A38 Derby Junctions

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6.3 Environmental Statement Appendices

Appendix 8.6b: Great Crested Newt Surveys in 2015

Regulation 5(2)(a)

Planning Act 2008

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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A38 Derby Junctions Development Consent Order 202[ ]

6.3 Environmental Statement Appendices
Appendix 8.6b: Great Crested Newt Surveys in 2015

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A38 Derby Junctions

Great Crested Newt Survey Report

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1. INTRODUCTION

1.1 Background and Scope

1.1.1 On July 14, 2014 AECOM was awarded the contract by Highways England to provide design services regarding the development of the A38 Derby Junctions Scheme (referred to herein as the proposed scheme). The proposed scheme concerns three junctions on the A38 in Derby as follows (refer to Figure 1):

- A38/ A5111 Kingsway junction;
- A38/ A52 Markeaton junction; and
- A38/ A61 Little Eaton junction.

1.1.2 These three junctions are spread over an approximate 5.5 km distance along the A38 to the west and north-west of Derby.

1.1.3 AECOM will be preparing an Environmental Assessment Report (EAR) which will assess whether the proposed scheme has the potential to result in significant environmental effects, taking into account impact avoidance measures that are embedded into the proposed scheme design, as well as standard management activities that will be adopted. In order to support the ecological impact assessment to be reported in the EAR, AECOM has undertaken an extended Phase 1 habitat survey along the route of the proposed scheme (in January 2015). Results of the extended Phase 1 habitat survey (AECOM, 2015, report number 47071319-URS-05-RP-EN-003) identified the presence of twenty six (26) water bodies within 500 m of the proposed scheme. Four of these were small sludge lagoons, very close together located within Little Eaton Water Treatment Works and at any one time only two held water but necessarily the same two. All twenty six water bodies were identified as potentially suitable to support great crested newts *(*GCN*, Triturus cristatus*). Presence/ likely absence surveys for GCN, followed by population estimates if GCN presence was confirmed, were recommended at all these 26 ponds within 500 m of the proposed scheme.

1.1.4 The GCN surveys of the 26 water bodies were undertaken between mid-April 2015 and the end of May 2015.

1.1.5 Results of these GCN surveys are documented herein, together with desktop data and recommendations for further survey work and/ or for European Protected Species licence application (where necessary).

1.2 Study Site

1.2.1 The proposed scheme under appraisal (herein the proposed scheme footprint is referred to as the 'Site') encompass the Kingsway and Markeaton junctions, west of the City of Derby (Centroid SK 32801 36103) and the Little Eaton junction north of Derby (Centroid SK 36402 39990). A plan showing the Site boundaries is presented in Figures 2 and 3 in Appendix A. The ecological study area as referred to herein extends up to 500 m beyond the Site boundaries.

1.2.2 The A38 is an existing and busy arterial 'A' road carrying traffic around the west and north of the City of Derby. South of the Kingsway junction, the road enters a cutting and is bordered by semi-improved grassland and scrub covered verges. The central reservation south of Kingsway junction and the junction island in this location support a mosaic of habitat types, including semi-improved neutral grassland and native broadleaved woodland. Bramble Brook flows from the west of the proposed scheme in this location, through culverts located under the north-

bound carriageway and the central reservation before connecting with further culverts located between the junction islands. North of the Kingsway junction there is an area of mixed plantation represented by semi-mature trees on embankment.

1.2.3 The Markeaton junction section of the proposed scheme is bordered to the east by residential properties and to the west by parkland with veteran trees. The outfall from Markeaton Lake and Markeaton Brook flows through culverts beneath the existing A38 at the northern extent of the Markeaton junction section of the proposed scheme.

1.2.4 The western boundary of the proposed scheme at Little Eaton junction borders the road bridge over the River Derwent. The existing A38 is on embankment in this location, with the embankments themselves represented by areas of scrub and immature broadleaved plantation habitats. A variety of grassland habitats exist at the base of the embankments in this location.

1.3 Relevant Legislation

1.3.1 The GCN is listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). This legislation, when taken together, results in a level of protection that prohibits the intentional, deliberate or reckless:

- Killing, injuring, taking or disturbance of GCN;
- Damaging, destroying or obstructing any place used by GCN for the purposes of breeding or sheltering/ protection; and
- Selling and/ or advertising for sale a GCN or any part thereof.

1.3.2 The common toad, along with common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) and palmate newt (*Lissotriton helveticus*) are listed under Section 9(5) of the Wildlife and Countryside Act (as amended), which protects them against sale only.

1.3.3 GCN is listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 as Species of Principal Importance for Conservation in England. Section 40 of the same Act requires that local and regional authorities have regard to the conservation of biodiversity in England, when carrying out their normal functions. Common toads (*Bufo bufo*) are also listed under Section 41 of the NERC Act (2006), but do not receive the same level of legal protection as the aforementioned species. The common toad is also a priority species in England under Biodiversity 2020: A strategy for England's wildlife and ecosystem services.

1.3.4 GCN and common toad are both amphibian species in Derbyshire recognised as Priority species of conservation interest in England under Section 41 of the NERC Act 2006 and Local Biodiversity Action Plan (LBAP) priority species. These have been recorded in the Lowland Derbyshire Biodiversity Action Plan area since 2000 (Lowland Derbyshire Biodiversity Partnership, 2011).

1.3.1 Highways England, through the national Road Investment Strategy (RIS), has set an aspiration that the operation, maintenance, and enhancement of the Strategic Road Network (SRN) should move to a position that delivers no net loss of biodiversity; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works. Highways England published a Biodiversity Plan (HEBP) in 2015 to show how it will work with service providers

to halt overall biodiversity loss, and maintain and enhance habitats and ecological networks. The Government requires Highways England to demonstrate progress against the HEBP, to secure an ongoing annual reduction in the loss of net biodiversity due to its activities. The HEBP provides a general plan to protect and increase biodiversity. The HEBP supersedes the preceding 2002 Highways Agency Biodiversity Action Plan (HABAP), which still however carries some relevance as it lists specific species of conservation concern. Badgers are listed in the 2002 HABAP as priority species. The objectives of this species action plan for GCN is to maintain and enhance great crested newt populations that occur within the soft estate, through protection and appropriate management of suitable habitat, and to prevent or adequately mitigate any adverse impacts of new road schemes on the species and its habitat.

2. METHODOLOGY

2.1 Desk-based Study

2.1.1 A desk-based study was undertaken to identify internationally, nationally and locally designated statutory sites, local designated non-statutory sites and records of protected and/ or notable amphibians up to 2 km of central OS grid locations of the two sections of the proposed scheme. The OS grid references representing the central points of the Kingsway and Markeaton junctions and the Little Eaton junction desk-based study areas are SK 32801 36103 and SK 36402 39990, respectively. Online data resources were reviewed e.g. the Multi-Agency Geographic Information Centre (MAGIC) and Nature on the Map and the National Biodiversity Network (NBN) Gateway. A data search to identify any further notable or protected amphibian records and ponds within 2 km of the central OS grid locations detailed above for the two sections of the proposed scheme, was also requested from the Derbyshire Wildlife Trust (DWT). Furthermore, OS maps and online aerial photographs were used to identify water bodies.

2.1.2 The Highways England Environmental Information System (EnvIS) was also searched for any amphibian records.

2.2 Great Crested Newt Survey

Habitat Suitability Index (HSI)

2.2.1 All 26 water bodies identified within 500 m of the Site are detailed in Figures 4 and 5. Each water body was assessed for its suitability for supporting GCN using the standardised Habitat Suitability Index (HSI) (*Oldham et al*., 2000). The HSI is a mathematical model that incorporates ten suitability indices, all of which are thought to influence the likelihood of the presence of GCN in a water body. The output of an HSI assessment is a score between 0 (unsuitable) and 1 (optimal). The HSI is a tool for assessing the suitability of water bodies for GCN; however, it is not a substitute for surveys. It does provide useful baseline data for the creation of new ponds, or the restoration of existing ponds. The HSI is calculated using the following formula (*Oldham et al*., 2000):

- $HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$, where SI represent Suitability Indices, as detailed below in Table 1:

Table 1: Habitat Suitability Indices

Suitability Index	
SI_1	Location
SI_2	Pond Area
SI_3	Pond Drying
SI_4	Water Quality
SI_5	Shade
SI_6	Fowl
SI_7	Fish
SI_8	Ponds Within 1 km

Suitability Index	
SI_9	Terrestrial Habitat
SI_{10}	Macrophyte Cover

2.2.2 Based on the categorisation of HSI scores, pond suitability for GCN is rated as follows:

- <0.5 = poor;
- 0.5 – 0.59 = below average;
- 0.6 – 0.69 = average;
- 0.7 – 0.79 = good;
- >0.8 = excellent.

Field Techniques

eDNA Sampling

2.2.3 The eDNA sampling technique was used on 15 of the 26 water bodies (Pa1, Pa2, Pa3, Pa4, Pa5, Pa6, Pa7, Pa8, Pa9, Pb2a, Pb3a, Pb4, Pb6, Pb8 and Pb9). Four of the 26 waterbodies were found to be dry, either during or following the HSI survey, therefore eDNA sampling was not undertaken on these four water bodies (Pb2b, Pb3a, Pb5, and Pb7). Four conventional survey methods for determining the presence/absence of GCN were used on seven of the 26 water bodies (Pa10, Pa11, Pa12, Pa13, Pa14, Pa15 and Pb1); these seven ponds were discovered later on in the survey season, therefore conventional survey methods commenced immediately so that population size class estimates could be undertaken if required.

2.2.4 Habitat descriptions were recorded at each of the fifteen waterbodies, which were visited for the purpose of eDNA sampling. A search was made of vegetation for GCN eggs, and if none were found, then a water sample was taken from the pond. Sampling was carried out according to the prescribed protocol using the equipment provided by ADAS, the laboratory undertaking the analysis[1].

2.2.5 This eDNA sampling technique was used to determine the presence/ likely absence of GCN at those waterbodies located with 500 m of the Site and previously identified as being of potential suitability to this species. This novel survey technique was developed through research funded by DEFRA, details of which can be found on the DEFRA website[2].

2.2.6 The results of the DEFRA research identified a 99% GCN detection rate using eDNA compared to 95% for conventional survey techniques. Natural England subsequently announced that they would accept the results of eDNA testing for presence/ likely absence GCN surveys provided they follow the method set out in

[1] ADAS Veterinary Laboratory based on the University of Nottingham Agricultural Campus at Sutton Bonington, Nottinghamshire

[2] http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18650&FromSearch=Y&Publisher=1&SearchText=wc1067&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description

the Freshwater Habitat Trust technical advice note, which is published as an annex to the report (as per the link in the footnote below).

2.2.7 The eDNA sampling test can only be used to determine GCN presence/ likely absence and not to inform GCN population size class estimates. Consequently, when positive GCN presence results are obtained, six surveys are still required to provide an estimate of GCN population size in order to inform an impact assessment or determine/ fulfil mitigation and licensing requirements. These six surveys must be carried out between mid-March to mid-June, with three of the six surveys undertaken within the period mid-April to mid-May.

2.2.8 There are strict protocols for both field sampling of ponds and subsequent laboratory analysis. Water sampling was undertaken by two AECOM ecologists who both have Natural England GCN survey licences and extensive experience in sampling protocols associated with a range of biological analyses. The dates, weather conditions and temperatures at the time of pond sampling are shown in Table 2.

2.2.9 Separate sampling kits were provided by ADAS for each water body. The kits comprised: a sampling ladle, a sealable plastic bag, a pipette, two pairs of latex gloves and six sample bottles each containing absolute ethanol as a fixing agent, sodium acetate and other markers. The protocol for sampling is:

- Put on first pair of gloves;
- Take sampling ladle and plastic bag;
- Using the ladle, take around 20 full (30 ml) ladle samples of water from around the pond edge, first gently agitating the water to stir up the water column, but not too much to avoid disturbing or collecting sediment in the sample;
- Seal the plastic bag and shake to mix the sample;
- Put on new gloves and, taking pipette, put 15 ml into each of the six replicated sample bottles;
- Screw the lid tight and then shake to mix the sample with the ethanol; and
- Once samples had been taken, they were kept in cool boxes until delivered to the laboratory within two days of sampling.

Conventional Survey Methodology

2.2.10 As the eDNA test can only be used to determine presence/ likely absence and not population estimates, conventional GCN surveys were also undertaken to ensure that, if eDNA sampling results were returned as positive, a population estimate survey could still be undertaken in spring 2015 (representing six visits, including three within the period mid-April to mid-May).

2.2.11 Two survey visits were undertaken to 23 identified water bodies. The dates, weather conditions and temperatures at the time of each survey are shown in Table 2. As the ponds of “the Mill Dam Allotment” (Pa10, Pa11, Pa12, Pa13, Pa14 and Pa15) were discovered at a later date, a set of four visits were undertaken on these ponds. All surveys were undertaken by Natural England licensed ecologists from AECOM.

2.2.12 Where possible, and in accordance with published guidance (*English Nature*, 2001; *Gent & Gibson*, 1998), each survey visit utilised a minimum of three

approved survey techniques; namely bottle trapping, egg searching and torching with refuge searching and/ or netting also used where appropriate. A brief description of each technique is described below:

- Bottle trapping involved the placement of traps (constructed from 2 l plastic bottles) around the pond margin at 2 m intervals, where access permitted;
- Vegetation and other submerged materials were inspected for the presence of GCN eggs for a minimum of 15 minutes per pond;
- Surveyors walked the periphery of the pond (where possible) using powerful handheld torches (Clulite – 1M candlelight) to search the water for adult newts and their larvae;
- Refuge searching involved looking underneath rocks, logs, moss, and discarded debris, especially in the vicinity of ponds;
- Netting involved using a sturdy dip-net with a 2 - 4 mm mesh can be a useful survey technique, although in general it is not as likely to reveal the presence of newts as are egg searching, torching or bottle trapping.

Table 2: GCN Survey Conditions

Water body	Survey methodology	Visit number	Date	Weather conditions	Overnight temperature (°C)
Pa5, Pa6, Pa7, Pa8	Conventional survey	1	31/03/2015	Dry Cloud cover: 100% Wind speed (Beaufort): 6-7	5
		2	14/04/2015	Dry Cloud cover: 0% Wind speed (Beaufort): 0	7
		3 (for Pa6)	05/05/2015	Showery Cloud cover: 80% Wind speed (Beaufort): 2	9
		4 (for Pa6)	07/05/2015	Dry Cloud cover: 50% Wind speed (Beaufort): 1	5
	eDNA sampling		15/04/2015	Dry Cloud cover: 0% Wind speed (Beaufort): 0	7
Pb1, Pb2a-Pb2b, Pb3a-Pb3b. Pb4, Pb5, Pb7, Pb8	Conventional survey	1	01/04/2015	Dry Cloud cover: 80% Wind speed (Beaufort): 5	4
		2	15/04/2015	Dry Cloud cover: 0% Wind speed (Beaufort): 0	7
	eDNA sampling		16/04/2015	Dry Cloud cover: 0% Wind speed (Beaufort): 0	7
Pa1, Pa2, Pa3, Pa4, Pa9,	Conventional survey	1	02/04/2015	Dry Cloud cover: 100% Wind speed (Beaufort): 2	4
		2	16/04/2015	Dry Cloud cover: 0%	7

Water body	Survey methodology	Visit number	Date	Weather conditions	Overnight temperature (°C)
Pb6				Wind speed (Beaufort): 0	
	eDNA sampling		17/04/2015	Dry Cloud cover: 0% Wind speed (Beaufort): 0	5
Pa10, Pa11, Pa12, Pa13, Pa14, Pa15	Conventional survey	1	05/05/2015	Showery Cloud cover: 80% Wind speed (Beaufort): 2	9
		2	07/05/2015	Dry Cloud cover: 50% Wind speed (Beaufort): 1	5
		3	12/05/2015	Dry Cloud cover: 30% Wind speed (Beaufort): 1	9
		4	14/05/2015	Dry Cloud cover: 50% Wind speed (Beaufort): 1	6

Limitations

2.2.13 No significant constraints to the validity of the surveys were identified.

2.2.14 On nights when the water bodies were turbid, torchlight surveys could only be undertaken in the margins. On these occasions, other survey techniques such as refuge search or netting were also used to complement the survey.

2.2.15 On April 1 and 2, 2015, the overnight temperature was 4°C, 1°C below the 5°C recommended by Natural England. The air temperature below which torching becomes less reliable has not been established, but 5°C can be taken as a working guide. In days following frozen or very cold conditions, newts can be so inactive in ponds that they go undetected (*Langton et al*., 2001); these surveys were however not undertaken in such conditions. All the ponds surveyed with conventional techniques on April 1 and 2, 2015 were also subsequently surveyed with eDNA sampling.

2.2.16 The water bodies were identified from OS maps, online aerial photographs, pond records from the Derbyshire Wildlife Trust, information from locals and the results of the Phase 1 habitat survey undertaken January 2015. Considering the urban landscape of the proposed scheme, it is possible that there are small ponds located within private gardens but these could not be confirmed. However, it is not considered that this or any of the above limitations represent significant constraints with regard to the validity of the surveys as reported herein.

2.2.17 The survey constraints relative to each water body on different visits, and how these were considered/ addressed, are highlighted in Table 5.

2.2.18 The location of construction compounds and flood attenuation areas is yet to be determined; these areas have not been considered as part of the GCN surveys.

3. RESULTS AND RECOMMENDATIONS

3.1 Desk-based Study

3.1.1 Biological records were provided by Derbyshire Wildlife Trust as part of the desk based investigations (see Figures 2 and 3 in Appendix A).

3.1.2 There are records of GCN from within 2 km of the proposed scheme from within the last ten years: eight records from within 2 km of the Kingsway and Markeaton junctions (six records shown in Figure 2, Appendix A, the two other records are beyond the area shown on the map); and three records from within 2 km of the Little Eaton junction (shown in Figure 3, Appendix A). However, all the records are located further than 1 km from the Site boundary.

3.1.3 No amphibian records were provided from EnvIS.

3.2 HSI Results

3.2.1 Twenty six (26) water bodies were identified within 500 m of the Site boundary through survey and inspection of aerial photographs. These water bodies (shown in Figures 4 and 5, Appendix A) were assessed for their potential to support GCN breeding populations. Therefore, HSI scores were calculated for 26 of these water bodies - full details are presented in Appendix B. Eight of the water bodies have HSI scores of good or above in terms of potential to support breeding GCN populations, with the remaining ponds all having poor, below average or average potential to support breeding GCN populations.

3.3 Water Body/ Pond Descriptions

3.3.1 The water body/ pond descriptions are shown in Table 3.

Table 3: Water Body/ Pond Descriptions and HSI Values

Water body/ Pond no.	Water Body / Pond Description	HSI Value	Plate Reference (Appendix C)
a1	Pa1 is a very large water body with an area of approximately 2,000 m^2. Bulrush (*Typha latifolia*) is present all around the margins. It located to the west of the carriageway at SK 32110 35459. It has been installed to accept run-off from the Girton Way residential development. This pond is located amongst semi-improved grassland with scrub and plantation woodland, providing terrestrial habitat which is also of potential suitability to GCN.	**0.85 Excellent**	Plate 1

Water body/ Pond no.	Water Body / Pond Description	HSI Value	Plate Reference (Appendix C)
a2	Pa2 is a very large (approximately 1,500 m^2) balancing pond south of the Kingsway junction, and to the east of the carriageway. It is understood that this pond was installed to accept run-off from the Derby Royal Hospital overflow car park. The pond is cut in two by a large strip of common reed (*Phragmites australis*). The western bank of the pond is bare and slopes gently towards the water. The eastern side is within scrub and immature trees. The pond is surrounded by semi-improved grassland of potential suitability to GCN.	**0.86 Excellent**	Plate 2
a3	Pa3 is a shallow medium sized pond created in 2013 to receive water from drainage channels dug across the Mackworth allotments. This pond is located within disturbed ground with minimal marginal vegetation. Submerged macrophytes include *Elodea. canadensis* and the surface is dominated by *Lemna spp.* The surrounding habitats consist of scrub and semi-improved grassland of potential suitability to GCN.	**0.73 Good**	(No Plate)
a4	Pa4 is a small, recently dug, wildlife pond within the grounds of Brackensdale Junior School at SK 32870 36498 near the Kingsway junction. This pond is located within amenity grassland and is considered to have limited connectivity with surrounding habitats of potential value to GCN.	**0.64 Average**	Plate 3
a5	Pa5 is a balancing pond for the University of Derby Arts building. The northern bank is steep and maintained with gabions. The southern side slopes gently within amenity grassland towards the water. Two large stands of common reed are located within the water.	**0.86 Excellent**	Plate 4
a6	Pa6 is Mill Dam Canal. It is located north of the Markeaton junction. It is long water body stocked with fish. No aquatic vegetation was recorded. The margins are steep with tall herb ruderal. A line of mature trees runs along the southern side of the pond.	**0.48 Poor**	Plate 5
a7	Pa6 is linked with Pa7 via a culvert. Pa7 is known as Mill Dam pond. It is also stocked with fish.	**0.34 Poor**	(No Plate)

Water body/ Pond no.	Water Body / Pond Description	HSI Value	Plate Reference (Appendix C)
a8	Pa8 is a very large stocked fishing lake with high numbers of waterfowl present. The lake at the time of the survey was devoid of any visible submerged macrophytes. The banks are vertical across much of the shore with small bays that are heavily poached by waterfowl. The surrounding habitats consist of managed improved grassland with limited potential to GCN and discrete area of scrub and woodland with more suitable potential for GCN.	**0.30 Poor**	Plate 6
a9	Pa9 is a new pond located within Bramble Brook and Margins Local Wildlife Site, south of the Kingsway junction, and east of the carriageway. The pond covers an area of approximately 200 m^2. It is located within dense woodland and is entirely shaded. No marginal or aquatic vegetation were recorded. It is set within terrestrial habitat with potential to support GCN.	**0.63 Average**	Plate 7
a10	Pond Pa10 is located within Mill Dam allotment, plot 36. It is very small (approximately 1 m^2), but it is located within good terrestrial habitat. Blanket weed was recorded.	**0.46 Poor**	Plate 8
a11	Pond Pa11 is located within Mill Dam allotment, plot 14. It is lined and covered by a protective mesh. No aquatic or marginal vegetation was recorded. Only 3 cm deep. It is located within good terrestrial habitat, adjacent to a ditch Pa12.	**0.52 Below average**	Plate 9
a12	Pa12 is located within Mill Dam allotment. It is a narrow and shallow ditch running east-west and then north-south. Dense aquatic or marginal vegetation was recorded.	**0.88 Excellent**	Plate 10
a13	Pond Pa13 is located within Mill Dam allotment, plot 47. It is small (approximately 7 m^2) but it is located within good terrestrial habitat.	**0.57 Below average**	Plate 11
a14	Pond Pa14 is located within Mill Dam allotment, plot 101. It is small (approximately 6 m^2) and covered by a safety mesh. It is located within good terrestrial habitat.	**0.55 Below average**	Plate 12
a15	Pond Pa15 is located within Mill Dam allotment, plot 69. It is small (approximately 2 m^2) and lined. Some yellow flag iris (*Iris pseudacorus*) emerging. It is located within good terrestrial habitat.	**0.46 Poor**	Plate 13
b1	A ditch (Pb1) surrounds the eastern and southern edges of the Severn Trent Water ponds (Pb2, Pb3). This waterbody is surrounded by good terrestrial habitat and has potential to support GCN.	**0.81 Excellent**	Plate 14

Water body/ Pond no.	Water Body / Pond Description	HSI Value	Plate Reference (Appendix C)
b2a – b2b and b3a – 3b	These four ponds are located to the north of Little Eaton junction centred on SK 36188 40616. They are associated with the Severn Trent Water (STW) Treatment works. These four ponds are used as settling lagoons for waste sludge from the treatment works. On separate survey occasions only two of the four ponds held water as the landowner (STW) cycles the ponds regularly. The GCN survey was not of the same two lagoons on each survey occasion	**0.42 Poor**	Plates 15 - 18
b4	Pb4 is a spring-fed duck pond with a septic tank overflow also entering the pond at SK 36780 40247. This waterbody is surrounded by good terrestrial habitat.	**0.48 Poor**	Plate 19
b5	Pb5 is a small shallow pond that receives run-off from road gullies on the Little Eaton junction. The pond is heavily silted with dense reed sweetgrass *Glyceria maxima* and *Lemna spp.* present. The surrounding habitat offers low potential for GCN, with limited connectivity to habitat with moderate potential for GCN to the north.	**0.56 Below average**	Plate 20
b6	Pb6 is a concrete lined overflow tank to the east of Little Eaton junction Site boundary taking water from the enclosed potable water reservoir. This pond is located in a small area of coniferous woodland.	**0.71 Good**	Plate 21
b7	Pb7 is a long shallow ditch located between the A38, north of Little Eaton junction and Alfreton Road. This ditch is fed from run-off water from the Little Eaton Garden Centre car park located at the north end of the ditch. This waterbody is surrounded by moderate terrestrial habitat.	**0.76 Good**	Plate 22
b8	Pb8 is a long ditch with slow flowing water flows from Little Eaton alongside the Alfreton Road to the Little Eaton junction at SK 36422 40173. It is surrounded by good terrestrial habitat and has potential to support GCN.	**0.61 Average**	Plate 23
b9	Pb9 is a temporary inundation area that dried out in June 2015. No aquatic vegetation was recorded.	**0.38 Poor**	Plate 24

3.4 Survey Results

3.4.1 No GCN were recorded during the course of the surveys. All the eDNA tests came back negative apart from one, relating to pond Pa6, which came back as indeterminate (i.e. inconclusive). The laboratory results for the eDNA tests are available in Appendix D. The indeterminate result signifies that no GCN DNA was found, but micro-sediment was present in the sample. As DNA has a tendency to

adhere to sediment, the potential for GCN DNA to have been removed from the sample during the sediment washing/ filtering process cannot be ruled out. Consequently, the results did not provide a conclusive negative, and thus two additional conventional surveys were undertaken at this pond (bringing the total number of conventional surveys replicates to four) to conclude the presence/ likely absence survey. No GCN were found within pond Pa6.

3.4.2 Smooth newts were found in ponds Pa1, Pa2, Pa4, Pa5, Pa6, Pa7, Pa9, Pa10, Pa11, Pa12, Pa15, Pb1 and Pb6.

3.4.3 Common frogs (either adults, eggs or tadpoles) were found in ponds Pa1, Pa2, Pa4, Pa5, Pa6, Pa7, Pa8, Pa9, Pa10, Pa11, Pa12, Pa14, Pb4, Pb6, Pb7 and Pb8.

3.4.4 Adult common toads were found in ponds Pa6, Pa7 and Pa8.

3.4.5 Table 4 summarises the findings of the survey, where the peak count figures are derived as follows: the highest count of animals obtained by torch, bottle trap, refuge search or netting for each pond on one survey occasion was picked.

3.4.6 Table 5 shows survey results of the GCN surveys. The water turbidity was assessed on a scale for 0 to 5, where 0 is very clear and 5 is very turbid.

Table 4: Results Summary - Peak Counts

Water body / Pond no.	GCN	Smooth Newt (SN)	Frog	Toads
a1	0	4 ♂, 5 ♀	Eggs	0
a2	0	3 ♂	Eggs	0
a3	0	0	0	0
a4	0	5 ♂, 3 ♀	2; Eggs	0
a5	0	14 ♂, 11 ♀	1 ♀; Eggs	0
a6	0	16 ♂, 11 ♀	2 ♂, Eggs	6
a7	0	5 ♂, 2 ♀	1 ♀ ; Eggs	3
a8	0	0	Eggs	26
a9	0	5 ♂, 9 ♀	Eggs	0
a10	0	1 ♀	5 adults, 2 juvenile	0
a11	0	3 ♂, 2 ♀	1	0
a12	0	1 ♂, 2 ♀	1	0
a13	0	0	0	0
a14	0	0	1	0
a15	0	3 ♂, 5 ♀	0	0
b1	0	2 ♂, 7 ♀	0	0
b2a – b2b	0	0	0	0
b3a – 3b	0	0	0	0
b4	0	0	Eggs	0
b5	0	0	0	0
b6	0	1 ♂	1 ♂	0

Water body / Pond no.	GCN	Smooth Newt (SN)	Frog	Toads
b7	0	0	Eggs	0
b8	0	0	Eggs	0

Table 5: GCN Survey Results

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
a1	Visit 1	02/04/2015	1	0	Bottles: 3 males SN, 1 female SN; frog eggs	No	Bottle trap Torching Egg search Refuge search	Approximately 40% of bank accessible for torching	-
	Visit 2	16/04/2015	1	0	Torch: 2 males SN Bottles: 4 males SN, 5 females SN	No	Bottle trap Torching Egg search	-	-
	eDNA sampling	17/04/2015		Negative					
a2	Visit 1	02/04/2015	3	0	Bottles: 3 males SN; frog eggs	No	Bottle trap Torching Egg search Refuge search	Approximately 40% of bank accessible for torching	-
	Visit 2	16/04/2015	2	0	Bottles: 1 female SN	No	Bottle trap Torching Egg search	-	-
	eDNA sampling	17/04/2015	-	Negative					
a3	Visit 1	02/04/2015	-	-	-	No	-	No access	-
	Visit 2	16/04/2015	2	0	0	No	Bottle trap Egg search Refuge search	Obscured with Lemna	-
	eDNA sampling	17/04/2015	-	Negative					
a4	Visit 1	02/04/2015			Bottles: 5males SN, 3 females SN, 1 frog; frog eggs	No	Bottle trap Egg search Refuge search	Torching not possible as no access after 8pm. Netting not viable: pond very deep and full of Elodea	Dug 2014
	Visit 2	14/05/2015	1	0	Bottles: 3male SN, 2 females SN, 2 frog	No	Bottle trap Egg search Refuge search	Torching not possible as no access after 8pm. Netting not viable: pond very deep and full of Elodea	Dug 2014
	eDNA sampling	15/04/2015	-	Negative					
a5	Visit 1	31/03/2015	1	0	Torch:7males SN, 9 females SN; Bottles: 14 males SN, 11 females SN, 1 female frog; frog eggs	No	Bottle trap Torching Egg search	-	-
	Visit 2	14/04/2015	1	0	Torching: 7 males SN, 10 females	No	Bottle trap	-	-

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
					SN; Bottles: 5 males SN, 14 females SN; frog eggs		Torching Egg search		
	eDNA sampling	15/04/2015		Negative					
a6	Visit 1	31/03/2015	4	0	2males SN, 3 females SN, 2 males frogs, frog eggs	Yes	Bottle trap Torching Egg search Refuge search	High turbidity	-
	Visit 2	14/04/2015	2	0	Torching: 6 toads; Bottles: 5 males SN, 4 females SN	Yes	Bottle trap Torching Egg search	-	-
	eDNA sampling	15/04/2015		Indeterminate					Two more visits required as result did not come back negative
	Visit 3	05/05/2015	2	0	Bottles: 8 males SN, 2 females SN	Yes	Bottle trap Torching Egg search	-	-
	Visit 4	07/05/2015	2	0	Bottles: 16 males SN, 11 females SN	Yes	Bottle trap Torching Egg search	-	-
a7	Visit 1	31/03/2015	4	0	Frog eggs	Yes	Bottle trap Torching Egg search Refuge search	High turbidity High level of frog spawn	-
	Visit 2	14/04/2015	1	0	Torching: 3 toads; Bottles: 5 males SN, 2 females SN, 1 female frog; frog eggs	Yes	Bottle trap Torching Egg search	-	-
	eDNA sampling	15/04/2015		Negative				-	-
a8	Visit 1	31/03/2015	4	0	0	Yes	Bottle trap Torching Egg search Refuge search	High turbidity	No suitable vegetation visible
	Visit 2	14/04/2015	3	0	Torch: 26 toads; frog eggs	Yes	Bottle trap Torching	High turbidity	-

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
							Egg search Refuge search		
	eDNA sampling	15/04/2015		Negative					
a9	Visit 1	02/04/2015	5	0	Frog eggs	No	Bottle trap Torching Egg search Refuge search	High turbidity	-
	Visit 2	16/04/2015	2	0	Bottles: 5 males SN, 9 females SN	No	Bottle trap Torching Egg search Refuge search	Lemna cover	-
	eDNA sampling	17/04/2015		Negative					
a10	Visit 1	05/05/2015	0	0	Torch: 1 frog	No	-	-	-
	Visit 2	07/05/2015	0	0	Torch: 1 frog, 1 female SN	No	-	-	-
	Visit 3	12/05/2015	3	0	Torch: 1 male frog, 1 female frog	No	Torching Egg search Refuge search	Blanket weed Too shallow to bottle trap	-
	Visit 4	14/05/2015	3	0	Torch: 5 frogs, 2 juvenile frogs	No	Torching Egg search Refuge search	Blanket weed Too shallow to bottle trap	-
a11	Visit 1	05/05/2015	1	0	Torch: 3 male SN, 2 female SN	No	Bottle trap Torching Egg search	-	-
	Visit 2	07/05/2015	1	0	Torch: 1 female SN; Bottles: 1 female SN	No	Bottle trap Torching Egg search	-	-
	Visit 3	12/05/2015			1 frog found by green house, 3 m from the pond location		Refuge search	Pond had been destroyed and replaced by 2 piles of compost	-
a12	Visit 1	05/05/2015	3	0	Torch: 2 males SN	No	Torching Egg search Refuge search	Too shallow to bottle trap	-
	Visit 2	07/05/2015	3	0	Torch: 1 female SN, 1 frog	No	Torching Egg search Refuge search	Too shallow to bottle trap	-

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
	Visit 3	12/05/2015	3	0	Torch: 1 male SN	No	Torching Egg search Refuge search	Water level very low (1 cm), apart from bath tub within ditch where the SN was recorded	-
	Visit 4	14/05/2015	3	0	Torch: 1 male SN, 2 females SN	No	Torching Egg search Refuge search	Water level very low (1 cm), apart from bath tub within ditch where the SN was recorded	-
a13	Visit 1	05/05/2015	3	0	0	No	Torching Egg search Refuge search	Too shallow to bottle trap	-
	Visit 2	07/05/2015	2	0	0	No	Torching Egg search Refuge search	Too shallow to bottle trap	-
	Visit 3	12/05/2015		0	0	No	Torching Egg search Refuge search	Nearly dry	-
	Visit 4	14/05/2015					Refuge search	Dry	-
a14	Visit 1	05/05/2015	3	0	Torch: 1 frog	No	Torching Egg search Refuge search	Bottle trapping not possible due to safety mesh	-
	Visit 2	07/05/2015	2	0	0	No	Torching Egg search Refuge search	Bottle trapping not possible due to safety mesh	-
	Visit 3	12/05/2015	4	0	0	No	Torching Egg search Refuge search	Low visibility. Covered with duckweed	-
	Visit 4	14/05/2015	4	0	0	No	Torching Egg search Refuge search	Low visibility. Covered with duckweed	-
a15	Visit 1	05/05/2015	2	0	0	No	Bottle trap Torching Egg search Refuge search	Low visibility. Covered with duckweed	-
	Visit 2	07/05/2015	2	0	0	No	Bottle trap Torching	Low visibility. Covered with duckweed	-

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
							Egg search Refuge search		
	Visit 3	12/05/2015	0	0	Torch: 3 males SN, 5 females SN	No	Bottle trap Torching Egg search Refuge search	-	-
	Visit 4	14/05/2015	0	0	0	No	Torching Egg search Refuge search	Too shallow to bottle trap	-
b1	Visit 1	01/04/2015	2	0	0	No	Bottle trap Torching Egg search	-	-
	Visit 2	16/04/2015	2	0	Torch: 2 males SN, 7 females SN; Bottles: 1 female SN	No	Bottle trap Torching Egg search	-	-
	Visit 3	12/05/2015						Dry	-
b2a – b2b	Visit 1	01/04/2015	1	0	0		Bottle trap Torching Egg search	Bottle trapping difficult. Heavy gravel substrate and sleep sides. Approx. 30% of banks accessible for torching	Poor water quality. No suitable vegetation
	Visit 2	15/04/2015	2	0	0	Yes	Torching Refuge search	Bottle trapping and netting not completed due to health and safety concerns	-
	eDNA sampling	16/04/2015		Negative					
b3a – 3b	Visit 1	01/04/2015	1	0	0	Yes	Bottle trap Torching Egg search	-	Poor water quality. No visible aquatic invertebrates. No suitable vegetation
	Visit 2	15/04/2015	1	0	0	Yes	Torching Refuge search	Bottle trapping and netting not completed due to health and safety concerns	-
	eDNA sampling	16/04/2015		Negative					
b4	Visit 1	01/04/2015	1	0	Frog eggs	No	Bottle trap	-	2 geese

Water body / Pond no.	Visit occasion	Date	Water turbidity	GCN	Other amphibians Smooth newt (SN), frog and toad	Fish	Methods used	Constraints	Notes
							Torching Egg search		
	Visit 2	15/04/2015	2	0	0	No	Bottle trap Torching Egg search	-	-
	eDNA sampling	16/04/2015		Negative					
b5	Visit 1	01/04/2015	4	0	0	No	Bottle trap Torching Egg search Refuge search	High turbidity	-
	Visit 2	15/04/2015						Dry	-
b6	Visit 1	02/04/2015	0	0	0	No	Bottle trap Torching Refuge search	No suitable egg laying vegetation Only leaf litter	-
	Visit 2	15/04/2015	1	0	Torch: 1 male frog; Bottles: 1 male SN	No	Bottle trap Torching Refuge search	No suitable egg laying vegetation Only leaf litter	-
	eDNA sampling	16/04/2015		Negative					
b7	Visit 1	01/04/2015	2	0	Frog eggs	No	Bottle trap Torching Egg search	Water level fluctuates with time Traps dry in the morning	-
	Visit 2	15/04/2015						Dry	-
b8	Visit 1	01/04/2015	2	0	Frog eggs	No	Bottle trap Torching Egg search	-	-
	Visit 2	15/04/2015	3	0	0	No	Bottle trap Torching Egg search	-	-
	eDNA sampling	16/04/2015		Negative					
b9	eDNA sampling	16/04/2015		Negative		No			

3.5 Recommendations

3.5.1 No GCN were recorded during the course of the eDNA or conventional surveys. It is therefore reasonable to conclude that GCN are absent from the Site and do not represent a constraint to the proposed scheme.

3.5.2 Toads were found in ponds Pa6, Pa7 and Pa8 located within 50 m of the Markeaton junction. Although these water bodies are located within 50 m of the Site boundary, they would not be directly impacted by, or lost to the proposed scheme. Furthermore, the proposed scheme would not sever those habitats near these water bodies. As such, toad tunnels and crossings are not deemed necessary to maintain the current conservation status of the existing toad populations in this area.

3.5.3 It is likely that a strip of habitat would be removed either side of the existing A38. However, considering the large extent of optimum habitat that would be available, it is not considered that this would result in a significant impact on local amphibian populations. It is, therefore, reasonable to conclude that toads do not represent a constraint to the proposed scheme.

3.5.4 Mitigation for amphibians will be considered as part of the proposed scheme design.

3.5.5 It is recommended that the GCN surveys are updated in approximately two years' time i.e. from mid-March 2017. This is to reaffirm the status of the amphibians (including great crested newts) across the proposed scheme and accurately assess any potential impacts on amphibians prior to any Development Consent Order submission. Given the negative results, it is likely that e-DNA surveys will suffice unless there is a positive result.

4. SUMMARY

4.1.1 GCN surveys were undertaken between April and May 2015 using eDNA sampling techniques and conventional survey methods. The surveys identified that GCN are likely to be absent from those habitats within and around the proposed scheme. Other amphibians found are smooth newts, toads and frogs with a medium population of smooth newts and toads identified by Markeaton (peak count of 27 smooth newts at Pa6; and peak count of 26 toads at Pa8). The proposed scheme would not sever those habitats near these water bodies.

4.1.2 Recommendations for mitigation and/ or enhancement will be investigated and reported in the Environmental Assessment Report (EAR) which is being prepared.

5. REFERENCES

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Appendix A Figures

N

M1 JUNCTION 28

A38/A61 LITTLE EATON JUNCTION

A38/A6 PALM COURT JUNCTION

A38/A52 MARKEATON JUNCTION

A38/A5111 KINGSWAY JUNCTION

A50/A38 JUNCTION

2 0 2 4 6 8 Kilometres

Project Title/Drawing Title

A38 DERBY JUNCTIONS SCHEME LOCATION PLAN

Project Number 47071319		
Drawn GB	Checked SW	Approved SW
Date 04/02/2016	Scale @ A3 1:100,000	Purpose of issue FINAL
Drawing Number Figure 1		Rev 2F

Highways England
Major projects
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Store Street
Manchester
M1 2WD

AECOM
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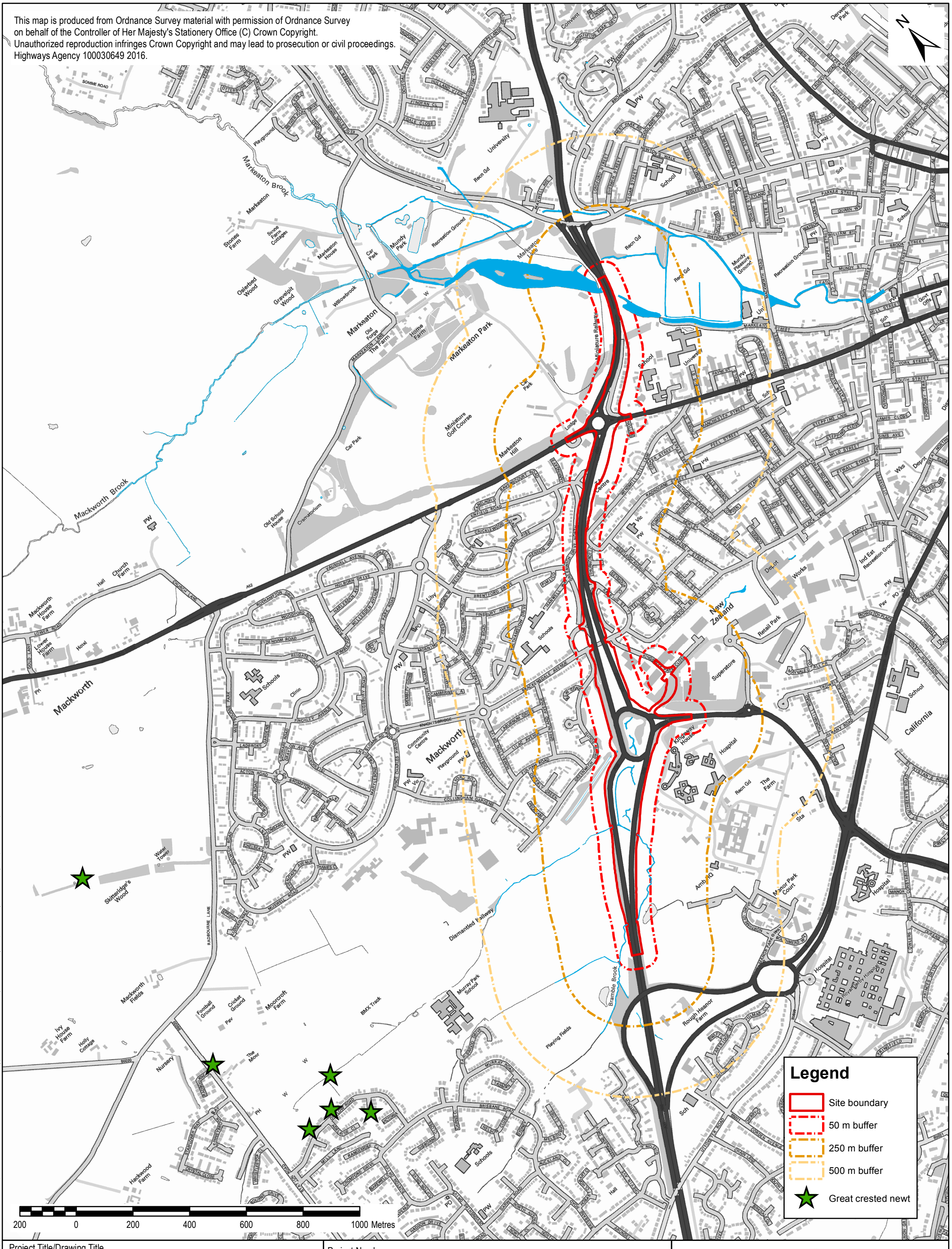
Basil Close, Chesterfield
Derbyshire. S41 7SL
+44 (0) 1246 209221
+44 (0) 1246 209229
www.aecom.com

File Name:\\ch-wip-001\CH_Roads\A38 Derby Jcns - PO1339\12 CAD\12.1 WIP\FIGURE 1.1 - LOCATION PLAN F1.mxd



Project Title/Drawing Title

A38 DERBY JUNCTIONS MARKEATON AND KINGSWAY DESK STUDY - GCN RECORDS FROM DWT

Project Number 47071319		
Drawn GSB	Checked SR	Approved OB
Date 05/02/2016	Scale @ A3 1:12,000	Purpose of issue FINAL
Drawing Number Figure 2		Rev 2F

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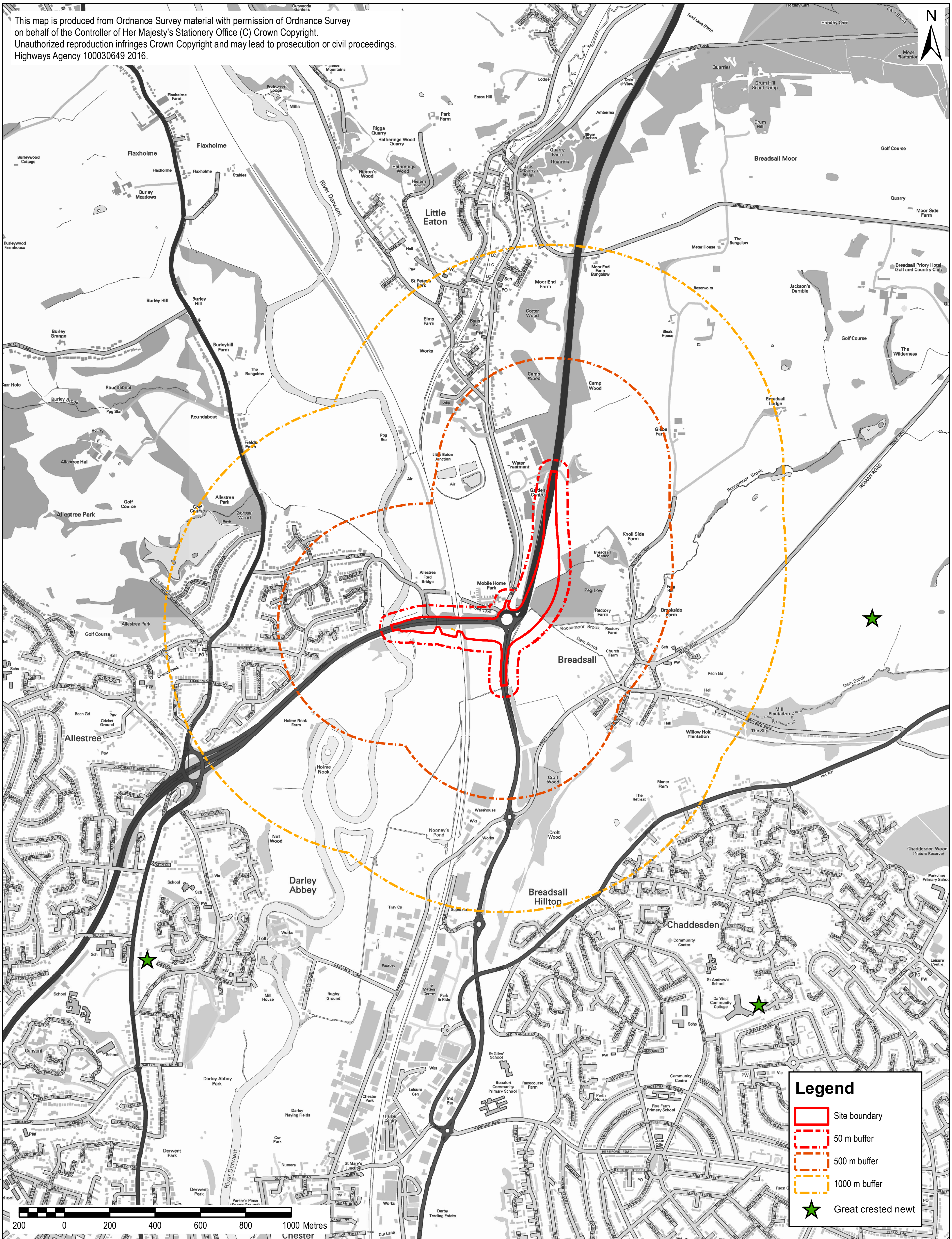
File Name:J:\Derby-Jobs\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Kingsway\GCN\Fig2_A38_Kingsway_DeskStudy_GCNrecords_20160205.mxd



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Project Title/Drawing Title

A38 DERBY JUNCTIONS
LITTLE EATON
DESK STUDY - GCN RECORDS FROM DWT

Project Number 47071319		
Drawn GSB	Checked SR	Approved OB
Date 05/02/2016	Scale @ A3 1:15,000	Purpose of issue FINAL
Drawing Number Figure 3		Rev 2F

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Middle Brook

Markeaton Brook

Mackworth Brook

Markeaton Lake

Markeaton Brook

Pa14

Pa13

Pa15

Pa12

Pa10

Pa11

Pa6

Pa7

Pa5

Pa8

Mill Pond 2

Mill Pond 1

Pa4

Bramble Brook

Bramble Brook

Bramble Brook

Pa2

Pa1

Pa9

Pa3

Legend

- Site boundary
- 50 m buffer
- 250 m buffer
- 500 m buffer
- Water body

200 0 200 400 600 800 1000 Metres

File Name: J:\Derby-Jobs\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Kingsway\GCN\Fig2_A38 Kingsway Markeaton_WaterBodies_20160205.mxd

Project Title/Drawing Title: A38 DERBY JUNCTIONS MARKEATON AND KINGSWAY WATER BODIES	Project Number: 47071319	Highways England, Major projects, Piccadilly Gate, Store Street, Manchester, M1 2WD
	Drawn: GSB / Checked: SR / Approved: OB	
	Date: 05/02/2016 / Scale @ A3: 1:10,000 / Purpose of issue: FINAL	AECOM, Royal Court, Basil Close, Chesterfield, Derbyshire. S41 7SL, +44 (0) 1246 209221, +44 (0) 1246 209229, www.aecom.com
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N

Pb1
Pb2a
Pb2b
Pb3a
Pb3b
Pb4
Pb5
Pb6
Pb7
Pb8
Pb9

River Derwent
Watermeadows ditch
Boosemoor Brook
Dam Brook
Dam Brook

100 0 100 200 300 400 500 Metres

Legend

- Site boundary
- 50 m buffer
- 250 m buffer
- 500 m buffer
- Water body
- Dry pond

File Name:J:\Derby-Jobs\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Little Eaton\GCN\Fig5_A38_LittleEaton_WaterBolies_20160205.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS
LITTLE EATON
WATER BODIES

Project Number 47071319		
Drawn GSB	Checked DS	Approved OB
Date 05/02/2016	Scale @ A3 1:5,000	Purpose of issue FINAL
Drawing Number Figure 5		Rev 2F

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Appendix B GCN Habitat Suitability Index

		Pa1		Pa2	
		Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00
SI_2	Pond area	2000m²	0.80	1500m²	0.88
SI_3	Pond drying	Never	0.90	Never	0.90
SI_4	Water quality	Good	1.00	Good	1.00
SI_5	Shoreline shade	10%	1.00	20%	1.00
SI_6	Fowl	Minor	0.67	Minor	0.67
SI_7	Fish	Absent	1.00	Absent	1.00
SI_8	Pound count	4	0.72	4	0.72
SI_9	Terrestrial habitat	Good	1.00	Good	1.00
SI_{10}	Macrophytes	30%	0.60	30%	0.60
	HSI		**0.85**		**0.86**
	Pond suitability		**Excellent**		**Excellent**

		Pa3		Pa4		Pa5	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	150m²	0.30	20m²	0.04	450m²	0.90
SI_3	Pond drying	Never	0.90	Never	0.90	Never	0.90
SI_4	Water quality	Moderate	0.67	Good	1.00	Moderate	0.67
SI_5	Shoreline shade	10%	1.00	0%	1.00	10%	1.00
SI_6	Fowl	Minor	0.67	Minor	0.67	Minor	0.67
SI_7	Fish	Absent	1.00	Absent	1.00	Absent	1.00
SI_8	Pound count	4	0.72	5	0.78	8	0.88
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Good	1.00
SI_{10}	Macrophytes	20%	0.50	30%	0.60	40%	0.70
	HSI		**0.73**		**0.64**		**0.86**
	Pond suitability		**Good**		**Average**		**Excellent**

		Pa6		Pa7		Pa8	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	4300m²	0.45	3000m²	0.65	6000m²*	0.18
SI_3	Pond drying	Never	0.90	Never	0.90	Never	0.90
SI_4	Water quality	Moderate	0.67	Moderate	0.67	Moderate	0.67
SI_5	Shoreline shade	20%	1.00	40%	1.00	40%	1.00
SI_6	Fowl	Minor	0.67	Major	0.01	Major	0.01
SI_7	Fish	Major	0.01	Major	0.01	Major	0.01
SI_8	Pound count	8	0.88	8	0.88	8	0.88
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Good	1.00
SI_{10}	Macrophytes	10%	0.40	30%	0.60	30%	0.60
HSI			**0.48**		**0.34**		**0.30**
Pond suitability			**Poor**		**Poor**		**Poor**

* The pond area of Pa8 is 30500 m^2, but the area considered suitable for GCN was estimated as 6000 m^2.

		Pa9		Pa10		Pa11	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	200m²	0.40	1m²	0.00	2.5m²	0.01
SI_3	Pond drying	Never	0.90	Sometimes	0.50	Rarely	1.00
SI_4	Water quality	Moderate	0.67	Good	1.00	Good	1.00
SI_5	Shoreline shade	100%	0.20	5%	1.00	5%	1.00
SI_6	Fowl	Absent	1.00	Absent	1.00	Absent	1.00
SI_7	Fish	Absent	1.00	Absent	1.00	Absent	1.00
SI_8	Pound count	1	0.38	8	0.88	8	0.88
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Good	1.00
SI_{10}	Macrophytes	20%	0.50	20%	0.50	5%	0.35
HSI			**0.63**		**0.46**		**0.52**
Pond suitability			**Average**		**Poor**		**Below average**

		Pa12		Pa13		Pa14	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	1000m²	0.95	7m²	0.01	6m²	0.01
SI_3	Pond drying	Rarely	1.00	Sometimes	0.50	Rarely	1.00
SI_4	Water quality	Moderate	0.67	Moderate	0.67	Moderate	0.67
SI_5	Shoreline shade	5%	1.00	0%	1.00	0%	1.00
SI_6	Fowl	Absent	1.00	Absent	1.00	Absent	1.00
SI_7	Fish	Absent	1.00	Absent	1.00	Absent	1.00
SI_8	Pound count	8	0.88	8	0.88	8	0.88
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Good	1.00
SI_{10}	Macrophytes	20%	0.50	90%	0.90	5%	0.35
	HSI		**0.88**		**0.57**		**0.55**
	Pond suitability		**Excellent**		**Below average**		**Below average**

		Pa15	
		Results	Scores
SI_1	Location	A	1.00
SI_2	Pond area	2m²	0.0004
SI_3	Pond drying	Sometimes	0.50
SI_4	Water quality	Moderate	0.67
SI_5	Shoreline shade	0%	1.00
SI_6	Fowl	Absent	1.00
SI_7	Fish	Absent	1.00
SI_8	Pound count	8	0.88
SI_9	Terrestrial habitat	Good	1.00
SI_{10}	Macrophytes	5%	0.35
	HSI		**0.46**
	Pond suitability		**Poor**

		Pb1		Pond Pb2a, Pb2b and Pb3a, Pb3b		Pb4	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	1000m²	0.95	4000m²	0.49	300m²	0.60
SI_3	Pond drying	Never	0.90	Sometimes	0.50	Never	0.90
SI_4	Water quality	Good	1.00	Poor	0.33	Good	1.00
SI_5	Shoreline shade	90%	0.40	20%	1.00	70%	0.80
SI_6	Fowl	Minor	0.67	Minor	0.67	Major	0.01
SI_7	Fish	Absent	1.00	Major	0.01	Absent	1.00
SI_8	Pound count	3	0.65	3	0.65	4	0.72
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Moderate	0.67
SI_{10}	Macrophytes	50%	0.80	20%	0.50	0%	0.30
	HSI		**0.81**		**0.42**		**0.48**
	Pond suitability		**Excellent**		**Poor**		**Poor**

		Pb5		Pb6		Pb7	
		Results	Scores	Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00	A	1.00
SI_2	Pond area	100m²	0.20	300m²	0.60	700m²	1.00
SI_3	Pond drying	Annually	0.10	Rarely	1.00	Sometimes	0.50
SI_4	Water quality	Poor	0.33	Moderate	0.67	Good	1.00
SI_5	Shoreline shade	50%	1.00	90%	0.40	90%	0.40
SI_6	Fowl	Absent	1.00	Absent	1.00	Minor	0.67
SI_7	Fish	Absent	1.00	Absent	1.00	Absent	1.00
SI_8	Pound count	4	0.72	4	0.72	4	0.72
SI_9	Terrestrial habitat	Good	1.00	Good	1.00	Good	1.00
SI_{10}	Macrophytes	30%	0.60	0%	0.30	40%	0.70
	HSI		**0.56**		**0.71**		**0.76**
	Pond suitability		**Below average**		**Good**		**Good**

		Pb8		Pb9	
		Results	Scores	Results	Scores
SI_1	Location	A	1.00	A	1.00
SI_2	Pond area	200m²	0.40	4000m²	0.49
SI_3	Pond drying	Sometimes	0.50	Annually	0.10
SI_4	Water quality	Poor	0.33	Moderate	0.67
SI_5	Shoreline shade	95%	0.30	10%	1.00
SI_6	Fowl	Absent	1.00	Major	0.01
SI_7	Fish	Absent	1.00	Absent	1.00
SI_8	Pound count	3	0.65	1	0.38
SI_9	Terrestrial habitat	Good	1.00	Good	1.00
SI_{10}	Macrophytes	30%	0.60	20%	0.50
	HSI		**0.61**		**0.38**
	Pond suitability		**Average**		**Poor**

Appendix C Site Photos

Plate number	Notes	Plate
1	Girton Way balancing pond (Pa1)	
2	Derby Royal Hospital car park balancing pond (Pa2)	

Plate number	Notes	Plate
3	Brackensdale Junior School wildlife pond (Pa4)	
4	Derby University Arts Building balancing pond (Pa5)	

Plate number	Notes	Plate
5	Mill Dam Canal	
6	Markeaton Lake (Pa8)	

Plate number	Notes	Plate
7	Pa9	
8	Mill Dam allotment number 36, Pond Pa10.	

Plate number	Notes	Plate
9	Mill Dam allotment number 14, Pond Pa11	
10	Mill Dam allotment Pond Pa12	

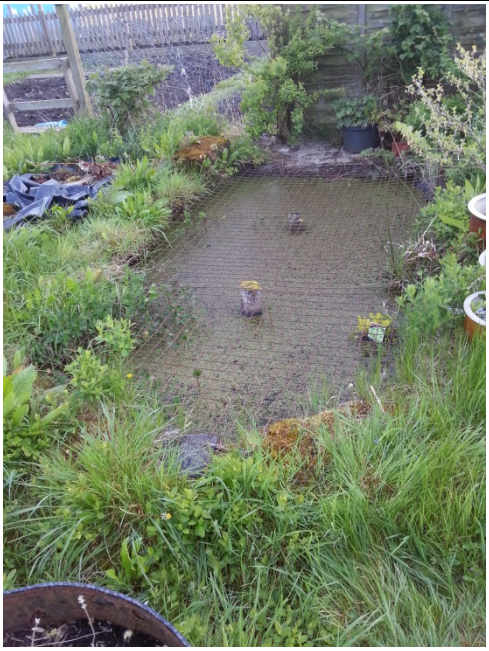
Plate number	Notes	Plate
11	Mill Dam allotment number 47, Pond Pa13	
12	Mill Dam allotment number 101, Pond Pa14	

Plate number	Notes	Plate
13	Mill Dam allotment number 69, Pond Pa15	
14	Severn Trent ditch (Pb1)	

Plate number	Notes	Plate
15	Severn Trent Lagoons (Pb2a)	
16	Severn Trent Lagoons (Pb2b)	

Plate number	Notes	Plate
17	Severn Trent Lagoons (Pb3a)	
18	Severn Trent Lagoons (Pb3b)	

Plate number	Notes	Plate
19	Spring fed duck pond (Pb4)	
20	Little Eaton receiving pond (Pb5)	

Plate number	Notes	Plate
21	Severn Trent overflow tank (Pb6)	
22	Ditch between A38 and Alfreton Road (Pb7)	

Plate number	Notes	Plate
23	Alfreton Road/ A38 ditch (Pb8)	
24	Pb9	

Appendix D eDNA Test Results from ADAS

ADAS Wolverhampton HQ
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Hayley Astbury
Aecom Infrastructure & Environment UK Ltd
12 Regan Way
Chilwell
Nottingham
NG9 6RZ

Sample/Report ID: 2015-2136
Client Identifier: Girton Way Pa1
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	28/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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AECOM FAO HANNAH GODDARD
AECOM
12 Regan Way Chetwynd Business Park
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NG9 6RZ

Sample/Report ID: 2015-07
Client Identifier: A38 Hosp
Date of Receipt: 17/04/15

Pa2

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-05
Client Identifier: Allotment Pond
Date of Receipt: 17/04/15

Pa3

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	23/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-256

Pa4

Client Identifier: B Dale Infants

Date of Receipt: 17/04/15

Condition on Receipt: Low Sediment Visual Inspection of Volume: Passed

Description: 6x50mL - pond water samples in preservatives

Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	29/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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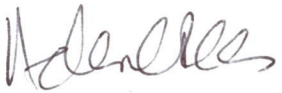
Sample/Report ID: 2015-09 Pa5
Client Identifier: Uni Pond
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	23/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-08
Client Identifier: Mill Dam Pa6
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Indeterminate	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-14 Pa7
Client Identifier: EOH
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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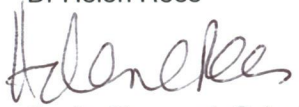
Sample/Report ID: 2015-15
Client Identifier: Markeaten Pork Lake
Date of Receipt: 17/04/15

Pa8

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	28/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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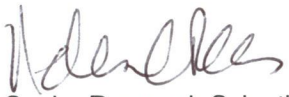
Sample/Report ID: 2015-04 Pa9
Client Identifier: A38 LWS
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-03 Pb2a
Client Identifier: STW Lagoons R
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	27/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-01 Pb3a
Client Identifier: STW Lagoons L
Date of Receipt: 17/04/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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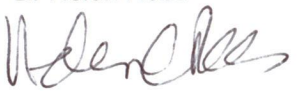
Sample/Report ID: 2015-11 Pb4
Client Identifier: Godber
Date of Receipt: 17/04/15

Condition on Receipt: Low Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-06 Pb6

Client Identifier: Low Service STW

Date of Receipt: 17/04/15

Condition on Receipt: Good

Visual Inspection of Volume: Passed

Description: 6x50mL - pond water samples in preservatives

Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	27/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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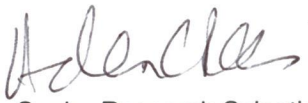
Sample/Report ID: 2015-12
Client Identifier: Starbucks
Date of Receipt: 17/04/15

Pb8

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	24/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-13
Client Identifier: Horsefield
Date of Receipt: 17/04/15

Pb9

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	27/04/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	29/04/15	Date of issue:	30/04/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.