

A38 Derby Junctions

TR010022

Volume 6

6.3 Environmental Statement Appendices

Appendix 8.15: Fish Survey in 2018

Regulation 5(2)(a)

Planning Act 2008

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

April 2019

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 8.15: Fish Survey in 2018**

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A38 Derby Junctions

Dam Brook and Watermeadows Ditch Fish Survey Report

**Report Number: HE514503-ACM-EBD-A38_SW_PR_ZZ-RP-EG-0021 P02 S4
December 2018**

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1 INTRODUCTION

1.1 Background and Scope

- 1.1.1 AECOM Infrastructure & Environment UK Limited (AECOM) has been commissioned by Highways England to provide design services with regards to the A38 Derby Junctions Scheme (referred to as “the Scheme” herein).
- 1.1.2 This Scheme concerns the grade separation of three junctions on the A38 in Derby, namely:
- A38/ A5111 Kingsway junction
 - A38/ A52 Markeaton junction
 - A38/ A61 Little Eaton junction
- 1.1.3 These three junctions are located along an approximate 5.5km length of the A38 national trunk road, to the west and north of Derby.
- 1.1.4 In 2015 and 2018, AECOM undertook an extended Phase 1 Habitat survey along the route of the Scheme (AECOM 2016(b) and 2018(a)). The results of the extended Phase 1 Habitat surveys were used to identify watercourses that would be crossed and/ or potentially indirectly impacted by the Scheme. These watercourses were subject to River Corridor Surveys (RCS) and River Habitat Surveys (RHS) on 26 May 2015 (AECOM, 2016(f)), and updated RHS in 2018 (AECOM2018(b)).
- 1.1.5 Dam Brook would need to be diverted as part of the Scheme works at Little Eaton junction. Consequently, fish surveys were commissioned to establish which species are present and to identify the suitability of donor rivers to receive these species (if needed).
- 1.1.6 Bramble Brook would also be directly impacted by the Scheme at Kingsway junction. However, the results of the fish habitat assessment, completed as part of the 2018 RHS, identified a lack of suitable habitat to support fish populations. This was because the north arm of Bramble Brook was dry, considered to be the result of water diversion into the Mickleover cutting, and a lack of water able to support fish in both the Central and main arms of Bramble Brook. These arms of Bramble Brook could be utilised as flood refuge under high flow events, although it is likely that only minor species would be able to inhabit them.
- 1.1.7 Fish surveys were also commissioned on Watermeadow Ditch to identify its suitability as a donor watercourse for the fish population in Dam Brook. This was due to Dam Brook draining into Watermeadow Ditch and the proximity and contiguous habitats present.
- 1.1.8 The survey objective was to provide data on the fish species that are present in the watercourses affected by the Scheme and provide appropriate translocation details for those species found in Dam Brook.

1.2 Study Site

- 1.2.1 The Scheme encompasses Kingsway and Markeaton junctions, west of the City of Derby and Little Eaton junction north of Derby. A plan showing the junction locations is presented in Figure 1, Appendix A. The ecological study area as referred to herein

includes the Dam Brook watercourse within the Scheme boundary plus the adjacent section of Watermeadows ditch, both at Little Eaton junction.

1.2.2 Dam Brook is a small tributary of the River Derwent. It consists of two small streams rising from land east of Little Eaton junction, converging to form Dam Brook. Dam Brook flows through two culverts, one directly east of Little Eaton junction inside the Scheme boundary, and the other on the Scheme boundary beneath the A61, downstream of which it forms a channel known as Watermeadows Ditch. Upstream of the culvert, Dam Brook flows through a heavily shaded section of channel under dense hawthorn.

1.2.3 Watermeadows Ditch is a small tributary of the River Derwent that is fed by Dam brook and flows west for approximately 1km before joining the River Derwent south of Little Eaton junction. The watercourse is heavily canalised with typical ditch morphology and is heavily eutrophic, as indicated by abundant coverage with macrophyte plant species.

1.3 Relevant Legislation

1.3.1 The fish survey sought to identify the presence of all species within Dam Brook and Watermeadows Ditch, including those species that are protected. Those species considered protected are the ones covered under one or more of the following legislation:

- The EC Habitats Directive (Directive 92/43/ECC) as translated into UK law by The Habitats and Species Regulations 2017
- UK Biodiversity Action Plan (UK BAP)
- The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention)
- The Water Environment (Water Framework Directive 'WFD') (England and Wales) (Amendment) Regulations 2015

1.3.2 Highways England, through the National Road Investment Strategy (RIS), set an aspiration that the operation, maintenance, and enhancement of the Strategic Road Network (SRN) should aim to reduce net loss of biodiversity by 2020; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works by 2040. Highways England published a Biodiversity Plan 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 2015 Biodiversity Plan, to secure an ongoing annual reduction in the loss of net biodiversity due to its activities. The 2015 Biodiversity Plan provides a general plan to protect and increase biodiversity. The 2015 Biodiversity Plan supersedes the preceding 2002 Highways Agency (now Highways England) Biodiversity Action Plan (Highways BAP 2002), which still however carries some relevance as it lists specific habitats and species of conservation concern.

2 METHODOLOGY

2.1 Field Surveys

- 2.1.1 Field surveys were undertaken by AECOM aquatic ecologists in summer (01 August) 2018. A map highlighting where all surveys were undertaken can be found in Figure 12, Appendix A.
- 2.1.2 Two additional sites were surveyed upstream of the primary Dam Brook survey site; upstream of the weir (site 2); and within the respective weir pool (site 3). These were chosen to assess the community structure upstream of the primary survey site as they fall within the Scheme boundary (Figure 2, Appendix A).
- 2.1.3 Fish surveys were undertaken by three suitably experienced aquatic ecologists to assess the presence and absence of fish species in the watercourses. The survey was carried out using Electracatch WFC4 electrofishing gear in line with standard Environment Agency methodology (Beaumont *et al*, 2014).
- 2.1.4 Surveys on each watercourse were conducted by wading upstream towards their respective culverts and collecting each fish that presented with hand-held nets.
- 2.1.5 Fish that were collected during the survey were placed in an oxygenated holding tank to allow full recovery and species processing.
- 2.1.6 At the end of the survey, caught fish were identified, and their lengths were recorded. Once processed, the fish were released back into the watercourse.

2.2 Survey Limitations

- 2.2.1 The survey of Watermeadow Ditch could not be completed at the proposed planned site (SK 36309 39665) due to lack of site access. Subsequently the site had to be surveyed downstream (SK 36181 39492; Figure 2, Appendix A). This section of the ditch was subject to heavy siltation, high macrophyte growth and increased levels of eutrophication believed to be the result of runoff from the adjacent land. The channel has been modified due to the installation of a handmade barrier in the watercourse (SK 36079 39317) resulting in increased water depth and a reduction of flow. However, it is considered that the results from the fish survey were not affected by these limitations.

3 RESULTS

3.1 Site Observation

- 3.1.1 Survey photographs are provided in Appendix B and referenced throughout the report.
- 3.1.2 Dam Brook is bordered by pastoral farmland on one bank and follows the A61 for a significant portion of its length on the other bank (Plate 1; Plate 2, Appendix B).
- 3.1.3 Details of the survey conditions of Dam Brook at the time of the surveys are presented in Table 1.

Table 1: Dam Brook Survey Conditions

Survey area (NGR)	SK 36409 39832 - SK 36462 39979
Average depth	0.3m
Average width	1.5m
Temperature	22°C
Substrate	Silt (80%), sand (15%) and gravel (5%)
Habitat	Slack (80%) & Glide (15%) & riffle (5%)
Bank structure	Simple/Complex (3-4 vegetation types) with high levels of shading
Electrofishing parameters	25 amperes
Observations	Turbidity was clear with normal flow conditions

- 3.1.4 At the survey site, Watermeadows Ditch runs adjacent to the railway on the right-hand bank and has arable land on the left bank currently used as a turf farm (Plate 3; Plate 4, Appendix B).
- 3.1.5 Details of the survey conditions of Watermeadows Ditch at the time of the surveys are presented in Table 2.

Table 2: Watermeadows Ditch Survey Conditions

Survey area (NGR)	SK 36111 39366 - SK 36181 39492
Average depth	0.5m
Average width	3m
Temperature	22°C
Substrate	Silt (95%) and sand (5%)
Habitat	Slack 100%
Bank structure	Uniform/Simple with moderate shading
Electrofishing parameters	25 amperes
Observations	Turbidity was clear with normal flow conditions

3.2 Fish Survey Results

3.2.1 Tables 3, 4 and 5 present the summary results of the three fish surveys undertaken in Dam Brook in summer 2018. The data presented are the fork lengths (mm) of each fish caught with a total species count for each site in bold.

Table 3: Results of the Fish Survey Undertaken on the Primary Survey Site of Dam Brook

Brown trout (<i>Salmo trutta</i>)	Perch (<i>Perca fluviatilis</i>)	European brook lamprey (<i>Lampetra planeri</i>)	Bullhead (<i>Cottus gobio</i>)	Three-spined stickleback (<i>Gasterosteus aculeatus</i>)	Stone loach (<i>Barbatula barbatula</i>)
118	134	62	93		
163	108	115	62		
268	116	85	74		
194	115	70	20		
142	125	105	60		
270	235	120	62		
206	117	130	29		
165	113	78	82		
147	111	45	98		
109	136	115	50		
134	114	95	85		
95	95	70	70		
117	218	110	46		
118	124	80	35		
137	117	110	82		
174	125	65	35		
112	210	90	48		
90		90	60		
120		65	29		
105		85	30		
118		110	98		
120		95	108		
208		85	78		
128		100	73		
114		130	98		
		45	70		
		65	115		
		55	35		
		65	93		
		95	97		
		70	75		
		50	73		
		80	113		
		45	68		

Brown trout (<i>Salmo trutta</i>)	Perch (<i>Perca fluviatilis</i>)	European brook lamprey (<i>Lampetra planeri</i>)	Bullhead (<i>Cottus gobio</i>)	Three-spined stickleback (<i>Gasterosteus aculeatus</i>)	Stone loach (<i>Barbatula barbatula</i>)
		75	90		
		95	87		
		75	97		
		65	97		
		70			
		55			
25	17	40	38	0	0

Table 4: Results of the Fish Survey Undertaken Upstream of the Weir (Site 2) of Dam Brook

Brown trout (<i>Salmo trutta</i>)	Perch (<i>Perca fluviatilis</i>)	European brook lamprey (<i>Lampetra planeri</i>)	Bullhead (<i>Cottus gobio</i>)	Three-spined stickleback (<i>Gasterosteus aculeatus</i>)	Stone loach (<i>Barbatula barbatula</i>)
105			104	30	98
182			42	31	
158			83	60	
102			122		
			100		
			60		
			76		
			40		
			76		
			36		
			72		
			62		
			72		
			38		
			83		
			70		
			38		
4	0	0	17	3	1

Table 5: Results of the Fish Survey Undertaken on the Weir Pool (Site 3) of Dam Brook

Brown trout (<i>Salmo trutta</i>)	Perch (<i>Perca fluviatilis</i>)	European brook lamprey (<i>Lampetra planeri</i>)	Bullhead (<i>Cottus gobio</i>)	Three-spined stickleback (<i>Gasterosteus aculeatus</i>)	Stone loach (<i>Barbatula barbatula</i>)
250	135				
1	1	0	0	0	0

3.2.2 Table 6 presents the summary results of the fish surveys undertaken in Watermeadows Ditch in summer 2018. The data presented are the fork lengths (mm) of each fish caught with a total species count for each site in bold.

Table 6: Results of the Fish Survey Undertaken on Watermeadows Ditch

European brook lamprey (<i>Lampetra planeri</i>)	Three-spined stickleback (<i>Gasterosteus aculeatus</i>)	Stone loach (<i>Barbatula barbatula</i>)	Ninespine stickleback (<i>Pungitius pungitius</i>)
98	30	33	26
110	28	88	
110	32		
110	18		
125	16		
100	36		
140	16		
135			
115			
125			
120			
95			
105			
105			
110			
100			
80			
115			
105			
115			
20	7	2	1

4 DISCUSSION

- 4.1.1 A total of 177 fish of seven different species were caught between the survey sites. The highest species present were the ammocoetes of European brook lamprey (*Lampetra planeri*; Plate 6, Appendix B) with 60 individuals, closely followed by bullhead (*Cottus gobio*; Plate 7, Appendix B) with 55 individuals. However, bullheads were absent from Watermeadows Ditch due to the dominance of silt substrate and lack of in-channel refugia.
- 4.1.2 No invasive or non-native fish species were discovered during the survey.
- 4.1.3 Three protected/ notable species were present in Dam Brook (brook lamprey, bullhead and brown trout; Table 7) and one was present in Watermeadows Ditch (brook lamprey).

Table 7: Protected Species Present in Dam Brook

Protection status and legislation	Brook lamprey	Bullhead	Brown trout
IUCN red list	✓	✓	
Bern Convention (Annex III)	✓		
EC Habitats Directive (Annex II)	✓	✓	
UK BAP priority fish species			✓

- 4.1.4 The fish community structure at Dam Brook differed amongst each site. The primary site held a good number of brown trout (*Salmo trutta*; Plate 5, Appendix B), perch (*Perca fluviatilis*; Plate 9, Appendix B), brook lamprey (ammocoetes) and bullhead. Whereas the survey section upstream of the weir contained small numbers of trout, three-spined stickleback (*Gasterosteus aculeatus*) and stone loach (*Barbatula barbatula*; Plate 8, Appendix B). The Dam Brook weir pool, however, only contained one trout and one perch.
- 4.1.5 It is considered that the diminishing number of species and fish abundance upstream of the primary survey site at Dam Brook is caused by the culvert and weir impacting fish movements. Further, it is considered that the weir is a barrier to all movements upstream, notably due to the absence of brook lamprey upstream of the weir.
- 4.1.6 Watermeadows Ditch only contained four species: European brook lamprey (ammocoetes), three-spined stickleback, nine-spined stickleback (*Pungitius pungitius*) and stoneloach. Brook lamprey was the most prominent fish species with the minor species only being recorded in small numbers.
- 4.1.7 It is considered that the difference in community structure between the two watercourses is the result of a reduction in water quality and heavy siltation in Watermeadows Ditch that is likely caused by two factors: i) increased eutrophication from nutrient input from the adjacent land; and ii) the installation of a handmade barrier dam in the watercourse resulting in an increased water depth and sedimentation, and a reduction in flow. Both factors are reducing the habitat suitability for more sensitive species (e.g. trout and bullhead).
- 4.1.8 Relocating the brook lamprey from Dam Brook to Watermeadows Ditch would be feasible given that lampreys were found in the donor waterbody, Watermeadows Ditch, and this watercourse has suitable substrate and habitat for the ammocoetes. It

would also be feasible to release the brook lamprey into the River Derwent as these species are noted within the river and its tributaries. Although Watermeadows Ditch would be preferable as the donor site.

- 4.1.9 Relocating the minor species (three-spined stickle back and stone loach) from Dam Brook to Watermeadows Ditch would also be feasible as these were also found in the donor waterbody.
- 4.1.10 The relocation of trout, bullhead and perch into Watermeadows Ditch would not be feasible due to the deterioration in water quality and unsuitable habitat. It is, therefore, recommended that these species are relocated to a different waterbody locally, for example the River Derwent.
- 4.1.11 Given the proximity to the River Derwent (roughly 400m due west), it is suggested that the trout, bullhead and perch from Dam Brook are relocated into the River Derwent as close to the confluence with Watermeadows Ditch as possible. The River Derwent already has established populations of these three fish species, as established through historic Environment Agency fish survey data¹, and will provide suitable habitat and water conditions for all three species to survive.

¹ <https://data.gov.uk/dataset/f49b8e4b-8673-498e-bead-98e6847831c6/freshwater-fish-counts-for-all-species-all-areas-and-all-years> - accessed November 2018

5 SUMMARY

- 5.1.1 The fish surveys for the Scheme were undertaken during summer 2018. The objective of the fish surveys undertaken on Dam Brook and Watermeadows Ditch, watercourses within or adjacent to the Scheme, was to gather baseline data to assess the fish communities and evaluate the feasibility of relocating the fish from Dam Brook to Watermeadows Ditch.
- 5.1.2 Overall, 177 fish were recorded in both survey sites with six species present in Dam Brook and four species in Watermeadows Ditch.
- 5.1.3 The results of the fish survey demonstrate that:
- Three protected/ notable species were recorded in Dam Brook (brook lamprey, bullhead and brown trout) and one in Watermeadows Ditch (brook lamprey).
 - No invasive or non-native fish species were recorded.
 - Watermeadows Ditch and the River Derwent are suitable donor waterbodies for the brook lamprey, three-spined stickleback and stone loach from Dam Brook.
 - Watermeadows Ditch is not a suitable donor waterbody for the trout, bullhead and perch from Dam Brook due to poor habitat suitability and water quality.
 - It is proposed that these latter species are relocated into the River Derwent.
- 5.1.4 The survey results as presented herein will be part of the ecological impact assessment to be reported in the Environmental Statement.

6 REFERENCES

AECOM(a) (2018) A38 Derby Junctions Extended Phase 1 Habitat Survey 2017 Report Ref. No. HE514503-ACM-EBD-A38_SW_PR_ZZ-RP-EG-004.

AECOM(b) (2018) A38 Derby Junctions River Habitat Survey Report 2018 Report Ref. No. HE514503-ACM-EBD-A38_SW_PR_ZZ-RP-EG-0020.

AECOM(b) (2016) A38 Derby Junctions Phase 1 Habitat Survey Report Ref. No. 47071319-URS-05-RP-EN-003.

AECOM(f) (2016) A38 Derby Junctions River Corridor Survey and River Habitat Survey Report Ref. No. 47071319-URS-05-RP-EN-015.

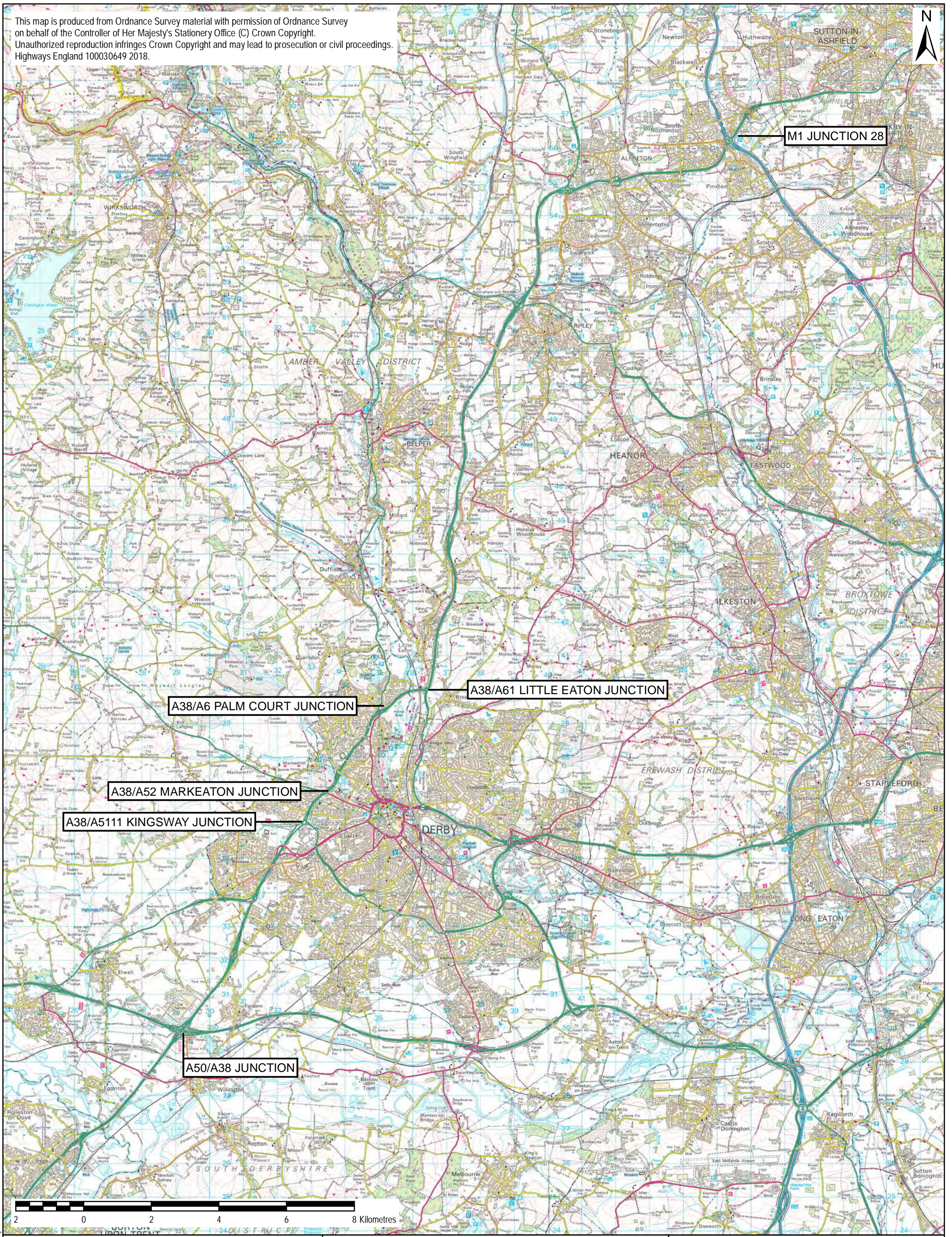
Beaumont, W.R.C, Taylor, A.A.L., Lee, M.J., & Welton J.S. 2014. Guidelines for Electric Fishing Best Practice. Environment Agency, R&D Technical Report W2-054/TR.

Appendix A Figures



Figure 1: Scheme Location Plan

Figure 2: Location of Dam Brook and Watermeadows Ditch survey sites

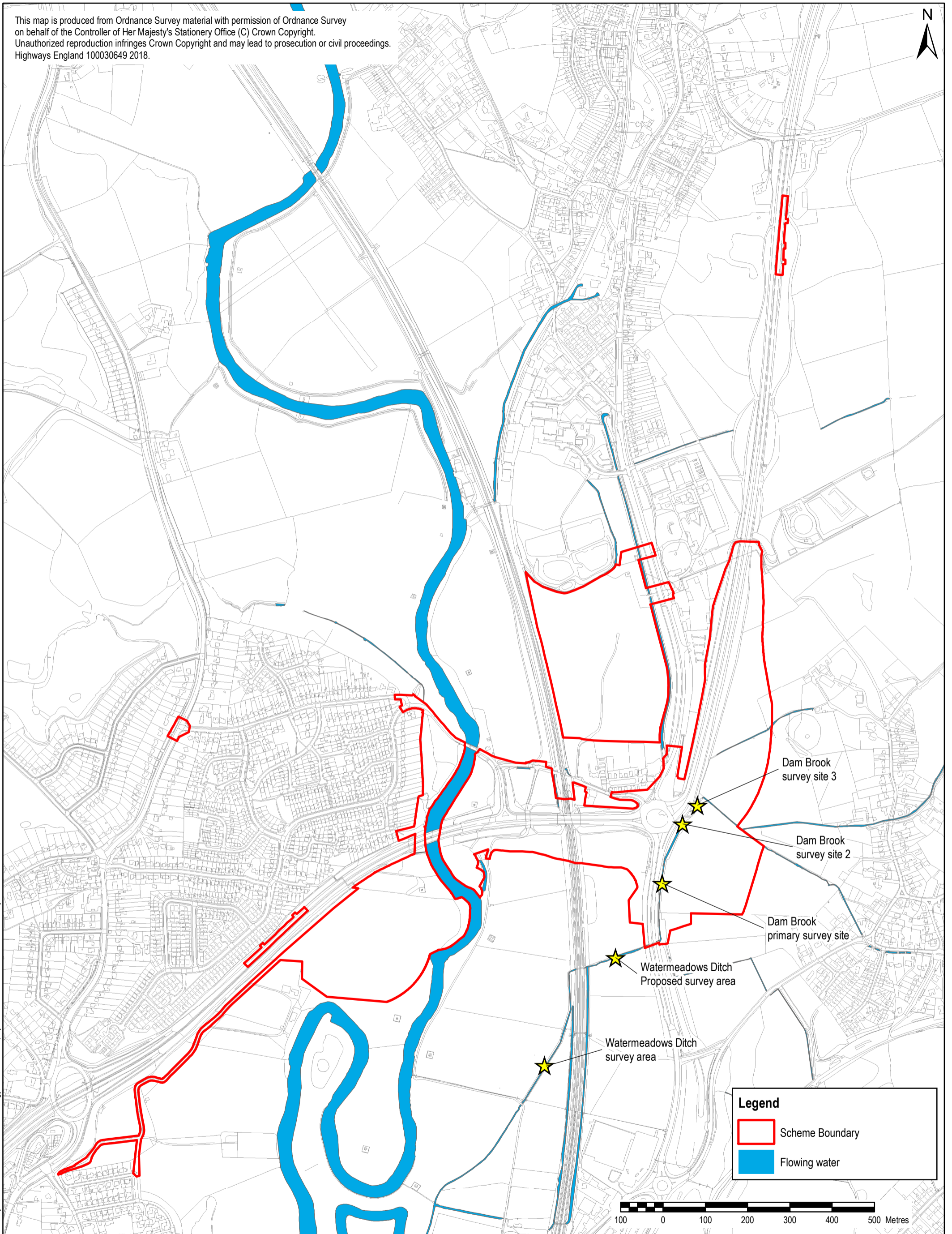
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File Name: \\ch-wip-001\CH_Roads\A38 Derby Jns - P0133912 CAD\12.1 WIP\FIGURE 1.1 - LOCATION PLAN F1.mxd

Project Title/Drawing Title		AECOM Internal Project Number 60533462		Highways England A38 Derby Junctions Project Highways England, Floor 5 2 Colmore Square 38 Colmore Circus Birmingham B4 6BN	
A38 DERBY JUNCTIONS SCHEME LOCATION PLAN		Drawn GB	Checked SR	Approved DD	
		Date 01/10/2018	Scale @ A3 1:100,000	Purpose of issue FINAL	
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Legend

- Scheme Boundary
- Flowing water



File Name: Y:\Highways Agency\47071390_A38 Derby Juncs - Environment\Technical\Ecology\GIS_A38_2018\project_files\Fish\A38 Little Eaton Fish survey 2018.mxd

Project Title/Drawing Title A38 DERBY JUNCTIONS LOCATION OF DAM BROOK AND WATERMEADOWS DITCH SURVEY SITES LITTLE EATON			AECOM Internal Project Number 60533462		A38 Derby Junctions Project Highways England, Floor 5 2 Colmore Square 38 Colmore Circus Birmingham B4 6BN highways england
Drawn GSB	Checked PC	Approved PC		AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	
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Appendix B Site Photographs



Plate number	Notes	Plate
P1	Surveying in Dam Brook 1	 A photograph showing two surveyors in a ditch. The ditch is filled with dense, tall vegetation, including green grasses and pink flowers. One surveyor, wearing a dark blue shirt and a cap, is on the left, holding a blue bucket. The other surveyor, wearing a high-visibility yellow vest with 'ACM' on the back and a white cap, is on the right, holding a blue measuring tape. A blue line is stretched across the ditch in the foreground.
P2	Surveying in Dam Brook 2	 A photograph showing two surveyors in a ditch. The ditch is filled with dense, tall vegetation, including green grasses and pink flowers. One surveyor, wearing a dark blue shirt and a cap, is on the left, holding a blue measuring tape. The other surveyor, wearing a high-visibility yellow vest with 'ACM' on the back and a white cap, is on the right, holding a blue measuring tape.




Plate number	Notes	Plate
P3	Surveying in Watermeadows Ditch 1	 A photograph showing two individuals in high-visibility gear and waders working in a narrow ditch. The ditch is heavily lined with tall green reeds. One person is using a long-handled net or tool in the water, while the other stands nearby. The background shows a grassy field under a cloudy sky.
P4	Surveying in Watermeadows Ditch 1	 A photograph similar to P3, showing two surveyors in a ditch with reeds. One person is using a long-handled net, and the other is holding an orange bucket. The scene is a narrow waterway surrounded by dense vegetation.
P5	Brown trout caught at Dam Brook	 A close-up photograph of a brown trout lying on a white ruler. The ruler is marked in centimeters, showing the fish is approximately 25 cm long. The fish is positioned horizontally, and its head is to the left. The background consists of dry grass and twigs.




Plate number	Notes	Plate
P6	Brook lamprey (ammocoete) caught at Dam Brook	
P7	Bullhead caught at Dam Brook	
P8	Stone loach from Dam Brook	

Plate number	Notes	Plate
P9	Perch caught from Dam Brook	