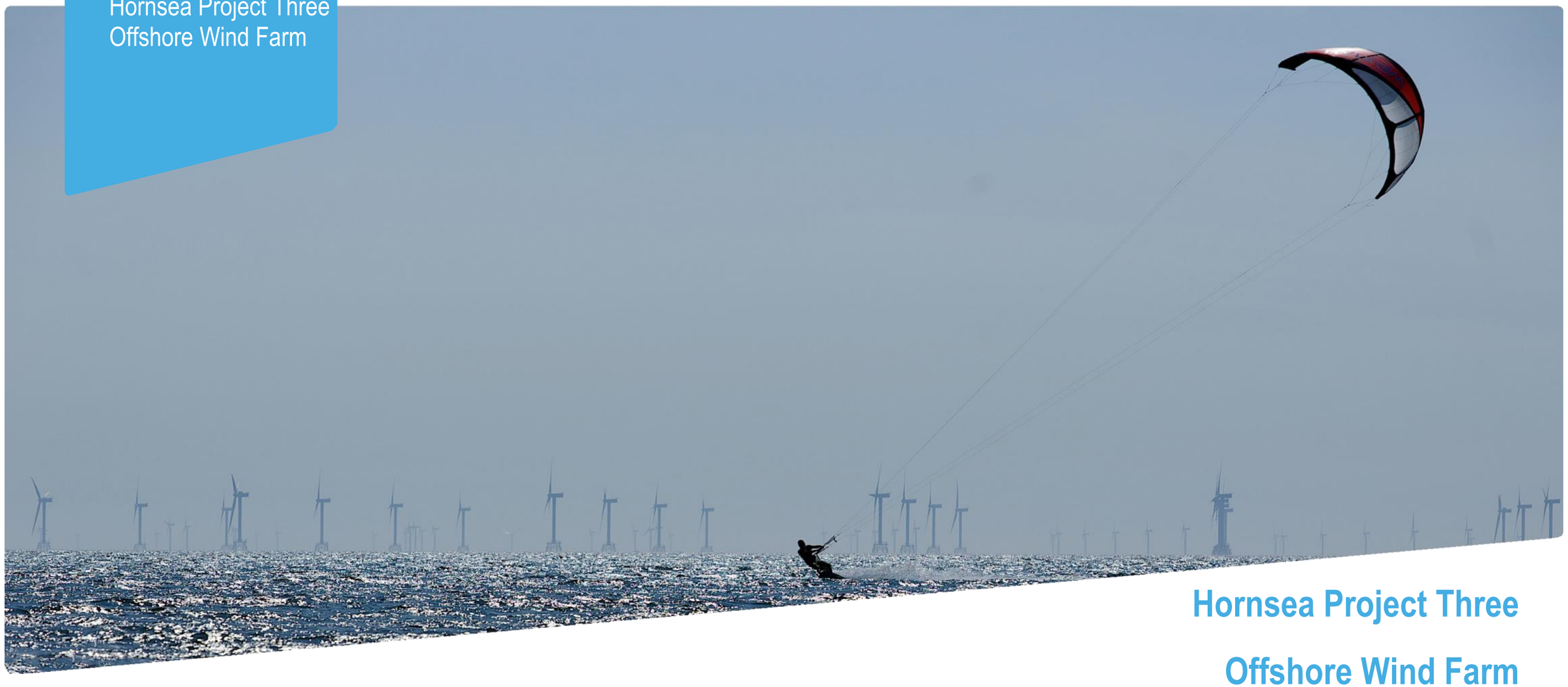
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Environmental Statement:
Volume 6, Annex 3.3 - Desmoulin's Whorl Snail Survey

PINS Document Reference: A6.6.3.3
APFP Regulation 5(2)(a)

Date: May 2018

Hornsea 3
Offshore Wind Farm

Ørsted

Environmental Impact Assessment

Environmental Statement

Volume 6

Annex 3.3 – Desmoulin's Whorl Snail Survey

Liability

This report has been prepared by Thomson Ecology Ltd, with all reasonable skill, care and diligence within the terms of their contract with Orsted Power (UK) Ltd.

Report Number: A6.6.3.3

Version: Final

Date: May 2018

This report is also downloadable from the Hornsea Project Three offshore wind farm website at:
www.hornseaproject3.co.uk

Ørsted

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London, SW1P 1WG

Front cover picture: Kite surfer near a UK offshore wind farm © Orsted Hornsea Project Three (UK) Ltd, 2018.

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Table of Contents

List of Tables

Glossary

Term	Definition
Calcareous	Occurring on chalk or limestone.
Habitats Directive	EU directive adopted in 1992 requiring Member States to take measures to maintain or restore natural habitats and wild species of European importance.
Mollusc	An invertebrate of a large phylum which includes snails, slugs, mussels, and octopuses. They have a soft unsegmented body and live in aquatic or damp habitats, and most kinds have an external calcareous shell.
Monocotyledons	A group of flowering plants (angiosperms) whose seeds typically contain only one embryonic leaf, the main families include grasses (Poaceae), lilies (Liliaceae) and irises (Iridaceae).
Riparian	The wetland transition between land and a river or stream.
Preliminary Ecological Appraisal	The first stage in any site ecological assessment. It has two main elements; an ecological desk study and an extended Phase 1 habitat survey.
Survey Area	The survey area for the Desmoulin's Whorl Snail Survey comprised the PEIR onshore cable corridor search area and the potential alternative routes (as shown in Appendix A, Figure 1.1).

Acronyms

Unit	Description
EIA	Environmental Impact Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest

Units

Unit	Description
GW	Gigawatt (power)
m	Metre (distance)
m²	Metre squared (area)
km	Kilometre (distance)

1. Introduction

1.1 Development background

1.1.1.1 Ørsted is promoting an application for a development consent order ('DCO') for the Hornsea Project Three Offshore Wind Farm (hereafter referred to as 'Hornsea Three') a proposed offshore wind farm located in the southern North Sea. This report focuses on the onshore components of Hornsea Three (as described in volume 1, chapter 3: Project Description).

1.1.1.2 At the time of ecological survey scoping in December 2016, a 200 m wide cable corridor search area had been identified which was the focus of the Preliminary Environmental Information Report (PEIR) submitted in July 2017. This search area is hereafter referred to as the 'PEIR onshore cable corridor search area'. Following this, some alternate route considerations were added. Ecological survey area boundaries were therefore based on the PEIR onshore cable corridor search area and alternate routes considered, with an appropriate survey buffer added where necessary. The survey area applicable to this report is shown in Appendix A, Figure 1.1.

1.1.1.3 Subsequently, a further route refinement process has been undertaken to refine the PEIR onshore cable corridor search area down to an approximately 80 m wide corridor (referred to as the 'onshore cable corridor') as well as identifying locations of compounds, access roads and storage areas. The location of permanent and temporary land take associated with the HVDC converter/HVAC substation and HVAC booster station has also been refined. This process is described in more detail in volume 1, chapter 4: Site Selection and Alternatives.

1.1.1.4 A full description of Hornsea Three is provided in volume 1, chapter 3: Project Description.

1.2 Ecology background

1.2.1.1 A Preliminary Ecological Appraisal (PEA) of the onshore components of Hornsea Three was undertaken in 2016 (RPS, 2016). This included a Phase 1 habitat survey of an area comprising a 500 m wide corridor (including the PEIR onshore cable corridor search area) and an ecological desk study, whereby protected species data was requested from the Norfolk Biodiversity Information Service (NBIS). Subsequently, a second Phase 1 habitat survey was undertaken to cover 30 areas which were either not accessible during the PEA, or became relevant to Hornsea Three due to design refinements (see volume 6, annex 3.1 of the Environmental Statement).

1.2.1.2 The PEA (RPS, 2016) recorded that Desmoulin's whorl snail (*Vertigo moulinsiana*) is known to be present within Booton Common and the Wensum River Valley Site of Special Scientific Interest (SSSI) / Special Area of Conservation (SAC) and suitable habitat for Desmoulin's whorl snail was identified during the PEA Phase 1 habitat survey (but not during the second Phase 1 habitat survey of additional areas).

1.2.1.3 Based on these findings, Thomson Ecology was commissioned in November 2016 to undertake a survey for Desmoulin's whorl snail to inform the EIA process. This survey is the focus of this report.

1.3 Legislative background

1.3.1.1 Desmoulin's whorl snail is listed in Annex IIa of the European Economic Community 92/43/EEC Directive on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive'), is classed as Vulnerable in the most recent IUCN-based UK status review of non-marine mollusca (Seddon *et al*., 2014) and is one of the species "of principal importance for the purpose of conserving biodiversity" in England covered under section 41 of the Natural Environment and Rural Communities Act 2006.

1.4 The brief and objectives

1.4.1.1 The brief of the survey was to:

- Undertake a Desmoulin's whorl snail Habitat Suitability Assessment (HSA) of waterbodies within the survey area to assess the potential of the habitats to support Desmoulin's whorl snail, as per best-practice guidance (Killeen & Moorkens, 2003);
- Determine the presence or likely absence of Desmoulin's whorl snail within the survey area;
- Note other mollusc species observed during the field survey, especially the narrow-mouthed whorl snail (*Vertigo angustior*), a species with the same legal and conservation status as Desmoulin's whorl snail;
- Record the results with GPS-enabled digital mapping devices; and
- Provide a combined report on the survey giving the methods and results of the survey, including a digitised map of the survey results.

1.4.1.2 The objective of the survey was to identify the presence of Desmoulin's whorl snail populations in waterbodies within the survey area (defined below) to enable an assessment of the potential impacts of Hornsea Three on this species within volume 3, chapter 3: Ecology and Nature Conservation.

2. Methodology

2.1 Survey area

2.1.1.1 For the purpose of the Desmoulins's whorl snail survey, an initial survey area was defined based on the PEIR onshore cable corridor search area and the potential alternative routes, as shown in Appendix A, Figure 1.1. Within this survey area, 40 waterbodies, mainly ditches, were identified as requiring further assessment based on the findings of the PEA report (RPS, 2016), publicly available aerial photography and OS-sourced polygon and line waterbody layer. No additional sites requiring further assessment were identified in the second Phase 1 habitat survey.

2.1.1.2 All surveyed waterbodies are listed in Appendix B: Desmoulin's whorl snail habitat suitability assessment results, and shown in Appendix A, Figure 2.1 to 2.13.

2.1.1.3 The main construction compound to the east of the Hornsea Three onshore cable corridor is outside of the survey area for this study and comprises existing hard standing with negligible ecological importance. Therefore, a detailed survey of baseline conditions was not required.

2.2 Habitat suitability assessment

2.2.1.1 The HSA, undertaken in March 2017, was based on the measurement of a set of habitat parameters identified by Killeen and Moorkens (2003) as being influential in the success of Desmoulin's whorl snail.

2.2.1.2 Of the 40 waterbodies identified for further survey, 35 sites were accessible for the HSA (see section 2.5). The following information was collected at each accessible survey location:

- Vegetation height;
- Vegetation species composition (dominant and other plants);
- Ground moisture levels (recorded on a semi-quantitative scale of 1 (dry), 2 (damp), 3 (wet), 4 (very wet) or 5 (under water));
- Scrub cover (as a percentage);
- Site management (grazing or mowing); and
- Hydrological information (water level, depth, hydrology regime).

2.2.1.3 Categories were assigned as being excellent, good, average, below average or poor based on best practice guidance (Killeen & Moorkens, 2003) and review of the information collected. Better quality habitat was considered to have: an average vegetation height in August of 0.7 m; a plant species composition dominated by Class I species (see Table 2.1); ground moisture levels between two and four, and a site management regime that has light/rotational grazing, or no grazing. Habitat survey parcels assessed as being of poor quality were screened out for further survey, as recommended by the Desmoulin's whorl snail specialist, Paul Lee.

2.2.1.4 Further details on the habitat parameter information collected is included below.

2.2.2 Vegetation height

2.2.2.1 The vegetation height was recorded at the time of the survey visit. Desmoulin's whorl snail may climb up to 2 m to find its preferred humidity level and in the most favourable habitat the dominant vegetation grows to at least 0.7 m in August (Killeen & Moorkens, 2003).

2.2.3 Dominant plant species

2.2.2.2 Desmoulin's whorl snail is found most frequently on tall wetland monocotyledons (Killeen, 2003). Habitats dominated by the plant species listed under Class I in Table 2.1, are most likely to be suitable for the snail.

Table 2.1: Classification of plant species in Desmoulin's whorl snail habitats (adapted from Killeen & Moorkens 2003).

Class I	Class II
Reed sweet-grass (*Glyceria maxima*) Lesser pond-sedge (*Carex acutiformis*) Tufted sedge (*Carex elata*) Greater tussock-sedge (*Carex paniculata*) Greater pond-sedge (*Carex riparia*) Great fen-sedge (*Cladium mariscus*)	Reed canary-grass (*Phalaris arundinacea*) Common reed (*Phragmites australis*) Branched bur-reed (*Sparganium erectum*) Reedmace (*Typha* spp.) Yellow Flag (*Iris pseudacorus*) Meadowsweet (*Filipendula ulmaria*) Stinging nettle (*Urtica dioica*)
Class III	**Class IV**
Water-mint (Mentha aquatica) Ambibious bistort (Persicaria amphibium) Willowherbs (Epilobium spp.)	All other species

2.2.4 Other plant species

2.2.4.1 As the season progresses and population densities build, Desmoulin's whorl snail may occur on a much wider range of vegetation within the habitat, especially the species listed under Class II in Table 1. If meadowsweet (*Filipendula ulmaria*), stinging nettle (*Urtica dioica*) or the species in Class III or IV become too frequent this indicates that the habitat is becoming too dry for the snail. The presence of watercress (*Rorippa nasturtium-aquaticum*) and/or fool's watercress (*Apium nodiflorum*) indicates that the habitat is becoming too wet (Killeen, 2003).

2.2.5 Ground moisture levels

2.2.5.1 Ground moisture was measured on a scale of 1 to 5 where the numbers were interpreted as:

- Dry. No visible moisture on ground surface;
- Damp. Ground visibly damp, but water does not rise under pressure;
- Wet. Water rises under light pressure;
- Very wet. Pools of standing water, generally less than 0.05 m deep; and
- Site under water. Entire sampling site in standing or flowing water over 0.055 m deep.

2.2.5.2 Ground moisture levels between damp and very wet (2-4) are most suitable for Desmoulin's whorl snail (Killeen & Moorkens, 2003).

2.2.6 Scrub cover

2.2.6.1 The percentage cover of scrub was estimated. Desmoulin's whorl snail is a species of open habitats and is unlikely to be found where dense scrub or tree cover result in high levels of shade (Killeen, 2003).

2.2.6.2 Where appropriate, additional notes were included on any features that the surveyor considered may be relevant.

2.3 Presence/likely absence survey

2.3.1.1 The presence/likely absence survey for Desmoulin's whorl snail, undertaken in August 2017, followed the 'General Methodology for Initial Survey' as outlined by Killeen and Moorkens (2003) with variations of Abrehart (2014). At each of the sites surveyed, snails were searched at five sampling points in suitable vegetation. The linear nature of most of the sites allowed for these five sampling points to be located at approximately 10 m intervals along a single transect.

2.3.1.2 At each sampling point a large (approximately 0.2 m^2) white plastic tray was held near the base of the vegetation and the vegetation bent over the tray and shaken vigorously. The plant litter falling into the tray was examined carefully for snails and the species to which each specimen belonged was recorded. The sample was returned to the original site and the tray cleaned carefully before the next sample was collected.

2.3.1.3 The species survey methodology was designed to be used in mid to late summer, ideally August, when the vegetation has reached its peak height, the snails are high on the leaves and the population is dominated by larger, more easily detected adult individuals. Therefore the species survey was undertaken in suitable conditions at the optimal time of year. Furthermore, field visits were scheduled to ensure that the vegetation was not wet from rainfall and to avoid anything stronger than a gentle breeze (as the snails seek shelter during high winds). On any given day, the survey work did not commence before 10:00 am to allow for the early morning dew to evaporate.

2.4 Surveyors

2.4.1.1 Habitat suitability assessment surveys were undertaken by suitably qualified ecologists from Thomson Ecology. Presence or likely absence survey were undertaken by Paul Lee MSc FRES CEcol CEnv MCIEEM, an ecological consultant of 20 years standing and with 40 years of experience in invertebrate ecology.

2.5 Limitations

2.5.1.1 As noted in section 2.1, the survey area for this study was based on the PEIR onshore cable corridor search area and some alternative route options as shown in Appendix A, Figure 1.1. Since then, further design refinements have occurred (e.g. identification of construction compounds, access roads and storage areas) which fall outside of the survey area described in this report. As these design refinements were finalised in November 2017, the survey season had finished and it was not possible to survey these newly identified areas for Desmoulin's whorl snail.

2.5.1.2 Furthermore, although the status of landowner permission to access survey areas was reviewed on a weekly basis during the survey season for this species, five of the 40 sites identified for HSA and 11 of the 21 sites identified for a presence or likely absence survey could not be surveyed due to the absence of landowner permission. These included three of the four sites assessed as having good suitability in March 2017, located on the River Wensum floodplain (see Appendix A, Figure 2.8). According to the PEA (RPS, 2016) Desmoulin's whorl snail is known to be present within Wensum River Valley. There was also no access to survey on the River Tud floodplain. All sites where access was a limitation are listed in Appendix B and shown in Appendix A, Figures 2.1 to 2.13.

2.5.1.3 Although it was not possible to survey the areas listed above, it is considered that sufficient information on this species has been collected to inform the impact assessment reported in volume 3, chapter 3: Ecology and Nature Conservation. The areas where survey could not be completed, that will be impacted by Hornsea Three (it is likely that impacts on rivers and streams, including the River Wensum and River Tud, will be avoided by horizontal directional drilling), will be checked during pre-construction surveys enabling amendment of mitigation or the application of further mitigation, to that specified in volume 3, chapter 3: Ecology and Nature Conservation. Further details on pre-construction surveys are provided in volume 3, chapter 3: Ecology and Nature Conservation.

3. Results

3.1.1.1 The HSA results for the 35 sites surveyed are summarised in Table 3.1 and full results for each site are given in Appendix B: Desmoulin's whorl snail habitat suitability assessment results. Waterbody locations and HSA results are shown in Appendix A, Figure 2.1 to 2.13, whilst photographs of the surveyed sites are provided in Appendix A, Figures 3.1 to 3.4.

Table 3.1: Summary of the Desmoulin's whorl snail HSA results.

Desmoulin's whorl snail HSA Category	Number of habitat survey parcels in each category within survey area	Number of habitat survey parcels in each category within the Hornsea Three onshore cable corridor
Excellent	0	0
Good	4	3
Average	7	6
Below Average	10	9
Poor	14	8
No Access	5	5
Total	**40**	**31**

3.1.1.2 A total of 21 sites of below average suitability or above were identified as requiring a Desmoulin's whorl snail presence/likely absence survey. Due to permission to access the land not being granted, 11 of these sites could not be re-visited for a presence/likely absence survey in August 2017. No Desmoulin's whorl snails were found in any of the ten sites where a presence/likely absence survey was undertaken.

3.1.1.3 The absence of Desmoulin's whorl snail from all locations was not unexpected given the results of the habitat assessments and the preference of the snail for open sites in calcareous swamps, fens and marshes, bordering rivers, lakes and ponds, or in river floodplains (Killeen, 2003). Killeen describes the most suitable riparian habitats as comprising a relatively wide marginal strip of reed sweet-grass or bur-reed forming dense floating rafts on gently sloping banks. Steeper banks prevent the development of suitable vegetation stands and so Desmoulin's whorl snail will be absent. In this regard, of the 35 locations assessed for habitat suitability in March 2017, 26 were found to have scrub cover of 50% or greater and consequently could not be considered open habitats. In addition, many waterbodies had steep or very steep banks. Only one location, pond D1A1 (see Appendix A, Figures 2.1 and 3.1), had marginal fen vegetation greater than 3 m wide.

3.1.1.4 Presence/likely absence surveys at the ten waterbodies surveyed in August 2017 demonstrated a limited diversity of snails as shown in Table 3.2. Some of the shells could not be assigned to a species as the animals were still juvenile. These specimens were assigned to a genus or family as appropriate. No specimens of any species of whorl snail Vertigo spp. were found at any of the locations surveyed. All the snails seen were common and widespread species of least concern for conservation purposes.

Table 3.2: Snail taxa identified in the survey area.

Scientific name	Common name	Location label									
		D1A1	D1C1	D1C3	D1C4	D1F1	D1F2	D1F3	D1F5	D1F6	D1F8
Anisus vortex	Whirlpool ramshorn	0	0	0	0	0	0	0	0	1	0
Arianta arbustorum	Copse snail	0	0	0	0	0	0	1	0	0	0
Cepaea sp.	Banded snail	15	16	7	0	2	3	16	7	3	2
Cepaea nemoralis	Brown-lipped banded snail	1	0	0	0	0	0	1	0	0	0
Cornu aspersum	Garden snail	0	0	0	0	0	0	0	10+	0	0
Monacha cantiana	Kentish snail	1	0	0	0	0	0	4	0	0	4
Oxyloma/Succinea sp.	Amber snail	0	60+	26	0	0	23	9	1	0	14
Trochulus hispidulus	Hairy snail	0	0	0	0	0	0	0	1	0	0
Trochulus striolatus	Strawberry snail	0	0	0	0	0	0	2	0	0	1

4. Conclusion

4.1.1.1 The habitat assessments undertaken along the survey area suggest that the majority of aquatic habitats are poor or below average for Desmoulin's whorl snail. There was no evidence of Desmoulin's whorl snail at any of the ten locations surveyed in August 2017. In addition, there was no evidence of narrow-mouthed whorl snail or any other snail species of conservation importance at any of these locations.

4.1.1.2 Results of the survey have been used to inform the final location and design of the onshore components of Hornsea Three (see volume 1, chapter 4: Site Selection and Alternatives) and to enable the assessment of the impacts on ecology and nature conservation and associated mitigation, reported in volume 3, chapter 3: Ecology and Nature Conservation of the Environmental Statement.

5. References

Abrehart, T.R. (2014) Annex A: SAC status reporting on *Vertigo moulinsiana* in Norfolk and Suffolk. An ecological survey including vegetation and invertebrate observations undertaken for Natural England by Abrehart Ecology.

CIEEM (2015) Guidelines for Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester.

Killeen, I.J. (2003) Ecology of Desmoulin's Whorl Snail. Conserving Natura 2000 Rivers Ecology Series No. 6. English Nature, Peterborough.

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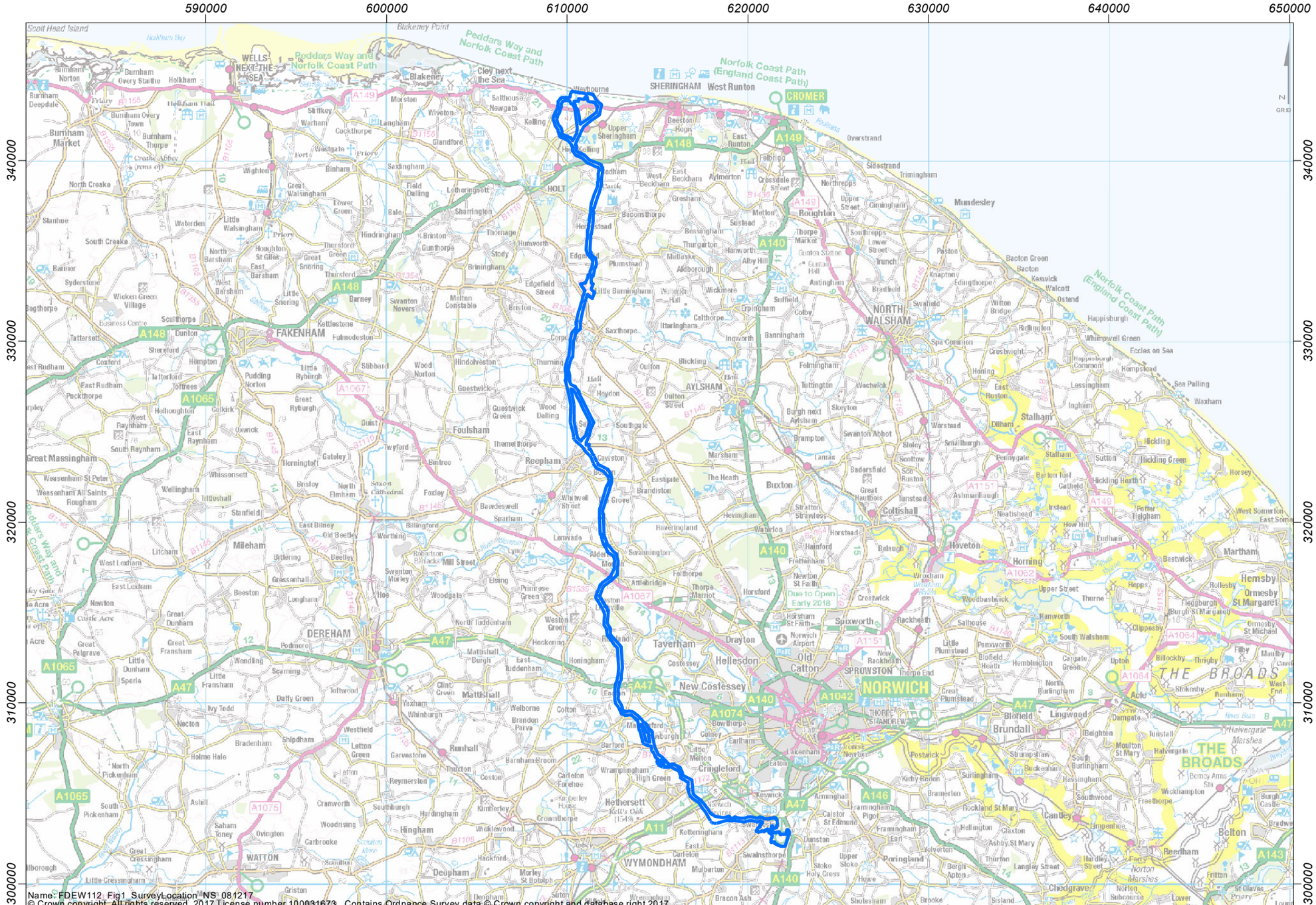
RPS (2016) Hornsea Three Preliminary Ecological Appraisal.

Seddon, M.B., Killeen, I.J. & Fowles, A.P. (2014) A Review of the Non-Marine Mollusca of Great Britain: Species Status No. 17. NRW Evidence Report No: 14, 84pp, Natural Resources Wales, Bangor.

Appendix A Figures

A.1 Desmoulin's whorl snail survey area



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Desmoulin's Whorl Snail Survey Area

It is drawn to the readers attention that the survey area depicted in this figure is not representative of the final project boundary. The relationship between the final project boundary and the survey area, as well as any implications for the baseline information as it relates to the EIA is discussed in the limitations section of this annex (see Section 2).

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REV	REMARK	DATE
01	Initial Issue	22/08/2017

Hornsea Project Three
Figure 1.1:
Demoulin's Whorl Snail Survey Area

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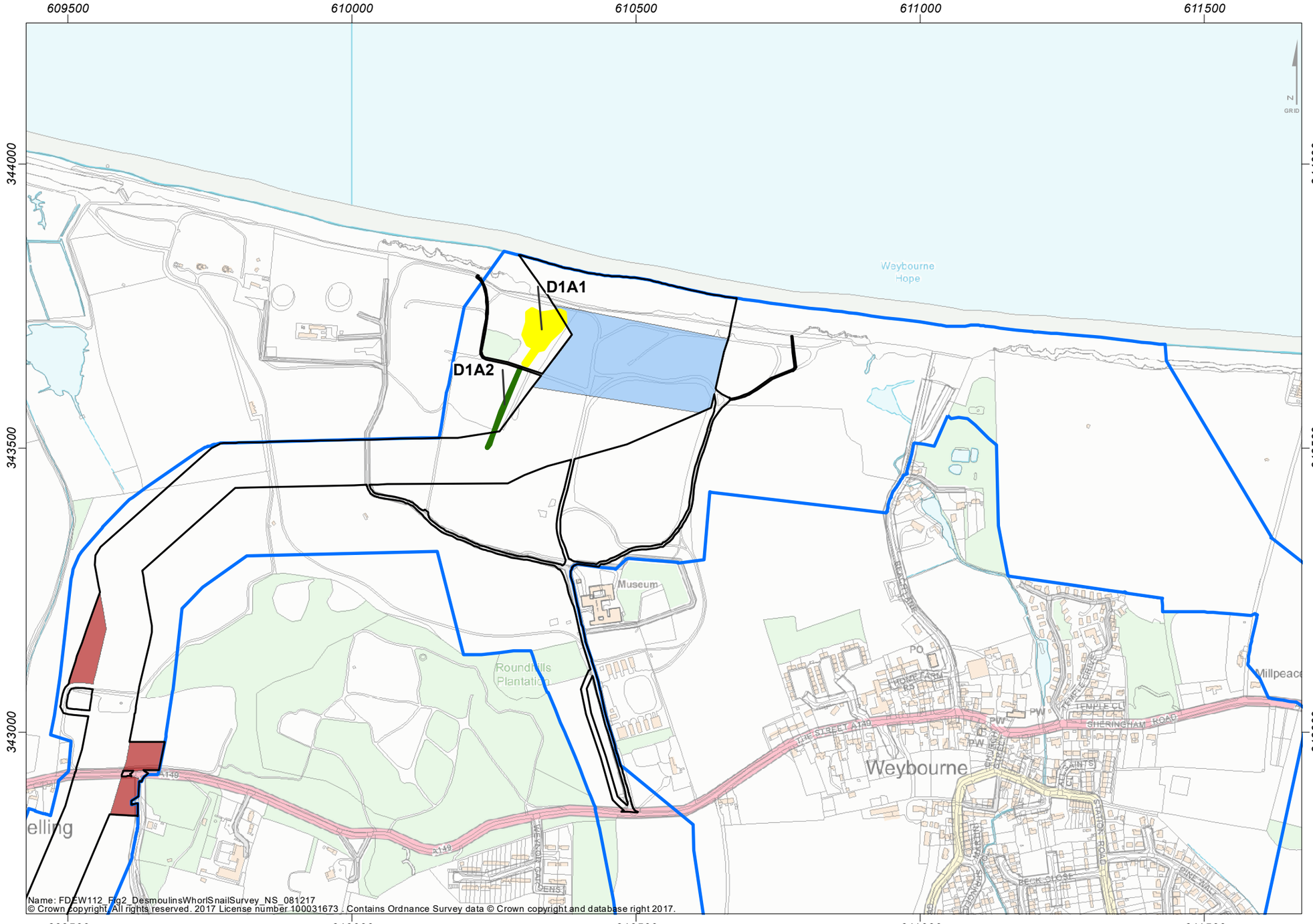
Checked by: AS
Approved by:NS

RPS Ørsted

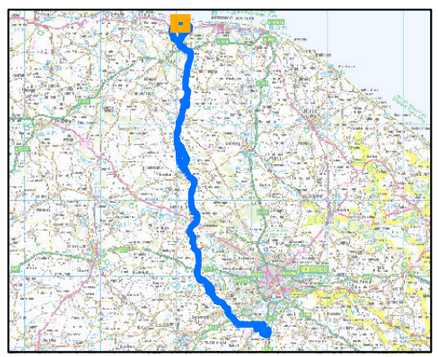
A.2 Desmoulin's whorl snail survey results.



Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Average
- Poor
- Desmoulin's Whorl Snail Survey Area
- Landfall Construction Compound
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



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REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.1
Desmoulin's Whorl Snail Survey Results.

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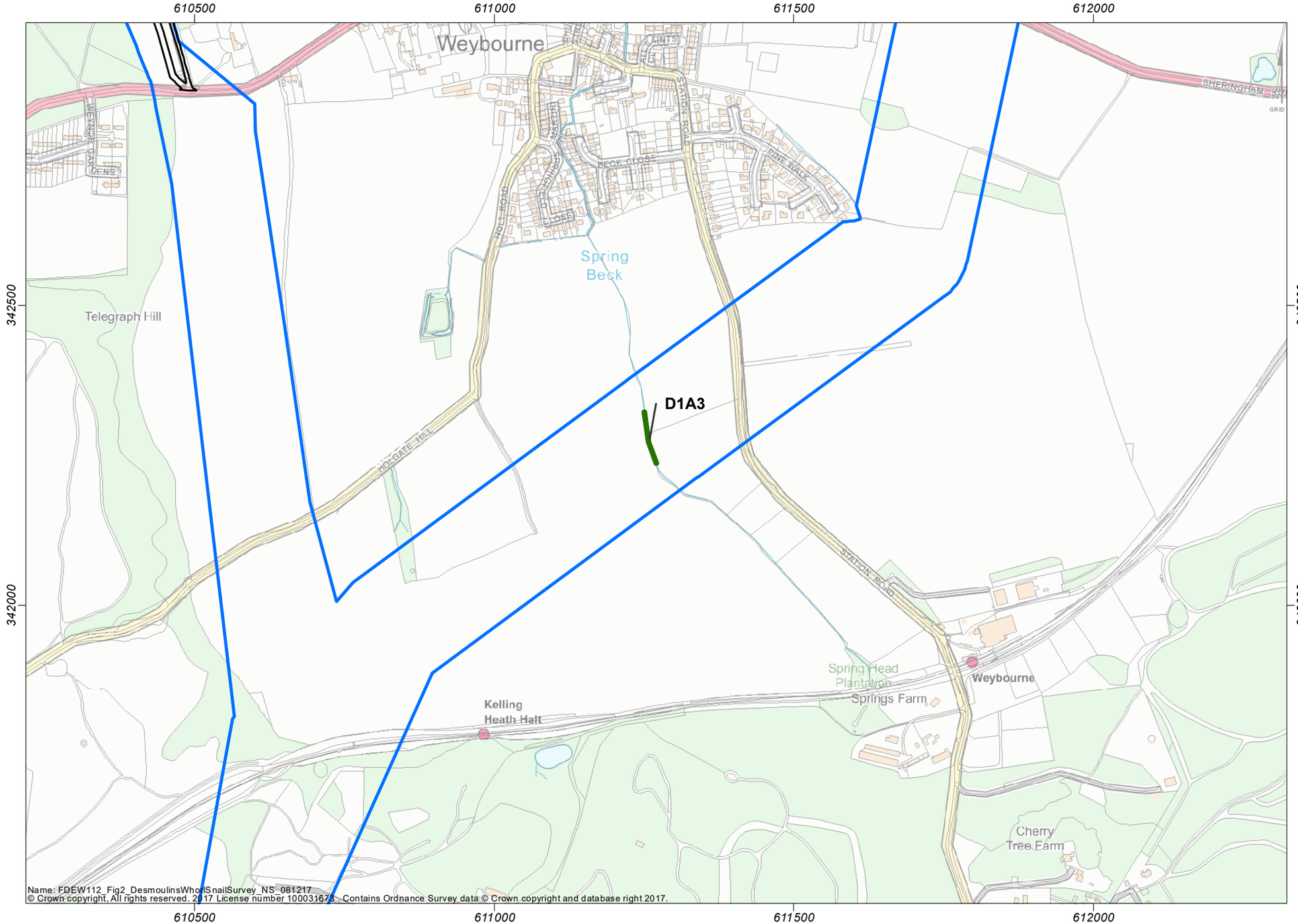
Checked by: HC
Approved by:NS

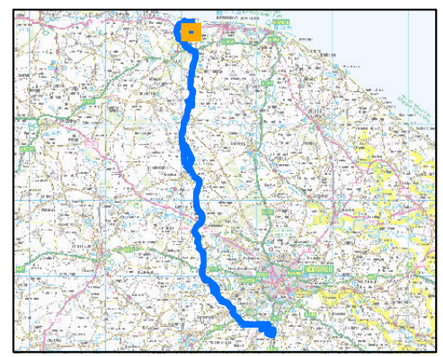
RPS Ørsted



Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Poor
- Desmoulin's Whorl Snail Survey Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



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REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.2
Desmoulin's Whorl Snail Survey Results.

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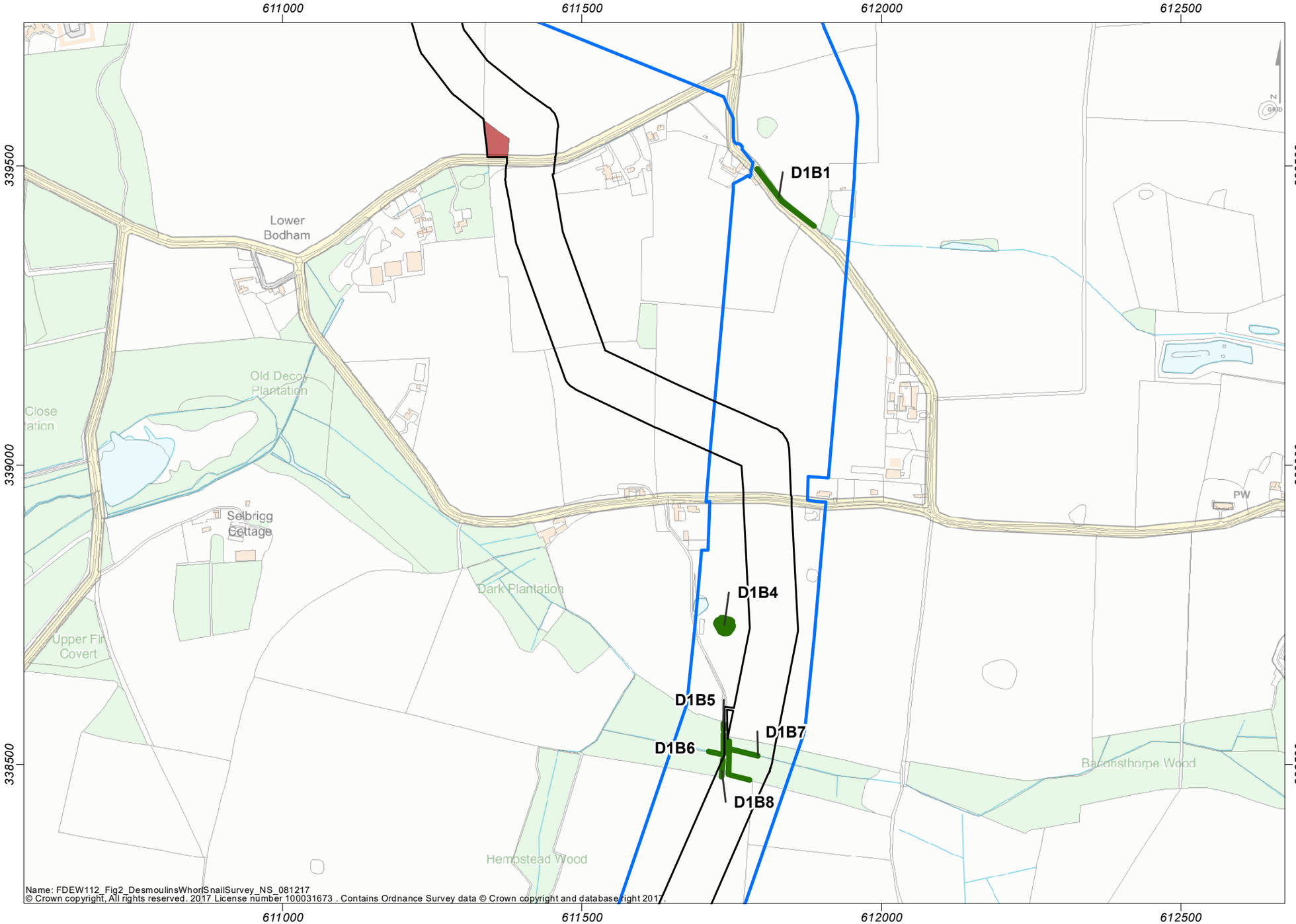
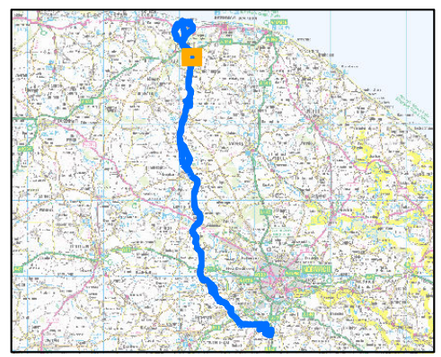


Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Poor
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



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REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.3
Desmoulin's Whorl Snail Survey Results.

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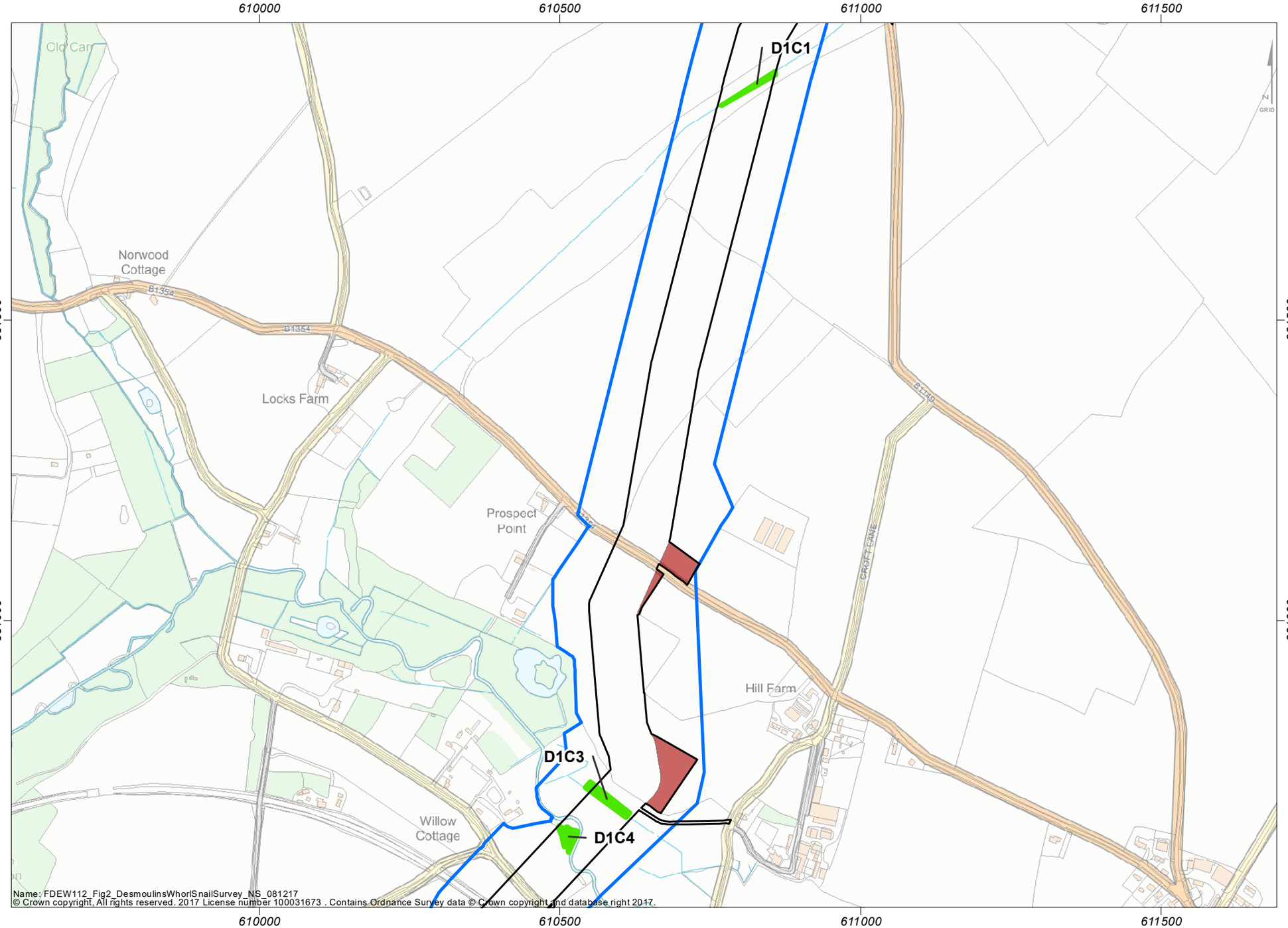

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Below Average
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

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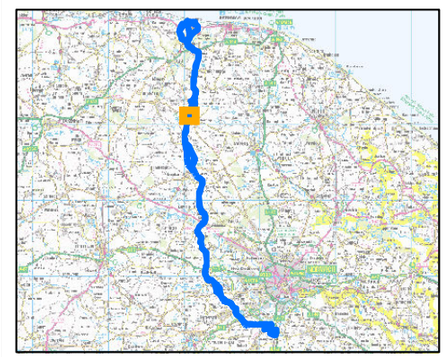

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REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.4
Desmoulin's Whorl Snail Survey Results.

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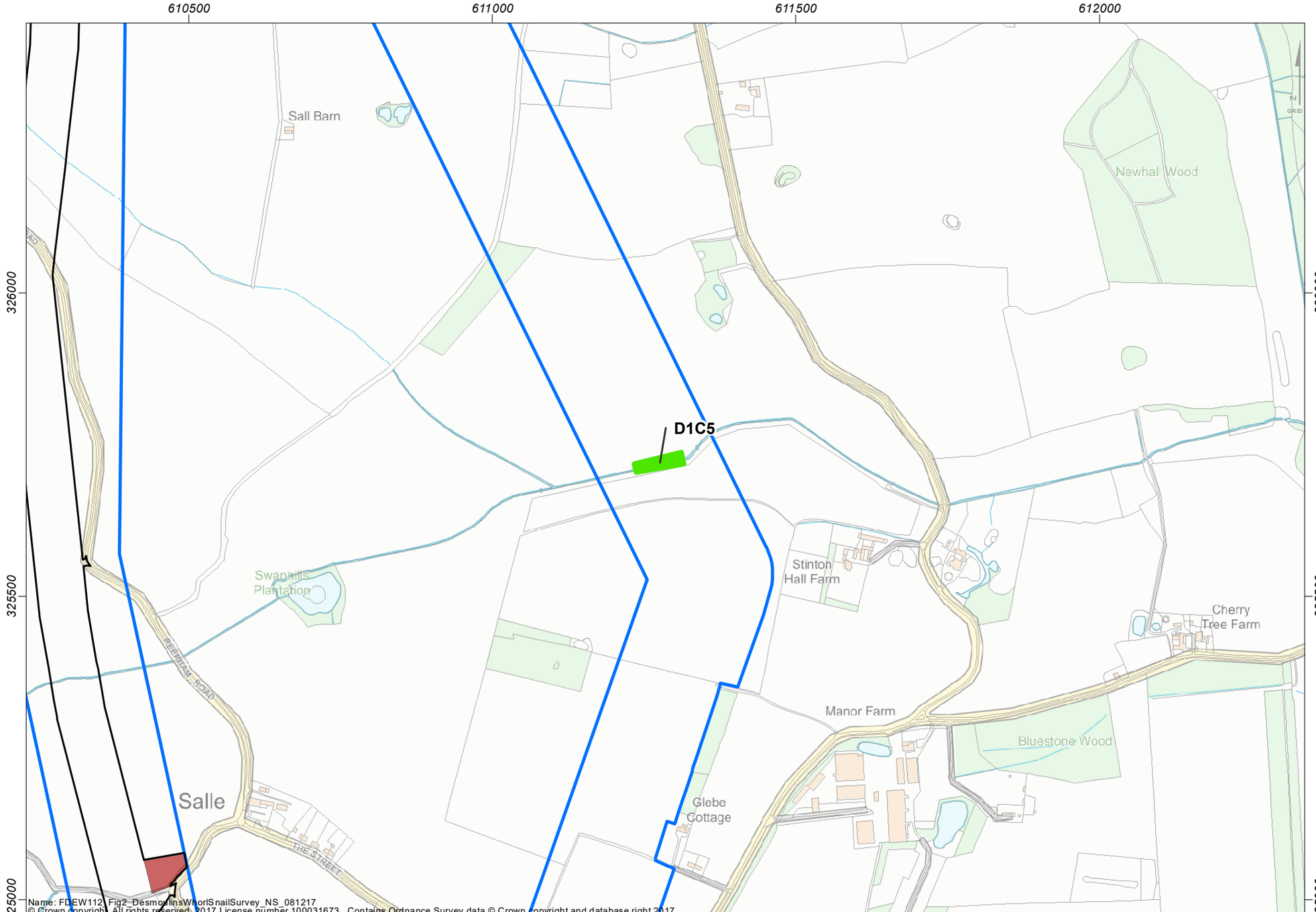
RPS Ørsted

Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

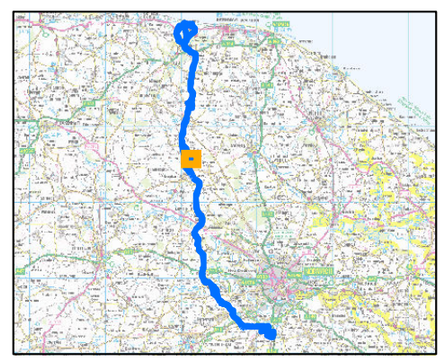


Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Below Average
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

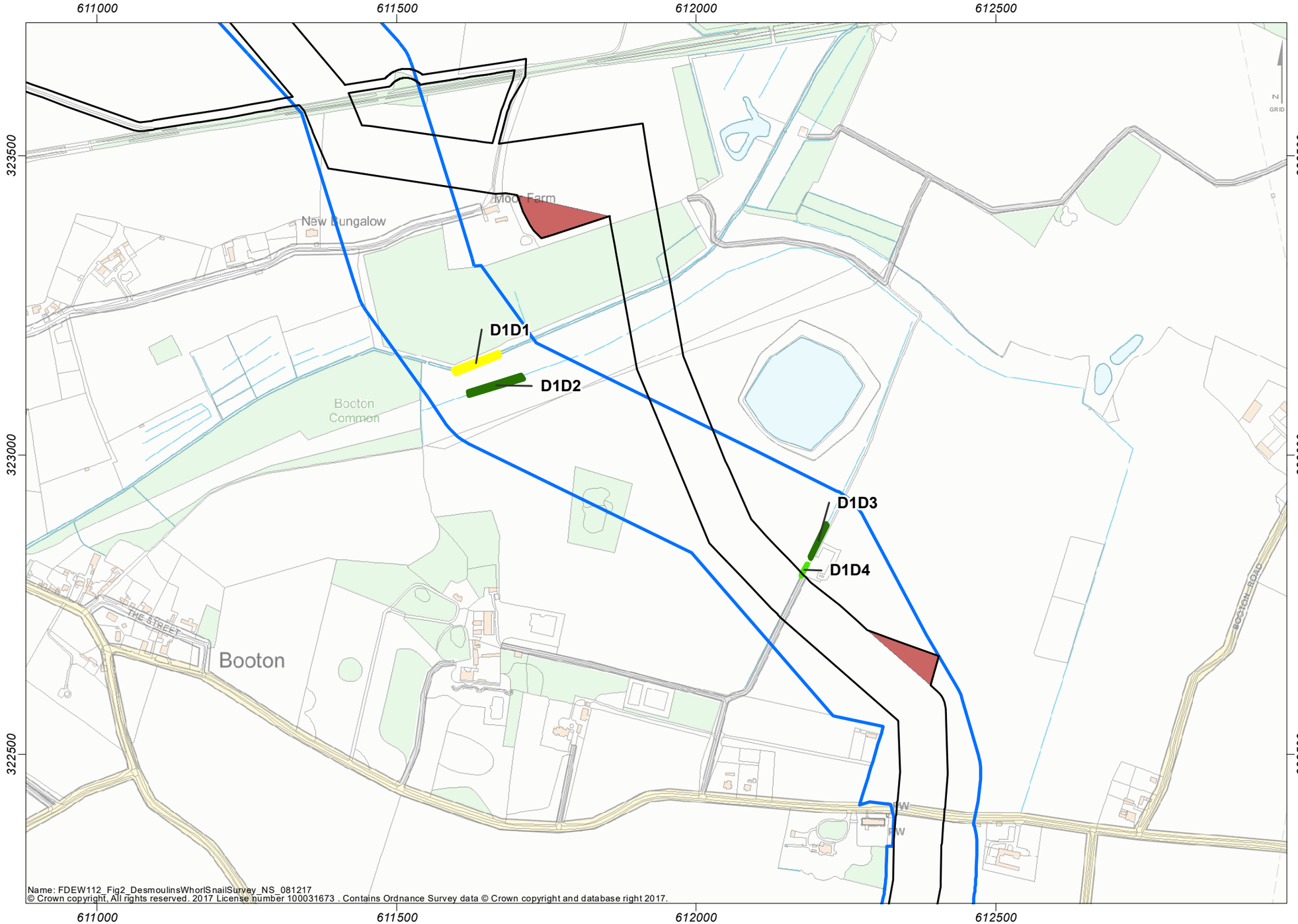
0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.5
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23286/1
Created by: NS
Checked by: HC
Approved by:NS

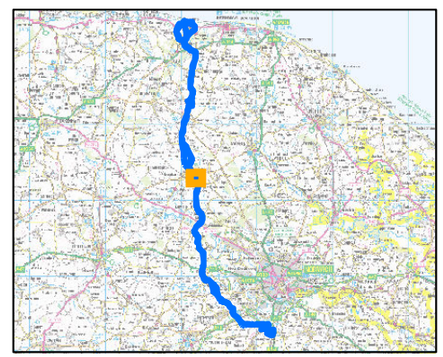
RPS Ørsted



Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Average
- Below Average
- Poor
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.6
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23287/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

611000 611500 612000 612500

321000 320500 320000

The Rookery

D1D5

D1D6

The Belt

MARK'S CLOSE LANE

REEPHAM ROAD

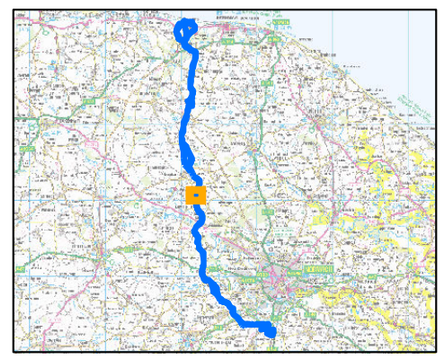
Little Witchingham

N GRID

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Poor
- Desmoulin's Whorl Snail Survey Area
- Compound
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

0 200 Metres

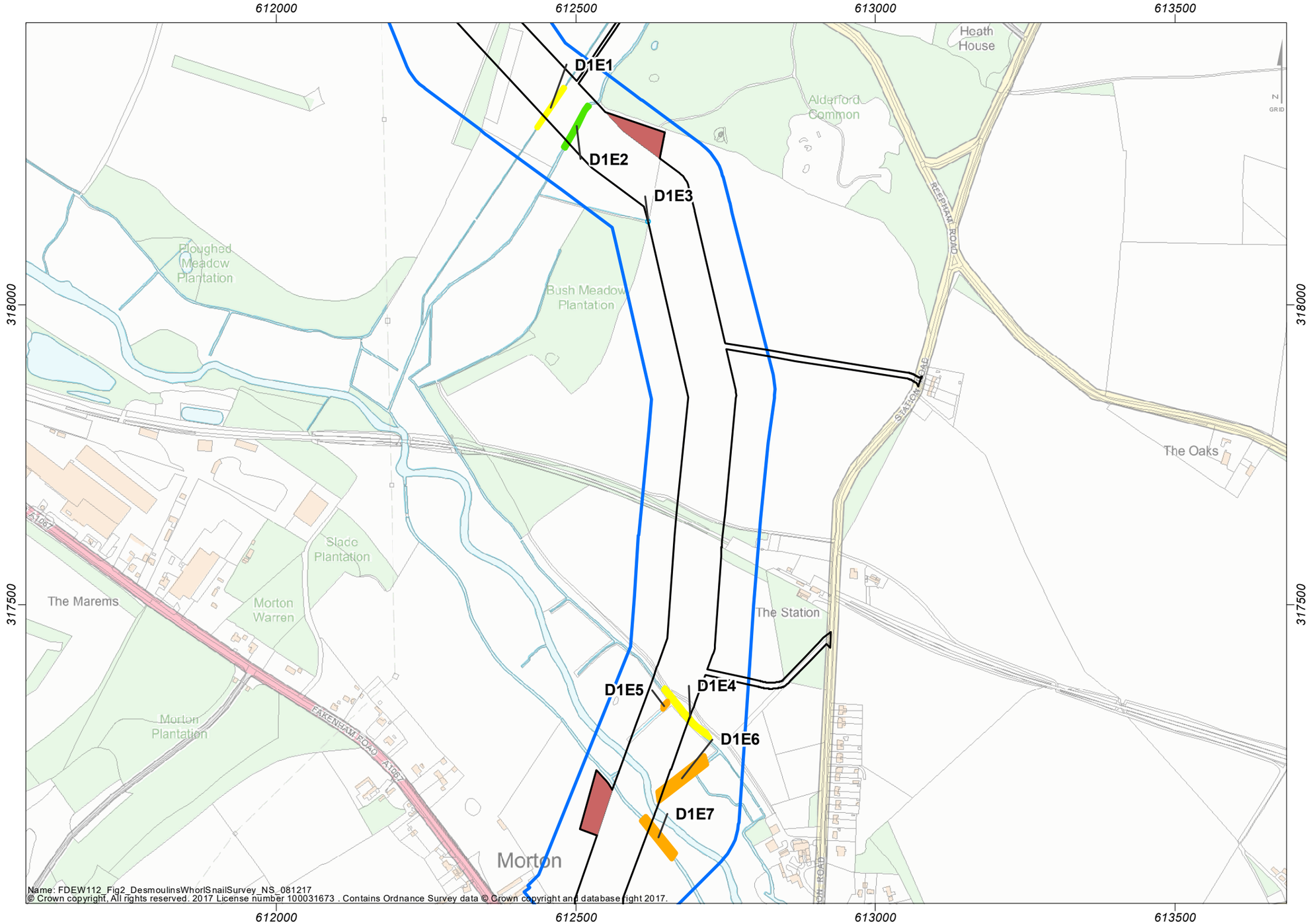
REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.7
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23288/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217



Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

No Access to Survey

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

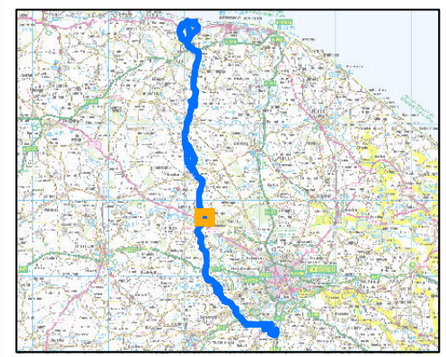
- Good
- Average
- Below Average

Desmoulin's Whorl Snail Survey Area

Storage Area

Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

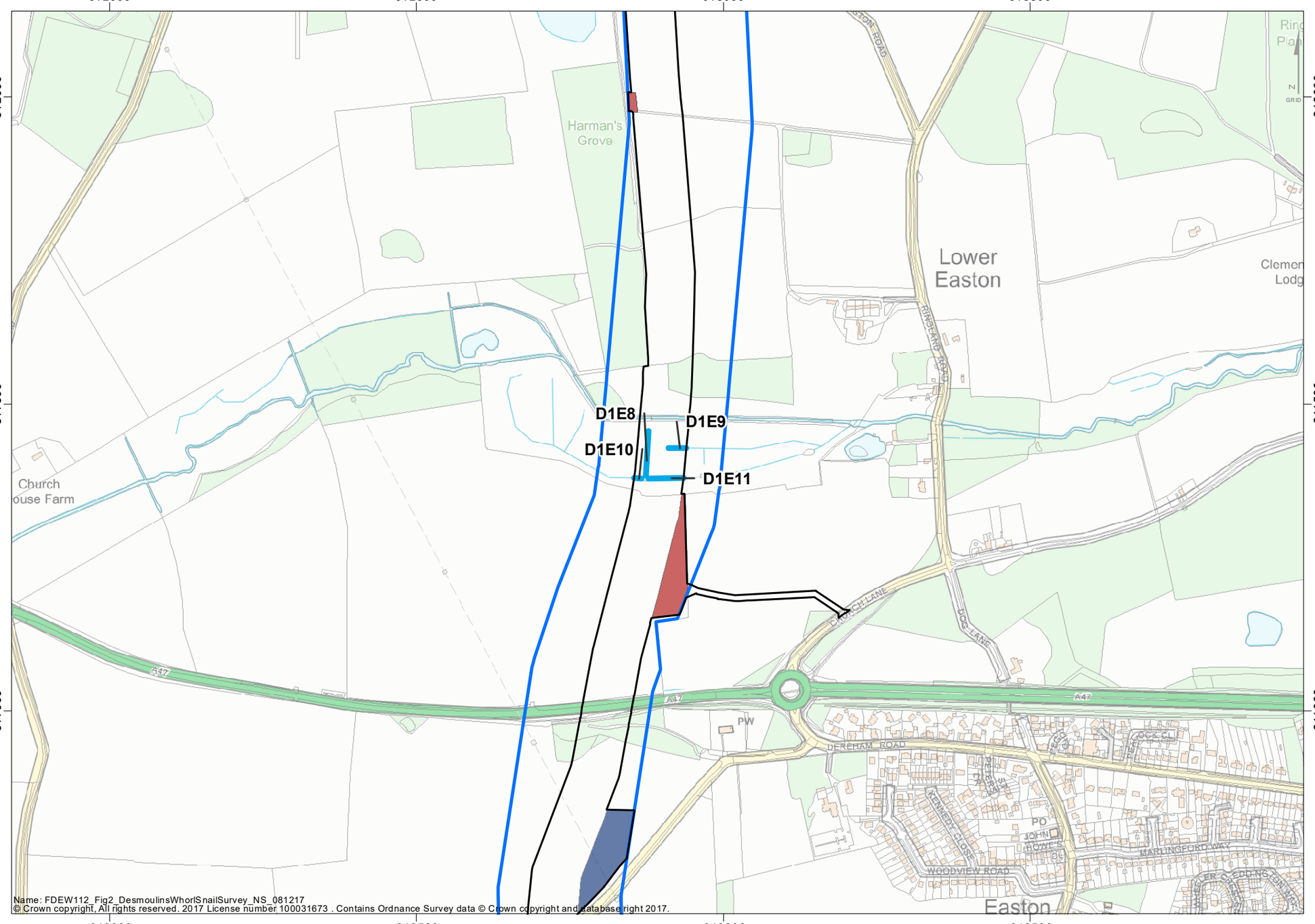
0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.8
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23289/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted



No Access to Survey

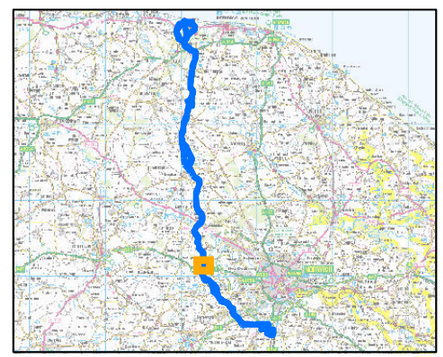
Desmoulin's Whorl Snail Survey Area

Storage Area

Compound

Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

0 200 Metres

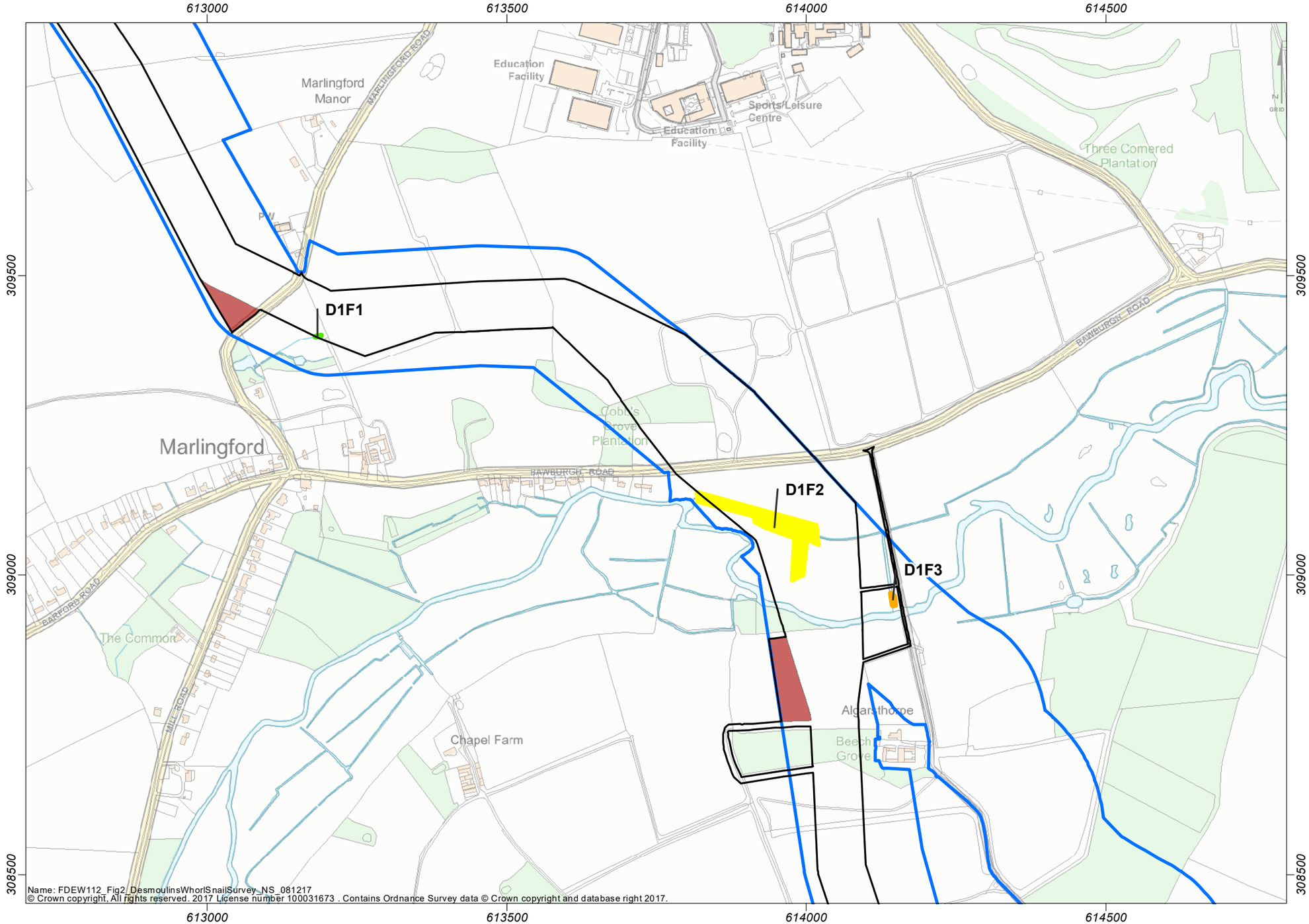
REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.9
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23290/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

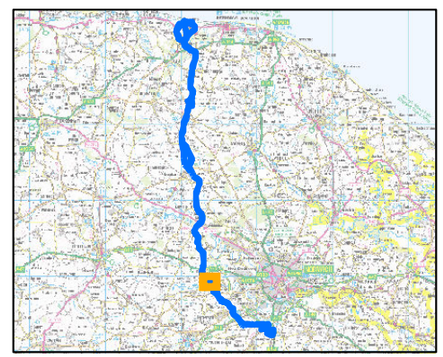


Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Good
- Average
- Below Average
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

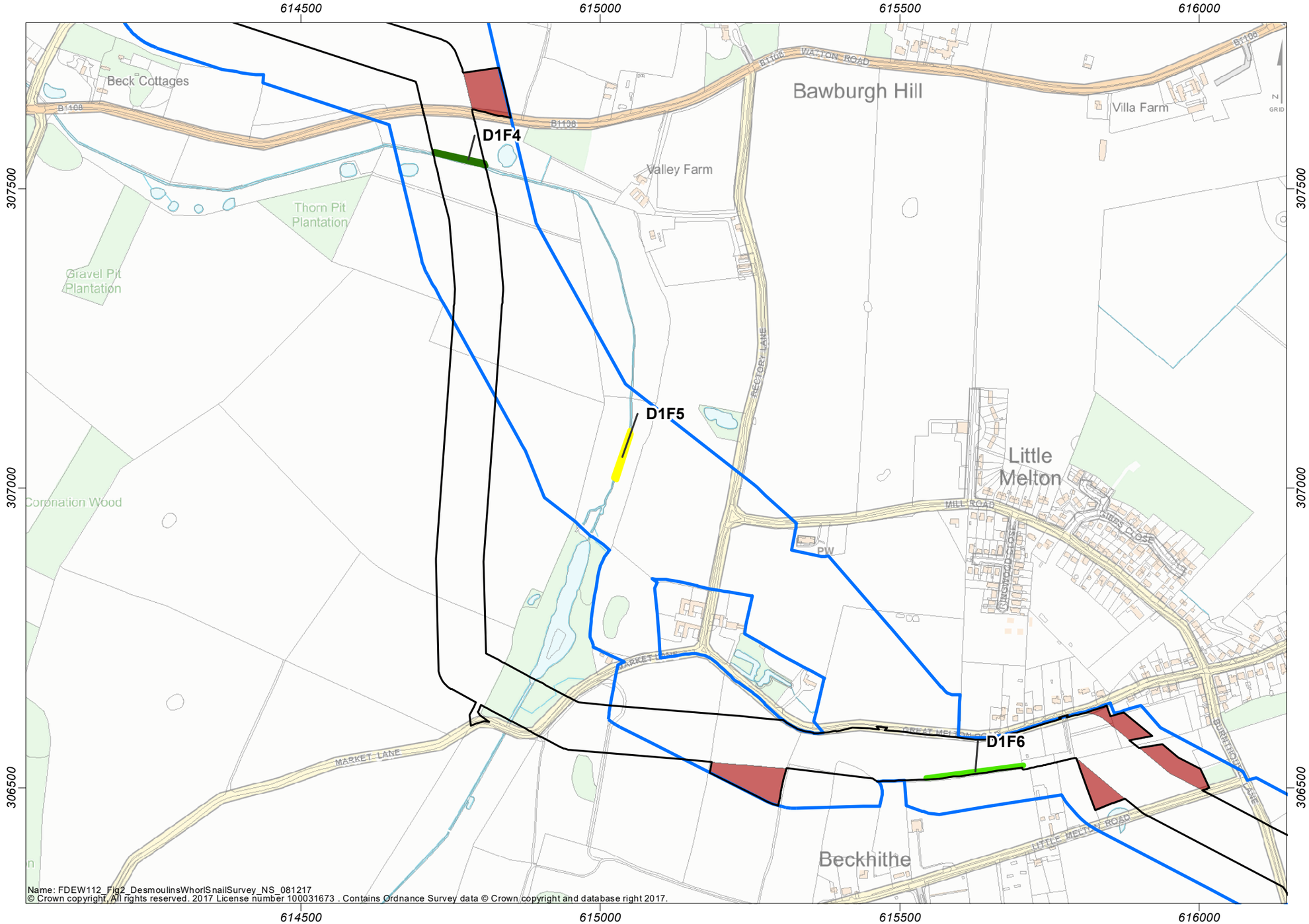
0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.10
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23291/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

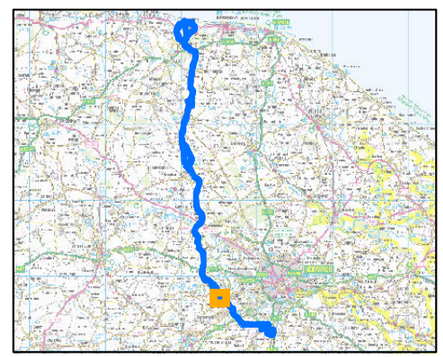


Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Average
- Below Average
- Poor
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

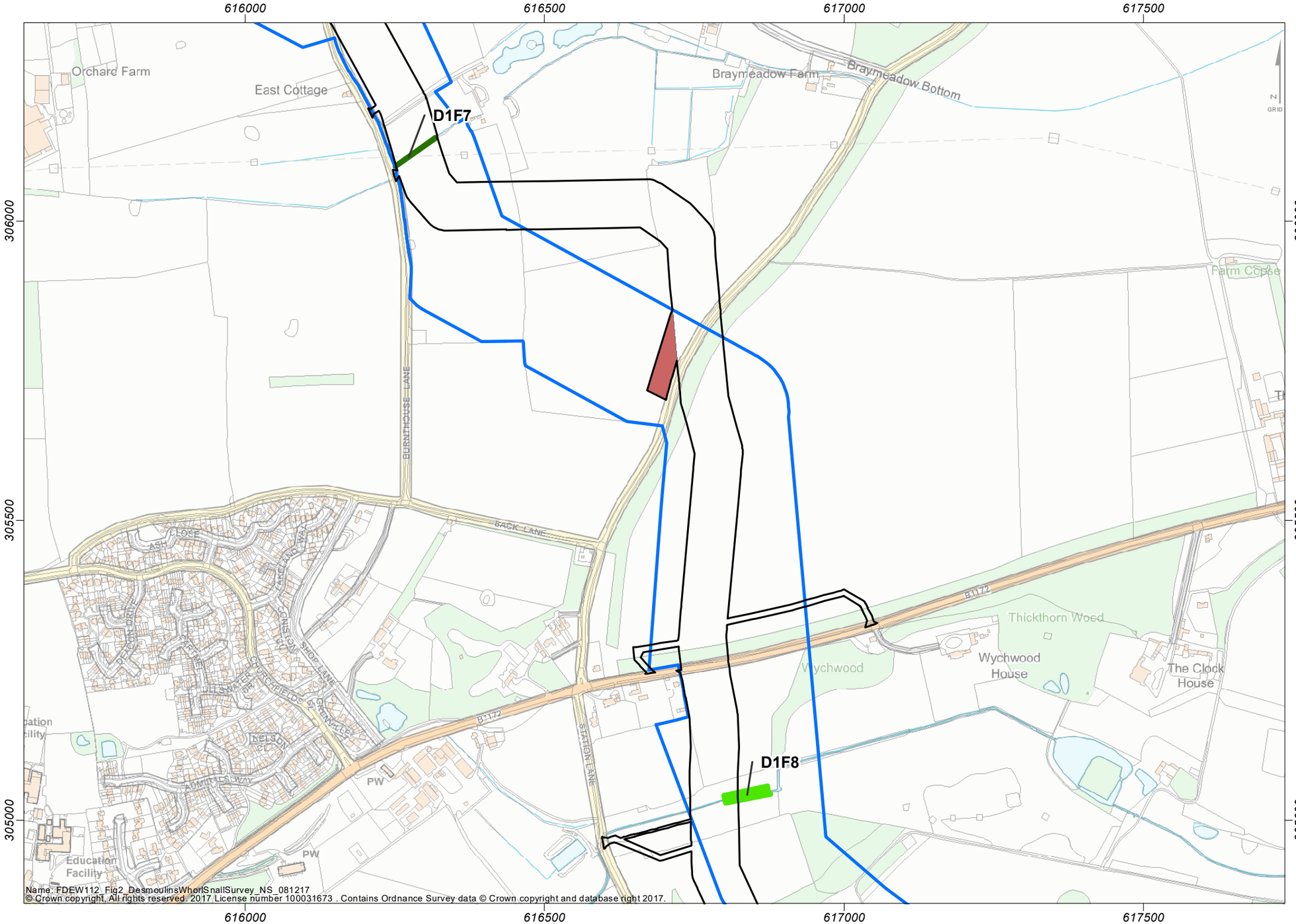
0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.11
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23292/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

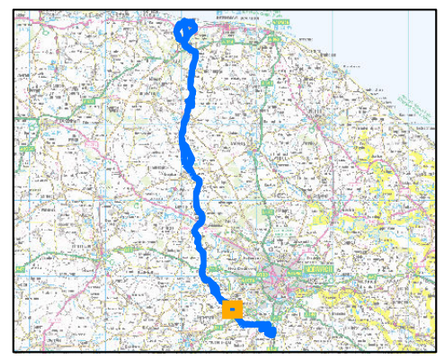


Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Below Average
- Poor
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.12
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23293/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

618000 618500 619000 619500 620000

304000 303500 303000

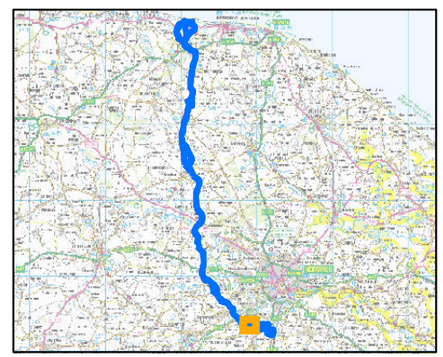
Intwood
Lilac Plantation
High Noon Cottages
Home Farm
Scott's Grove
Spruce's Plantation
Foxburrow Plantation
Wood
D1G2
D1G3
The Meadows
North Farm
Furze Meadow
Mulberry House
Lower East Carleton
Swardeston Common
FACK LANE
SWARDESTON LANE
INTWOOD LANE
THE DRIFT
LOW COMMON
THE COMMON

Name: FDEW112_Fig2_DesmoulinsWhorlSnailSurvey_NS_081217

Desmoulin's Whorl Snail Habitat Suitability Assessment Category

- Average
- Below Average
- Desmoulin's Whorl Snail Survey Area
- Storage Area
- Hornsea Three onshore cable corridor

Note: this set of figures does not include sections of the onshore cable corridor where no features were surveyed.



Reference System : OSGB36
Projection : BNG

Scale@A3:1:7,500
Vertical reference: Newlyn

0 200 Metres

REV	REMARK	DATE
01	Initial Issue	22/06/2017

Hornsea Project Three
Figure: 2.13
Desmoulin's Whorl Snail Survey Results.

Doc no: FDEW112/23294/1
Created by: NS
Checked by: HC
Approved by:NS

RPS Ørsted

A.3 Photographs of waterbodies

Photograph 1:
D1A1.

Photograph 2:
D1C1.

Photograph 3:
D1C3.

Photograph 4:
D1C4.

Photograph 5:
D1C5.

Photograph 6:
D1D1.

Name: FDEW112_Fig3_DesmoulinsWhorlSnailPhotos_DJ_131217

Reference System : N/A
Projection : N/A

Scale@A3: N/A
Vertical reference: N/A

REV	REMARK	DATE
01	Initial Issue	13/12/2017

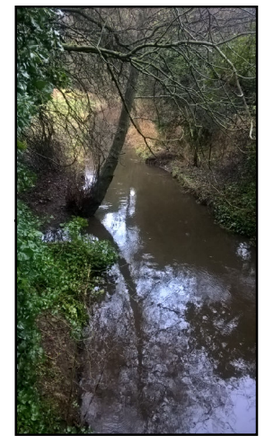
Hornsea Project Three
Figure 3.1:
Photographs of Waterbodies

Doc no: FDEW112/22862/1
Created by: DJ
Checked by: NS
Approved by:NS

RPS Ørsted

Photograph 7:
D1D4.

Photograph 8:
D1E1.



Photograph 9:
D1E2.

Photograph 10:
D1E4.

Photograph 11:
D1E5.

Photograph 12:
D1E6.

Name: FDEW112_Fig3_DesmoulinsWhorlSnailPhotos_DJ_131217

Reference System : N/A
Projection : N/A

Scale@A3: N/A
Vertical reference: N/A

REV	REMARK	DATE
01	Initial Issue	13/12/2017

Hornsea Project Three
Figure 3.2:
Photographs of Waterbodies

Doc no: FDEW112/22863/1
Created by: DJ
Checked by: NS
Approved by:NS

RPS Ørsted

Photograph 13:
D1E7.

Photograph 14:
D1F2.

Photograph 15:
D1F3.

Photograph 16:
D1F5.

Photograph 17:
D1F6.

Photograph 18:
D1F8.

Name: FDEW112_Fig3_DesmoulinsWhorlSnailPhotos_DJ_131217

Reference System : N/A
Projection : N/A

Scale@A3: N/A
Vertical reference: N/A

REV	REMARK	DATE
01	Initial Issue	13/12/2017

Hornsea Project Three
Figure 3.3:
Photographs of Waterbodies

Doc no: FDEW112/22864/1
Created by: DJ
Checked by: NS
Approved by:NS

RPS Ørsted

Photograph 19:
D1G2.

Photograph 20:
D1G3.

Name: FDEW112_Fig3_DesmoulinsWhorlSnailPhotos_DJ_131217

Reference System : N/A
Projection : N/A

Scale@A3: N/A
Vertical reference: N/A

REV	REMARK	DATE
01	Initial Issue	13/12/2017

Hornsea Project Three
Figure 3.4:
Photographs of Waterbodies

Doc no: FDEW112/22865/1
Created by: DJ
Checked by: NS
Approved by:NS

RPS Ørsted

Appendix B Desmoulin's whorl snail habitat suitability assessment results

Habitat Survey parcel ID	Waterbody type	Vegetation Height (m)	Vegetation Composition	Ground Moisture Levels	Scrub Cover (%)	HSA Category	Further surveys recommended	Further survey results
D1A1	Pond	1.5	Willowherbs (III)	1 (Dry)	50	Average	Yes	Likely Absent
D1A2	Ditch	0.25	Other (IV)	2 (Damp)	65	Poor	No	N/A
D1A3	Ditch	20	Other (IV)	2 (Damp)	50	Poor	No	N/A
D1B1	Ditch	0.1	Other (IV)	2 (Damp)	20	Poor	No	N/A
D1B4	Pond	0.1	Other (IV)	5 (Under water)	50	Poor	No	N/A
D1B5	Ditch	0	Other (IV)	2 (Damp)	80	Poor	No	N/A
D1B6	Ditch	10	Willowherbs (III)	2 (Damp)	60	Poor	No	N/A
D1B7	Ditch	10	Willowherbs (III)	2 (Damp)	80	Poor	No	N/A
D1B8	Ditch	0	Stinging nettle (II)	2 (Damp)	80	Poor	No	N/A
D1C1	Ditch	1	Willowherbs (III)	3 (Wet)	60	Below Average / Poor	Yes	Likely Absent
D1C3	Ditch	1	Other (IV)	3 (Wet)	10	Below Average / Poor	Yes	Likely Absent
D1C4	Pond	1	Other (IV)	5 (Under water)	30	Below Average / Poor	Yes	Likely Absent
D1C5	Ditch	0.2	Reed canary-grass (II)	3 (Wet)	0	Below Average / Poor	Yes	No Access
D1D1	Ditch	3.5	Other (IV)	5 (Under water)	60	Average	Yes	No Access
D1D2	Ditch	2	Willowherbs (III)	3 (Wet)	80	Poor	No	N/A
D1D3	Ditch	1	Stinging nettle (II)	3 (Wet)	100	Poor	No	N/A
D1D4	Ditch	1	Stinging nettle (II)	3 (Wet)	90	Below Average	Yes	No Access
D1D5	Ditch	1	Other (IV)	2 (Damp)	50	Poor	No	N/A
D1D6	Ditch	1	Other (IV)	2 (Damp)	50	Poor	No	N/A
D1E1	Ditch	0.5	Other (IV)	3 (Wet)	20	Average	Yes	No Access
D1E2	Ditch	1	Other (IV)	3 (Wet)	90	Below Average	Yes	No Access
D1E3	No Access for Survey							
D1E4	Ditch	1.5	Reed sweet-grass (I)	4 (Very wet)	80	Average	Yes (River Wensum SSSI/SAC)	No Access
D1E5	Ditch	1.5	Reed sweet-grass (I)	4 (Very wet)	90	Good	Yes (River Wensum SSSI/SAC)	No Access
D1E6	Ditch	2	Reed sweet-grass (I)	4 (Very wet)	90	Good	Yes (River Wensum SSSI/SAC)	No Access
D1E7	Ditch	3	Reed sweet-grass (I)	4 (Very wet)	70	Good	Yes (River Wensum SSSI/SAC)	No Access
D1E8	No Access for Survey (River Tud floodplain)							
D1E9	No Access for Survey (River Tud floodplain)							
D1E10	No Access for Survey (River Tud floodplain)							
D1E11	No Access for Survey (River Tud floodplain)							
D1F1	Ditch	2	Other (IV)	2 (Damp)	70	Below Average / Poor	Yes	Likely Absent
D1F2	Ditch	30	Reed sweet-grass (I)	2 (Damp)	0	Average	Yes	Likely Absent
D1F3	Ditch	1.5	Reed sweet-grass (I)	2 (Damp)	50	Good	Yes	Likely Absent

Habitat Survey parcel ID	Waterbody type	Vegetation Height (m)	Vegetation Composition	Ground Moisture Levels	Scrub Cover (%)	HSA Category	Further surveys recommended	Further survey results
D1F4	Ditch	4	Other (IV)	5 (Under water)	100	Poor	No	N/A
D1F5	Ditch	2	Other (IV)	5 (Under water)	20	Average	Yes	Likely Absent
D1F6	Ditch	0.2	Other (IV)	3 (Wet)	50	Below Average / Poor	Yes	Likely Absent
D1F7	Ditch	0.2	Other (IV)	3 (Wet)	0	Poor	No	N/A
D1F8	Ditch	40	Willowherbs (III)	1 (Dry)	20	Below Average	Yes	Likely Absent
D1G2	Ditch	50	Reed canary-grass (II)	3 (Wet)	50	Average	Yes	No Access
D1G3	Ditch	0.1	Other (IV)	5 (Under water)	80	Below Average	Yes	No Access