

Appendix 5F

Great Crested Newt Survey Report

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1. Introduction

- 1.1.1 The Environment Partnership (TEP) was instructed through WSP by Cadent Gas Limited (Cadent) in 2022, 2023 and 2024 to undertake surveys to identify the presence/likely absence of great crested newts (GCN) along the section of the HyNet North West Hydrogen Pipeline (hereafter referred to as ‘the Project’) situated within St Helens Local Planning Authority (LPA) boundary. Cadent (the Applicant) is applying to the Secretary of State for a Development Consent Order (DCO) to construct, operate, and maintain a new underground hydrogen pipeline approximately 100km in length.
- 1.1.2 The Project within the Preliminary Order Limits can be split into five distinct areas, comprising four pipeline Corridor routes and the Central Hub, an area where the four Corridor routes meet which cannot be associated with any specific route. The Northern Corridor is partially situated within the St Helens LPA boundary. Please note that as part of the design process, the order limits have undergone a number of iterations (as described in **Appendix 2A: Design evolution** of the Draft ES) and this report is based on the Preliminary Order Limits as considered in the Preliminary Environmental Information Report (PEIR) published in September 2022.
- 1.1.3 The purpose of this technical report is to detail the method of the GCN surveys, present the results of the surveys and identify the location of ponds supporting GCN that may be impacted by the Project.

1.2 Legislation

- 1.2.1 Great crested newts are afforded a high level of protection under the Conservation of Habitats and Species Regulations 2017 (the ‘Habitat Regulations’), the legislation means that it is an offence to:
- Deliberately capture, injure, or kill a wild great crested newt;
 - Deliberately disturb wild great crested newts; ‘disturbance of animals includes in particular any disturbance which is likely:
 - (a) *to impair their ability —*
 - (i) *to survive, to breed or reproduce, or to rear or nurture their young; or*
 - (ii) *in the case of animals of a hibernating or migratory species, to hibernate or migrate; or*
 - (b) *to affect significantly the local distribution or abundance of the species to which they belong.’*
 - Damage or destroy a breeding site or resting place used by this species.
- 1.2.2 Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of animals when using places of shelter, and obstruction of access to places of shelter.

- 1.2.3 Due to the high level of protection afforded to great crested newts and their habitat, mitigation for this species is governed by a strict licensing procedure administered by Natural England (normally, planning permission must be obtained before a licence can be sought). Licensing is subject to three tests, as defined under the Habitats Regulations, these must also be applied by the planning authority before granting permission for activities affecting great crested newts. For permission to be granted the following criteria must be satisfied:
- The proposal is necessary 'to preserve 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';
 - 'There is no satisfactory alternative'; and
 - The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.
- 1.2.4 In areas where District Level Licensing is available the application process is separate and this is discussed further below.
- 1.2.5 The great crested newt is also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under Section 40 of the NERC Act (2006) public bodies (including local planning authorities) have a duty to have regard for the conservation of SPI when carrying out their functions, including determining planning applications.

1.3 District Level Licensing (DLL)

- 1.3.1 District Level Licensing (DLL) is an alternative approach to [mitigation licensing](#) for developments which could affect great crested newts (GCN). Apart from St Helens, DLL is available throughout the area of the Project.¹ Through DLL, Natural England identifies key areas for targeting GCN conservation at a district level. The scheme uses compensatory 'conservation payments' from developers to off-set impacts of development by strategically providing new or better habitats in targeted areas to benefit the wider GCN population. Based on a development boundary, Natural England measures the impact of a proposed development and determines the cost of compensating for the impact (i.e. the conservation payment which the developer pays). This information is set out within an impact assessment and conservation payment certificate (IACPC), which a developer signs upon entering DLL for a proposed development.

¹ The Project covers five local planning authority (LPA) boundaries, of which DLL is available in the Cheshire West and Chester, Halton, Trafford, and Warrington LPA boundaries. DLL is not currently available in the St Helens LPA boundary.

- 1.3.2 Once an IACPC is signed by Natural England and a developer, it confirms that the proposed development is suitable for DLL, meets the ‘favourable conservation status’ test², and will compensate for any impacts on GCN via a conservation payment. If a developer obtains an IACPC, they do not need to include a detailed assessment of GCN in the Environmental Impact Assessment of the proposed development.
- 1.3.3 It is proposed that DLL is utilised in all areas of the Project where it is available, and the Applicant is in on-going consultation with Natural England³ to obtain a quote for DLL.
- 1.3.4 As DLL is not available in the St Helens LPA boundary, conventional surveys, assessment, and mitigation practices are required in this area. Therefore, the survey methodology and results presented within this report pertain to the parts of the Project located within St Helens only.

² In line with the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, licensable mitigation must pass the ‘favourable conservation status’ test, such that the activity must not harm the long-term conservation status of the species.

³ The most recent meeting between Cadent, WSP and Natural England was held on 30th January 2024, which provided the latest iteration of the Preliminary Order Limits and areas of potential permanent land take for Natural England to prepare a revise DLL quote.

2. Methodology

2.1 Desk Study

Great crested newt records

- 2.1.1 A desk study was undertaken in Spring 2022 and the methodology for this is set out in Section 5.5 and Table 5.8 of the Preliminary Environmental Information Report (PEIR). The desk study recorded the presence of statutory designated sites within up to 20km⁴ of the Preliminary Order Limits (Section 5.6.1, Table 5.10, and Figure 5.1 of the PEIR) and non-statutory designated sites within 2km (Section 5.6.2, Table 5.11, and Figure 5.2 of the PEIR). The desk study also recorded the presence of Habitats of Principal Importance (HPI) within 2km of the Preliminary Order Limits (section 5.6.3., Table 5.12 and Figure 5.3 of the PEIR). Records of protected and notable species within 2km of the Preliminary Order Limits are discussed within section 5.6.12-5.6.41 of the PEIR.
- 2.1.2 The desk study information from the PEIR is not repeated in this report or discussed further. The desk study will be updated for the Environmental Statement following design freeze for the Project.

Waterbodies

- 2.1.3 A desk-based exercise was undertaken to identify waterbodies (ponds and ditches) that are potentially suitable for GCN within the Preliminary Order Limits and a surrounding 250m buffer. Potential water bodies were identified through a review of Ordnance Survey mapping⁵, aerial imagery⁶ and the UKHab survey report for the Project⁷.

2.2 Survey Area

- 2.2.1 As noted in **Section 1.1**, this report only pertains to the parts of the Project within the St Helens LPA boundary. Only the Northern Corridor of the Project falls within St Helens LPA boundary.
- 2.2.2 The GCN survey area comprises the Preliminary Order Limits and a surrounding 250m buffer within St Helens LPA boundary. The Preliminary Order Limits were revised in spring 2023 and the survey area was updated to reflect this revision. Following the revision of the Preliminary Order Limits, an updated waterbody

⁴ Dependent on reasons for designation; within 2km for habitats, extending to 10km for bats, and up to 20km for ornithological interest for international sites.

⁵ Available at <https://magic.defra.gov.uk/> [Accessed 30/03/2023]

⁶ Google Earth Pro [Accessed 30/03/2023]

⁷ WSP (2024). HyNet North West Hydrogen Pipeline - UK Habitat Classification Survey Report. Technical Report for Cadent.

search identified 33 ponds and 24 ditches within the survey area⁸ using Ordnance Survey mapping⁵, aerial imagery⁶ and UKHab surveys⁷. The location of the ponds and ditches are shown on figure G9473.02.001C in **Annex 5F 4**.

2.3 Waterbody Scoping Assessment

- 2.3.1 A waterbody scoping assessment was carried out on site. The scoping assessment ascertained whether a waterbody was present on the ground, and if present, whether this was suitable for further assessment (i.e., accessible and potentially suitable habitat for GCN). Potentially suitable waterbodies were then subject to a detailed on-site scoping exercise using Habitat Suitability Index assessment and consideration of other factors associated with suitability for GCN (as described below). Scoping assessments were undertaken between 23rd June - 1st July 2022, 17th April - 23rd May 2023 and 30th May 2024 by suitably qualified and experienced TEP ecologists.

Habitat Suitability Index (HSI) assessment

- 2.3.2 HSI⁹ is a standard measure of calculating the suitability of a pond to support breeding by GCN, based on an assessment of ten characteristics (indices), including size, water quality, shading, vegetation coverage, pond density, terrestrial habitat quality, and other factors which can adversely affect GCN populations such as high densities of fish and waterfowl. The assessment generates a number between 0 and 1 for each of the indices which are combined to provide an overall assessment score of a pond's suitability to support breeding GCN. The score is converted into a categorical scale of bad (<0.4), poor (0.4 to 0.49), below average (0.5 to 0.59), average (0.6 to 0.69), good (0.7 to 0.79) or excellent (>0.8).
- 2.3.3 HSI scores were not attributed to ditches as the HSI assessment has not been designed for or tested on linear waterbodies such as ditches. An assessment of ditches was made based on whether ditches were holding water and if so, whether there was a noticeable flow to the water making it unsuitable for GCN egg laying, as well as consideration of other factors influencing suitability (see below).

⁸ Prior to the Preliminary Order Limits being revised in spring 2023, 33 ponds and 25 ditches were identified within the original survey area. Following the spring 2023 update of the Preliminary Order Limits, a single ditch (D019) was excluded from the survey area as it is now located >250m from the Preliminary Order Limits. D019 is therefore no longer referenced within this report, reducing the total number of ditches within the survey area to 24.

⁹ ARG UK Advice Note 5 (May 2010) Great Crested Newt Habitat Suitability Index

Other factors influencing suitability for GCN

2.3.4 In addition to HSI, an assessment was made of other factors linked to decreased suitability of a waterbody to support GCN, or factors that can limit GCN movement between a waterbody and surrounding terrestrial habitat. In accordance with the Herpetofauna Workers Manual¹⁰, these factors are summarised below:

- Insufficient water depth to enable successful amphibian courtship and breeding from spring (egg laying) through to autumn when the larvae mature and leave the pond;
- A lack of aquatic vegetation or other suitable medium that could be used for egg laying;
- Obvious signs of poor water quality, such as receiving discharge of pollutants at excessive levels or containing anoxic waters, or limited diversity of invertebrate fauna;
- Flowing water, small water bodies linked to fast flowing streams, or the presence of an extreme management regime;
- A lack of signs of other amphibians e.g., tadpoles;
- Poor quality of surrounding terrestrial habitat for GCN such as habitat with poor structure for foraging and a lack of suitable refugia for shelter (i.e., stable, cool, damp, and shaded areas that may be used by GCNs, particularly during the winter months);
- Significant barriers to movement between the pond and areas of suitable terrestrial habitat on a site such as flowing water or major roads, or a lack of suitable connecting features such as mature hedgerows, ditches or woodland between the pond and a site;
- Evidence of fish being present (which reduces the likelihood of newt presence and may limit population size); and
- Evidence of excessive waterfowl activity (such as where the number of waterfowl present exceeds 10 per 1000m²) and associated negative impacts on habitat quality.

2.3.5 It should be noted that the criteria above are for guidance only and each waterbody has been considered independently. The criteria listed above may not exclude a waterbody, as a range of factors must be considered. Occasionally a waterbody may still be included, if for example the local area is a stronghold for GCNs.

¹⁰ Gent, A.H., & Gibson, S.D., 2003. Herpetofauna workers' manual. Peterborough, Joint Nature Conservation Committee (JNCCC).

2.4 GCN Presence/likely Absence Surveys using Environmental DNA Sampling

- 2.4.1 Ponds with a HSI score of 0.4 or above (poor, below average, average, good or excellent) and ditches assessed as suitable to support GCN were subsequently subject to eDNA survey. Following these criteria, 13 ponds and 4 ditches were subject to eDNA survey in 2022, a further 8 ponds surveyed in 2023 and a further 6 ponds surveyed in 2024.
- 2.4.2 Sample collection was undertaken by TEP. Sample kits and analysis was provided by ADAS. Both organisations followed the relevant sections of the method set out in the DEFRA funded study endorsed by Natural England¹¹. In summary the sampling protocol is as follows:
- 20 samples were taken from around the entire perimeter of the waterbody and combined in a sample bag to provide a single overall sample.
 - Sample locations were distributed as evenly as possible around the pond perimeter, but micro-siting was used to target locations most likely to be used by GCN (such as open water habitat for courtship displays and areas of suitable egg-laying substrate).
 - The surveyor stayed out of the water while taking the samples (extension poles were used in situations where open/sufficiently deep water was at a distance from the dry banks).
 - At each sample location the water column was stirred prior to taking the sample but care was taken to avoid disturbing the sediment on the base of the pond.
 - Once all 20 samples were taken and combined, they were shaken to thoroughly mix any DNA throughout the overall sample. A 15ml aliquot of the total sample was pipetted into each of 6 sampling tubes containing ethanol preservative and shaken to mix the sample and preservative. The main water sample was mixed before taking each 15ml sub-sample to ensure any DNA remained mixed throughout the sample.
 - At all times the surveyor ensured that the risk of contaminating the sampling equipment was minimised by avoiding the placement of the ladle or pipette on the ground or on any otherwise potentially contaminated surfaces and by changing gloves between the initial sampling stage and the pipetting stages of the method.
- 2.4.3 On receipt from ADAS the sampling kits were registered on a central database using the unique bar codes. Immediately prior to survey, sampling kits were issued to surveyors with individual Sample Forms using the unique bar code as identification. The site name and date of issue was also recorded on this form (and on the central database). Once in the field and at the ponds, the surveyor confirmed that the appropriate Sample Form was being completed by checking the bar code on the box and double checking the corresponding bar codes on the

¹¹ Biggs et al 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford

sample tubes. The surveyor then filled in the date of survey and the pond ID number (as well as other information relating to survey conditions) on the Sample Form.

- 2.4.4 On returning to the office, the Sample Forms were signed to confirm who received the samples and checked them into the fridge, and the temperature of the fridge was recorded. The unique pond ID recorded on each Sample Form was checked against a site map confirming which ponds had been sampled and the map was stored with the Sample Forms. The sample metadata was also recorded on the central database. The sample preserving tubes were stored in a fridge with a stable temperature of between 2°C and 4°C until the morning of collection by the courier to transport the samples for laboratory analysis by ADAS. Courier collections were arranged weekly at TEP, with no sample remaining in refrigerated storage for longer than 7 days. The Sample Forms and the central database were updated to confirm the date of collection by the courier.
- 2.4.5 The unique bar codes were used by ADAS to report results. All analysis results returned by ADAS were recorded in the central database by one TEP member of staff and cross-checked by a second member of staff before issuing to the project leader for review.

2.5 GCN Population Size-class Assessment Surveys

- 2.5.1 Waterbodies where eDNA survey confirmed presence of GCN (see **Section 3.4**) were subject to further surveys using traditional survey methods to inform a population size-class assessment in accordance with the Natural England GCN mitigation guidelines¹². Surveys were undertaken at three waterbodies (ponds P005 and P021 and ditch D011) during 2023.
- 2.5.2 Population size-class assessment surveys comprise six survey visits to each pond, spread across the recommended survey period of mid-March to mid-June, with at least three of these visits required during the optimal survey period between mid-April and mid-May.
- 2.5.3 In line with current guidance for conventional pond surveys (English Nature⁴ and Froglife¹³), a combination of at least three survey techniques were used to record GCN within a pond. Nocturnal torch surveys, bottle trapping and daytime or nocturnal egg searches were the three survey techniques used as described in the following sections.
- 2.5.4 Suitably experienced surveyors worked in pairs for health and safety purposes with at least one GCN licensed surveyor in each team. Surveys were undertaken between mid-April and mid-June and specific survey dates for each pond are provided in **Annex 5F 3, Table 5F 3.1**.

¹² English Nature (2001). Great crested newt mitigation guidelines. English Nature (now Natural England), Peterborough.

¹³ Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth

- 2.5.5 To ensure effective detection rates, torch and bottle trap surveys were undertaken when night-time air temperatures were $>5^{\circ}\text{C}$ and when rain and wind conditions did not affect visibility below water level.
- 2.5.6 The Great Crested Newt Mitigation Guidelines¹² provide a framework to rank amphibian populations into three population size classes. This applies the maximum counts per pond per night gained through a single visual night-time survey method (namely, torch survey or bottle-trapping). Where ponds are close ($<250\text{m}$ of each other with no barriers), counts can be summed across these ponds on the same survey visit to provide a meta-population size class. Applying this framework, GCN populations are classed as:
- “Small” for maximum counts up to 10;
 - “Medium” for maximum counts between 11 and 100;
 - “Large” for maximum counts over 100.

Torch survey

- 2.5.7 Ponds were surveyed by walking the perimeter. Torch surveys were conducted after dusk with a high-powered torch (one million candle power). The number, species and (where possible) sex and age class of amphibians seen were recorded. It is not always possible to achieve 100% coverage along pond margins using the torch surveys because of access difficulties, for example dense vegetation or boggy banks (see **Section 2.6 Constraints**).

Bottle trapping

- 2.5.8 Bottle traps used were funnel traps made from 2 litre plastic bottles. The bottle traps were secured in the pond margins using a flagged cane. Bottle traps were positioned so that the trap entrance was close to the pond bottom and the trap was at an angle to retain an air reservoir.
- 2.5.9 Bottle traps were set at an average spacing of 2m along accessible shorelines (to allow estimation of population size) where microhabitats were considered by the surveyor to be most suitable for newts (e.g., with suitable vegetation for egg laying or bare areas suitable for displaying males). Where significant lengths of shoreline were inaccessible, or if the pond was exceptionally large, bottle trapping was used in the accessible areas (see **Section 2.6 Constraints**), using 2m spacing as a means of standardising survey effort.
- 2.5.10 Traps were set in the evening and operated overnight, emptying the traps early the following morning. Newts are particularly at risk on warm sunny days in shallow water traps; bottle traps are not used if air temperatures are below 5°C , with the licensed surveyor making an informed decision based on shallowness of the pond, shading and temperatures on warm evenings. It was not necessary to abandon the use of bottle traps on any survey visit.

Egg search

- 2.5.11 Newts predominantly lay their eggs on the leaves of submerged (live or dead) vegetation, folding the leaves over the egg to form a protective 'purse'. Aquatic vegetation was searched by walking or wading the shoreline of a waterbody and looking for the characteristic shape of folded leaves.
- 2.5.12 The presence of eggs confirms the waterbody as a breeding site. However, it is impossible to obtain any reliable population estimate on the basis of a newt egg count. Unwrapping eggs (to identify the species) increases larval failure rates; therefore, egg searching in any waterbody was ceased as soon as a GCN egg was found.

2.6 Constraints

Waterbody scoping assessment

- 2.6.1 Health and safety concerns prevented HSI assessment or subsequent surveys of pond P018.
- 2.6.2 **Table 5F 2.1** lists all ponds and ditches that could not be assessed and the reasons for this, or which were found to be dry at the time of survey.

Table 5F 2.1 Waterbody scoping assessment constraints

Waterbody number	Waterbody type	Constraints to scoping assessment
P002	Pond	Dry pond
P008	Pond	Dry pond
P010	Pond	Dry pond
P011	Pond	Dry pond
P018	Pond	No access due to health & safety considerations
P026	Pond	Dry pond
D001	Ditch	Dry ditch
D002	Ditch	Dry ditch
D003	Ditch	Dry ditch
D004	Ditch	Dry ditch
D005	Ditch	Dry ditch
D006	Ditch	Dry ditch

Waterbody number	Waterbody type	Constraints to scoping assessment
D007	Ditch	Fast flowing ditch
D009	Ditch	Dry ditch
D010	Ditch	Dry ditch
D013	Ditch	Dry ditch
D014	Ditch	Dry ditch
D015	Ditch	Dry ditch
D016	Ditch	Dry ditch
D017	Ditch	Dry ditch
D018	Ditch	Fast flowing ditch
D020	Ditch	Dry ditch
D021	Ditch	Dry ditch
D022	Ditch	Dry ditch
D024	Ditch	Dry ditch
D025	Ditch	Dry ditch

GCN presence/likely absence surveys using eDNA sampling

- 2.6.3 Due to delays in obtaining access, one pond (P014) was subject to eDNA sampling on 1st July 2022, just outside of the survey period stipulated by Natural England of 15th April to 30th June. As this survey was carried out only one day later than the stated survey period, during a period of consistently suitable weather conditions, it is not considered to be a significant constraint to the survey.

GCN population size-class assessment surveys

- 2.6.4 Pond P005 did not have three survey visits during the peak survey period between mid-April and mid-May due to access issues, but six visits were completed throughout the survey period between April and June.
- 2.6.5 In late May 2024 a positive eDNA sample was recorded for pond P032, 120m north-west of the Preliminary Order Limits. The Preliminary Order Limits situated within 250m of the pond consist of an existing access track where no upgrade works are proposed. All other main works are situated more than 250m from the pond. As no terrestrial habitat for GCN will be impacted within 250m of the P032, further population size class assessments were not considered to be necessary, given that the size of the population will not change the mitigation proposals.

2.6.6 **Table 5F 2.2** lists all ponds and ditches subject to population size-class assessment surveys and details the constraints encountered at each waterbody on each survey visit.

Table 5F 2.2 Population estimate survey constraints

Waterbody	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6
P005	75% of shoreline bottle trapped, dense vegetation on remaining 25% of shoreline limited bottle trapping and torch survey	Dense bulrush reducing visibility for torch survey on 25% of the shoreline.	Dense vegetation limiting torch survey on 25% of the shoreline.	Dense vegetation limiting torch survey on 25% of the shoreline.	Dense vegetation limiting torch survey on 25% of the shoreline.	Dense vegetation limiting torch survey on 25% of the shoreline.
P021	25% of shoreline bottle trapped, too shallow in other areas	40% of shoreline torch survey, 25% bottle trapped, dense vegetation	80% of shoreline bottle trapped, water level dropped meaning insufficient depth for bottle traps in places	60% of shoreline bottle trapped, water level dropped meaning insufficient depth for bottle traps in places	80% of shoreline bottle trapped, water level dropped meaning insufficient depth for bottle traps in places	Dense vegetation affecting accessibility for torch survey, 90% shoreline surveyed.
D011	60% of shoreline bottle trapped, too shallow in other areas	60% bottle trapped, dense vegetation in other areas	75% of shoreline bottle trapped, shallow in other areas. Turbidity affected torching	30% of shoreline bottle trapped, water level dropped. Some turbid areas for torch survey.	Not bottle trapped, too shallow	Only 20% torch surveyed, water level down and dense vegetation on banks hindering access. Too shallow to bottle trap

- 2.6.7 The water level in P021 fluctuated significantly in line with rainfall prior to survey, which accounts for the variation in the percentage shoreline bottle trapped on each survey visit.

2.7 Personnel

- 2.7.1 The programme of surveys was led by an experienced TEP GCN ecologist (GCN survey WML-CL08 class licence holder, licence registration number 2015-16438-CLS-CLS), with over 10 years' experience working in ecological consultancy. The GCN lead ecologist was supported by additional licenced, experienced, ecologists (WML-CL08 licence registration numbers 2015-16877-CLS-CLS, 2020-45934-CLS-CLS, 2015-18449-CLS-CLS and 2015-18144-CLS-CLS).

3. Results

3.1 Desk Study

Waterbodies

- 3.1.1 The desk study identified a total of 57 waterbodies (33 ponds and 24 ditches) within the survey area.

3.2 Waterbody Scoping Assessment

- 3.2.1 Across the 2022, 2023 and 2024 survey periods 32 ponds (P018 not surveyed due to health and safety reasons; see **Section 2.6 Constraints**) and 24 ditches were subject to waterbody scoping assessments, including HSI for ponds where relevant. The waterbody scoping assessment results are shown on figure G9473.02.002D in **Annex 5F 4** and described in the following sections for ponds and ditches respectively.

Ponds

- 3.2.2 HSI scores for the 32 ponds which were accessible during the 2022, 2023 or 2024 surveys are shown in **Table 5F 3.1 Waterbody scoping assessment summary** and summarised below (detailed HSI assessment results are shown in **Annex 5F 1**). All ponds assessed as having 'poor' suitability or above were scoped in for GCN presence/likely absence surveys (see **Section 3.4**). The ponds within the 250m buffer of the Preliminary Order Limits ranged from having Poor to Excellent suitability for breeding GCN:

- 2 ponds (P030 and P032) have Excellent suitability;
- 5 ponds (P001, P020, P023 and P031 and P033) have Good suitability;
- 9 ponds (P004, P006, P009, P012, P013, P014, P019, P022 and P028) have Average suitability;
- 6 ponds (P003, P005, P015, P016, P017 and P021) have Below Average suitability;
- 5 ponds (P007, P024, P025, P027 and P029) have Poor suitability for breeding GCN; and
- 5 ponds (P002, P008, P010, P011 and P026) were dry, with no HSI score attributed to them.

Table 5F 3.1 Waterbody scoping assessment summary

Waterbody	Grid Reference of closest point	Distance and direction from Preliminary Order Limits (POL)	Year of Survey	HSI Score	HSI Category	Scoped in for presence/likely absence Survey (Y/N)
P001	SJ 51543 94333	~15m W	2022	0.74	Good	Y
P002	SJ 51380 94137	~120m S	2023	N/A - Dry	N/A - Dry	N
P003	SJ 50835 92588	~225m E	2022	0.54	Below Average	Y
P004	SJ 50805 92565	~230m E	2023	0.68	Average	Y
P005	SJ 50777 92586	~185m E	2022	0.56	Below Average	Y
P006	SJ 50746 92559	~185m E	2023	0.68	Average	Y
P007	SJ 49674 91970	~130m W	2023	0.48	Poor	Y
P008	SJ 50218 91516	Adjacent to POL	2023	N/A - Dry	N/A - Dry	N
P009	SJ 50157 91436	Within POL	2022	0.68	Average	Y
P010	SJ 50523 90920	Adjacent to POL	2023	0.26	N/A - Dry	N
P011	SJ 50581 90853	Adjacent to POL	2023	0.28	N/A - Dry	N
P012	SJ 50363 90684	~190m W	2022	0.65	Average	Y
P013	SJ 50860 91103	Adjacent to POL	2023	0.65	Average	Y
P014	SJ 51014 91095	~60m E	2022	0.64	Average	Y
P015	SJ 50473 90566	~190m W	2022	0.57	Below Average	Y
P016	SJ 50592 90346	~60m W	2022	0.54	Below Average	Y
P017	SJ 50762 90651	Within POL	2023	0.53	Below Average	Y

Waterbody	Grid Reference of closest point	Distance and direction from Preliminary Order Limits (POL)	Year of Survey	HSI Score	HSI Category	Scoped in for presence/likely absence Survey (Y/N)
P019	SJ 51013 90437	~20m N	2023	0.68	Average	Y
P020	SJ 51083 90411	~110m NE	2023	0.71	Good	Y
P021	SJ 51367 90387	~225m NE	2023	0.60	Below Average	Y
P022	SJ 50909 89867	~105m SW	2022	0.64	Average	Y
P023	SJ 51767 90178	~240m E	2022	0.71	Good	Y
P024	SJ 51854 90010	~175m NE	2022	0.48	Poor	Y
P025	SJ 51858 89981	~135m NE	2022	0.43	Poor	Y
P026	SJ 53210 88911	~125m N	2023	N/A - Dry	N/A - Dry	N
P027	SJ 53740 88846	~175m N	2022	0.48	Poor	Y
P028	SJ 51540 94221	~5m NE	2024	0.69	Average	Y
P029	SJ 51446 94118	~5m SW	2024	0.48	Poor	Y
P030	SJ 50226 92156	~180m NE	2024	0.86	Excellent	Y
P031	SJ5021891845	~130m E	2024	0.71	Good	Y
P032	SJ 50389 91674	~120m NW	2024	0.84	Excellent	Y
P033	SJ 53612 88939	~230m N	2024	0.78	Good	Y

Ditches

3.2.3 Ditch suitability assessment for all 24 ditches surveyed during 2022 or 2023 are shown in **Table 5F 3.2 Linear waterbody scoping assessment summary** and summarised below (detailed assessment results are shown in **Annex 5F 2**). Several ditches which were dry during 2022 were subsequently assessed during 2023. All ditches assessed as 'suitable' were scoped in for GCN presence/likely absence surveys (see **Section 3.4**).

- 4 ditches (D008, D011, D012 and D023) have suitability for breeding GCN; and

- 20 ditches (D001, D002, D003, D004, D005, D006, D007, D009, D010, D013, D014, D015, D016, D017, D018, D020, D021, D022, D024 and D025) were unsuitable.

3.2.4 The majority of ditches throughout the survey area were not suitable to support GCN. In the majority of cases ditches were heavily shaded, with a lack of suitable aquatic vegetation for egg laying. A large number of ditches were dry, and although it is possible the water levels in the ditches fluctuate, regular repeated drying out, combined with a lack of egg laying material, provides suboptimal habitat for GCN breeding.

Table 5F 3.2 Linear waterbody scoping assessment summary

Linear Waterbody	Grid Reference of closest point	Distance and direction from Preliminary Order Limits	Year of Survey	Ditch Suitability to support GCN	Scoped in for GCN Survey (Y/N)
D001	SJ 51278 94217	~110m SW	2022	Unsuitable	N
D002	SJ 50784 93624	~200m W	2022	Unsuitable	N
D003	SJ 50913 93648	~100m W	2022	Unsuitable	N
D004	SJ 51218 93511	~210m E	2022	Unsuitable	N
D005	SJ 50147 92563	~100m S	2023	Unsuitable	N
D006	SJ 49651 92001	~170m W	2022	Unsuitable	N
D007	SJ 50264 91297	~15m N	2022	Unsuitable	N
D008	SJ 50442 91225	~20m E	2022	Suitable	Y
D009	SJ 50682 91308	~120m NW	2022	Unsuitable	N
D010	SJ 50885 91163	Adjacent to RLB	2023	Unsuitable	N
D011	SJ 50969 90930	Within RLB	2022	Suitable	Y

Linear Waterbody	Grid Reference of closest point	Distance and direction from Preliminary Order Limits	Year of Survey	Ditch Suitability to support GCN	Scoped in for GCN Survey (Y/N)
D012	SJ 50525 90547	~135m W	2022	Suitable	Y
D013	SJ 51072 90694	~125m E	2022	Unsuitable	N
D014	SJ 50694 90312	Within RLB	2023	Unsuitable	N
D015	SJ 50696 90301	Within RLB	2023	Unsuitable	N
D016	SJ 51192 90376	~130m NE	2022	Unsuitable	N
D017	SJ 51421 90377	~150m E	2022	Unsuitable	N
D018	SJ 51294 90173	~20m N	2022	Unsuitable	N
D020	SJ 50747 90130	~25m W	2023	Unsuitable	N
D021	SJ 50806 90096	~225m SW	2023	Unsuitable	N
D022	SJ 51692 90410	~85m E	2023	Unsuitable	N
D023	SJ 52845 88881	Within RLB	2022	Suitable	Y
D024	SJ 54098 88141	~70m S	2022	Unsuitable	N
D025	SJ 54446 88283	Within RLB	2023	Unsuitable	N

3.3 Terrestrial Habitat Assessment

3.3.1 Terrestrial habitats vary throughout the survey area. To the north, terrestrial habitats are largely urban, passing through commercial and residential areas with little connectivity between ponds and ditches. Further south the landscape becomes more rural, with habitats consisting predominantly of agricultural fields. There is suitable connecting habitat provided by hedgerows and pockets of woodland that are suitable for foraging, commuting, refuging, and hibernating. Additionally, there are barriers to amphibian movement between ponds, including major roads which bisect the Preliminary Order Limits (A570 and M62). Overall, the terrestrial habitat is generally of low quality to GCN, although there are pockets of suitable habitat which could support GCN populations.

3.4 GCN Presence/Likely Absence Surveys using eDNA Sampling

- 3.4.1 Of the 33 ponds identified during the desk study, 27 ponds which were identified as being suitable for GCN (HSI score of 0.4 or above) were subject to eDNA sampling between 23rd June - 1st July 2022, 5th April - 12th June 2023 and on 30th May 2024. The remaining 6 ponds were not subject to eDNA assessment for the following reasons:
- 5 ponds were dry (P002, P008, P010, P011 and P026); and
 - 1 pond was not accessed due to health and safety concerns (P018).
- 3.4.2 Of the 24 ditches identified during the desk study, 4 ditches which were identified as being suitable for GCN were subject to eDNA sampling. The remaining 20 ditches were not subject to eDNA sampling due to being identified as unsuitable to support GCN either through being dry (18 ditches) or fast flowing water (2 ditches).
- 3.4.3 The results of the presence/likely absence eDNA surveys are presented in **Table 5F 3.3** and are shown on figure G9473.02.003C in **Annex 5F 4**.
- 3.4.4 In 2022 positive eDNA samples were recorded for ditch D011 within the Preliminary Order Limits and P005 approximately 185m east of the Preliminary Order Limits; indicating presence of GCN. An indeterminate result was received for pond P020, 110m north of the Preliminary Order Limits. No GCN eDNA was identified in any other ponds or ditches during the 2022 surveys.
- 3.4.5 In 2023 positive eDNA samples were recorded for pond P021, although a later retest of this pond during the same survey season returned a negative eDNA result. P020 was retested in 2023 due to the indeterminate result in 2022 and this returned a negative eDNA result. D011 was also retested in 2023 and returned a negative result.
- 3.4.6 In 2024 a positive eDNA sample was recorded for pond P032, 120m north-west of the Preliminary Order Limits. No GCN eDNA was identified in any other ponds during the 2024 surveys.

Table 5F 3.3 Summary of eDNA survey results

Waterbody	Year of Survey	eDNA positive/negative result
P001	2022	Negative
P003	2022	Negative
P004	2023	Negative
P005	2022	Positive
P006	2023	Negative
P007	2023	Negative
P009	2022	Negative
P012	2022	Negative
P013	2023	Negative
P014	2022	Negative
P015	2022	Negative
P016	2022	Negative
P017	2023	Negative
P019	2023	Negative
P020	2023	Indeterminate in 2022, Negative in 2023 retest
P021	2023	Positive 2023, Negative in 2023 retest
P022	2022	Negative
P023	2022	Negative
P024	2022	Negative
P025	2022	Negative
P027	2022	Negative
P028	2024	Negative
P029	2024	Negative
P030	2024	Negative
P031	2024	Negative
P032	2024	Positive

Waterbody	Year of Survey	eDNA positive/negative result
P033	2024	Negative
D008	2022	Negative
D011	2022	Positive in 2022, Negative in 2023 retest
D012	2022	Negative
D023	2022	Negative

3.5 GCN Population Size-class Assessment Surveys

- 3.5.1 2 ponds and 1 ditch (P005, P021, and D011) within the survey area that returned positive eDNA samples (indicating presence of GCN) were subject to subsequent population size-class assessment surveys during 2023. Detailed results of the pond surveys are presented in **Annex 5F 3**. Survey results are illustrated on the population size-class assessment survey results plan (figure G9473.02.004B in **Annex 5F 4**).
- 3.5.2 P032 recorded a positive eDNA sample in late May 2024, however, based on the distance to the Preliminary Order Limits (120m from existing access track where no upgrade works are proposed and more than 250m from all other main works), and given that no terrestrial habitat for GCN will be impacted within 250m of the P032, further population size class assessments were not considered to be necessary, as the size of the population will not change the mitigation proposals.
- 3.5.3 **Table 5F 3.4** summarises the results of the GCN population size-class assessment surveys.

Table 5F 3.4 Summary of GCN population size-class assessment survey results

Waterbody ID	GCN	GCN eggs	Palmate Newt	Smooth Newt	Common Frog	Common Toad	Fish	Identifying Method
P005	Y	N	Y	Y	Y	N	Y	Torch, Bottle
P021	N	N	N	Y	N	Y	Y	Torch, Bottle
D011	N	N	N	N	N	N	Y	Torch

- 3.5.4 GCN were only recorded in P005 during population size-class assessment surveys. These were recorded on a single visit, on 13th April 2023 when 3 female adult GCN were recorded during torch surveys. The peak count of GCN for P005 is therefore 3, indicating that a “small” GCN population is present within this pond. No evidence of breeding activity such as courtship displays or egg laying was observed on this single survey when GCN were recorded.

- 3.5.5 GCN eggs (and the eggs/spawn of other amphibians) were not recorded in P005, P021 or D011 during the population size-class assessment surveys. As such, there was no evidence of breeding by GCN (or other amphibians) recorded in any waterbody surveyed.

3.6 GCN eDNA Retesting

- 3.6.1 As pond P021 and ditch D011 returned positive eDNA results but no evidence of GCN presence was recorded during the subsequent population size-class assessment surveys, these two waterbodies were subject to a repeat eDNA sampling on 24th May 2023 and 6th June 2023 respectively.
- 3.6.2 Both P021 and D011 returned a negative result for GCN eDNA during the 2023 retest (see **Table 5F 3.3**); indicating absence of GCN, which concurs with the results of the population size-class surveys.

4. Summary

4.1 Overview

- 4.1.1 The survey area includes 33 ponds and 24 ditches (within 250m of the Preliminary Order Limits).
- 4.1.2 Of the 32 ponds and 24 ditches subjected to waterbody scoping assessments, 27 ponds (achieving HSI scores of 0.4 or above, ranging from Poor to Excellent suitability) and 4 ditches were identified as being suitable for GCN breeding. These were carried forward to presence/likely absence surveys.
- 4.1.3 At the time of survey 5 ponds and 18 ditches were found to be dry and unsuitable for breeding GCN, 2 ditches were found to be too fast flowing to support breeding GCN and 1 pond could not be surveyed due to health and safety issues and 6 ponds could not be accessed (see **Section 2.6 Constraints**).
- 4.1.4 GCN presence was identified in 2 ponds (P005, P021) and 1 ditch (D011) by positive eDNA sample results during 2022 and in 1 pond (P032) by positive eDNA sample results during 2024. Waterbodies P005, P021 and D011 were subject to population size-class surveys during 2023. A single survey peak count of 3 GCN was recorded in pond P005, equating to a “small” population size-class estimate, but no evidence of breeding GCN was recorded (e.g. courtship displays, ovipositing, eggs, or larvae). No GCN were recorded in pond P021 or ditch D011 during the population size-class assessment surveys. This pond and ditch were subsequently retested for GCN presence/likely absence using eDNA in 2023 and both returned negative results, indicating absence of GCN which concurs with the results of the population size-class assessment surveys.
- 4.1.5 Pond P005 did not have three survey visits during the peak season between mid-April and mid-May due to access issues. While there is the possibility that this could mean the GCN population within P005 is under recorded, no evidence of GCN breeding was recorded, the aquatic habitat was assessed as below average suitability for GCN, and the surrounding terrestrial habitats are largely unsuitable for GCN. The pond is isolated, surrounded by yards and access roads to within 5m of the banks of the pond. Additionally, GCN were found to be absent in all ponds within 250m of pond P005 and there are no ditches within 250m of it. The GCN population size-class assessment for pond P005 is small and is considered to be an isolated population.
- 4.1.6 No GCNs were identified during the population size-class assessment surveys in either pond P021 or ditch D011, and although both waterbodies originally returned positive eDNA results, they both returned negative eDNA results when they were subsequently retested after the population size-class assessment surveys in 2023. It is considered that the earlier GCN positive eDNA results were likely false positives, given the lack of GCN recorded during the population size-class assessment surveys and the negative result from the repeat eDNA samples. Further to this pond P021 was assessed as having below average suitability for GCN and has poor water quality, and there are no additional GCN records within a 250m radius of either of these waterbodies.

- 4.1.7 P032 recorded a positive eDNA sample in late May 2024, however, based on the distance to the Preliminary Order Limits (120m from existing access track where no upgrade works are proposed and more than 250m from all other main works), and given that no terrestrial habitat for GCN will be impacted within 250m of the P032, further population size class assessments were not considered to be necessary, as the size of the population will not change the mitigation proposals.
- 4.1.8 Pond P018 could not be accessed for health and safety reasons. Within 250m of P018 there are 3 ponds and 1 ditch, all with connectivity to P018 along hedgerows and ditches. These are P017, P019, P020 and D013. All 3 ponds were subject to eDNA presence/likely absence surveys in 2023 and results indicated the likely absence of GCN from these ponds. D013 was deemed unsuitable for GCN, this was recorded as a completely dry ditch, overgrown with dense vegetation, with no aquatic vegetation present. There are no additional GCN records within a 250m radius of any of these waterbodies. Taking into account the connectivity of pond P018 to the surrounding waterbodies, and the absence of GCN from waterbodies within 250m of it, as well as lack of historical records of GCN within 250m radius, it is considered unlikely that P018 would support a population of GCN.
- 4.1.9 Terrestrial habitats within the survey area are mostly of low quality to GCN (agricultural land and developed areas), although there are pockets of suitable habitat (woodland and connecting hedgerows) which could support GCN populations.

Annex 5F 1

Pond Descriptions and Habitat Suitability Index Assessment

Table 5F 1.1 **Pond Descriptions and Photographs**

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P001 Large pond between A570 and retail park. Steep banks and surrounded by dense vegetation.	0.74 – Good	
P002 (2022 photograph) Small pond located within Ravenhead Nature Park, surrounded by dense vegetation.	N/A - dry	
P003 One of four small ponds (P003, P004, P005 and P006) located within amenity areas of a business park. Densely vegetated and holding water.	0.54 – Below Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P004 One of four small ponds (P003, P004, P005 and P006) located within amenity areas of a business park. Densely vegetated.	0.68 - Average	
P005 One of four small ponds (P003, P004, P005 and P006) located within amenity areas of a business park. Densely vegetated and holding water.	0.56 – Below Average	
P006 One of four small ponds (P003, P004, P005 and P006) located within amenity areas of a business park. Densely vegetated.	0.68 - Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P007 Pond located within a steep ditch, through a densely vegetated hedgerow. More of a pool associated with the ditch.	0.48 – Poor	
P008 Pond located within other neutral grassland surrounded by scrub. Dry at time of survey.	N/A - dry	
P009 Pond located on a hedgeline between two arable fields. Difficult to access due to dense willow and bramble scrub.	0.68 – Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P010 Pond located within an arable field, surrounded by scrub and trees. Low water levels.	N/A - dry	
P011 Pond located within an arable field, surrounded by scrub and trees. Very little water remaining in pond at time of survey.	N/A - dry	
P012 Pond heavily shaded by woodland adjacent to Chapel Lane. Full of leaf litter and sediment. Very low water level.	0.65 – Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P013 Pond located at the edge of a field withing the treeline.	0.65 - Average	
P014 Pond located within a small woodland copse within an arable field. Heavily shaded and covered in duckweed.	0.65 – Average	
P015 Pond located in a woodland copse within an amenity grassland area. Heavily shaded and full of leaf litter.	0.57 – Below Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P016 Pond located within a woodland belt alongside the A570. Heavily shaded, full of leaf litter and surrounded by dense vegetation.	0.54 – Below Average	
P017 Pond surrounded by trees within a rear garden. Access could not be gained into the garden due to loose dogs at the property.	0.53 – Below Average	
P019 Pond located at edge of an arable field within treeline and scrub.	0.68 - Average	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P020 Pond located on a hedgerow between two arable fields. A wider section of woodland exists at the pond location. Heavily shaded, leaf litter and full duckweed cover.	0.71 – Good	
P021 Pond located on a hedgerow between two arable fields. Shaded by willow to banks and willow island.	0.60 – Below Average	
P022 Medium sized pond in arable wheat field. Very steep banks. Wide fallow field margins in are but good habitat generally limited to area immediately around the pond.	0.64 – Average	
P023 Pond in hay meadow. Possibly previously was stocked with fish due to remnants of wooden posts around pond, though unclear if fish present now. Good habitat around pond and field. 30% cover of	0.71 – Good	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
lilypads and <i>Potamogeton natans</i> .		
P024 Large ornamental duck pond with fountains within managed gardens. Reeded fringes provide some refuge areas. Water turbid.	0.48 – Poor	
P025 Medium sized ornamental duck pond with fountains within managed gardens. Reeded fringes provide some refuge areas. Water turbid.	0.43 – Poor	
P026 Pond at the edge of an arable field. Dry at time of survey	N/A - dry	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P027 Large pond requiring two eDNA kits. Possibly fishing lake. Densely vegetated banks. Large numbers of Canada geese and oystercatcher present.	0.48 – Poor	
P028 Oval shaped pond, surrounded by scrub and amenity grassland. A pair of Canada geese and moorhens were observed. Evidence of fishing.	0.69 – Average	
P029 Large, linear shaped waterbody adjacent to industrial estate. Surrounded by plantation woodland and heavily fished.	0.48 – Poor	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P030 Very large and long pond down a steep slope (possibly an old quarry). There are housing / residential areas to the east, south and south-west. Surrounded by regeneration woodland with reeds covering the perimeter.	0.86 – Excellent	
P031 Pond has a swampy outer edge on its south-western aspect. Open frontage to the north-east and north-west. Willow scrub and exposed mud surround the pond on the south and west edges. A residential area is adjacent to the east, arable fields to the west and railway tracks adjacent to the south.	0.71 – Good	
P032 Circular pond with a dense coverage of reeds around the perimeter. Arable fields to the north, south and west. Dense woodland and tall ruderal adjacent to the east.	0.84 – Excellent	

Pond Description	HSI Score (see detailed assessment in Table 5F 1.2)	Photograph
P033 Large circular pond with two patches of lily gathering at the west and centre of the pond. Surrounded by >1.5m foliage including reeds, cow parsley and some gunnera. Some sapling sycamore trees around the pond with one mature sycamore at the south-west corner.	0.78 – Good	

Table 5F 1.2 Pond HSI Assessment Results

Pond ID	SI1 Location	SI2 Pond Area	SI3 Permanence	SI4 Water Quality	SI5 Shade	SI6 Fowl	SI7 Fish	SI8 Ponds	SI9 Terrestrial Habitat	SI10 Macrophytes	HSI Score/ Habitat Suitability
P001	1	0	0.9	0.67	0.7	1	1	0.71	0.67	0.35	0.74 Good
P002	N/A - Dry Pond										
P003	1	0.1	0.1	0.67	1	1	1	0.92	0.33	0.95	0.54 Below Average
P004	1	0.1	1	0.67	1	1	1	0.92	0.33	1	0.68 Average
P005	1	0.1	0.5	0.67	0.3	1	1	0.92	0.33	1	0.56 Below Average
P006	1	0.1	1	0.67	1	1	1	0.92	0.33	1	0.68 Average
P007	1	0.05	0.5	0.33	0.2	1	1	0.71	0.67	0.75	0.48 Poor
P008	N/A - Dry Pond										
P009	1	1	1	0.67	0.2	0.67	1	0.97	0.67	0.35	0.68 Average
P010	N/A - Dry Pond										

Pond ID	SI1 Location	SI2 Pond Area	SI3 Permanence	SI4 Water Quality	SI5 Shade	SI6 Fowl	SI7 Fish	SI8 Ponds	SI9 Terrestrial Habitat	SI10 Macrophytes	HSI Score/ Habitat Suitability
P011	N/A - Dry Pond										
P012	1	0.8	0.1	0.67	0.8	1	1	0.92	0.67	0.5	0.65 Average
P013	1	0.5	0.5	0.67	0.6	1	1	0.55	0.67	0.35	0.65 Average
P014	1	0.2	1	0.33	0.4	1	1	0.99	0.67	0.8	0.65 Average
P015	1	0.8	0.5	0.33	0.2	1	1	0.71	0.67	0.3	0.57 Below Average
P016	1	0.6	0.5	0.33	0.2	1	1	0.55	0.67	0.3	0.54 Below Average
P017	1	0.2	1	0.33	0.2	1	0.67	0.81	0.67	0.4	0.53 Below Average
P019	1	0.2	0.5	0.67	1	1	1	0.81	0.67	0.6	0.68 Average
P020	1	0.6	1	0.67	0.4	1	1	0.81	0.7	0.35	0.71 Good
P021	1	0.3	0.5	0.67	0.4	1	0.33	0.89	0.67	0.8	0.60 Below Average
P022	1	1	1	0.67	1	1	0.67	0.1	0.67	0.4	0.64

Pond ID	SI1 Location	SI2 Pond Area	SI3 Permanence	SI4 Water Quality	SI5 Shade	SI6 Fowl	SI7 Fish	SI8 Ponds	SI9 Terrestrial Habitat	SI10 Macrophytes	HSI Score/ Habitat Suitability
Average											
P023	1	1	1	0.67	1	1	0.33	0.55	0.67	0.4	0.71 Good
P024	1	0.92	0.9	0.33	1	0.01	0.67	0.55	0.67	1	0.48 Poor
P025	1	0.6	0.9	0.33	1	0.01	0.67	0.55	0.67	0.5	0.43 Poor
P026	N/A – Dry Pond										
P027	1	0	0.9	0.33	1	0.01	0.67	0.95	0.67	1	0.48 Poor
P028	1	0.88	0.9	0.67	1	0.67	0.33	0.65	0.67	0.45	0.69 Average
P029	1	Null ¹⁴	0.9	0.67	1	0.67	0.01	0.65	1	0.55	0.48 Poor
P030	1	Null ¹⁴	0.9	1	1	0.67	0.67	0.89	1	0.7	0.86 Excellent
P031	1	Null ¹⁴	0.5	1	0.2	1	1	0.82	0.67	0.8	0.71 Good

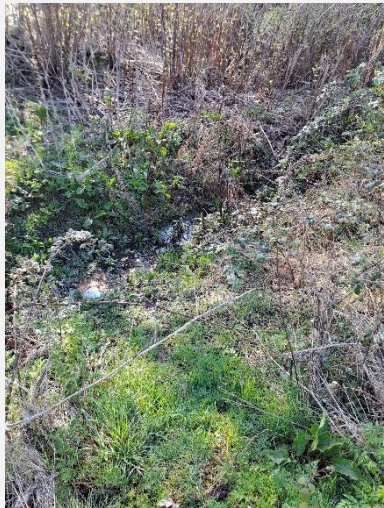
¹⁴ For ponds larger than 2000 m² this factor is omitted from the HSI calculation

Pond ID	SI1 Location	SI2 Pond Area	SI3 Permanence	SI4 Water Quality	SI5 Shade	SI6 Fowl	SI7 Fish	SI8 Ponds	SI9 Terrestrial Habitat	SI10 Macrophytes	HSI Score/ Habitat Suitability
P032	1	1	0.9	1	0.6	1	0.67	0.72	1	0.7	0.84 Excellent
P033	1	0.97	0.9	1	1	0.67	0.33	0.65	1	0.65	0.78 Good

Annex 5F 2

Ditch Suitability Assessment

Ditch Description	Ditch Suitability	Photograph
D001 Dry ditch. Potentially holds some water in winter or very wet years. Bramble and hogweed growing within the channel.	Unsuitable	
D002 Long, mostly dry ditch with some small pooling along section. Looks like it will hold water earlier in the year. Likely to have a flow due to the slope. May have suitability if holding water in other years (dry and unsuitable now).	Unsuitable	
D003 Dry ditch which appears not to have held any water in years. Used as rubbish dump behind property.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D004 Extremely narrow, shallow ditch in golf course. Size of a roof gutter. Sloped land - will not hold water, rather drain it away from course.	Unsuitable	
D005 Small, nearly dry, tree lined ditch running between arable fields.	Unsuitable	
D006 Dry ditch, ephemeral feature. Still full of autumn leaves. 100% shaded.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D007 Fast flowing, tree lined ditch forming the boundary between two arable fields.	Unsuitable	
D008 A large ditch between two arable fields. Surrounded by scrub and trees.	Suitable	
D009 Tree lined ditch forming the boundary between fields. Completely dry and unsuitable.	Unsuitable	
D010 Tree lined ditch surrounded by scrub that forms the boundary between fields. Completely dry.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D011 Wide, deep ditch. No flow and holding water. Deemed to be suitable for GCN.	Suitable	
D012 Heavily shaded ditch. No flow and holding water. Deemed suitable for GCN.	Suitable	
D013 Completely dry ditch, overgrown with dense vegetation.	Unsuitable	
D014 Tree lined ditch at the edge of an arable field running alongside a road.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D015 Ditch within a woodland, surrounded by dense scrub and vegetation.	Unsuitable	
D016 Deep ditch along field margin. Dry but will hold water earlier in the year / in wetter years.	Unsuitable	
D017 Deep ditch in arable/haylage fields. Treeline along one third of length.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D018 Long, deep ditch running through haylage and arable fields. Unshaded other than by tall marginal / in-channel vegetation. Only small section of shallow water but vegetation indicates presence of water throughout for much of the year/wetter years. Culverted at easterly point.	Unsuitable	
D020 Narrow ditch at the edge of a field bordering the woodland.	Unsuitable	
D021 Narrow deep ditch at the edge of an arable field, with dense scrub and bramble.	Unsuitable	

Ditch Description	Ditch Suitability	Photograph
D022 Ditch along the edge of Sutton Manor Woodland.	Unsuitable	No image available due to equipment failure
D023 Narrow ditch forming a boundary between two arable fields. Holding water and no flow so deemed suitable for GCN.	Suitable	
D024 Narrow ditch forming a boundary between two arable fields. Completely dry and overgrown.	Unsuitable	
D025 Narrow, dry, ditch forming a boundary between two arable fields.	Unsuitable	

Annex 5F 3

GCN Population Size-Class Assessment Survey Results

Table 5F 3.1 Torch Survey Results

Waterbody ID	Date	Water (°C)	Rain ¹	T ²	V ³	Shore % ⁴	GCN ⁵	SN/P N ⁵	CT ⁵	CF ⁵	Fish ⁶
P005	13/04/23	8	Dry	0	3	100	3 (F)	0	0	0	N
	24/05/23	11	Dry	1	4	100	0	0	0	0	N
	01/06/23	15	Dry	0	4	100	0	0	0	0	N
	06/06/23	15	Dry	1	4	100	0	0	0	0	N
	08/06/23	13	Dry	1	4	100	0	0	0	0	N
	12/06/23	19	Light	2	4	100	0	0	0	0	Y
D011	05/04/23	11	Dry	5	1	75	0	0	0	0	Y
	13/04/23	8	Dry	4	0	40	0	0	0	0	Y
	20/04/23	12	Dry	2	1	90	0	0	0	0	Y
	15/05/23	11	Dry	3	0	80	0	0	0	0	Y
	24/05/23	10	Dry	0	0	100	0	0	0	0	Y
	01/06/23	13	Dry	4	1	20	0	0	0	0	Y
P021	05/04/23	12	Dry	1	1	100	0	0	0	0	Y

Waterbody ID	Date	Water (°C)	Rain ¹	T ²	V ³	Shore % ⁴	GCN ⁵	SN/P N ⁵	CT ⁵	CF ⁵	Fish ⁶
	15/05/23	11	Dry	1	2	100	0	0	0	0	Y
	24/05/23	10	Dry	3	0	100	0	0	0	0	Y
	06/06/23	15	Dry	3	2	50	0	0	0	0	Y
	08/06/23	12	Dry	3	2	100	0	0	2	0	Y
	12/06/23	19	Heavy	4	0	90	0	1 (F)	0	0	Y

1. Rainfall (dry, light, heavy)

2. T = turbidity score, ranked 0-5 (0 = completely clear; 3 = bottom visible at margins but not further in pond, 5 = very turbid)

3. V = vegetation cover score, ranked 0-5 (0 = no vegetation obscuring survey, 5 = water completely obscured by vegetation)

4. % shoreline accessible for survey

5. Counts of adult great crested newt (GCN), smooth newt (SN), palmate newt (PN), common toad (CT) or common frog (CF) recorded during survey visit

6. Fish noted during survey visit (Y or N)

Table 5F 3.2 Bottle Trapping Survey Results

Waterbody ID	Date	Water (°C)	Rain ¹	T ²	V ³	Shore % ⁴	GCN ⁵	SN/PN ⁵	CT ⁵	CF ⁵	Fish ⁶
P005	13/04/23	8	Dry	0	3	75	0	0	0	0	N
	24/05/23	11	Dry	1	4	100	0	1 (MPN)	0	2	N
	01/06/23	15	Dry	0	4	100	0	5 (2MS N, 3F)	0	0	N
	06/06/23	15	Dry	1	4	100	0	0	0	0	N
	08/06/23	13	Dry	1	4	100	0	0	0	0	N
	12/06/23	19	Light	2	4	100	0	0	0	0	Y

Waterbody ID	Date	Water (°C)	Rain ¹	T ²	V ³	Shore % ⁴	GCN ⁵	SN/PN ⁵	CT ⁵	CF ⁵	Fish ⁶
D011	05/04/23	11	Dry	5	1	75	0	0	0	0	Y
	13/04/23	8	Dry	4	0	25	0	0	0	0	Y
	20/04/23	12	Dry	2	1	60	0	0	0	0	Y
	15/05/23	11	Dry	3	0	30	0	0	0	0	Y
	24/05/23	10	Dry	0	0	N/A - Too Shallow					
	01/06/23	13	Dry	4	1	N/A - Too Shallow					
P021	05/04/23	12	Dry	1	1	75	0	0	0	0	Y
	15/05/23	11	Dry	1	2	80	0	0	0	0	Y
	24/05/23	10	Dry	3	0	60	0	0	0	0	Y
	06/06/23	15	Dry	3	2	50	0	0	0	0	Y
	08/06/23	12	Dry	3	2	50	0	0	0	0	Y
	12/06/23	19	Heavy	4	0	N/A - Too Shallow					

1. Rainfall (dry, light, heavy)

2. T = turbidity score, ranked 0-5 (0 = completely clear; 3 = bottom visible at margins but not further in pond, 5 = very turbid)

3. V = vegetation cover score, ranked 0-5 (0 = no vegetation obscuring survey, 5 = water completely obscured by vegetation)

4. % shoreline accessible for survey

5. Counts of adult great crested newt (GCN), smooth newt (SN), palmate newt (PN), common toad (CT) or common frog (CF) recorded during survey visit

6. Fish noted during survey visit (Y or N)

Table 5F3.3 Torch / Bottle Trap Survey Limitations Review

Waterbody ID	Water Temperatures	Rainfall	Turbidity Score >3 ¹	Vegetation Cover Score >3 ²
P005	No effects	Dry for most surveys, light rainfall on final visit (12/06) did not obscure waters surface for torching	N/A	Vegetation including bulrush, yellow iris and dead leaves obscured much of the pond's surface for all visits
D011	No effects	Dry for all surveys, no effects on surface water	Visibility patchy on all surveys, although some areas were shallow enough to see through to the bottom	N/A
P021	No effects	Dry for most surveys, heavy rainfall may have slightly obscured water's surface on final visit (12/06)	Higher turbidity on later survey (12/06) meant only shallower areas could be fully viewed	N/A

1. Turbidity scores of >3 constraint torch surveys as visibility into the deeper water is obscured.

2. Vegetation scores of >3 constraint torch surveys as visibility is obscured by dense vegetation. Vegetation can also constrain bottle trapping by preventing access to set bottle traps effectively.

Table 5F 3.4 Egg Search Results

Waterbody ID	Date	GCN	Smooth/Palm ate Newt	Common Frog	Common Toad
P005	13/04/23	N	N	N	N
	24/05/23	N	N	N	N
	01/06/23	N	N	N	N
	06/06/23	N	N	N	N
	08/06/23	N	N	N	N
	12/06/23	N	N	N	N
D011	05/04/23	N	N	N	N
	13/04/23	N	N	N	N

Waterbody ID	Date	GCN	Smooth/Palm ate Newt	Common Frog	Common Toad
	20/04/23	N	N	N	N
	15/05/23	N	N	N	N
	24/05/23	N	N	N	N
	01/06/23	N	N	N	N
P021	05/04/23	N	N	N	N
	15/05/23	N	N	N	N
	24/05/23	N	N	N	N
	06/06/23	N	N	N	N
	08/06/23	N	N	N	N
	12/06/23	N	N	N	N

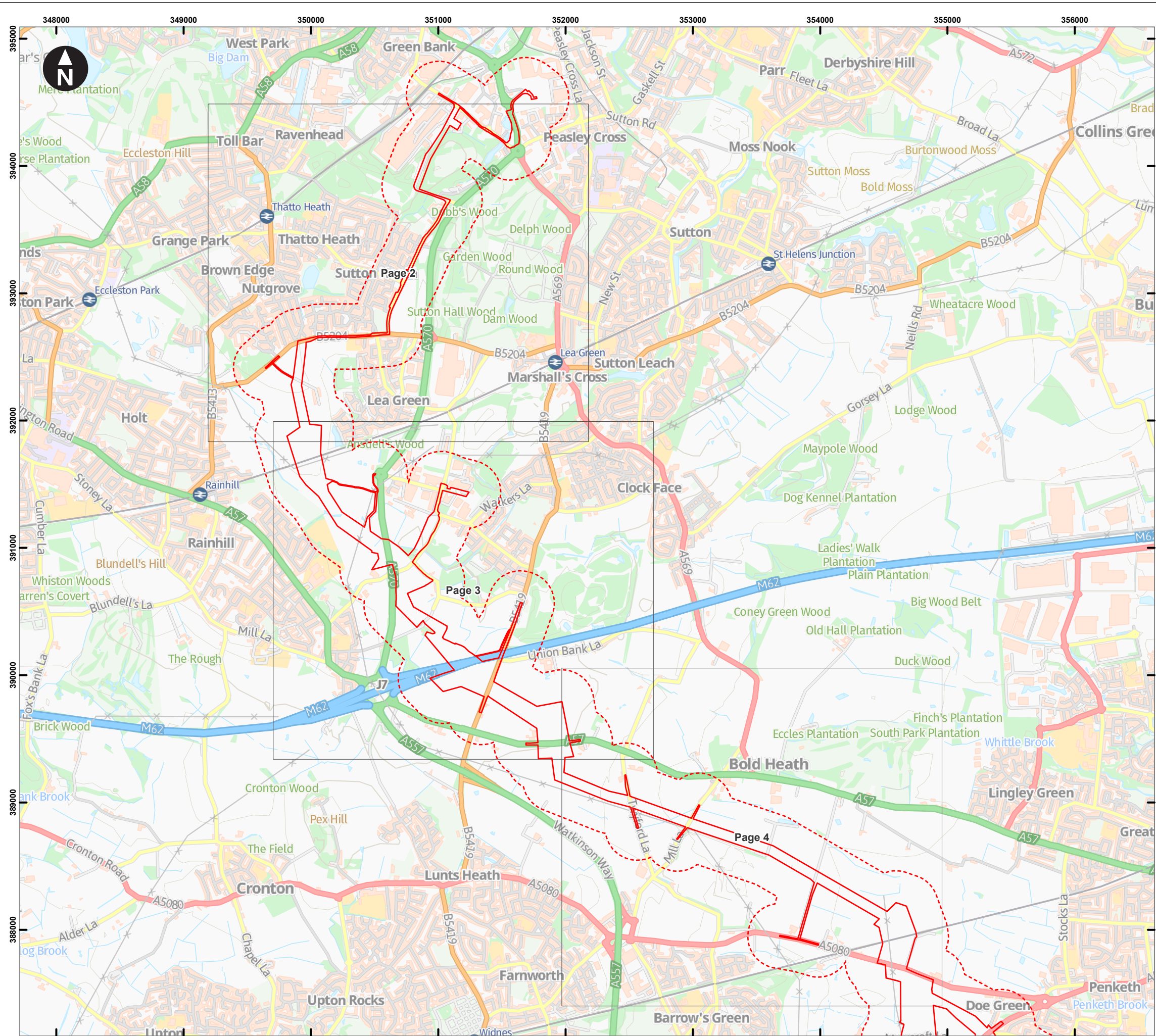
Annex 5F 4 Figures

Figure 5F 4.1 Waterbody Location Plan

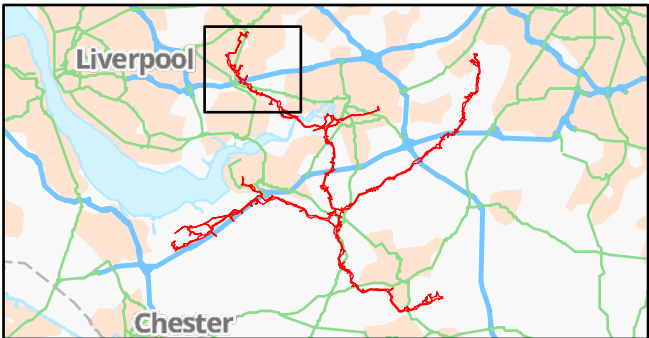
Figure 5F4.2 Waterbody Scoping Assessment

Figure 5F4.3 eDNA Survey Results

Figure 5F4.4 GCN Population Size-Class Assessment Survey Results



- Key
- Preliminary order limits
 - Preliminary order limits - 250m buffer
 - Page and page number



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Figure 5F.1
GCN Waterbody Location Plan
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Key

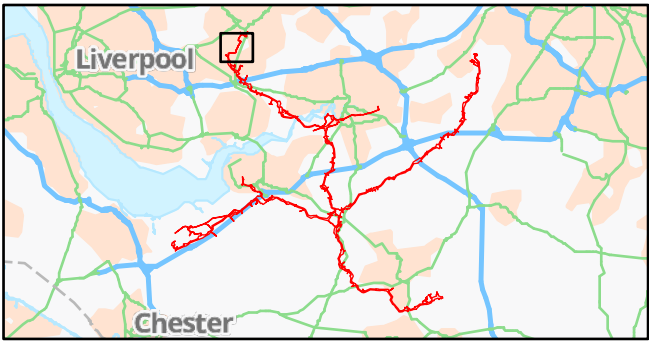
Preliminary order limits

Preliminary order limits - 250m buffer

Waterbody

■ Ditch

● Pond



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Figure 5F.1
GCN Waterbody Location Plan
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Key

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- Preliminary order limits - 250m buffer

Waterbody

- Ditch
- Pond

0 0.5 Km

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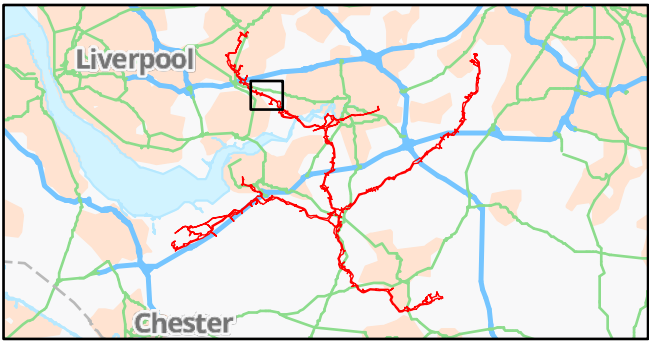
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Figure 5F.1
GCN Waterbody Location Plan
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February 2024



- Key
- Preliminary order limits
 - Preliminary order limits - 250m buffer
- Waterbody
- Ditch
 - Pond



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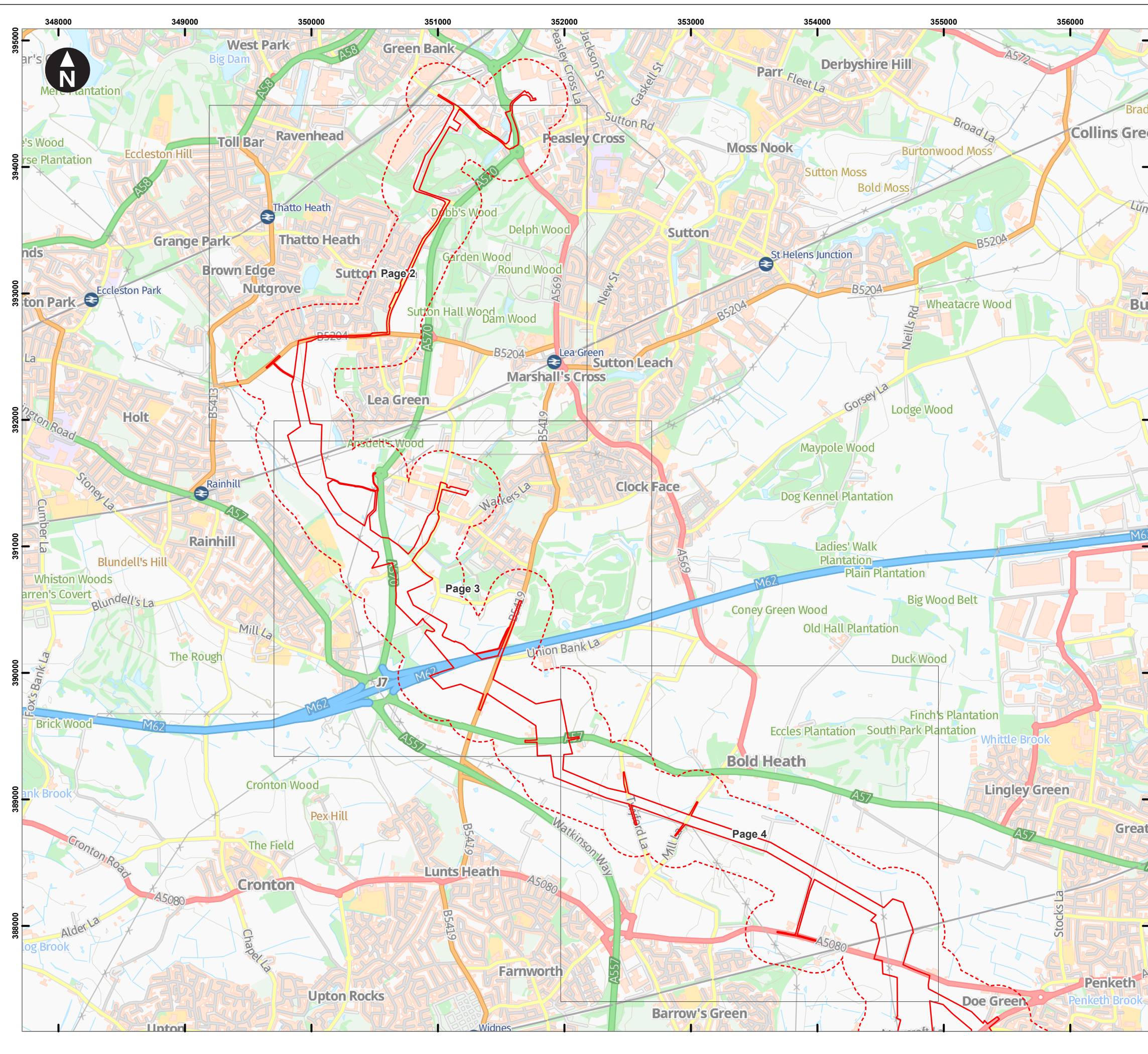
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Figure 5F.1
GCN Waterbody Location Plan
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Figure 5F.2
GCN Waterbody Scoping Assessment
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June 2024

TEP **wsp**



Key

- Preliminary order limits
- Preliminary order limits - 250m buffer

Pond Habitat Suitability Index Score

- Excellent
- Good
- Average
- Below average
- Poor
- N/A - Dry

Ditch Suitability to Support Great Crested Newt

- Ditch unsuitable to support great crested newt

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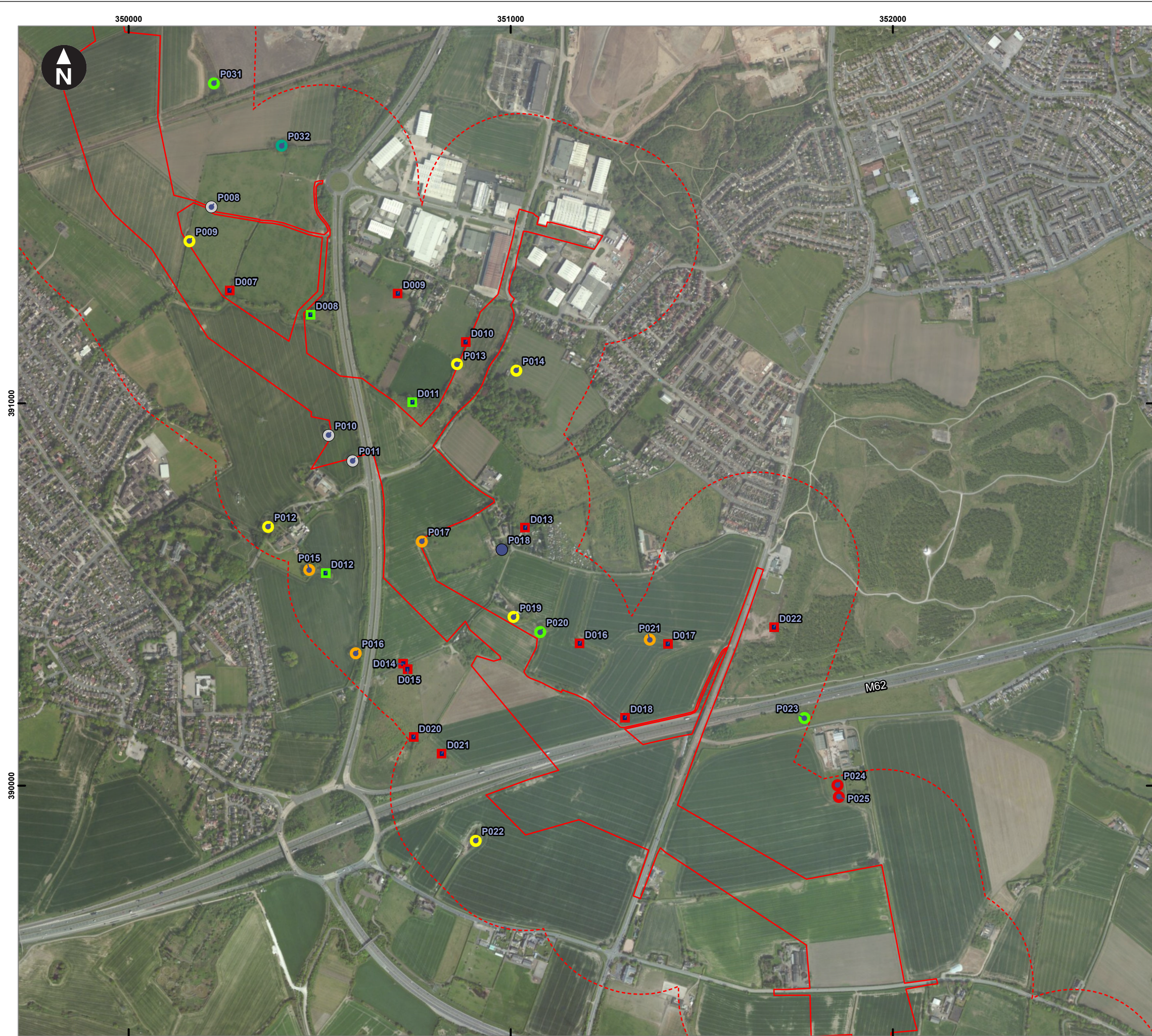
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Figure 5F.2
GCN Waterbody Scoping Assessment
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June 2024

TEP **wsp**



Key

- Preliminary order limits
- Preliminary order limits - 250m buffer

Pond Habitat Suitability Index Score

- Excellent
- Good
- Average
- Below average
- Poor
- N/A - Dry
- Pond not surveyed

Ditch Suitability to Support Great Crested Newt

- Ditch suitable to support great crested newt
- Ditch unsuitable to support great crested newt

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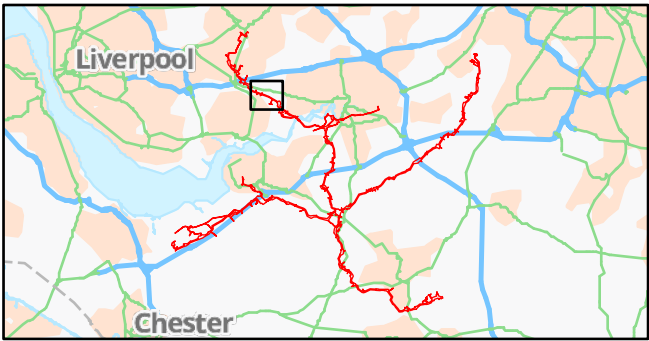
Figure 5F.2
GCN Waterbody Scoping Assessment
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June 2024

TEP **wsp**



- Key
- Preliminary order limits
 - Preliminary order limits - 250m buffer
- Pond Habitat Suitability Index Score**
- Good
 - Poor
 - N/A - Dry
- Ditch Suitability to Support Great Crested Newt**
- Ditch suitable to support great crested newt
 - Ditch unsuitable to support great crested newt



0 0.5 Km

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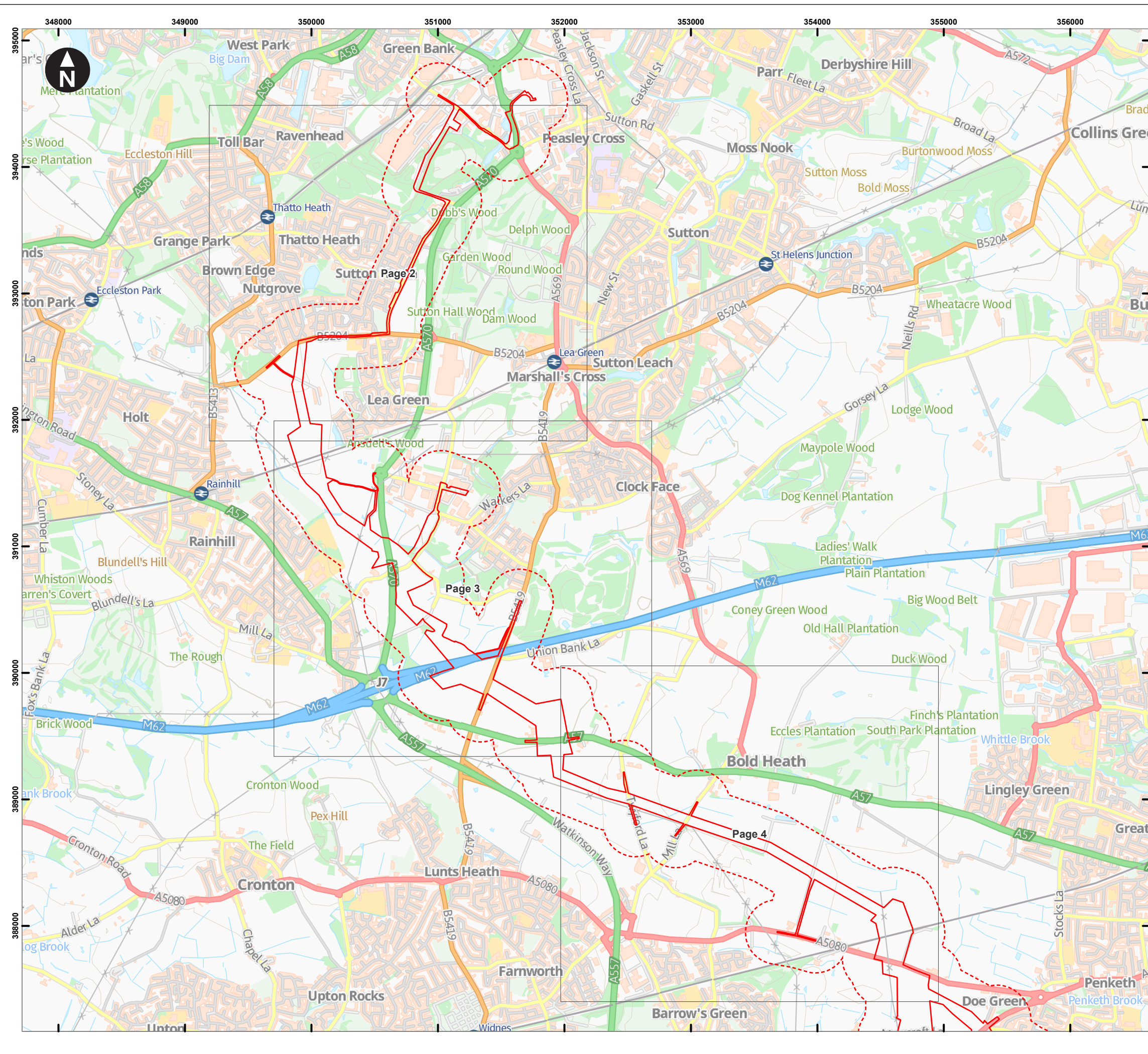
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Figure 5F.2
GCN Waterbody Scoping Assessment
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Figure 5F.3
GCN eDNA Survey Results
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TEP **wsp**



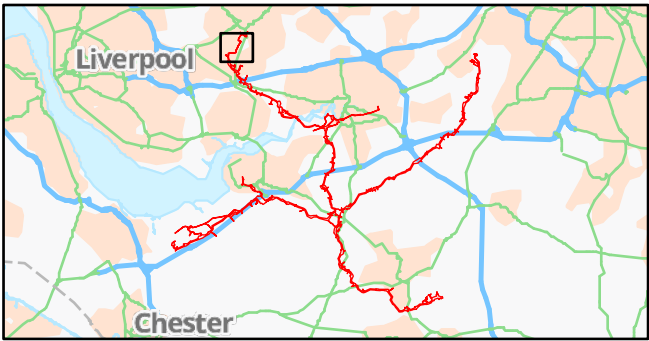
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 - Preliminary order limits - 250m buffer

eDNA Survey Results - Ditches

- Assessed as unsuitable habitat

eDNA Survey Results - Ponds

- Great crested newt absence
- Great crested newt presence
- Assessed as unsuitable habitat



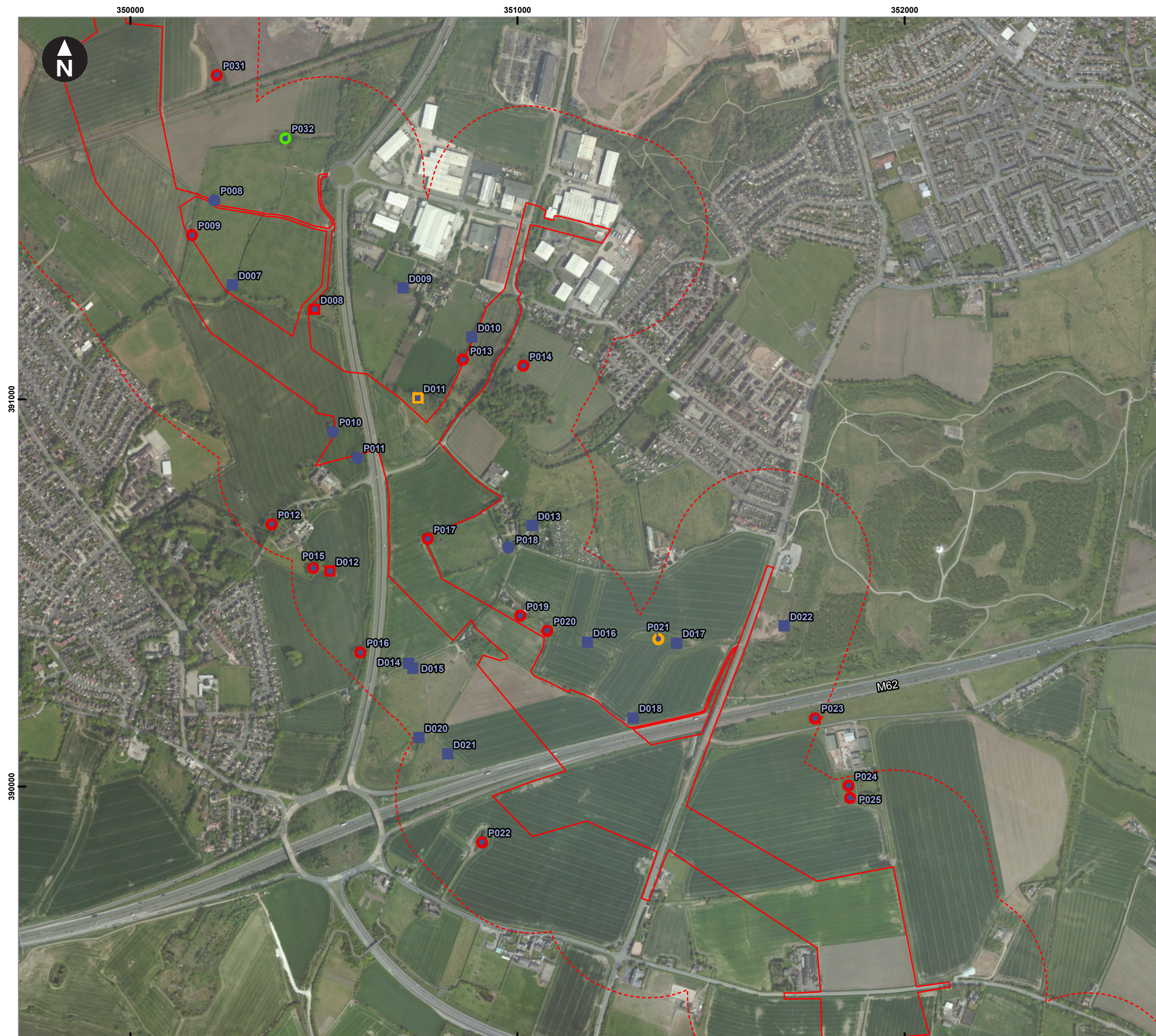
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Figure 5F.3
GCN eDNA Survey Results
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Key

- Preliminary order limits
- Preliminary order limits - 250m buffer

eDNA Survey Results - Ditches

- Great crested newt absence
- Great crested newt presence, retest absent
- Assessed as unsuitable habitat

eDNA Survey Results - Ponds

- Great crested newt absence
- Great crested newt presence
- Great crested newt presence, retest absent
- Assessed as unsuitable habitat

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Figure 5F.3
GCN eDNA Survey Results
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TEP **wsp**



Key

Preliminary order limits

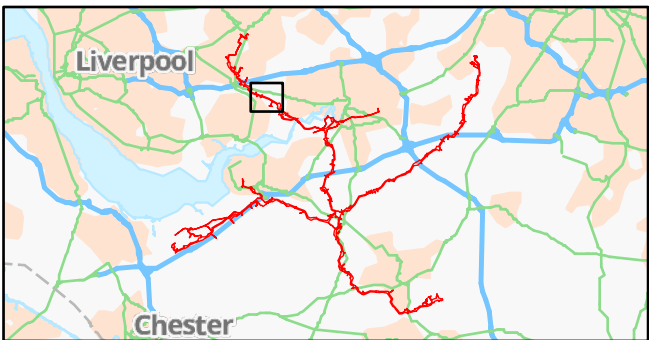
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eDNA Survey Results - Ditches

- Great crested newt absence
- Assessed as unsuitable habitat

eDNA Survey Results - Ponds

- Great crested newt absence
- Assessed as unsuitable habitat



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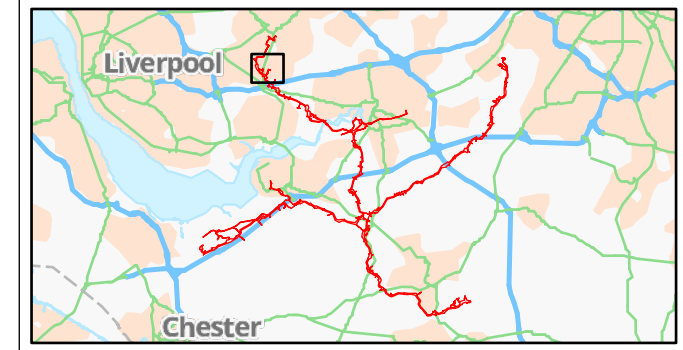
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Figure 5F.3
GCN eDNA Survey Results
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- Key
- Preliminary order limits - 250m buffer
 - Preliminary order limits - 250m buffer
- Size-Class Assessment Results
- Small great crested newt population
 - Great crested newt absent
- P005 250m buffer



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Figure 5F.4
Great Crested Newt Survey 2022/2023
Population Size-Class Assessment Survey Results

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