M25 junction 10/A3 Wisley interchange TR010030
6.5 Environmental Statement: Appendix 7.17 White-clawed crayfish

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6.5 ENVIRONMENTAL STATEMENT:

APPENDIX 7.17 WHITE-CLAWED CRAYFISH

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7.1 White-clawed crayfish surveys 2018

7.1.1 Introduction

7.1.1.1 White-clawed crayfish (*Austropotamobius pallipes*) are protected against intentionally taking from the wild under the Wildlife and Countryside Act 1981 (as amended). A summary of the relevant legislation can be found in Appendix 7.1.

7.1.1.2 This report provides the methodology and results of these surveys. Further details about the importance of white-clawed crayfish will be provided in the Environmental Statement (ES) for the Scheme.

7.1.2 Objectives

7.1.2.1 The aim of the surveys is to determine the presence or likely absence of white-clawed crayfish (or any invasive crayfish species) within and in close proximity (50 m) to the Scheme.

7.1.3 Methodology

7.1.3.1 All white-clawed crayfish surveys detailed below have been undertaken in accordance with relevant guidance and Chartered Institute of Ecology and Environmental Management (CIEEM) competencies for undertaking white-clawed crayfish surveys[1]. Surveys were led by a suitably experienced and licensed ecologist.

Desk study

7.1.3.2 A desk study was conducted in April 2017, which included the provision of records from Surrey Biodiversity Information Centre (SBIC) for white-clawed crayfish up to 1 kilometre (km) from the Scheme.

Field Survey

7.1.3.3 The survey methods used were the most appropriate for the type of habitat present[2] and were based on Peay's (2003) 'Monitoring the White-clawed Crayfish'[3].· Information was also drawn from Peay's (2000) 'Guidance on works affecting white-clawed crayfish'[4].

<u>Survey Area Selection</u>

7.1.3.4 The survey area selection considered all watercourses within or adjacent to the Scheme:

- Stratford Brook is located within the Scheme at the southern end of the Scheme;
- The River Wey is adjacent to the Park Barn Farm replacement land; and,

[1] CIEEM (2013) Competencies for Species Survey: White-clawed Crayfish
[2] Peay, S (2004) A cost-led evaluation of survey methods and monitoring for white-clawed crayfish – lessons from the UK. Accessed via: https://www.kmae-journal.org/articles/kmae/pdf/2004/01/kmae2004372p335.pdf (on 24 November 2017)
[3] Peay, S (2003) Monitoring the White-clawed Crayfish. English Nature: Peterborough. Accessed via: http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=SMURF_crayfish_monitoring.pdf (on 24 November 2017)
[4] Peay, S (2000) Guidance on works affecting white-clawed crayfish. Accessed via: https://www.devon.gov.uk/guidancewccrayfish.pdf (on 24 November 2017)

- The River Mole is located adjacent to Chatley Wood replacement land.

7.1.3.5 The Environment Agency has confirmed that signal crayfish (*Pacifastacus leniusculus*) are known to occur within the River Wey, which is located downstream of Stratford Brook. As part of the Scheme, a feasibility study will be undertaken to assess the removal / modification of the sill within Stratford Brook North and South Culvert. This will create a potential passage way for signal crayfish upstream into Stratford Brook, which in turn may result in the loss of white-clawed crayfish from Stratford Brook, should they be present[5]. Therefore, a white-clawed crayfish survey was undertaken at Stratford Brook[6].

7.1.3.6 The River Wey and River Mole have been ruled out of any white-clawed crayfish survey as the replacement areas do not physically adjoin the rivers edges, and these sites are only undergoing habitat enhancement works. Therefore, should any white-clawed crayfish be present within the River Wey or the River Mole, they would not be affected by the proposed habitat enhancement works within the replacement areas. In addition, signal crayfish are known to be present in the River Wey, indicating that white-clawed crayfish are likely to be absent.

Habitat Assessment Survey

7.1.3.7 A habitat suitability assessment was undertaken on the 29th October 2018 at Stratford Brook to assess the potential suitability of the watercourse for white-clawed crayfish surveys. The survey was centred around the relevant interaction with the Scheme at Stratford Brook Culvert South, at Ordnance Survey National Grid Reference (OSNGR) TQ 063 575. The habitat suitability assessment covered 1.6 km of the watercourse, which was approximately 900 m downstream and 700 m upstream of the Stratford Brook Culvert South. The survey area is showing on Figure 7.28.

7.1.3.8 During the habitat suitability assessment, attention was given to whether the conditions were best suited to a manual search and/ or a trapping survey. Suitable conditions for manual survey include: ample loose, ‘searchable’ potential refuges in shallow water less than 0.5 m deep in water that is clear, with little settled silt and with extensive lengths (> 100 m) that can be safely accessed from the bank and waded. Table A.1.1 in Annex A outlines crayfish habitat preferences and can serve as a guide to identifying patches to survey and refuges[3].

7.1.3.9 During the habitat assessment, all suitable crayfish habitat upstream and downstream of Stratford Brook Culvert South was recorded. The habitats within the survey area were assessed as having negligible to low suitability for white-clawed crayfish. The presence of sewage fungus and other pollution within the brook reduced this further to negligible.

7.1.3.10 However, options for further investigatory surveys were explored, as requested by the client, due to the presence of signal crayfish in adjacent watercourses and the high risk of the works if white-clawed crayfish were present. Potential survey methods include manual search, night viewing and trapping. Trapping was not practicable due to the shallow and narrow nature of the brook, leaving manual search and night viewing. Manual searching was limited by the lack of available refuges to search, while night-torching was limited by high turbidity in the

[5] The non-native North American signal crayfish is an invasive species and carries a disease to which the white-clawed crayfish has no natural resistance.
[6] Team meeting minutes from a meeting with the Environment Agency on the 15th August 2018.

sections of brook affected by sewage fungus. Therefore, a combined approach was adopted.

7.1.3.11 In accordance with Peay (2003), five patches of potential crayfish habitat were identified for manual searching, which was deemed to be the most suitable method for further surveying due to the shallow depth and slow flowing water. Between mid-July and mid-September, a manual search can immediately follow the habitat suitability survey if the habitat is assessed as suitable for white-clawed crayfish. As the survey area was 1.6 km, 2 or 3 stretches would normally be chosen to survey. However, due to the limited amount of suitable habitat and sparsity of refuges within the survey area, the whole Site was classified as a single stretch, with the five patches restricted to areas where anthropomorphic materials, such as bricks, had fallen into the stream bed, although some roots and cobbles were also noted. These patches were a minimum of 5 m apart, and at least 1 m^2 in size.

Night viewing

7.1.3.12 A night viewing survey was undertaken on the 29 October 2018. All accessible areas of the survey site, including the five patches, were surveyed with the aid of torches with one million candle power. The survey area for night viewing can be found on Figure 7.29.

7.1.3.13 Night viewing surveys were used to record crayfish, which are active are night. Surveys are recommended to be undertaken where temperatures are above 8°C, as crayfish are less active in temperatures below this[3].

Manual Searching

7.1.3.14 Manual searching surveys were undertaken on the 29 and 30 October 2018. The locations of the manual searches can be found on Figure 7.29.

7.1.3.15 Within each patch, ten potential refuges were selected; refer to Annex A for details of how potential refuges were identified. A manual search of refuges involved searching under stones and dead wood present in channel for crayfish. In addition, sweep netting under tree roots was carried out where appropriate. Any netting was done with two surveyors, with one surveyor undertaking the netting and the second downstream to catch any crayfish that may be present.

7.1.3.16 In addition, during this survey the supplementary technique of searching for crayfish remains was also carried out.

7.1.3.17 Biosecurity measures were implemented throughout all surveys, with disinfection of equipment[7] between watercourses. In addition, where a downstream site was surveyed first on a watercourse, equipment was disinfected before surveying upstream.

7.1.4 Constraints

7.1.4.1 During the manual searching and night-viewing, surveys were undertaken outside of the optimal survey season (October), with water temperatures ranging from 5.8°C and 6.2°C. White-clawed crayfish are typically less active at temperatures under 8°C and harder to find. Both of these factors will have reduced the effectiveness of surveys carried out and have been taken into consideration. It is not, however, considered to be a significant limitation based

[7] The disinfectant product that was used was Virkon S.

on the overall suitability of the site (negligible – low), the number of survey methods employed, and the fact that no obvious signs of crayfish or crayfish burrows were observed.

7.1.4.2 Access to downstream of Stratford Brook Culvert South was limited to 15% due to dense vegetation on both sides of the banks that extended over the narrow stream, restricting surveyor access due to health and safety concerns. This is not considered to be a significant limitation due to the low suitability of habitat identified as a whole in the downstream area, and access upstream being 95%. The accessible areas of the survey site can be found on Figure 7.28.

7.1.5 Results

Desk study

7.1.5.1 The SBIC desk study returned no records of white-clawed crayfish within 1 km of the Site.

7.1.5.2 Environmental Agency data states that signal crayfish are present in the River Wey, which is to the north-west of Stratford Brook[6].

Habitat Assessment

7.1.5.3 Stratford Brook flows from the east, beneath the A3 through two culverts towards the River Wey. The watercourse has steep banks approximately 1 m to 1.25 m high and is heavily shaded by mature woodland. Upstream of the A3 culverts the width of the watercourse is approximately 2.5 m wide and narrows to approximately 1.5 m wide downstream of the A3 culverts. The channel depth is approximately 0.5 m upstream and decreases to approximately 0.2 m downstream. No flow was evident along the whole reach, with the water becoming increasing turbid towards Stratford Brook Culvert South.

7.1.5.4 The vast majority of Stratford Brook was found to be unsuitable for crayfish as the channel substrate is dominated by silt with few natural refugia present. Potentially suitable habitat present included short sections of stony riffles, vertical banks with exposed tree roots and the occasional dislodged brick or branch. However, these were limited in area and isolated by larger patches of unsuitable habitat.

7.1.5.5 Sections of Stratford Brook had no flow, and an oily film was present on the surface of the water. Sewage fungus was present along the entire section of Stratford Brook that was surveyed. Sewage fungus results from a high concentration of biodegradable organic waste within the watercourse and causes deoxygenation and the growth of bacterial and fungal slimes[8]. Although no water quality tests have been conducted on Stratford Brook, the present of the oily film and sewage fungus suggest poor water quality.

7.1.5.6 The watercourse was found to be heavily shaded by mature woodland which prevented the presence of any in-stream aquatic vegetation and resulted in a high-amount of leaf-litter within Stratford Brook.

[8] EPA (2008). Irelands Environment 2008: River Water Quality. Available at: https://www.epa.ie/pubs/reports/indicators/irlenv/43366%20EPA%20report%20chap%207.pdf. Accessed 28th November 2018.

Field Survey

7.1.5.7 A combination of manual searches and night-viewing was used. No visual sighting or field signs, such as burrows or remains, were identified during the survey for white-clawed crayfish. In addition, no invasive non-native crayfish species such as the signal crayfish were recorded.

7.1.6 Discussion

7.1.6.1 White-clawed crayfish surveys were conducted in October 2018 at Stratford Brook. No evidence of white-clawed crayfish or invasive non-native crayfish species were observed during these surveys.

7.1.6.2 Stratford Brook was identified as unsuitable to support white-clawed crayfish due to a lack of suitable refuges and severe pollution at the time of survey. White-clawed crayfish are sensitive to pollutants, and large expanses of sewage fungus were recorded throughout Stratford Brook.

7.1.6.3 Based on the survey results and absence of evidence of white-clawed crayfish recorded during the surveys, white-clawed crayfish are considered to be likely absent from Stratford Brook.

7.1.6.4 No other watercourses will be directly affected by the Scheme.

Appendices

Appendix A Crayfish habitat and refuge guidance

A.1 Identification of crayfish refuges and habitat preferences

A.1.1 The text below is taken from Peay (2003)[3] and details how to identify good refuges for crayfish.

A.1.2 The key features of potential refuges for crayfish are that they are:

- Big enough to amply cover the crayfish;
- Relatively stable and resistant to high flows;
- In flow that is slow enough for a crayfish to walk in it;
- Not too silted.

A.1.3 Foster (1993)[9] showed that the use of refuges is related to body size. This has been confirmed by many other studies. Crayfish prefer large refuges to a much greater extent than could be accounted for simply by avoiding predatory fish. The ability of refuges to resist movement during spates is a very important factor, as crayfish take avoiding action as soon as there is any increase in velocity in a watercourse. The need for security in floods is especially important in relatively high-energy, stony watercourses, but it applies to all crayfish populations in watercourses. In general, crayfish have habitat preferences, as shown in Table A.1.1 below.

A.1.4 Look for areas of the channel with preferred features. Not all characteristics are obvious from a distance. For example, boulders in a slow glide may all be too deeply bedded in sand for crayfish to have access underneath. Cobbles and rubble tipped on the outside of a bend to prevent erosion may offer abundant crevices for crayfish, but the material may be piled so deeply that it cannot be searched effectively.

A.1.5 Searching cobbles and pebbles under one large boulder can be considered as one refuge.

Table A.1.1: A guide to identifying habitat patches to survey and refuges

Crayfish strongly prefer	more than	much more than (or avoid)
Boulders (>25 cm), stone or other material	large cobbles (15 – 25 cm)	small cobble (6 – 15 cm)
Slow-flowing glides and pools (provided there are refuges)	riffles	high-energy areas such as rapids (avoided).
Localised velocity of 0.1 m s^{-1} or less	less than 0.2 m sec^{-1}	more than 0.2 m sec^{-1} (avoided)

[9] Foster J (1993) The relationship between refuge size and body size in the crayfish *Austropotamobius pallipes* (Lereboullet). Freshwater Crayfish 9, 345–349

Crayfish strongly prefer	more than	much more than (or avoid)
Boulders or large cobbles in groups with crevices between them	isolated large stones on smaller substrate such as pebble and gravel	a lot of small stone (small cobble and pebble)
Deep crevices in bedrock (can't usually search)	partly flattened boulders and large cobbles	high-sided, rounded cobbles (more easily rolled in spates)
Underlying substrate of fine gravel / sand with some pebbles	pebble and coarse gravel	clay
Loose boulders		deeply bedded boulders in a compacted bed (not accessible to crayfish)
Submerged refuges in stable banks (e.g. natural crevices, stone block reinforcement or stable, slightly undercut banks with overhanging vegetation, large tree roots, etc.)	refuges in the slow-flowing margins	refuges in mid-channel (especially if flow is a run or higher energy)
Margins next to favourable bankside habitat	margins where adjacent banks have no scope for refuges (e.g. shallow slopes)	margins where adjacent earth banks are slumped and actively eroding

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