseline, or current state, can be used as a reference, against which multiple theoretical development scenarios may be compared in order to assess their relative impacts.

The following work represents the development of an objective, data-driven, analysis method that can be used as a decision-making support tool, with regard to the consideration of GCN within the planning process. We utilise graph theory-based connectivity analysis techniques to quantify relative impacts of development options on GCN metapopulations in the localised area around Wrexham industrial estate, the site of a proposed development.

The development's main building footprint was supplied in the format of a shapefile. Locations of proposed mitigation ponds were also supplied in shapefile format. A total of three model scenarios were run: (i) Baseline model – the current state, with no development simulated. (ii) Post-development model – with the development of the area described by the building footprint simulated (i.e. made impermeable to GCN). (iii) Mitigation model – the same as the Post-development model, but with the proposed mitigation ponds added too.

We found that the modelled impacts of development of the Firestone site (building footprint) on the wider GCN population network appears to be minimal, with no loss of ponds/nodes and the loss of only one link that possesses a low importance value. Whilst the modelled impacts may represent a relatively conservative estimate, the addition of five ponds to the network, as a means of mitigation, appears to compensate more than adequately for the minor loss in connectivity.

Introduction

Great crested newts (GCN) are protected by both British and European law, which together make provision for the protection of the species and its associated habitats. In England and Wales it is illegal to (i) intentionally or deliberately capture, kill, or intentionally injure great crested newts. (ii) Deliberately disturb great crested newts or intentionally or recklessly disturb them in a place used for shelter or protection. (iii) Damage or destroy a breeding site or resting place. (iv) Intentionally or recklessly damage, destroy or obstruct access to a place used for shelter or protection. (v) Possess a great crested newt, or any part of it, unless acquired lawfully. (vi) Sell, barter, exchange, transport or offer for sale great crested newts or parts of them.

Any activity likely to contravene the legislation must be licensed by the appropriate party, whom issues licences for the purposes of “preserving public health or public safety or other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment” [Regulation 44(2)(e)].

A licence will not be granted unless:

- “There is no satisfactory alternative” [Regulation 44(3)(a)], and
- “The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range” [Regulation 44(3)(b)].

Therefore, any proposed development must show that any damage to the status of GCN must be adequately compensated for. Compensation must amount to the maintenance of conservation status, taking into account population size, viability and connectivity.

Local planning authorities have the responsibility of ensuring that protected species issues are taken into account as a material consideration when determining planning applications. They must also ensure that protected species issues are taken into account in the preparation of Local Development Plans (LDPs). These responsibilities are underlined by Regulation 3(4) of the Conservation (Natural Habitats & c.) Regulations 1994, which require authorities to have regard for the conservation of European Protected Species, such as great crested newts.

When considering options for development plans, it can be costly and time-consuming to undertake detailed surveys at all ponds and GCN presence locations, for the purpose of quantifying impacts. Although it is usually a requirement that any submitted plans are accompanied by full surveys of the areas affected, this is not to say that **all** options considered prior to submission need to be subject to full surveys.

In the interest of optimising allocation of time and resources to full surveys, it would be immensely valuable to be able to assess relative impacts of options, without having to first undertake detailed surveys at all presence locations within the vicinity of candidate development sites. Desktop studies can be useful, in the interest of time and costs; however they still require data on GCN presence. These data are sometimes present, in the form of local/regional records centre data, but rarely provide much beyond the species’ presence or absence.

The present study utilises Species Distribution Modelling (SDM) in order to quantify the potential value of populations at GCN presence locations and incorporates this data into a wider, landscape-level connectivity analysis. The connectivity analysis uses a resistance surface, which can be modified to reflect proposed developments, to model the likely movement of GCN through the landscape between locations of known presence. By using a metric that captures both the value of individual habitat patches (ponds/nodes) and the degree of connectivity at a landscape level, it is possible to compare the relative predicted impacts of multiple development scenarios without having to first carry out detailed GCN surveys at all sites. This approach allows many development options/scenarios to be compared with minimal outlay, both in terms of time and money.

Materials and Methods

Software & Data

The following software was used in this study:

- The majority of analysis was conducted in R (R Core Team, 2013), using the 'gdistance' (van Etten, 2012), 'rgdal' (Bivand et al., 2013) and 'raster' (Hijmans, 2013) packages.
- Network analysis was conducted using the Command Line version of Conefor software (Torné & Saura, 2013).
- Composition and creation of map outputs was carried out using ArcGIS 10.2 (ESRI, 2013).

All GCN presence location data used in this study was derived from the Cofnod dataset used in Arnell & Wilkinson (2013). MaxEnt model output and resistance surface GIS layers were all taken from Arnell & Wilkinson (2013). GIS shapefile data describing the proposed candidate development site and detailing the mitigation pond locations was provided by the client.

Study area



Figure 1 – Map showing location of study area.

The proposed development site is located in the Wrexham industrial estate, on the eastern outskirts of Wrexham town, north Wales (see Fig.1 above). The study area is essentially defined by a 2km buffer around the development site. However, after visual inspection we concluded that there were additional GCN records just outside the buffer (predominantly to the north-east), near enough to the study site as to be relevant. The study area was expanded to include these additional records.

Resistance Surface Scenarios

The resistance surface created for the Anglesey & NE Wales project was clipped to the extent of the study area. An unmodified version was used as the baseline “no



development” scenario. The remaining 2 scenarios were each represented by a modified resistance surface, where cells of the selected development site was assigned a high value (10000), rendering those cells impermeable to all intents and purposes.

Least Cost Pathways

Calculating Least Cost Pathways (LCPs) is a necessarily processor-intensive procedure, particularly when working at high resolutions. However these calculations can be minimised by limiting the number of pairs of points for which the LCPs are calculated. In this study, we filtered out any pair of points that possessed a Euclidean separation distance exceeding 2000m, a distance beyond which it is reasonable to assume that negligible dispersal occurs.

LCPs were calculated for the remaining pairwise combinations of points (1866 combinations/LCPs in total for the first two scenarios, 2130 for the mitigation scenario). LCPs were calculated for each the baseline, development and mitigation scenarios, which were represented by the resistance surfaces. Line shapefiles containing the LCPs, and their corresponding cost-distance values, as attributes, were generated for subsequent visualisation and map creation.

Graph construction and analysis

We used the graph theory software Conefor (see Software section) to highlight populations that are likely to be most important. Graph theory has been used for a variety of applications, including geography and computer science and recently has been employed to provide estimates of connectivity between habitat patches at landscape scale (Minor and Urban, 2007; Saura and Rubio, 2010; Urban and Keitt, 2001). This software is able to calculate a connectivity index (Probability of Connectivity, ‘varPC’) for each population, which is comprised of the habitat quality/patch size of each patch (varPC Intra), the patches’ contribution to connecting between patches (varPC Con) and the position of the patch within the network (varPC Flux) (Saura and Rubio, 2010).

Nodes: The GCN presence points were used as nodes in graph construction. Each of the nodes was assigned a “patch” value, representing some surrogate for habitat value. These “patch” values were derived from the MaxEnt model output from the Anglesey & NE Wales project, on the basis that most suitable locations were of higher habitat value than less suitable locations.

Edges/Links: The LCP cost-distance values were used as edge/link distance values in the graph construction – the higher the LCP cost-distance value, the further apart the two corresponding nodes are.

Conefor Parameterisation: In order to calculate varPC values for the graph objects, thresholds must first be defined. In the context of this study, the threshold relates to dispersal distances. Although the median dispersal distance used in previous studies was 250m, a recent further literature review led us to revise this up to 400m. Research carried out by Jehle *et al.* (2005) suggests that a median dispersal distance of 250m may be somewhat conservative. Furthermore, Joly *et al.* (2001) suggest that a median dispersal distance of 400m is appropriate.

As all of our edge/link values are in cost-distance, rather than Euclidean distance, the threshold had to be converted into corresponding units of cost-distance. In order to do this, we calculated an average cost per metre of the LCPs (0.924), which characterises the wider landscape, then multiplied this landscape value by 400 to give a cost-distance of 369.6 for median (0.5 probability) dispersal.

For each node, the varPC index and its components were recorded. For each edge/link, the change in overall, landscape PC number associated with its removal from the graph (representing link importance) was recorded. The overall PC number, a measure of combined graph object coherence, was also recorded for each of the scenarios.

Results

Initial, baseline analysis (no sites developed)

Those edges/links with cost-distance values above a cost-distance threshold equivalent to a Euclidean distance of 2000m ($2000 \times 0.924 = 1848$) were removed from the final maps, as dispersal beyond this cost-distance is deemed to be negligible, leaving a total of 1444, 1443 and 1559 remaining links for the Baseline, Post-development and Mitigation scenarios respectively.

In the initial baseline model (see Appendix 1) the bulk of pond/nodes are down the eastern side of the study area in a slight crescent shape, wrapping around the industrial estate. They are most densely distributed in the middle, thinning out to the north and to the south. There are a few sparsely distributed nodes to the west of the development site, which are relatively poorly connected to the main part of the network. More important ponds/nodes generally represent those that are better connected, and less important ones generally represent those that are more isolated. Overall pond/node importance (sum of PC components – Intra, Flux and Con) is reflected in the diameter of the corresponding pie-chart.

Due to the relatively dense configuration of the main body of the network of nodes, the links between them are good and numerous. There are some more tenuous links, separating a small sub-cluster in the south of the study area from the main body of the network, but not so much as to be significant. There appears to only be one, relatively low importance link crossing the proposed development site.

Regarding composition of importance/PC metric for each node, 'varPC Con' is very low, almost non-existent, due to the spatial configuration of individual nodes within network components (removal does not increase fragmentation of components significantly). For the main part, the only visible components of PC are 'Intra' (red) and 'Flux' (green). The variations in relative proportions of these components is broadly explained by isolation of the pond/node in question – 'Intra', representing the actual habitat patch value, increases as a function of isolation, thus those ponds/nodes that are more isolated tend to display a higher proportion of red.

Development Scenario

As mentioned above, there is only one link that crosses the development site (see Baseline model, Appendix 1). There are no nodes lost as a result of the development. Beyond the loss of the individual link, there are no significantly discernable impacts on the network through the development of the site (see Post-development model, Appendix2). The loss of the link, which is of relatively low importance, results in a decrease in overall landscape value (PCnum) of just 0.01%, from 390.645 to 390.602 (See Fig. 2).

Mitigation Scenario

Five ponds/nodes were added to land adjacent to the building in the mitigation scenario (see Mitigation model, Appendix 3). They border the development to the south and east and connect well with the two existing nodes in the immediate vicinity, as well as the main body of the network, via numerous new links. The new nodes also improve the connectivity of the southern part of the overall network to the sparse western nodes. The addition of 5 nodes (i.e. habitat patches) to the network in conjunction with the increase in cohesiveness of the network through improved connectivity results in a healthy increase in overall landscape value (PCnum) of 3.2%, from post-development value of 390.602 to 403.178 (see Fig.1).

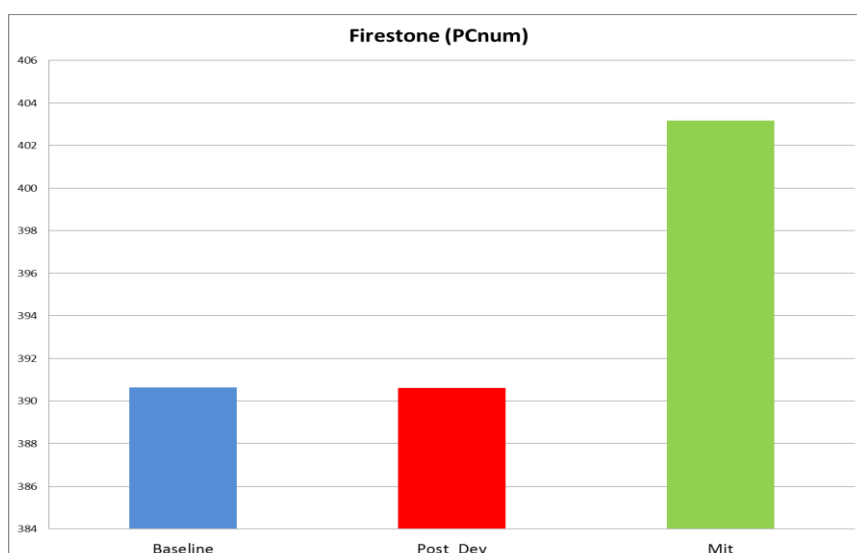


Figure 2 – Graph displaying the overall landscape metric, PCnum (sum of all nodes' components) associated with each scenario. The baseline model, 'no development', is coloured blue, post-development model is coloured red and the mitigation model is green. *Note that Y-axis does not start at zero*

Discussion

Methods

We used MaxEnt output as a surrogate for habitat patch value. The approach could be augmented by the addition of HSI data and ground-truthing. Nevertheless, this approach follows a clear and logical theoretical grounding and in the absence of HSI, or other survey data, may provide a more realistic representation of potential patch habitat value than a simple binary present/absent approach.

Generally, the methods used in this study offer useful insights into the way that the target taxa may use and move through the landscape, although data-imposed limitations must be recognised and considered when interpreting the outputs. For instance, the resistance layers, the basis for LCP creation, are far from a perfect representation of the real world. It is highly probable that barriers exist that are not captured by the data sources used to derive the resistance surfaces (i.e. fences, walls, etc). Furthermore, there is a paucity of research relating to the relative resistance of landcover types to GCN movement – this research would be invaluable in calibrating more accurate resistance surfaces.

Nonetheless, providing the limitations are kept in mind when interpreting outputs, the methods outline in this study can highlight key areas for potential corridors of dispersal, which can be verified through short-term, focussed surveys (i.e. drift netting). They can also provide a consistent, objective, transparent means of comparing various development scenarios, without the cost of detailed surveys. This could potentially allow planners to consider a greater number of options, refining them through the methods used here, before carrying out more detailed analysis on only the best two or three.

Model Outputs

It is important to note that the comparative analyses carried out in this study, were done so on the strict basis that specific combinations of development sites and nodes (those stipulated by the client) comprised the development scenarios. The authors would recommend the use of extreme caution when trying to extrapolate beyond the remit of the specified combinations of developed sites set out herein. Furthermore, the modelled impact of the development does not necessarily capture the full range of possible negative effects associated with such a development. For instance, the footprint of the building will

not be the spatial limit of influences during construction (i.e. people and vehicles moving around site). However, the identification of important dispersal pathways and ponds should allow planners and developers to minimise impacts through avoiding them where possible.

These analyses elucidate the current structure of the GCN population network in the localised area around the proposed, Firestone, development site and highlight the links most important to the taxa's dispersal capabilities. The 'post-development' model shows that there is relatively little impact to the GCN population network through the development of the proposed site; specifically the loss of a single, relatively low importance, link. The 'mitigation' model suggests that the impact of the development is more than compensated for by the addition of five new ponds (under the assumption that these ponds are made suitable for GCNs).

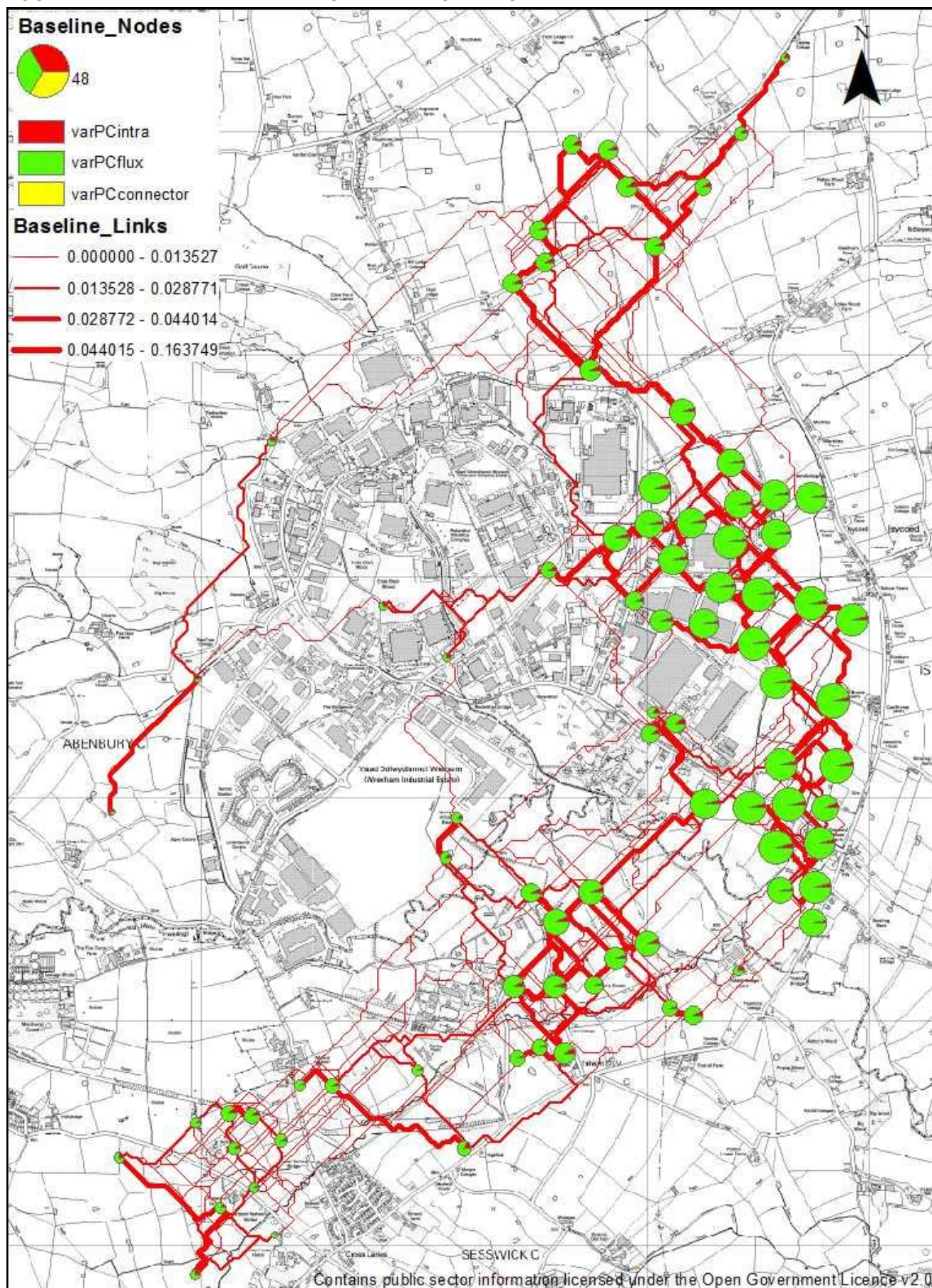
Conclusions

The modelled impacts of development of the Firestone site (building footprint) on the wider GCN population network appears to be minimal, with no loss of ponds/nodes and the loss of only one link that possesses a low importance value. Whilst the modelled impacts may represent a relatively conservative estimate, the addition of five ponds to the network, as a means of mitigation, appears to compensate more than adequately for the minor loss in connectivity.

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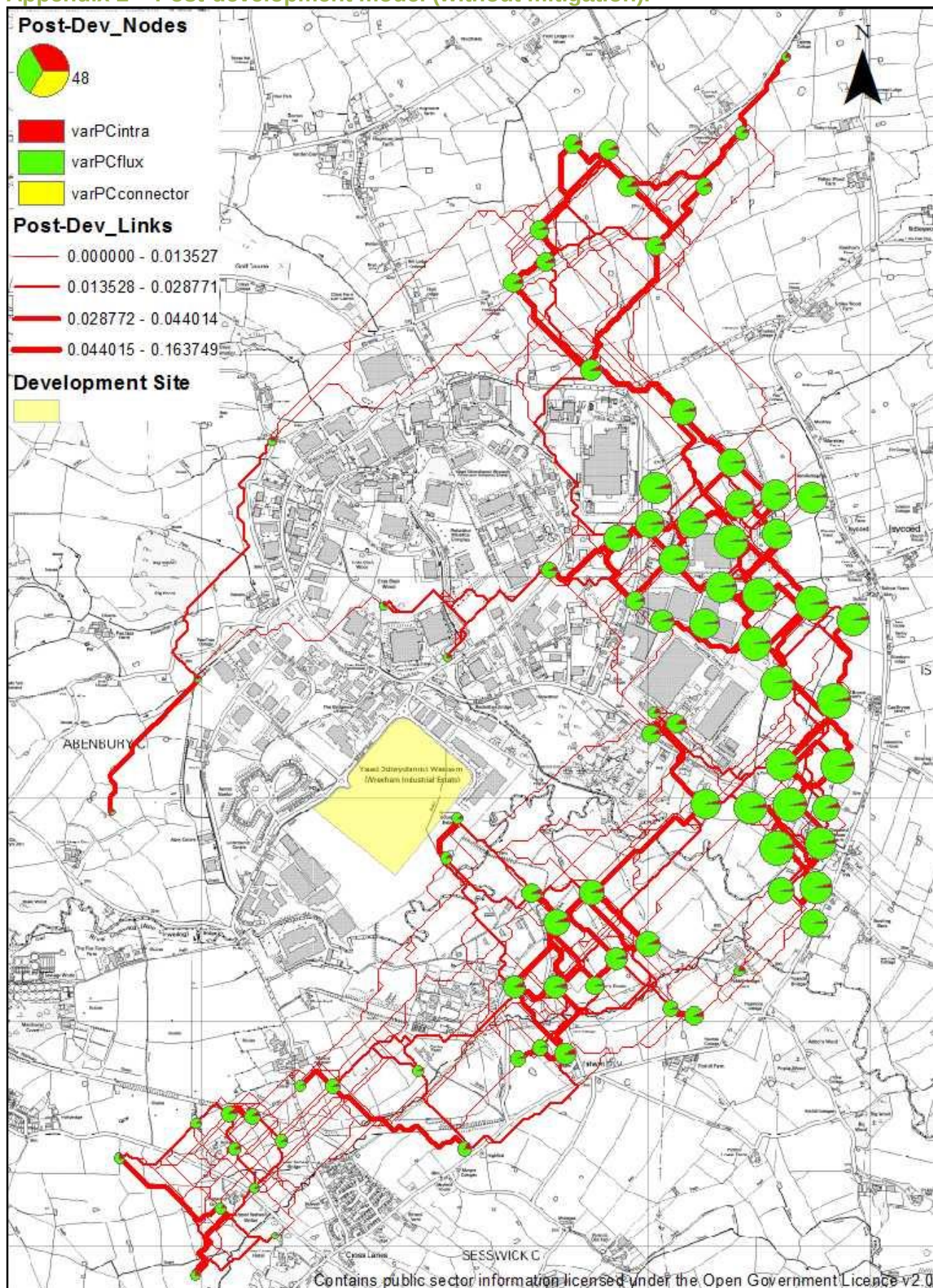
Appendix 1 – Baseline model (no development).



Firestone GCN Modelling



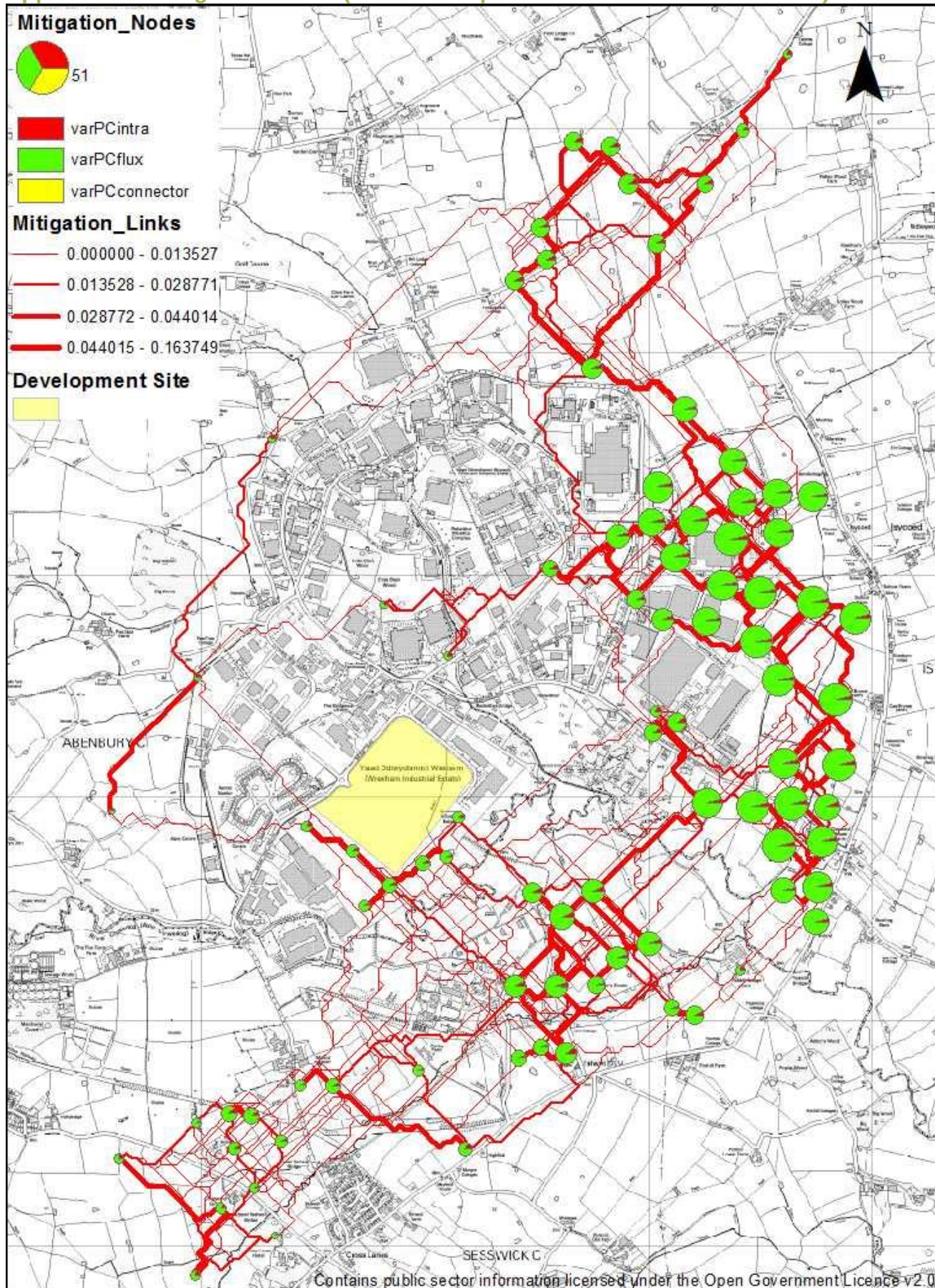
Appendix 2 – Post-development model (without mitigation).



Firestone GCN Modelling



Appendix 3 – Mitigation model (Post-development model with added nodes).



Firestone GCN Modelling



Annex C: Biosecurity Risk Assessment Proforma

BIOSECURITY RISK ASSESSMENT

Ref No:	
---------	--

Organisation	
--------------	--

Assessment type	
Initial	✓
Review	

Assessment date	Assessment carried out by

Location
The risk assessment is applicable to the former Firestone Site at Wrexham Industrial Estate

A. Assesed Activities

Description of work activity being assessed	• Great crested newt (<i>Triturus cristatus</i>) surveillance/monitoring assessments; • Great crested newt trapping and translocation; and • Habitat enhancement and clearance works including creation of new ponds and maintenance off existing ponds.
--	--

B. Description of Risk Species

Description of Risk	Species / habitats specifically at risk
Himalayan Balsam Himalayan Balsam is widely distributed in North Wales and occurs in both lowland and upland localities. The species is thought to have extended its range and abundance, particularly in wetland habitats. Spread of species via construction machinery/ movement of soil. Introduction of seeds via contaminated soil.	Species Applies to all vegetation within the Ecology Area to south and west of prison. Habitats Mosaic of species rich neutral grassland interspersed with areas of dense and scattered scrub.

Description of Risk	Species / habitats specifically at risk																											
Crassula helmsii Australian Swamp Stonecrop Crassula helmsii was first identified on Halkyn Mountain in 2001. Since then it has been recorded in both Johnstown Newt Sites SAC and Deeside and Buckley Newt Sites SAC. Active control has been undertaken within all three SAC's. The species is highly invasive and represents one of the principle factors that affect the long term ecological functionality of ponds as breeding sites for amphibians.	Species Great crested newt and other amphibians including common toad Bufo bufo and smooth newt Triturus vulgaris. Habitats Ponds and ditches.																											
Other Invasive Non-Native Aquatic Plant Species A range of invasive non native plant species have been recorded to date in North Wales. The table below reviews risk species. <table><tr><th>Species</th><th></th><th>Risk</th></tr><tr><td>Fern, Water</td><td>Azolla filiculoides</td><td>High Risk</td></tr><tr><td>Parrot's-feather</td><td>Myriophyllum aquaticum</td><td>Medium Risk</td></tr><tr><td>Pennywort, Floating</td><td>Hydrocotyle ranunculoides</td><td>High Risk</td></tr><tr><td>Waterweed, Canadian</td><td>Elodea Canadensis</td><td>Medium</td></tr><tr><td>Waterweed, Curly</td><td>Lagarosiphon major</td><td>Medium</td></tr><tr><td>Waterweed, Nuttall's</td><td>Elodea nuttallii</td><td>Medium</td></tr><tr><td>Waterweeds(other Elodea)</td><td>Elodea spp</td><td>Medium</td></tr><tr><td>Least duckweed</td><td>Lemna minuscula</td><td>High</td></tr></table>	Species		Risk	Fern, Water	Azolla filiculoides	High Risk	Parrot's-feather	Myriophyllum aquaticum	Medium Risk	Pennywort, Floating	Hydrocotyle ranunculoides	High Risk	Waterweed, Canadian	Elodea Canadensis	Medium	Waterweed, Curly	Lagarosiphon major	Medium	Waterweed, Nuttall's	Elodea nuttallii	Medium	Waterweeds(other Elodea)	Elodea spp	Medium	Least duckweed	Lemna minuscula	High	Species Amphibians and aquatic invertebrates. Habitats Ecological functionality of ponds and ditches.
Species		Risk																										
Fern, Water	Azolla filiculoides	High Risk																										
Parrot's-feather	Myriophyllum aquaticum	Medium Risk																										
Pennywort, Floating	Hydrocotyle ranunculoides	High Risk																										
Waterweed, Canadian	Elodea Canadensis	Medium																										
Waterweed, Curly	Lagarosiphon major	Medium																										
Waterweed, Nuttall's	Elodea nuttallii	Medium																										
Waterweeds(other Elodea)	Elodea spp	Medium																										
Least duckweed	Lemna minuscula	High																										
Chytrid The Chyrid fungus was identified in Talacre and Johnstown in 2008. This fungus has affected amphibian globally and has caused the extinctions of species.	Species Common toad, great crested newt, smooth newt and palamte newt Habitats Non affected																											

C. Activity Risk Assessment

- Great Crested Newt Surveillance / Monitoring Assessments						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
1	Site visit by amphibian surveyors to monitor great crested newt populations in the Ecology Area	Medium	1. Ensure all surveyors are aware of bio-security control measures including those associated with <i>Chytrid</i> , <i>Crassula</i> and other invasive species prevention. 2. Disinfect and sterilize all equipment including clothing and footwear before and after each visit. Including between sites (if applicable). 3. All debris, plant fragments and mud should first be scrubbed off and rinsed with water. Disinfection should comprise soaking in a bleach solution (1 measure of household bleach to 9 measures water) for 15 minutes; or Virkon solution (1 mg/ml) for 1 minute; or fabrics can be washed on a 40°C cycle (with detergent, ensuring sufficient rinsing). 4. All used disinfectants should be disposed of appropriately.	Low		
2	Torch Surveying	Medium	1. Based on degree of risk, consider surveying ponds supporting invasive species last or use a team to specifically survey ponds supporting non-	Low		

- Great Crested Newt Surveillance / Monitoring Assessments						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
			native species. 2. Avoid entering ponds whenever possible. Clean equipment, boots/waders and clothes after each survey. 3. Where surveys entail surveys of two or more ponds, consider provision of duplicate equipment including boots/waders.			
3	Netting	High	1. Consider using survey techniques that constitute a lower bio-security risk (eg torching.) 2. Avoid use of this technique within sites know to trapping within sites known to support Chytrid or Crassula, 3. Nets should be boiled for 10 minutes or if the fabric allows disinfected with spray bleach and rinsed thoroughly. Rinse with clean water and if possible allow to dry before next use. K4. eep net inside plastic bags during transit and storage to reduce the likelihood of transmitting disease. 5. Consider using nets on a site specific basis. All used disinfectants should be disposed of appropriately. 6. Clean and dry equipment between each site	Low		

- Great Crested Newt Surveillance / Monitoring Assessments						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
			visit. If multiple sites visits are to be undertaken concurrently, consider using more than one net.			
4	Bottle trapping	Medium	1. Consider using survey techniques that constitute a lower bio-security risk (eg torching). 2. Bottle traps to be used on a site specific basis and cleaned and sterilized before each survey. 3. Boots and other equipment to be sterilized before and after each survey. 4. Avoid trapping within sites known to support Chytrid or Crassula. 5. Ensure bottle traps are clean and dry between each survey.	Low		
5	Egg Surveys	Medium	See Activity 2: Torch Surveying	Low		
6	Use of cars	Medium	1. Wherever possible ensure vehicles stick to metalled roads and parking areas. Sterilize wheels if vehicle has visited woodland within past week	Low		

- Trapping and Translocation						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
1	Trap and translocation of amphibians	Medium	1. Ensure all surveyors are aware of bio-security control measures including those associated with Chytrid, Crassula and other invasive species prevention. 2. Amphibians will only be released only at the within the Ecology Area. 3. Disinfect and sterilize all equipment including clothing and footwear before and after each visit. Including between sites (if applicable). 4. All debris, plant fragments and mud should first be scrubbed off and rinsed with water. Disinfection should comprise soaking in a bleach solution (1 measure of household bleach to 9 measures water) for 15 minutes; or Virkon solution (1 mg/ml) for 1 minute; or fabrics can be washed on a 40°C cycle (with detergent, ensuring sufficient rinsing). 5. All used disinfectants should be disposed of appropriately.	Low		
2	Installation of amphibian proof fencing and buckets for trapping and translocation	Medium	1. Ensure all contractors are aware of bio-security control measures including those associated with Chytrid, Crassula and other invasive species prevention	Low		

- Trapping and Translocation						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
			2. Use only amphibian proof fencing, don't use fencing from other site. 3. Disinfect buckets to be used for trapping amphibians.			
3	Use of cars	Medium	1. Wherever possible ensure vehicles stick to metalled roads and parking areas. Sterilize wheels if vehicle has visited woodland within past week	Low		
4	Use of equipment and machinery to install fencing		1. Disinfect and sterilize the wheels and buckets of excavators before entering the site. 2. Use a brush to scrub off any debris, plant fragments, mud.	Low		

- Habitat Enhancement and Clearance Works						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
1	Excavating new ponds and soil movement	Medium	1. Disinfect and sterilize the wheels and buckets of excavators before entering the site. 2. Use a brush to scrub off any debris, plant fragments, mud. 3. Avoid using equipment that has been used for work on off-site waterbodies within the last 48 hours. 4. Ensure contractors know what Himalayan Balsam looks like. If any plants are identified these should be pulled up and left to dry before the seeds set (July/ August).	Low		
2	Scrub and vegetation clearance	Medium	1. Ensure contractors know what Himalayan Balsam looks like. If any plants are identified these should be pulled up and left to dry before the seeds set (July/ August).	Low		
3	Removal of in pond vegetation	Medium	1. Ensure all contractors are aware of bio-security control measures including those associated with Chytrid, Crassula and other invasive species prevention. 2. Disinfect and sterilize equipment and footwear to be used in the ponds. Use a brush to scrub off any debris, plant fragments, mud.	Low		

- Habitat Enhancement and Clearance Works						
No.	Activity	Risk (High, Medium or Low)	Control measures needed	Risk after control measure implemented	Control measure in place	
					No	Yes
			3. Avoid using equipment that has been used for work on off-site waterbodies within the last 48 hours.			
7	Use of cars	Medium	1. Wherever possible ensure vehicles stick to metalled roads and parking areas. Sterilize wheels if vehicle has visited woodland within past week	Low		

D Spatial Activity Assessment Sheet – To be Completed by Contractor Undertaking Surveys or Site Work

Great Crested Newt Surveillance / Monitoring Assessments				
Factor	No	Risk	Score	
Cummulative Total No of Sites Surveyed/ Visited Per annum	1 – 10	Low	☐ 1	
	10-100	Medium	☐ 2	
	100+	High	☐ 3	
Geographical extent of all surveys / equipment used per annum (Cummulative)	0-10 Km ²	Low	☐ 1	
	10-100 Km ²	Medium	☐ 2	
	1000+ Km ²	High	☐ 3	
Range of all surveys, pond or watercourse works carried out per annum	>1km	Low	☐ 1	
	1 - 10 Km		☐ 2	
	>10/County	Medium	☐ 3	
	Region		☐ 4	
	County		☐ 5	
	UK	High	☐ 6	
Nett Score				
Where any risk species present on sites visited during the past 7 days?	☐ No ☐ Yes	Yes = +10 Points	0	
Score and Risk	Low	3-5	Total Score	
	Medium	6-12		
	High	13-22		

Low risk rating will only be achieved if all the above control measures are implemented.

E Risk Rating

Current risk rating taking account of control measures		
Low	Medium	High

Low is the only acceptable risk rating.

	Yes	No
1. Adequate control measures are in place and low risk rating achieved?		

F Review Frequency

Review frequency		
Low: annually ☒	Medium: 3 - 6 months ☐	High: 1 - 3 months ☐

Review Date	Date reviewed	Reviewed by	Signature
March 2014			

Assessed by	Signature	Date