



Norfolk County Council

Norwich Western Link Road

Desmoulin's Whorl Snail Report 2021





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Type of document (version) Public

Project no. 70061370-09

Our Ref. No. 70061370-09-27

Date: June 2022

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Quality control

Issue/revision	First issue	Revision 1	Revision 2
Remarks	First Draft	Second Draft	Accessibility compliant checks complete
Date	January 2022	February 2022	June 2022
Prepared by	TRA001	TRA001	TRA001
Checked by	UKSJM011	UKSJM011	UKSJM011
Authorised by	UKIDE002	UKIDE002	UKIDE002
Project number	70061370-09	70061370-09	70061370-09
Report number	70061370-09-27	70061370-09-27	70061370-09-27



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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.
- 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.
- 1.1.2. 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.
- 1.1.3. 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. Desmoulin's whorl snail *Vertigo moulinsiana* (hereafter referred to as *V. moulinsiana*) is a snail typically found in old or semi-natural open calcareous fen and wetlands, usually adjacent or close to rivers, streams, lakes and ponds. In the UK it is chiefly distributed in a broad band of country from central-southern England to East Anglia (Kerney, 1999). Outlying populations also exist in the midland meres, north Wales, and north Cornwall. Across its range the species has experienced significant reductions in its populations, several of which are no longer viable.
- 1.2.2. *V. moulinsiana* is categorised as Rare (category 3) in the UK Red Data Books (Bratton, 1991), and more recently has been classified as vulnerable on the IUCN based UK red list review (Seddon, Killeen, & Fowles, 2014). The species is listed in Annex II a of the European Community Habitats and Species Directive (92/43/EEC) and is a NERC Section 41 'Species of Principal Importance in England' (replacing the UK BAP priority species in 2006). Since the designation of *V. moulinsiana* as a Priority Species in 1995, many surveys have been undertaken (summary details of some of these appear in Drake (A review of the status, distribution and habitat requirements of *Vertigo moulinsiana* in England, 1999)).

- 1.2.3. The requirement for *V. moulinsiana* survey was established in 2018 following identification, through a Desk Study (WSP UK Ltd., 2018), of the River Wensum Special Area of Conservation (SAC) which will be crossed by the Scheme. *V. moulinsiana* is a qualifying feature (S1016) (Code UK0012647) of the River Wensum SAC and as such it was considered important to understand its distribution in relation to the Scheme.
- 1.2.4. Targeted surveys for *V. moulinsiana* were therefore undertaken by WSP UK Ltd in 2019 and 2020 in order to provide baseline data regarding the presence and extent of this species within the vicinity of the Scheme (WSP UK Ltd, 2019; 2020). The Survey Areas to date have encompassed the River Wensum floodplain within the Scheme boundary, as well as an extended area of the Wensum valley between St Margaret's Church track off the Fakenham Road to the north west of the Scheme to Ringland Road to the south east. The 2020 Survey Area also encompassed a section of Foxburrow Stream, a tributary of the River Tudd which will also be crossed by the Scheme to the south.
- 1.2.5. The 2019 and 2020 surveys identified the presence of *V. moulinsiana* within two floodplain ditches within the Scheme boundary. *V. moulinsiana* were also confirmed to be present at sixteen sampling locations across the Wensum valley between St Margaret's Church track off the Fakenham Road to the north west of the Scheme to Ringland Road to the south east. This indicated the presence of a large population within the floodplain north of Ringland Lane situated to the south east of the Scheme.

1.3 Brief and objectives

- 1.3.1. In 2021, WSP UK Ltd was commissioned to undertake an update survey for *V. moulinsiana* in order to provide an assessment of any potential change over the past year of the presence and extent of this species within the vicinity of the Scheme. To achieve this, the following objectives were set:
 - Undertake sampling in areas where *V. moulinsiana* had previously been identified to confirm the continued presence or likely absence of *V. moulinsiana*;
 - Undertake a reassessment of the large population identified within the floodplain north of Ringland Lane situated to the south east of the Scheme;
 - To assess the status of *V. moulinsiana* populations where presence is confirmed;
 - To assess the Survey Area to source suitable mitigation measures; and
 - Present the findings of the survey in a report.
- 1.3.2. The results of meeting these objectives will be used to inform mitigation proposals and areas for compensation/enhancement with respect to *V. moulinsiana*. Details of the impact assessment and mitigation will be included within the Biodiversity Chapter of the Environmental Statement for the Scheme.

1.4 Study and survey area

Study area

- 1.4.1. A previous Desk Study was completed and reported in 2018 (WSP UK Ltd., 2018) using a broad Study Area which covered a large area encompassing multiple route options. This was updated in October 2021 using a more refined Study Area based on the Preferred Route.
- 1.4.2. The 2021 updated Desk Study defined Study Areas for *V. moulinsiana* as follows:
 - Records of *V. moulinsiana* within 2km of the Scheme; and
 - A search for statutory sites designated for *V. moulinsiana* within 10km of the Scheme.
- 1.4.3. These Study Areas are presented in Appendix A.

Survey area

- 1.4.4. The 2021 Survey Area encompassed three main areas of the River Wensum floodplain which had all been surveyed previously in 2019 and/or 2020:
 - A central floodplain ditch within the Scheme boundary which previously supported a population of *V. moulinsiana* in 2019 and 2020 (this ditch was included within the 'northern section' Survey Area in the 2020 report).
 - A small poplar plantation situated adjacent to the southern bank of the River Wensum to the north west of the Scheme boundary which supported an area of potentially suitable *Carex riparia* habitat (this area was included within the 'northern section' Survey Area in the 2020 report).
 - An area of floodplain to the south east of the Scheme boundary north of Ringland Lane, referred to as the 'south eastern section (south)' in the 2020 report which was found to support a large, scattered population.
- 1.4.5. The Survey Area and sampling locations are show in Appendix B, Figures B1 and B2.

2 Relevant legislation

2.1 Legal compliance

- 2.1.1. *V. moulinsiana* are afforded a high level of protection under Annex II of the Habitats and Species Regulations 2017 (the 'Habitats Regulations'). Under this legislation, it is an offence to;
- Deliberately capture, injure or kill a wild *V. moulinsiana*;
 - Deliberately disturb wild *V. moulinsiana*; '*disturbance of animals includes in particular any disturbance which is likely:*
 - (a) *to impair their ability —*
 - (i) *to survive, to breed or reproduce, or to rear or nurture their young; or*
 - (ii) *in the case of animals of a hibernating or migratory species, to hibernate or migrate; or*
 - (b) *to affect significantly the local distribution or abundance of the species to which they belong.'*
 - Damage or destroy a breeding Site or resting place used by this species.
- 2.1.2. Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of animals when using places of shelter, and obstruction of access to places of shelter.
- 2.1.3. It is listed in the British Red Data Book (Bratton 1991) as an RDB3 (rare) species.
- 2.1.4. Due to the high level of protection afforded to *V. moulinsiana* and their habitat, mitigation for this species is governed by Natural England. No licence is required; however, SAC, SSSI, and Natural England consents will be required as part of the planning permission and must be obtained before mitigation is carried out. Works which do not require planning permission must still adhere to Natural England consents.
- 2.1.5. Consent is subject to three tests, as defined under the Habitats Regulations. These must also be applied by a planning authority before granting permission for activities affecting *Vertigo moulinsiana*. For permission to be granted the following criteria must be satisfied:
- The proposal is necessary '*to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*';
 - '*There is no satisfactory alternative*'; and
 - The proposals '*will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range*'.



2.1.6. *V. moulinsiana* are also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under Section 40 of the NERC Act (2006) public bodies (including local planning authorities) have a duty to have regard for the conservation of SPI when carrying out their functions, including determining planning applications.

3 Methods

3.1 Overview

- 3.1.1. A walkover survey was undertaken on 17th September 2021 and areas of habitat suitable for supporting *V. moulinsiana* were identified for detailed survey work. The Survey Area included sections of the River Wensum SAC and surrounding grazing marshes. In total, 52 sampling locations were subject to detailed survey.
- 3.1.2. All *V. moulinsiana* records collected during the 2021 surveys will be submitted to Norfolk Biodiversity Information Service (NBIS).

3.2 Desk study

- 3.2.1. The updated ecological desk study, completed in October 2021, requested records of any notable or legally protected species, including *V. moulinsiana*, from within 2km of the Scheme were requested from the Norfolk Biodiversity Information Service (NBIS).
- 3.2.2. A review of the Multi-Agency Geographic Information for the Countryside (MAGIC) website ([MAGIC](#)) was completed to identify any statutory sites designated for *V. moulinsiana* within 10km of the Scheme.

3.3 Field Survey

- 3.3.1. The habitat preferences of *V. moulinsiana* at a broad level are known (Kerney, 1999). For example, in general the snail prefers *Carex* vegetation and 'swampy' conditions. However, the specific and fine-scale habitat preferences and thus the optimal biotic and abiotic conditions for the species are not known. As a result, surveying potentially unsuitable habitat is often undertaken to ensure a robust assessment as occasionally *V. moulinsiana* can be found in other habitats. This also contributes to improving assessment knowledge for the species which can be applied to other sites. A high degree of surveyor experience was therefore used to assess habitat suitability and select sampling locations.
- 3.3.2. The presence and distribution of *V. moulinsiana* was assessed using spot sampling along transects in September 2021. At each sampling location, two sub-samples of terrestrial molluscs were taken, described as samples A and B. Duplicating sampling in this way minimises the risk that, where present at a given sampling location, *V. moulinsiana* might not be detected.
- 3.3.3. The mollusc community was sampled using a non-destructive method. A white plastic tray (40cm x 60cm) was held near the base of the vegetation and the vegetation was bent over the tray and shaken vigorously. Adult *V. moulinsiana* snails were identified and separated from other molluscs by the presence of a developed lip and apertural teeth in the shell and then they were counted. All other terrestrial molluscs present were noted and quantified. Once this analysis was complete animals were returned to their origin.

- 3.3.4. *V. mouliinsiana* can be easily identified in the field and as such no samples needed to be retained.
- 3.3.5. At each sampling location, a minimum of five minutes was spent to record all molluscs and vegetation within an area of one metre from a centre point.
- 3.3.6. Sampling results for each location are provided in Appendix C.
- 3.3.7. At each sampling location, several environmental and biotic variables were recorded at the sampling locations:
 - Canopy cover (shade) (Table 3-1);
 - Average height of the vegetation;
 - Vegetation composition – DAFOR scale; and
 - Moisture content of the soil (Table 3-2)

Table 3-1 – Canopy Cover Classes

Canopy cover	Percentage
1	0-20%
2	21-40%
3	41-60%
4	61-80%
5	81-100%

Table 3-2 – Soil moisture classes

Soil moisture classes	Description
1 – Dry	No visible moisture on ground surface.
2 – Damp	Ground visibly damp, but water does not rise under pressure.
3 – Wet	Water rises under light pressure.
4 – Very wet	Pools of standing water, generally less than 5cm deep.
5 – Site under water	Entire Sampling Location in standing or flowing water over 5cm deep.

Botanical assessment

- 3.3.8. Quadrats were used to assess the composition of vegetation around each mollusc sampling location.
- 3.3.9. The percentage cover of vegetation was recorded within each quadrat. In addition to this, other biotic and abiotic factors were also recorded including:
- Open water;
 - Litter depth;
 - Field layer;
 - Vegetation height;
 - Slope;
 - Aspect; and
 - National Vegetation Classification (NVC) community.
- 3.3.10. In this sample-site specific survey, the emphasis was on covering the area immediately around the mollusc sampling locations and detecting as many plant species as possible.

Table 3-3 - Vegetation classes

Vegetation classes	Plant species
Class I	Tall <i>Carex</i> species, <i>Cladium mariscus</i> <i>Glyceria maxima</i>
Class II	<i>Equisetum fluviatile</i> <i>Phragmites australis</i>
Class III	<i>Juncus subnodulosus</i> <i>Mentha aquatica</i> <i>Angelica sylvestris</i>
Class IV	<i>Urtica dioica</i> <i>Eupatorium cannabinum</i> and all other species

Vegetation cover within each quadrat was assessed as follows:

- D – Dominant (over 70% cover)
- A – Abundant (50-70% cover)
- C – Common (30-50% cover)
- F – Frequent (10-30% cover)
- O – Occasional (3-10% cover)
- R – Rare (less than 3% cover)

3.3.11. The exact mid-point of a quadrat was located by GPS co-ordinates at ten figure grid references.

3.4 Dates of survey and personnel

- 3.4.1. The recommended survey period for *V. moulinsiana* is from mid-late summer into the autumn inclusive (Killeen I.J., 2000.), following the main reproductive period; however, this species does breed throughout the year, with juveniles present in samples across all seasons meaning that *V. moulinsiana* can be successfully detected at any time of year. The surveys should be carried out before the first frosts of the autumn, before the main vegetation has started to collapse and whilst the conditions are not too wet. This avoids excessive disturbance to the habitat.
- 3.4.2. The surveys were led by a Suffolk-based mollusc surveyor and nationally recognised Vertiginidae specialist, who is also a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). The Survey Area was visited on 17th September 2021 to undertake a habitat assessment and sampling.

3.5 Notes and limitations

There were no limitations to the 2021 survey. The weather conditions were suitable, with wet warm weather in the previous month providing optimal conditions for *V. moulinsiana*.

4 Results

4.1 Overview

4.1.1. *V. moulinsiana* was confirmed to be present in twenty sampling locations across the 2021 Survey Area. The results indicated the continued presence of a large population within the south-eastern section (south) initially identified in 2020, as well as the continued presence of *V. moulinsiana* in the central floodplain ditch within the Scheme Boundary as recorded in 2019 and 2020 (WSP UK Ltd, 2020; 2021). The results also indicated the continued likely absence of *V. moulinsiana* within the poplar plantation to the north west of the Scheme boundary.

4.2 Desk study

- 4.2.1. The updated desk study found that no records of *V. moulinsiana* were returned by NBIS within a 2km radius of the Study Area.
- 4.2.2. Two statutory sites designated for *V. moulinsiana* were identified within 10km of the Scheme. These are:
- The River Wensum SAC for which *V. moulinsiana* is a qualifying feature (S1016) (Code UK0012647), which the Scheme crosses; and
 - The Norfolk Valley Fens SAC (Code UK0012892) which is approximately 6.2km north-east of the Scheme, for which *V. moulinsiana* is a primary reason for selection of the site.
- 4.2.3. Given the limited mobility of the species, the population present within the Norfolk Valley Fens SAC will not be impacted by the Scheme, however the 10km Study Area allowed a wider view of the distribution of this species in the local area for information.

4.3 Field survey

4.3.1. The 2021 survey mainly focussed on the south-eastern section (south) to assess the extent of the main area of the *V. moulinsiana* habitat recorded in 2020. The central floodplain ditch within the Scheme boundary and poplar plantation to the north west were also sampled. Sampling locations and occurrences of *V. moulinsiana* are shown in Appendix B, Figures B1 and B2.

Habitat assessment

Wensum Valley - Northern Section

- 4.3.2. The central floodplain ditch habitat within the Scheme boundary was found to be identical to that reported in 2020, supporting a mosaic of *Glyceria maxima* and *Carex riparia* with smaller quantities of *Phalaris arundinacea*. A section of this ditch approximately 150m east of where *V. moulinsiana* were previously recorded in 2019 and 2020 however appeared to have been recently dredged at the time of survey and as such, was completely devoid of any aquatic or emergent vegetation. This section of ditch was previous sampled in 2020 which did not record any *V. moulinsiana* and therefore the dredging works are considered unlikely to have impacted any *V. moulinsiana* populations.
- 4.3.3. The small poplar plantation situated adjacent to the River Wensum supported an area of suitable *Carex riparia* habitat. At the time of the survey (September) this was damp with water only filling the ditch to the south and west. It was noted that there was a large amount of Himalayan balsam present throughout the plantation that wasn't present in 2020. The poplar plantation created significant shade for much of the habitat, except along the outer margins to the south and west. Here the sedge beds formed hover habitat over the ditch.
- 4.3.4. The poplar plantation *Carex riparia* beds included an area covering 0.25 hectare of potential habitat - with 0.049 of currently suitable habitat. The vegetation in the understorey of the woodland was dominated by *Carex riparia* with *Urtica dioica* on the dryer sections closer to the river. The sward of *Carex riparia* was at a light density, as would be expected in a shaded woodland. At the outer western and southern margins of the area there was a ditch supporting a hover of *Carex riparia*. This was a denser sward though was well grazed from the marsh sides reducing the potential habitat.

Wensum Valley - South-eastern Section (South)

- 4.3.5. This section incorporated land to the west of the River Wensum which supported a range of grazing marshes, with a less intense grazing regime allowing for taller fen habitats to establish.
- 4.3.6. Re-assessment of the ditches in this section found that they were still in the same condition as reported in 2020 and were therefore still considered unsuitable to support *V. moulinsiana*.
- 4.3.7. The ditches were generally around 4m wide ranging in depth from 0.5 to 1m. A large proportion of the ditches were grazed from both sides, with very little habitat that was not accessed by livestock. Where the grazing was limited, the ditches supported a higher density of *Sparganium erectum* (not suitable for *V. moulinsiana*). The vegetation communities were very similar across this section with *Carex riparia*, *Glyceria maxima* and *Phalaris arundinacea* being prevalent. The wider, deeper ditches with a low to moderate flow supported a higher density of *Sparganium erectum*, interspersed with scattered stands of *Glyceria* or *Carex*.

- 4.3.8. The main aim of the survey in 2021 was to reassess the large, scattered population of *V. moulinsiana* recorded in this section in 2020. This population was previously recorded within a series of scattered wet *Carex riparia* beds interspersed with areas of *Agrostis stolonifera*, *Festuca rubra* and *Deschampsia caespitosa*. The *Carex riparia* beds were wet at the time of the survey and had a layer of thatch and tussocks. This latter habitat was deemed of low suitability; however, all the larger stands of *Carex* had potential to support *V. moulinsiana*.

Sampling

Wensum Valley - Northern Section (samples 17th September 2021)

- 4.3.9. Only the central floodplain ditch within the Scheme boundary and margin of the poplar plantation to the north west were sampled in 2021. All the other ditches were assessed as not to have changed over the past year with still heavy grazing on at least one side.
- 4.3.10. Sampling in the central ditch within the Scheme boundary recorded the continued presence of *V. moulinsiana*. Samples taken from the same location as 2019 and 2020 recorded a total of 6 adults and 1 juvenile, compared to 106 in 2019 and 49 in 2020 (WSP UK Ltd, 2020). The other molluscs present in the samples taken here were dominated by *Succinea putris* and *Deroceras laeve*.
- 4.3.11. Sampling within the margins of the small poplar plantation to the north west of the Scheme boundary did not record any *V. moulinsiana*.

Wensum Valley – South-eastern Section South (samples 17th September 2021)

- 4.3.12. A total of 52 samples were taken across the *Carex riparia* beds within this section, though no ditches were sampled as they were still considered unsuitable to support *V. moulinsiana*. All samples taken were small to not disturb the greater population. It was decided that removing material for laboratory was not required to protect this large population.
- 4.3.13. Sampling across the *Carex riparia* beds recorded *V. moulinsiana* in 35 sub samples of 20 sampling locations, with numbers ranging from a single specimen to 47 in a single sub sample.
- 4.3.14. It should be noted that at each of the sampling locations in 2021, *V. moulinsiana* was often found in both of the two samples taken. In 2020, *V. moulinsiana* were only recorded in a single sub sample at each location. This indicates that the distribution of *V. moulinsiana* within this *Carex riparia* dominated community is more widespread in this area than in 2020. This was considered likely to be attributed to the wetter summer in 2021 which is likely to have contributed to a better breeding event in 2021.
- 4.3.15. A re-survey of the habitat with *Deschampsia caespitosa*, *Festuca rubra* and *Agrostis stolonifera* community however, showed that *V. moulinsiana* was no longer present, though the population here may well be transient, depending on the level of moisture on the site.

4.3.16. In the *Carex riparia* bed samples, the general mollusc community was by far the richest within the Survey Area, with up to seven species present. With the exception of *V. moulinsiana*, none of the species were of conservation significance, though of interest were good numbers of *Euconulus alderi* and *Ashfordia granulata*.

5 References

5.1 Project references

- WSP UK Ltd. (2020). *Phase 1 Habitat Survey*. Cambridge

5.2 Technical references

Bratton. (1991). *Red Data Book of British Invertebrates*. London. Joint Nature Conservation Committee.

CIEEM. (2019). Advice Note on the Lifespan of Ecological Reports and Surveys. Winchester. CIEEM.

Drake, C. M. (1999). A review of the status, distribution and habitat requirements of *Vertigo moulinsiana* in England. *Journal of Conchology*(36), 63-79.

Kerney, M. P. (1999). *Atlas of land and freshwater molluscs of Britain and Ireland*. Colchester Harley Books.

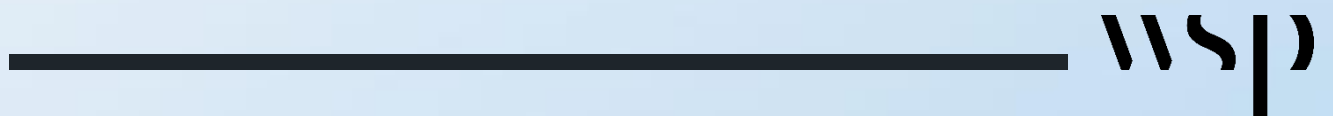
Seddon, M. B., Killeen, I. J., & Fowles, A. P. (2014). A review of the Non-Marine Mollusca of Great Britain. Species Status No. 17. In *NRW Evidence Report No. 14* (p. 84). Bangor: Natural Resources Wales.

Abrehart Ecology 2017. Desmoulin's Whorl Snail (*Vertigo moulinsiana*) Article 17 Condition Assessment of River Wensum SAC for Natural England by Abrehart Ecology 2017

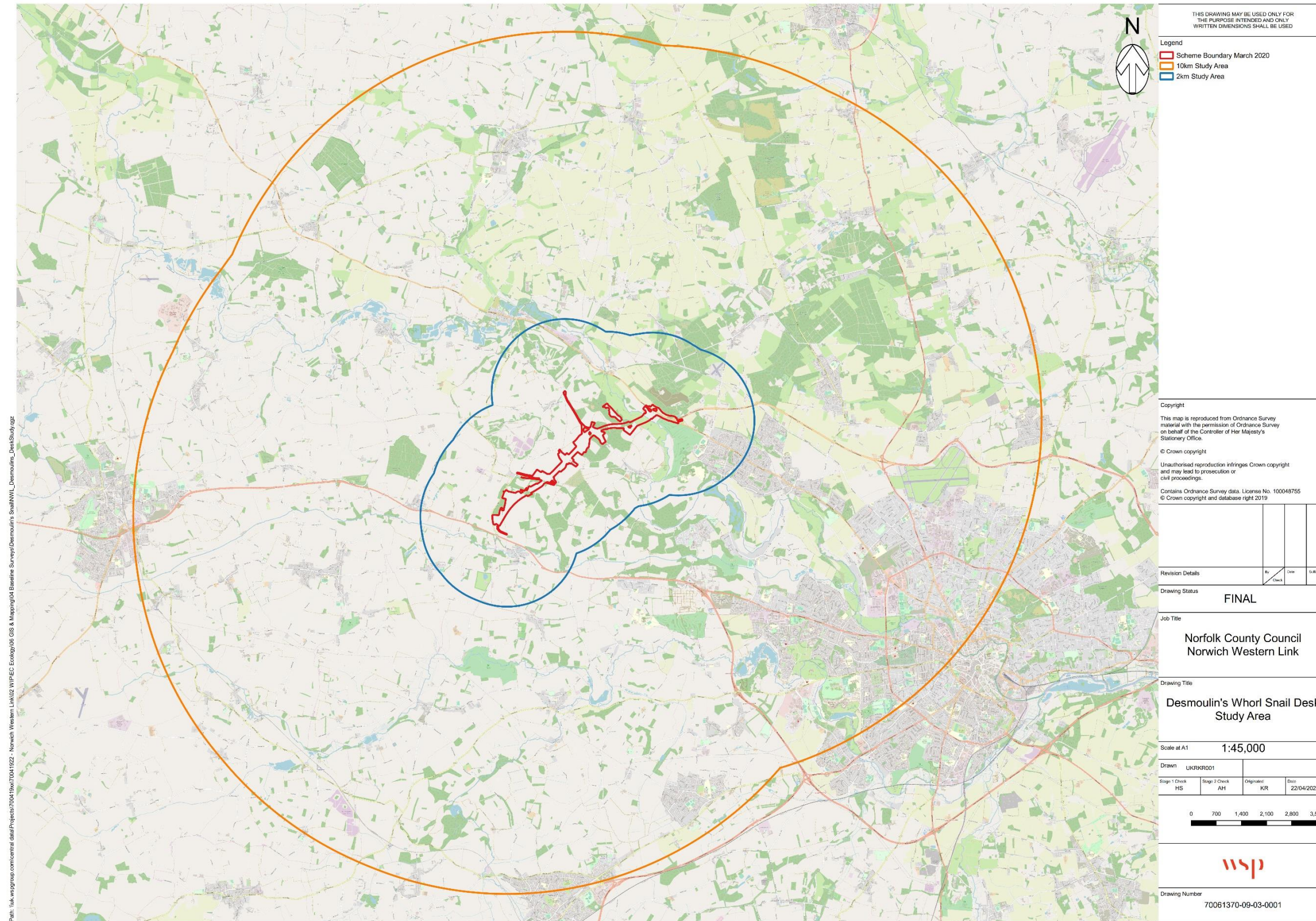
Killeen I.J., 2001. Surveys of EU Habitats Directive *Vertigo* Species in England. 3. *Vertigo moulinsiana*, Part 7: The River Wensum SAC

Appendix A

Desk study area

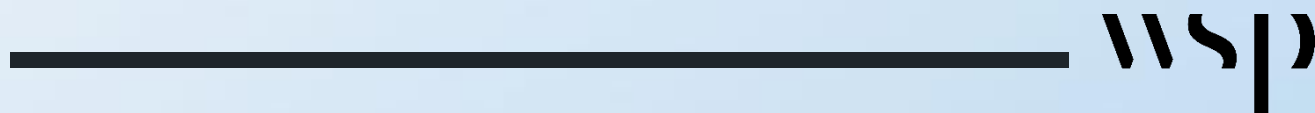


Appendix A – Desk Study Area

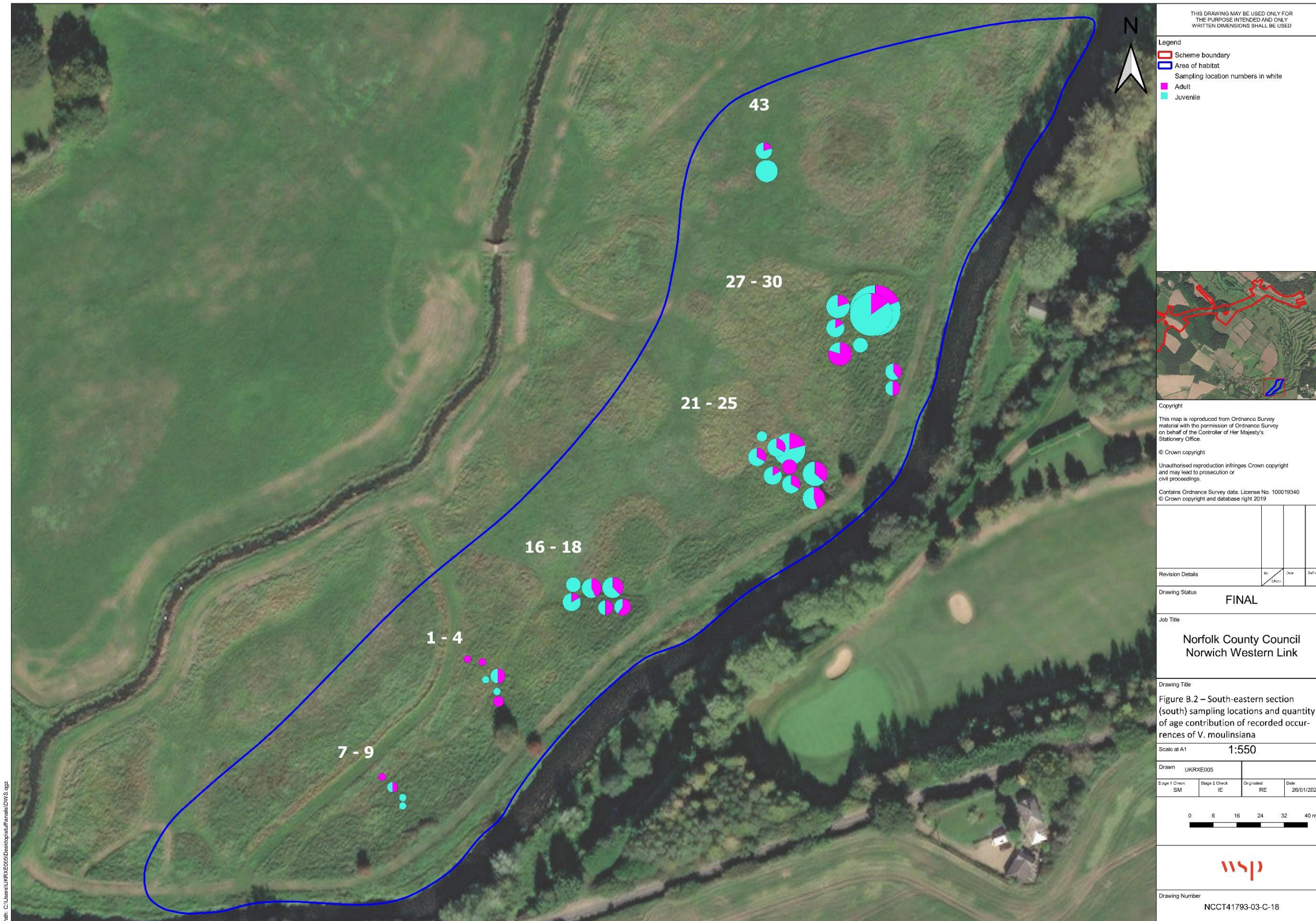


Appendix B

Survey area, sampling locations and results







Appendix C

Raw survey data

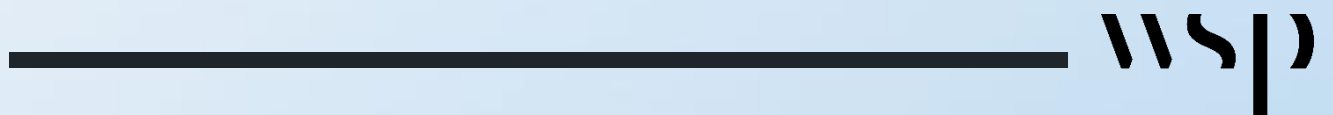


Table C-1 – Sampling results

Site location	Grid reference	Vertigo moulinsiana Adult	Vertigo moulinsiana Juvenile	Ashfordia granulata	Cepaea hortensis	Deroceras reticulatum	Euconulus alderi	Galba truncatula	Succinea putris	Zonitoides nitidus
1a	TG143513780	0	1	0	1	0	0	0	1	1
1b	TG143513780	2	0	4	0	0	0	0	1	0
2a	TG1435013784	0	1	2	2	0	0	0	1	0
2b	TG1435013784	2	2	1	1	0	0	0	3	0
3a	TG1434613490	1	0	4	2	0	0	0	2	0
3b	TG1434613490	0	0	7	1	0	0	0	8	0
4a	TG1434113791	0	0	22	0	0	0	0	7	0
4b	TG1434113791	1	0	35	0	0	0	0	2	0
5a	TG1433613793	0	0	3	0	0	0	0	2	0
5b	TG1433613793	0	0	19	0	0	0	0	3	0
6a	TG1433213798	0	0	4	0	0	0	0	2	0
6b	TG1433213798	0	0	4	0	0	0	2	12	0
7a	TG1431913744	0	1	4	0	0	0	0	1	0
7b	TG1431913744	0	1	1	0	0	1	0	8	0
8a	TG1431513747	0	0	3	0	1	1	0	6	0
8b	TG1431513747	1	1	2	0	1	1	0	18	0
9a	TG1431213751	0	0	2	0	0	1	0	3	0
9b	TG1431213751	1	0	3	0	1	0	0	4	0
10b	TG1431113761	0	0	3	0	0	1	0	5	0
11	TG1430813763	0	0	14	0	0	0	0	11	0
12	TG1430413266	0	0	42	0	1	0	1	7	0
13	TG1430413266	0	0	12	0	0	0	0	33	0
14	TG1429113770	0	0	32	1	2	0	0	40	0
15	TG1436413827	0	0	0	0	0	0	0	5	0
16a	TG1439213808	3	2	0	0	0	0	0	1	0
16b	TG1439213808	2	2	0	0	0	0	0	3	0
17a	TG1438813813	3	5	1	0	1	0	0	3	0
17b	TG1438813813	3	4	0	0	1	9	0	1	0
18a	TG1438113815	1	5	0	0	3	5	0	4	0
18b	TG1438113815	0	4	0	0	1	9	0	1	0
19a	TG1437813821	0	0	0	0	0	0	0	6	0
19b	TG1437813821	0	0	0	0	0	0	0	2	0
20	TG1437813821	0	0	0	0	0	0	0	34	0
21a	TG1445613851	4	7	1	1	2	3	0	8	0
21b	TG1445613851	4	5	11	0	0	3	0	5	0
22a	TG1444913855	4	0	1	0	0	0	0	2	0
22b	TG1444913855	2	4	2	0	1	2	0	2	0
23a	TG1444673858	4	15	0	0	1	0	0	5	0
23b	TG1444673858	1	5	0	0	0	0	0	2	0
24a	TG1444413861	2	4	0	3	1	0	0	21	0

Site location	Grid reference	Vertigo moulinsiana Adult	Vertigo moulinsiana Juvenile	Ashfordia granulata	Cepaea hortensis	Deroceras reticulatum	Euconulus alderi	Galba truncatula	Succinea putris	Zonitoides nitidus
24b	TG1444413861	2	4	0	0	1	0	0	9	0
25a	TG1444113866	0	0	0	0	0	0	0	1	0
25b	TG1444113866	0	2	0	0	0	3	0	11	0
26a	TG1443813870	0	0	0	0	0	0	0	2	0
26b	TG1443813870	0	0	0	0	0	0	0	3	0
27a	TG1448413887	2	3	1	1	0	0	0	1	4
27b	TG1448413887	2	2	0	0	1	0	0	3	0
28a	TG1447313899	0	4	0	0	1	0	0	0	0
28b	TG1447313899	8	2	0	0	1	0	0	2	0
29a	TG1447213902	9	38	0	0	1	2	0	12	0
29b	TG1447213902	5	28	0	1	0	2	0	6	1
30a	TG1446413908	2	8	0	0	1	0	0	3	2
30b	TG1446413908	1	5	0	0	0	0	0	3	2
31	TG1432513801	0	0	0	0	0	0	0	1	0
32	TG1432513801	0	0	1	0	0	0	0	3	0
33	TG1432213805	0	0	2	0	0	0	0	1	0
34	TG1432213805	0	0	1	0	0	0	0	5	0
35	TG1431613809	0	0	0	0	0	0	0	1	0
36	TG1431613809	0	0	0	0	0	0	0	9	0
37	TG14307138185	0	0	15	0	0	0	0	4	0
38	TG14307138185	0	0	0	0	0	10	0	0	0
40a	TG1445913908	0	0	0	0	0	0	0	3	0
40b	TG1445913908	0	0	0	0	0	0	0	4	0
41a	TG1445213909	0	0	0	0	0	0	0	1	0
42	TG1444413918	0	0	0	0	0	0	0	2	0
43a	TG1444013962	1	4	3	0	0	0	0	0	0
43b	TG1444013962	0	0	0	0	0	0	0	3	0
44	TG1450213969	0	0	0	0	0	0	0	3	0
45	TG1450413986	0	0	0	0	0	0	0	15	0
46	TG1451214034	0	0	0	0	0	0	0	6	0
47	TG1453314111	0	0	0	0	0	0	0	4	0
48	TG1453714268	0	0	0	0	0	0	0	38	0
49	TG1453514272	0	0	0	0	0	0	0	32	0
50	TG1449914271	0	0	0	0	0	0	0	25	0
51	TG1449214280	0	0	0	0	0	0	0	25	0
52	TG1383615428	6	1	0	0	0	0	0	4	0



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