Norfolk County Council

Norwich Western Link Road

Aquatic Ecology Survey Report 2021

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1 Introduction

1.1 Project background

1.1.1. The Norwich Western Link Road (NWL) is a highway scheme linking the A1270 Broadland Northway from its junction with the A1067 Fakenham Road to the A47 trunk road near Honingham.

1.1.2. The NWL, hereafter referred to as the Scheme, will comprise:

- Dualling the A1067 Fakenham Road westwards from its existing junction with the A1270 to a new roundabout located approximately 400m to the north west.
- Construction of a new roundabout.
- Constructing a dual carriageway link from the new roundabout to a new junction with the A47 near Honingham.

1.1.3. As part of a separate planned scheme, National Highways proposes to realign and dual the A47 from the existing roundabout at Easton to join the existing dual carriageway section at North Tuddenham. If that scheme proceeds, it is expected that National Highways will construct the Honingham junction and the Norwich Western Link will connect to the north-eastern side of that junction.

1.1.4. The Scheme will cross the River Wensum and its flood plain by means of a viaduct. In addition, six other structures are proposed to cross minor roads and to provide habitat connectivity. The Scheme will include ancillary works such as provision for non-motorised users, necessary realignment of the local road network, including the stopping up of some minor roads, and the provision of environmental mitigation measures.

1.2 Ecological background

1.2.1. This report presents the results of the River Habitat Survey (RHS) and macrophyte assessment of the Foxburrow Stream completed in 2021. Baseline surveys of the River Wensum and floodplain were completed in 2020 including a RHS and macrophyte survey at the location of the viaduct structure crossing (WSP UK Ltd., 2021a; 2021b).

1.3 Brief and objectives

1.3.1. WSP UK Ltd was commissioned by Norfolk County Council (NCC) to complete a RHS and macrophyte survey to fulfil the following objectives:

- To characterise and assess the physical structure of the Foxburrow Stream within the Survey Area;
- To determine the presence/likely absence of protected and/or notable macrophyte species within the Survey Area; and
- To present the findings of the surveys in a baseline report.

1.3.2. The findings of the surveys will be used to inform the impact assessment, proposed mitigation and enhancement opportunities across the Scheme. Details of the impact assessment and mitigation will be included within the Biodiversity Chapter of the Environmental Statement for the Scheme.

1.4 Survey area

1.4.1. The ‘Survey Area’, as it is referred to hereafter, includes the location at which the RHS and macrophyte survey was conducted on the Foxburrow Stream. The Survey Area encompassed a section of the Foxburrow Stream which flows through an area of wet/marshy grassland in the southern aspect of the Scheme.

1.4.2. The Survey Area comprised a 100m section of the Foxburrow Stream between National Grid Reference (NGR); TG 10377 13469 and TG 10309 13503 (Figure 1-1).

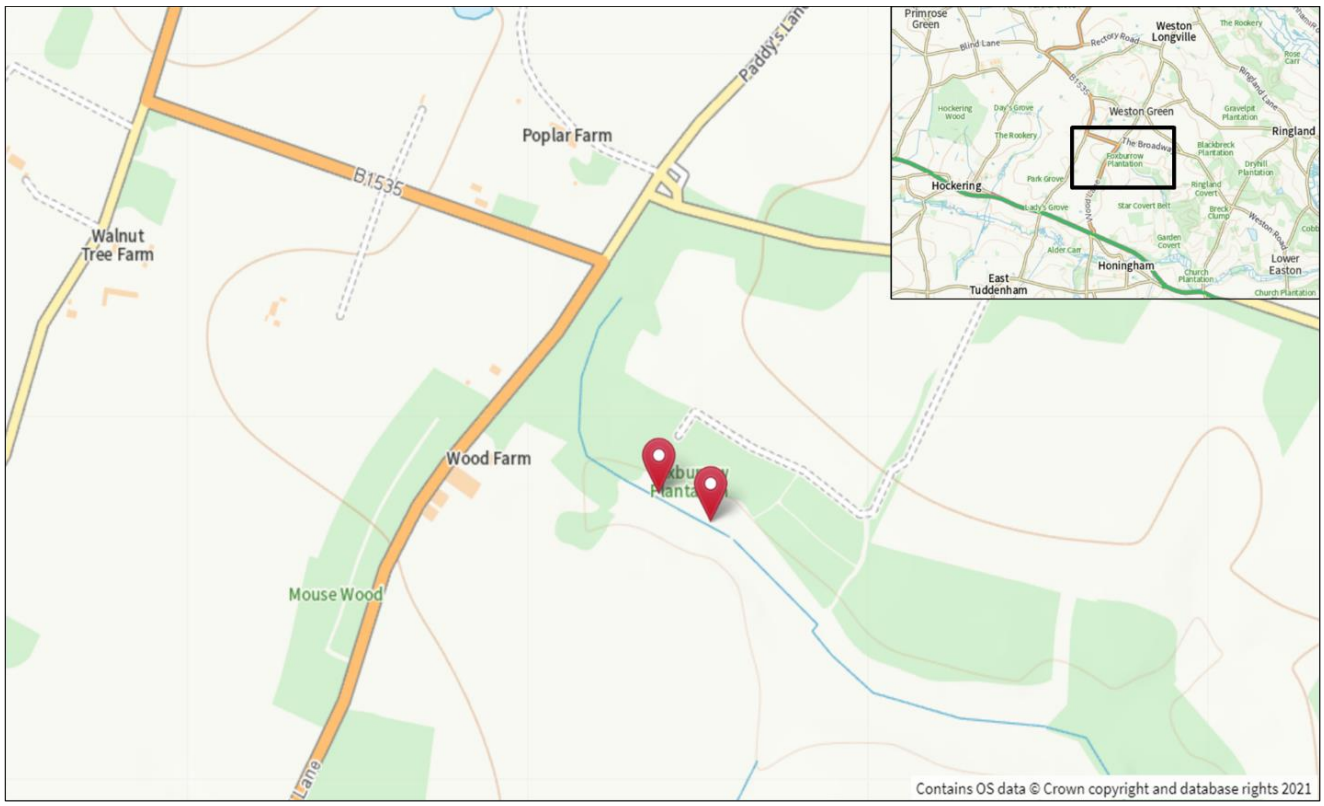

Figure 1-1 - Map displaying upstream and downstream survey extent for RHS and macrophyte survey within the Foxburrow Stream

2 Methods

2.1 River habitat survey

Field survey

2.1.1. A RHS was undertaken by two surveyors on 29 June 2021. Weather conditions were fair and cloudy with no precipitation.

2.1.2. The RHS was carried out with reference to standard methodology as detailed in the River Habitat Survey Field Survey Guidance Manual: 2003 Version (Environment Agency, 2003) to characterise the physical habitat character, structure and degree of morphological modification of the Foxburrow Stream.

2.1.3. Limited access to the banks and channel of the Foxburrow Stream, due to dense vegetation, meant that the standard 500m survey length, including 10 spot-checks, was not able to be completed (see Limitations in Section 2.3). Alternatively, a 100m section with two spot-checks was undertaken to identify observed features. Photographs were taken throughout the survey at any occurrence of habitat modification (such as bridges and bank reinforcement) and to record any other features of interest noted within the vicinity of the river corridor.

2.1.4. Site photographs are presented in Appendix A.

2.1.5. The standard RHS methodology is provided below.

2.1.6. Measurements are taken for the following variables as part of the survey:

- A. General field survey details
- B. Predominant valley form
- C. Number of riffles, pools and point bars
- D. Artificial features
- E. Physical attributes of the left and right bank, and channel
- F. Bank top land-use and vegetation structure
- G. Channel vegetation types
- H. Land-use within 50m of bank top
- I. Bank profiles
- J. Extent of trees and associated features
- K. Extent of channel and bank features
- L. Channel dimensions
- M. Features of special interest
- N. Choked channel
- O. Notable nuisance plant species
- P. Overall characteristics

2.1.7. The measurements for variables E, F and G were taken in the form of two spot-checks on the Foxburrow Stream. In a full 500m survey, this would consist of 10 spot-checks 50m apart with a 1-10m wide survey transect across the river depending on the type of measurement.

2.1.8. The remainder of the measurements (A to D and H to P) were taken as part of the entire 100m Survey Area. This would normally be performed as part of a 500m sweep-up, or at one location on a straight or uniform section to measure more detailed physical attributes of the river.

RHS indices

2.1.9. The RHS indices have been omitted from this report. The RHS indices could not be calculated due to inaccessibility of the watercourse to complete the standard RHS methodology (see Limitations in Section 2.3).

2.2 Macrophyte survey

Field survey

2.2.1. A macrophyte survey was undertaken by two surveyors on 29 June 2021. Weather conditions were fair and cloudy with no precipitation.

2.2.2. The survey was carried out using the Water Framework Directive UK Technical Advisory Group's methodology for assessing macrophytes in rivers (WFD-UKTAG, 2014). This method conforms with CEN 14184: 2003 Water Quality – Guidance standard for the surveying of aquatic macrophytes in running waters.

2.2.3. The methodology specifies that a 100m stretch of the watercourse should be sampled between 1 June and 30 September. Sampling should not be completed during or immediately after high flows. If cold weather or spring floods have delayed the growth of macrophyte taxa, sampling should commence after 30 June.

2.2.4. Surveyors recorded the presence of all macrophytes within the Survey Area to species level where possible. Where it was not possible to identify a particular macrophyte to species level, it was recorded under its genus or other aggregate taxon level.

2.2.5. The general condition of the Foxburrow Stream's macrophyte community within the Survey Area was recorded. It was not possible to record the percentage cover range and assign a taxon cover value for each macrophyte species due to limitations of the assessment presented by site conditions.

Biological indices

2.2.6. The standard WFD biological indices, derived from the statistical tool River Predictions and Classification Systems for Macrophytes (LEAFPACS2), were not applicable due to limitations to the survey preventing mandatory variables such as taxon cover value being recorded.

Ellenberg light indicator values

2.2.7. Ellenberg light indicator values score flora along gradients reflecting various habitat preferences (Ellenberg *et al*. 1991). The purpose of these indicator values is to assess the ecological niche of regional flora. Ellenberg light indicator values were attributed to the species identified within the Foxburrow Stream. The values and associated tolerances are described below.

Table 2-1 – Ellenberg light indicator values and associated tolerances

Value	Description
1	Plant in deep shade
2	Between 1 and 3
3	Shade plant, mostly less than 5% relative illumination, seldom more than 30% illumination when trees are in full leaf
4	Between 3 and 5
5	Semi-shade plant, rarely in full light, but generally with more than 10% relative illumination when trees are in leaf
6	Between 5 and 7
7	Plant generally in well-lit places, but also occurring in partial shade
8	Light-loving plant rarely found where relative illumination in summer is less than 40%
9	Plant in full light, found mostly in full sun

2.3 Notes and limitations

2.3.1. Every effort has been made to provide a comprehensive description of the river habitat and macrophyte community within the watercourse; however, the following specific limitations apply to this assessment:

- The RHS survey was limited by poor access along the banks due to dense coverage of tall herb/rank vegetation and severe encroachment of the wetted channel (see Appendix A – Site Photographs). A standard 500m RHS survey was not possible due to the vegetation limiting safe and practical access for surveyors around the watercourse, and the key features of the survey, such as bank profile and channel dimensions, not being visible. A 100m length of Foxburrow Stream, that could be safely accessed and observed for two RHS spot-checks, was selected for the assessment.
- The macrophyte survey of the Foxburrow Stream was also limited to a degree by the dominance and encroachment of bank vegetation. A standard 100m length of channel was assessed broadly for its macrophyte assemblage from several accessible vantage points. However, the overgrown nature of the stream by bank vegetation meant that assessing the percentage cover of each macrophyte species accurately was not possible. Consequently, the taxon cover values; derived from the percentage cover field data, and required for LEAFPACS2, could not be determined and therefore no statistical analysis could be performed to produce standard WFD biological indices.

- Despite the limitations encountered during these surveys, it has been possible to obtain a sufficient, representative characterisation of the habitat, flora and fauna present within the Foxburrow Stream, which will enable the determination of appropriate mitigation and improvement measures to address any identified impacts associated with the Proposed Scheme.
- Ecological survey data is typically valid for up to 18 months unless otherwise specified. The likelihood of surveys needing to be updated increases with time and is greater in circumstances where the habitat or its management has changed significantly since the surveys were undertaken (CIEEM, 2019). No such changes to habitat or management have been identified with respect to aspects discussed in this report.

3 Results

3.1 Overview

3.1.1. The Foxburrow Stream flows through rough pasture and shows evidence of realignment, bank reprofiling and livestock poaching. The river corridor was densely vegetated with tall herbs on both banks and some scattered trees shading the channel. The wetted channel was narrow and uniform in flow type, habitat features and substrate. At the time of the survey, the Foxburrow Stream had a low flow and shallow average water depth of 10cm. In general, the Foxburrow Stream contained a modest diversity of aquatic macrophyte taxa, comprised exclusively of emergent species with the dominant being Fool's watercress *Apium nodiflorum*.

3.2 River habitat survey

3.2.1. Channel dimensions for Foxburrow Stream are presented in Table 3-1.

3.2.2. The land use within 5m of the banktop was noted as rough pasture, scrub and shrubs, and tall herb/rank vegetation on both banks. Both banks were earthen and had a gentle profile with signs of reprofiling and livestock poaching. Trees on both banks were isolated/scattered with some overhanging boughs. Shading of the channel was categorised as less than one third of the survey reach.

3.2.3. The survey identified the absence of any riffles, pools and point bars. The channel exhibited a shallow vee form which was evidently realigned for more than one third of the survey reach. The flow type was mostly smooth, with some rippled flow, over a main substrate of sand with some interspersed gravel. Marginal silt deposits were unvegetated and were extensive throughout the reach.

3.2.4. No nuisance or invasive non-native species (INNS) plant species were observed.

Table 3-1 - Foxburrow Stream RHS channel dimensions

Left bank	Dimensions	Channel	Dimensions	Right bank	Dimensions
Banktop height (m)	0.5	Bankfull/top width (m)	3	Banktop height (m)	0.5
Banktop height same as bankfull height	Yes	Water width (m)	0.75	Banktop height same as bankfull height	Yes
Embanked height (m)	0.5	Water depth (m)	0.10	Embanked height (m)	0.5

3.3 Macrophyte survey

Water framework directive

3.3.1. The Foxburrow Stream lies within the WFD 'Tud' catchment area (waterbody ID GB105034051000) (Environment Agency, 2021a). The River Tud is designated as a WFD watercourse, whilst the Foxburrow Stream is classed as an ordinary watercourse.

3.3.2. There are no Environment Agency macrophyte monitoring locations on the Foxburrow Stream (Environment Agency, 2020b).

Survey results

3.3.3. Images of the surveyed stretch of the Foxburrow Stream are displayed in Appendix A.

3.3.4. A total of seven macrophyte taxa were recorded in the survey (Figure 3-2). The majority of the Survey Area was dominated by macrophytes with Ellenberg light indicator values of 7. Ellenberg light indicator value species of 7 are characterised by inhabiting well-lit places, but also tolerate partial shade (Ellenberg et al. 1991).

3.3.5. Fool's watercress was the dominant species in the Survey Area. The other species recorded were great willowherb *Epilobium hirsutum*, bittersweet *Solanum dulcamara*, water mint *Mentha aquatica*, soft rush *Juncus effusus*, brooklime *Veronica beccabunga* and water dock *Rumex hydrolapathum*.

Table 3-2 – List of macrophyte species recorded at Foxburrow Stream on 29 June 2021.

Common name	Scientific name	Ellenberg light indicator value
Fool's watercress	*Apium nodiflorum*	7
Great willowherb	*Epilobium hirsutum*	7
Bittersweet	*Solanum dulcamara*	7
Water mint	*Mentha aquatica*	7
Soft rush	*Juncus effusus*	8
Brooklime	*Veronica beccabunga*	7
Water dock	*Rumex hydrolapathum*	7

4 Conclusions

4.1.1. The Foxburrow Stream appears to have been subject to historic realignment and bank reprofiling with some evidence of recent livestock poaching. The stream in its current condition is highly overgrown with bank vegetation and provides a relatively modest diversity of aquatic macrophyte taxa.

Despite the limitations encountered during these surveys, it has been possible to obtain a sufficient, representative characterisation of the habitat, flora and fauna present within the Foxburrow Stream, which will enable the determination of appropriate mitigation and improvement measures to address any identified impacts associated with the Proposed Scheme.

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Appendix A – Site Photographs

Figure A-1 – Foxburrow Stream banks and surrounding land

Figure A-2 - Foxburrow Stream channel and bank vegetation community

Figure A-3 - Foxburrow Stream aquatic zone and substrate in an open channel area

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