



Oxford Flood Alleviation Scheme

Reptile Survey

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Executive Summary

This report presents the results of an updated reptile survey for the proposed Oxford Flood Alleviation Scheme (OFAS), Oxford, along with providing a preliminary assessment of the potential impact of the scheme on reptiles. These surveys were conducted during April, May and September 2020.

Surveys followed the industry recognised methodology, for recording reptile presence/absence, and resurveyed many of the same locations that were first surveyed in 2015 and then 2016, 2017 & 2018, as well as a small number of locations where access had previously been denied. These areas were determined according to the habitats present within the study site, which includes all proposed working areas and potential site compounds.

In total, 29 sites were surveyed; 14 in April/May (Spring), and 15 in September (Autumn).

Spring surveys identified a single site with a low population of grass snake.

Autumn surveys identified four sites with a low population of grass snake. Anecdotal evidence from a landowner suggested a low population of slow worm in close proximity to the scheme's boundary.

Incidental records included; a single shed reptile skin (one site in spring), a moderate local population of smooth newts (one site in Autumn), and a moderate local population of common toads (two sites in Autumn).

Impacts of the scheme, along with suggestions for mitigation are presented. In conclusion, as the reptile survey suggests that the population of reptiles throughout the study area is relatively small, it can be assumed that with the implementation of construction best practices and targeted mitigation, the proposed scheme could be implemented without significant adverse ecological impacts.

1. Introduction

1.1 Background

The Environment Agency, together with their local partners, are proposing a flood alleviation scheme (FAS), which comprises a combination of modifications to existing channels, together with the construction of a new two-stage channel and new flood defences, to move flood water away from developed areas and reduce the frequency of flooding over the next 100 years, for which a planning application was submitted in 2018 for the scheme. Since submission of the original planning application for the Oxford FAS (which has now been withdrawn), the Environment Agency are now pursuing some changes to the scheme, which may affect the scheme boundary.

Consequently, Jacobs has been commissioned by the Environment Agency to undertake a reptile survey within the footprint of the updated scheme boundary, as well as additional areas that may be considered part of potential future planning applications for the scheme. Updated data is also required as the reptile surveys are now over two years old.

The need for a reptile survey was recommended following a walkover over the site (Jacobs, 2020), which identified the need for more detailed ecological surveys, to inform an Environmental Impact Assessment.

The aim of this survey is to note any potential changes in protected species activity and to establish how any changes to the scheme will affect the local biodiversity.

1.2 Objectives

The purpose of this report is to:

- present the results of the reptile presence/absence survey, which was undertaken in suitable areas of habitat within the site likely to be affected by the Oxford FAS Scheme;
- provide a preliminary assessment of the potential impacts of the proposed Scheme on reptiles; and
- recommend appropriate mitigation measures and opportunities for enhancement.

1.3 Report Structure

The report is structured as follows:

- Section 2 - Methodology. This section summarises the methodology used for undertaking the desk study and field survey. In addition, it describes the basis for the evaluation of ecological features;
- Section 3 - Legislation. This section sets out the legislative framework for reptiles and informs the recommendations set out in Section 5.
- Section 4 - Survey results. This section describes the findings of the results of the survey with respect to reptiles, including any other noted features; and
- Section 5 - Evaluation and Recommendations. This section sets out the conclusions and recommendations of the reptile assessment in relation to relevant legislation and nature conservation strategies.

2. Methodology

2.1 Desk Study

A desk study was carried out as part of the Ecological Appraisals (CH2M, 2015 & 2016), in which records of protected species, including reptile, were provided by Thames Valley Environmental Records Centre (TVERC) in 2014 and 2015.

These records, along with the following data sources were consulted to locate records of reptiles and suitable habitat within and adjacent to the proposed working area:

- Ordnance survey maps; and

- Multi-Agency Geographic Information for the Countryside website (MAGIC).

Understanding nature conservation issues and historic records within the wider area helps in the assessment of the ecological value of a site and the habitats and species that a site supports.

2.2 Reptile Presence/Absence Survey Methodology

The locations surveyed in 2020 were a combination of previously surveyed locations (either within the Ecological Appraisal Reports (CH2M, 2015 & 2016) or the Survey of Additional Sites (CH2M, 2017 & 2018)), or within areas recently added into the Scheme which were classed as having potential to support reptile populations. All survey locations were within the red line boundary, which can be found in Appendix A (Figure 1).

The scheme area was divided into two separate reptile survey areas; to the north Spring surveys (April and May) and to the south Autumn (September), as due to the size of the scheme there were not sufficient ecologists to survey the whole area in spring with Covid-19 restrictions.

Spring surveys consisted of 14 sites to the north of the study area, which had been previously identified as having potential for reptiles. These were given a reference letter from 1A to 1N. Autumn surveys consisted of 15 sites to the south of the study area which were given a reference letter from 2A to 2N. These sites are shown on Appendix A (Figure 2). The number of refugia placed in each site are given in the respective tables in sections 4.2 and 4.3.

Surveys were undertaken by experienced ecologists in accordance with the methodologies set out in Gent & Gibson (2003), Froglife (1999) and best practice. Artificial refugia consisting of 50 centimetres (cm) x 50 cm of roofing felt were used. The dark material of the roofing felt absorbs heat and becomes an attractive spot for cold-blooded reptiles to shelter underneath and warm or to bask. The refugia were placed on site and left for a minimum of seven days before the presence/ absence survey began. This allows time for the refugia to 'bed-in' and for reptiles in the area to locate them. Guidance recommends a density of five to ten refugia per hectare (Froglife, 1999). To maximise the chances of recording reptiles, this number was increased.

Once the refugia are established a minimum of seven survey visits are recommended at each location in order to determine if reptiles are present or likely absent from that site. Peak survey months for undertaking reptile presence/absence surveys are April, May and September. A survey is usually undertaken within one season. The length of time the refugia is left on site is minimised where possible, to avoid the refugia from being moved, vandalised, lost within vegetation and from causing any issues with livestock. The date, weather conditions, air temperature, age class and sex of reptiles (if easily determined) were recorded during each visit. All visits were undertaken when the air temperature was in excess of 9°C but less than 23°C. No visits were undertaken during periods of heavy or prolonged rain.

2.3 Limitations

The majority of the survey sites contained habitat that was suitable for reptiles, however, as a number of these areas supported a high number of refuge and/or basking locations, it is possible that reptiles were using these instead of utilising the refugia placed as part of the survey.

During the period of surveying, a number of tiles went missing, or were moved, from all of the sites. These were replaced, where possible, to continue surveying. However, the disruption in location and 'bedding in time' will potentially have had an effect on reptile numbers recorded.

The recommendations made within this report take full account of these limitations.

All work carried out in preparing this report is based upon Jacob's current professional knowledge and understanding of current relevant UK standards, best practice and legislation. Any changes to legislation and guidance that may occur in the future could lead to a review of the recommendations made in this report.

2.4 Evaluation

The ecological value of the reptiles present has been determined based on the guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). The value of specific ecological receptors was assigned using a geographic frame of reference, i.e. international value being

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most important, then national, regional, county, district, local and lastly, within the immediate zone of influence of the scheme area only.

The evaluation was made using a variety of characteristics, including the rarity of populations, either locally or within a wider area, the vulnerability of species (for example, to disturbance or fragmentation from other populations), and statutory recognition of biodiversity importance through inclusion in local or national biodiversity action plans. Note that legal protection is not, in itself, a consideration in the evaluation of species.

3. Legislation

3.1 Legislation Framework

The four widespread reptile species most likely to inhabit the Oxford FAS area are:

- common lizard *Zootoca vivipara*;
- slow-worm *Anguis fragilis*;
- grass snake *Natrix natrix*; and
- adder *Vipera berus*.

These species are listed in Schedule 5 of the Wildlife and Countryside Act (WCA) 1981 (as amended). This makes it an offence to intentionally, or recklessly, kill or injure any of the above species, and/or sell, or attempt to sell, any part of the species, alive or dead. The Countryside and Rights of Way (CROW) Act 2000 strengthened the legal protection for threatened species by introducing a new offence of 'reckless' disturbance, which could be 'arrestable' and punishable by fines. Therefore, all reasonable measures need to be taken to avoid incidental killing or injury to reptiles during development operations.

Sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca* are unlikely to be present within the FAS area due to the habitat not being suitable for these species and well outside their known UK range. These species have full protection under the WCA 1981 (as amended) and the Conservation (Natural Habitats) Regulations 1994 (as amended).

Common lizard, slow-worm, grass snake, adder, sand lizard and smooth snake are included under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 as species of principal importance for conserving biodiversity in England. Under this Act, all local and public authorities in England and Wales have a duty to promote and enhance biodiversity in all of their functions.

Where relevant, this reptile survey takes account of the legislative protection afforded to specific species.

4. Survey results

4.1 Context

The scheme was divided into two and were surveyed for reptiles:

- Spring surveys were located to the north of Botley road and through North Hinksey (central OSGR: SP 50016 05580). Survey sites comprised large areas of scrub and ruderal vegetation and, in parts, were bordered by a waterway. North Hinksey was a large collection of poor, semi-improved agricultural fields, surrounded by a combination of either scrub or tall herb and fern ruderal hedgerows.
- Autumn surveys were located in South Hinksey and to the south, through to New Hinksey and Kennington (central OSGR: SP 51430 04204). Survey sites comprised primarily of scrub and ruderal vegetation, but separated by woodland, amenity grassland and residential properties.

All of these habitat features have potential to support widespread reptile species. However, it is important to consider that large sections of the area regularly flood which can make them unsuitable for most reptile species during times of spate.

There are many records (TVERC 2014 & 2015) of reptiles within the wider Oxford area, with three species of reptile; common lizard, grass snake and slow-worm. However, none of these records were from the sites surveyed in this report but were within the scheme boundary.

4.2 Spring Survey

Reptile refugia locations and survey results are mapped and presented in Appendix A. Information on the ecology of reptiles is given in Appendix B Reptile Ecology.

Table 4.1 gives the site number and location name, number of artificial refugia placed, and a brief description of the area. Survey results are presented in Table 4.2 Spring reptile presence/absence survey results.

Results were from observations and from checking the artificial and any pre-existing refugia (i.e. pieces of wood and corrugated metal) present within the survey sites.

Further recommendations for reptiles are made in Section 5.

Table 4.1 Spring reptile survey sites and number of refugia

Survey Site & Location Name	Number of Refugia*	Habitat
1A	19	Rough, grassland with many tussocks and carried sward heights, tall ruderal and scrubby edges.
1B	14	Arable field with sunny, scrubby embankment along the edges and tall ruderal along the field margins.
1C	10	Tall herb, rough grassland and scrub.
1D	31	Semi-improved meadow with ruderal vegetation along the banks of the streams. Good sunny interface habitat for reptiles along the watercourse on northern and eastern boundaries of the field.
1E	17	Semi improved field with scrubby and rough sunny edges dominated by bramble <i>Rubus sp.</i> .
1F	40	Rough grassland north of Botley Road with sunny edges dominated by dense strands of bramble. Bordered by Bulstake stream to the north, allotments to the east and grassland to the west.
1G	3	Small area of grassland, bordered by laid hedgerow and stands of ruderal vegetation along the margins, dominated by nettle <i>Urtica dioica</i> .
1H	20	Area of tall herb dominated by meadowsweet <i>Filipendula ulmaria</i> with stands of dense scrub and scattered scrub with fringing tall ruderal.
1I	11	Northern extent of Osney Meadows with southern facing exposures along blackthorn <i>Prunus spinosa</i> dominated hedgerow. Tiles disappeared (unauthorized removal) after three survey checks and were not replaced.
1J	20	Rough grassland field with tall ruderal and woodland edge habitat all around the margins.
1K	15	Field with rough grassland and scrubby edges, bordered by woodland with tall herb ground vegetation. Field bordered by Bulstake stream to the east.
1L	30	Rough grassland with fence along field margins. Trees, scrub and ruderal vegetation along fence line.
1M	15	Rough grassland with scrub and tall ruderal around the field margins. Common reed <i>Phragmites australis</i> dominant along Hogacre ditch.
1N	12	Hedgerow bordering meadows with sunny southern exposure and ruderal vegetation.

* Initial number of refugia, these required 'topping up' during the survey period.

Table 4.2: Spring reptile presence/absence survey results

Date	27/04/20	05/05/20	07/05/20	12/05/20	14/05/20	22/05/20	29/05/20
Temperature	11	12		12		17	18
Weather	Cloudy with a slight breeze	Sunny spells with slight wind.	Clear skies, slight wind.	Cloudy with moderate wind.	Cloudy but calm	Cloudy but calm	Sunny and still
Site 1A	-	-	-	-	-	-	-
Site 1B	-	-	-	-	-	-	-
Site 1C	-	-	-	-	-	-	-
Site 1D	-	-	-	-	-	-	-
Site 1E	-	-	*	-	-	-	-
Site 1F	-	-	-	-	-	-	-
Site 1G	-	-	-	-	-	-	-
Site 1H	-	-	-	-	-	-	-
Site 1I	-	-	-	X	X	X	X
Site 1J	-	-	-	-	-	-	-
Site 1K	-	-	-	-	-	-	-
Site 1L	-	-	-	-	-	-	-
Site 1M	-	-	-	-	-	-	-
Site 1N	-	Adult Grass snake	-	Adult Grass snake	Adult Grass snake	-	-

X = Surveys not undertaken- high disturbance and all but two tiles removed.

* =Snakeskin recovered from beneath tile



Photo 1: Reptile skin found at Site 1E (07/05/2020)

4.3 Autumn Survey

Reptile refugia locations and survey results are mapped and presented in Appendix A. Information on the ecology of reptiles is given in Appendix B Reptile Ecology.

Table 4.3 gives the site number and location name, number of artificial refugia placed, and a brief description of the area. Survey results are presented in Table 4.4 Autumn reptile presence/absence survey results.

Results were from observations and from checking the artificial and any pre-existing refugia (i.e. pieces of wood and corrugated metal) present within the survey sites.

Further recommendations for reptiles are made in Section 5.

Table 4.3 Autumn reptile survey sites and number of refugia

Survey Site & Location Name	Number of Refugia*	Habitat
2A	10	A small lane between Whitehouse Road and the train tracks, bordered by a sports field, a playschool and a small amount of woodland. Surrounded in amenity grassland but with field boundaries consisting of small clumps of woodland with scrub (bramble) ground flora.
2B	10	The southern edge of Hinksey Park. Reptile mats were placed between the amenity grassland and the vegetative border – comprising a long, mature, hedgerow (primarily laurel).
2C	10	Located east of Abingdon Road, this site lies in adjacent and north of the Spires Hotel. Surrounded in mature scattered trees, the site primarily comprises of mostly ruderal vegetation (mostly nettle species), though some areas of sun-spots were noted providing potential basking areas for reptiles.
2D	10	The northern point of a livestock field used for grazing horses.

		Reptile tiles were placed next to the scrub habitat (mostly bramble and thistle), surrounded by mixed trees. Vegetation was kept short through grazing and fresh signs of livestock usage were recorded during each visit.
2E	20	Southern point of the scheme. A field primarily of ruderal scrub (bramble, nettles and thistles), located between an A-road and a waterbody. Field to the immediate north was overgrown thick ruderal (bramble: no access).
2F	10	This site lies adjacent and south of the A423 and east of Kennington Road. This site consists mostly of ruderal and scrub vegetation (mostly nettle and thistle) with a few individual scattered trees spread throughout the site. The site contains numerous basking areas for reptiles.
2G	10	The north bordering field boundary between a grazed field (horses) and private gardens. Field boundary was thick brambles, with numerous opportunities for basking reptiles.
2H	10	The edge of an agricultural field in South Hinksey. These tiles were placed to the north of a large fallow field, comprising mostly of tall grass and herbs, which bordered tall, established woodland. Tiles were placed on the edge of these habitats in sun-spots, away from the unofficial pathway.
2I	10	The edge of an agricultural field in South Hinksey. Half of these tiles were on the edge of an agricultural field, which had a crop for the majority of the surveys but was harvested the day before tile retrieval. The second half were between a public accessed path and scrub, comprising of nettles and tall grass species. Both of these areas were exposed to direct sunlight throughout the survey period.
2J	11	Along an access track between the Devil's backbone and the bottom of a pylon. The track was slightly elevated, a previous flood alleviation bank constructed with concrete. The field to the southwest was overgrown with a fallow tall grass species and small clumps of bramble. This access track was one long sun-spot.
2K	10	Along the edge of a fallowed field, between the tall grass species (with occasional thistle growth) and the bramble/nettle bordering vegetation. Tiles were placed along the western edge of the field, close to an unofficial path which runs north to south. Edge of scrub is exposed to direct sunlight throughout the survey period.
2L	10	The edge of a grass field, along the field boundary under a large, established laurel hedgerow (with singular trees). The field comprised of a tall grass species with established routes snaking through the middle. Area was exposed to direct sunlight throughout the survey period.
2M	10	West side of the Kennington Road nature reserve. Due to ongoing ground investigation surveys being conducted on site, tile placement was restricted to immediately within the nature reserve. Tiles were placed along the edge of the path, bordered by scrub habitat (brambles) and/or close to under the tree canopy. Some of the

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		tiles were moved to the other side of the track after two surveys to be in direct sunlight.
2N	10	East side of the Kennington Road nature reserve. Due to ongoing ground investigation surveys being conducted on site, tile placement was restricted to immediately within the nature reserve. Tiles were placed on either side of the path, bordered by scrub habitat (brambles) and tree canopy.
2O	10	The edge of an agricultural field in South Hinksey. These tiles were placed to the north of a large fallow field, comprising mostly of tall grass and herbs, which bordered a woody field boundary with an established understory of bramble. Tiles were placed on the edge of these habitats in sun-spots, away from the unofficial pathway.

* Initial number of refugia, these required 'topping up' during the survey period.

Table 4.4: Autumn reptile presence/absence survey results

Date	01/09/20	03/09/20	07/09/20	09/09/20	11/09/20	14/09/20	16/09/20
Temperature	15	19	18	18	14	16	20
Weather	Patchy cloud	Cloudy turning into showers	Cloudy	Cloudy	Scattered Cloud	Sunny & clear	Bright & sunny
Site 2A	-	-	-	-	-	-	-
Site 2B	-	-	-	-	-	-	-
Site 2C	-	Juvenile Grass snake	-	-	-	-	-
Site 2D	-	-	-	-	-	-	-
Site 2E	-	-	2x Adult Grass snake	-	-	-	-
Site 2F	-	-	-	-	-	-	-
Site 2G	-	-	*	-	-	-	-
Site 2H	-	-	-	-	-	-	-
Site 2I	-	-	-	-	-	-	-
Site 2J	-	-	Juvenile Grass snake	Juvenile Grass snake	Juvenile Grass snake	Juvenile Grass snake	-
Site 2K	-	-	-	-	-	-	-
Site 2L	-	-	-	-	-	-	-
Site 2M	-	-	-	-	-	-	-
Site 2N	-	-	-	Adult Grass snake	Adult Grass snake	Adult Grass snake	-
Site 2O	-	-	-	-	-	-	-

*Anecdotal evidence from landowner on the other side of the field boundary that slow worms were 'regularly seen'

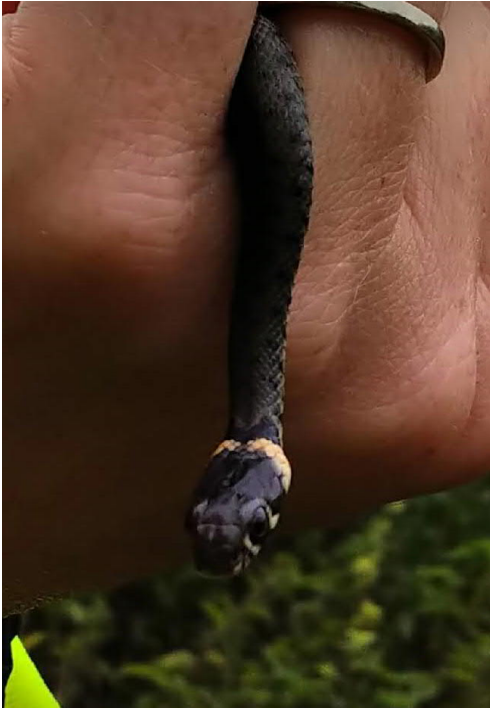


Photo 2: Juvenile Grass snake from Site 2C (03/09/2020)

5. Evaluations and Recommendations

5.1 Discussion

In total, grass snakes were recorded at four out of 29 survey locations for 2020, throughout the red line boundary for OFAS. A maximum number of two grass snakes were recorded per visit (per site), suggesting that the reptile population is low in these areas.

One of the locations (2C) which returned a positive grass snake result during 2020 is the same location that returned a positive grass snake during the surveys of 2018.

A single snakeskin was found during one of the spring surveys at a single location (1E), but no further signs of reptile occupation were made. This site was surveyed in 2017 but returned no results. As a cautious response, this location also should be recorded as having a low reptile population present.

Anecdotal evidence, from a local resident, mentioned the occurrence of slow worms at a single location (2G) during the autumn surveys. Similar to above, as a cautious response, this location should also be recorded as having a low reptile population present.

Grass snakes are strong swimmers and can often be found close to freshwater hunting for prey. However, although grass snakes seem to be well adapted to freshwater, they need to hibernate in winter, typically underground, in areas that are not subject to freezing or water logging. These factors are likely to influence their presence within flood plains.

Although low numbers of reptiles were recorded, these six sites are suitable for reptile species with variable vegetation structure and good connectivity, although the areas are regularly used by members of the public, particularly dog walkers, which may deter reptiles from the site periphery where the survey was focussed/could access. There were also many opportunities and numerous existing natural refugia where reptiles could seek shelter. The existence of natural refugia can make it harder to detect reptiles using survey refugia. As these sites are subject to frequent flooding it is likely that if a reptile population were to be present it is most likely in very low numbers.

Considering the habitat, its connectivity, potential reptile receptors, and that the reptile population is considered to be low within the scheme boundary, the ecological value of the reptile's present has been determined as within the immediate zone of influence of the scheme area only.

5.2 Impacts

In the absence of mitigation, there is a potential for the Scheme to have a negative impact on the local reptile population, especially in areas that currently do not flood frequently. Areas that do not flood are likely to have a higher reptile population than areas that do.

During the construction phase, there are likely to be temporary direct impacts (mortality) on individuals during vegetation removal, excavations and driving machinery as well as indirect impacts from loss of habitat connectivity and a reduction of suitable foraging, shelter and hibernation habitat.

However, the longer-term impacts during the operation phase will be dependent on the amount of connective habitat removed. It is considered that the reptile population would recover if sufficient habitat connectivity was maintained.

5.3 Other Species

During the course of surveying for reptiles, a number of other taxa were recorded, primarily smooth newts and common toads (Table C.1, Appendix C). Both smooth newts and common toads are listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to intentionally, or recklessly, kill or injure this species, and/or sell, or attempt to sell, any part of these species, alive or dead. Common toads are also a listed priority species under the Natural Environment and Rural Communities (NERC) Act (2006). Under the NERC Act, all local and public authorities in England and Wales have a duty to promote and enhance biodiversity in all their functions.

Most sites (2C, 2D & 2G) where other species were recorded returned a small number (<5) of individuals. However, two sites returned a large number of individuals which were; 2A, recording 15 toads, and 2B, recording 34 smooth newts and 50 common toads. These two locations should be classed as having a moderate local population of these species and managed accordingly during construction.

Negative impacts from the scheme are likely to arise through permanent loss of terrestrial habitats used by both smooth newts and common toads. Mitigation measures put in place for other species (primarily great crested newts and grass snakes) are likely to benefit the smooth newts and toads.

A small number of mammal species were recorded using the reptile mats, however identification to a species were not possible before they ran away, out of sight. Based on the numbers, the scheme is unlikely to have a negative impact on any local mammal populations. Standard construction best practices will help mitigate against accidental trapping, injuring or killing of these species.

A single incidental record of a signal crayfish *Pacifastacus leniusculus* was recorded on the 3rd September, in the river of Hinksey Park. This invasive species is assumed within the waterways, however this sighting confirms their presence within this scheme.

5.4 Recommendations and Mitigation

The following section describes mitigation that should be considered to reduce and/or avoid potential adverse impacts on reptiles from site preparation and construction works, to ensure that the project complies with current legislation.

Widespread reptile species receive a limited degree of protection in the UK under the WCA 1981 (as amended). Reptiles likely to use the site (e.g. grass snake, common lizard and slow-worm) are protected against killing, injury and sale.

General recommendations for mitigation are listed below:

- During the winter months before works commence, whilst reptiles are in hibernation, a programme of grass and ruderal strimming should be undertaken by hand, at locations where reptiles and amphibians were recorded, so vegetation is as close as possible to ground level. The vegetation should be maintained at this height up to and throughout the construction process. This will act to deter reptiles from using the proposed working area footprint.
- When creating unsuitable habitat to deter reptiles, enough suitable habitat and connectivity should be kept providing reptiles with adequate shelter, hibernation and foraging habitat. This will be determined by a qualified ecologist with good working knowledge and experience of UK reptiles.
- Any works with a potential to impact upon reptiles' hibernation sites (i.e. works to hedgerows, mature tree roots, log piles or other hibernacula features) should be assessed and potentially supervised by an ecologist and should only be undertaken in the summer months when reptiles are active.
- In areas, not currently subject to flooding, that become flooded as a result of the scheme, additional mitigation such as removal of hibernation features may be required.

There is potential for small numbers of reptiles, or amphibians, to be found during construction. Translocation of found individuals are not considered appropriate mitigation for this scheme. Natural dispersal will be used, encouraging reptiles out of potential harm with a minimal of handling. If this is not appropriate, such as a long distance to safety or surrounded by works, a number of refuges located in adjacent unaffected habitat will need to be identified, so found individuals can be moved to these safe locations.

5.5 Conclusion

The results of the reptile survey suggest that the population of reptiles throughout the study area is relatively small. Locally low numbers of grass snakes and a smaller population of slow worms, are likely to be present across the wider scheme.

It is considered that the proposed scheme could be implemented without significant adverse ecological impacts; will not be detrimental to the conservation status of reptiles; and will be in accordance with relevant legislation and planning policy. This conclusion assumes adoption of the recommendations set out above in relation to avoiding or mitigating for potential impacts to reptile species, taking into account the importance of carrying out certain tasks at the appropriate time of year.

6. References

CH2M (2015). *Oxford Flood Alleviation Scheme Ecological Appraisal*. Environment Agency

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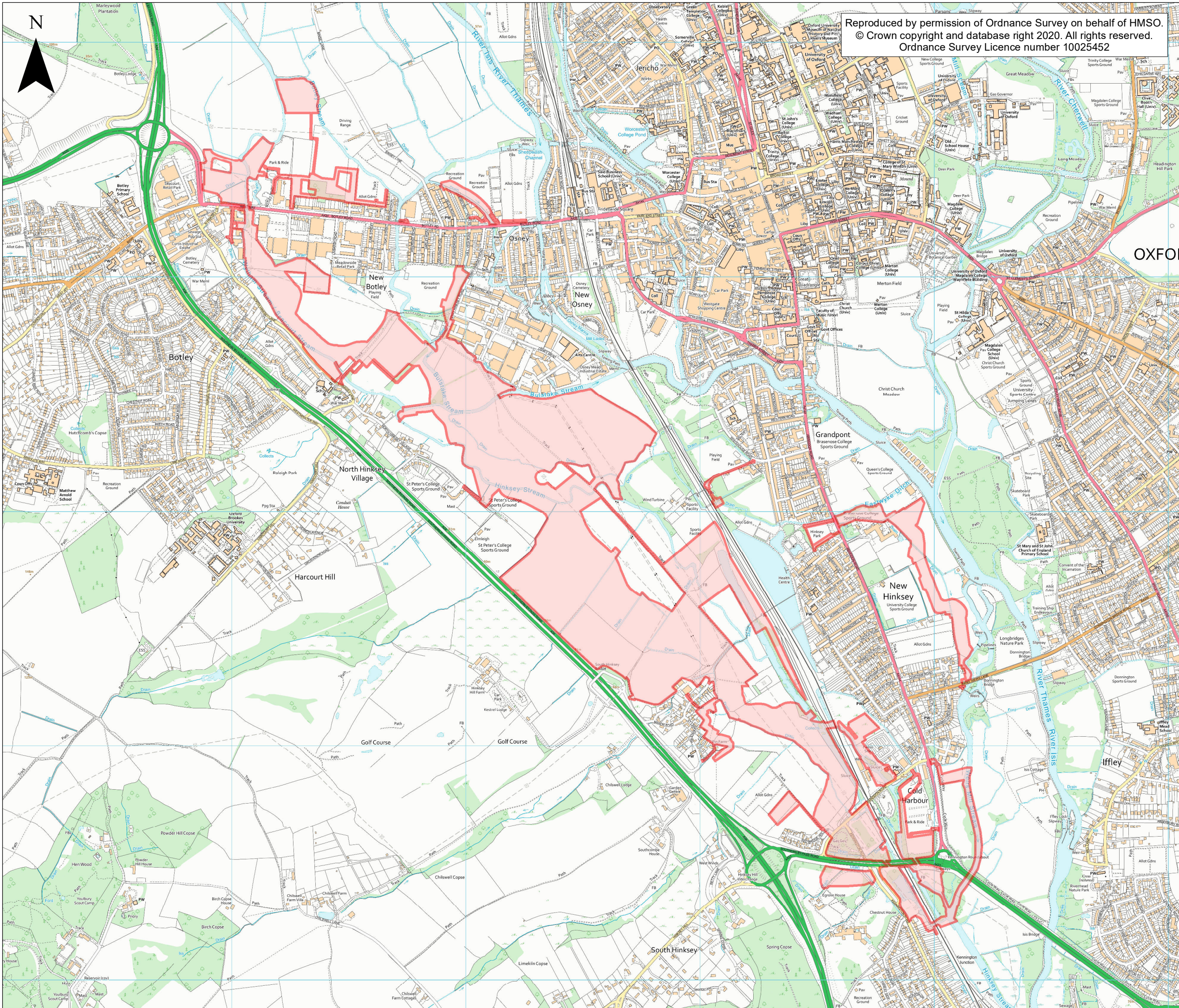
Websites

Multi-Agency Geographic Information for the Countryside: <http://www.magic.gov.uk/>

Appendix A – Figures

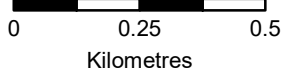
Figure 1: Red Line Boundary (1 Sheet)

Figure 2: Reptile Survey 2020 OFAS (15 Sheets)



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Legend
 Red Line Boundary



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Project :
 Oxford Flood Alleviation Scheme

Drawing :
 Figure 1: Red Line Boundary

Drawn By : MPC **Date:** 06/03/2020

Checked By : RS **Date:** 06/03/2020

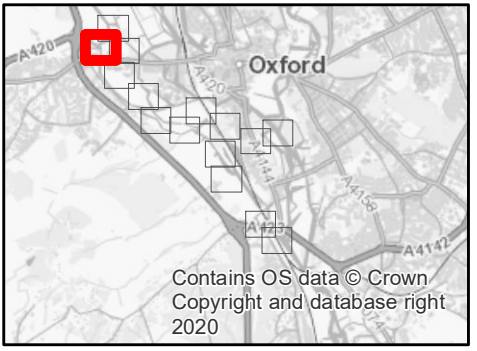
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

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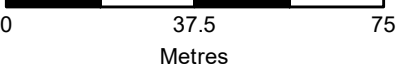


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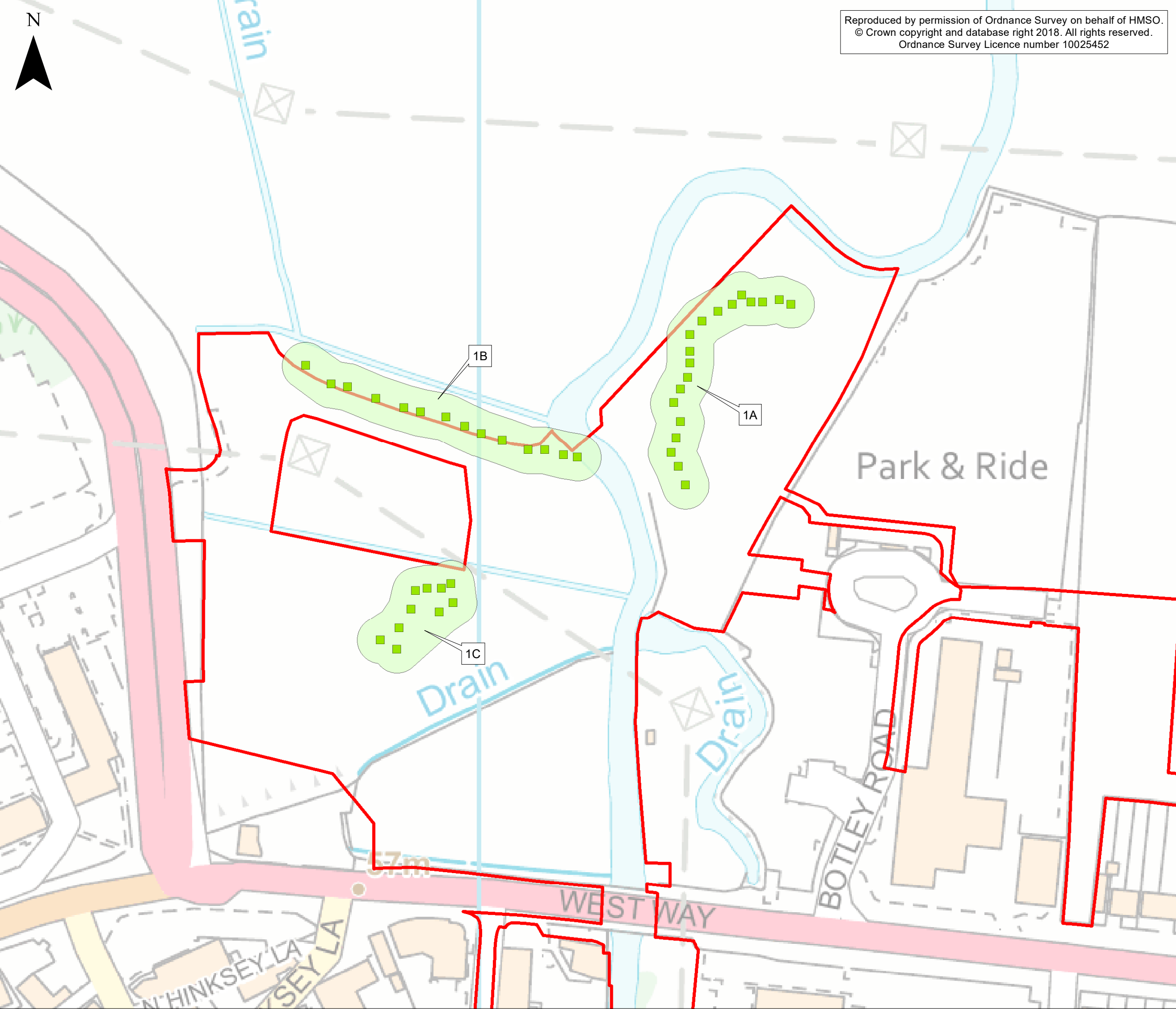
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Checked By : Rosie McLaren Date: 28/10/2020

Approved By : Emily Hewitt Date: 28/10/2020

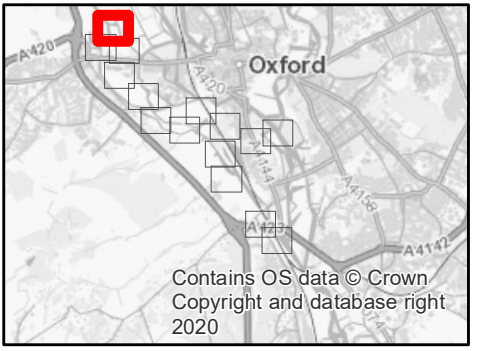
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



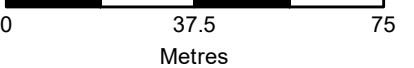


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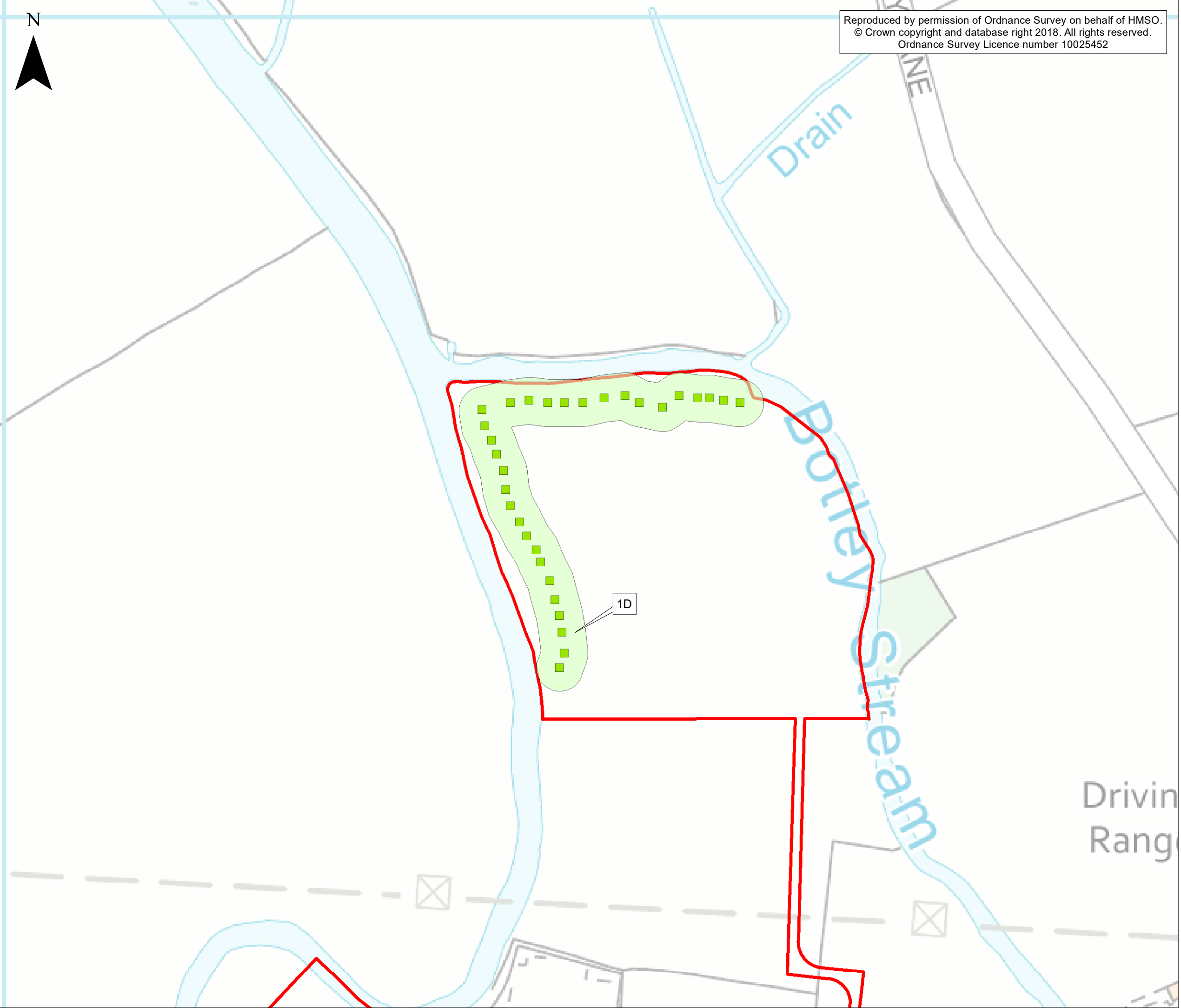
Project :
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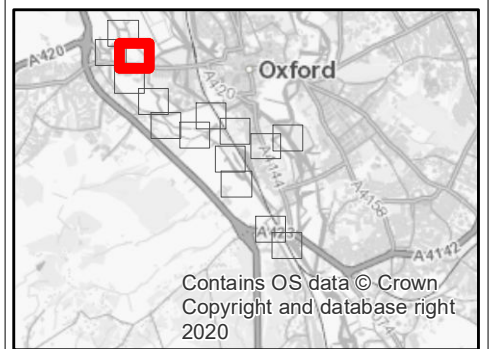
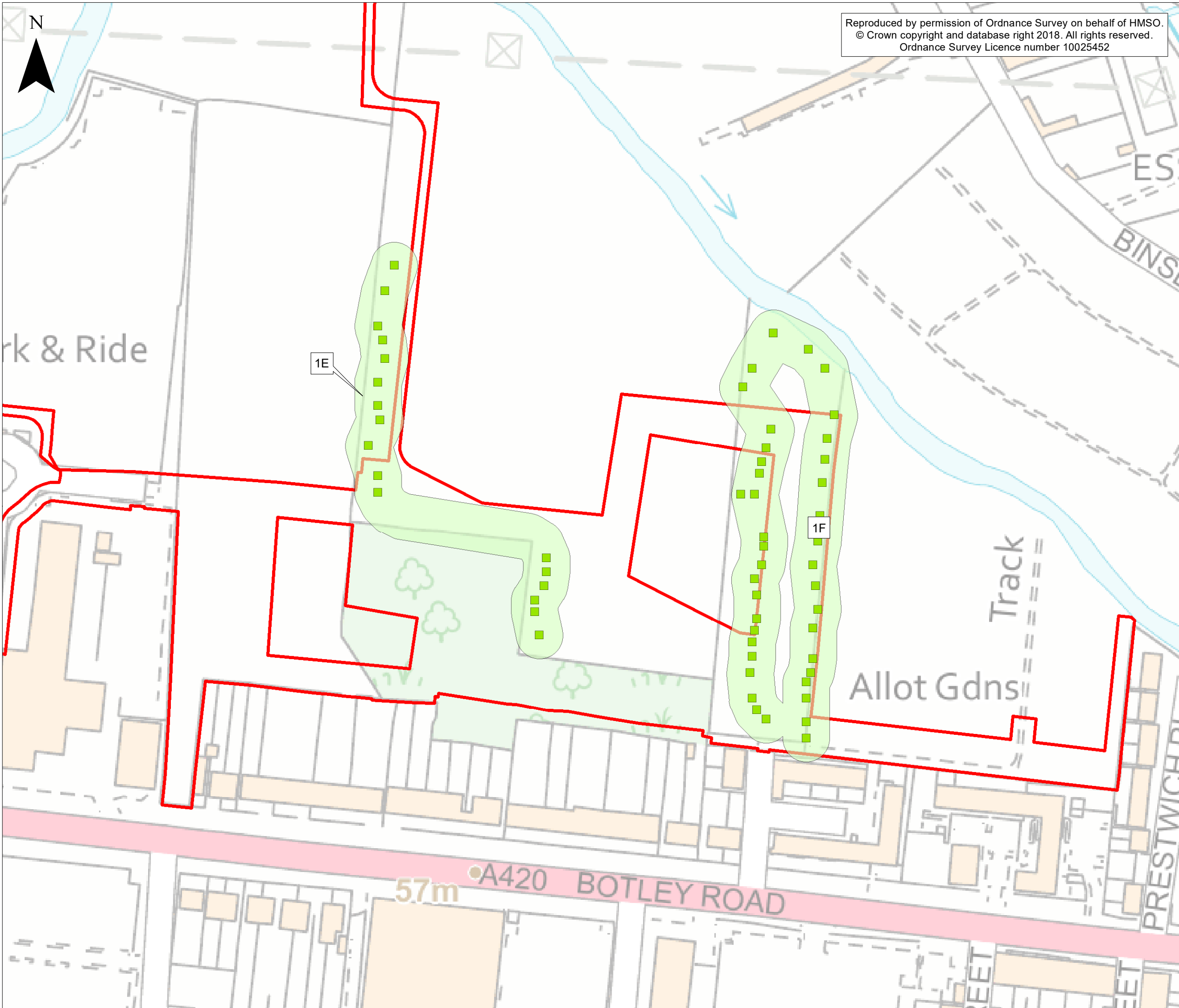
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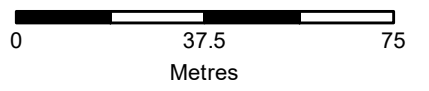
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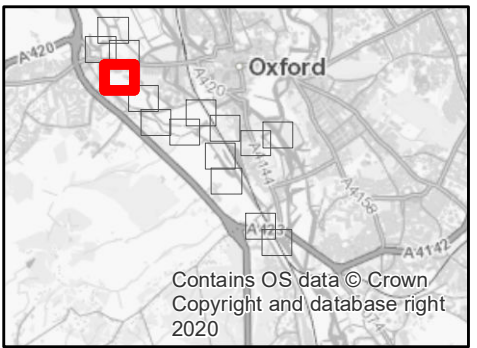
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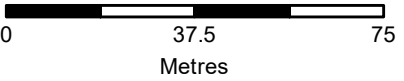
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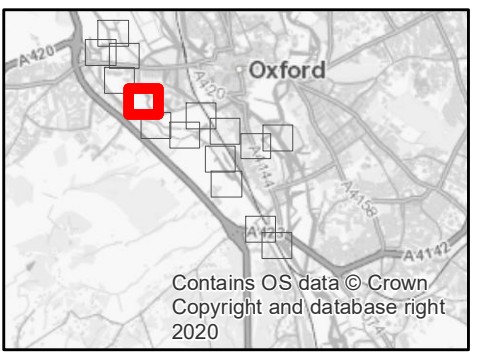
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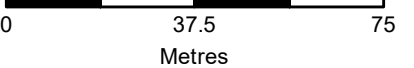


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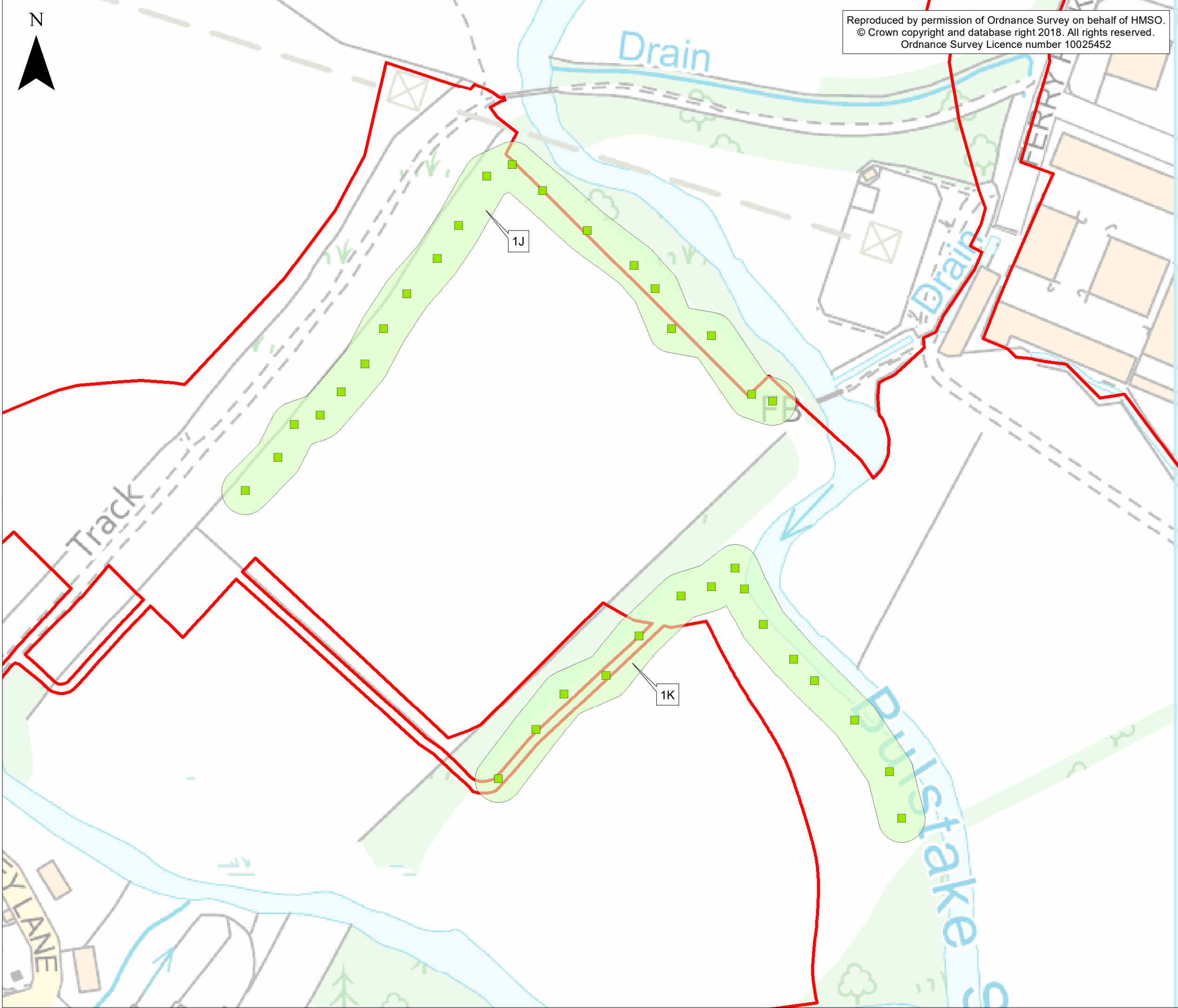
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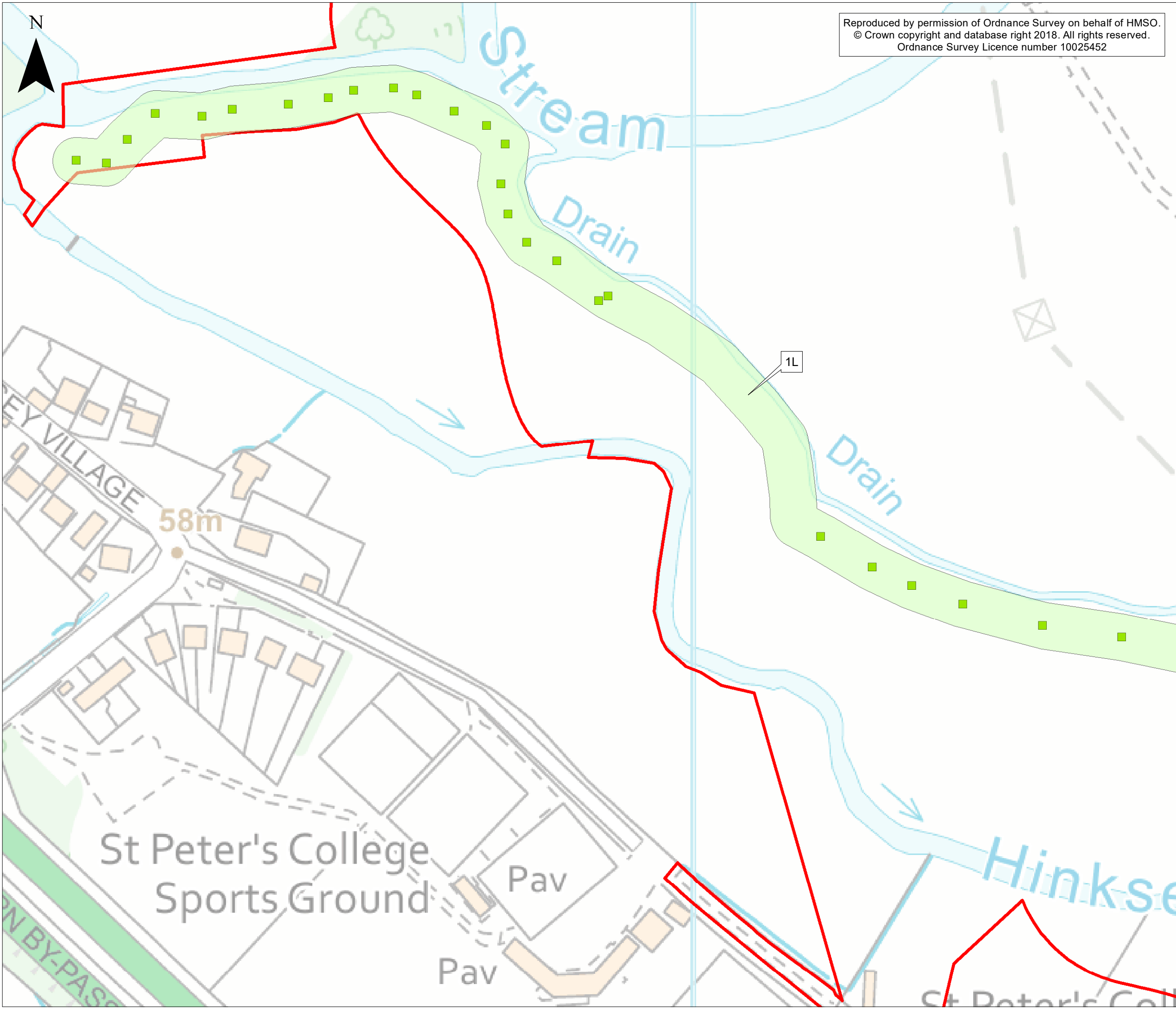
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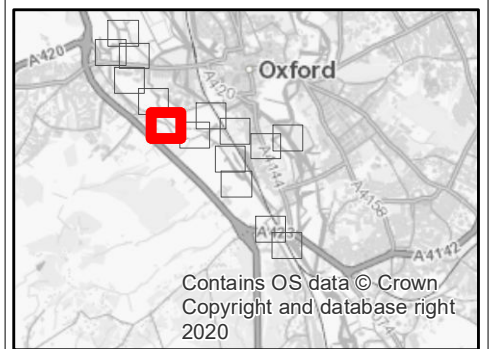
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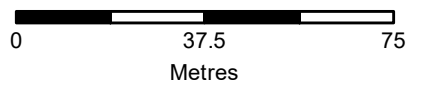


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Drawing No. :
Figure 2f

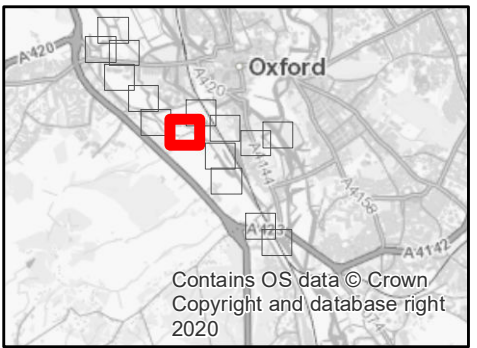
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

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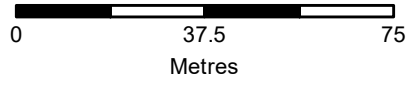


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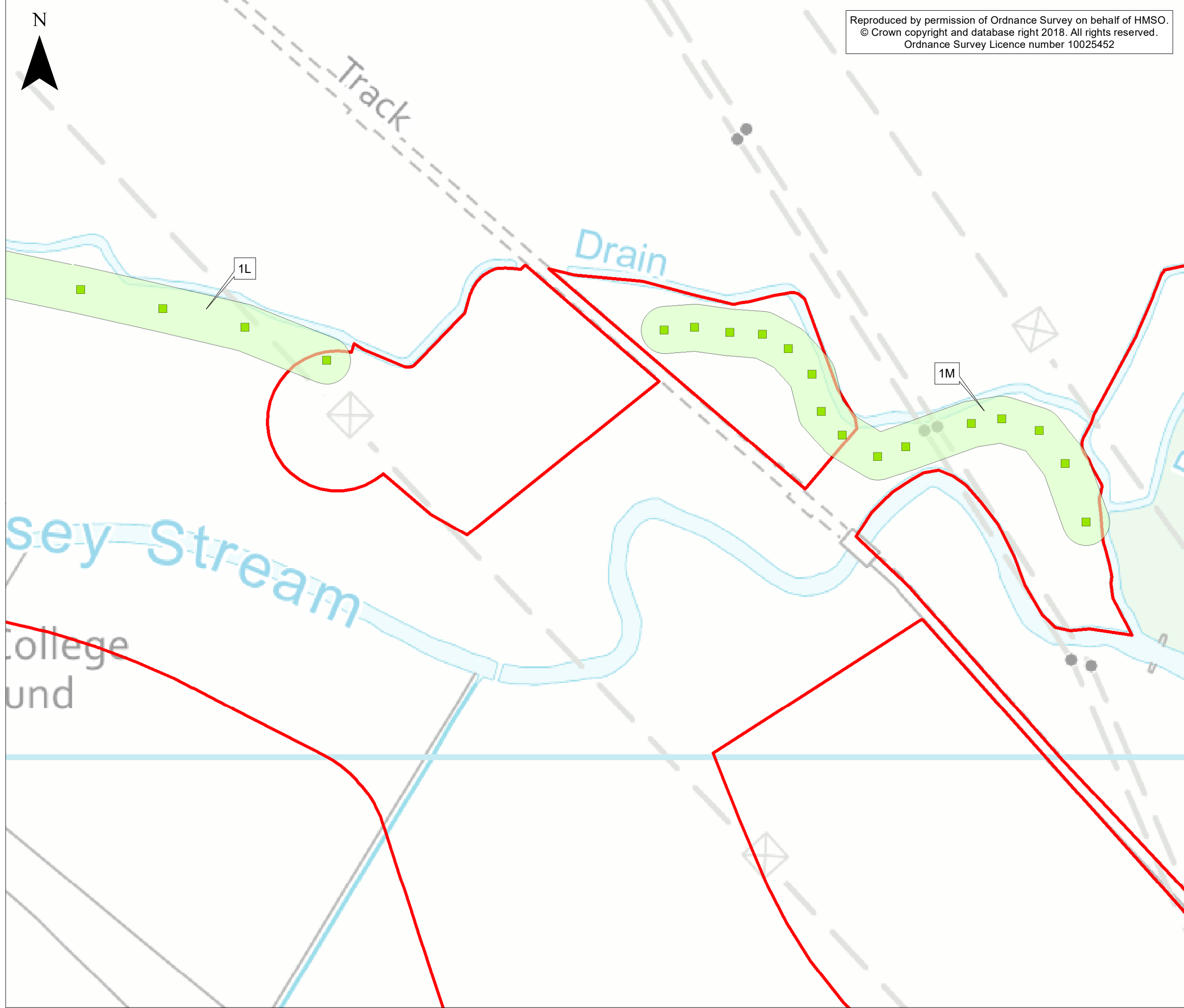
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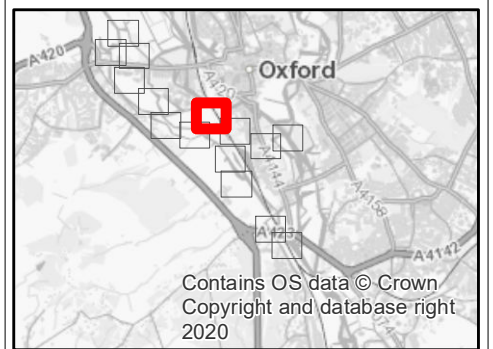
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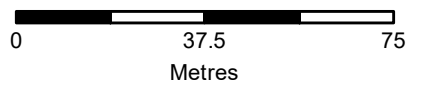


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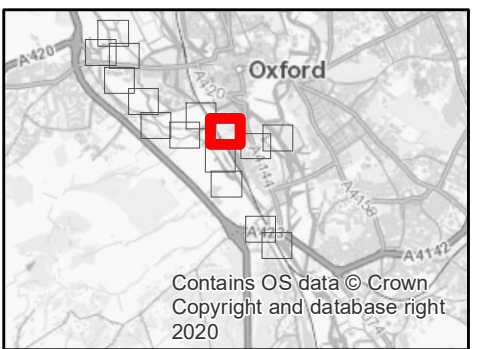
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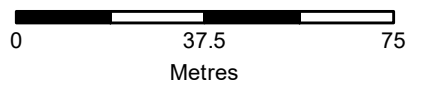
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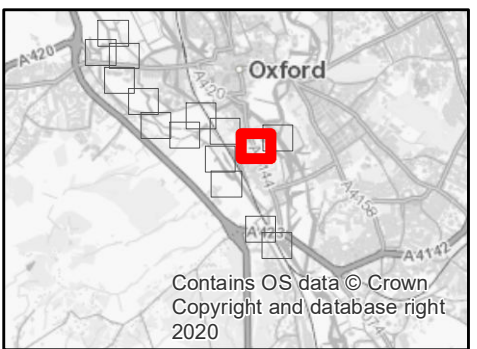
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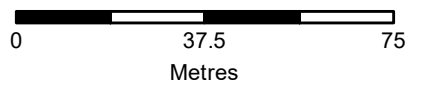


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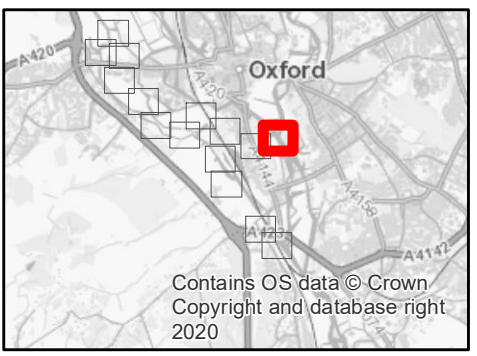
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

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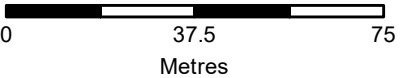


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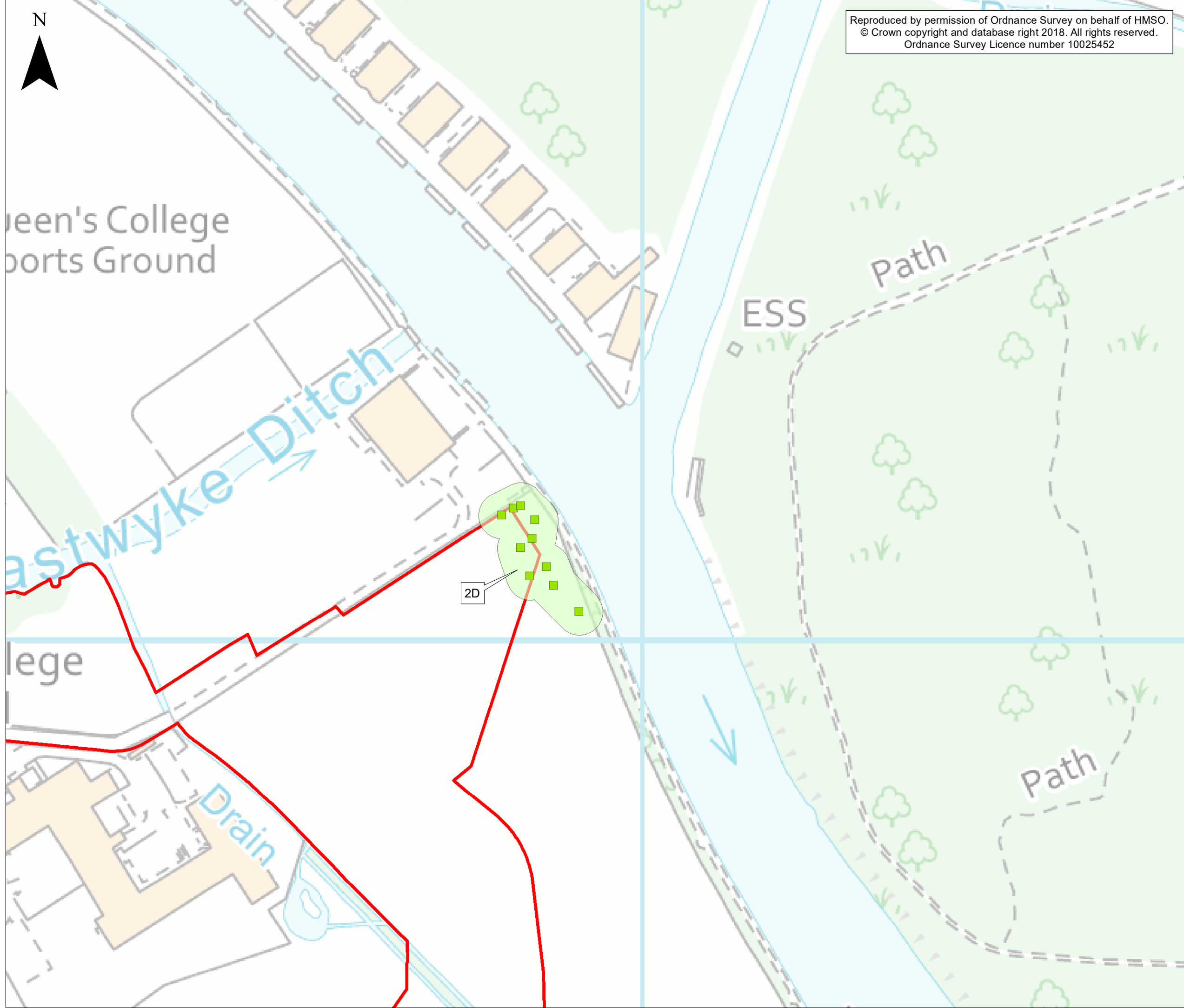
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**Reptile Survey 2020 OFAS
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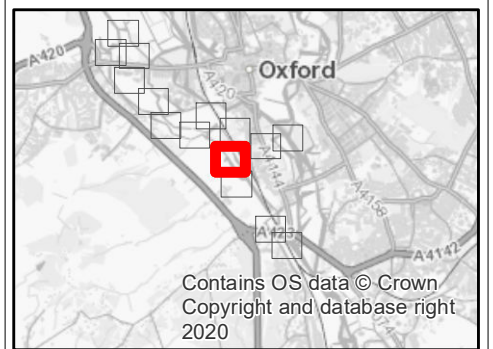
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



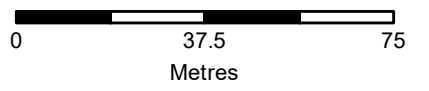
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(Sheet 12 of 15)

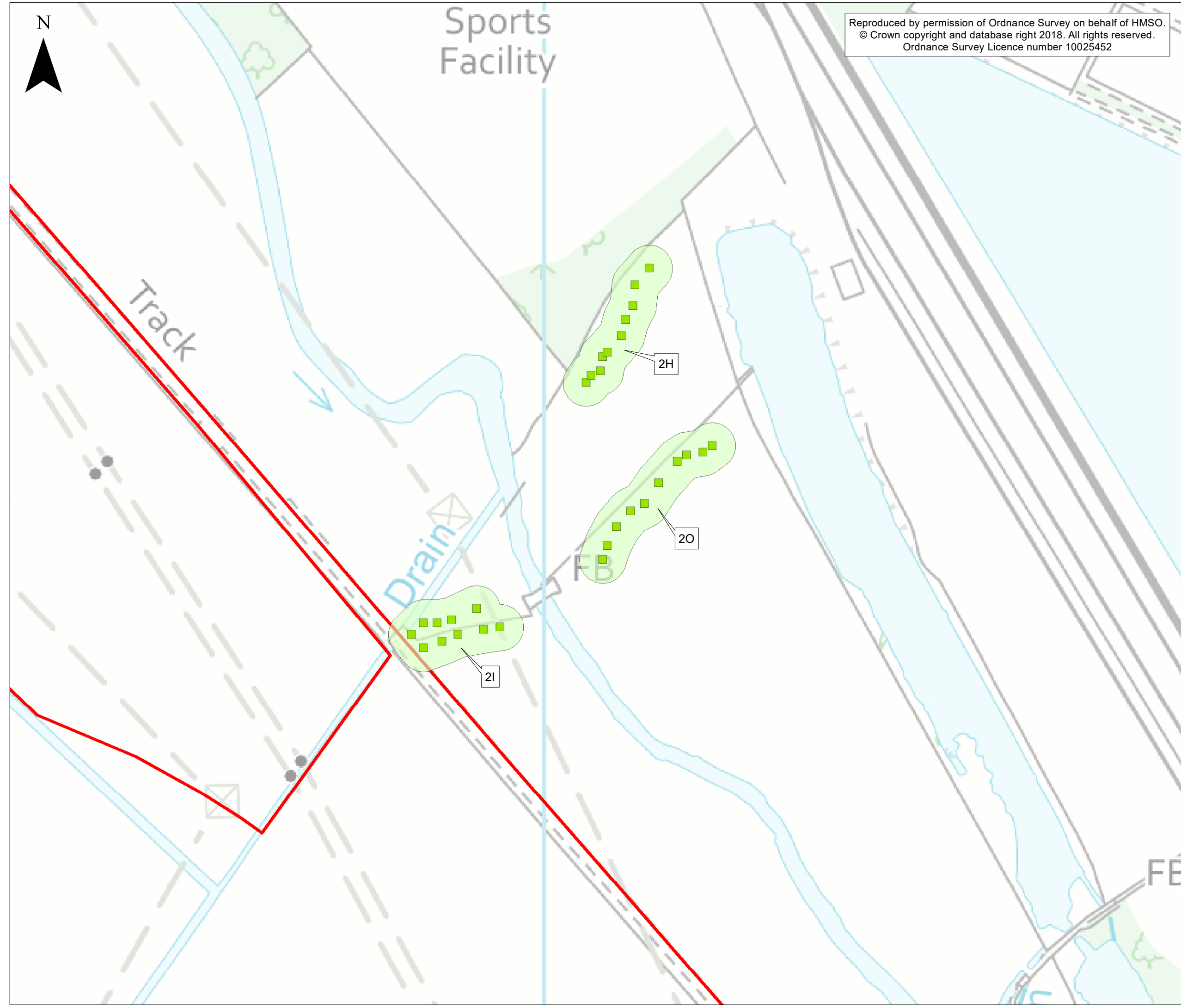
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Approved By : Emily Hewitt Date: 28/10/2020

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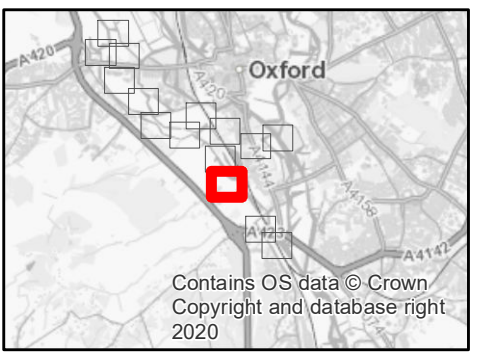
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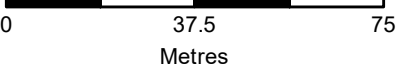


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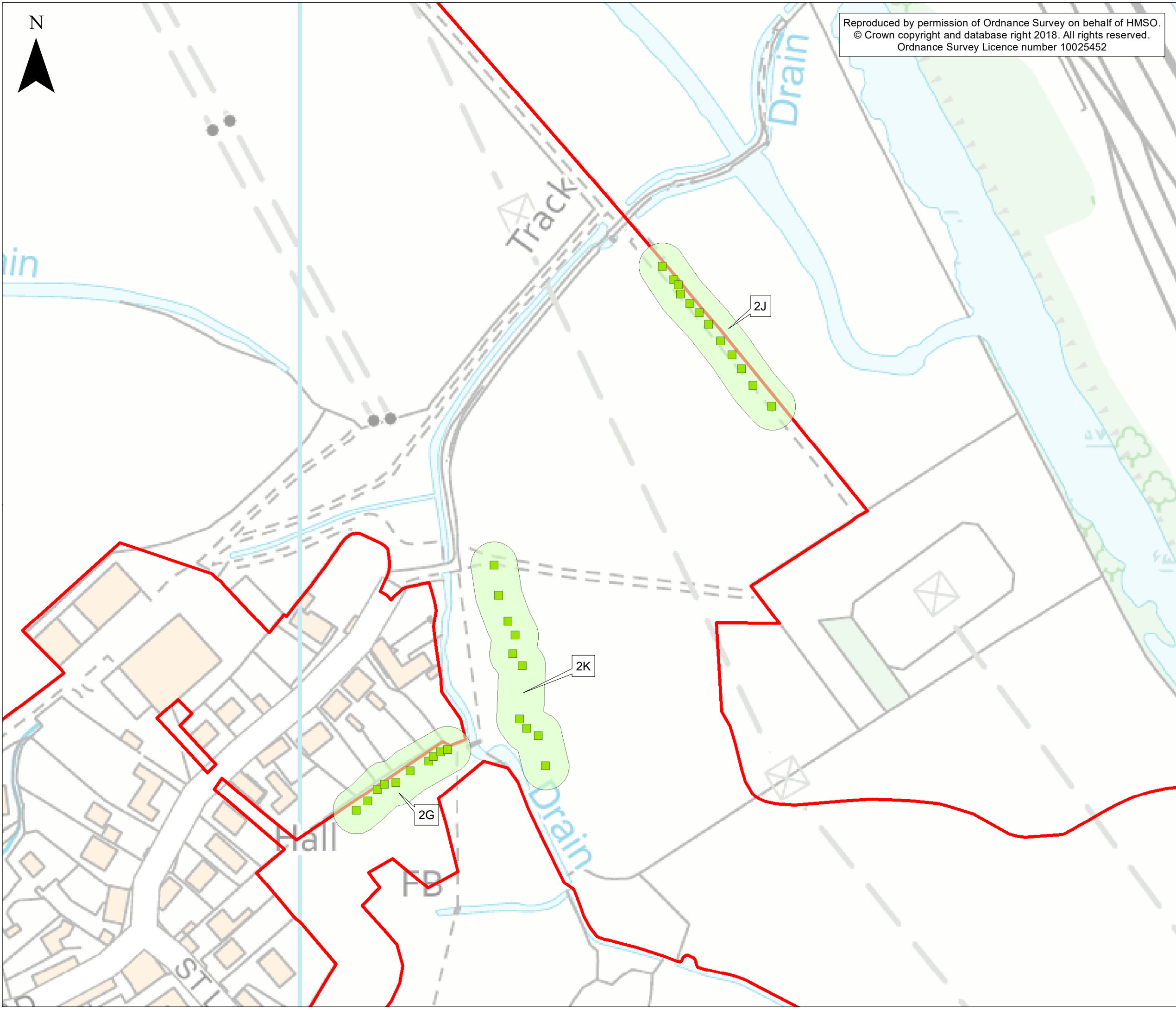
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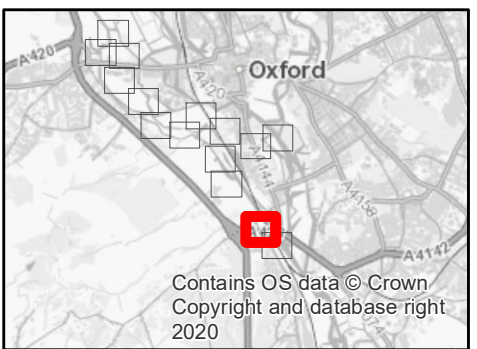
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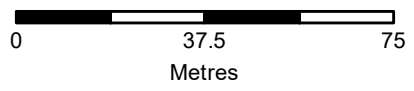
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Project :
Oxford Flood Alleviation Scheme

Drawing :
**Reptile Survey 2020 OFAS
(Sheet 14 of 15)**

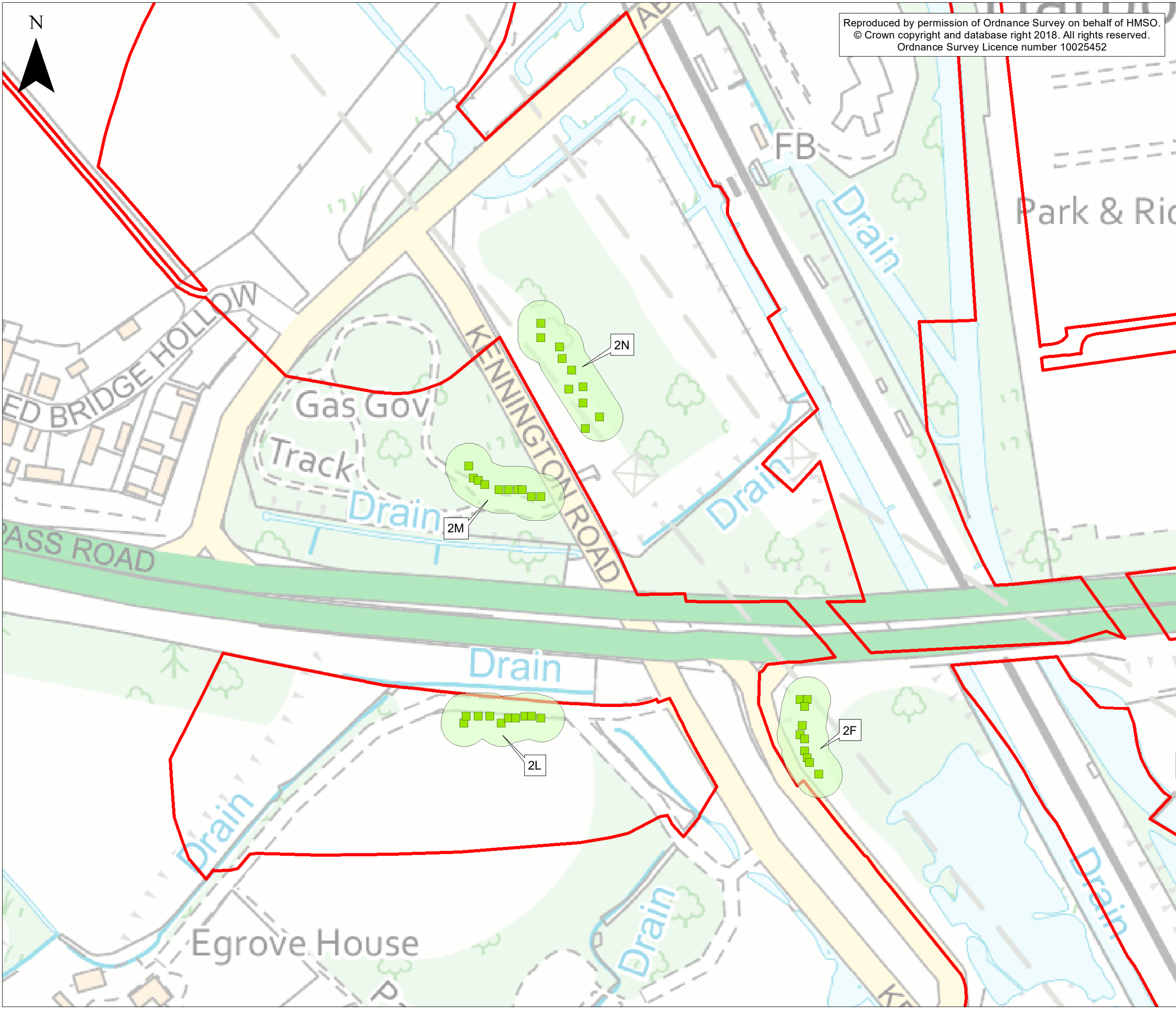
Drawn By : Tim Curtis Date: 28/10/2020

Checked By : Rosie McLaren Date: 28/10/2020

Approved By : Emily Hewitt Date: 28/10/2020

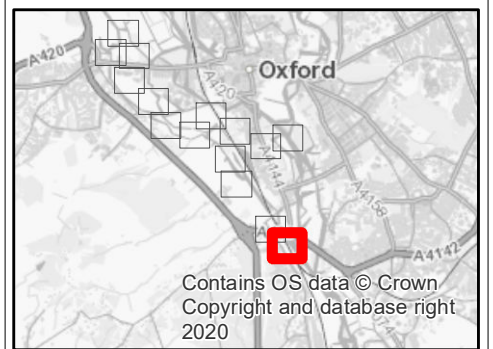
Drawing No. : Figure 2n	Revision -
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Drawing Scale : 1:1,500



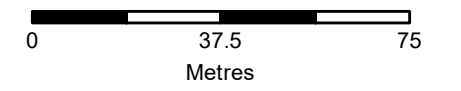


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Legend

- Survey Boundary
- Reptile Survey Area
- Reptile Tiles



Rev	By	Chkd	Apprvd	Date	Description

Client
 Environment Agency
 Kings Meadow House
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Project :
 Oxford Flood Alleviation Scheme

Drawing :
 Reptile Survey 2020 OFAS
 (Sheet 15 of 15)

Drawn By : Tim Curtis Date: 28/10/2020
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 Approved By : Emily Hewitt Date: 28/10/2020

Drawing No. : Figure 2o	Revision -
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Drawing Scale : 1:1,500

Appendix B - Reptile Ecology

Introduction

England has six native reptile species, namely:

- Adder *Vipera berus*;
- Common lizard *Zootoca vivipara*;
- Grass snake *Natrix natrix*;
- Sand lizard *Lacerta agilis*;
- Slow-worm *Anguis fragilis*; and
- Smooth snake *Coronella austriaca*.

The attributes of these species and their relevance to the Oxford FAS are discussed below.

Adder

The adder is England's only venomous reptile, preferring dry habitats with limited disturbance, ranging from heath and open woodland to upland moors. Adders hibernate in large clusters from October to March utilising sheltered hibernacula such hollows such as those found within the ground and dense tree roots.

The Oxford FAS study area has limited habitat attributes to support a potential population of adders. However, there is a small possibility that a population may be present.

Common Lizard

Common lizards prefer open sunny habitats (frequently basking in spring or autumn sunshine), including open woodland, hedge banks and sparse natural grassland, with free draining soils. In areas of land intensively managed for agricultural purposes, they are relatively scarce. Common lizards hibernate from October to early April in hibernacula such as underground burrows, rock crevices or log piles.

The Oxford FAS study area has suitable habitat attributes to support a potential population of common lizards.

Grass Snake

The grass snake is widely distributed throughout England. It prefers a wide range of habitats i.e. open woodland, grassland and hedgerows. It also prefers damp habitats such as ditches, ponds and other open water, as it is able to swim in order to predate aquatic fauna such as juvenile amphibians. Grass snakes hibernate from October to the beginning of March in hibernacula, utilising wall crevices, underground burrows or tree roots and compost heaps.

The Oxford FAS study area has suitable habitat attributes to support a potential population of grass snakes.

Sand Lizard

Largely restricted to the sandy heathlands (predominantly Sussex, Surrey, Merseyside, Dorset and Hampshire), the sand lizard is a very rare reptile and is unlikely to inhabit the study area.

Slow-worm

Slow-worms are widespread throughout England, and although resembling a snake are actually legless lizards. They utilise a wide range of habitats, but tend to prefer overgrown and

SECTION 6

heavily vegetated rough grassland to provide cover from predators and also to forage within. Slow-worms hibernate in the ground between October and February in underground refugia.

The study area has suitable habitat attributes to support a potential population of slow-worms.

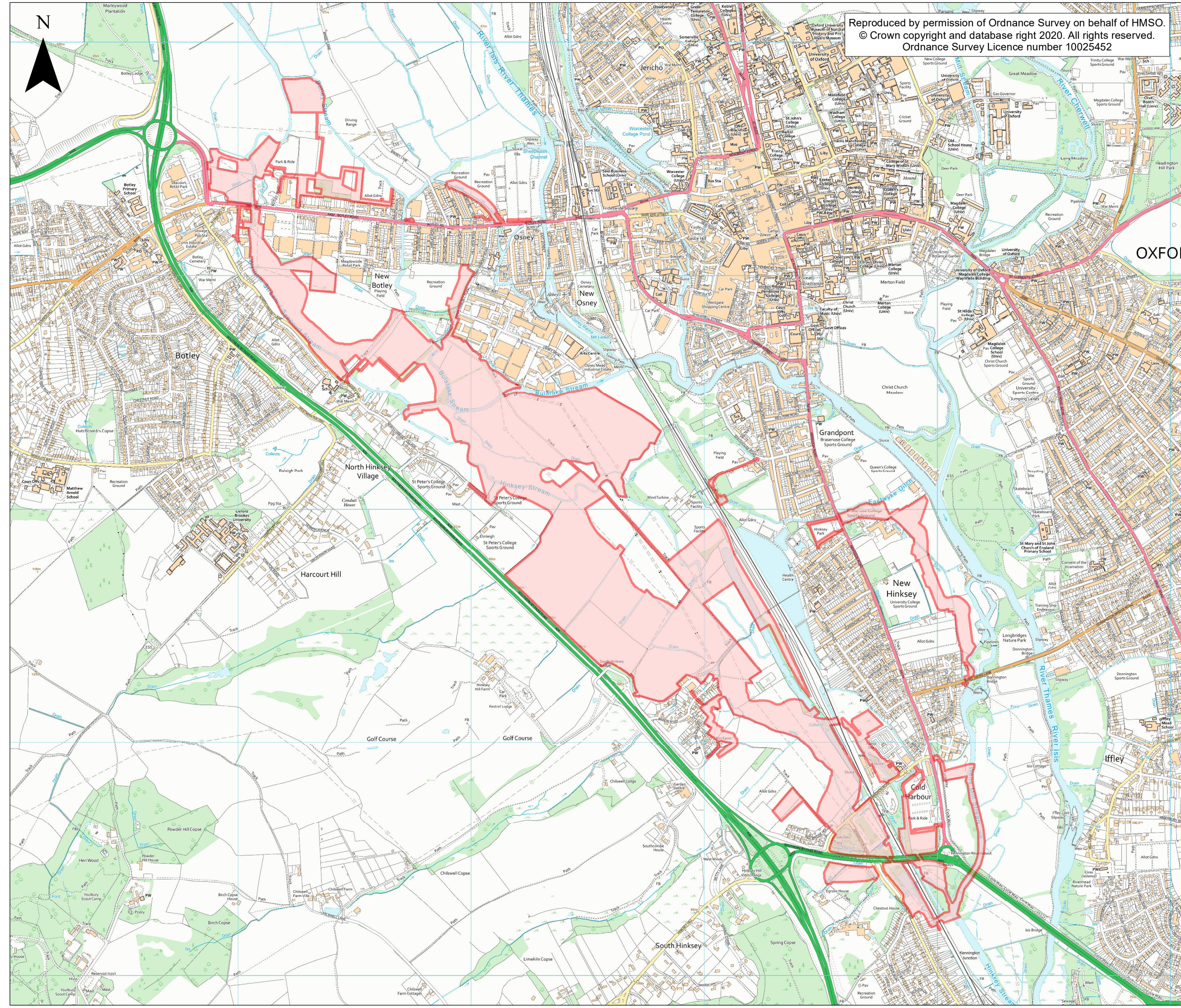
Smooth Snake

Largely restricted to the sandy heathlands of southern England (predominantly Dorset, Hampshire and Surrey), the smooth snake is a very rare reptile, and is unlikely to inhabit the Oxford FAS study area.

Appendix C – Other species found during Autumn surveys

Table C.1: Other record species. 'Juv.' Is Juvenile, 'Ad' is Adult and 'Mammal' was either; mouse, shrew, or vole species.

Date	01/09/20	03/09/20	07/09/20	09/09/20	11/09/20	14/09/20	16/09/20
Temperature	15	19	18	18	14	16	20
Weather	Patchy cloud	Cloudy turning into showers	Cloudy	Cloudy	Scattered Cloud	Sunny & clear	Bright & sunny
Site 2A	-	2x Juv. Toad	5x Juv. Toad	1x Juv. Toad 1x Ad. Toad	4x Juv. Toad 1x Ad Toad 1x Mouse Sp.	-	1x Juv. Toad
Site 2B	3x Juv. Smooth Newt 3x Juv. Toad	6x Juv. Smooth Newt 2x Ad. Toad 7x Juv. Toad	1x Ad Smooth Newt 7x Juv. Smooth Newt 11x Juv. Toad	1x Ad Smooth Newt 8x Juv. Smooth Newt 5x Juv. Toad	1x Juv. Smooth Newt 11x Juv. Toad	3x Juv. Smooth Newt 6x Juv. Toad	4x Juv. Smooth Newt 5x Juv. Toad
Site 2C	-	-	-	-	2x Juv. Toad	1x Juv. Toad	-
Site 2D	-	2x Mammals	1x Mammal	-	-	-	1x Juv. Toad
Site 2E	2x Mammal	-	-	-	-	-	-
Site 2F	-	-	2x Mammal	1x Mammal	-	-	-
Site 2G	-	-	-	1x Juv. Toad	1x Juv. Toad	-	-
Site 2K	-	-	-	-	1x Mammal	-	-



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Legend
 Red Line Boundary

0 0.25 0.5
 Kilometres

Rev	By	Chkd	Apprd	Date	Description

Client
 Environment Agency
 Kings Meadow House
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 Reading
 RG1 8DQ



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Project :
 Oxford Flood Alleviation Scheme

Drawing :
 Figure 1: Red Line Boundary

Drawn By : MPC **Date:** 06/03/2020

Checked By : RS **Date:** 06/03/2020

Approved By : GH **Date:** 06/03/2020

Drawing No. : IMSE500177-CH2-XX-ZZ-VS-EN-1032 **Revision**
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Drawing Scale : 1:15,000