A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.7 Environmental Statement – Appendix 9.4 Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report

Part A

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

June 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

The A1 in Northumberland: Morpeth to Ellingham

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Environmental Statement - Appendix

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Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report

Version 1.1

March 2017

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1.1	March 2017	Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report	Emma Fambely

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APPROVALS

Name	Signature	Title	Date of Issue	Version
Peter Farrer			March 2017	1.1

CONTENTS

EXECUTIVE SUMMARY

This technical report presents the findings of amphibian environmental DNA (eDNA) surveys undertaken by Jacobs UK Ltd. (Jacobs) on behalf of Highways England.

The aim of the survey was to identify whether great crested newts (GCN) (*Triturus cristatus*) were present in ponds within 500 m of the proposed upgrade to dual carriageway of the A1 between Morpeth and Ellingham. This scheme comprised two discreet sections:

- Section A - Morpeth to Felton, and;
- Section B - Alnwick to Ellingham.

The surveys comprised a desk-top study of online resources and a data search from the local environmental records centre and wildlife groups (as outlined in Section 2.2 of this report), Habitat Suitability Index (HSI) assessments and eDNA surveys for GCN.

The HSI and eDNA surveys were conducted between the 18th and 20th of April 2016 and were conducted in line with standard methodology[1,2].

The habitat suitability index for GCN of the 32 ponds surveyed in 2016 within Sections A and B ranged from excellent to poor. Three of the ponds that had excellent suitability were located to the north of Section A and one was located midway along Section B.

The eDNA results from the surveys in April showed GCN were absent from 21 out of the 22 ponds that were sampled. A positive result was obtained from Pond A23, located within woodland to the north of the River Coquet. An additional ten ponds were identified subsequent to the initial eDNA sampling that were not identified from aerial photography or mapping.

It is recommended that a presence/absence survey is undertaken at Pond A23 to confirm the eDNA results and to obtain a population count should GCN presence be confirmed.

In addition, GCN presence / absence, and if necessary, population size class assessment surveys, are recommended for all ponds that are within 250 m of the proposals at PCF Stage 3. These ponds are listed in Table 7 in Section 4 of this report.

All ponds that are between 250 m and 500 m from the construction footprints, are not separated by a major barrier, have a HSI score above 0.7 (Good) and / or possess historic records of GCN presence should also be subject to presence / absence, and if necessary population size class assessment surveys.

As the behaviour of wildlife is seasonable and highly unpredictable, it is therefore considered good practice that the surveys for GCN should be repeated if the development is deferred for over 12 months from the date of the initial survey.

[1] Oldham, R.S. et al. 2000. *Evaluating the Suitability of Habitats for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal, 10: 143 – 155.

[2] Biggs, J. et al. 2014. *Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

1 INTRODUCTION

1.1 Scheme Background

1.1.1 Following the outcomes of the 2014 A1 North of Newcastle Feasibility Study the Department of Transport confirmed, in its first Roads Investment Strategy, the intention to upgrade twenty-one kilometres of the existing A1 to a dual carriageway between Morpeth and Ellingham in Northumberland. This comprised two discreet sections:

- Section A - Morpeth to Felton, and;
- Section B - Alnwick to Ellingham.

1.1.2 At this stage of the project (PCF Stage 2) three options are under consideration for Section A and one option is under consideration for Section B, these are briefly described below:

Section A - Morpeth to Felton

- Online Option – this option follows the line of the existing A1.
- Hybrid Option - this option has a similar arrangement to the online option, however a short offline section would provide a smoother curve between Causey Park Bridge and Bockenfield Bridge. A short section of the existing A1 would be detrunked (i.e. handed over for maintenance to Northumberland County Council rather than Highways England) and form part of a local road network.
- Offline Option – this option would be online at its north and south ends, but a large central section would form a new bypass to the west of the existing A1 between the Floodgate Burn crossing and Bockenfield Bridge. The existing A1 would be detrunked and form part of a local road network, which would separate local and strategic traffic.

Section B – Alnwick to Ellingham

- Online Option – this option follows the route of the existing A1. This option includes the construction of a single compact grade separated junction accommodating all movements, with an overbridge, at Charlton Mires, linking the A1 with the B6347. The remaining junctions would be closed off, and a number of accommodation bridges provided to improve connectivity and allow access to farm units.

1.2 Report Rationale

1.2.1 The aim of this report is to present the amphibian Habitat Suitability Index (HSI) and environmental DNA (eDNA) survey results from surveys undertaken in 2016 by Jacobs for Highways England. The information presented will be used to inform the preferred option and identify the requirement for additional surveys to be completed at PCF Stage 3. The data will ultimately inform the Environmental Impact assessment (EIA) for the preferred option.

1.3 Definitions

1.3.1 The study area relates to a 2 km buffer around the proposed options for Section A and Section B in which desk study information has been collated via online and third party sources.

1.3.2 The survey area refers to a 500 m buffer around the proposed options for Section A and Section B. Where possible all ponds within this 500 m buffer were surveyed. The survey area is shown on Figures 2.1 – 2.19 and Figures 3.1-3.13 of this report.

1.4 Legislative and Regulatory Context

1.4.1 An assessment of the legislative and regulatory framework covering amphibians in the UK has been undertaken. Due consideration has been given to the following statutory instruments and policy frameworks in the preparation of this report:

- Conservation of Habitats and Species Regulations 2010 (as amended)[3];
- Wildlife and Countryside Act 1981 (as amended)[4] (WCA), and;
- Natural Environment and Rural Communities Act 2006[5] (NERC).

1.4.2 There are three species of amphibian fully protected either under the combined measures contained in the Conservation of Habitats and Species Regulations 2010 (as amended) or the WCA, these are: great crested newt (*Triturus cristatus*) (GCN), natterjack toad (*Epidalea calamita*) and pool frog (*Pelophylax lessonae*). Natterjack toad and pool frog have very restricted geographical ranges in the UK making it extremely unlikely that they would occur in the study area covered by this report. The study area falls within the known distribution of GCN and therefore this report focuses on the presence/absence of this species.

1.4.3 Appendix A of this report provides a brief synopsis of how the above frameworks relate to the protection of amphibians (including GCN) in the UK.

Nature Conservation Status

1.4.4 GCN are listed as Priority Species on the Northumberland Local Biodiversity Action Plan (LBAP).

1.4.5 A study of GCN distribution in Northumberland was undertaken by Northumberland Wildlife Trust in 2006. The study shows a distribution in Northumberland concentrated within the large numbers of ponds in the eastern lowlands.

1.4.6 Current targets outlined in the Northumberland LBAP are the following:

- Maintain the current range of the Great Crested Newt in Northumberland of 41 sites by 2015, and;
- Increase the current range of the Great Crested Newt in Northumberland to 66 sites by 2015.

[3] http://www.legislation.gov.uk/uksi/2010/490/pdfs/uksi_20100490_en.pdf

[4] http://www.legislation.gov.uk/ukpga/1981/69

[5] http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf

2 METHODOLOGY

2.1 Desk Study

2.1.1 A desk study was undertaken in May 2016 with species record data requested from ERIC North East and North East Reptile and Amphibian Group (NERAG). Data relating to amphibians within 2 km of Section A and Section B options were requested. At the time of writing this report no records had been received from NERAG.

2.1.2 The presence of statutory and non-statutory protected sites, with amphibians as qualifying features or a contributing reason for designation, was also considered as part of the desk study.

2.1.3 The MAGIC (Multi Agency Geographic Information for the Countryside)[6] website was accessed during November 2016 to search for Natural England European Protected Species Licence (EPSL) applications relating to GCN within 2 km of the proposed options of Sections A and Section B.

2.1.4 In addition planning applications within 500 m of the proposed options, linked to Natural England protected species licenses relating to GCN, were also reviewed.

2.1.5 Amphibian records within the 2 km study area are shown on Figures 1.1 (Section A) and 1.2 (Section B).

2.2 HSI Assessment

2.2.1 GCN HSI assessments were undertaken for each pond/waterbody in the survey area. The assessments were undertaken between the 18th and 20th April 2016. The locations of all ponds/waterbodies surveyed are shown on Figures 2.1 – 2.19 (Section A) and Figures 3.1-3.13 (Section B).

2.2.2 The HSI assessments were conducted in line with best practice guidance[7]. This involved recording ten habitat parameters that influence the suitability of a pond to support GCN. The overall index score obtained gave an indication of a ponds suitability to support GCN as per Table 1 below. The detailed results and calculations of the HSI surveys are provided in Appendix B of this report.

Table 1 – HSI Pond/waterbody Grading

HSI Score	Pond Suitability
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

[6] MAGIC (2016) [Online] Available at Http://www.magic.gov.uk/MagicMap.aspx [Accessed November 2016)

[7] Oldham, R. S., Keeble, J., Swan, M. J., and Jeffcote, M. (2000). *Evaluating the Suitability of Habitats for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal, 10: 143 – 155.

2.3 eDNA Sampling

2.3.1 Each waterbody accessed within the survey area was assessed for GCN presence or absence using eDNA sampling techniques. Waterbodies were sampled on the 18th, 19th and 20th April 2016, during the same visit as when the HSI assessments were undertaken.

2.3.2 The eDNA field sampling techniques and laboratory analysis followed standard protocols published by FERA (Biggs, J. et al. 2014)[8].

2.3.3 The lab report for eDNA sampling is provided in Appendix C of this report.

2.4 Survey Limitations

2.4.1 The HSI score is a measure of habitat suitability and is not a substitute for GCN surveys. A high score, i.e. greater than 0.7, can suggest a higher probability of GCN presence, but does not serve as evidence of the presence of absence of GCN.

2.4.2 The eDNA methodology has inherent limitations due to the nature of DNA. Depending on environmental conditions eDNA only persists in aquatic environments for 7 to 21 days. However, as the samples were taken during the GCN breeding season (mid-April to the end of June) when GCN reside within waterbodies, this was not considered to be a significant limitation of this survey.

2.4.3 Although best practice minimises the risk of contamination between samples in the field and the lab, there is an unavoidable contamination risk from inflows and aquatic animals moving between ponds.

2.4.4 False-negative results can occur for the following reasons:

- Low numbers of newts within a waterbody may mean that the concentration of eDNA is too low to be detected.
- When sampling wide and shallow waterbodies the likelihood of collecting samples from areas where GCN are not active is increased.
- eDNA is less likely to be detected if samples are taken from areas of dense vegetation.

2.4.5 False-positive results can occur through contamination of kits in the field or during DNA amplification in the lab.

2.4.6 However, the risk of false-negative and false-positive results can be minimised by following good field survey and lab practice.

2.4.7 At the time of the field surveys several ponds could not be accessed as permission was not agreed with the landowners or there was livestock in the vicinity making access unsafe. Ponds where access was restricted were Ponds A2, A4 and B10. These ponds were assigned HSI scores based on reviews of aerial photography and information gathered during subsequent field visits whilst undertaking other ecological surveys in 2016. Further surveys at PCF Stage 3 would be required to determine the presence/absence of GCN in these ponds.

2.4.8 The junction configurations and locations of proposed access tracks for the proposed options have changed since the HSI and eDNA surveys were carried out in April 2016, therefore the 500 m survey area buffer has also changed. A desk study exercise was undertaken to evaluate whether there were any additional ponds within the new survey

[8] Biggs, J. et al. 2014. *Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

area. Only one pond (B6) was not within the old survey buffer. This pond was assigned HSI scores based on reviews of aerial photography and information gathered during subsequent field visits whilst undertaking other ecological surveys in 2016. Further surveys at PCF Stage 3 would be required to determine the presence/absence of GCN in this pond.

2.4.9 Online ordnance survey (OS) mapping and aerial photography was used to find all waterbodies that could provide potential amphibian habitat. Field surveys, including HSI and eDNA surveys, were then carried out at these waterbodies (where access was possible). Since the HSI and eDNA surveys were carried out an extended Phase 1 Habitat Survey has been undertaken. During the extended Phase 1 survey, several extra ponds were recorded that were not shown on OS or aerial mapping. Ponds found during the extended Phase 1 habitat surveys were Ponds A1, A6, A7, A14, A18, B2 and B6. These ponds were assigned HSI scores based on target notes and/or photos from the extended phase 1 survey. Further surveys at PCF Stage 3 would be required to determine the presence/absence of GCN in these ponds.

2.4.10 The results within this report reflect the condition of waterbodies at the time of survey. GCN can disperse large distances overland to colonise new aquatic and terrestrial habitats. Therefore, colonisation of new areas is possible within a relatively short timescale. Consequently, if the construction of the proposed development is delayed for an extended period of time, the survey results would be less reliable and the surveys may need to be repeated.

2.4.11 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document.

3 BASELINE

3.1 Desk Study

Designated Sites

3.1.1 No statutory designated sites with amphibians listed as a qualifying feature were present within 2 km of the site.

Amphibian Records

3.1.2 Desk study records from ERIC North East showed that there were three instances of common toad (*Bufo bufo*), four instances of common frog (*Rana temporaria*) and five instances of GCN recorded between 1983 and 2015 within the study area for Section A (see Table 2 below). Within Section B there were two records of GCN made between 1983 and 2005 (See Table 3 below).

3.1.3 The five records of GCN within the 2 km study area for Section A were made between 2006 and 2015. All amphibian records received for the study area are mapped on Figures 1.1 (Section A) and 1.2 (Section B).

Table 2: GCN records within Section A received from ERIC North East

Abundance	Approx, minimum distance from proposed options	Date observed	Grid reference
Unknown	430 m	08/05/2006	NU1700
3 Count	390 m	07/04/2015	NZ176970
1 Count	770 m	21/07/2015	NZ17259685
3 Count	1390 m	03/06/2015	NZ168964
72 Count	1080 m	07/04/2015	NZ169969

Table 3: GCN records within Section B received from ERIC North East

Abundance	Approx. minimum distance from proposed options.	Date observed	Grid reference
Unknown	2000 m	1983	NU203202
Unknown	2000 m	05/06/2005	NU2020

3.1.4 One Natural England protected species licence application relating to GCN was found within 2 km of the proposed options for Section A at Burgham Park Golf course. The licence number was EPSM2013-6209 and related to damage of a resting place. The licence start date was 12/12/2013 and the end date was 30/06/2019. The location of the European Protected Species Licence (EPSL) was at GR NZ 16897 96903.

The planning application and associated ecology report[9] relating to this protected species licence reported that there was a “good” or “moderate”[10] population of GCN present in two ponds at this location. Presence/absence surveys recorded a peak count of 39 individuals in 2013. The report recommended translocation of the GCN to a receptor site at NZ 17628 97064 which is within 500 m of the proposed options under consideration for Section A. Planning permission for the development had been granted but it is unknown whether the translocation took place.

[9] Great crested newt habitat creation strategy Burgham Park Golf course (2015) E3 Ecology.
[10] 2 English Nature (2001) Great Crested Newt Mitigation Guidelines

3.2 Field Survey Results

Habitat Suitability Index Survey (HSI)

3.2.1 The HSI assessments were carried out on all of the ponds identified during the desk study and the Phase 1 habitat survey within 500 m of the proposed options of Section A and Section B. The results of the initial HSI assessments are summarised in Table 4 below with the full results given in Appendix B.

3.2.2 In total there were 22 potentially suitable waterbodies for GCN identified within 500 m of the proposed options in Section A and 10 potentially suitable waterbodies for GCN within 500 m of the proposed options for Section B. Their HSI scores are given in Table 4 and Table 5 respectively and summarised shown in Chart 1 and Chart 2. The locations of all ponds/waterbodies surveyed are shown on Figures 2.1 – 2.19 (Section A) and Figures 3.1-3.13 (Section B). Indicative photos of some of the ponds/waterbodies surveyed are provided in Appendix D of this report.

Table 4: Section A HSI Survey Results

Pond Number	HSI Score	Category
A1	0.57	Below Average
A2	0.54	Below Average
A3	0.79	Good
A4	0.63	Average
A5	0.63	Average
A6	0.41	Poor
A7	0.79	Good
A8	0.638	Average
A9	0.52	Below Average
A10	0.59	Below Average
A11	0.74	Good
A12	0.58	Below Average
A13	0.7	Good
A14	0.73	Good
A15	0.44	Poor
A16	0.51	Below Average
A17	0.9	Excellent
A18	0.53	Below Average
A19	0.89	Excellent
A20	0.81	Excellent
A21	0.74	Good
A22	0.48	Poor

Table 5: Section B HSI Survey Results

Pond Number	HSI Score	Category
B1	0.64	Average
B2	0.56	Below Average
B3	0.68	Average
B4	0.65	Average
B5	0.84	Excellent
B6	0.61	Average

Pond Number	HSI Score	Category
B7	0.66	Average
B8	0.45	Poor
B9	0.79	Good
B10	0.36	Poor

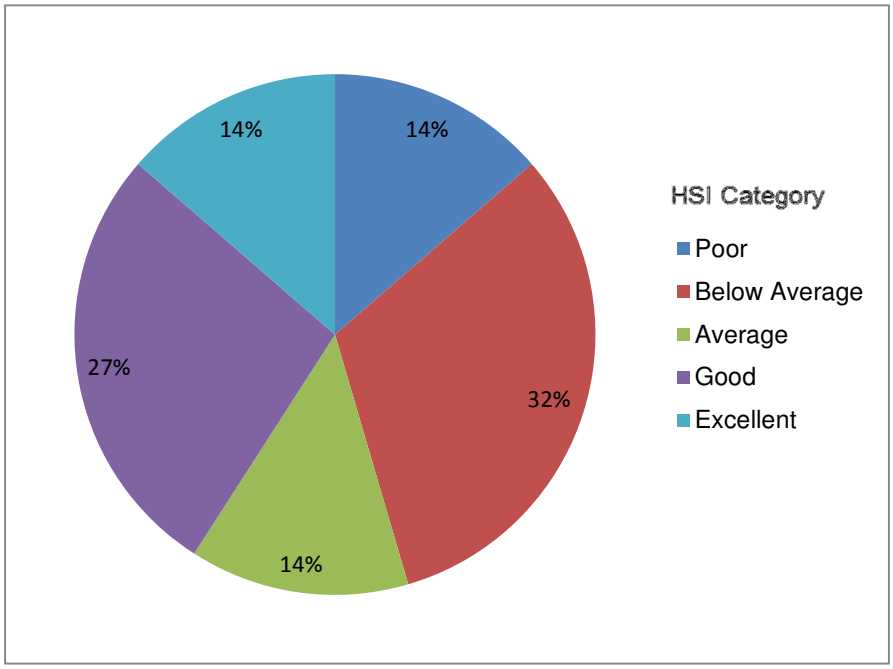

Chart 1: Relative percentages of each HSI category in Section A.

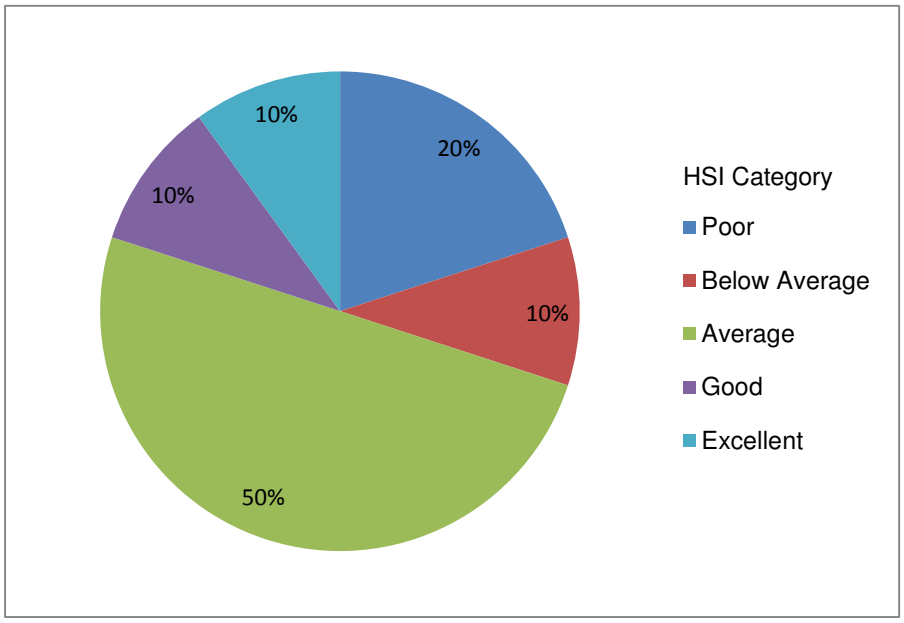

Chart 2: Relative percentages of each HSI category in Section B.

eDNA Sampling Results

3.2.3 The eDNA test results were received from Nature Metrics on 21st May 2016. One pond tested positive for GCN, Pond A23. All other ponds returned a negative result. A summary

of the results is shown in Table 6 (Section A) below and Table 7 (Section B) overleaf. The eDNA sampling results are mapped on Figures 2.1 – 2.19 (Section A) and Figures 3.1-3.13 (Section B). The results of the eDNA testing from Nature Metrics are provided in Appendix C. To avoid confusion, it should be noted that the pond numbering from the laboratory results are not the same as the pond numbers shown on the results figures. Numbering of the laboratory samples were ordered sequentially for Jacobs purposes and based on the known ponds at the time of sampling. Additional pond have been identified during subsequent habitat surveys.

Table 6: Summary of the eDNA results from Section A for samples collected in April 2016.

Pond	Grid Reference	GCN Presence/Absence
A1	NZ 18874 89427	Unknown (Not surveyed)
A2	NZ 18579 91256	Unknown (Not surveyed)
A3	NZ 18342 91548	Absent
A4	NZ 17888 91920	Unknown (Not surveyed)
A5	NZ 18718 93714	Absent
A6	NZ 18581 95238	Unknown (Not surveyed)
A7	NZ 17945 96410	Unknown (Not surveyed)
A8	NZ 18943 96534	Absent
A9	NZ 18457 96835	Absent
A10	NZ 18479 96848	Absent
A11	NZ 17649 97025	Absent
A12	NZ 18083 97099	Absent
A13	NZ 17834 97104	Absent
A14	NZ 18074 97116	Unknown (Not surveyed)
A15	NZ 18064 97353	Absent
A16	NZ 17937 97867	Absent
A17	NZ 17593 98179	Absent
A18	NZ 17099 98657	Unknown (Not surveyed)
A19	NU 17328 00008	Absent
A20	NU 16932 00575	Absent
A21	NU 17083 00523	**Present**
A22	NU 18049 00359	Absent

Table 7: Summary of the eDNA results from Section B for samples collected in April 2016.

Pond	Grid Reference	GCN Presence/Absence
B1	NU 18643 17240	Absent
B2	NU 18428 17353	Unknown (Not surveyed)
B3	NU 17927 18540	Absent
B4	NU 18020 18578	Absent
B5	NU 18153 18643	Absent
B6	NU 19013 20120	Unknown (Not surveyed)
B7	NU 18301 20789	Absent

Pond	Grid Reference	GCN Presence/Absence
B8	NU 17553 20960	Absent
B9	NU 17452 21127	Absent
B10	NU 16604 22938	Unknown (Not surveyed)

4 SUMMARY

4.1.1 Desk study records from ERIC North East showed that there were three instances of common toad, four instances of common frog and five instances of GCN recorded between 1983 and 2015 within the 2 km study area for Section A. Within the 2 km study area of Section B there were two records of GCN made between 1983 and 2005.

4.1.2 As shown by Figures 1.1 and 2.2 these records are concentrated around Burgham Park Golf Course in the Section A study area and fairly sparse in the study area for Section B (two records concentrated around the village of Rock).

4.1.3 The HSI for GCN of the all the ponds surveyed in April 2016 ranged between excellent and poor. Three of the ponds that had excellent suitability were located to the north of Section A (Ponds A17, A19 and A20) and one was located halfway up Section B (Pond B5).

4.1.4 Chart 1 shows that the most common categories of HSI score in Section A were “good and “below average”. Chart 2 shows that the most common category of HSI score in Section B was “average”.

4.1.5 The eDNA results from surveys conducted in April 2016 indicated that GCN were absent from 21 out of the 22 ponds that were sampled within the survey area for Section A and Section B. A positive result was obtained from Pond A21, located within woodland to the north of the River Coquet..

4.2 Recommendations for further survey

4.2.1 eDNA sampling has a high detection rate for GCN but are not definitive when used in isolation. Added to this there are records of GCN within the survey area (including a previous EPS licence application) and several ponds with a HSI index score of “Good” or “Excellent”. With all these factors in mind further surveys are recommended in order to negate the risk of finding an unknown population of GCN later in the project programme. Such a discovery would result in significant risk of substantial delay to the statutory process or to construction.

4.2.2 It is recommended that GCN presence / absence surveys, and if necessary GCN population size class estimates surveys, should be undertaken on all suitable ponds that are within 250 m of the proposed options under consideration including Pond A21. The aim would be to corroborate the eDNA results and to obtain a GCN population class size assessment should GCN presence be confirmed. The relevant ponds are listed in Table 7 below. Ponds excluded from the survey programme are those scoped out based on other physical factors such as presence of fish or size such as Pond A15 which contains fish and abundant waterfowl.

4.2.3 All ponds that are between 250 m - 500 m from the construction footprints and are not separated by a major barrier, have a HSI score above 0.7 (Good) and / or possess historic records of GCN presence should also be subject to presence / absence surveys, and if necessary population size class estimate surveys at PCF Stage 3 April and June 2017. These ponds are also listed in Table 7 below.

Table 7: Ponds recommended for further survey at PCF Stage 3

	Pond Numbers	
Ponds recommended for further survey	**Section A (Morpeth to Felton)**	**Section B (Alnwick to Ellingham)**
Ponds within 0- 250m	A3, A5, A6, A9, A10, A12, A13, A14, A17, A18 and A19	B5, B6, B7, B9
Ponds within 250-500m	A4, A7, A11, A20 and A21	

4.2.4 The ponds listed in Table 7 above reflect the option alignments at the time of survey. The requirement for survey will be reviewed once the preferred options have been defined.

FIGURES

FIGURE 1.1

Legend

2km Buffer (all options combined)

Species Records

- Common Frog
- Common Toad
- Great Crested Newt

1 Common Frog
1 Common Toad

1 Common Frog
1 Common Toad

1 Common Frog
1 Common Toad

0 2,000 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 17	Initial Issue	IM	EF	AM	MC

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www.jacobs.com

Client: highways england

Project: A1 NORTHUMBERLAND

Drawing Title: SECTION A
SPECIES RECORDS
AMPHIBIANS

Drawing Status:

Scale @ A3	1:70,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_0101

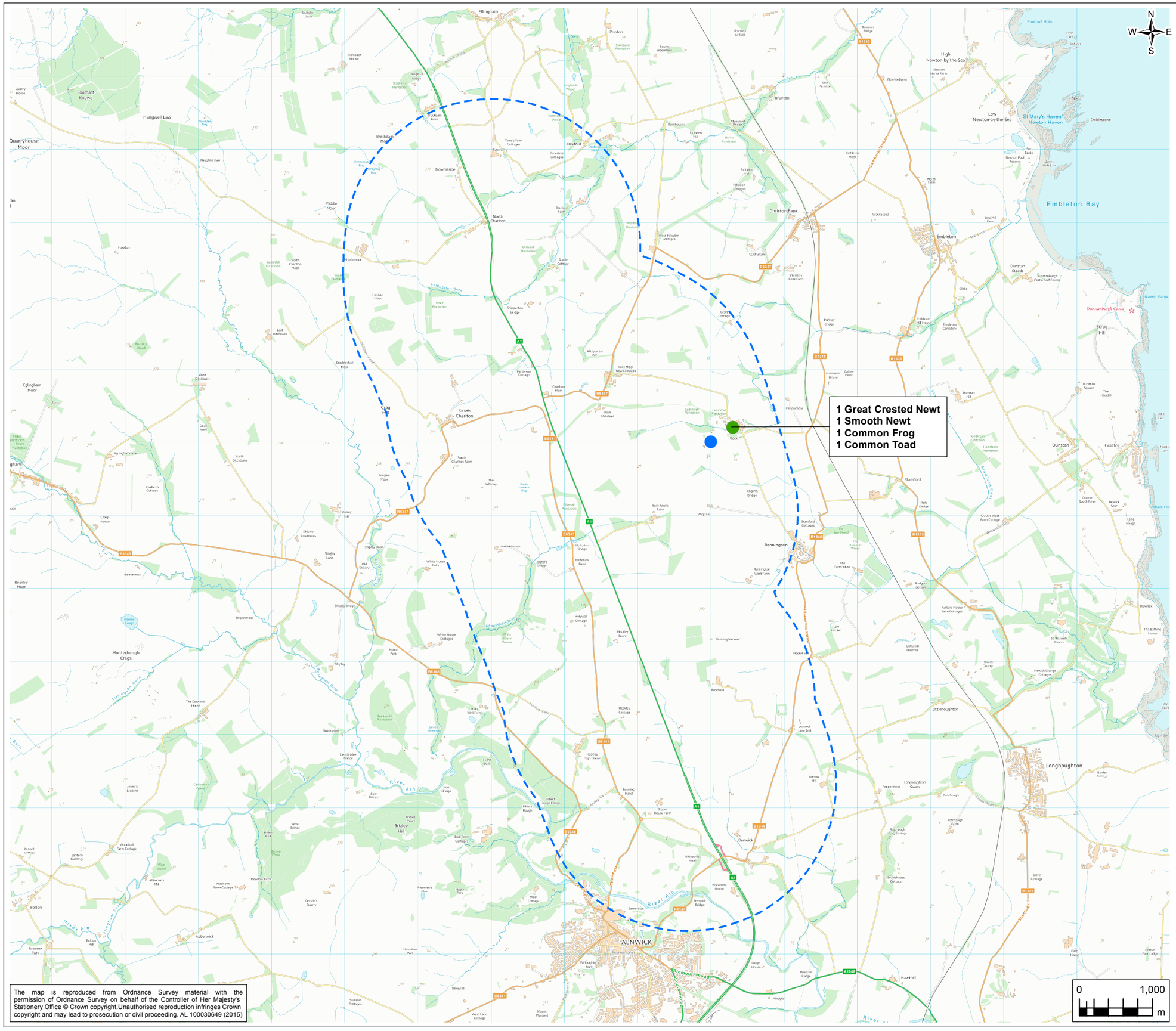

FIGURE 1.2

Legend

2km Buffer

Species Records

- Common Frog
- Common Toad
- Great Crested Newt
- Smooth Newt

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 17	Initial Issue	IM	EF	AM	MC

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Client: highways england

Project: A1 NORTHUMBERLAND

Drawing Title: SECTION B
SPECIES RECORDS
AMPHIBIANS

Drawing Status:

Scale @ A3	1:50,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_0102

FIGURE 2.1

Legend

- 250m Survey Area
- 500m Survey Area
- Sheet Extents (sheet number)

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018

N W E S

0 2,000 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 17	Initial Issue	IM	EF	AM	MC

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Project: A1 NORTHUMBERLAND

Drawing Title: SECTION A
GREAT CRESTED NEWTS SURVEY
FIGURE OVERVIEW

Drawing Status:

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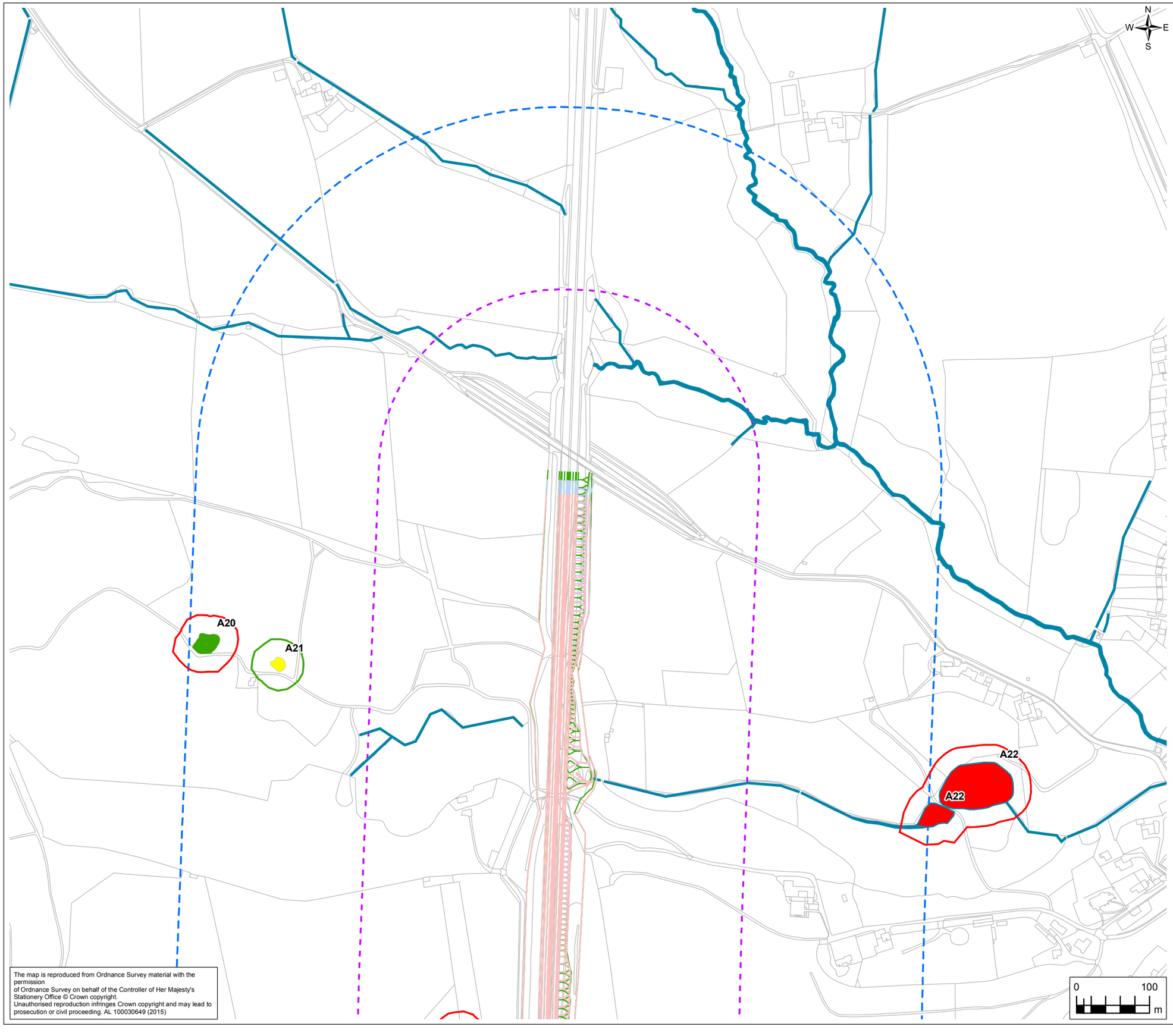
FIGURE 2.2



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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GREAT CRESTED NEWTS SURVEY MAP
Sheet 1

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Client No.		

Drawing No. B2104700_EC_GCN_SectionA_001

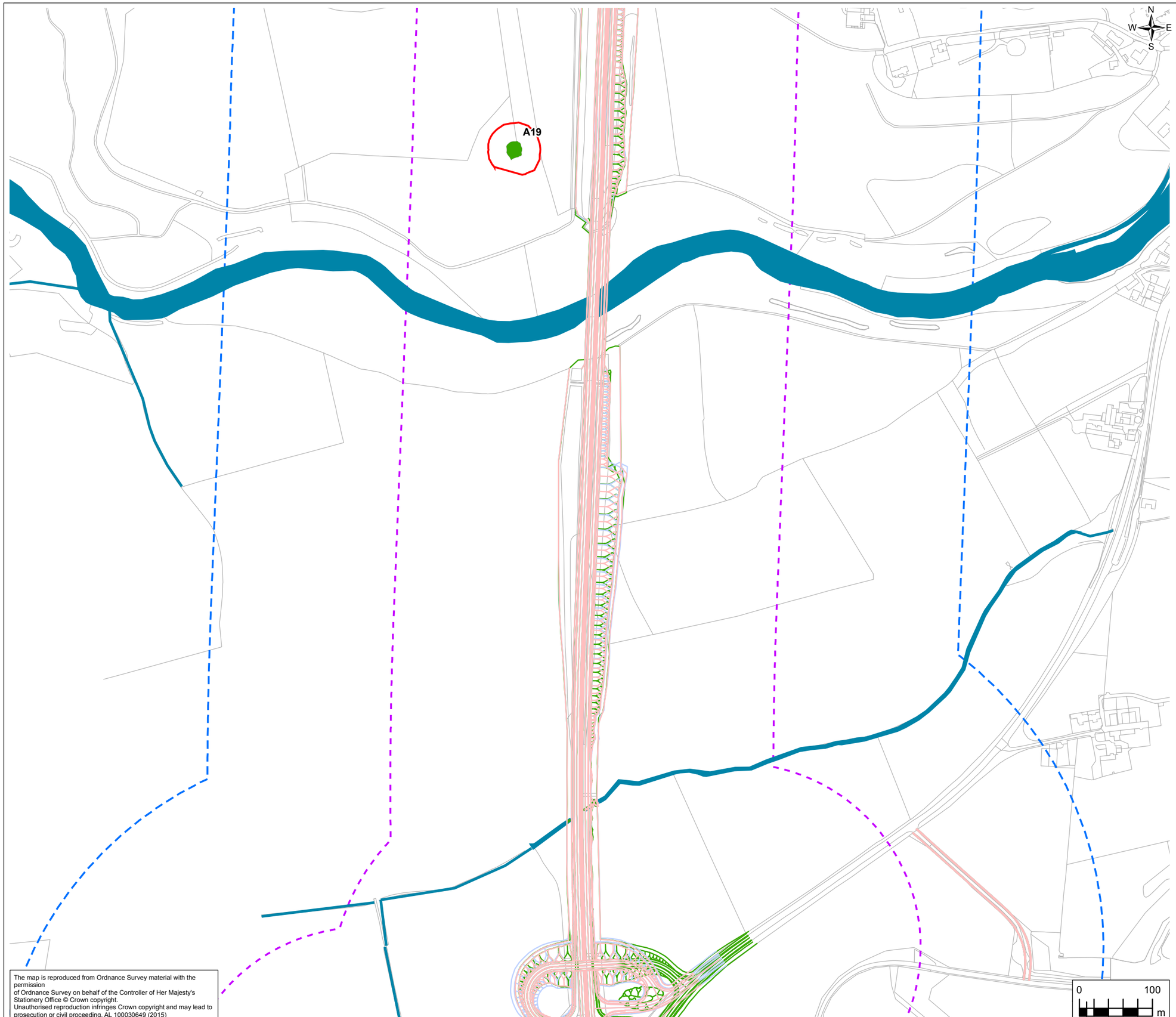

FIGURE 2.3

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Drawing Title: SECTION A
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Sheet 2

Drawing Status:

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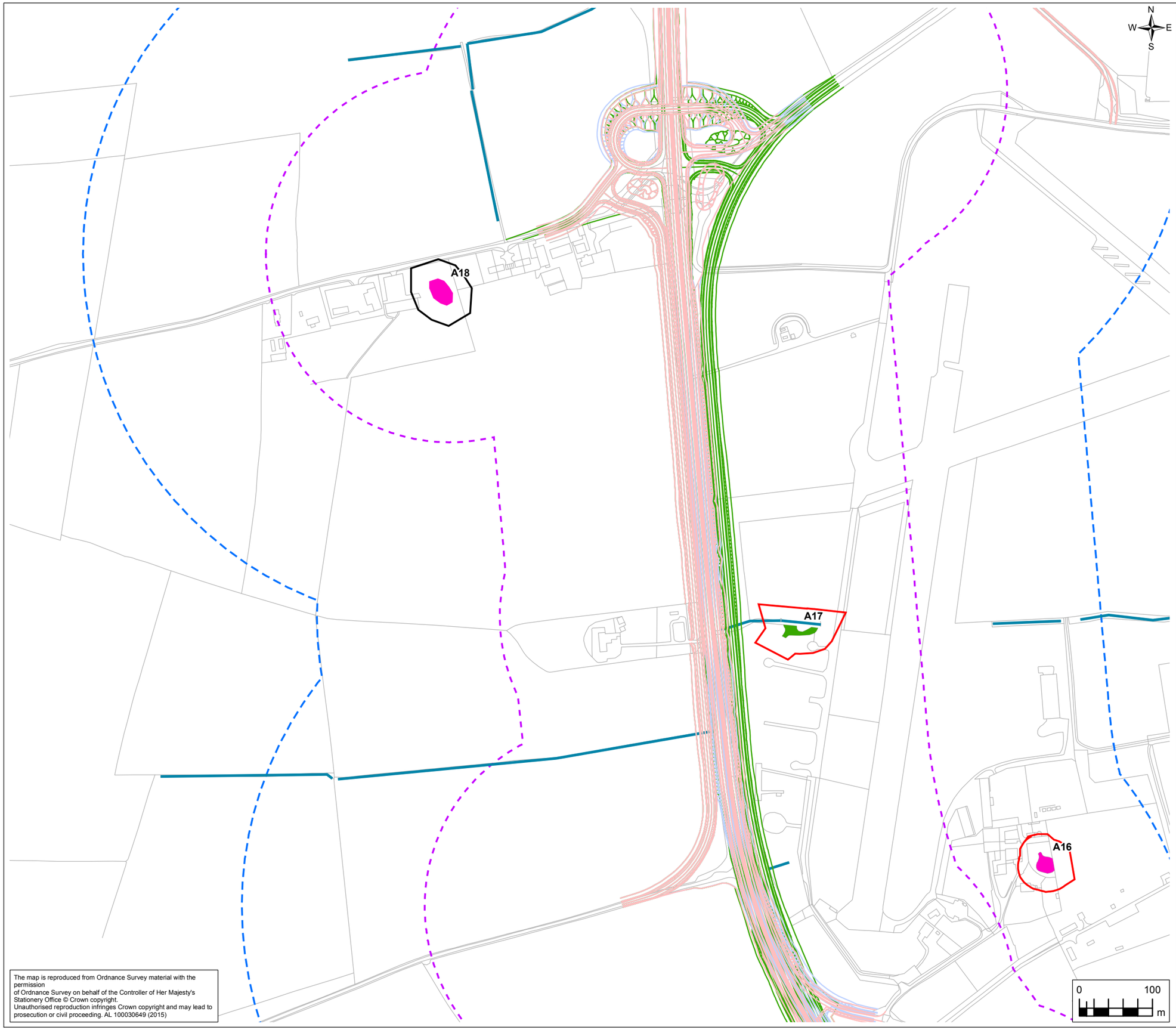
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_002

FIGURE 2.4



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 3

Drawing Status

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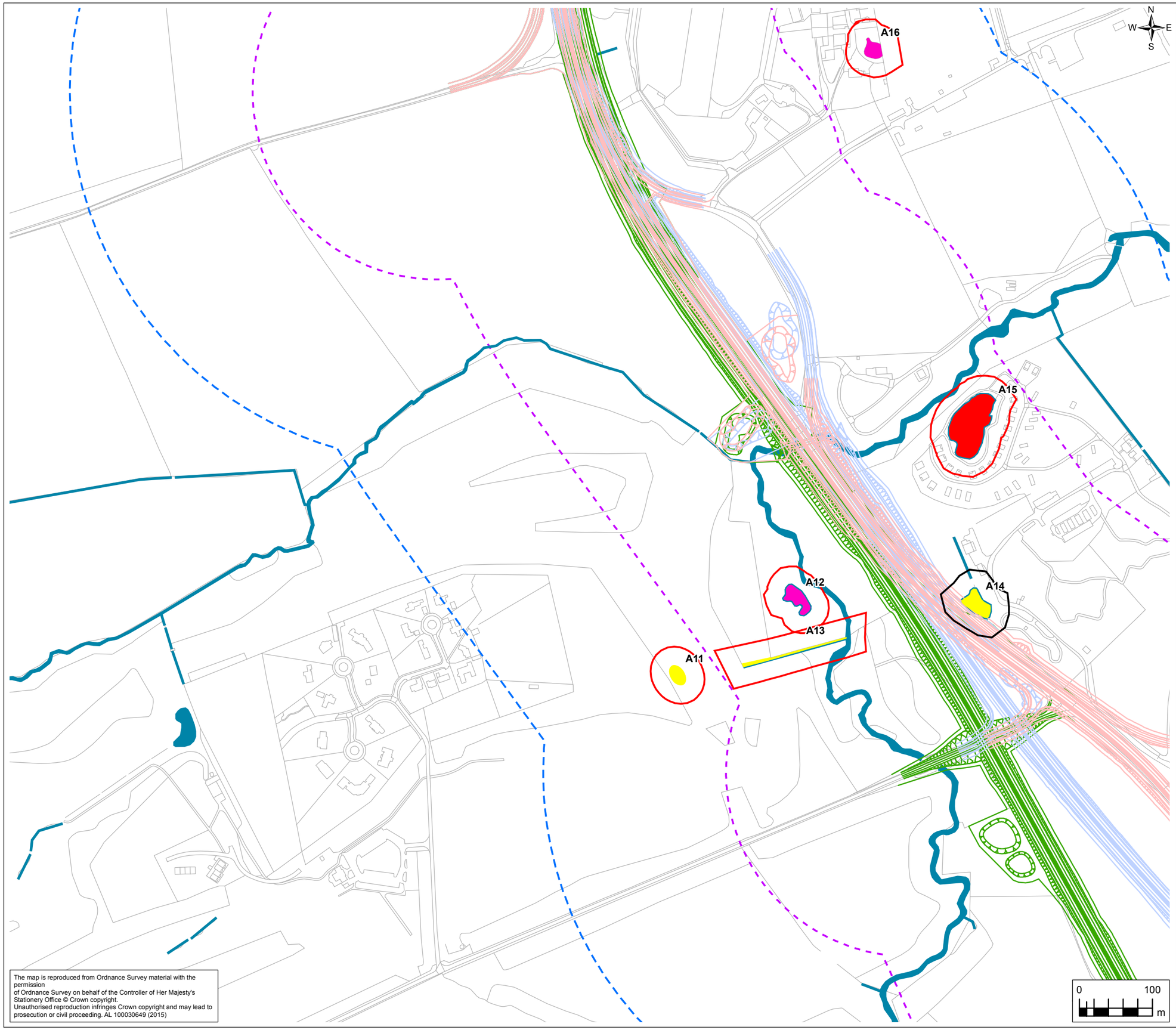
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_003

FIGURE 2.5



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Drawing Title:
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Sheet 4

Drawing Status:

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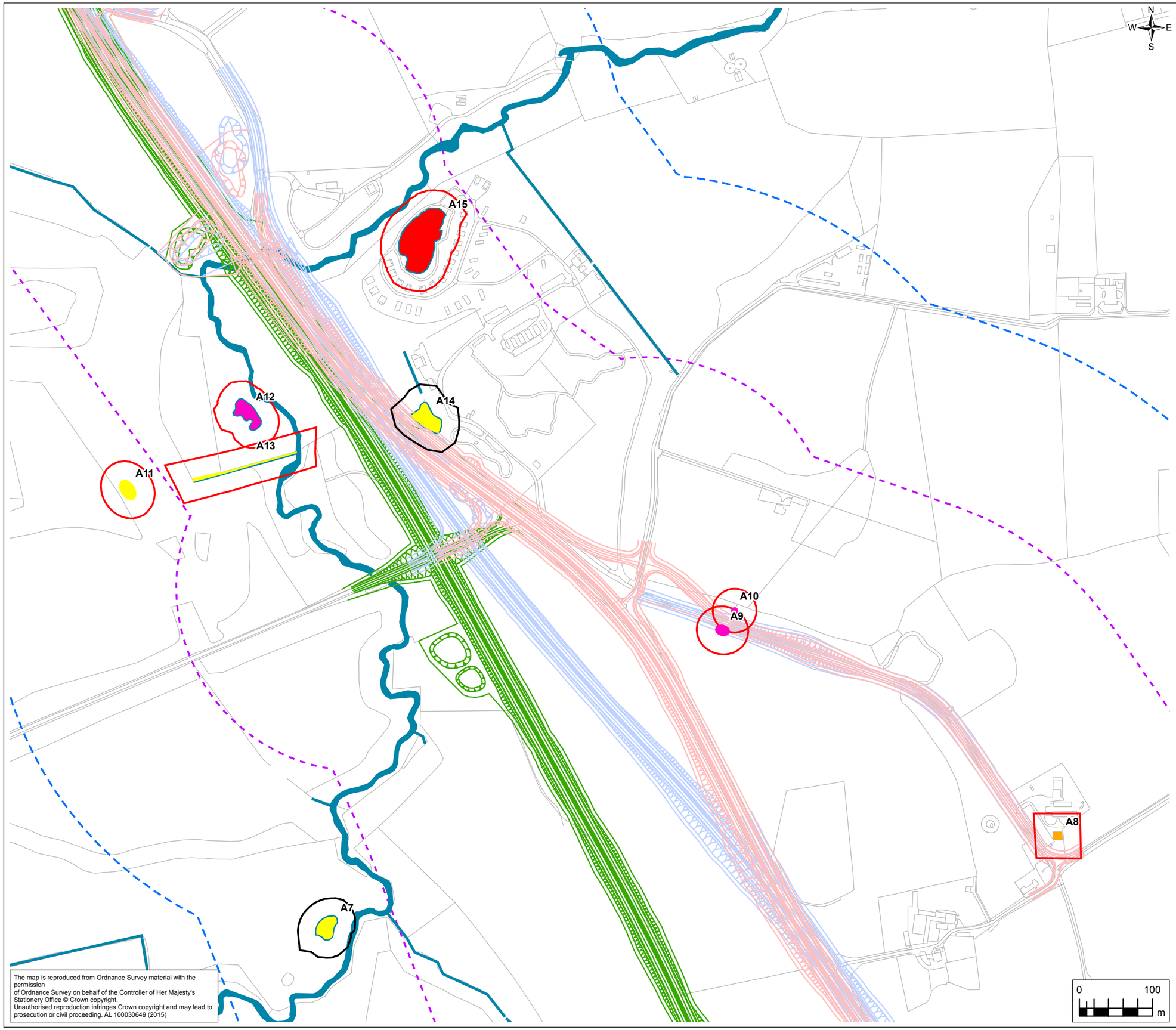
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_004

FIGURE 2.6



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 5

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_005

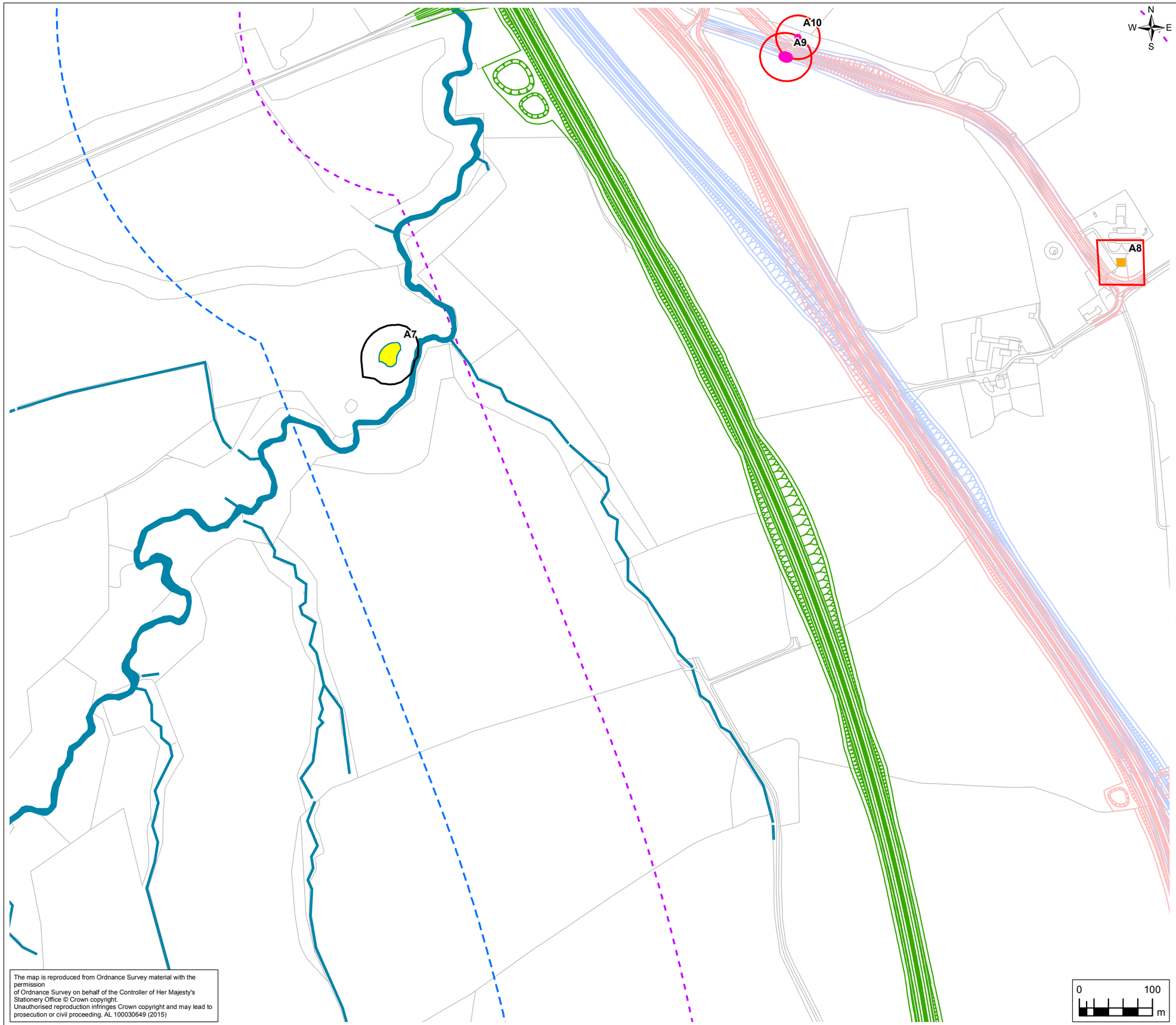

FIGURE 2.7

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 6

Drawing Status

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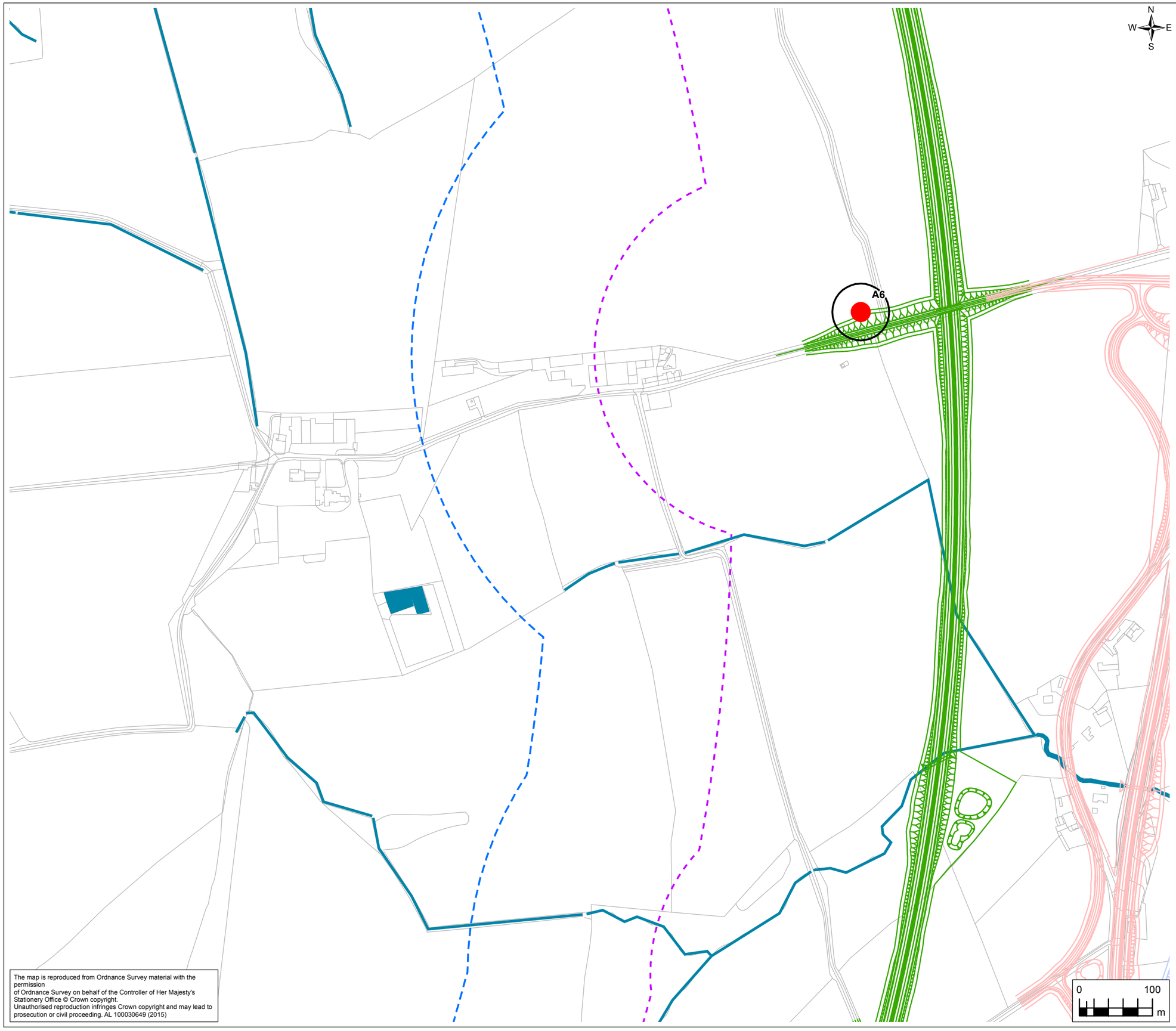
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_006

FIGURE 2.8



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 7

Drawing Status:

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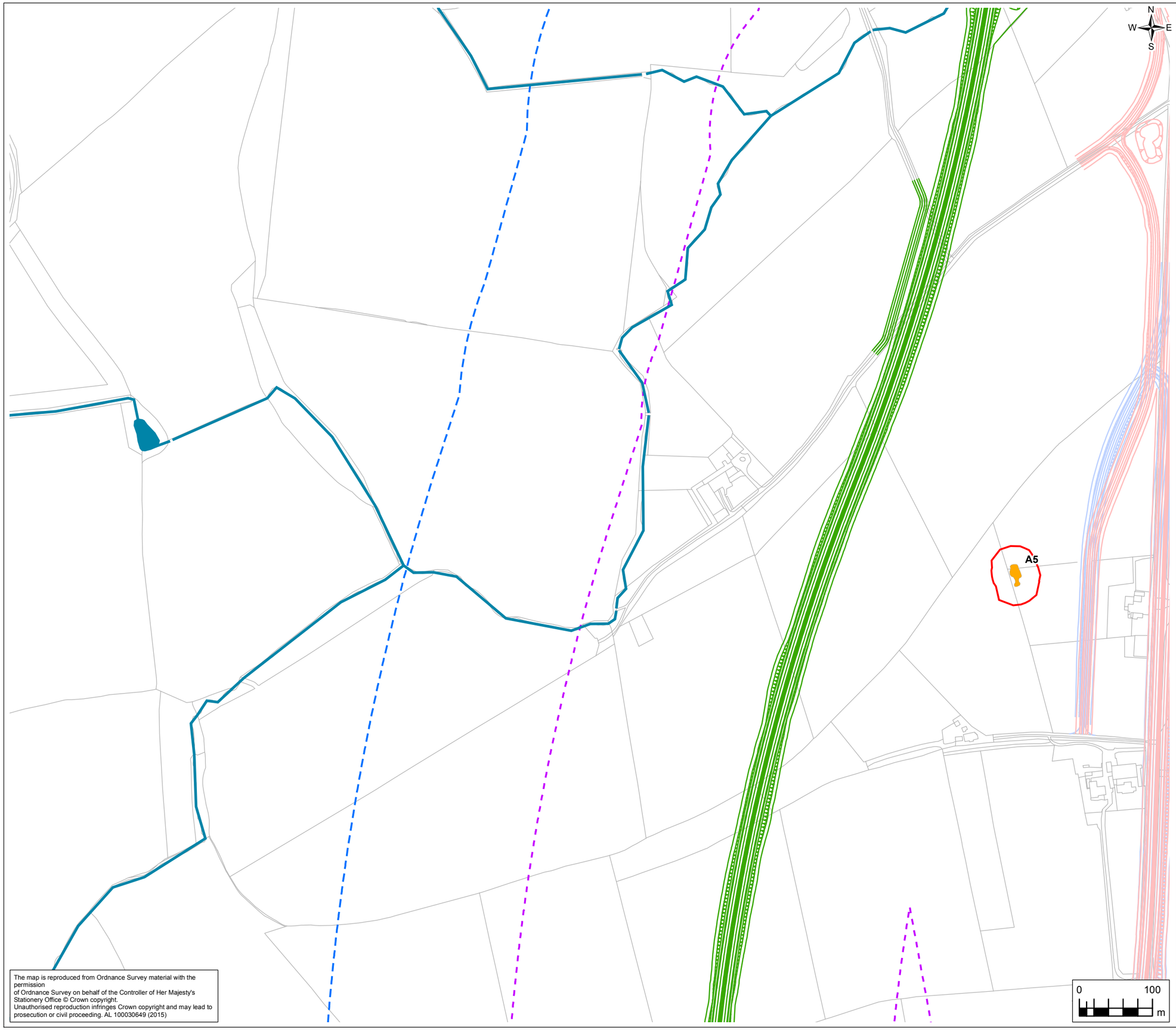
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_007

FIGURE 2.9



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 8

Drawing Status:

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Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_008

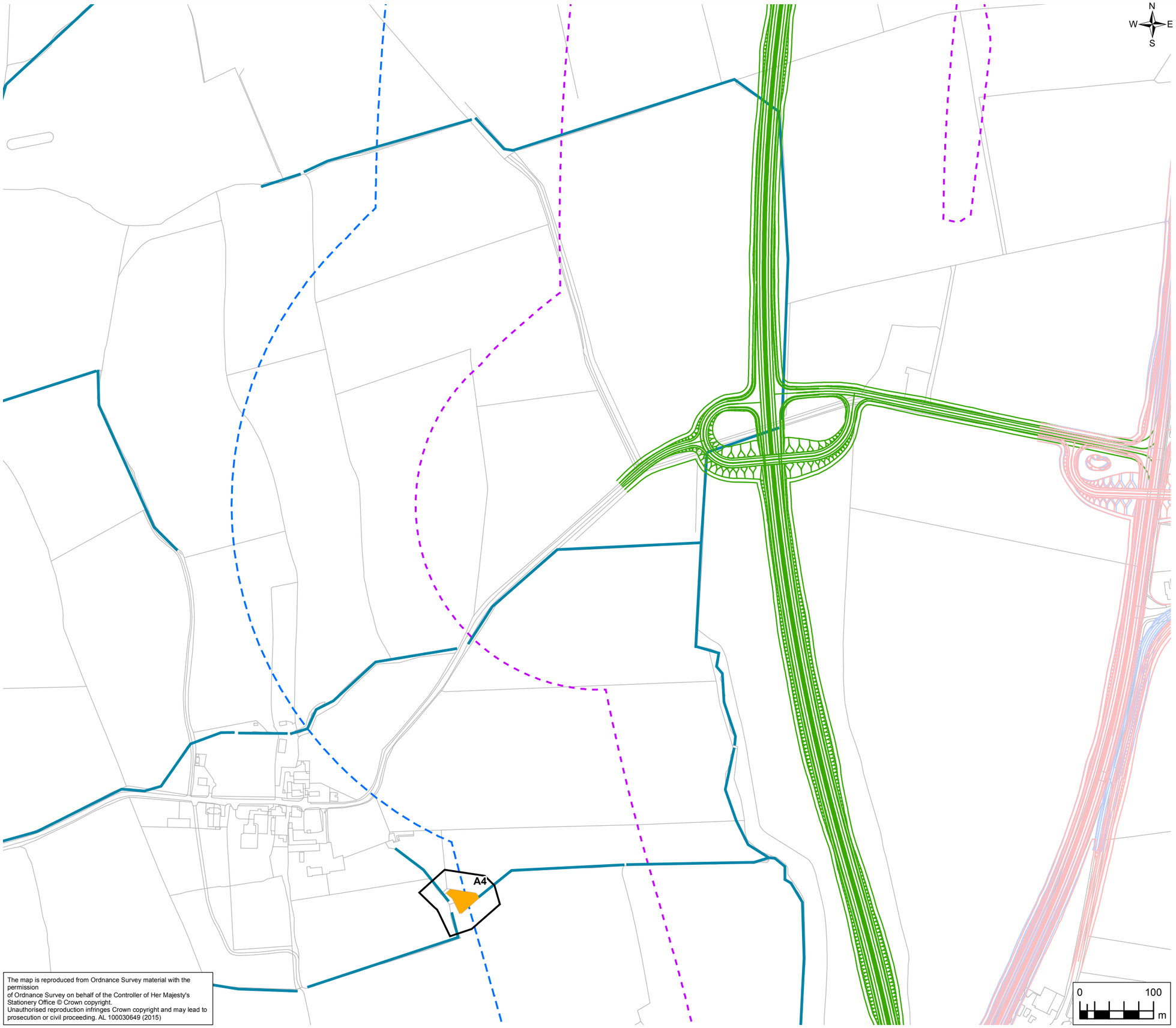

FIGURE 2.10

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Drawing Status:

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Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_009

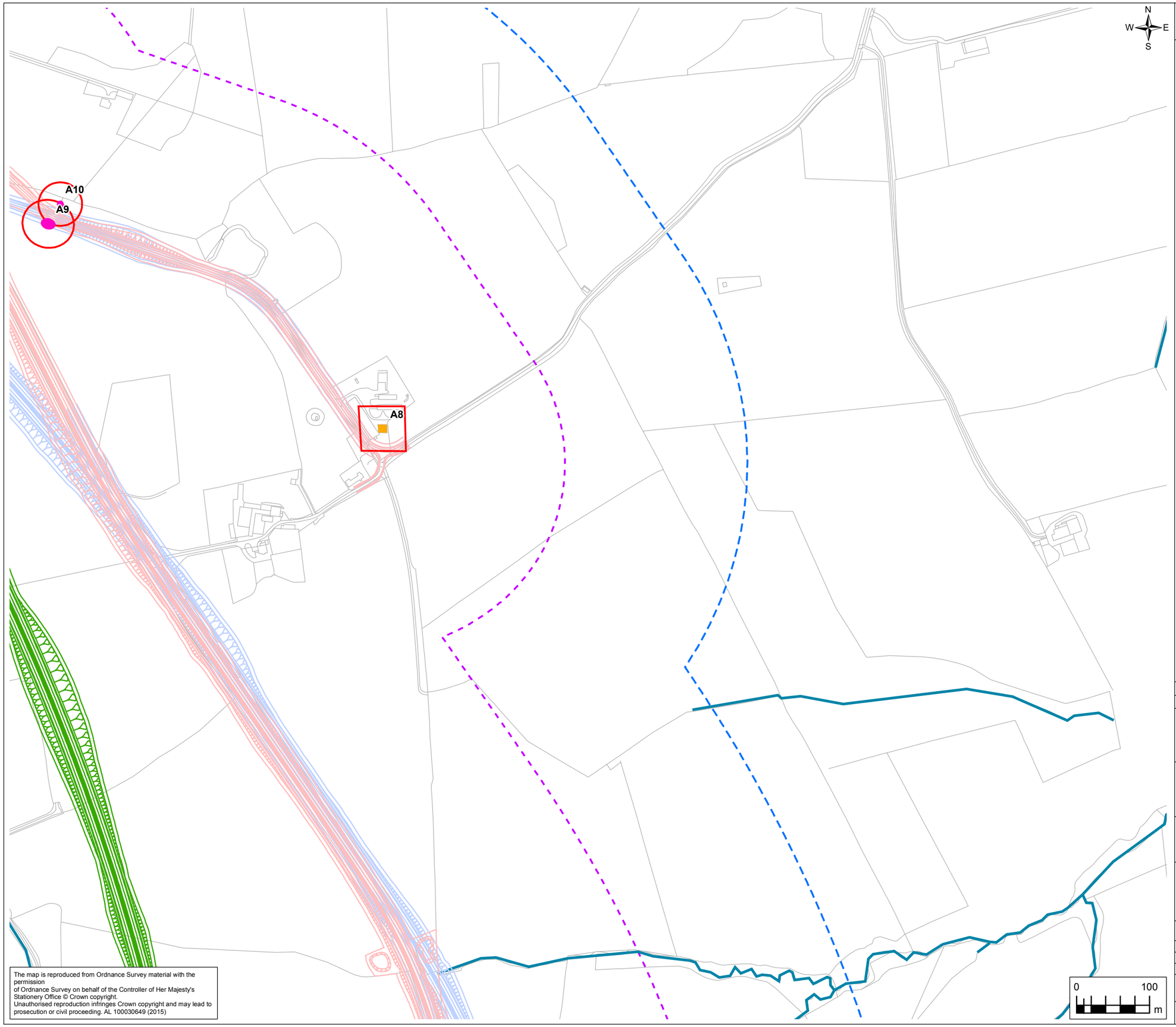

FIGURE 2.11

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 10

Drawing Status:

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Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_010

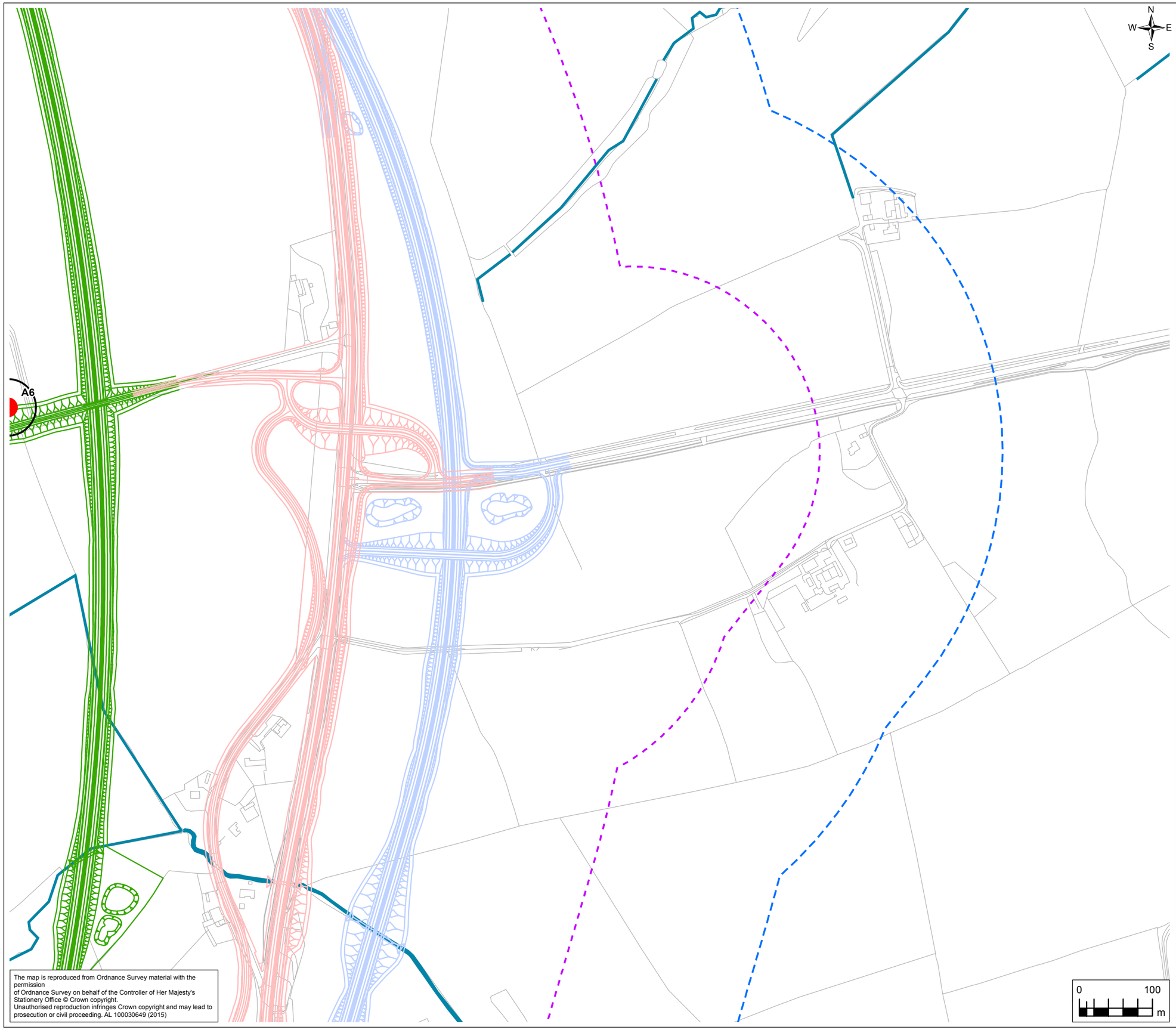

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FIGURE 2.12

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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GREAT CRESTED NEWTS SURVEY MAP
Sheet 11

Drawing Status

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Client No.		

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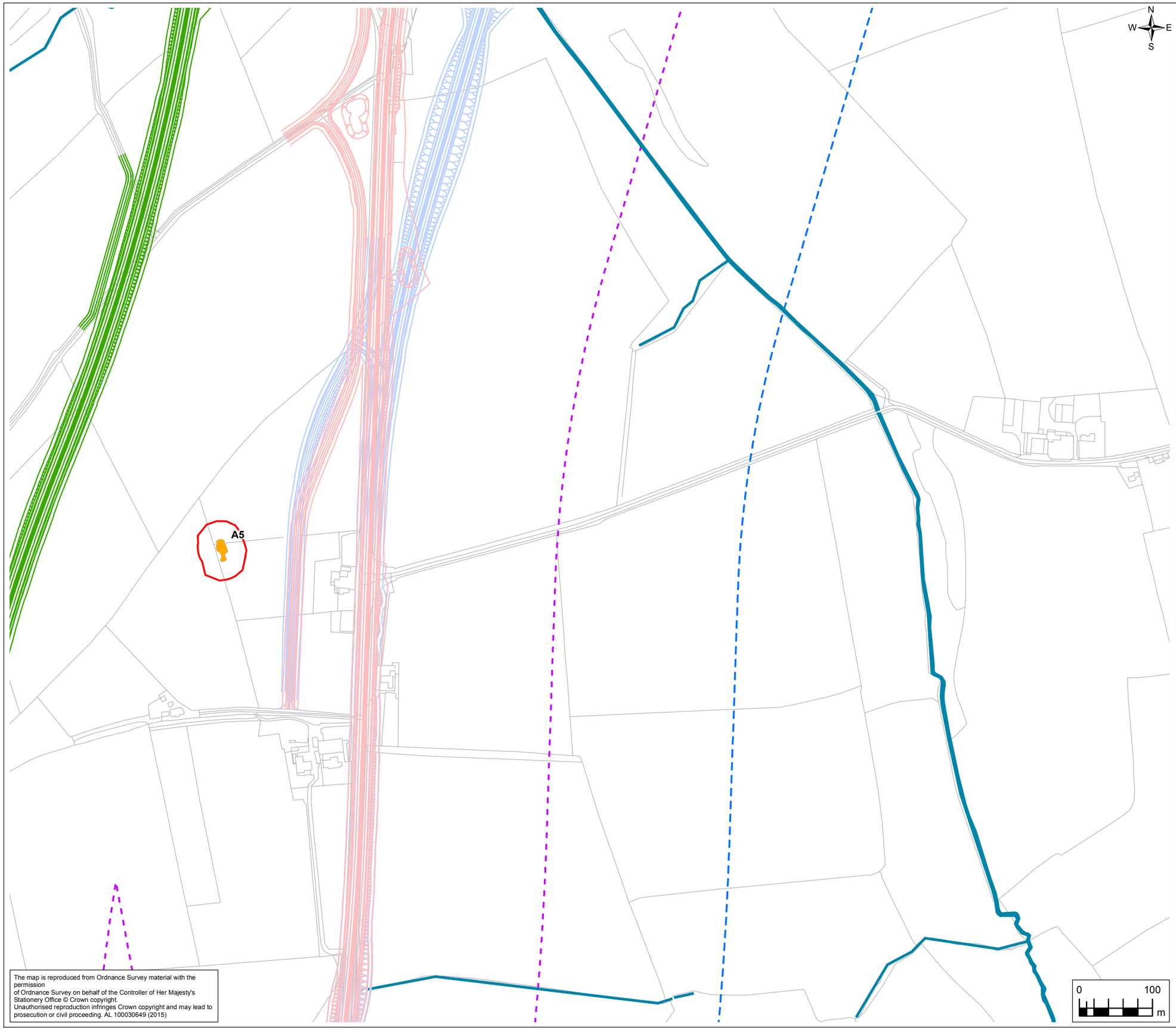

FIGURE 2.13

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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GREAT CRESTED NEWTS SURVEY MAP
Sheet 12

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_012

FIGURE 2.14

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

N W E S

0 100 m

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Drawing Status:

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Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_013

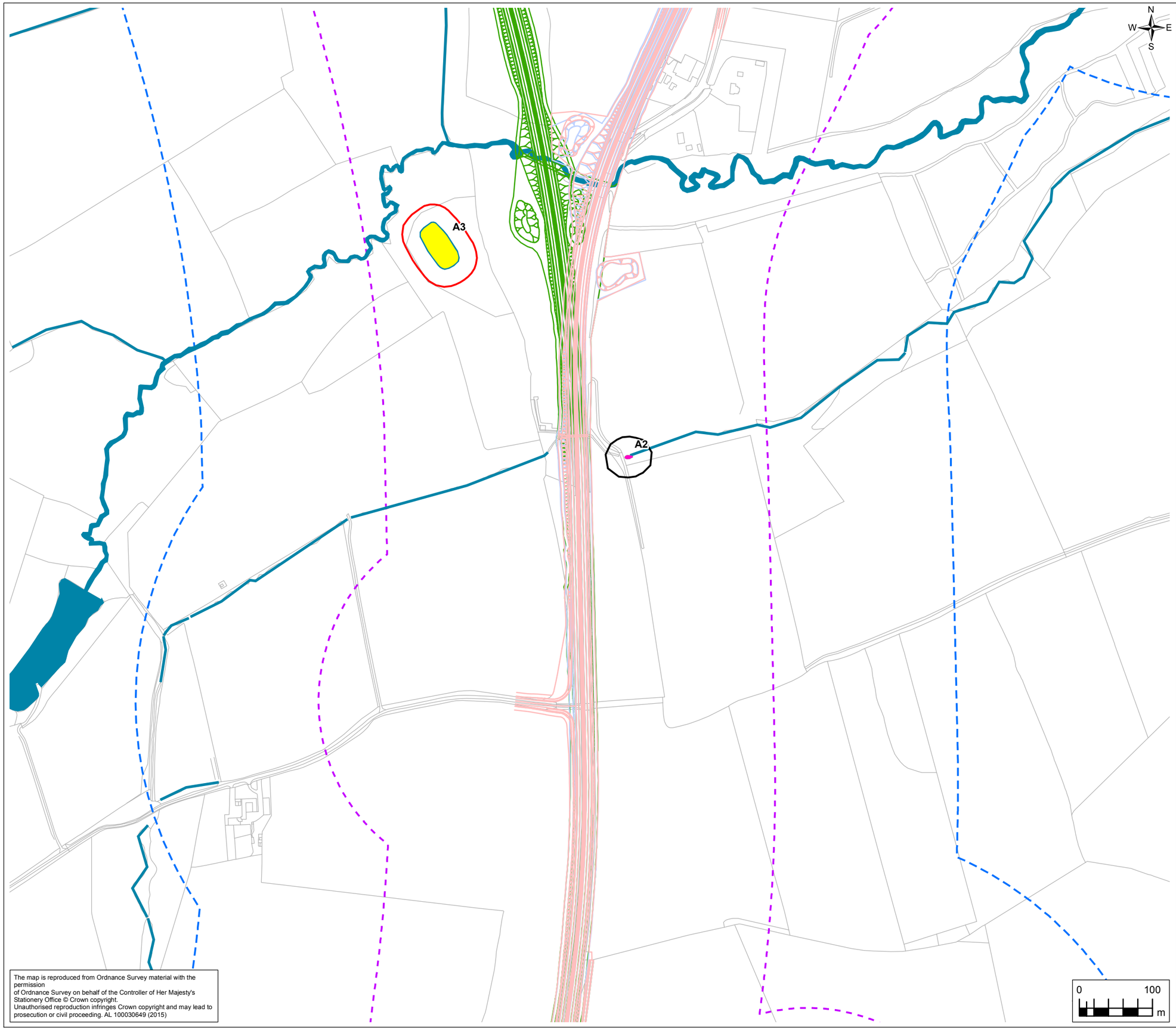

FIGURE 2.15

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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GREAT CRESTED NEWTS SURVEY MAP
Sheet 14

Drawing Status

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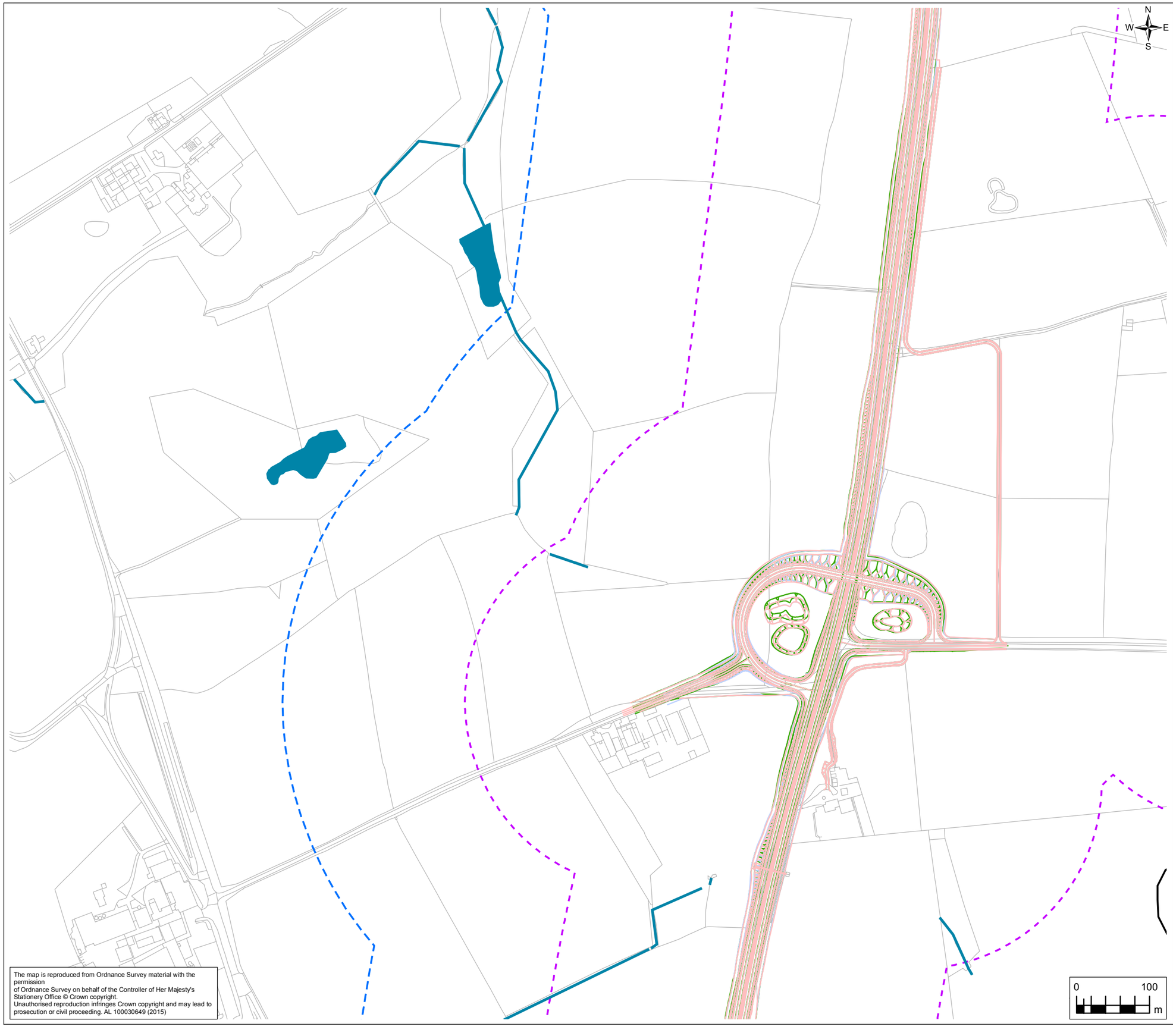
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_014

FIGURE 2.16



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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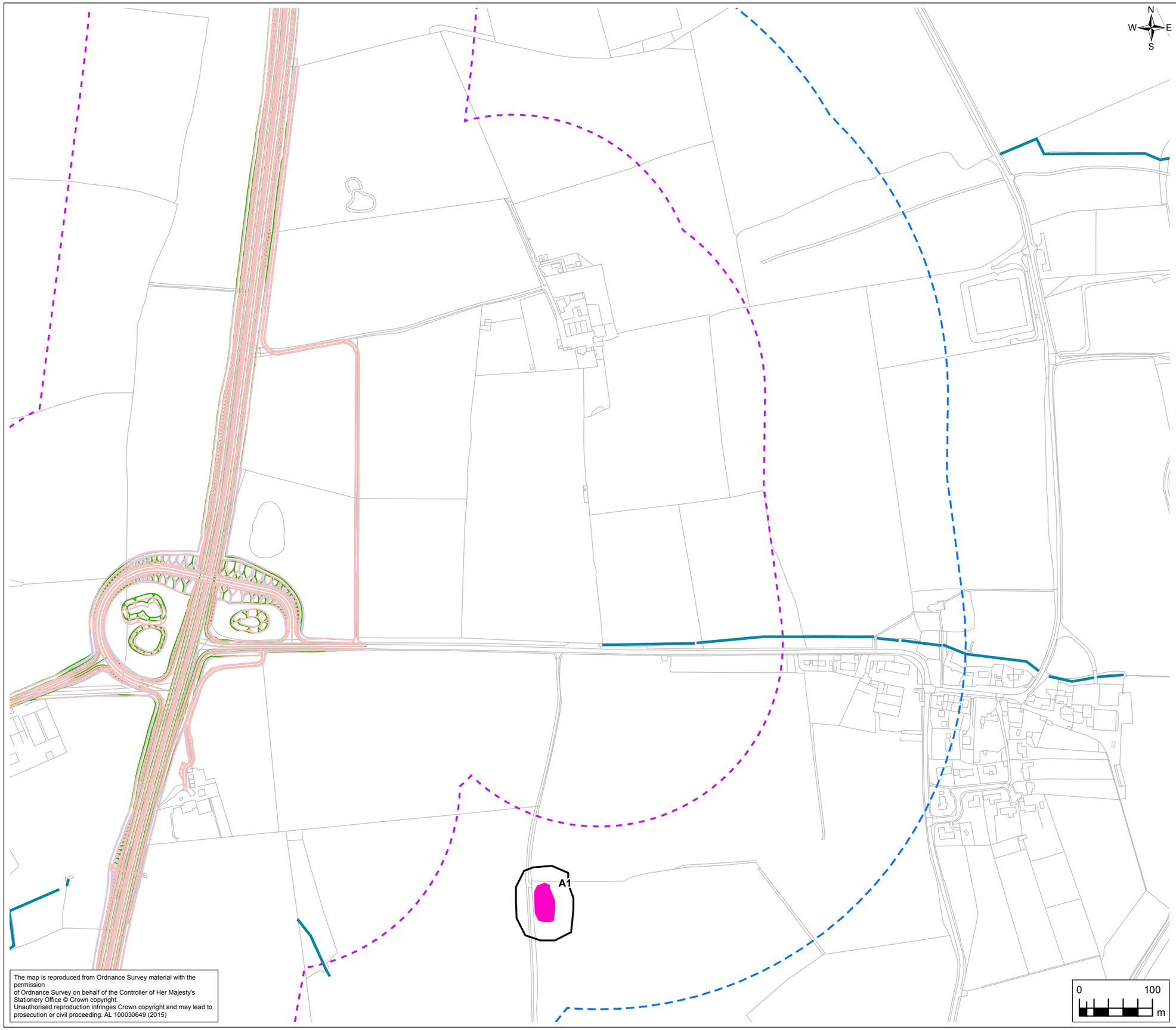
Drawing Title:
SECTION A
GREAT CRESTED NEWTS SURVEY MAP
Sheet 15

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_015

FIGURE 2.17



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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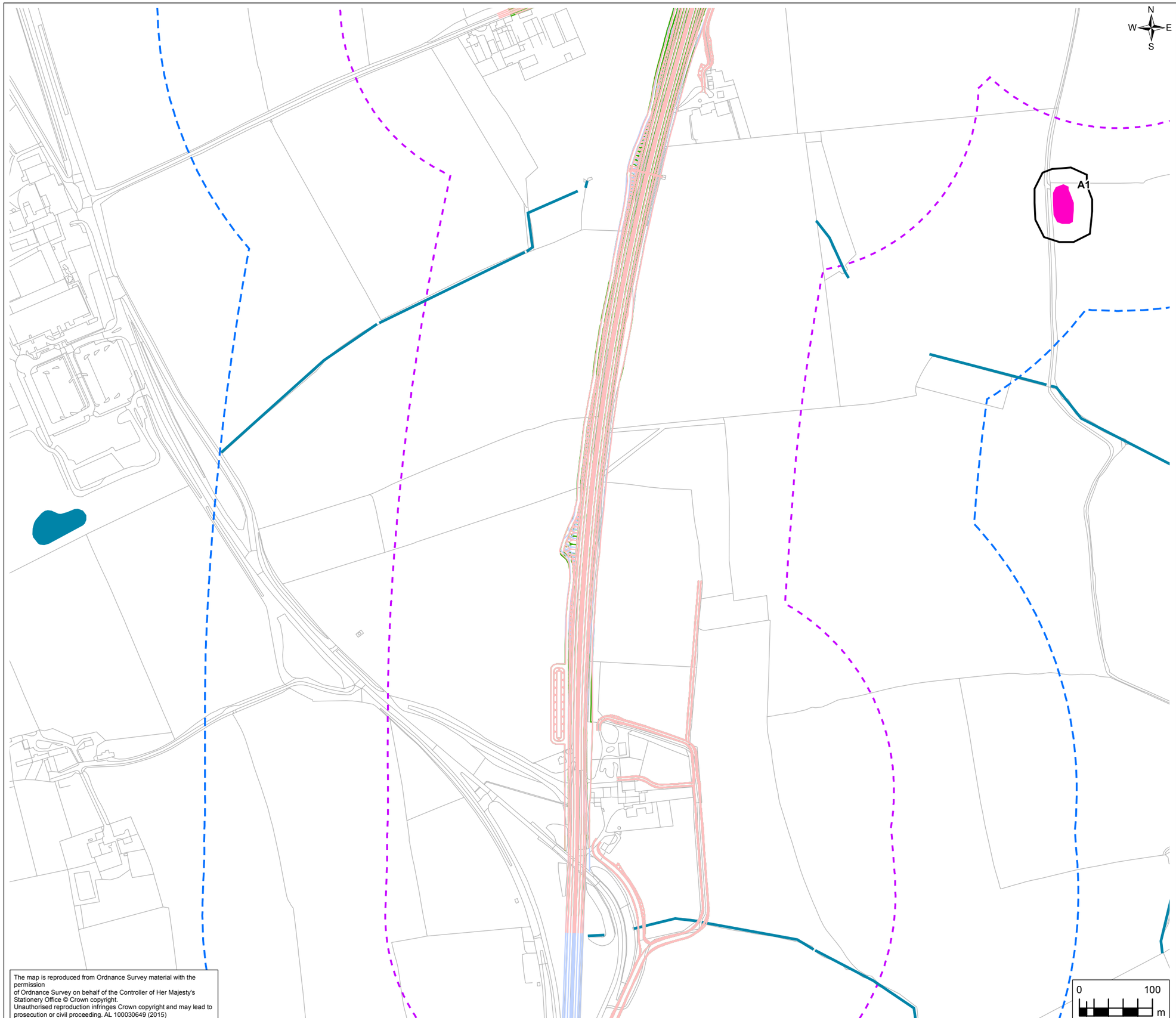
Drawing Title: SECTION A
GREAT CRESTED NEWTS SURVEY MAP
Sheet 16

Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_016

FIGURE 2.18



Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Drawing Title:
SECTION A
GREAT CRESTED NEWTS SURVEY MAP
Sheet 17

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_017

FIGURE 2.19

N
W E
S

Legend

- Online Option
- Hybrid Option
- Offline Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

0 100 m

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Drawing Title:
SECTION A
GREAT CRESTED NEWTS SURVEY MAP
Sheet 18

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionA_018

FIGURE 3.1

Legend

- 250m Survey Area
- 500m Survey Area
- Sheet Extents (sheet number)

001
002
003
004
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006
007
008
009
010
011
012

N
W E
S

0 1,000 m

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Drawing Title: SECTION B
GREAT CRESTED NEWTS SURVEY
FIGURE OVERVIEW

Drawing Status

Scale @ A3	1:35,000	DO NOT SCALE
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Client No.		

Drawing No. B2104700_EC_GCN_0301

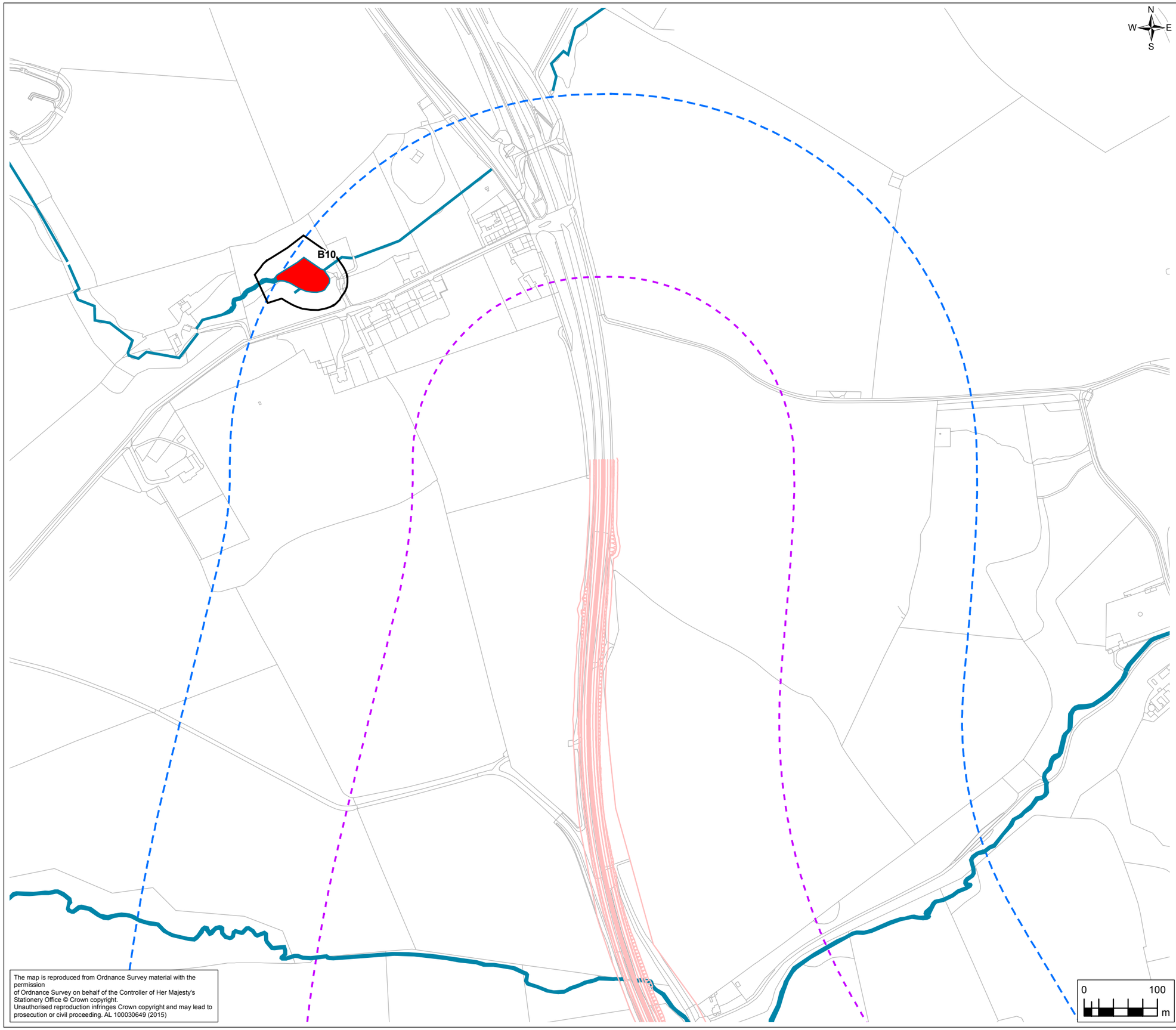

FIGURE 3.2

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

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Sheet 1

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Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_001

FIGURE 3.3

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

N
W E
S

0 100 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 17	Initial Issue	IM	EF	AM	MC

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Jacobs No.	B2104700	
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Drawing No.: B2104700_EC_GCN_SectionB_002

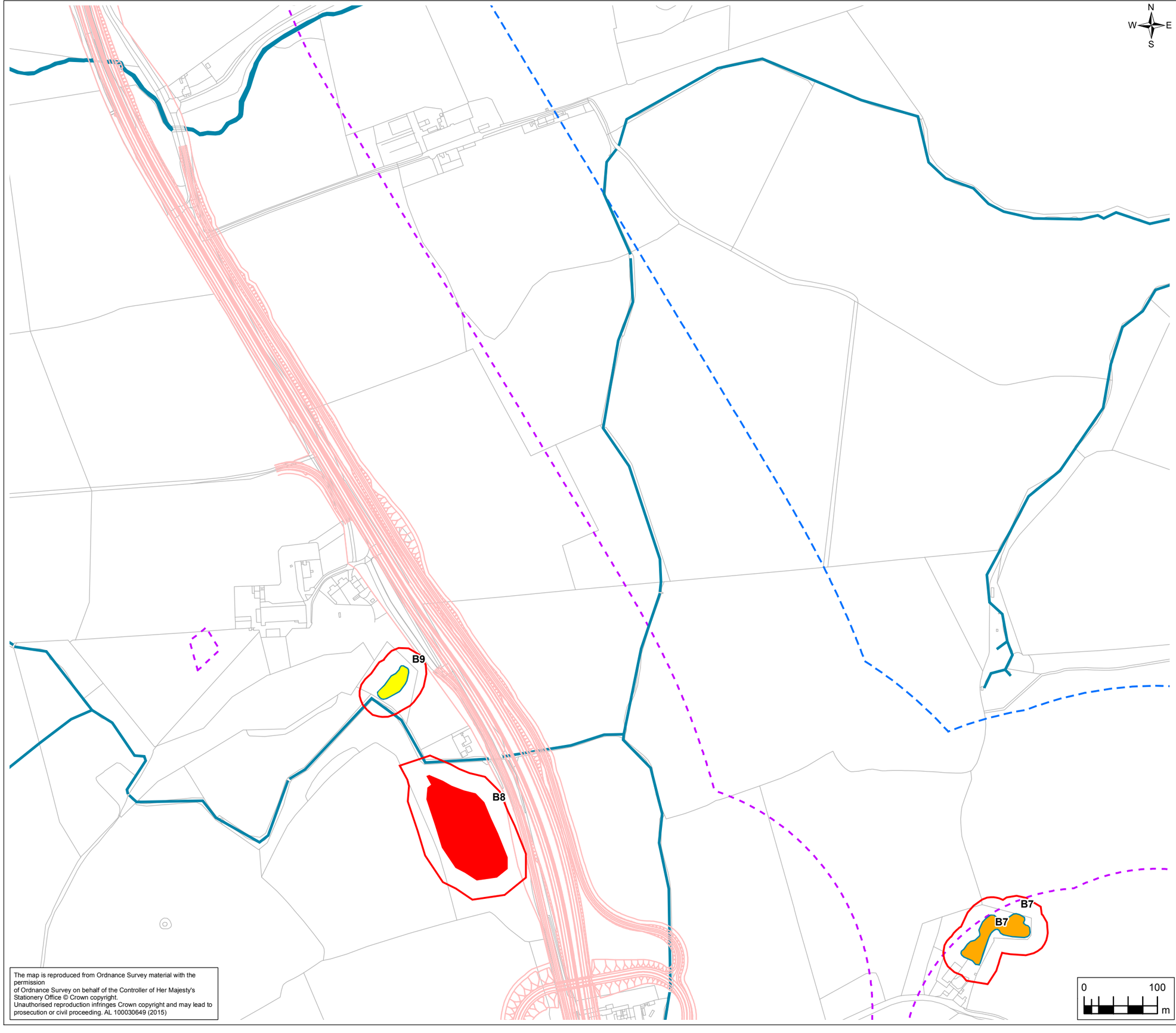

FIGURE 3.4

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Sheet 3

Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No. B2104700_EC_GCN_SectionB_003

FIGURE 3.5

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No. B2104700_EC_GCN_SectionB_004

0 100 m

B7

B7

N
W E
S

0 100 m

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FIGURE 3.6

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Title: SECTION B
GREAT CRESTED NEWTS SURVEY MAP
Sheet 5

Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No. B2104700_EC_GCN_SectionB_005

FIGURE 3.7

B7

B7

B6

N
W E
S

0 100 m

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Sheet 6

Drawing Status

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Client No.		

Drawing No. B2104700_EC_GCN_SectionB_006

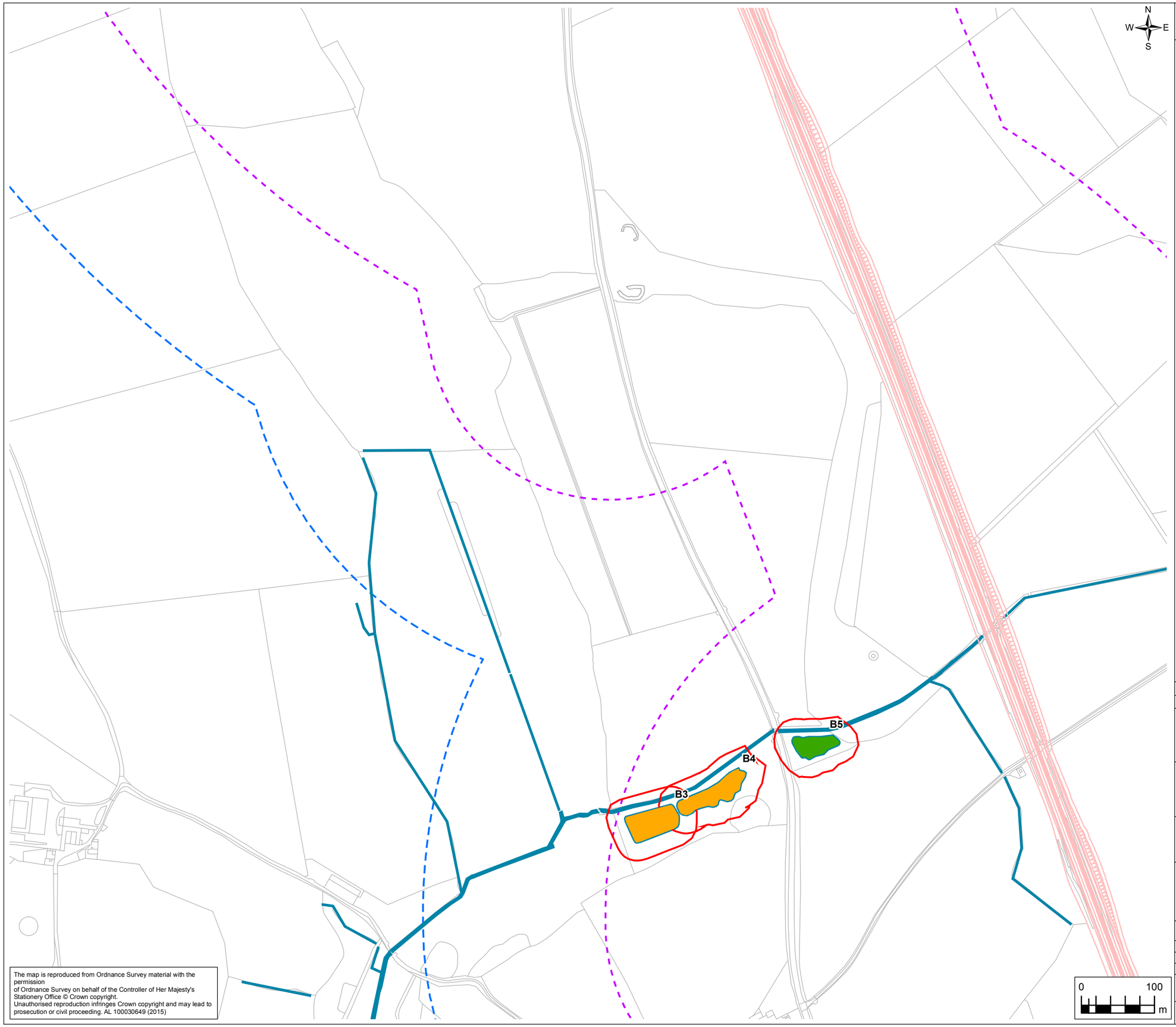

FIGURE 3.8

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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GREAT CRESTED NEWTS SURVEY MAP
Sheet 7

Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_007

FIGURE 3.9

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

0 100 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Status

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Client No.		

Drawing No. B2104700_EC_GCN_SectionB_008

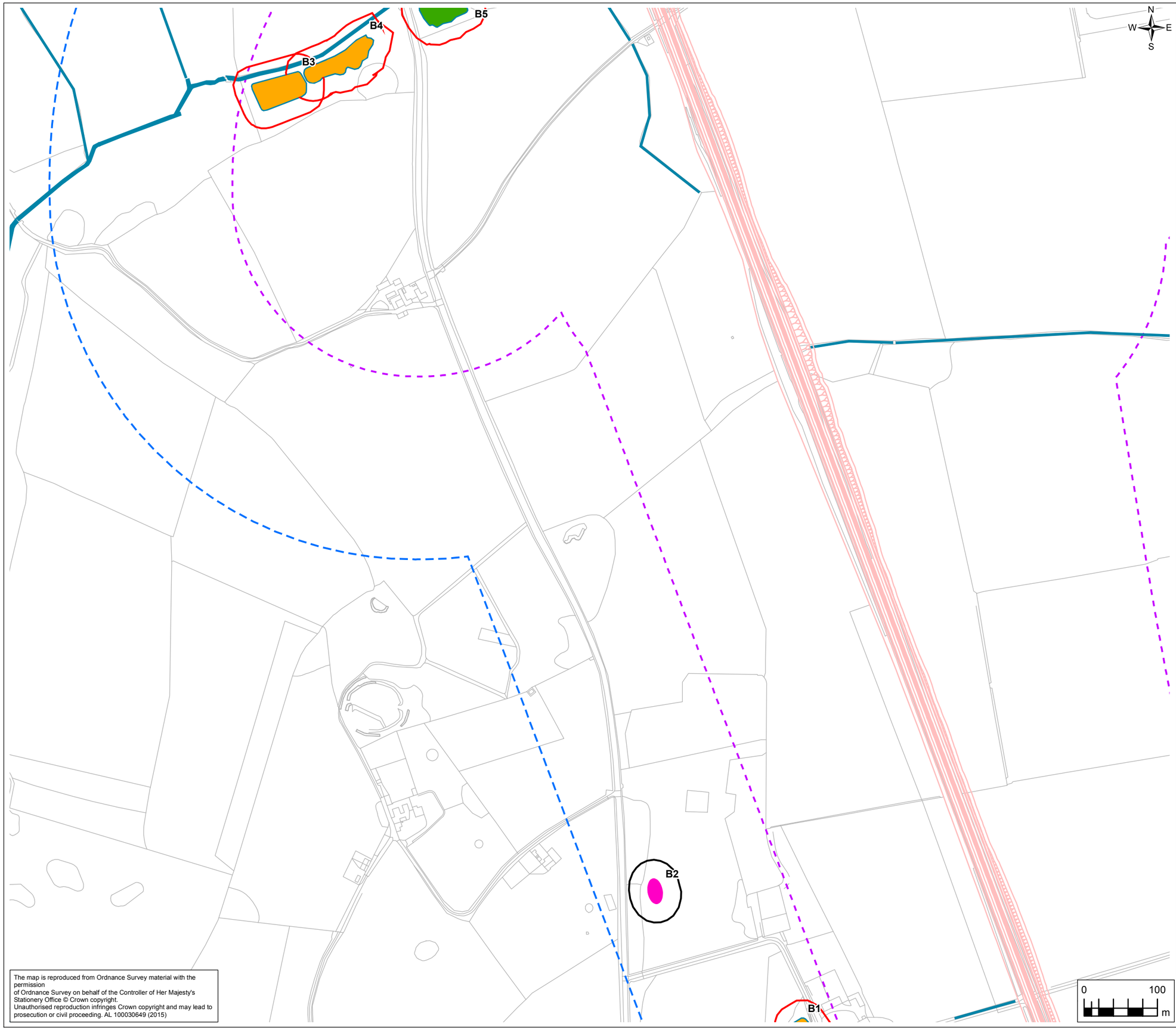

FIGURE 3.10

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Sheet 9

Drawing Status:

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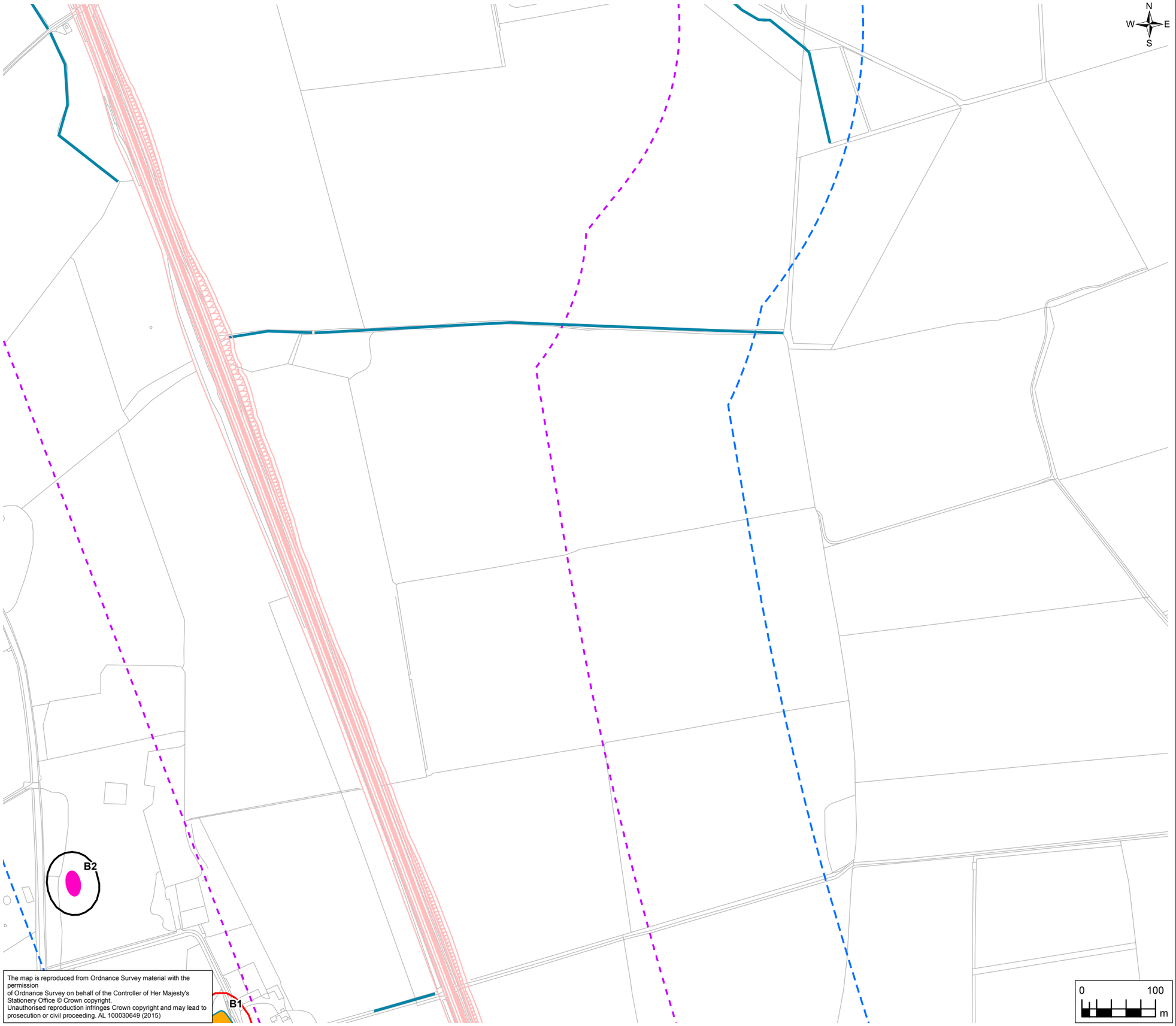
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_009



0 100 m

FIGURE 3.11

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Sheet 10

Drawing Status:

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Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_010

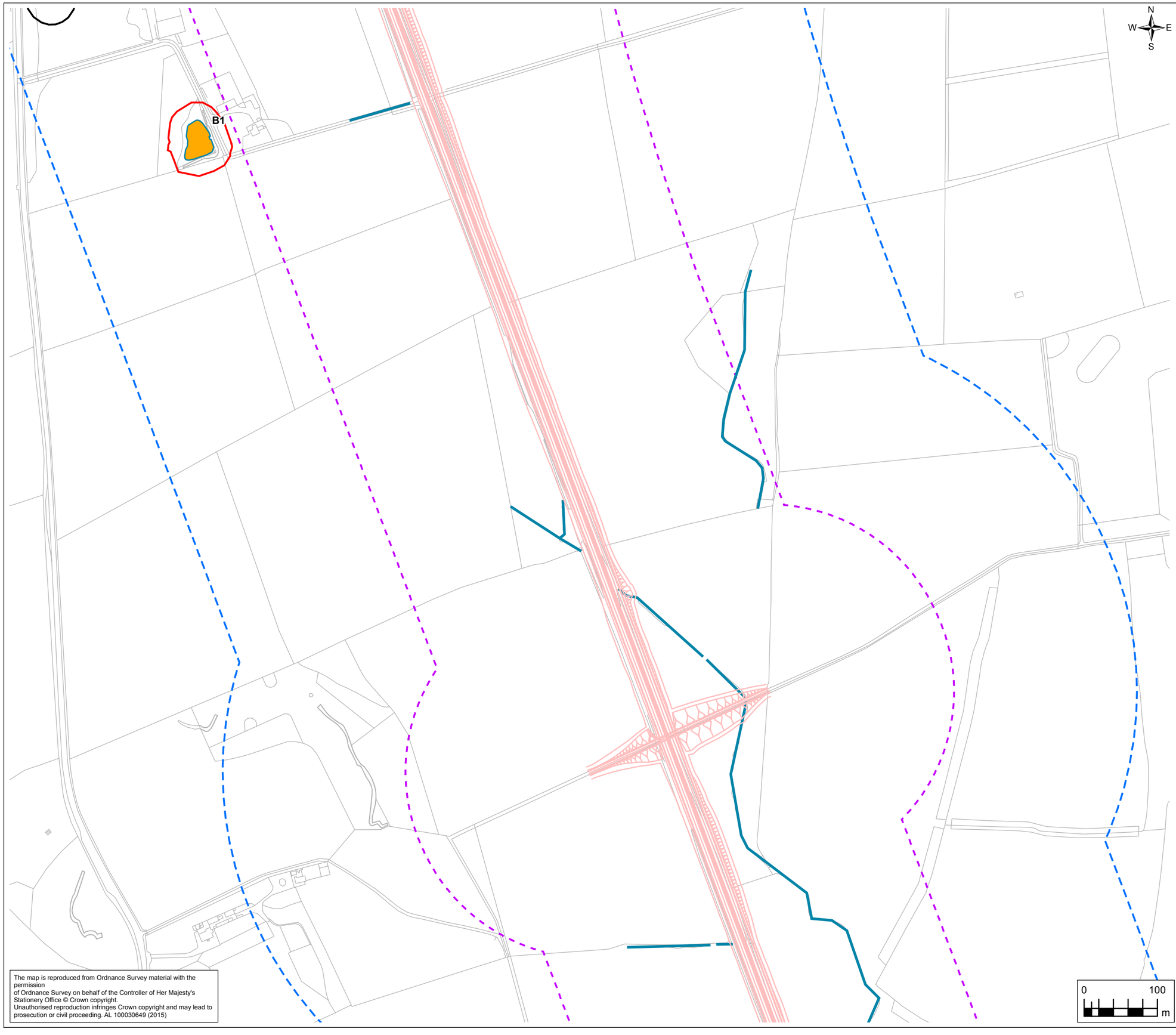

FIGURE 3.12

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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GREAT CRESTED NEWTS SURVEY MAP
Sheet 11

Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_011

FIGURE 3.13

Legend

- Online Option
- 250m Survey Area
- 500m Survey Area
- Waterbody (not surveyed)

HSI Scores

- Excellent
- Good
- Average
- Below Average
- Poor

eDNA Results

- Positive eDNA
- Negative eDNA
- Not surveyed for eDNA

0 100 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 17	Initial Issue	IM	EF	AM	MC

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Drawing Title: SECTION B
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Drawing Status:

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104700_EC_GCN_SectionB_012

APPENDIX A - LEGISLATIVE AND PLANNING CONTEXT

The Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitat and Species Regulations 2010 (as amended)

Great crested newts (GCNs) are fully protected under the Wildlife and Countryside Act 1981 (as amended) (henceforth referred to as the WCA) and The Conservation of Habitats and Species Regulations 2010 (as amended) (henceforth referred to as the Habitats Regulations or Regulations).

The Habitats Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation Regulations.

Under the WCA and the Habitats Regulations it is an offence to:

- deliberately capture, injure or kill any wild animal listed as an EPS;
- deliberately disturb wild animals of any such species in such a way as to be likely to impair their ability:
    - to survive, to breed or reproduce, or to rear or nurture their young; or
    - in the case of animals of a hibernating or migratory species, to hibernate or migrate;
- to affect significantly the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Act concerns biodiversity and states: "*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*."

Section 41 of the NERC Act sates that: "*The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". Common toad, natterjack toad, pool frog and GCN have been listed as 'Species of Principal Importance' under the NERC Act. The list of species can be downloaded from the natural England website at:

http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

The Act stresses that "*it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission*."

APPENDIX B - HSI RESULTS TABLES

Table B1: HSI Survey Results – Section A

Pond #	HSI score	Habitat suitability	Pond description	Grid reference
A1	0.57	Below Average	Pond approximately 10 m x 15 m in size. Surrounded by rank grassland. Aquatic marginal vegetation was absent. A defunct hedge of gorse (*Ulex sp.)* and hawthorn (*Crataegus monogyna*) bordered the pond.	NZ 18874 89427
A2	0.54	Below Average	Small pond located at the end of a watercourse. Habitat suitability evaluated from aerial photography.	NZ 18579 91256
A3	0.79	Good	The pond appeared to be man-made. The pond was silty with tadpoles present. Pond did not appear to be linked to the nearby watercourse.	NZ 18342 91548
A4	0.63	Average	Large pond with no shading and a hedgerow margin. Habitat suitability evaluated from aerial photography.	NZ 17888 91920
A5	0.63	Average	Pond was in a field and appeared to be man-made. Potential water vole (*Arvicola amphibius*) field signs present.	NZ 18718 93714
A6	0.41	Poor	Man-made pond next to motocross track. No macrophytes present and no shade. Fish possibly present. Waterfowl present; two mallard *(Anas platyrhynchos*).	NZ 18581 95238
A7	0.79	Good	Equestrian eventing pond with jumps. Pond was not shaded. There were no macrophytes, fish or wildfowl present. Moderate water quality from field run off.	NZ 17945 96410
A8	0.638	Average	Brick built, steep sided reservoir with outfall. Water quality was poor. The waterbody was rain fed and quite deep. Not suitable for bottle trapping due to steep sides.	NZ 18943 96534
A9	0.52	Below Average	Waterbody was a ditch with standing water. Waterbody was on the edge of woodland.	NZ 18457 96835
A10	0.59	Below Average	Waterbody was a settled ditch with no flow. Within woodland	NZ 18479 96848
A11	0.74	Good	Pond is within golf course. Pond may completely dry sometimes. There were two dry ponds immediately to the north west.	NZ 17649 97025
A12	0.58	Below average	Small pond above A15, banks steep and very muddy. Wildfowl present. May be dangerous for surveyors to enter to bottle trap.	NZ 18083 97099
A13	0.70	Good	Tadpoles present in pond. Pond is fed from land drain and is very silty. Wildfowl	NZ 17834 97104

Pond #	HSI score	Habitat suitability	Pond description	Grid reference
			present and fish presence possible. Surrounding terrestrial habitat is moderate for GCN.	
A14	0.73	Good	Small isolated pond with species-poor marginal vegetation and no apparent aquatic vegetation. The southern section of the pond had a large area of locally dominant common reed (*Phragmities* sp.). No tadpoles were observed at the time of survey though newts (species unknown) and frogs (*Rana temporaria*) have been observed according to the campsite owner's son.	NZ 18074 97116
A15	0.44	Poor	Pond is within holiday park; numerous wildfowl and fishing stations were present.	NZ 18064 97353
A16	0.51	Below Average	Pond was in garden of house, south east of an airfield. Pond formed by leaking septic tank. Bad water quality. Surveyors advised not to enter.	NZ 17937 97867
A17	0.90	Excellent	Moderate water quality. Waterfowl and fish absent, surrounding terrestrial habitat is good.	NZ 17593 98179
A18	0.53	Below Average	Small pond, heavily dominated by water crowfoot (*Ranunculus aquatilis)* soft rush *(Juncus effusus)* at margins and green algae (Species unknown) also present. Pond was approximately 7 m in diameter. The surrounding terrestrial habitat was good for GCN. The pond was not shaded but had moderately good water quality and no signs of fish or wild fowl.	NZ 17099 98657
A19	0.89	Excellent	Pond was approximately 25 m x 30 m in size. Tadpoles and aquatic invertebrates were present. Wild fowl and fish absent. Abundant emergent vegetation included species such as bulrush (*Typha sp.)*, floating sweet grass (*Glyceria fluitans*) and rushes (*Juncus* sp.*)* with willow scrub (*Salix* sp.*)* at pond margins. Surrounding terrestrial woodland habitat was good for GCN.	NU 17328 00008
A20	0.81	Excellent	Algae present. Pond had very shallow margins, with deep silt. The northern part of the pond was shallow and in this area approximately 30 % was inundated with bulrush	NU 16932 00575
A21	0.74	Good	Small pond approximately 8 m x 10 m with side flowering rushes to margins and abundant duckweed (*Lemna minor).* In line with a water channel that flows from west to east and a wet channel that links to A22 and flows west to east.	NU 17083 00523

Pond #	HSI score	Habitat suitability	Pond description	Grid reference
A22	0.48	Poor	Pond had a pinched figure of 8 shape. There were lots of aquatic invertebrates present. Wide and deep margins on northern side; the small part of the pond is to the west. Moorhen (*Gallinula chloropus*), Canada goose (*Branta Canadensis*) and 100+ mallard were present.	NU 18049 00359

Table B2: HSI Survey Results – Section B

Pond	HSI score	Habitat suitability	Pond description	Grid reference
B1	0.64	Average	Pond was approximately 50 m x 40 m in size with patchy marginal vegetation including common reed mace (*Typha latifolia*), soft rush, great willowherb (*Epilobium hirstum*), meadow sweet (*Filipendula ulmaria*) and encroaching grey willow (*Salix cinerea*). Aquatic species included pond weed (*Potamogeton* sp.) and brooklime (*Veronica beccabunga*). The pond was very shallow and it evidently suffered heavily from siltation. Wildfowl present.	NU 18643 17240
B2	0.56	Below Average	Small eutrophic dew pond dominated by floating sweet grass.	NU 18428 17353
B3	0.68	Average	Within a series of ponds, fed by upper pond (B4); grazed by sheep. Wildfowl present but not in large numbers.	NU 17927 18540
B4	0.65	Average	Upper pond of the series; sheep grazing evident.	NU 18020 18578
B5	0.84	Excellent	Pond 60 m x 25 m in size; marginal vegetation included locally frequent yellow flag iris (*Iris pseudocorus)*, soft rush and reed sweet grass. Grazing evident around part of pond.	NU 18153 18643
B6	0.61	Average	Pond surrounded by woodland. Shaded. Habitat suitability evaluated from aerial photography.	NU 19013 20120
B7	0.66	Average	Large (60 m x 40 m) and fairly shallow (20 cm to 1 m); fairly eutrophic ornamental pond, used by domestic ducks and geese. Poor marginal vegetation dominated by nettle (*Urtica dioica*), perennial rye grass (*Lolium perenne*) and cocksfoot (*Dactylis glomerata*). No evident aquatic vegetation. Steep banks on half of perimeter.	NU 18301 20789
B8	0.45	Poor	Large pond formed as a result of run off	NU 17553 20960

Pond	HSI score	Habitat suitability	Pond description	Grid reference
			from surrounding fields; linked to culvert running under A1. Many waders present; little emergent vegetation and no shade.	
B9	0.79	Good	Pond with a small island of marshy grassland and tall ruderal vegetation in the centre. Pond is trappable with care, bank drops off but accessible. Pond is near to a stream to the south but does not appear to be linked.	NU 17452 21127
B10	0.36	Poor	Large pond with central island surrounded by scrub margins and trees. Grassland surrounds. Habitat suitability evaluated from aerial photography.	NU 16604 22938

Table B3 HSI Survey Calculations[11] – Section A

Pond ref.	A1	A2*	A3	A4*	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22
SI1 - Location	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SI2 - Pond area	0.6	0.1	0.85	1	0.6	0.5	1	0.89	0.3	0.67	1	0.67	0.985	0.985	0.8	0.9	0.9	0.02	0.8	0.985	0.55	0.8
SI3 - Pond drying	0.9	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.9	0.9	1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
SI4 - Water quality	0.67	0.3	0.67	0.3	1	0.33	0.67	0.33	0.67	0.33	0.67	1	0.67	0.67	0.67	0.01	0.67	0.67	1	0.67	0.67	0.67
SI4 - Shade	1	1	1	1	1	1	1	1	0.4	0.8	1	1	1	1	1	1	1	1	1	1	1	1
SI6 - Fowl	0.67	0.7	0.67	0.7	0.67	0.01	1	1	1	1	1	1	0.67	0.67	0.01	0.67	1	1	1	0.67	0.67	0.01
SI7 - Fish	0.7	0.7	1	0.3	1	0.7	1	1	1	1	1	1	0.3	0.3	0.3	1	1	1	1	1	1	0.7
SI8 - Ponds	0.1	0.6	0.6	0.6	0.1	0.45	0.75	0.65	0.65	0.65	0.65	0.65	0.65	0.89	0.65	0.6	0.72	0.45	0.65	0.65	0.65	0.65
SI9 - Terr'l habitat	0.67	1	1	0.7	0.33	0.33	0.67	0.67	1	1	1	1	1	1	0.67	1	1	1	1	1	1	1
SI10 - Macrophytes	0.35	0.5	0.35	0.4	0.9	0.9	0.35	0.35	0.9	0.35	0.35	0.35	0.35	0.4	0.35	0.35	0.9	0.35	0.7	0.5	0.35	0.35
HSI	0.58	0.54	0.77	0.63	0.64	0.41	0.80	0.73	0.69	0.72	0.82	0.83	0.70	0.73	0.43	0.51	0.90	0.53	0.89	0.82	0.74	0.49

Table B4 HSI Survey Calculations – Section B

Pond ref.	B1	B2	B3	B4	B5	B6*	B7	B8	B9	B10*
SI1 - Location	1	1	1	1	1	1	1	1	1	1
SI2 - Pond area	0.895	0.02	0.8	0.8	0.925	0.9	0.8	0.8	1	0.9
SI3 - Pond drying	0.9	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
SI4 - Water quality	1	0.67	0.33	0.33	1	0.67	0.67	0.67	0.67	0.67
SI4 - Shade	1	1	1	1	1	1.2	1	1	1	1
SI6 - Fowl	0.67	1	0.67	0.67	0.67	1	1	0.01	1	0.01
SI7 - Fish	0.7	1	0.7	0.7	0.7	0.67	0.3	0.7	1	0.67
SI8 - Ponds	0.1	0.45	0.6	0.6	0.6	0.45	0.45	0.45	0.45	0.45
SI9 - Terr'l habitat	1	1	1	0.67	1	0.67	0.67	0.67	1	0.07
SI10 - Macrophytes	0.35	1	0.35	0.35	0.8	0.3	0.35	0.35	0.35	0.35
HSI	0.65	0.56	0.69	0.66	0.85	0.61	0.66	0.45	0.79	0.36

[11] Natural England (2015) Great Crested Newt Method Statement for EPS licence application

APPENDIX C – ENVIRONMENTAL DNA LABORATORY REPORTS

NatureMetrics
DNA based monitoring

Report: 16049-Jac28AM-2

Great Crested Newt eDNA Results

Company:	Jacobs UK
Address:	1 City Walk, Leeds, LS11 9DX
Contact:	Andy McIlwraith
Project No:	B2104700
Date of Report:	21 May 2016
Number of samples:	9

Thank you for sending your samples for analysis by NatureMetrics. Your samples have been processed in accordance with the protocol set out in Appendix 5 of Biggs *et al*. (2014).

DNA was precipitated via centrifugation at 14,000g and then extracted using Qiagen Blood and Tissue extraction kits.

qPCR amplification was carried out in 12 replicates per sample using the primers and probe described by Biggs *et al*. (2014) in the presence of both positive and negative controls.

Results indicate GCN presence in 1 sample (GCN000846 – A8) and GCN absence in all other samples. No DNA degradation or PCR inhibition was detected in any sample, and all controls performed as expected.

eDNA score gives the number of replicates (out of 12) that tested positive for GCN. This should not be interpreted as a measure of population size. Note that a negative result does not preclude the presence of Great Crested Newts at a level below the limits of detection.

NatureMetrics
DNA based monitoring

Sample	Pond ID	Date arrived	GCN Status	eDNA Score	Inhibition	Degradation
GCN000853	A1	25/04/2016	Negative	0/12	No	No
GCN000838	A2	25/04/2016	Negative	0/12	No	No
GCN000852	A3	25/04/2016	Negative	0/12	No	No
GCN000831	A4	25/04/2016	Negative	0/12	No	No
GCN000847	A5	25/04/2016	Negative	0/12	No	No
GCN000833	A6	25/04/2016	Negative	0/12	No	No
GCN000848	A7	25/04/2016	Negative	0/12	No	No
GCN000846	A8	25/04/2016	Positive	1/12	No	No
GCN000849	A9	25/04/2016	Negative	0/12	No	No
GCN000834	A10	25/04/2016	Negative	0/12	No	No
GCN000861	A11	25/04/2016	Negative	0/12	No	No
GCN000845	A12	25/04/2016	Negative	0/12	No	No
GCN000854	A13	25/04/2016	Negative	0/12	No	No
GCN000842	A14	25/04/2016	Negative	0/12	No	No
GCN000844	A15	25/04/2016	Negative	0/12	No	No
GCN000843	B2	25/04/2016	Negative	0/12	No	No
GCN000860	B3	25/04/2016	Negative	0/12	No	No
GCN000840	B4	25/04/2016	Negative	0/12	No	No
GCN000857	B5	25/04/2016	Negative	0/12	No	No
GCN000856	B6	25/04/2016	Negative	0/12	No	No
GCN000830	B7	25/04/2016	Negative	0/12	No	No
GCN000839	B8	25/04/2016	Negative	0/12	No	No

APPENDIX D - POND PHOTOS

Pond A1

Pond A3

Pond A9

Pond A11

Pond A12

Pond A21

Pond A22

Pond A23

Pond B8

Pond B9

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If you have any enquiries about this document A1inNorthumberland@highwaysengland.co.uk or call **0300 470 4580***.

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