



Norwich Western Link

Environmental Statement

Chapter 10: Biodiversity

Appendix 10.24: Macrophyte Survey Report 2021

Author: WSP

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Contents

1	Introduction	3
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1 Introduction

1.1.1 WSP UK Ltd was commissioned by Norfolk County Council to complete an RHS to fulfil the following objectives:

- To characterise and assess the physical structure of the River Wensum within the Survey Area; and
- To present the findings of the surveys in a baseline report.

1.1.2 The findings of the survey will be used to inform the impact assessment, proposed mitigation and enhancement opportunities to be presented within the Biodiversity Chapter of the Environmental Statement for the Scheme.

1.1.3 We have included a summary of key information shown in this document in an accessible format. However, some users may not be able to access all technical details. If you require this document in a more accessible format please contact norwichwesternlink@norfolk.gov.uk



Norfolk County Council

NORWICH WESTERN LINK ROAD

River Habitat Survey – Baseline Report





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River Habitat Survey – Baseline Report

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WSP

2 London Square

Cross Lanes

Guildford, Surrey

GU1 1UN

Phone: +44 148 352 8400

WSP.com



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CONTENTS

1	INTRODUCTION	3
1.1	PROJECT BACKGROUND	3
1.2	ECOLOGICAL BACKGROUND	3
1.3	BRIEF AND OBJECTIVES	3
2	RELEVANT LEGISLATION	4
2.1	LEGAL COMPLIANCE	4
3	METHODS	6
3.1	RIVER HABITAT SURVEY	6
3.2	LIMITATIONS	9
4	RESULTS	10
4.1	RIVER HABITAT SURVEY	10
5	REFERENCES	11

TABLES

Table 3-1 – Habitat Modification Score (HMS) and associated Habitat Modification Class (HMC).	7
Table 3-2 – Habitat Quality Assessment (HQA) classes and descriptors.	8
Table 4-1 – RHS indices for the River Wensum.	10

FIGURES

Figure 3-1 – Upstream and downstream extents of the River Habitat Survey of the River Wensum, carried out on 15 July 2020	6
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APPENDICES

APPENDIX A

RIVER HABITAT SURVEY - SURVEY SCORES (FULL OUTPUT)

APPENDIX B

SITE PHOTOGRAPHS

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, Highways England 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 Highways England 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. The Scheme will also cross four minor roads by means of overpass or underpass bridges. The Scheme will include ancillary works such as provision for non-motorised users, necessary realignment of the local road network and the provision of environmental mitigation measures.

1.2 ECOLOGICAL BACKGROUND

- 1.2.1. The requirement for River Habitat Survey (hereafter referred to as RHS) habitats within the River Wensum that may be affected by the Scheme. This was identified following the Phase 1 Habitat Survey and associated desk study (WSP UK Ltd., 2018B) and the refined survey in 2020. As part of the Scheme, a viaduct structure is required to carry the NWL across the River Wensum at NGR TG 13979 15483.
- 1.2.2. The 'Survey Area', as it is referred to hereafter, includes the location at which the RHS was conducted (Figure 3.1). The Survey Area includes the location of the proposed viaduct where it crosses the River Wensum.

1.3 BRIEF AND OBJECTIVES

- 1.3.1. WSP UK Ltd was commissioned by Norfolk County Council to complete an RHS to fulfil the following objectives:
- To characterise and assess the physical structure of the River Wensum within the Survey Area; and
 - To present the findings of the surveys in a baseline report.
- 1.3.2. The findings of the survey will be used to inform the impact assessment, proposed mitigation and enhancement opportunities to be presented within the Biodiversity Chapter of the Environmental Statement for the Scheme.

2 RELEVANT LEGISLATION

2.1 LEGAL COMPLIANCE

- 2.1.1. Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation are an Annex I habitat and a primary reason for the designation of the River Wensum as a Special Area of Conservation (SAC) (JNCC, 2019) under The Conservation of Habitats and Species Regulations 2017 (HMSO, 2017a).
- 2.1.2. Such habitats designated as Sites of Community Importance (SCIs) and included in the Natura 2000 network (now referred to as National Network Sites following the UK's exit from the European Union¹). These sites must be managed in accordance with the ecological needs of the features that characterise them.
- 2.1.3. The River Wensum is also designated as a Site of Special Scientific Interest (SSSI), as specified under the Wildlife and Countryside Act (HMSO, 1981). The purpose of this SSSI designation is to safeguard the diversity and geographic range of habitats, species and geological and physiographic features. Public bodies have a statutory duty to take reasonable steps, consistent with the proper exercise of its functions, to further the conservation and enhancement of the sites special scientific interest.
- 2.1.4. The Natural Environment and Rural Communities (NERC) Act 2006 places a duty upon all public authorities, including planning authorities, to have regard for the conservation of biodiversity when discharging their duties. The Act refines the definition of biodiversity conservation, stating that it includes restoring or enhancing a population or habitat. Section 41 of the NERC Act requires the Secretary of State to list habitats and species of principal importance (HPIs and SPIs) for the conservation of biodiversity in England. The habitats and species listed in accordance with Section 41 largely replicate those listed on the UK Biodiversity Action Plan (BAP) which occur in England.
- 2.1.5. The Water Environment (Water Framework Directive) (England and Wales) Regulations (HMSO, 2017b) establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater, and for water all waterbodies (unless artificial or heavily modified) to achieve “good” ecological status. This is a retained EU law following United Kingdom’s exit from the EU, as managed by The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (HMSO, 2019b).
- 2.1.6. Ecological Status is expressed in terms of five classes (High, Good, Moderate, Poor or Bad). These classes are based on specific criteria and boundaries defined against biological, physico-chemical and hydromorphological quality elements. The overall Ecological Status of a WFD water body is determined by its poorest quality element. For example, a water body’s chemical and physico-chemical quality elements might be classed as ‘Good’ but the biological element classed as ‘Moderate Status’. In this case it would be classed overall as ‘Moderate Ecological Status’. To

¹ <https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017>



achieve the overall aim of good surface water status, the Directive requires that surface waters be of at least Good Ecological Status and Good Chemical Status. To achieve High Status, the Directive requires that the hydromorphological Quality Elements are also in place. When considering the impact of a development or activity on a waterbody it is a regulatory requirement under the WFD to assess if it will cause or contribute to a deterioration in status or jeopardise the waterbody achieving Good status in the future.

3 METHODS

3.1 RIVER HABITAT SURVEY

FIELD SURVEY

- 3.1.1. A RHS was undertaken by two surveyors, with a combined total of 24 of years in carrying out RHS, on 15 July 2020. Weather conditions were fair and cloudy with no precipitation.
- 3.1.2. The RHS was carried out using 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 River Wensum.
- 3.1.3. A 500m survey was conducted along the River Wensum between TG 14037 15422 and TG 13725 15669 (Figure 3-1).

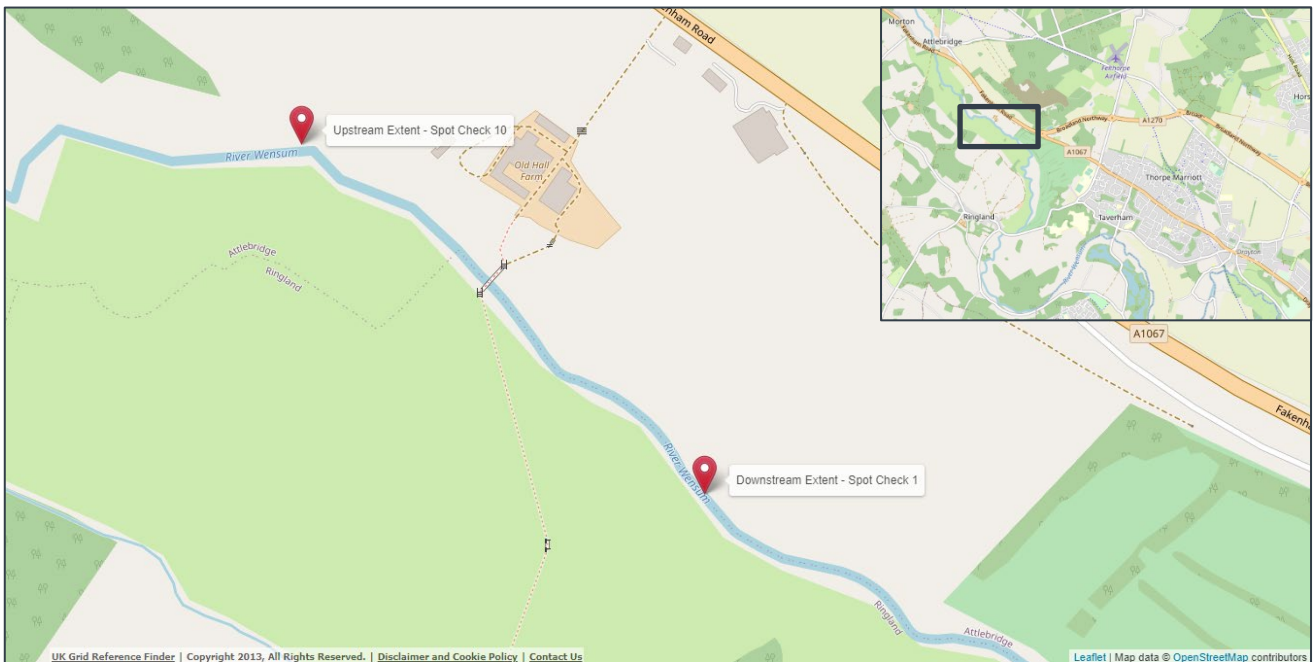


Figure 3-1 – Upstream and downstream extents of the River Habitat Survey of the River Wensum, carried out on 15 July 2020

- 3.1.4. Measurements were 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

3.1.5. The measurements for variables E, F and G were taken in the form of 10 spot-checks. These consisted of ten survey points 50m apart with a 1-10m wide survey transect across the river depending on the type of measurement. GPS co-ordinates for all spot check locations were recorded to aid further assessment in the future if required.

3.1.6. The remainder of the measurements (A to D and H to P) were taken either as part of a 500m sweep-up, which aims to identify any features observed within the 500m survey area but not falling within the ten spot-check locations, or at a single survey point at one location on a straight or uniform section of the river to measure more detailed physical attributes of the river.

3.1.7. Photographs were taken throughout the survey at the spot check locations, at each 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. Photographs are presented in Appendix B.

RHS INDICES

3.1.8. A number of indices were calculated from the raw RHS data, including the Habitat Modification Score (HMS) and Habitat Quality Assessment (HQA) metrics

3.1.9. The HMS was calculated by scoring all the modifications recorded on the RHS, for example: those features that are not naturally formed. These modifications are graded depending on the level of alteration and impact they have on the watercourse, for example, brick/laid stone scores 50 at each spot check where it is recorded. The modifications recorded in the RHS are totalled and the overall value is given a score. The HMS was then converted into a Habitat Modification Class (HMC), which is on a scale from 1-5, see Table 3-1 below:

Table 3-1 – Habitat Modification Score (HMS) and associated Habitat Modification Class (HMC).

HMS	HMC	Description
0-16	1	Pristine/semi-natural
17-199	2	Predominantly unmodified
200-499	3	Obviously modified
500-1399	4	Significantly modified
1400+	5	Severely modified

3.1.10. The HQA scoring system is a broad measure of the diversity and ‘naturalness’ of the physical habitat structure of a site, including both the channel and river corridor. The HQA score is calculated based upon the presence and extent of habitat features of known wildlife interest recorded during

the field survey. Additional points reflect the variety of substrate, flow-types, in-channel vegetation (affected by the presence of fluvial features), and the extent of trees and semi-natural land-use adjacent to the river. Points are added together to provide the HQA.

- 3.1.11. For the assessment of RHS habitat quality, it is essential to run Context Analysis to compare the HQA score of the RHS survey being studied in the assessment against the distribution of HQA scores for a subset of RHS sites of similar type within the RHS database. The subset of sites of similar type is extracted from RHS baseline surveys that characterise the state of river habitats in the UK. These sites of similar type are derived based upon the map-based variables of altitude, slope, height of source and distance to source based upon the mid-point (spot-check 6) of the RHS site being assessed.
- 3.1.12. Once the HQA score is calculated, the HQA class may be determined by comparing it to the HQA scores of the 150 nearest sites of similar type based upon the map-based variables mentioned above and run through a Principal Component Analysis (Context Analysis). The HQA scores for the 150 sites of similar type are ranked and then split into quintiles to form five habitat quality classes, ranging from Very High to Very Poor habitat quality (see Table 3-2).

Table 3-2 – Habitat Quality Assessment (HQA) classes and descriptors.

HQA Class	Description of Habitat Quality
1	Very high
2	High
3	Fair
4	Poor
5	Very poor

- 3.1.13. The results of the HQA score may then be used to identify potential mitigation measures for the potentially impacted watercourses. The HQA score is split into a range of sub-scores for specific habitat features, such as trees and associated features, flow types and channel substrate. Using the Context Analysis, the HQA sub-scores for the site surveyed for this assessment may be compared with the sub-scores with the sites of similar type. This provides an indication of which habitat features are better represented within the sites of similar type. Thus, mitigation and enhancements may be identified based upon this comparison in order to improve the HQA score of the sites surveyed for this assessment once the mitigation is implemented and established. This may, in turn, result in an improvement in the HQA Class of the sites surveyed once the mitigation is established and the RHS site is re-surveyed.
- 3.1.14. It should be noted that the RHS method provides a tool for general characterisation of a 500m reach of a river. As discussed above, the classifications derived from RHS data are calculated from indices that use a combination of the spot-check and sweep-up survey data. Ten spot-checks make up the survey and the bulk of the habitat quality scoring. These spot-checks are located at 50m intervals along the survey reach.

3.2 LIMITATIONS

- 3.2.1. 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.

4 RESULTS

4.1 RIVER HABITAT SURVEY

- 4.1.1. A summary of the RHS indices produced for the River Wensum are presented in Table 4-1. The full output list of scores for the RHS completed on the River Wensum is presented in Appendix A.
- 4.1.2. The HMS of 380 for the River Wensum places the site into Habitat Modification Class (HMC) 3 (Obviously modified). The HMS sub-scores which scored in the calculation are the HMS Bridges sub-score (250), HMS Realigned sub-score (100) and HMS Poaching sub-score (30).
- 4.1.3. The HQA class for the River Wensum was calculated as 3, describing the habitat quality as 'Fair' (Table 4-1). This contrasts with sites of a similar type which have a HQA class of 2, which are described as being of 'High' habitat quality. This difference in HQA class highlights a greater degree of artificial intervention and river channel modification of the River Wensum in the Survey Area, compared to rivers with similar characteristics (e.g. gradient, distance from source) and geology.

Table 4-1 – RHS indices for the River Wensum.

Site	Survey Reach	HMS	HMC	HQA
River Wensum	Downstream Extent: TG 14037 15422 Upstream Extent: TG 13725 15669	380	3	3

- 4.1.4. The survey on the River Wensum categorised the flow type predominantly as smooth with areas of rippling. There were no pools or riffles within the 500m stretch, with the channel exhibiting a shallow vee form which was obviously realigned and over-deepened for less than 33% of the survey section.
- 4.1.5. The plant community visible along the survey section included emergent broad-leaved herbs, emergent reeds/sedges/rushes/grasses/horsetails, floating-leaved (rooted), free-floating, submerged broad-leaved, submerged linear-leaved, submerged fine-leaved and filamentous algae.
- 4.1.6. A single vegetated mid-channel bar was recorded during the survey along the River Wensum.

5 REFERENCES

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Appendix A

RIVER HABITAT SURVEY - SURVEY SCORES (FULL OUTPUT)

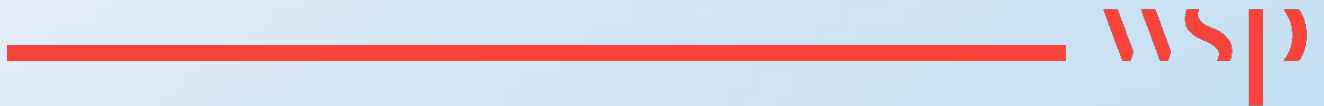




Table A-1 – Full RHS Indices for the survey of the River Wensum, completed on 15 July 2020, between TG 14037 15422 and TG 13725 15669.

RHS Outputs	River Wensum
Habitat Modification Score (HMS)	380
HMS Class	3
HMS Culverts sub-score	0
HMS Reinforced Bank Bed sub-score	0
HMS Resectioned Bank Bed sub-score	0
HMS Realigned sub-score	100
HMS Berms Embankments sub-score	0
HMS Weirs, Dams and Sluices sub-score	0
HMS Bridges sub-score	250
HMS Poaching sub-score	30
HMS Fords sub-score	0
HMS Outfall / Deflector sub-score	0
Habitat Quality Assessment (HQA) Score	41
HQA Adjusted	36
Baseline HQA Class	2
HQA Class position	76.00%
River Habitat Quality Class	3
HQA Flow Type 95-97	5
HQA Flow Type 94	4
HQA Channel Substrate	4
HQA Channel Features	1
HQA Bank Features	2
HQA Bank Vegetation Structure	12
HQA Channel Vegetation 95-97	7
HQA Channel Vegetation 94	5



RHS Outputs	River Wensum
HQA Land-use	1
HQA Trees	7
HQA Special Features 95-97	2
Riparian Quality Index (RQI) Score	80
RQI Class	2
Complexity sub-score	43
Naturalness sub-score	17
Continuity sub-score	20

Appendix B

SITE PHOTOGRAPHS





Figure B-1 - River Wensum – downstream survey area extent (TG 14037 15422)



Figure B-2 - River Wensum



Figure B-3 – River Wensum



Figure B-4 – River Wensum



Figure B-5 – River Wensum



Figure B-6 - River Wensum



Figure B-7 - River Wensum - upstream survey area extent (TG 13725 15669)



2 London Square
Cross Lanes
Guildford, Surrey
GU1 1UN

wsp.com

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