Norfolk Vanguard Offshore Wind Farm

Appendix 22.6

Desmoulin's Whorl Snail Survey Report

Environmental Statement

Volume 3 - Appendices

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Environmental Impact Assessment
Environmental Statement

Document Reference: PB4476-005-0226

June 2018

For and on behalf of Norfolk Vanguard Limited

Approved by: Ruari Lean, Rebecca Sherwood

Signed: [redacted]

Date: 8th June 2018

Norfolk Vanguard
Desmoulin's whorl snail presence / absence survey

Report prepared by Norfolk Wildlife Services Ltd.
on behalf of Royal HaskoningDHV

Reference: 2016/131.6

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1. Document details

Report produced by

Chris Smith/Ben Christie

Norfolk Wildlife Services

Bewick House
22 Thorpe Road
Norwich
NR1 1RY
NORFOLK

Tel. 01603 625540
Fax. 01603 598300

Agent details

Gordon Campbell

Royal HaskoningDHV

74/2 Commercial Quay
Commercial Street,
Leith
Edinburgh
EH6 6LX

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1.3	25/09/17	All	All	First draft for client	CS
2	17/10/17	All	All	Second draft for client - Project background update - Change of structure - Minor wording changes - Addition of GIS map	CS
3	13/11/17	All	All	Changes to structure	CS
4	01/12/17	All	All	Update as per comments and final changes to structure	CS

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2. Executive Summary

2.1. Following consultation with Natural England, a presence/absence survey of Desmoulin's whorl snail *Vertigo moulinsiana* was identified as being required within wet grassland and field drain habitats associated with the margins of the River Wensum and the adjacent floodplain (Royal HaskoningDHV 2017b).

2.2. The purpose of the survey was to ascertain whether *V. moulinsiana* is present within these habitat areas.

2.3. Eight survey locations were identified (referenced as AQ01 – 08) within the Norfolk Vanguard Phase 2 Ecological Survey Scope (Royal HaskoningDHV 2017b). These survey locations were sampled 3 times during August 2017 following methods set out by Killeen and Moorkens (2003) to determine the presence or absence of *V. moulinsiana*.

2.4. Observed limitations to the survey included a bull preventing access to part of the AQ07 survey location during the first visit, and only the southern bank of the River Wensum was sampled.

2.5. *V. moulinsiana* was not found during any of the sample visits and is considered absent from the survey locations.

2.6. It is recommended to create an additional survey location on the northern bank of the River Wensum and survey for *V. moulinsiana* following the methodology set out in this report due to the presence of the snail in other reaches of the River Wensum.

2.7. Further survey of location points AQ04, AQ05, AQ07 and AQ08 (as the most suitable locations) is recommended if works take place over three years from the survey date due to the potential for *V. moulinsiana* to become established within the survey area.

3. Introduction

3.1. Project background

3.1.1. Norfolk Vanguard is a proposed offshore wind farm being developed by Vattenfall Wind Power Limited (or an affiliate company), with a capacity of 1800MW, enough to power 1.3 million UK households. The offshore wind farm comprises two distinct areas, Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West) and will be connected to the shore by offshore export cables installed within the provisional offshore cable corridor. The project will also require onshore infrastructure in order to connect the offshore wind farm to the National Grid at the existing National Grid substation at Necton, which in summary will comprise the following:

- Landfall;
- Cable relay station (if required);
- Underground cables;
- Onshore substation; and
- Extension to the existing Necton National Grid substation.

3.1.2. The location of the onshore electrical infrastructure is shown on Figure 1, Appendix A of the Extended Phase 1 Habitat Survey Report (Royal HaskoningDHV, 2017a). Collectively the onshore electrical infrastructure is herein referred to as the 'onshore project area'.

3.1.3. During the development of the project, the onshore Scoping Area that was initially defined has been refined to include three landfall options, associated cable relay search zones, as well as an onshore substation search zone in proximity to the Necton National Grid substation. A 200m wide cable corridor has been identified within which the buried cable will be located, and Horizontal Directional Drilling (HDD) zones and mobilisation zones have been identified along the cable corridor.

3.1.4. The surveys described within this report were designed and based on the onshore project area which was in use when the project Extended Phase 1 Habitat Survey was undertaken (February 2017). As the project design is further refined, these search zones will decrease in size, and the final options for the siting of infrastructure (i.e. one cable relay station, one landfall, one onshore substation) will be taken forward for the final Development Consent Order (DCO) application in June 2018.

3.2. Aim of report

3.2.1. As Norfolk Vanguard is a Nationally Significant Infrastructure Project (NSIP) an Environmental Impact Assessment (EIA) is required as part of a DCO application under the Planning Act 2008.

3.2.2. Norfolk Wildlife Services were appointed in late April 2017 to undertake additional ecological surveys to support this application as set out within the Survey Scope (Royal HaskoningDHV, 2017b).

3.2.3. The Extended Phase 1 Habitat Survey (Royal HaskoningDHV, 2017a) identified the potential for legally protected species located within the project area plus a 50m buffer surrounding the project area, and provided recommendations for further surveys required to characterise the ecological baseline for the project area.

3.3. Survey objective

3.3.1. To provide baseline information on the presence or absence of *V. moulinsiana* within the wet grassland and field drain habitats associated with the River Wensum SAC survey area (Norfolk Vanguard Phase 2 Ecological Survey Scope, Royal HaskoningDHV, 2017b).

3.4. Survey scope

3.4.1. Development of survey scope

3.4.1.1. A Scoping Report for the EIA (Royal HaskoningDHV, 2016) was submitted to the Secretary of State on 3 October 2016 and the response in the form of a Scoping Opinion (PINS, 2016) published on 11 November 2016. That Scoping Opinion included the consultation responses of Natural England and Norfolk County Council.

3.4.1.2. An Extended Phase 1 Habitat Survey of the onshore project area was undertaken during February 2017 (Royal HaskoningDHV, 2017a). The Extended Phase 1 Habitat Survey identified the potential for legally protected species located within the project area plus a 50m buffer surrounding the project area, and provided recommendations for further surveys required to characterise the ecological baseline for the project area. These recommendations were issued to stakeholders on 17 March 2017 for comment, as part of the project Evidence Plan Process. Feedback was received from Norfolk County Council and Natural England on the 23 March 2017 and 3 April 2017 respectively that the methodologies were appropriate and acceptable.

3.4.1.3. A Survey Scope detailing the surveys required in order to deliver the Extended Phase 1 Habitat Survey Report recommendations (Royal HaskoningDHV, 2017b) was produced in March 2017. The Survey Scope (set out in Section 3.4.2, Royal HaskoningDHV 2017b) was used to tender for delivery of ecological surveys required for the project. Norfolk Wildlife Services used the methodology set out in the Survey Scope.

3.4.1.4. The whole length of the River Wensum is a designated Site of Special Scientific Interest (1993) and Special Area of Conservation (2005). The site is listed under Annex I for habitats and Annex II for species, including *V. moulinsiana*.

3.4.1.5. *V. moulinsiana* is listed under Annex II of the European Union Habitats and Species Directive. It is a priority species in the UK Biodiversity Action Plan (HMSO 1996) and is listed in the British Red Data Book (Bratton 1991) as an RDB3 (Rare) species.

3.4.2. Survey Scope

Survey area

3.4.2.1. Following consultation with Natural England conducted as part of the Evidence Plan Process, the need for a terrestrial invertebrate survey is required in relation to the wet grassland and field drain habitats associated with River Wensum. The survey was recommended by Natural England in order to determine presence / absence of *V. moulinsiana*, an Annex II species present as a qualifying feature, but not a primary reason for site selection for the River Wensum SAC.

3.4.2.2. The survey area is shown in Appendix 1 of this report, with the exact survey locations shown in Appendix 2.

Methodology

3.4.2.3. This invertebrate survey will follow the protocol set out in the Buglife's *A manual for the survey and evaluation of the aquatic plant and invertebrate assemblages of grazing marsh ditch systems* (Version 6) (2013). All of the ditches functionally connected to the River Wensum within the survey area, plus both banks of the River Wensum within the survey

area, will be sampled, as shown on Figure 1. This should include 7 samples in total. Each sample will be taken by netting on three occasions for 1-3 minutes at a selected location. Then each netted sample will then be sorted and species identified, and species abundance recorded. Those species which cannot be identified in the field will be taken back to the laboratory for identification.

3.4.2.4. The invertebrate survey should start in the last week in April and ideally be completed by early June (although useful results can be obtained up to mid-October).

3.4.2.5. All surveys should be undertaken by ecologists with experience in aquatic invertebrates surveys, preferably members of the CIEEM. No species licences are required for these surveys.

3.5. Scoping of survey locations

3.5.1. The survey locations identified by the Survey Scope (Royal HaskoningDHV, 2017b) based upon the Extended Phase 1 Habitat Survey (Royal HaskoningDHV, 2017a) consist of 8 separate survey locations (AQ01 – AQ08).

4. Methodology

4.1. This section sets out the protocol for the survey at the point prior to any field work commencing.

4.1. Survey protocol

Relevant guidance

4.1.1. The following guidance document was used to inform development of the survey methodology: "Killeen IJ and Moorkens E.A. (2003) A Monitoring Protocol for Desmoulin's Whorl Snail, Vertigo moulinsiana. Conserving Natura 2000 Rivers Monitoring Series No. 6. English Nature, Peterborough".

Survey locations

4.1.2. Eight survey locations were sampled, referenced as AQ01 – 08 (Appendix 2) as per the specified survey locations from the Norfolk Vanguard Phase 2 Ecological Survey Scope (Royal HaskoningDHV 2017b).

Survey methodology

4.1.3. The survey period and broad methodology outlined in the Survey Scope (Royal HaskoningDHV 2017b)was considered to be unsuitable for *V. moulinsiana*. Between April and June, the snails are lower on the vegetation and often present in very low numbers. The snails are most active and found with the highest numbers of adults high on vegetation during August.

4.1.4. The survey methodology is adapted from Killeen and Moorkens (2003), which is specific to *V. moulinsiana* and is described below.

4.1.5. For each of the eight identified survey locations, 3 survey samples will be spread out on approximately 1 week apart during August to gain maximum coverage during the peak survey season for adults of *V. moulinsiana*.

4.1.6. At each survey location, a photograph and GPS co-ordinates will be taken.

4.1.7. Within 20m either side of the survey locations, 5 sub-samples will be taken within suitable vegetation and combined to form a survey sample.

4.1.8. A sub-sample will consist of 1 minute of vegetation beating over a white tray. The survey sample will be sorted in the field, and presence / absence of *V. moulinsiana* recorded. Voucher specimens of any terrestrial gastropod molluscs (Pupilloidea) will be taken back to the laboratory for confirmation of identification.

4.1.9. Environmental variables as per Killeen and Moorkens (2003) shown in Table 1 will be recorded for each survey location including: ground moisture level, vegetation class and average sward height. The optimum ground moisture is between level 2 and 4, and optimum vegetation is considered to be Class 1 and 2 at an average sward height of 0.7m.

Table 1 : Environmental variables adapted from Killeen and Moorkens (2003). Highlighted rows show optimal variables.

Ground moisture			**Vegetation classes**	
1	Dry	No visible moisture	**Class 1**	*Glyceria, Carex, Cladium*
2	Damp	Ground visibly damp, but does not rise	**Class 2**	*Phalaris, Phragmites, Sparganium, Filipendula, Urtica*
3	Wet	Water rises under light pressure	**Class 3**	*Mentha, Epilobium, Persicaria*
4	Very wet	Pools of standing water, less than 5cm deep	**Class 4**	All other species
5	Under water	Entire site in standing or flowing water		

4.1.10. There are no specific time constraints. However, the snails shelter low down amongst vegetation overnight, surveys should therefore avoid early mornings and evenings.

4.1.11. Surveys will not be undertaken during wet and windy conditions, or early mornings with dew.

4.1.12. Specialist equipment was used to carry out the field surveys, which included:

- A 2m ruler calibrated at 10cm intervals to measure vegetation height,
- A white plastic tray (50x40cm, 5cm deep),
- A 1m long beating stick,
- A 20x magnification hand lens for field identification,
- Sample tubes for collection of voucher specimens pre-labelled for each survey location,
- A hand-held GPS receiver (Garmin eTrex).

4.1.13. A National Vegetation Classification survey, undertaken in 2017 by Norfolk Wildlife Services, identified NVC communities at sampling locations within the River Wensum survey area. The nearest NVC sampling locations (Norfolk Wildlife Services, 2017) to the eight survey locations (AQ01 – 08) will be referenced (Section 5.2).

4.1.14. No species licences are required for these surveys however; a permit to survey within the SAC will be required from Natural England.

4.1.15. All surveys will be undertaken by suitably experienced invertebrate surveyors, who will either be members of CIEEM or act according to its code of conduct.

4.2. Survey delivery

4.2.1. This Section details how the surveys were delivered in relation to the survey protocol, identifies any deviations or modifications that took place during the delivery of the survey and highlights survey limitations.

4.2.1. Survey methodology as delivered

Access to survey sites

4.2.1.1. A bull prevented access to part of the AQ07 survey location during visit 1 on 8th August 2017.

Survey effort

4.2.1.2. At all survey locations sampled, 3 repeat samples consisting of 5 sub-samples were carried out.

Timing and weather conditions

4.2.1.3. Survey visits were carried out on all survey locations on the 8th, 14th and 22nd August 2017.

4.2.1.4. Weather conditions as given previously were all suitable for the survey protocol.

Table 2 : Dates, time and weather for field visits

Survey visit	Date	Survey times (BST)	Surveyor	Safety worker	Beaufort Windscale	Precipitation	Presence of dew
Visit 1	08/08/2017	09:00 – 12:00	Ben Christie	Jennifer Christie	1	None	Absent
Visit 2	14/08/2017	08:30 – 11:30	Ben Christie	Carolyn Smith	2	None	Absent

Visit 3	22/08/2017	08:30 – 11:30	Ben Christie	Carolyn Smith	1	None	Absent

Personnel

4.2.1.5. All survey visits were carried out by Ben Christie GradCIEEM. Ben has over 6 years' experience in surveying invertebrates, across terrestrial and aquatic habitats. Other personnel mentioned in Table 2 were safety workers.

Consent

4.2.1.6. Consent for the survey of *V. moulinsiana* within the identified survey area during August 2017 was provided by Natural England on 24th July 2017 (Appendix 4).

4.2.2. Limitations

4.2.2.1. A bull prevented access to part of the AQ07 survey location during visit 1 however; this was not considered to be a significant limitation due to five sub-samples taken within the remaining accessible area and additional 2 repeated sample visits.

4.2.2.2. Only the southern bank of the River Wensum was sampled at one survey location (AQ08). The northern bank of the River Wensum was not included within the Survey Scope (Royal HaskoningDHV 2017b) due to lack of landowner access for this area. Since the northern bank of the River Wensum was not surveyed, there is potential that *V. moulinsiana* is present in this location.

5. Results

5.1. Presence / absence

5.1.1. The results of the field surveys are shown in Table 3 below. Photographs for each survey location are provided in Appendix 3.

5.1.2. *V. moulinsiana* was found to be absent from the survey locations.

5.1.3. Two common and widespread species of terrestrial gastropod molluscs were recorded throughout the survey locations: silky snail *Ashfordia granulata* and large amber snail *Succinea putris*.

Table 3 : Results of the presence / absence surveys for V. Moulinsiana *during the 2017 survey visits*

Survey Location	GPS co-ordinates	Visit 1 Presence 08/08/2017	Visit 2 Presence 14/08/2017	Visit 3 Presence 22/08/2017
AQ01	TG 03792 17399	Absent	Absent	Absent
AQ02	TG 03775 17515	Absent	Absent	Absent
AQ03	TG 03814 17615	Absent	Absent	Absent
AQ04	TG 03906 17451	Absent	Absent	Absent
AQ05	TG 03920 17521	Absent	Absent	Absent
AQ06	TG 03890 17652	Absent	Absent	Absent
AQ07	TG 03987 17648	Absent	Absent	Absent
AQ08	TG 04130 17662	Absent	Absent	Absent

5.2. Environmental variables

5.2.1. The environmental variables at five survey locations were suitable for *V. moulinsiana*, the exceptions were AQ02, AQ03 and AQ06 which were not solely dominated by suitable vegetation.

5.2.2. The nearest NVC sampling locations (Norfolk Wildlife Services, 2017) to the eight survey locations (AQ01 – 08) have been referenced in the vegetation description column in Table 4.

Table 4 : Environmental variables during the 2017 survey visits. Highlighted rows show sub-optimal environmental variables. Nearest NVC sampling locations have been included as per the NVC report (Norfolk Wildlife Services, 2017).

Survey Location	Ground moisture	Dominant vegetation class	Average vegetation height (m)	Brief vegetation description (nearest NVC sampling location)
AQ01	2	2	0.7	Consisting mostly of *Epilobium hirsutum* with some *Phalaris arundinacea* (1A)
AQ02	3	2/3	0.5	Consisting mostly of *Urtica dioica* with some *Epilobium hirsutum*. In-channel vegetation was dominated by *Berula eretca* with frequent *Mentha aquatica* (2A)
AQ03	2	2/3	1	Consisting mostly of *U. dioica* on the east bank. In-channel vegetation had frequent *M. aquatica* and occasional *B. erecta* and *U. dioica* (2B)
AQ04	4	1	1.2	Consisting mostly of *Carex sp.* with *Juncus inflexus* and *M. aquatica* (1C – 1D)
AQ05	3/4	1	1	Consisting mostly of *Carex sp.* with some *Sparganium erectum* (4C)
AQ06	2	2	1	Consisting mostly of *U. dioica* with some *P. arundinacea* and *Fillipendula ulmaria*. In-channel vegetation with frequent *M. aquatica* and *B. erecta* (2C – 2D)
AQ07	3	1	1.5	Consisting mostly of *Glyceria maxima* with some *Iris pseudacoris* and *S. erectum* (2E)
AQ08	2/3	1/2	1	Dominated by *G. maxima* with some *P. arundinacea* (River Wensum)

6. Conclusions

6.1. *V. moulinsiana* is absent from the survey locations.

6.2. Given the presence of *V. moulinsiana* in other reaches of the River Wensum and the suitable habitats present in the survey area, it is possible that a population could become established within the survey area in the future.

6.3. Further survey of location points AQ04, AQ05, AQ07 and AQ08 (as the most suitable locations) are recommended if works take place over three years from the survey date.

6.4. It is recommended to create an additional survey location on the northern bank of the River Wensum and survey for *V. moulinsiana* following the methodology set out in this report.

7. Bibliography

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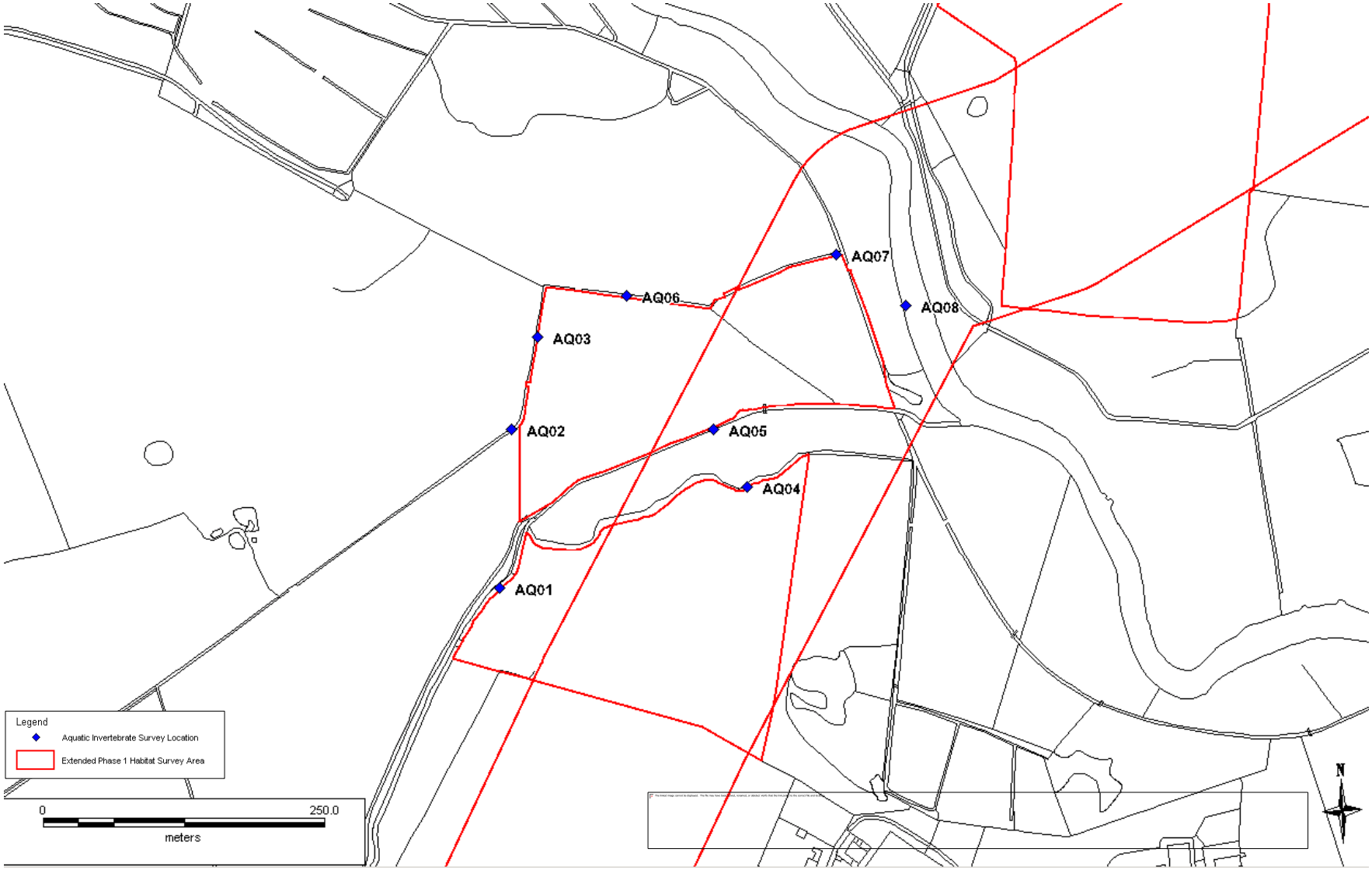
Appendix 1: Survey area

Appendix 2: Survey locations



Appendix 3: Photographs

Figure 1 : AQ01, facing northeast

Figure 2 : AQ02, facing northeast

Figure 3 : AQ03, facing north

Figure 4 : AQ04, facing west

Figure 5 : AQ05, facing southwest

Figure 6 : AQ06, facing east

Figure 7 : AQ07, facing northeast

Figure 8 : AQ08, facing north

Appendix 4: Natural England consent for survey

River Wensum Site of Special Scientific Interest Norfolk ("the SSSI")
River Wensum Special Area of Conservation (SAC)

CONSENT OF NATURAL ENGLAND

Section 28E(3)(a) of the Wildlife and Countryside Act 1981 (as amended and inserted by section 75 and Schedule 9 of the Countryside and Rights of Way Act 2000)
Regulation 21 of the Conservation of Habitats and Species Regulations 2010

To:

Mr Carrick

Of:

Castle Farm, Swanton Morley, Dereham, NR20 4JT

You have Natural England's consent to carry out, cause or permit to be carried out the operations specified below, on the land specified below.

This consent covers the period to 31st August 2017.

The specified operations:

Aquatic plant and Desmoulin whorl snail surveys

Timing of the operations:

24th July 2017 to 31st August 2017

Land on which the operations are to be carried out:

The River Wensum and adjacent land and ditches as shown on the attached maps.

Signed for Natural England: [redacted]

Date: 24/07/2017

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