Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement

Volume 3

Appendix 20.8 - Reptile Survey Report

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Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Photo of grass snake recorded near the River Tiffey at Barford

Volume 3, Technical Appendix 20.8: Reptile Survey Report

April 2022

Report produced by	Produced on behalf of
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The data which we have prepared and provided is accurate, and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.

This report conforms to the British Standard 42020:2013 Biodiversity – Code of practice for planning and development.

CONTENTS

LIST OF ACRONYMS

ARCT	Amphibian and Reptile Conservation Trust
DCO	Development Consent Order
DEP	Dudgeon Offshore Wind Farm Extension Project
ECoW	Ecological Clerk of Works
EP1HS	Extended Phase 1 Habitat Survey
ETG	Expert Topic Group
NARG	Norfolk Amphibian and Reptile Group
NBIS	Norfolk Biodiversity Information Service
NNDR	Norwich Northern Distributor Road
PEIR	Preliminary Environmental Information Report
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
WFE	Wild Frontier Ecology Ltd.

GLOSSARY OF TERMS

Term	Definition
DCO boundary / Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

EXECUTIVE SUMMARY

Wild Frontier Ecology Ltd. was commissioned by Equinor New Energy Ltd. to undertake presence or likely absence reptile surveys within selected areas of the onshore grid connection cable corridor associated with the proposed Sheringham Shoal Offshore Wind Farm Extension Project and Dudgeon Offshore Wind Farm Extension Project. At the time the surveys were commissioned in early 2021, the onshore cable corridor was defined as the Preliminary Environmental Information Report (PEIR) boundary. The ongoing site selection process involved refining the PEIR boundary by drawing on information obtained during the ecological studies (and others) to ensure the boundary avoided or minimised impacts on sensitive areas, such as by avoiding sites of ecological value.

The reptile surveys were preceded by an Extended Phase 1 Habitat Survey (EP1HS) of all accessible parts of the PEIR boundary, where key areas assessed as providing suitable reptile habitat were noted. Full results of the EP1HS are provided in **Technical Appendix 20.1** (document reference 6.3.20.1).

A data search was also completed with the Norfolk Biodiversity Information Service (NBIS) in January 2021, which obtained records of reptiles within the PEIR boundary and surrounding 2km area. NBIS also advised that other organisations in Norfolk may hold additional reptile records, but consultation with those organisations did not yield any further records. NBIS returned records of all four reptile species which occur within Norfolk (adder, common lizard, grass snake and slow worm) within the search area.

Using a combination of the data gathered during the EP1HS, and NBIS data on distribution of reptile populations within and around the PEIR boundary, a total of 15 sites were selected for the 2021 reptile presence/likely absence survey effort. Surveys used artificial refuges (sheets of roofing felt each measuring approximately 0.5 square metres) deployed throughout all areas of suitable habitat within each site subject to the 2021 survey effort, which were then checked on seven separate occasions for reptiles basking on or sheltering beneath these sheets. The surveys were completed during suitable weather conditions between April and July 2021.

Since the surveys were completed, the site selection process and the narrowing of the onshore cable corridor from the PEIR boundary to the DCO boundary have resulted in two of the 15 survey sites now being wholly outside the DCO boundary.

The 2021 surveys recorded reptile presence at 11 of the 15 survey sites. All four of the reptile species which occur in Norfolk were recorded; adder was recorded at two of the survey sites, common lizard was recorded at three survey sites, grass snake at five sites and slow worm at five sites. Four of the survey sites were found to support two reptile species each, with the other seven sites supporting a single species each. The numbers of animals recorded during the surveys was generally low (fewer than five, which is within the 'Low' population classification of best-practice guidance), although at one site bordering the A140 and railway line near the onshore substation site, a 'Good' population of slow worms was recorded (with a maximum count of 10 adult animals during a single survey). However, it should be acknowledged that surveys did not extend to population classification surveys but rather were restricted to presence/likely absence only, so these population classifications are estimates.

The possibility of direct construction impacts to eight of the confirmed reptile sites will be negated through the use of Horizontal Directional Drilling (HDD), which is proposed beneath these sites. Mitigation measures for the three sites which will be directly impacted by construction works will be required. This will include pre-construction

habitat management to pre-emptively deter reptiles from the proposed construction corridor. At one particular survey site (Hickling Lane) where slow worms are present, habitat management alone may not be fully effective so a pro-active translocation effort would also be necessary to ensure these animals are not harmed by construction works.

Further, pre-construction reptile surveys may be required, largely depending on habitat suitability/continuity at the survey sites and elsewhere throughout the DCO boundary at the time construction works would take place. However, assuming habitat conditions remain largely consistent, the mitigation approach would be sufficient at addressing risks to reptiles without any anticipated requirement for further surveys.

Post-construction habitat reinstatement/management is also required to ensure there are no long-term negative impacts to areas of suitable reptile habitat within and around the construction footprint.

1. BACKGROUND

Equinor New Energy Limited (hereafter Equinor) is proposing to extend the existing operational Sheringham Shoal Offshore Wind Farm and Dudgeon Offshore Wind Farm, named the Sheringham Shoal Offshore Wind Farm Extension Project (hereafter SEP) and Dudgeon Offshore Wind Farm Extension Project (hereafter DEP). SEP and DEP will consist of a number of offshore and onshore elements including the offshore wind turbines, offshore export cables and offshore substation. The offshore export cables will connect to shore on the North Norfolk coast, with onshore infrastructure connecting the offshore wind farms to the National Grid, which will comprise underground cables from landfall to an onshore substation and National Grid connection at Norwich Main. A full description of SEP and DEP is provided within **ES Chapter 5 Project Description** (document reference 6.1.5).

In 2021, WFE was commissioned by Equinor to undertake presence and likely absence reptile surveys within areas that had been assessed as providing suitable habitat to support reptile species during the EP1HS. The findings from the presence and likely absence reptile surveys have been used to inform the ecological impact assessment of the proposed onshore grid connection for the DEP and SEP, presented in **ES Chapter 20 Onshore Ecology and Ornithology** (document reference 6.1.20) which accompanies the DCO application. The onshore components comprise a c.60km route with landfall location around Weybourne on the North Norfolk coast, with the onshore cable route then running southwards and eventually eastwards around the west and south sides of Norwich, where it is to connect with a proposed onshore electricity substation near Norwich Main Substation.

Maps showing the areas targeted for surveys within and around the DCO boundary are provided in **Figure 1** to **Figure 11,** below.

At the time the majority of the EP1HS was completed (in 2020) and at the time the reptile surveys were commissioned (in early 2021), the site selection process for the onshore cable corridor was still underway. At those times, the corridor was defined as the PEIR boundary. The results of the 2021 reptile surveys, along with other ecology (and non-ecology) surveys/investigations undertaken for SEP and DEP have been incorporated into the site selection process whereby the corridor was refined to become the DCO boundary. The site selection process drew on the information obtained during the various surveys with the aim of minimising the overall impacts of SEP and DEP, for example by avoiding sensitive areas and features once they were identified by the surveys.

This report outlines the aims, methods and results of the presence and likely absence reptile surveys completed in 2021.

2. RELEVANT LEGISLATION

All native reptiles are listed on Schedule 5 of the Wildlife and Countryside Act 1981, and are afforded protection under Sections 9(1) and 9(5). For the reptile species occurring in Norfolk (adder *Vipera berus*, grass snake *Natrix helvetica*, slow-worm *Anguis fragilis* and common lizard *Zootoca vivipara*), this protection prohibits deliberate or reckless killing and injury but does not include habitat protection.

3. SURVEY METHODS

3.1. Desk Study

3.1.1. Norfolk Biodiversity Information Service Reptile Records

A data search was undertaken in January 2021 where a request was made to NBIS for all biological records (including of reptile species) within the PEIR boundary and surrounding 2km area.

3.1.2. Other Data Sources

Upon providing the data, NBIS advised that additional records of reptiles may be held by other groups, namely the Norfolk Amphibian and Reptile Group (NARG) and the Amphibian and Reptile Conservation Trust (ARCT). Both these organisations were subsequently consulted in April 2021 to request and obtain any additional reptile records to those held by NBIS.

3.2. Reptile Presence/Likely Absence Survey

During the Terrestrial Ecology and Ornithology Expert Topic Group (ETG) meeting on 28th January 2020, attended by Natural England, the Environment Agency, Broadland District Council, Norfolk County Council, North Norfolk District Council and South Norfolk District Council, it was agreed that all accessible areas within the PEIR boundary which provide suitable reptile habitat would be surveyed for reptiles.

All accessible areas within the PEIR boundary were subject to an EP1HS between March 2020 and January 2021, which included an appraisal of the suitability of habitats for reptiles. Habitats such as scrub, tall herb and ruderal vegetation, grasslands (especially if tussocky with an established and varied sward structure, and not subject to intensive management), woodland edge, mature hedgerows, railway embankments/cuttings, allotments, heathland and the banks/peripheries of waterbodies were amongst the types of habitats present within the PEIR boundary which were considered suitable for reptiles. The presence of suitable features for reptiles was also a factor in determining the suitability of an area. Reptiles require the following: open/unshaded areas for basking; cover for sheltering (usually in the form of dense vegetation); food sources such as invertebrates, amphibians and small mammals; and hibernacula such as woodpiles, rootstocks, banks or piles of various materials. Features such as compost heaps or other piles of vegetation which can be used as hibernacula can also provide breeding/egg-laying sites for grass snake.

In April 2021, the information from the EP1HS relating to suitable habitats and features for reptiles was reviewed in combination with reptile records returned by NBIS. This identified sites which required detailed surveys to confirm the presence or likely absence of reptiles. The following 15 sites were selected:

Table 1: Sites Selected for Reptile Presence/Likely Absence Surveys (to be read in conjunction with Figure 1 to Figure 11)

Reptile Survey Site Reference Name	Location and Habitat Description
Muckleburgh Collection	Coastal grassland and scrub with nearby ponds, inland from the landfall location, north-west of Weybourne
Sandy Hill Lane	Woodland edge habitat with some more open, un-shaded areas (formerly heathland, and connected to Kelling Heath) west of Sandy Hill Lane, south of Weybourne
River Bure	Tussocky, damp grassland with scattered scrub, ponds and drainage ditches bordering the River Bure east of Saxthorpe
Swannington meadow	Infrequently-grazed cattle pasture dominated by tall herb and ruderal vegetation with scattered scrub, a large woodpile, a pond and ditches, north of Church Lane, east of Swannington
Swannington field margin	Long-term field margin with encroaching scrub bordering a stream south of Church Lane, east of Swannington
River Wensum	Tussocky grassland amongst young broad-leaved plantation woodland adjacent to the River Wensum, south of Attlebridge
Telegraph Hill	Long-term field margin of tussocky grassland bordering a plantation woodland and pond, north of Telegraph Hill, south-east of Weston Green
Taverham Road	Bank of heathland vegetation and connected long-term field margin of tussocky grassland, east of Taverham Road, north-west of Easton
River Tud	Cattle-grazed grassland with ponds bordering the River Tud north-west of Easton
River Yare	Tall grassland and woodland edge on south-facing slope bordering the River Yare, south-east of Colton
River Tiffey	Tussocky, wet grassland with ponds and numerous fallen trees (deadwood on the ground) bordering the River Tiffey, east of Barford
Norwich Hill, Ketteringham	Tussocky grassland bordering woodland at Norwich Hill, east of Ketteringham
Valley Farm, Swardeston	Cattle-grazed meadows with scattered scrub and ditches south of Valley Farm, west of Swardeston
Hickling Lane	Tussocky grassland and scrub bordering north and south sides of Hickling Lane (ancient green lane) east of Swainsthorpe, south of the Norwich Main substation
A140/railway line	Long-term field margin of tussocky grassland with encroaching scrub bordering the A140 Ipswich Road to the east and an active railway line to the west, east of Swainsthorpe, south-east of the Norwich Main substation

Maps of the survey sites are provided in **Figure 1** to **Figure 11**, below, and photographs to show the key areas of suitable habitat within a selection of these sites are provided in Annex 1.

Some of the survey sites (e.g. Sandy Hill Lane) are outside of the DCO boundary, but these were targeted for reptile surveys in April to July 2021 because at that time the

survey area (i.e. the PEIR boundary) extended to cover these sites. The DCO boundary was refined to its current alignment after the surveys had been completed.

The sites listed in **Table 1** were subject to the 2021 reptile survey effort to determine the presence or likely absence of reptiles in accordance with survey guidance published by the Joint Nature Conservation Committee[1] and Froglife[2]. The surveys used artificial refuges, consisting of bitumen-felt sheets of roofing felt, each measuring approximately 0.5m^2, deployed throughout areas of suitable reptile habitat at these sites. These sheets were left to "bed-in" to the ground vegetation for around one week. Each site was then surveyed during suitable weather conditions on seven separate occasions to check for reptiles basking on or sheltering beneath the sheets. The survey sheets heat up in the sunlight and retain heat in short spells of overcast or cooler weather, attracting basking and sheltering reptiles. As the sheets sit on top of the vegetation, they also provide an unshaded basking feature.

The surveys were therefore completed during specific weather conditions when reptiles were most likely to be using the sheets for basking/sheltering; when air temperature was between 9° Celsius and 18° Celsius, with no precipitation, no more than light winds, and usually with limited cloud cover. It can be acceptable to survey outside these conditions in certain circumstances; for example, wind speed might not be a relevant consideration at a particularly sheltered site. It can also be acceptable to survey for reptiles if the air temperature is slightly warmer that 18° Celsius (perhaps up to 20° Celsius) if temperatures are climbing quickly (such as in strong morning sunshine), because ground temperatures will take time to warm up, particularly if they are shaded early in the morning.

When completing each survey, surveyors walked through each site, checking on and beneath the artificial refuges. Surveyors took care to minimise noise and disturbance as they walked through each survey site checking the refuges, so as to not disturb/alert any reptiles using them, as this could cause them to take shelter before the surveyor was able to record them. Any reptiles seen were noted for species and (where observable) sex, life stage and any notable features or condition (such as gravid female, missing tail etc.). Any other observations of reptiles were also noted when walking through the survey sites, as were other signs of presence such as sloughs (shed skin).

Precise details of numbers of artificial refuges deployed, dates of deployments and surveys, weather conditions during surveys and the survey results, are all provided in **Table 2** to **Table 16**, below.

The surveys were undertaken by the following WFE staff (always working in pairs). Surveyor's initials are given as these are used to denote the surveyor in **Table 2** to **Table 16.**

- Alex Lowe BSc MArbor (AL)
- Ptolemy McKinnon BSc MSc (PM)

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[1]Gent, T. & Gibson, S. (eds.) (2003). *Herpetofauna Worker's Manual*. Joint Nature Conservation Committee, Peterborough.

[2] Froglife (1999). *Reptile Survey: An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

- Justin Parry BSc (JP)
- Alice Petherick BA MA (AP)
- William Riddett BA ACIEEM (WR)
- Graham Riley BSc ACIEEM (GR)
- Katrina Salmon BSc QualCIEEM (KS)
- Adam Stickler BSc MSc ACIEEM (AS)
- Robert Yaxley BSc CEcol CEnv MCIEEM (RY)

The artificial refuges were removed from each survey site immediately after the seventh survey visit (or sooner at the two sites where surveys had to be aborted, at the River Tud and Valley Farm, Swardeston).

4. RESULTS

4.1. Desk Study

4.1.2. Norfolk Biodiversity Information Service Reptile Records

The NBIS data search returned 54 records of four species of reptiles within the DCO boundary and the surrounding 2km buffer. Nineteen of these records are of slow worm, 15 are of common lizard, another 15 are of grass snake and five are of adder. Most of these records (particularly of common lizard and slow worm) were obtained during reptile surveys completed for the Norwich Northern Distributor Road (NNDR) in 2005. The now constructed NNDR runs around the north and east sides of Norwich, but the reptile records provided by NBIS relate to locations around the west side of Norwich (around the villages of Ringland, Weston Longville and Honingham), which may have formed part of the proposed NNDR route in 2005.

For common lizard, the only record not associated with the NNDR was located in Wymondham and dates from 2009. For slow worm, the only six records not associated with the NNDR are located at Weston Longville from 2009 (four records), Plumstead from 2013 (one record) and Blackbreck Plantation bordering Telegraph Hill near Weston Longville from 2007 (one record).

Three of the records of adder and one of the records of grass snake are associated with the NNDR and date from 2005. Other records of grass snake are located around East Carleton, Ketteringham, Swardeston, Wymondham, Weston Longville and Cawston (dating from 2007 to 2015). The other three records of adder which are not associated with the NNDR are located at Brandiston (from 2008) and Kelling (from 2009).

4.1.2. Other Data Sources

The consultations with the NARG and the ARCT did not yield any further reptile records. The NARG advised that they do not hold biological records. The ARCT was not directly contactable, but an automated voicemail message (reviewed in August, October and most recently on 13th December 2021) confirmed that their office was closed due to COVID-19 pandemic restrictions, and they were not responding to enquiries at that time.

4.2. Presence/Likely Absence Surveys

Maps showing the 2021 survey sites are provided in **Figure 1** to **Figure 11**, and results are provided in **Table 2** to **Table 18**, below. In the below tables, animals recorded were adults unless stated otherwise. Photographs of some of the recorded reptiles are provided in Annex 1: Photographs, along with photographs to show key areas of typical suitable reptile habitat within some of the survey sites.

Table 2 to **Table 16** provide details relating to the weather conditions experienced during each survey visit. This information includes air temperature (given to degrees Celsius), wind force (estimate to Beaufort scale [BS]) and cloud cover (cc) percentage.

Table 2: Muckleburgh Collection Reptile Survey Results

Artificial refuges deployed: 184	Deployed on: 22nd April 2021	Deployed by: JP, AP	
Survey date	Surveyors	Weather conditions	Results
7th May 2021	JP, GR	11.5°C, BS2, cc25%	No reptiles
19th May 2021	JP, KS	15°C, BS2 cc20%	2 adders
28th May 2021	GR, AS	16°C, BS2, cc10%	1 common lizard
11th June 2021	PM, JP	20°C, BS3-4, cc100%	2 female adders, 1 juvenile adder and 2 common lizards
23rd June 2021	JP, GR	15°C, BS0-1, cc10%	1 female adder
24th June 2021	JP, RY	17°C, BS2, cc80%	3 adders (1 of which confirmed female), 1 juvenile adder and 2 common lizards
2nd July 2021	JP, GR	19°C, BS1, cc50%	1 male adder, 1 female adder and 2 common lizards

Table 3: Sandy Hill Lane Reptile Survey Results

Artificial refuges deployed: 11	Deployed on: 19th May 2021	Deployed by: JP, KS	
Survey date	Surveyors	Weather conditions	Results
26th May 2021	WR, KS	9.5°C, BS1, cc100%	No reptiles
4th June 2021	JP, KS	15°C, BS1 cc60%	1 juvenile adder
17th June 2021	JP, KS	16°C, BS0, cc100%	No reptiles
23rd June 2021	JP, GR	16°C, BS0, cc0%	No reptiles
30th June 2021	AL, AP	14°C, BS1, cc0%	No reptiles
2nd July 2021	JP, GR	19°C, BS1, cc30%	No reptiles
7th July 2021	JP, WR	18°C, BS1, cc50%	1 slow worm and 1 juvenile slow worm

Table 4: River Bure Reptile Survey Results

Artificial refuges deployed: 21	Deployed on: 22nd April 2021	Deployed by: JP, AP	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	10°C, BS0, cc80%	No reptiles
7th May 2021	JP, GR	10°C, BS0 cc55%	No reptiles
19th May 2021	JP, KS	16.5°C, BS0, cc10%	No reptiles
4th June 2021	JP, KS	16°C, BS0, cc100%	No reptiles
23rd June 2021	JP, GR	18°C, BS1, cc25%	No reptiles
30th June 2021	AL, AP	14°C, BS1, cc0%	No reptiles
8th July 2021	JP, GR	20°C, BS0, cc50%	No reptiles

Table 5: Swannington Meadow Reptile Survey Results

Artificial refuges deployed: 39	Deployed on: 21st April 2021	Deployed by: WR, KS	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	9°C, BS0-1, cc60%	No reptiles
7th May 2021	JP, GR	9°C, BS2 cc60%	No reptiles
23rd June 2021	JP, GR	18.5°C, BS2, cc20%	No reptiles
30th June 2021	AL, AP	14°C, BS1, cc0%	No reptiles
7th July 2021	JP, WR	18°C, BS1, cc80%	No reptiles
14th July 2021	GR, KS	15°C, BS1, cc100%	No reptiles
16th July 2021	JP, GR	19°C, BS2, cc0%	No reptiles

Table 6: Swannington Field Margin Reptile Survey Results

Artificial refuges deployed: 13	Deployed on: 23rd April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
7th May 2021	JP, GR	10°C, BS0 cc60%	No reptiles
19th May 2021	AP, WR	17°C, BS0 cc25%	No reptiles
23rd June 2021	JP, GR	18.5°C, BS2, cc20%	No reptiles
30th June 2021	AL, AP	14°C, BS1, cc0%	No reptiles
8th July 2021	JP, GR	19.5°C, BS0, cc45%	1 grass snake
14th July 2021	GR, KS	15°C, BS1, cc100%	No reptiles
16th July 2021	JP, GR	19°C, BS2, cc0%	No reptiles

Table 7: River Wensum Reptile Survey Results

Artificial refuges deployed: 20	Deployed on: 23rd April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	9.5°C, BS0-1 cc45%	No reptiles
7th May 2021	JP, GR	9°C, BS0 cc70%	1 female slow worm
13th May 2021	JP, AS	14°C, BS0-1, cc95%	1 female slow worm
19th May 2021	AP, WR	17°C, BS1, cc50%	2 slow worms
28th May 2021	AL, JP, AP	13.5°C, BS1, cc100%	2 female slow worms
30th June 2021	JP, GR	14°C, BS1, cc100%	1 grass snake and 1 juvenile grass snake
1st July 2021	JP, AP	12°C, BS3, cc100%	2 grass snakes

Table 8: Telegraph Hill Reptile Survey Results

Artificial refuges deployed: 24	Deployed on: 23rd April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
13th May 2021	JP, AP	14°C, BS2, cc75%	No reptiles
28th May 2021	AL, JP, AP	14°C, BS0-1 cc100%	No reptiles
23rd June 2021	JP, GR	18°C, BS0, cc30%	No reptiles
30th June 2021	AL, AP	14°C, BS1, cc0%	No reptiles
8th July 2021	JP, GR	20°C, BS1, cc60%	1 female slow worm
14th July 2021	JP, AP	15°C, BS1, cc100%	No reptiles
15th July 2021	JP, GR	18.5°C, BS3, cc90%	1 slow worm

Table 9: Taverham Road Reptile Survey Results

Artificial refuges deployed: 29	Deployed on: 23rd April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
30th April 2021	JP, WR	10.5°C, BS1, cc75%	No reptiles
7th May 2021	PM, WR	11°C, BS1 cc50%	No reptiles
13th May 2021	JP, AS	14°C, BS2, cc75%	No reptiles
19th May 2021	AP, WR	17°C, BS1, cc20%	No reptiles
30th June 2021	JP, GR	14.5°C, BS2, cc100%	No reptiles
14th July 2021	JP, AP	15°C, BS1, cc100%	No reptiles
15th July 2021	JP, GR	18.5°C, BS3, cc90%	1 common lizard

Table 10: River Tud Reptile Survey Results

Artificial refuges deployed: 9	Deployed on: 23rd April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
30th April 2021	JP, WR	11°C, BS1, cc75%	No reptiles
7th May 2021	PM, WR	11°C, BS1 cc30%	No reptiles
19th May 2021	PM, GR	11°C, BS1, cc40%	No reptiles
28th May 2021	AL, JP, AP	17°C, BS2, cc50%	No reptiles
Survey aborted after four visits due to ongoing survey interference/damage to survey sheets by grazing cattle			

Table 11: River Yare Reptile Survey Results

Artificial refuges deployed: 33	Deployed on: 20th May 2021	Deployed by: JP, AP	
Survey date	Surveyors	Weather conditions	Results
3rd June 2021	JP, WR	20°C, BS0, cc5%	1 grass snake
23rd June 2021	JP, GR	19°C, BS0-1 cc40%	1 grass snake and 1 juvenile grass snake
30th June 2021	JP, GR	14.5°C, BS1, cc100%	No reptiles
1st July 2021	JP, AP	12°C, BS3, cc100%	No reptiles
7th July 2021	JP, WR	19°C, BS1, cc75%	1 grass snake and 1 juvenile grass snake
8th July 2021	JP, GR	19.5°C, BS0, cc60%	1 grass snake
14th July 2021	JP, AP	15°C, BS1, cc100%	1 grass snake

Table 12: River Tiffey Reptile Survey Results

Artificial refuges deployed: 28	Deployed on: 20th May 2021	Deployed by: JP, AP	
Survey date	Surveyors	Weather conditions	Results
7th May 2021	PM, WR	11°C, BS1, cc50%	No reptiles
19th May 2021	PM, GR	13°C, BS1 cc25%	1 grass snake
3rd June 2021	JP, WR	20°C, BS0, cc0%	3 grass snakes
23rd June 2021	JP, GR	19°C, BS0, cc40%	No reptiles
30th June 2021	JP, GR	14°C, BS1, cc100%	No reptiles
7th July 2021	JP, WR	20°C, BS1, cc50%	1 juvenile grass snake
8th July 2021	JP, GR	19°C, BS1, cc80%	1 grass snake

Table 13: Norwich Hill, Ketteringham Reptile Survey Results

Artificial refuges deployed: 33	Deployed on: 21st April 2021	Deployed by: WR, KS	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	10°C, BS0, cc35%	No reptiles
7th May 2021	PM, WR	10.5°C, BS1 cc50%	No reptiles
12th May 2021	AP, WR	14°C, BS1, cc35%	1 juvenile grass snake
19th May 2021	AP, WR	17°C, BS1, cc20%	1 juvenile grass snake
28th May 2021	AL, JP, AP	18°C, BS1, cc100%	1 juvenile grass snake
23rd June 2021	AL, WR	19°C, BS1, cc25%	No reptiles
1st July 2021	JP, AP	12°C, BS3, cc100%	No reptiles

Table 14: Valley Farm, Swadeston Reptile Survey Results

Artificial refuges deployed: 40	Deployed on: 30th April 2021	Deployed by: JP, WR	
Survey date	Surveyors	Weather conditions	Results
7th May 2021	PM, WR	10°C, BS1, cc30%	No reptiles
13th May 2021	JP, AS	14°C, BS1-2 cc85%	No reptiles
Survey aborted after two visits due to ongoing survey interference/damage of survey sheets by grazing cattle, and landowner concerns over the presence of these sheets in cattle-grazed fields			

Table 15: Hickling Lane Reptile Survey Results

Artificial refuges deployed: 24	Deployed on: 21st April 2021	Deployed by: JP, WR, KS	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	10.5°C, BS1, cc40%	No reptiles
7th May 2021	PM, WR	9.5°C, BS1 cc25%	No reptiles
13th May 2021	JP, AS	13°C, BS0-1, cc90%	No reptiles
20th May 2021	JP, AP	14°C, BS3, cc100%	No reptiles
28th May 2021	AL, JP, AP	18°C, BS0, cc100%	1 female slow worm
15th June 2021	JP, AS	19°C, BS1, cc45%	No reptiles
23rd June 2021	AL, WR	18.5°C, BS1, cc25%	1 juvenile slow worm

Table 16: A140/Railway Line Reptile Survey Results

Artificial refuges deployed: 20	Deployed on: 21st April 2021	Deployed by: JP, WR	
Survey date	Surveyors	Weather conditions	Results
26th April 2021	JP, KS	10.5°C, BS1, cc40%	No reptiles
7th May 2021	PM, WR	9.5°C, BS1 cc20%	No reptiles
13th May 2021	JP, AS	13°C, BS0-1, cc90%	1 male slow worm, 1 female slow worm, 4 juvenile slow worms, 1 common lizard
20th May 2021	JP, AP	14°C, BS3, cc100%	6 slow worms, 1 common lizard
15th June 2021	JP, AS	19°C, BS1, cc45%	3 male slow worms, 3 female slow worms
23rd June 2021	AL, WR	19.5°C, BS1, cc20%	5 slow worms, 1 juvenile slow worm
30th June 2021	JP, GR	14°C, BS1-2, cc100%	2 male slow worms, 8 female slow worms, 5 juvenile slow worms

Table 17: Summary of the 2021 Reptile Survey Results

Reptile Survey Site	Summary of Reptile Presence/Absence* Survey
Muckleburgh Collection	Maximum counts of 3 adders and 2 common lizards
Sandy Hill Lane	Maximum counts of 1 juvenile adder and 1 slow worm
River Bure	Reptiles likely absent
Swannington meadow	Reptiles likely absent
Swannington field margin	Maximum count of 1 grass snake
River Wensum	Maximum counts of 2 grass snakes and 2 slow worms
Telegraph Hill	Maximum count of 1 slow worm
Taverham Road	Maximum count of 1 common lizard
River Tud	Reptiles likely absent (although survey aborted after 4 visits)
River Yare	Maximum count of 1 grass snake
River Tiffey	Maximum count of 3 grass snakes
Norwich Hill, Ketteringham	Maximum count of 1 juvenile grass snake
Valley Farm, Swardeston	Reptiles likely absent (although survey aborted after 2 visits)
Hickling Lane	Maximum count of 1 slow worm
A140/railway line	Maximum count of 10 slow worms and 1 common lizard

*Maximum counts relate to adults only, unless the survey has only recorded juveniles.

Table 18: Reptile Species and Population Classifications*

Reptile Survey Site	Reptile Species Recorded			
	Adder	Common lizard	Grass snake	Slow worm
Muckleburgh Collection	Low popn.	Low popn.	-	-
Sandy Hill Lane	N/A (juvenile only)	-	-	Low popn.
Swannington field margin	-	-	Low popn.	-
River Wensum	-	-	Low popn.	Low popn.
Telegraph Hill	-	-	-	Low popn.
Taverham Road	-	Low popn.	-	-
River Yare	-	-	Low popn.	-
River Tiffey	-	-	Low popn.	-
Norwich Hill, Ketteringham	-	-	N/A (juvenile only)	-
Hickling Lane	-	-	-	Low popn.
A140/railway line	-	Low popn.	-	Good popn.

*Population classifications have been determined in accordance with the Froglife guidance, with fewer than five adult animals representing a 'Low' population and more than five representing a 'Good' population. For grass snake and adder, more than 10 adult animals represent an 'Exceptional' population; for common lizard and slow worm this classification applies to peak counts of more than 20 adult animals. However, the surveys completed for SEP and DEP did not record any populations within this bracket.

Figure 1: Reptile Survey Map: Muckleburgh Collection Survey Site

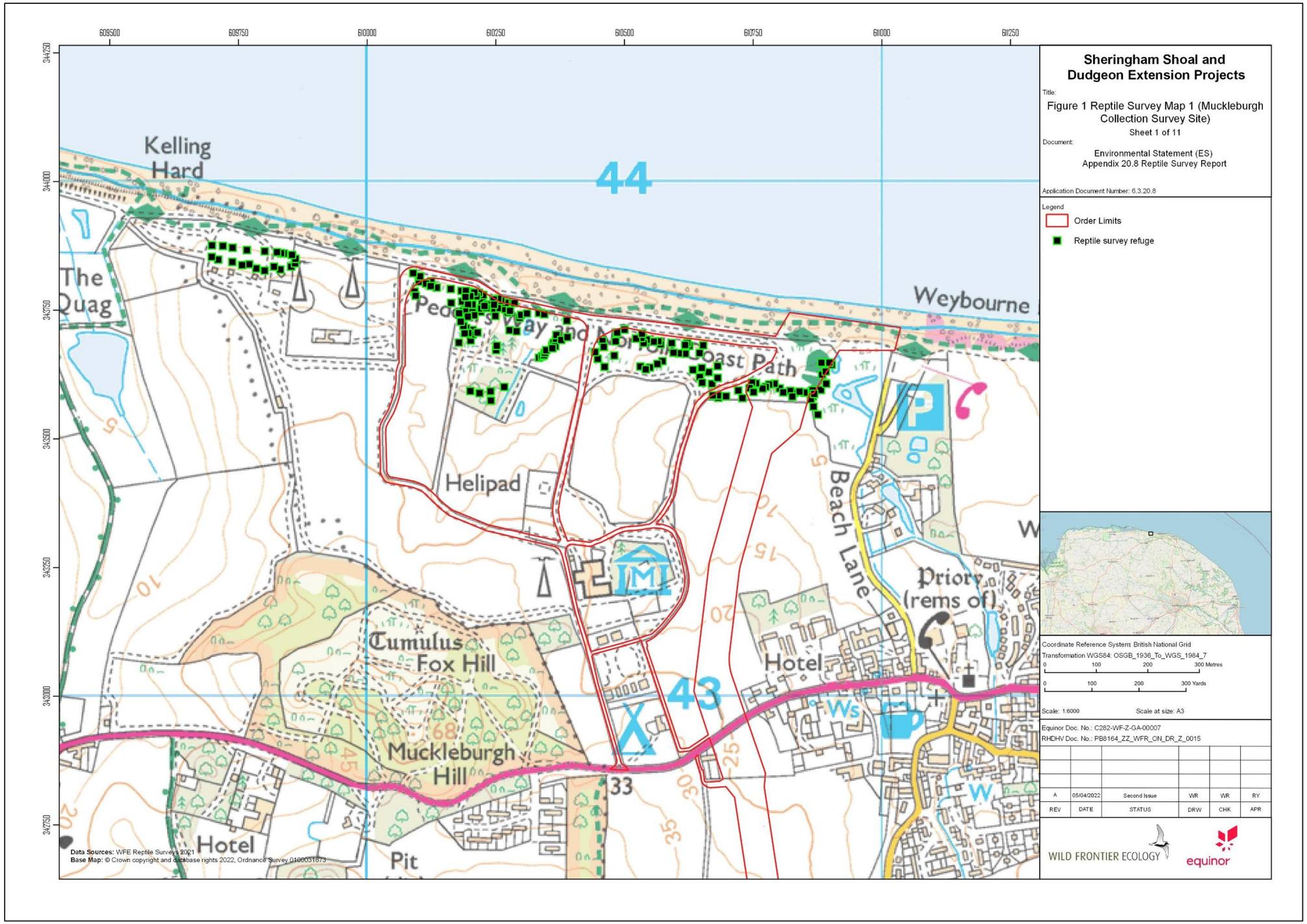


Figure 2: Reptile Survey Map: Sandy Hill Lane Survey Site

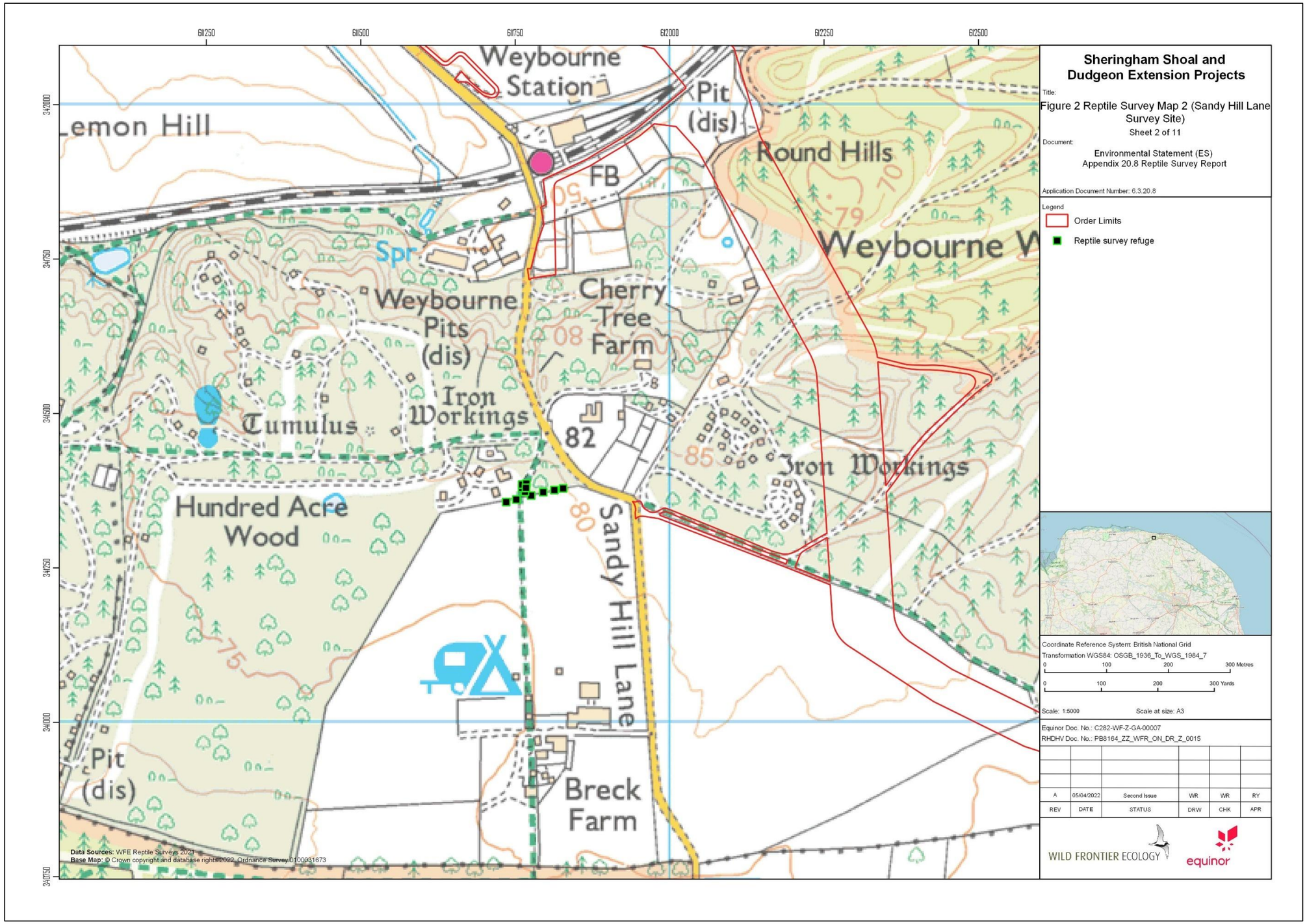


Figure 3: Reptile Survey Map: River Bure Survey Site

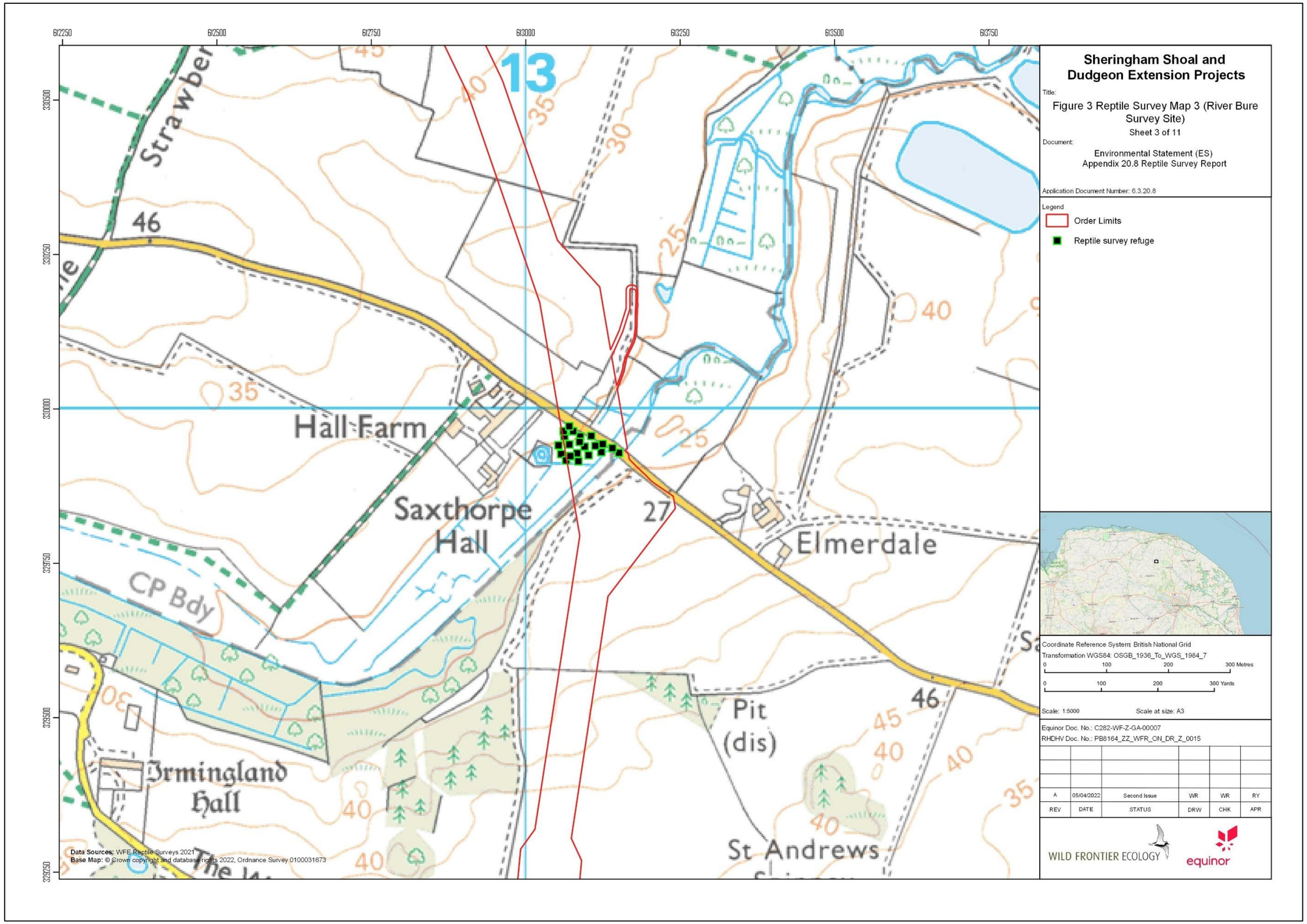


Figure 4: Reptile Survey Map: Swannington Meadow and Swannington Field Margin Survey Sites

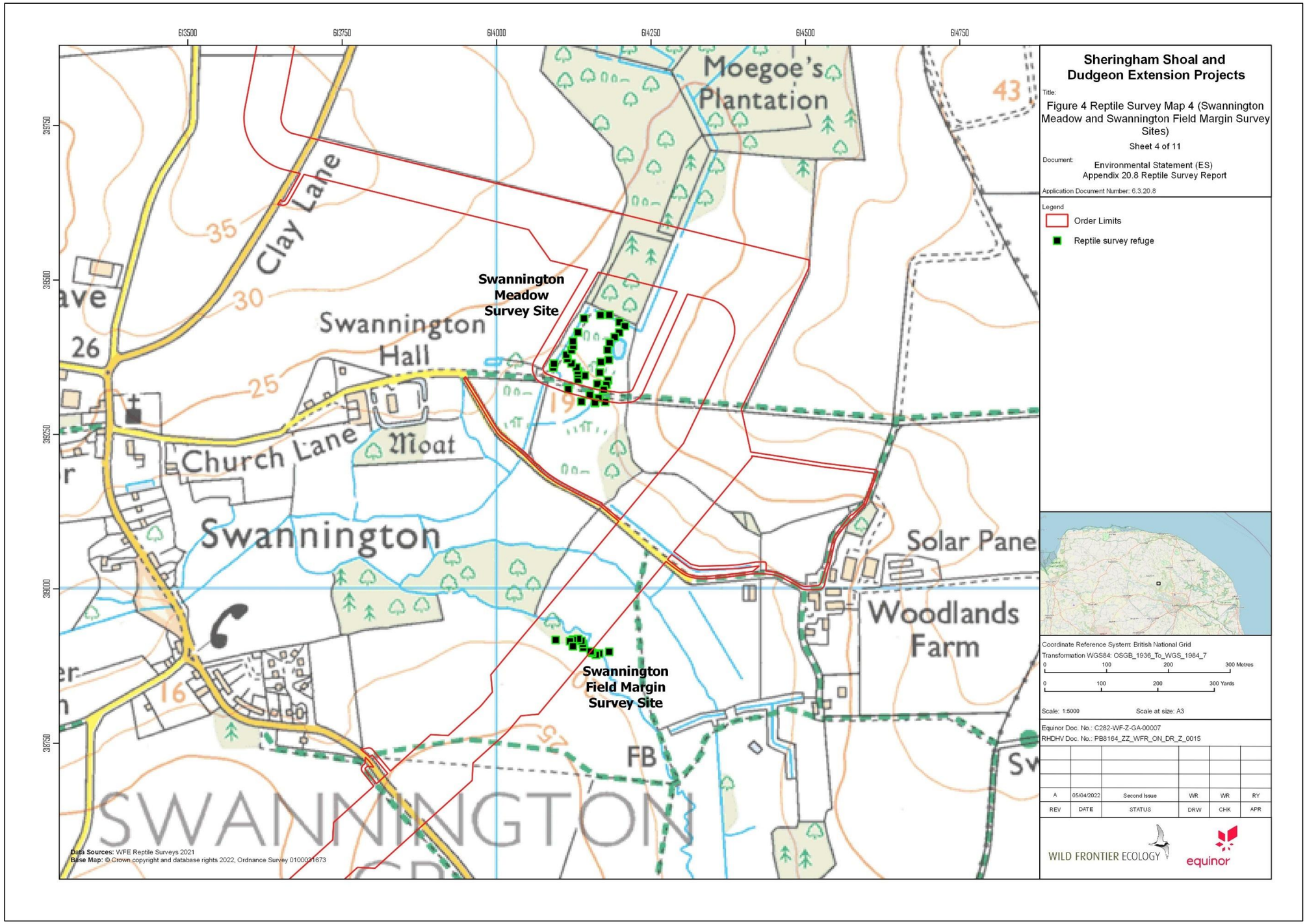


Figure 5: Reptile Survey Map: River Wensum Survey Site

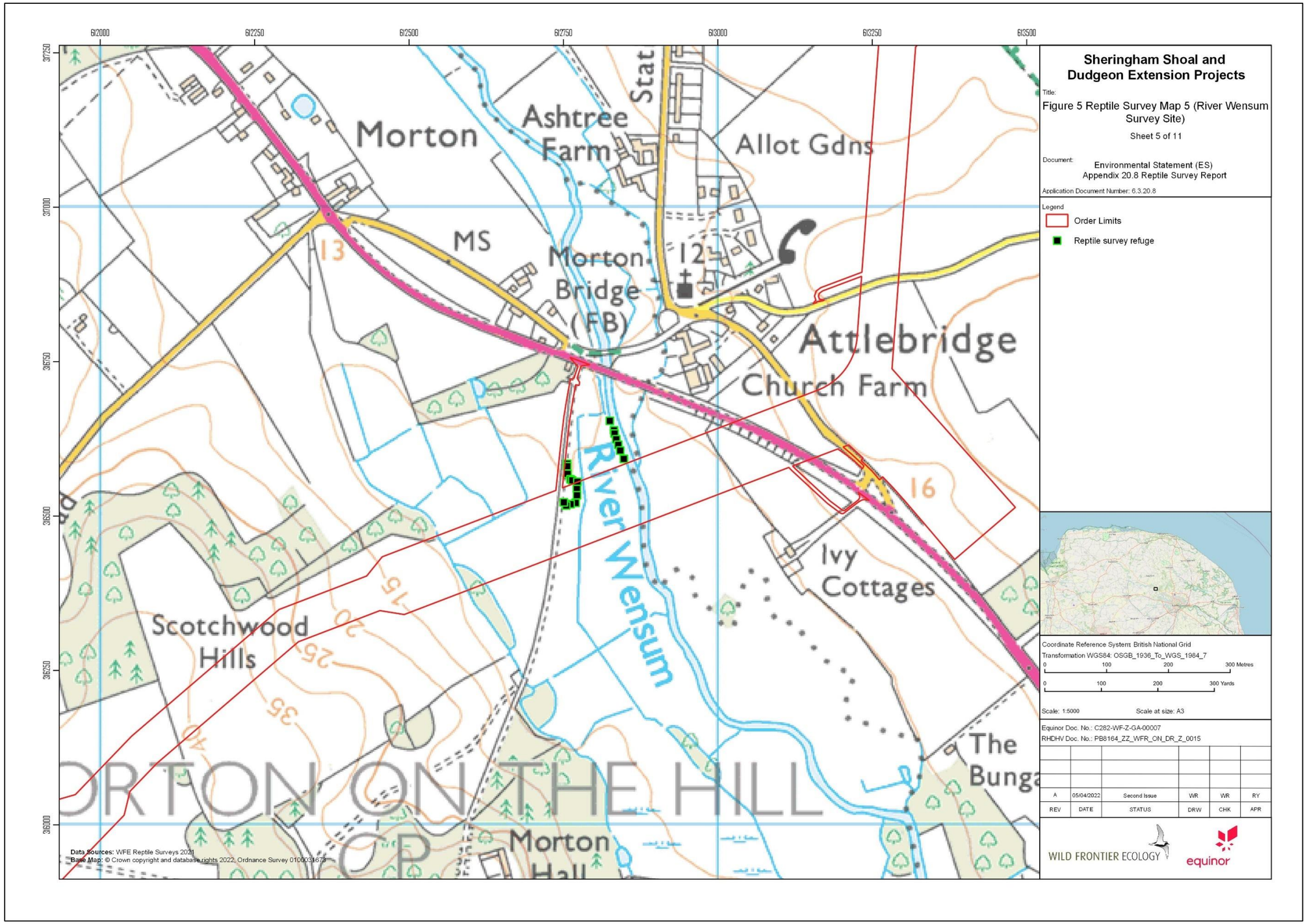


Figure 6: Reptile Survey Map: Telegraph Hill Survey Site

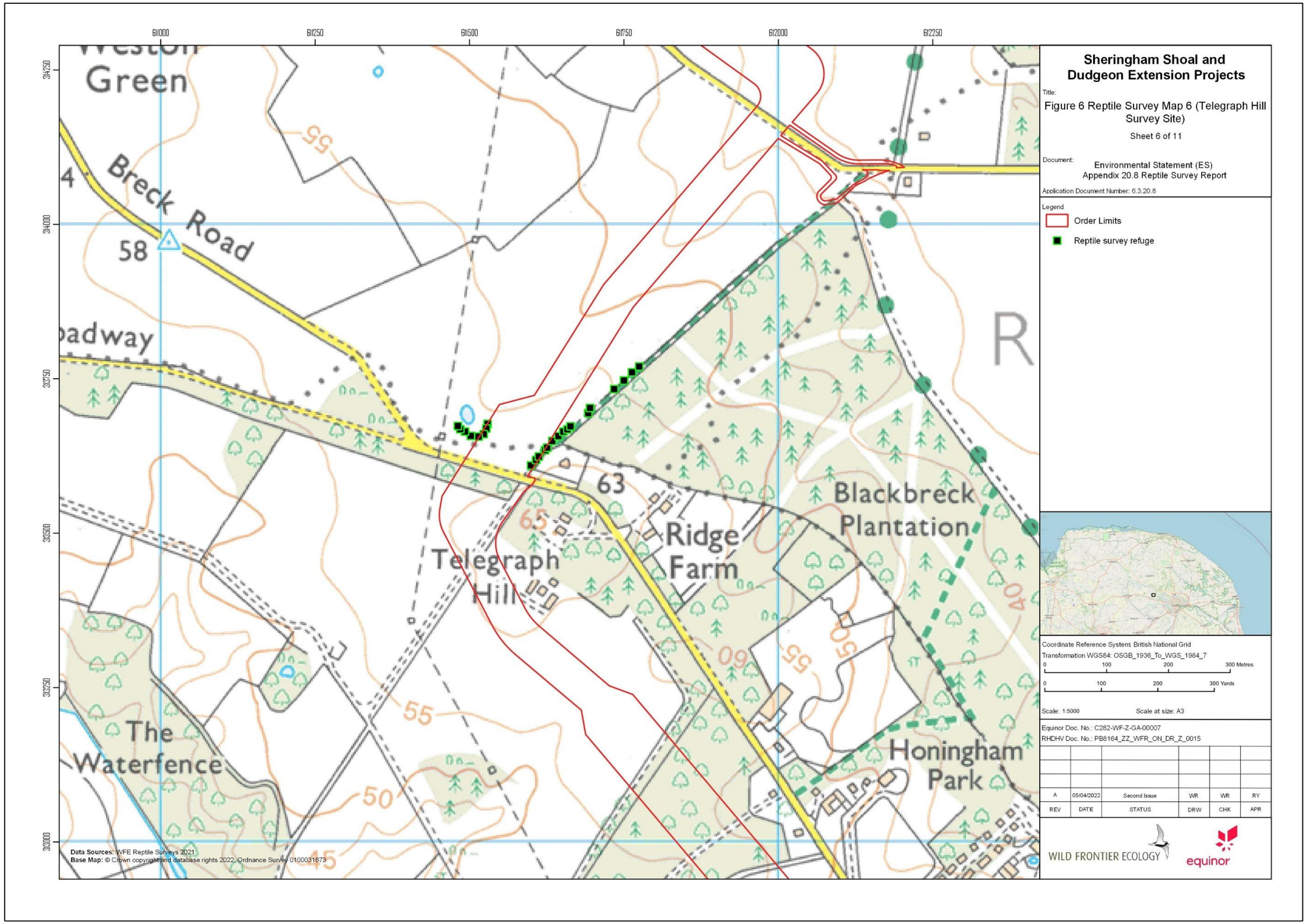


Figure 7: Reptile Survey Map: Taverham Road and River Tud Survey Sites

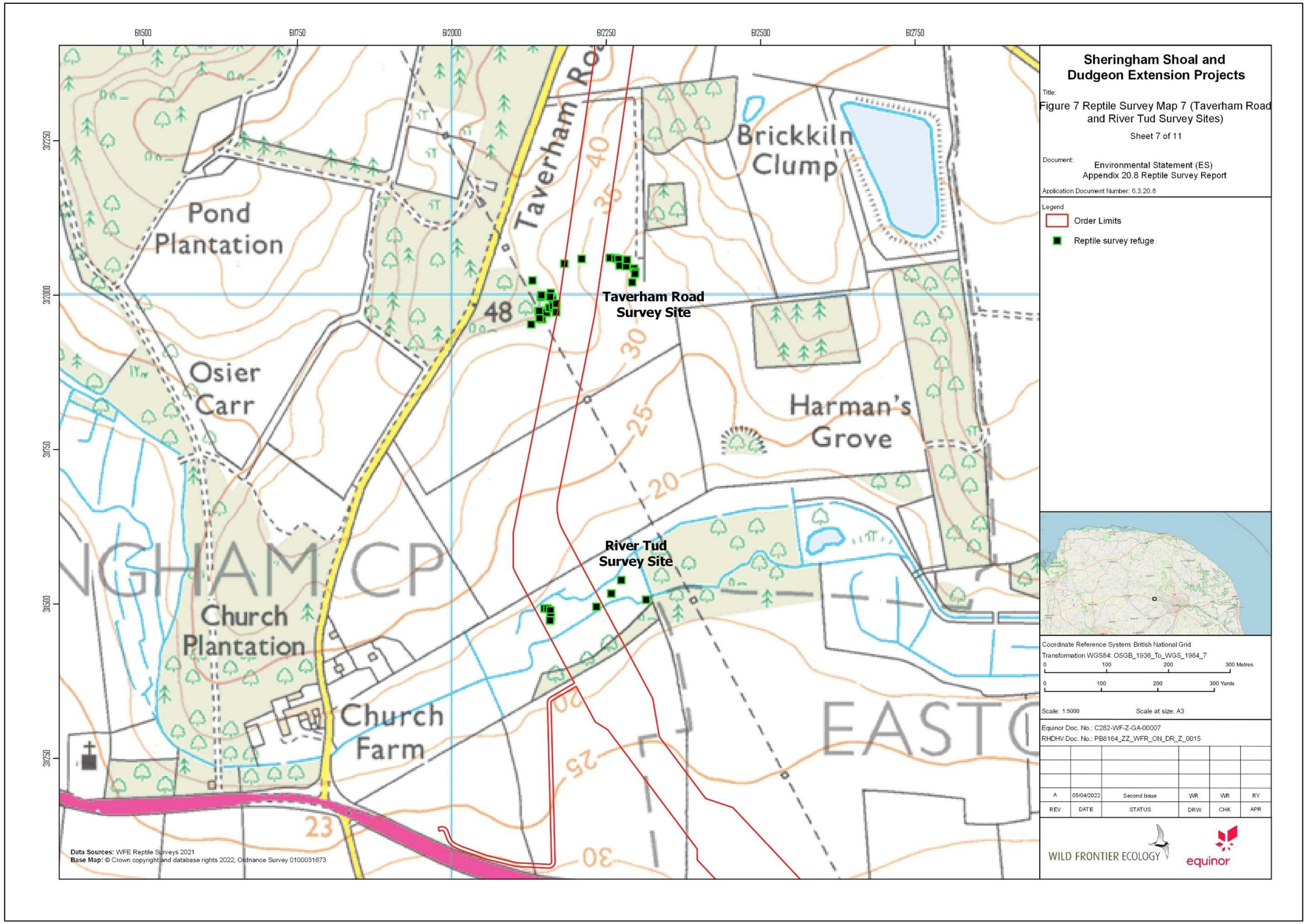


Figure 8: Reptile Survey Map: River Yare and River Tiffey Survey Sites

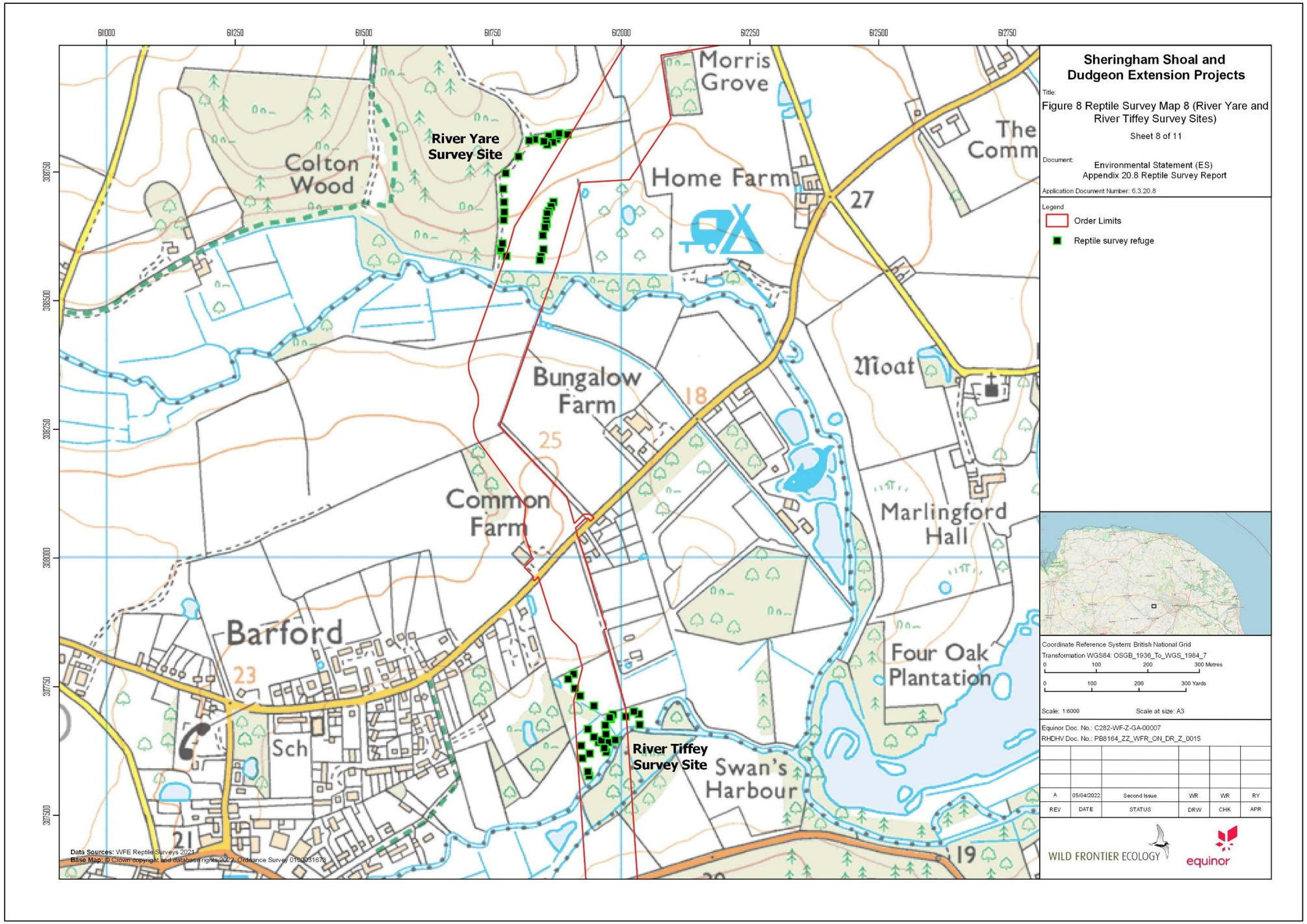


Figure 9: Reptile Survey Map: Norwich Hill, Ketteringham Survey Site

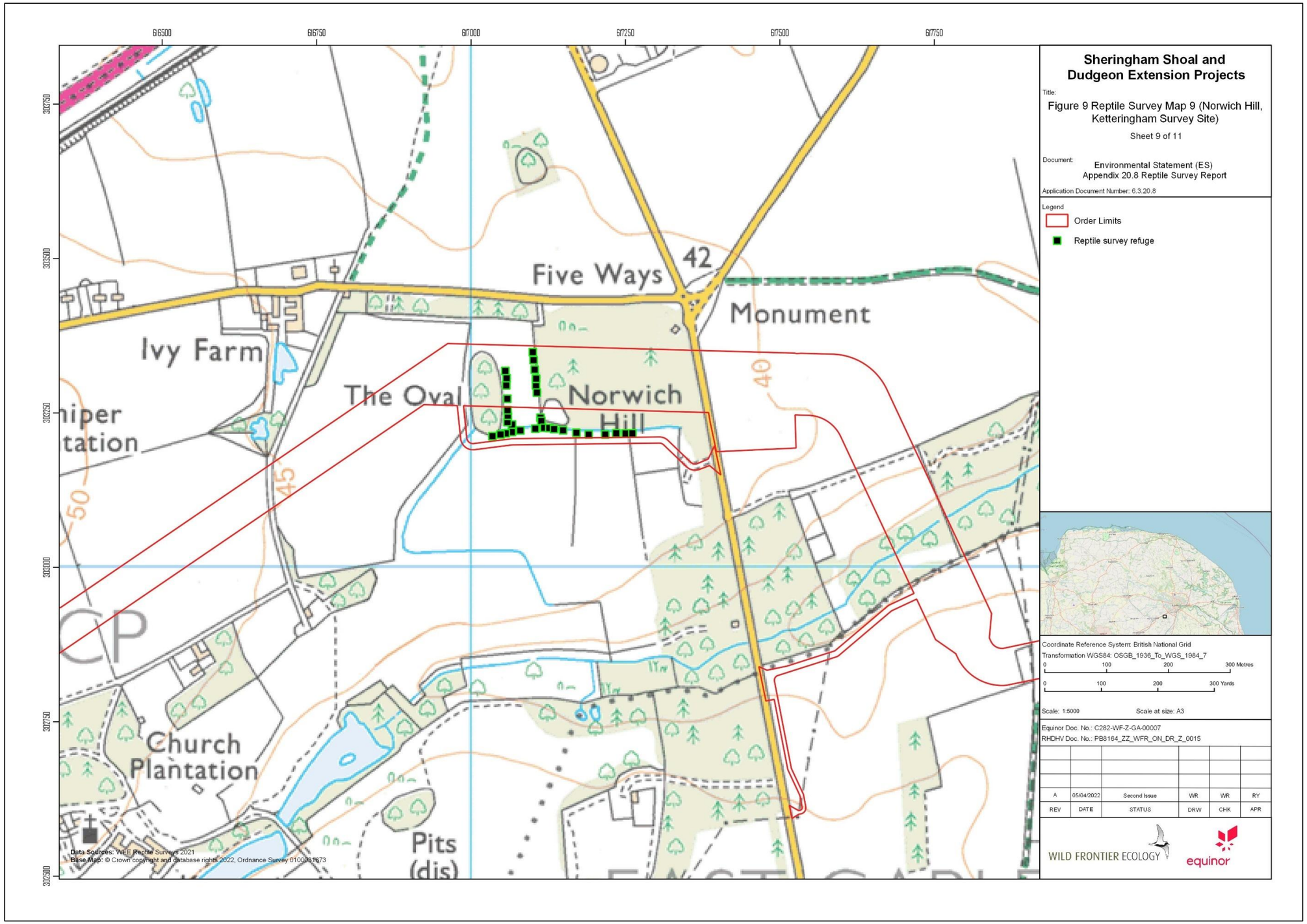


Figure 10: Reptile Survey Map: Valley Farm, Swardeston Survey Site

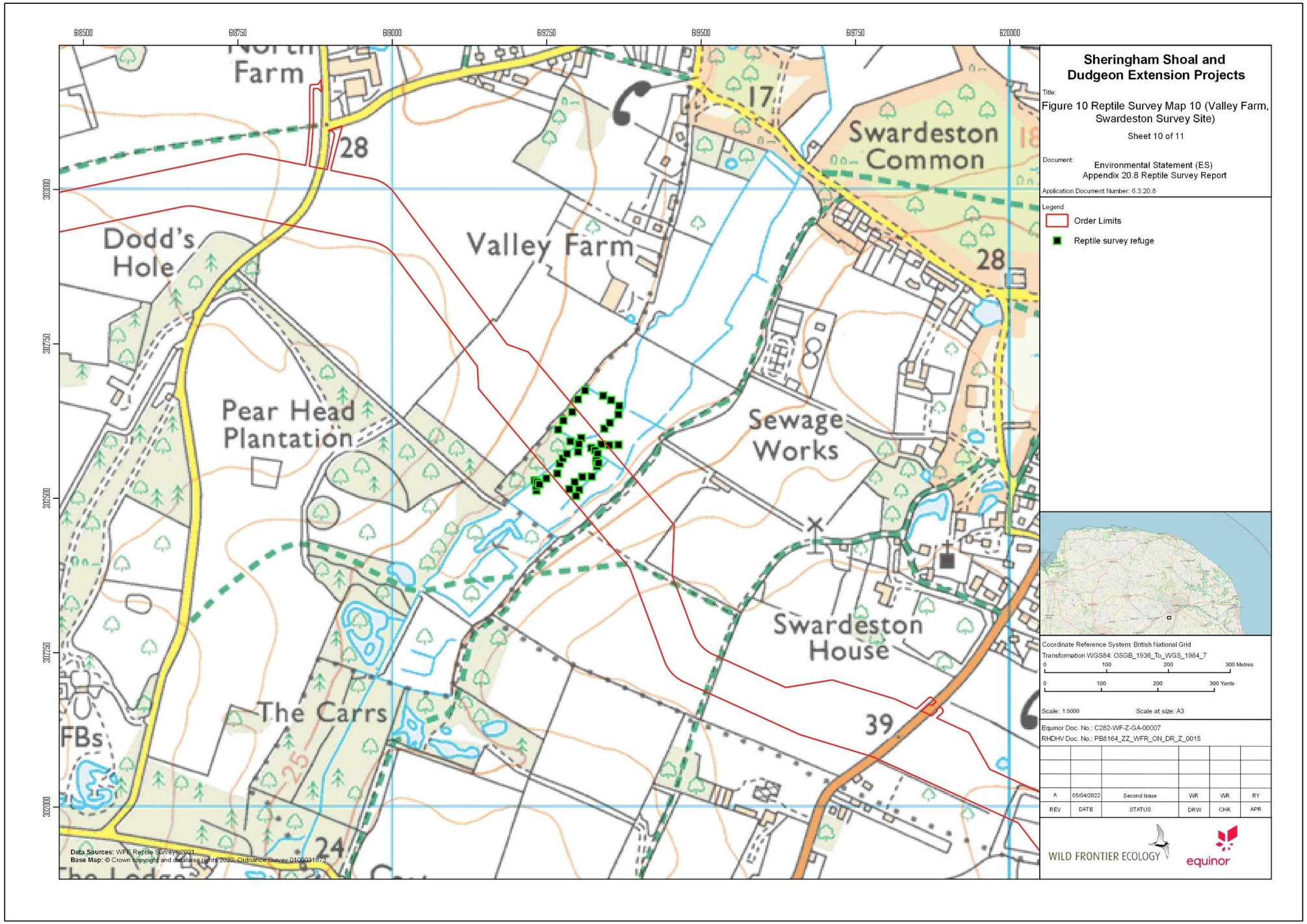
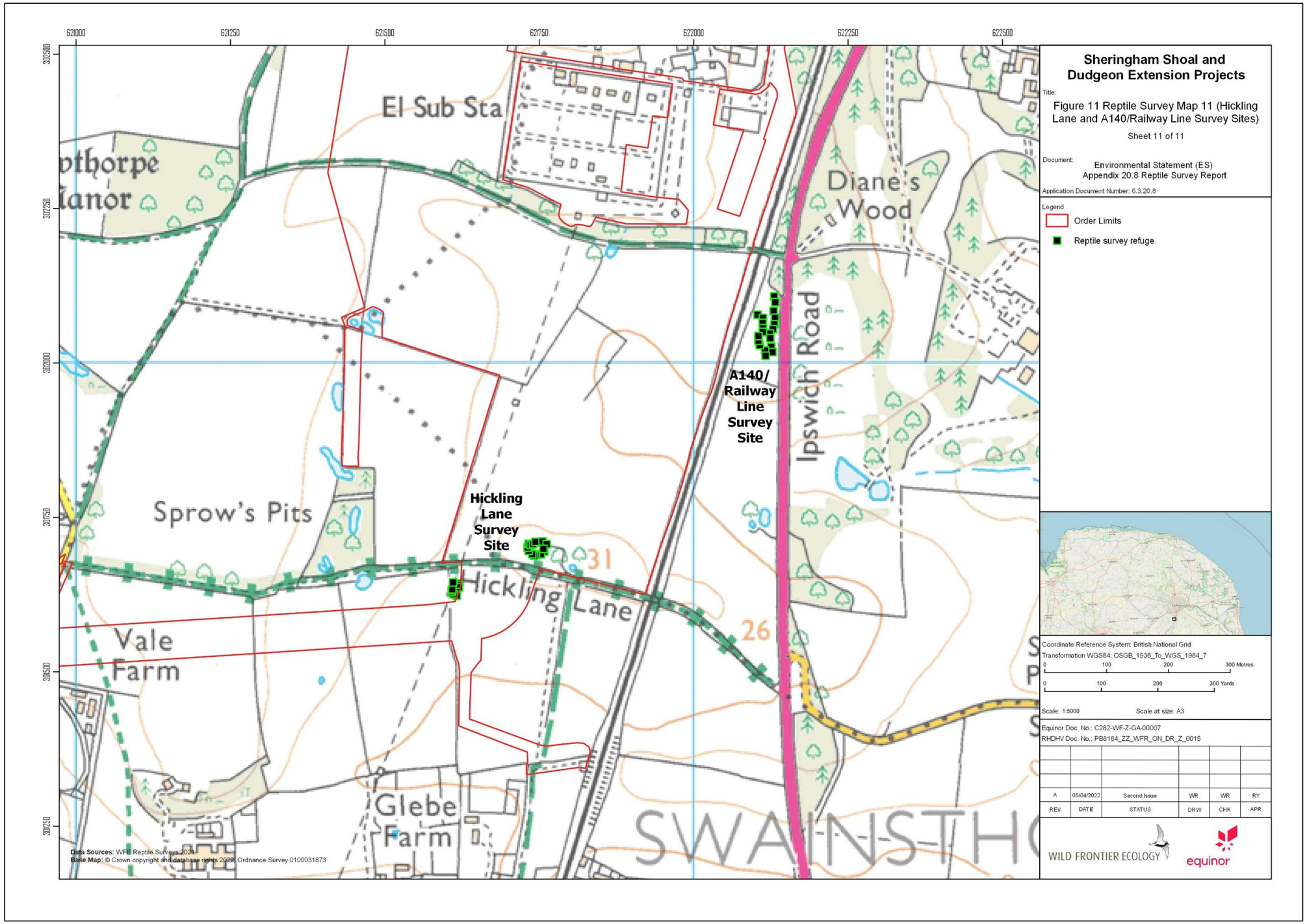


Figure 11: Reptile Survey Map: Hickling Lane and A140/Railway Line Survey Sites



4.3. Constraints and Limitations of Survey

The main constraints to the reptile surveys related to interference with the artificial refuges from livestock and vegetation cutting. At both the River Tud and Valley Farm, Swardeston reptile survey sites, interference with the refuges from cattle was so extensive that these surveys had to be aborted as the majority of refuges were regularly destroyed each time they were redeployed. At the Muckleburgh Collection survey site, grass cutting destroyed a number of the refuges on two separate occasions. These refuges were replaced, but there was a survey gap between finding that they had been destroyed, replacing them and then having them available for surveys again. For example, noting during the third visit that some of the artificial refuges had been destroyed meant they were redeployed during the fourth visit, and then were available for survey on the fifth visit.

The surveys were also marginally constrained by suboptimal weather, with air temperatures just outside optimal parameters and overcast conditions throughout much of the April to July period. As access for the surveys had to be arranged with landowners around one week in advance, the timings could not always be adjusted to coincide with optimal weather. In addition, weather conditions throughout April and May (which are typically optimal survey months) were occasionally suboptimal, with cool air temperatures and extensive cloud cover. However, this weather-related constraint affected only a small proportion of the total survey visits (as shown in **Table 2** to **Table 16**, above); most surveys were completed in suitable (and in many cases optimal) conditions, and no one site was particularly affected by suboptimal conditions.

These constraints are not considered to have a substantial impact on the reliability of the survey results; the results are considered to be sufficiently accurate and reliable to inform the ecological impact assessment and in turn identify any mitigation requirements for this species.

4.4. Further Survey Requirements, Expiry Dates and Mitigation/Licensing Options

Reptile survey data have no definitive period of validity. When considering whether survey data remains valid (for use within an ecological impact assessment) or requires updated surveys, factors such as the continuity of habitat, likely impacts of the proposal and anticipated effectiveness of any mitigation measures are all considered.

Where habitat conditions at a site have remained consistent since the survey, it would be appropriate for the impact assessment to conclude that the status of reptiles will remain largely unchanged since the survey, for a period of five years since completion of the surveys. After five years, it is considered that updated reptile surveys would be required regardless of habitat continuity at a given site. In addition, if the risks to reptiles at a certain site are considered to be low (and/or if there is strong justification that mitigation measures will prove successful), then updated surveys would not typically be warranted even if habitat conditions change. Pre-construction walkover surveys of the DCO boundary will also be completed which would identify any new areas of suitable reptile habitat which become established in the intervening period.

The period of validity of reptile survey data for SEP and DEP depends mainly on the anticipated impacts of the project on the confirmed reptile sites. Potential impacts to reptile populations confirmed present at the Sandy Hill Lane and A140/railway line sites will be avoided as the DCO boundary does not overlap with these sites (these sites were excluded from the boundary as part of the site selection process and refinement from the PEIR to the DCO boundary). Potential impacts to reptile populations confirmed

present at the Swannington field margin, River Wensum, Telegraph Hill, River Yare, River Tiffey and Norwich Hill, Ketteringham sites are expected to be avoided as the onshore construction works at these sites will adopt trenchless installation techniques (namely HDD). The very minor residual risks to the reptile populations at these sites will be sufficiently addressed by adopting best-practice and industry accepted measures during the construction works, as outlined below.

The reptile populations confirmed present at the Muckleburgh Collection, Taverham Road and Hickling Lane sites are at relatively high risk of experiencing impacts associated with construction of SEP and DEP, given that these sites will be subject to ground works such as excavation to install the onshore export cables. Potential impacts include mortality or injury of individual reptiles (which could constitute a legal offence if occurring deliberately or recklessly), and/or habitat damage, destruction or fragmentation. Mitigation is therefore required at these sites.

4.4.1. Mitigation Requirements at Muckleburgh Collection site

At least two weeks prior to construction works commencing at the Muckleburgh Collection reptile survey site, the areas of grassland and scrub within the DCO boundary will be altered so as to reduce their suitability for reptiles. This will be achieved by phased vegetation clearance, whereby the vegetation will initially be subject to a 'high-cut', during which the height of the grass and scrub will be reduced to a height of approximately 5cm. This cut will be completed using hand-tools, and on a mild day with air temperatures of at least 12ºC and no significant precipitation. An Ecological Clerk of Works (ECoW) will be required on-site to check areas targeted for clearance to confirm reptiles are absent immediately before clearance works occur. The ECoW will also oversee vegetation clearance works during this high-cut to confirm they are completed in accordance with the mitigation advice. Arisings will be removed from the DCO boundary.

Between five and ten days later, the vegetation will be subject to a 'low-cut' during which the vegetation will be reduced to ground level (also using hand-tools, with an ECoW on-site and during the same weather conditions as are required for the high-cut). Arisings will again be removed from the DCO boundary. At least five days will then be left before ground-clearance and construction works at the site commence. This entire approach will be timed to occur at some point between March and October, inclusive.

All vegetation cuttings will be stored at least 20m outside the DCO boundary (e.g. to the south). Storing the arisings in piles will create sheltering features/hibernacula for reptiles; in combination with the removal of scrub cover within the DCO boundary this should further encourage any reptiles present to vacate the DCO boundary.

This approach is anticipated to be effective at encouraging the low populations of adder and common lizard which were recorded here to vacate the section of the DCO boundary which overlaps with the survey site.

4.4.2. Mitigation Requirements at Taverham Road site

At least two weeks prior to construction works commencing at the Taverham Road reptile survey site, the grassland field margin habitat within the DCO boundary will be altered so as to reduce its suitability for reptiles. This will be achieved by phased vegetation clearance, whereby the grass sward will initially be subject to a 'high-cut', during which the height of the grass field margin vegetation will be reduced to a height of approximately 10cm. This cut will be completed using hand-tools, and on a mild day with air temperatures of at least 12ºC and no significant precipitation. Arisings will be

removed from the DCO boundary. Between five and ten days later, the vegetation will be subject to a 'low-cut' during which the grass sward will be reduced to <5cm in height (also using hand-tools and during the same weather conditions as are required for the high-cut). Arisings will again be removed from the DCO boundary. At least five days will then be left before ground-clearance and construction works at the site commence. This entire approach will be timed to occur at some point between March and October, inclusive.

This approach is anticipated to be effective at encouraging the low population of common lizard which was recorded here to vacate the section of the DCO boundary which overlaps with the survey site.

4.4.3. Mitigation Requirements at the Hickling Lane site

The Hickling Lane survey site is the only site at realistic risk of direct construction impacts associated with SEP and DEP which has been found to support a slow worm population. The pre-emptive habitat alteration approach advised at the Taverham Road site (to address potential impacts to the common lizard population there) may not be fully effective for slow worms, as the species is relatively unreceptive to short-term habitat alteration.

Habitat manipulation of the parts of the survey site within the DCO boundary will therefore be coupled with a pro-active translocation effort. This will involve the use of artificial refuges (i.e. sheets of roofing felt, as were used during the presence/likely absence surveys) deployed throughout the relevant area, which will then be repeatedly checked for slow worms. Any slow worms observed will be caught and translocated by hand to a receptor site outside the DCO boundary; there are suitable receptor site options around Hickling Lane which are outside the DCO boundary.

The same habitat management approach as outlined for the Taverham Road site (above) will also need to be enacted at the Hickling Lane site concurrent with the translocation effort, as this should prevent slow worms from moving back into the relevant part of the DCO boundary. In addition, habitat manipulation should aid capture/translocation efforts by encouraging any slow worms present to use the only remaining refuges (i.e. the artificial refuges) for shelter.

The translocation effort would need to run until there was a high degree of confidence that the slow worm population within the DCO boundary had been depleted. Determination of this point will partly depend on the numbers of animals found during the translocation effort, but it is expected that following five consecutive site checks by an ecologist during suitable weather conditions in which no slow worms were observed, that the population could be classified as having been successfully depleted and translocated off-site. There would need to be a minimum of seven site checks completed by an ecologist in total. If, after seven site checks, there have been no observations of slow worms then the low population found here in 2021 can be considered to be no longer present.

This translocation effort would need to take place between March and September, inclusive. Translocation is not advised in October because of risks associated with translocating animals shortly before they enter hibernation.

Full details of appropriate mitigation will be provided within the **Outline Ecological Management Plan**.

Post-construction habitat re-instatement will ensure there are no long-term net losses in terms of quantity, quality and connectivity of suitable reptile habitat within and

around the DCO boundary. At the three aforementioned sites, habitats are expected to naturally return to baseline conditions within a few years of completion of the construction phase of SEP and DEP.

5. CONCLUSIONS

The 2021 reptile surveys have confirmed that all four reptile species which occur in Norfolk are present within areas of suitable habitat within the DCO boundary. This survey finding largely aligns with desk study data from NBIS which also returned records of all four species within this area.

No further surveys for reptiles are due to be undertaken, but this will be partly dependent on the precise construction footprint and methods, and on the continuity of habitats at the reptile sites. Trenchless installation techniques at most of the sites which support reptiles negate any requirement for further surveys or detailed mitigation beyond standard best-practice measures. More extensive mitigation is required for the three sites which support reptiles and where trenchless installation cannot be accommodated, to minimise risks of legal offences (e.g. mortality or injury of reptiles). The proposed mitigation measures that will be implemented for the three sites will ensure reptiles vacate the area of works within the DCO boundary prior to any construction works commencing. Post-construction, the habitats within these three sites will be reinstated and will naturally return to their baseline conditions in the short- to medium-term.

6. REFERENCES

Froglife (1999). *Reptile Survey: An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

Gent, T. & Gibson, S. (eds.) (2003). *Herpetofauna Worker's Manual*. Joint Nature Conservation Committee, Peterborough.

Annex 1: Photographs

Photo 1: Slow worms at the A140/railway line survey site.

Photo 2: Grass snake at the River Tiffey survey site.

Photo 3: Grass snake at the River Yare survey site.

Photo 4: Adder at the Muckleburgh Collection survey site.

Photo 5: Common lizard at the Muckleburgh Collection survey site.

Photo 6: Grass snake at the River Wensum survey site.

Photo 7: Slow worm at the Telegraph Hill survey site.

Photo 8: Area of suitable reptile habitat at the Muckleburgh Collection survey site.

Photo 9: Area of suitable reptile habitat at the Swannington Meadow survey site.

Photo 10: Area of suitable reptile habitat at the Norwich Hill, Ketteringham survey site.

Photo 11: Area of suitable reptile habitat at the River Bure survey site.

Photo 12: Area of scrub and rank grassland bordering arable field, which comprised part of the Hickling Lane reptile survey site.