

WILD FRONTIER ECOLOGY



Broadland Northway Post-Construction
Breeding Bird Surveys 2022

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

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



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1. Non-technical Summary

This report details the results of the Year Five post-construction breeding bird surveys within the A1270 Broadland Northway corridor undertaken during spring/summer of 2022. The Environmental Statement for the project (Mott MacDonald 2014) included a stipulation for five years of post-construction surveys along the route; the first three post-construction survey reports for years 1-3 were compiled by Norfolk County Council Natural Environment Team and years 4 and 5 surveys were undertaken by Wild Frontier Ecology in 2021/22.

The surveys were undertaken along both sides of the road on alternate survey visits to maximise coverage, and where possible followed public footpaths and cycle paths, of which there are numerous sections running parallel with A1270. The precise routes of the previous surveys before 2021 were not documented within the reports and therefore it was not possible to exactly replicate the transects, which may have led to a degree of divergence between the datasets, with the 2021 and 2022 surveys considered likely to follow the road more closely than before. However, three visits to all sections of the road corridor were carried out, following the methodology of the previous surveys.

The surveys recorded 50 species within potential breeding habitat, including eight Red-listed and nine Amber-listed Birds of Conservation Concern (BoCC). A further two Red-listed, five Amber-listed species and one Schedule 1 listed species were observed during the surveys but were not considered likely to be breeding within the survey corridor.

In terms of comparison with previous years the total number of species considered likely to be breeding within the survey corridor was still notably lower than the 2020, 2019 and 2018 survey seasons which recorded 54 species in 2019 and 2020 and 55 in 2018. Potential reasons for this reduction are the divergence in survey routes with the earlier surveys likely covering more of the 'built' habitat within the buffer. The numbers of species considered likely to be breeding increased between 2021 and 2022. This is potentially due to the 2022 surveys not experiencing the unseasonably cool temperatures of spring 2021 which will have likely suppressed bird activity and led to later than average arrivals of migrant species.

Numbers of territories of Red and Amber list species recorded generally increased from 2021. Skylark territory numbers were considerably higher (estimated 99-156), similar to the pre-construction baseline of 156 singing males. This is significantly higher than skylark numbers recorded in 2018-2020 and is considered likely to be a reflection of the survey route more closely following the road in 2021 and 2022 and allowing larger areas of arable habitat to be surveyed than previously, without the constraints of the cool weather conditions in 2021.

The other Red-listed species to experience an increase in 2022 were house sparrow, linnet and starling. Evidence of breeding of four amber-listed species was recorded in 2022 but not in 2021, namely kestrel, reed bunting, shelduck and willow warbler with shelduck not recorded before on either the post-construction or pre-construction surveys. Increases in numbers of territories were also recorded for dunnoek, mallard and stock dove. These increases are again likely due to the more favourable weather conditions for breeding in 2022 compared to 2021.

Overall numbers of likely breeding species have decreased following construction, but no information is available on amber-listed species recorded during pre-construction species to provide full details. Most records of red-listed species considered likely to be breeding are fairly similar post-construction to pre-construction. The main difference is no evidence has been recorded for cuckoo holding territory during the post-construction surveys and mistle thrush and song thrush territories have both decreased following construction.

2. Background

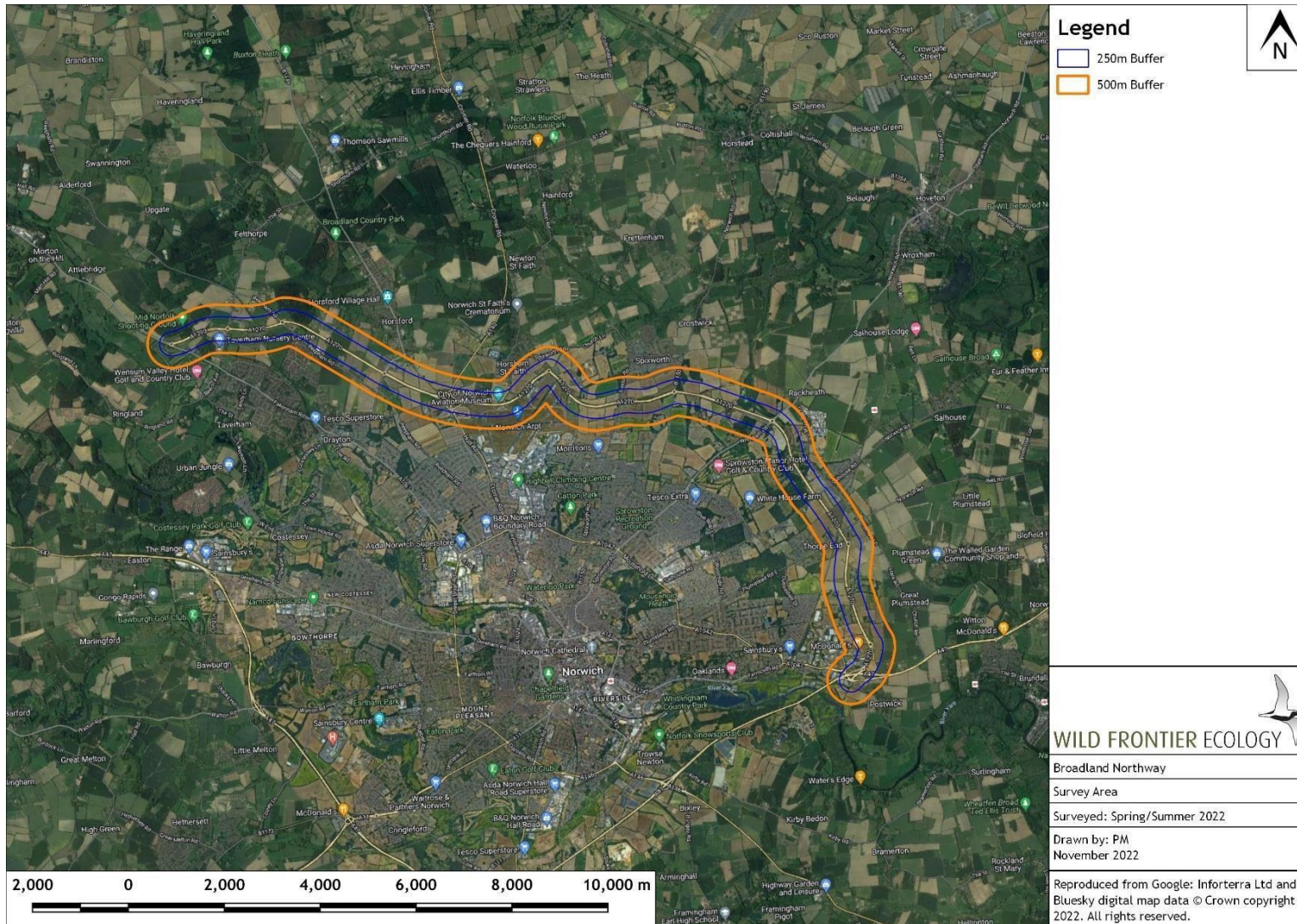
Wild Frontier Ecology (WFE) was commissioned by Norfolk County Council (NCC) to undertake the Year Five (of five) post construction surveys for the length of the A1270 Broadland Northway within a 250 metre (m) buffer (formerly the Norwich Northern Distributor Road, NDR), construction of which was completed in early 2018. Pre-construction surveys were undertaken in both 2012 and 2013 and provide the ecological baseline, the results of which are summarised within Volume 2 of the Environmental Statement (ES)¹. The post construction surveys are being completed as part of the Development Consent Order (DCO) for the Broadland Northway scheme (Norfolk County Council 2014a).

This report details the results of the 2022 surveys and provides comparisons with the previous post construction and baseline surveys where data is available.

The survey area is illustrated in Figure 1 below.

¹ Mott MacDonald (2013) *Norwich Northern Distributor Road, Breeding Bird Survey - Technical Appendix*. Mott MacDonald.

Figure 1: Survey Area



3. Methods

All surveys were conducted by experienced ecologists: Graham Riley BSc ACIEEM (GR), Ptolemy McKinnon BSc MSc (PM) and Robert Yaxley BSc CEcol CEnv MCIEEM (RY).

The aim was to replicate the post-construction survey methodologies as closely as possible, which involved visiting all parts (where possible) of the zone of influence (ZOI) which forms a 250m buffer from the centre of the road. Three full survey visits of the entire length of the road were undertaken comprising six separate survey visits covering the months of April, May and June, with each survey visit being undertaken by two surveyors, each covering a separate section. The route was divided into four sections of roughly equal length (western, central-western, central-eastern and eastern), and over the course of two visits the whole route was covered for the month.

It was not possible to precisely replicate the route of the 2018-2020 post-construction surveys as this was not accurately detailed within the previous survey reports². Therefore, the survey was undertaken by walking parallel with the road as closely as possible, mainly following pedestrian and cycle routes, but also walking sections of the cutting/embankment where this was not possible in order to access certain sections such as around Norwich Airport. High visibility clothing was worn at all times for safety reasons. Other sections of footpath and public road were also utilised where available. Both sides of the road were prioritised on alternate visits to maximise coverage over the course of the surveys.

The breeding bird surveys were an adaptation of the methodology detailed by the British Trust for Ornithology (BTO) in their Common Bird Census (CBC)³, and concentrated on recording and mapping Birds of Conservation Concern (BoCC)⁴ Red- and Amber-listed species and Schedule 1 species breeding on the site. BoCC Green listed species were recorded and likelihood of breeding was noted, but territories were not mapped (excluding Schedule 1 Green-listed species). Table 1 below shows the dates, times and weather conditions during which breeding bird surveys were conducted. The walkover routes are shown in Figures 2-5. Birds just outside of the buffer zone were also recorded on the assumption that part of their territory may have included some of the study site.

Nesting and territorial behaviour (singing, nest building, carrying food, fighting, copulation, nest locations, alarm calling, carrying faecal sacs) were noted by standard codes, as were the age and sex of the birds concerned, where observed. Non-nesting behaviour such as over-flying the site was also noted, together with the direction of movement. Birds not considered likely to be nesting on site were still noted where observed.

When compiled after all survey visits during a single breeding season, the CBC data concerning BoCC Red and Amber list species was analysed using standard methodology to

² Breeding Bird Monitoring Report: Northern Distributor Road Year 1 Postconstruction Survey 2018; (Natural Environment Team, NCC; 2018). • Breeding Bird Monitoring Report: Broadland Northway (Northern Distributor Road) Year 2 Post-construction Survey 2019; (Natural Environment Team, NCC; 2020).

³ Gilbert G., Gibbons D.W. and Evans J. (1998) Bird Monitoring Methods, RSPB, Sandy.

⁴ Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* **108**, pp. 708-746.

provide an estimate of bird breeding territory distribution and quantity^{5,6}. This was achieved by isolating the registrations recorded for a single, selected species in each survey visit, and then plotting all of those registrations together on a single map. The resulting cluster of registrations is then interpreted by an experienced ornithologist (in this case P. McKinnon) to define distinct breeding territories. The same method is repeated for each species recorded exhibiting nesting and/or territorial behaviour in any or all of the three survey visits.

As the surveys only comprised three visits, and were constrained by high traffic noise, it was decided that two separate methodologies would be implemented with regard to determining territory numbers, giving a minimum and maximum figure for each species of conservation concern. The minimum number was calculated by regarding a territory to be present only if the species exhibiting territorial behaviour, such as singing, was recorded at a location on more than one survey visit, whereas the maximum figure would include a species if it was recorded only on a single survey visit. In this way, a species such as mistle thrush *Turdus viscivorus*, where evidence of breeding was recorded in at least 3 separate locations but only on single occasions, is included within the breeding data, as these are likely to be territories within the survey corridor. The minimum territory numbers are more in line and therefore more comparable with the previous post construction surveys which utilised the precautionary multi-visit approach for the many species, especially passerines where song is a key indicator of territorial behaviour.

It should be noted that all post construction surveys were undertaken following the Red and Amber species categorisations detailed within Birds of Conservation Concern 4 (BoCC4) which was published in 2015. This has subsequently been superseded by BoCC5 published in December 2021⁷ but for continuity and ease of comparison between survey years the conservation listings from BoCC4 are followed within this report.

⁵ Marchant J.H. (1983). *BTO Common Bird Census Instructions*. BTO, Tring.

⁶ Bibby C.J., Burgess N.D., Hill D.A. and Mustoe S.H. (2000). *Bird Census Techniques* (2nd Edition). Academic Press, London.

⁷ Stanbury, A. Eaton, M.A., Aebischer, N.J., Brown, Balmer, D., R.D., Lock, L., Musgrove, A.J., Noble, D.G., Linley, P. and Win, I. (2021) *Birds of Conservation Concern 5: the status of our bird populations: the fifth birds of conservation concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain*

Table 1: CBC transect surveys

Visit and Date	Location	Weather Conditions	Time and Surveyor
Visit 1 20th April 2022	Western section	Wind BS 1, Temperature 7-10 °C, Cloud cover 0%, Precipitation 0	GR 06.30 - 09.15
Visit 1 20th April 2022	Central-western section	Wind BS 1-2, Temperature 7-11 °C, Cloud cover 20-30%, Precipitation 0	PM 06.40 - 09.20
Visit 1 28 th April 2022	Central-eastern section	Wind BS 1, Temperature 6-9 °C, Cloud-cover 0-60%, Precipitation 0	PM 06.40 - 09.00
Visit 1 28 th April 2022	Eastern section	Wind BS 1-2, Temperature 8-11 °C, Cloud-cover 0%, Precipitation 0	GR 06.45 - 09.10
Visit 2 9 th May 2022	Western section	Wind BS 1-2, Temperature 4-12 °C, Cloud-cover 0%, Precipitation 0	GR 06.30 - 09.00
Visit 2 9 th May 2022	Central-western section	Wind BS 1, Temperature 4-12 °C, Cloud-cover 0%, Precipitation 0	RY 06.30 - 09.00
Visit 2 25 th May 2022	Central-eastern section	Wind BS 2-3, Temperature 10-12 °C, Cloud-cover 50-90%, Precipitation 0	PM 06.30 - 08.40
Visit 2 25 th May 2022	Eastern section	Wind BS 2-3, Temperature 8-11 °C, Cloud-cover 50%, Precipitation 0	GR 06.15 - 08.30
Visit 3 7 th June 2022	Western section	Wind BS 0, Temperature 12-16 °C, Cloud-cover 20%, Precipitation 0	GR 06.30 - 09.10
Visit 3 7 th June 2022	Central-western section	Wind BS 1, Temperature 14-18 °C, Cloud-cover 50%, Precipitation 0	RY 06.25 - 08.30
Visit 3 30 th June 2021	Central-eastern section	Wind BS 0, Temperature 18-25 °C, Cloud-cover 0-100%, Misty start then cleared	RY 06.20 - 08.30
Visit 3 30 th June 2021	Eastern section	Wind BS 0, Temperature 18-22 °C, Cloud-cover 50-70%, Precipitation 0	GR 06.15 - 08.15

Figure 2: Survey Routes (western section)

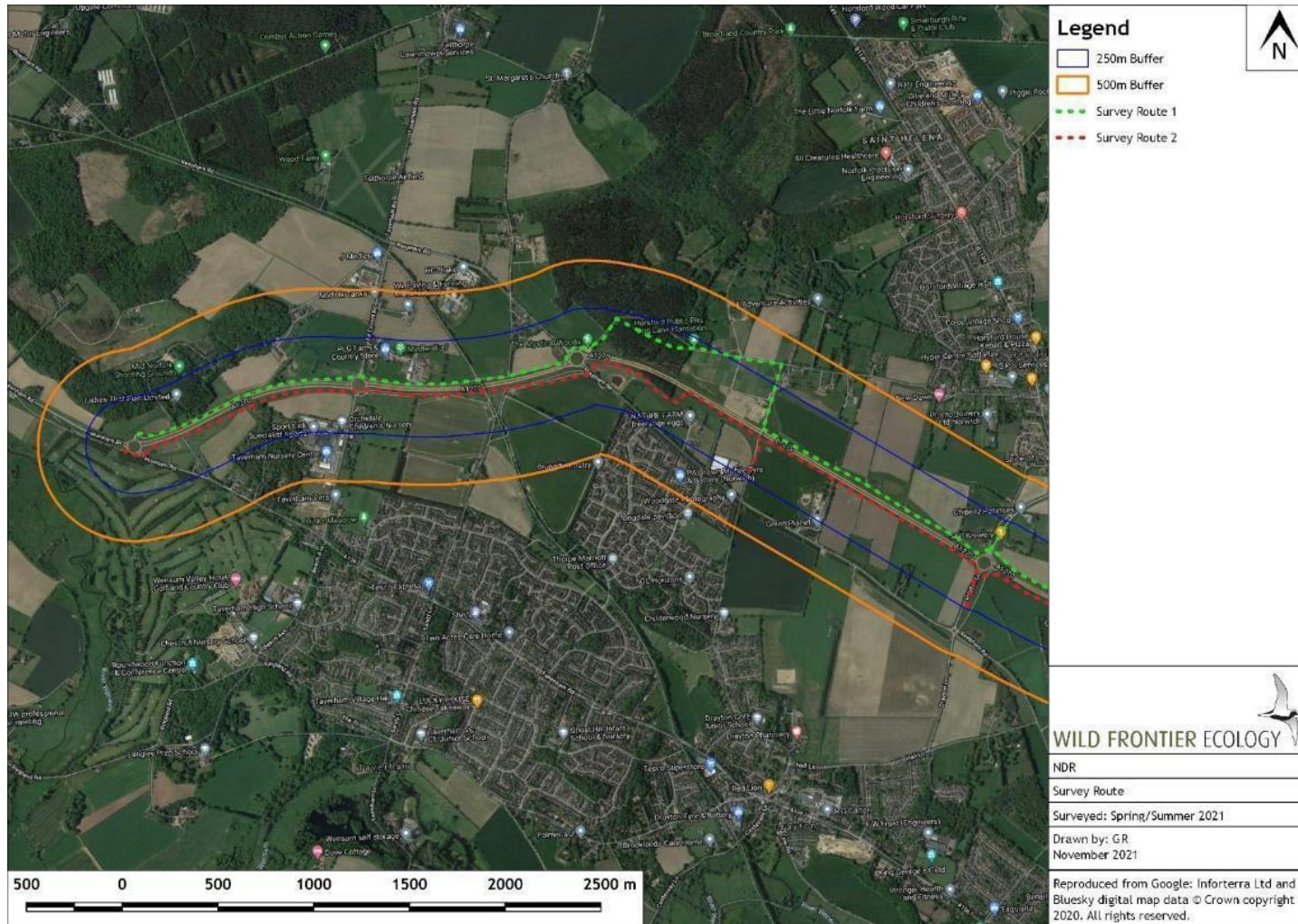


Figure 3: Survey Routes (central-western section)

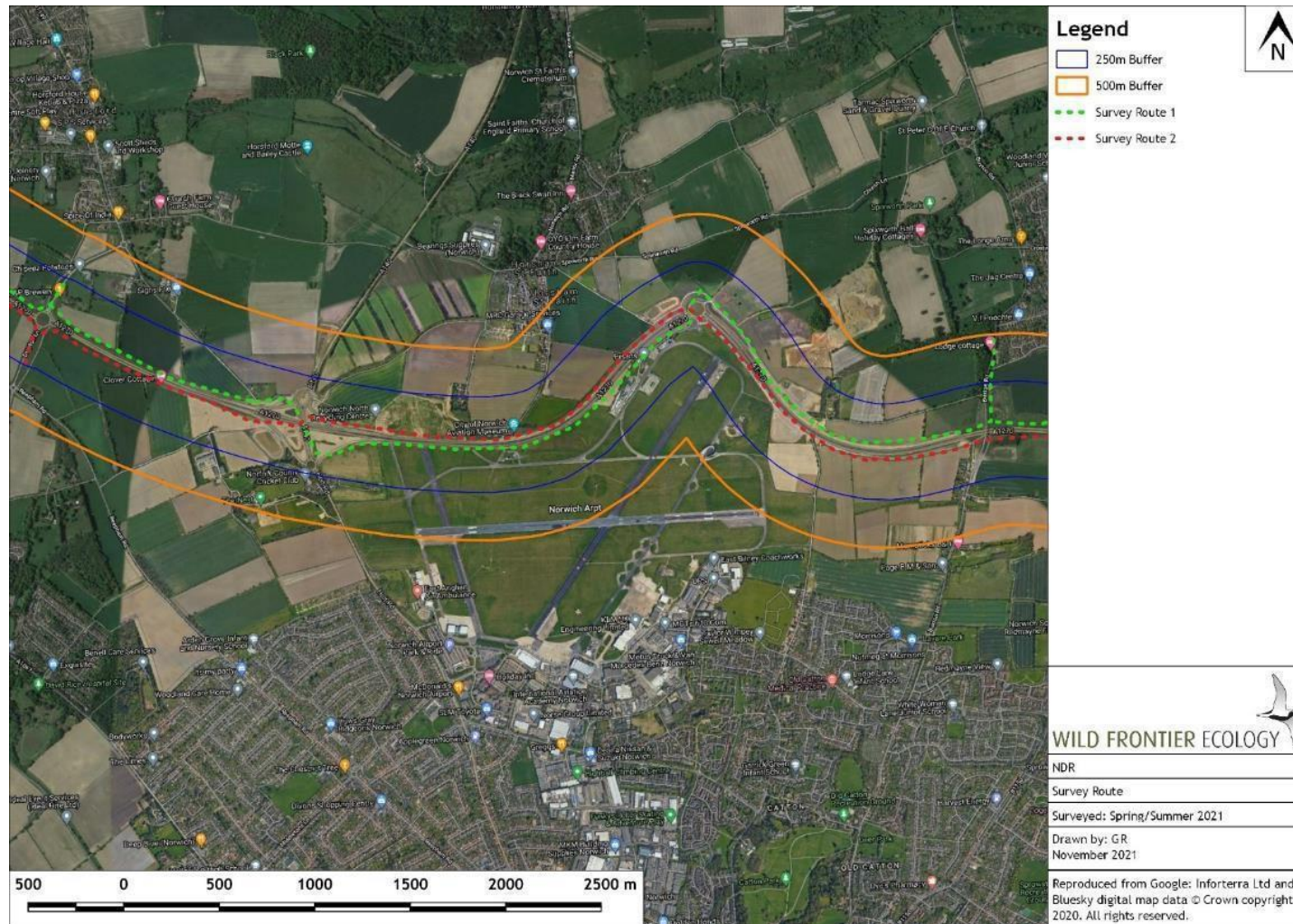


Figure 4: Survey Routes (central-eastern section)

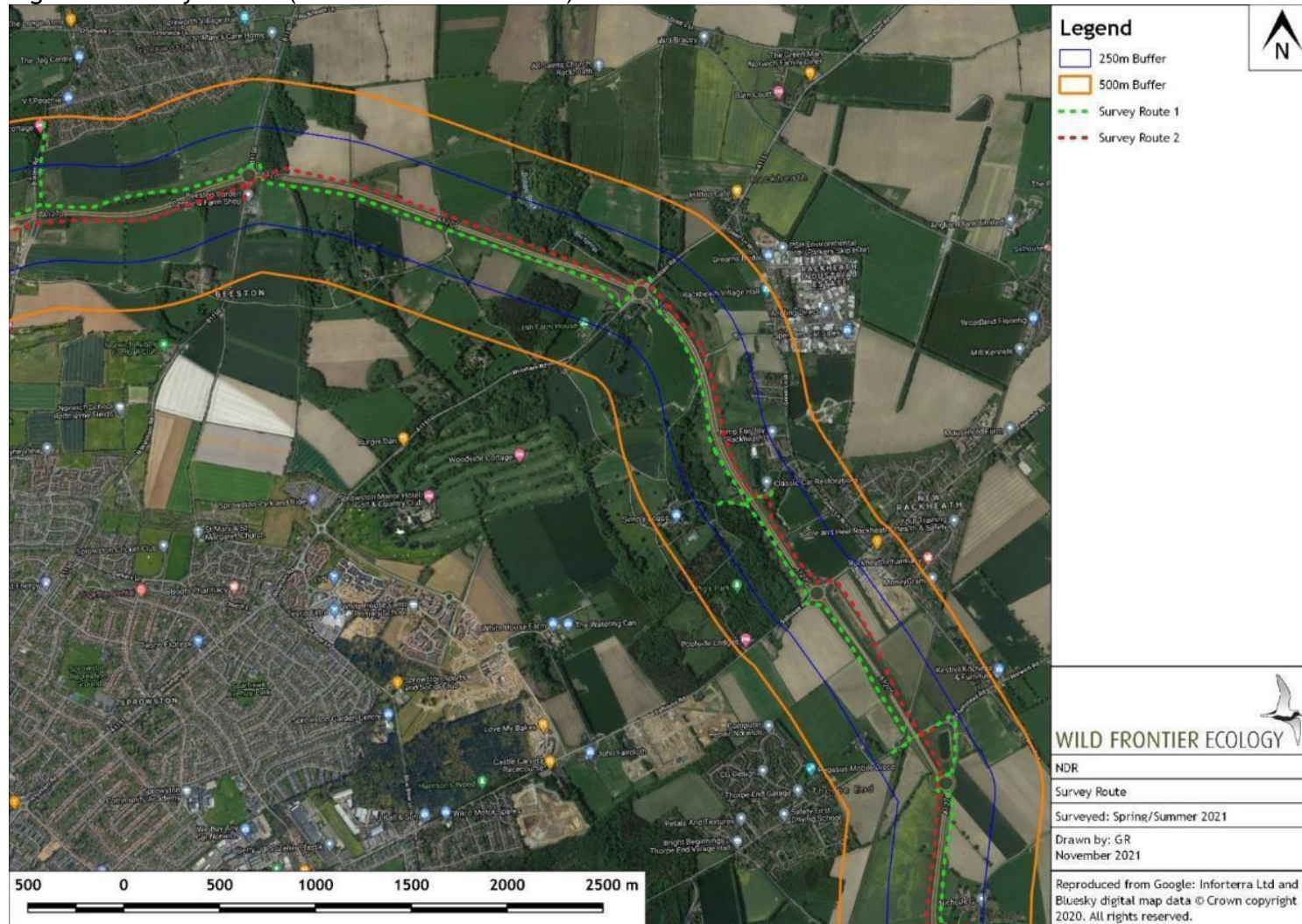
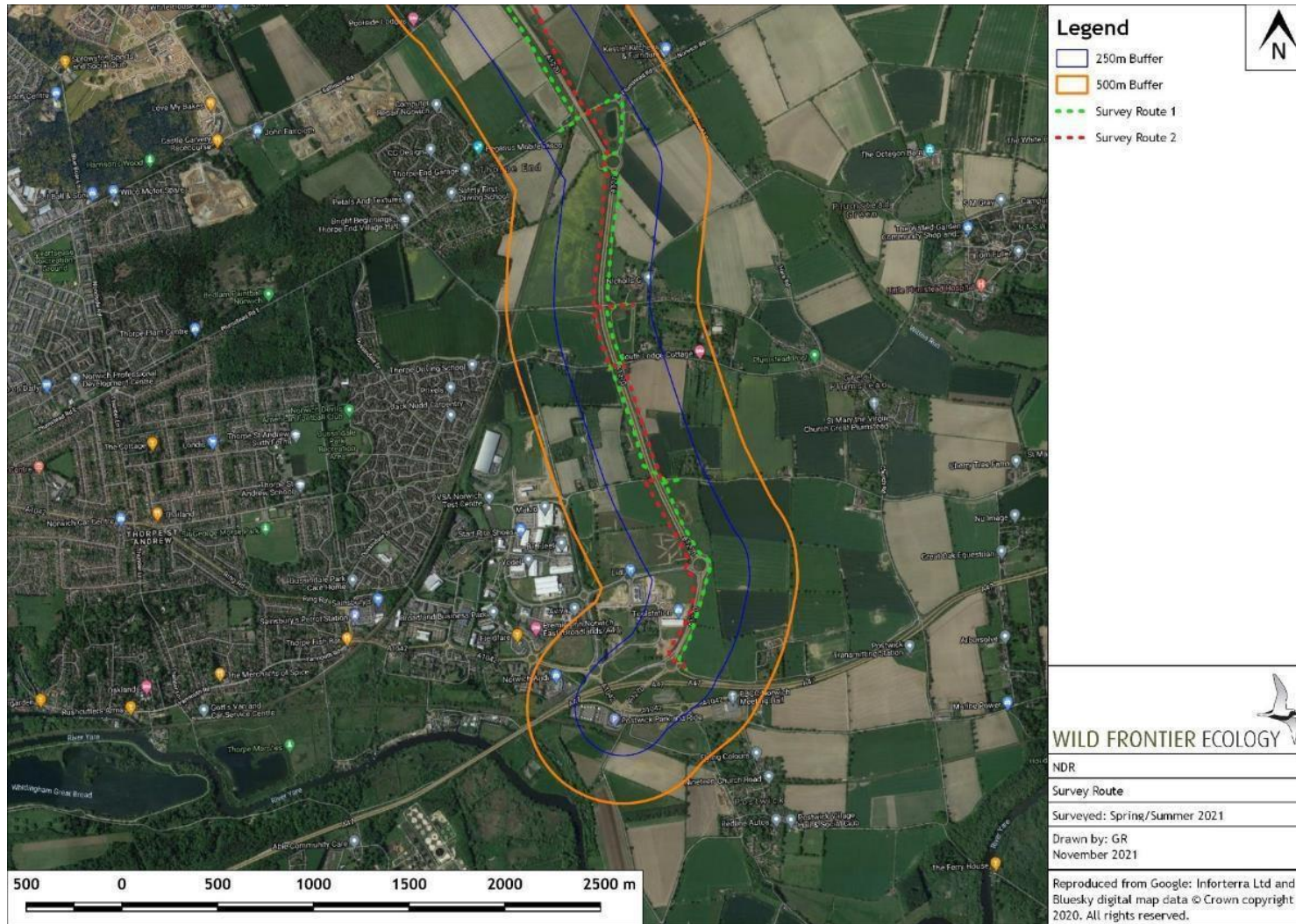


Figure 5: Survey Routes (eastern section)



4. Results

The CBC surveys of 2022 recorded a total of 64 bird species of which 50 were within suitable habitat and demonstrating probable or confirmed breeding behaviour (see Table 2 for the full species list). Of ten Red-listed species recorded eight showed some evidence of holding territory, while of thirteen Amber-listed species recorded, nine were considered likely to be breeding. A single Schedule 1 species was recorded, the Green-listed species little-ringed plover *Charadrius dubius* on a single survey visit, but no breeding evidence of this species was recorded. Table 3 provides the species recorded by WFE in 2021 as a comparison to 2022. Table 4 summarises all records of species of conservation concern and Figures 6 to 9 illustrate all territories identified for these species and minimum number of territories shown in Figures 10 to 13. Table 5 summarises all records of species of conservation concern in 2021 and Figures 14 to 21 illustrate territories of species of conservation concern in 2021 in comparison to 2022.

Areas or ‘hotspots’ holding territories of eight or more species were identified at two locations in 2022; Immediately east of the Buxton Road crossing, and between the Plumstead Road underpass and the roundabout to the south of here near Thorpe End. See Figure 22 for comparison between 2020, 2021 and 2022 locations of ‘hotspots’.

Table 2: All species recorded in 2022 noting evidence of breeding and conservation status

Species	Scientific Name	Evidence of breeding 2022	Conservation Listing (BoCC4)
Blackbird	<i>Turdus merula</i>	Y	Green
Blackcap	<i>Sylvia atricapilla</i>	Y	Green
Black-headed gull	<i>Chroicocephalus ridibundus</i>	N	Amber
Blue tit	<i>Cyanistes caeruleus</i>	Y	Green
Buzzard	<i>Buteo buteo</i>	N	Green
Chaffinch	<i>Fringilla coelebs</i>	Y	Green
Chiffchaff	<i>Phylloscopus collybita</i>	Y	Green
Carrion crow	<i>Corvus corone</i>	Y	Green
Coal tit	<i>Periparus ater</i>	Y	Green
Collared dove	<i>Streptopelia decaocto</i>	Y	Green
Dunnock	<i>Prunella modularis</i>	Y	Amber
Egyptian goose	<i>Alopochen aegyptiaca</i>	Y	Unlisted (feral)
Feral pigeon	<i>Columba livia domestica</i>	N	Unlisted (feral)
Gadwall	<i>Mareca strepera</i>	N	Amber
Garden warbler	<i>Sylvia borin</i>	Y	Green
Goldcrest	<i>Regulus regulus</i>	Y	Green
Goldfinch	<i>Carduelis carduelis</i>	Y	Green
Great-spotted woodpecker	<i>Dendrocopus major</i>	Y	Green
Great tit	<i>Parus major</i>	Y	Green
Green woodpecker	<i>Picus viridis</i>	Y	Green
Greenfinch	<i>Chloris chloris</i>	Y	Green
Grey heron	<i>Ardea cinerea</i>	N	Green
Herring gull	<i>Larus argentatus</i>	N	Red
House sparrow	<i>Passer domesticus</i>	Y	Red
Jackdaw	<i>Corvus monedula</i>	Y	Green
Jay	<i>Garrulus glandarius</i>	Y	Green
Kestrel	<i>Falco tinnunculus</i>	Y	Amber
Linnet	<i>Linaria cannabina</i>	Y	Red

Species	Scientific Name	Evidence of breeding 2022	Conservation Listing (BoCC4)
Lesser black-backed gull	<i>Larus fuscus</i>	N	Amber
Lesser whitethroat	<i>Curruca curruca</i>	Y	Green
Little grebe	<i>Tachybaptus ruficollis</i>	Y	Green
Little-ringed plover	<i>Charadrius dubius</i>	N	Green/Schedule 1
Long-tailed tit	<i>Aegithalos caudatus</i>	Y	Green
Magpie	<i>Pica pica</i>	Y	Green
Mallard	<i>Anas platyrhynchos</i>	Y	Amber
Meadow pipit	<i>Anthus pratensis</i>	Y	Amber
Mistle thrush	<i>Turdus viscivorus</i>	Y	Red
Moorhen	<i>Gallinula chloropus</i>	Y	Green
Nuthatch	<i>Sitta europea</i>	Y	Green
Oystercatcher	<i>Haematopus ostralegus</i>	Y	Amber
Pheasant	<i>Phasianus colchichus</i>	Y	Unlisted (feral)
Pied wagtail	<i>Motacilla alba</i>	N	Green
Red-legged partridge	<i>Alectoris rufa</i>	Y	Unlisted (feral)
Reed bunting	<i>Emberiza schoeniclus</i>	Y	Amber
Ring ouzel	<i>Turdus torquatus</i>	N	Red
Robin	<i>Erithacus rubecula</i>	Y	Green
Rook	<i>Corvus frugilegus</i>	N	Green
Sand martin	<i>Riparia riparia</i>	N	Green
Shelduck	<i>Tadorna tadorna</i>	Y	Amber
Skylark	<i>Alauda arvensis</i>	Y	Red
Song thrush	<i>Turdus philomelos</i>	Y	Red
Sparrowhawk	<i>Accipiter nisus</i>	Y	Green
Spotted flycatcher	<i>Muscicapa striata</i>	Y	Red
Starling	<i>Sterna vulgaris</i>	Y	Red
Stock dove	<i>Columba oenas</i>	Y	Amber
Swallow	<i>Hirundo rustica</i>	Y	Green
Swift	<i>Apus apus</i>	N	Amber
Teal	<i>Anas crecca</i>	N	Amber
Treecreeper	<i>Certhia familiaris</i>	Y	Green
Whitethroat	<i>Sylvia communis</i>	Y	Green
Willow warbler	<i>Phylloscopus trochilus</i>	Y	Amber
Wood pigeon	<i>Columba palumbus</i>	Y	Green
Wren	<i>Troglodytes troglodytes</i>	Y	Green
Yellowhammer	<i>Emberiza citrinella</i>	Y	Red

Table 3: All species recorded in 2021 noting evidence of breeding and conservation status

Species	Scientific Name	Evidence of breeding 2021	Conservation Listing (BoCC4)
Blackbird	<i>Turdus merula</i>	Y	Green
Blackcap	<i>Sylvia atricapilla</i>	Y	Green
Black-headed gull	<i>Chroicophelaus ridibundus</i>	N	Amber
Blue tit	<i>Cyanistes caeruleus</i>	Y	Green
Bullfinch	<i>Pyrrhula pyrrhula</i>	N	Amber
Buzzard	<i>Buteo buteo</i>	N	Green
Canada goose	<i>Branta canadensis</i>	N	Unlisted (feral)
Chaffinch	<i>Fringilla coelebs</i>	Y	Green
Chiffchaff	<i>Phylloscopus collybita</i>	Y	Green

Species	Scientific Name	Evidence of breeding 2021	Conservation Listing (BoCC4)
Carrion crow	<i>Corvus corone</i>	Y	Green
Coal tit	<i>Periparus ater</i>	Y	Green
Collared dove	<i>Streptopelia decaocto</i>	Y	Green
Coot	<i>Fulica atra</i>	Y	Green
Dunnock	<i>Prunella modularis</i>	Y	Amber
Egyptian goose	<i>Alopochen aegyptiaca</i>	Y	Unlisted (feral)
Feral pigeon	<i>Columba livia domestica</i>	N	Unlisted (feral)
Fieldfare	<i>Turdus pilaris</i>	N	Red
Garden warbler	<i>Sylvia borin</i>	Y	Green
Goldcrest	<i>Regulus regulus</i>	Y	Green
Goldfinch	<i>Carduelis carduelis</i>	Y	Green
Great-spotted woodpecker	<i>Dendrocopus major</i>	Y	Green
Great tit	<i>Parus major</i>	Y	Green
Great black-backed gull	<i>Larus marinus</i>	N	Amber
Green woodpecker	<i>Picus viridis</i>	Y	Green
Greenfinch	<i>Chloris chloris</i>	Y	Green
Grey heron	<i>Ardea cinerea</i>	N	Green
Grey partridge	<i>Perdix perdix</i>	Y	Red
Herring gull	<i>Larus argentatus</i>	N	Red
Hobby	<i>Falco subbuteo</i>	N	Green/Schedule 1
House martin	<i>Delichon urbicum</i>	N	Amber
House sparrow	<i>Passer domesticus</i>	Y	Red
Jackdaw	<i>Corvus monedula</i>	Y	Green
Jay	<i>Garrulus glandarius</i>	Y	Green
Kestrel	<i>Falco tinnunculus</i>	N	Amber
Linnet	<i>Linaria cannabina</i>	Y	Red
Lesser black-backed Gull	<i>Larus fuscus</i>	N	Amber
Little grebe	<i>Tachybaptus ruficollis</i>	Y	Green
Little-ringed plover	<i>Charadrius dubius</i>	N	Green/Schedule 1
Long-tailed tit	<i>Aegithalos caudatus</i>	Y	Green
Magpie	<i>Pica pica</i>	Y	Green
Mallard	<i>Anas platyrhynchos</i>	Y	Amber
Meadow pipit	<i>Anthus pratensis</i>	Y	Amber
Mistle thrush	<i>Turdus viscivorus</i>	Y	Red
Moorhen	<i>Gallinula chloropus</i>	Y	Green
Nuthatch	<i>Sitta europea</i>	Y	Green
Oystercatcher	<i>Haematopus ostralegus</i>	Y	Amber
Pheasant	<i>Phasianus colchichus</i>	Y	Unlisted (feral)
Pied wagtail	<i>Motacilla alba</i>	Y	Green
Red kite	<i>Milvus milvus</i>	N	Green/Schedule 1
Red-legged partridge	<i>Alectoris rufa</i>	Y	Unlisted (feral)
Robin	<i>Erithacus rubecula</i>	Y	Green
Rook	<i>Corvus frugilegus</i>	N	Green
Sand martin	<i>Riparia riparia</i>	N	Green
Skylark	<i>Alauda arvensis</i>	Y	Red
Song thrush	<i>Turdus philomelos</i>	Y	Red
Sparrowhawk	<i>Accipiter nisus</i>	N	Green
Starling	<i>Sturnus vulgaris</i>	Y	Red
Stock dove	<i>Columba oenas</i>	Y	Amber
Swallow	<i>Hirundo rustica</i>	Y	Green
Swift	<i>Apus apus</i>	N	Amber
Turtle dove	<i>Streptopelia turtur</i>	N	Red
Treecreeper	<i>Certhia familiaris</i>	Y	Green

Species	Scientific Name	Evidence of breeding 2021	Conservation Listing (BoCC4)
Wheatear	<i>Oenanthe oenanthe</i>	N	Green
Whitethroat	<i>Sylvia communis</i>	Y	Green
Woodlark	<i>Lullula arborea</i>	N	Green/Schedule 1
Wood pigeon	<i>Columba palumbus</i>	Y	Green
Wren	<i>Troglodytes troglodytes</i>	Y	Green
Yellowhammer	<i>Emberiza citrinella</i>	Y	Red

Table 4: Summary of birds of conservation concern and Schedule 1 species 2022

Species Common Name	Conservation Concern Listing	Information on Observations and Breeding Territories
Herring gull	Red-listed	Observed transiting over the survey area on several occasions. Not breeding
House sparrow	Red-listed	Considered likely to be breeding in at least 2 locations within the survey corridor, one close to Dog Lane in the western section and one in airport buildings in the central-western section
Linnet	Red-listed	Frequent sightings of foraging birds with an estimated minimum of 7 and maximum of 20 territories recorded, spread along the route
Mistle thrush	Red-listed	Minimum of 0 and maximum of 3 territories recorded in areas of woodland at the western end of the route, woodland to the east of Buxton Road and trees in a line of hedgerow to north of Plumstead Road
Ring ouzel	Red-listed	One individual recorded on visit 1 in grassland to north-west of Broadland Northway/B1150 roundabout in central-eastern section. Considered to be a passage migrant, not a known breeding species in Norfolk
Skylark	Red-listed	Recorded singing along the entire route over arable fields, grassy cuttings/embankments and around pond margins, estimated minimum of 99 and maximum of 156 territories. Notable concentrations were located in the western and central-western sections
Song thrush	Red-listed	A minimum of 2 and maximum of 10 territories spread along the route
Spotted flycatcher	Red-listed	A minimum of 0 and a maximum of one territory in woodland to east of Buxton Lane on north side of Broadland Northway (central-eastern section)
Starling	Red-listed	Minimum of 0 and maximum of 4 territories recorded in areas of buildings along the route.
Yellowhammer	Red-listed	Minimum of 13 and maximum of 29 territories estimated throughout the route
Black-headed gull	Amber-listed	Small flocks observed transiting and foraging in fields on occasion. Not breeding
Dunnock	Amber-listed	Minimum of 8 and maximum of 41 territories estimated throughout the route
Gadwall	Amber-listed	Single male recorded on Lagoon 25 to south of Smea Lane on visit 2. Not breeding

Species Common Name	Conservation Concern Listing	Information on Observations and Breeding Territories
Kestrel	Amber-listed	Observed hunting along the cuttings and embankments on several occasions, especially along the eastern section. Possible breeding at three locations, woodland near Spixworth, where the Marriot's Way goes under the Broadland Northway and an area of mature trees on land by Toad Lane and Middle Lane in the eastern section
Lesser black-backed gull	Amber-listed	Several overflying individuals recorded. Not breeding
Mallard	Amber-listed	At least three pairs thought likely to be breeding close to Lagoons 18, 22 & 23 in the central-eastern and eastern sections of the route
Meadow pipit	Amber-listed	0-2 territories, callings birds in suitable habitat close to Norwich Airport, both on a single occasion
Oystercatcher	Amber-listed	Pair observed in suitable breeding habitat at Lagoon 22 to south of Plumstead Road
Reed bunting	Amber-listed	Pairs observed in suitable breeding habitat at Lagoon 5 to west of Brewery Lane, and at Lagoon 22 to south of Plumstead Road
Shelduck	Amber-listed	Minimum of 0 and maximum of 1 territories. Single pair recorded on visit 1 at Lagoon 5 to west of Brewery Lane
Stock dove	Amber-listed	Minimum of 1 and maximum of 9 territories recorded spread along the route
Swift	Amber-listed	Recorded several times during the surveys but no evidence of breeding
Teal	Amber-listed	A single female recorded at Lagoon 17 near Dobb's Beck on visit 2, but no evidence of breeding
Willow warbler	Amber-listed	Minimum of 0 and maximum of 1 territories with a singing bird recorded in woodland at western end of route on visit 1
Little-ringed plover	Green listed Schedule 1	A single bird recorded on survey visit 3 by the Lagoon 17 near Dobb's Beck. Not seen previously and assumed to have moved elsewhere to breed. Not recorded at Lagoon 5 where breeding was confirmed in 2020

Table 5: Summary of birds of conservation concern and Schedule 1 species 2021

Species Common Name	Conservation Concern Listing	Information on Observations and Breeding Territories
Fieldfare	Red-listed	A single bird observed on the first survey visit close to Reepham Road junction. Winter visitor and therefore not breeding
Grey partridge	Red-listed	Two territories recorded within survey corridor; one pair flushed from the roadside cutting with chicks at the western end and the other a pair just north of the airport roundabout
Herring gull	Red-listed	Observed transiting over the survey area on several occasions. Not breeding
Linnet	Red-listed	Frequent sightings of foraging birds with an estimated minimum of 4 and maximum of 8 territories recorded, mostly in the western section of the route
Mistle thrush	Red-listed	Minimum of 0 and maximum of 3 territories recorded in the western section of the route
House sparrow	Red-listed	Considered likely to be breeding in at least 1 location within the survey corridor close to Dog Lane in the western section
Skylark	Red-listed	Recorded singing along the entire route over arable fields, grassy cuttings/embankments and around pond margins, estimated minimum of 86 and maximum of 132 territories. Notable concentrations were located between School Lane and Drayton Lane and between Fir Covert Road and Reepham Road both in the western section
Song thrush	Red-listed	A minimum of 3 and maximum of 9 territories identified in the western, central-western and central-eastern sections
Starling	Red-listed	Observed occasionally in flight at various locations along the route but no singing birds or evidence of breeding
Turtle dove	Red-listed	Single bird observed in flight during one survey visit close to Horsford junction in the western section. No evidence of breeding within the survey corridor
Yellowhammer	Red-listed	Minimum of 14 and maximum of 27 territories estimated throughout the route
Black-headed gull	Amber-listed	Small flocks observed transiting and foraging in fields on occasion. Not breeding
Bullfinch	Amber-listed	Single bird recorded close to the A140 junction, not thought to be breeding in this location
Dunnock	Amber-listed	Minimum of 4 and maximum of 36 territories estimated throughout the route

Species Common Name	Conservation Concern Listing	Information on Observations and Breeding Territories
Great black-backed gull	Amber-listed	Single observation by airport. Not breeding
Kestrel	Amber-listed	Observed hunting along the cuttings and embankments on several occasions, especially along the eastern section, but no evidence of breeding
Lesser black-backed gull	Amber-listed	Several overflying individuals recorded. Not breeding
Mallard	Amber-listed	At least two pairs thought likely to be breeding close to Lagoons 22 and 23 in the eastern section of the route
Meadow pipit	Amber-listed	0-1 territories, a singing bird close to the Horsford junction in the western section on a single occasion
Oystercatcher	Amber-listed	Pair observed in suitable breeding habitat at the western end of the route
Stock dove	Amber-listed	Minimum of 1 and maximum of 4 territories recorded in the central-eastern and eastern sections
Swift	Amber-listed	Recorded several times during the surveys but no evidence of breeding
Hobby	Green-listed Schedule 1	Single observation of a hunting bird by the A1151 junction. No evidence of breeding within the survey corridor
Little-ringed plover	Green listed Schedule 1	A pair recorded on survey visit 1 by Lagoon 8 at the A140 junction. Not seen subsequently and assumed to have moved elsewhere to breed. Not recorded at Lagoon 5 where breeding was confirmed in 2020
Woodlark	Green listed Schedule 1	A bird recorded singing and holding territory in small area of semi-suitable habitat at the far western end of the route. Not recorded subsequently and considered unlikely to be breeding in this location

4.1 Constraints

The surveys were constrained by heavy traffic noise making it difficult to detect bird song on the majority of sections adjacent to the road. Also, due to the lack of available detail regarding the previous survey routes, it was not possible to replicate the other post construction surveys (prior to 2021). This likely led to a disparity in recording certain species; in particular in areas of human habitation such as starling, swift and house sparrow. It seems therefore likely that previous survey routes did not follow the line of the highway as closely as in 2021 and 2022.

5. Discussion (and comparison with previous surveys)

The 2022 surveys recorded slightly more species considered likely to be breeding within the survey corridor than the 2021 surveys (50 species in 2022 compared to 44 in 2021), but still fewer than the previous post-construction surveys (54 species in both 2020 and 2019 and 55 in 2018). These are detailed in Tables 6 and 7. As outlined in the report for the 2021 surveys⁸, possible reasons for the disparity between the 2021/2022 surveys and those undertaken previous to this includes deviation in survey coverage; the 2022 and 2021 surveys followed very closely to the road itself and adjacent habitats, and did not cover much of the more 'urban' habitat within the edge of the buffer zone. It is assumed (exact routes were not available) that the previous post construction surveys had more coverage of this habitat as there were breeding records for species such as swift *Apus apus*, house martin *Delichon urbicum* and feral pigeon *Columba livia domestica* which were also recorded in 2021/2022 but only as casual observations. House sparrow *Passer domesticus* and starling *Sturnus vulgaris* were recorded as breeding, but numbers are still low and likely under-represented compared to the 2020, 2019 and 2018 surveys given the suitable 'urban' habitat on the periphery of the buffer zone.

There was a net increase in numbers of red-listed species considered likely to be breeding within the survey corridor in 2022 as compared to those recorded in 2021. One additional red-listed species was recorded with evidence of breeding, namely spotted flycatcher *Muscicapa striata*, and also starling was recorded in 2022 but not in 2021. Grey partridge *Perdix perdix* was not recorded in 2022, although breeding evidence was obtained in 2021. This species however is difficult to detect, particularly over traffic noise and may well have been overlooked in 2022.

In terms of numbers of territories of Red-listed species (data was not available for territory numbers of Amber-listed species prior to 2021), there were increases in number of territories of house sparrow, linnets *Linaria cannabina*, skylark *Alauda arvensis* and starling between 2021 and 2022. Territories of mistle thrush, song thrush *Turdus philomelos* and yellowhammer *Emberiza citrinella* were broadly similar in both 2022 and 2021. The only species where a decline has been observed in territory numbers is grey partridge, which, as detailed above, was not recorded during the 2022 surveys.

The increase in skylark territories from a minimum of 86 in 2021 to a minimum of 99 is considered likely due to the more favourable weather conditions for breeding this year. The maximum number of recorded territories is effectively the same as the pre-construction survey results (156 maximum territories in 2022 compared to 156 singing males in 2013) and validates the conclusion in last year's report¹¹ that the estimated range represents a much more realistic picture of actual numbers present than the previous likely under-estimations.

Territories of four additional amber-listed species were recorded in 2022 compared to 2021, these being kestrel *Falco tinnunculus*, reed bunting *Emberiza schoeniclus*, shelduck *Tadorna tadorna* and willow warbler *Phylloscopus trochilus*. These are likely due to annual variations with all of these species excluding shelduck having been recorded as likely or confirmed breeders in at least one of the previous post-construction survey years. The more favourable weather conditions in spring 2022 could also be a factor in a wider range of species being recorded. Shelduck is a newly recorded potential breeding species for the study area.

As well as an increase in number of Amber-listed species breeding within the survey area in 2022 compared to 2021, there was also an increase in number of territories for some of these

⁸ Riley, G. (2021) *Broadland Northway, Post-construction Breeding Bird Surveys 2021*. Wild Frontier Ecology.

species. Of those species that were recorded breeding in 2021, dunnock *Prunella modularis*, mallard *Anas platyrhynchos* and stock dove *Columba oenas* all experienced notable increases in territory numbers in 2022. There were no Amber-listed species lost as breeding species in 2022 which were recorded in 2021, with oystercatcher *Haematopus ostralegus* likely breeding again in 2022, having been recorded as a new post-construction survey breeding species in 2021.

The majority of species have remained relatively consistent in number across the five years of post-construction surveys. As mentioned, skylark numbers have increased over the post-construction surveys, but are similar to those recorded during the pre-construction surveys. Species such as mute swan and tawny owl have not been recorded in the last two years of surveys.

Total numbers of species considered likely to be breeding are down in post-construction years compared to pre-construction. The highest post-construction record is 55 species recorded in 2018, compared to 61 recorded in the pre-construction surveys. This is likely due to change of habitat and disturbance from construction and subsequent use by traffic. As details of amber-listed species are not given for pre-construction, no conclusion can be made regarding changes in territory numbers of amber-listed species before and after construction.

The records of red-listed species in the majority of post-construction years, or at least in later years of the post-construction surveys, are very similar to the pre-construction survey results. The main difference is the loss of cuckoo as a breeding species, the species was considered to likely be breeding during the pre-construction surveys but has only been recorded outside of the buffer during post-construction surveys. This may be due to a loss of suitable habitat which despite the creation of lagoons, has not yet developed yet for cuckoos to re-establish. Song thrush and mistle thrush populations are also down when compared to baseline figures, possibly due to loss of habitat or disturbance from construction impacting these species. There is a national decline of cuckoo, mistle thrush and song thrush which will also likely be a reason for these trends over the course of the surveys.

Despite these losses the creation of new habitats such as the lagoons have provided suitable breeding areas for species not recorded prior to the development such as little grebe, while the grassy roadside embankments and newly planted trees/scrub have provided additional habitat for Red-listed species such as skylark and linnet. As these habitats mature populations of some species may continue to increase, while additional wetland species may be attracted to the area in future years.

Table 6: Pre and post construction CBC comparison of Red-Listed breeding territories

Species	Number of Territories Baseline survey 2012 and 2013	Number of Territories 2018	Number of Territories 2019	Number of Territories 2020	Number of Territories 2021	Number of Territories 2022
Cuckoo	2 birds	Not recorded	Heard outside buffer	Not recorded	Not recorded	Not recorded
Grasshopper warbler	Not recorded	1 singing	Not recorded	Not recorded	Not recorded	Not recorded
Grey Partridge	Not breeding	1 pair	Not recorded	Not recorded	2 territories	Not recorded
House sparrow	3 singing males	4 colonies	4 colonies	3-4 colonies	1 'colony'	2 'colonies'
Linnet	10 singing males	13 singing males	21 singing males	11 singing males	Estimated 4-8 territories	Estimated 7-20 territories
Marsh tit	2 territories	4 territories (1 location)	4 territories (2 locations)	1 territory	Not recorded	Not recorded
Mistle thrush	10 territories	4 territories	3 territories	3 territories	0-3 territories	0-3 territories
Skylark	156 singing males	25 territories	37 territories	44 territories	Estimated 86-132 territories	Estimated 99-156 territories
Song thrush	22 territories	10 territories	10 territories	10 territories	3-9 territories	2-10 territories
Spotted flycatcher	1 pair	Not recorded	Not recorded	Not recorded	Not recorded	0-1 territories
Starling	4 singing males	17 males	11 males	8 males	No singing males	0-4 territories
Yellowhammer	34 territories	9 territories	13 territories	16 territories	14-27 territories	13-29 territories

Table 7: Comparison of post construction Amber-Listed breeding species

Amber-listed Species	Year 1 Survey: 2018 Evidence of Breeding (Y/N)	Year 2 Survey: 2019 Evidence of Breeding (Y/N)	Year 3 Survey: 2020 Evidence of Breeding (Y/N)	Year 4 Survey: 2021 Evidence of Breeding (Y/N)	Year 5 Survey: 2022 Evidence of Breeding (Y/N)
Black-headed gull	N	N	N	N	N
Bullfinch	Y	Y	Y	N	Not recorded
Common sandpiper	Not recorded	Not recorded	N	N	Not recorded
Dunnock	Y	Y	Y	Y	Y
Gadwall	Not recorded	Not recorded	Not recorded	Not recorded	N
Great BB Gull	Not recorded	Not recorded	Not recorded	N	Not recorded
Greylag goose	N	N	N	N	Not recorded
House martin	Y	Y	Y	N	Not recorded
Kestrel	N	N	N	N	Y
Lesser BB Gull	N	N	N	N	N
Mallard	N	N	Y	Y	Y
Meadow pipit	Y	Y	Y	Y	Y
Mute swan	N	N	Y	Not recorded	Not recorded
Oystercatcher	N	N	N	Y	Y
Reed bunting	Y	Y	N	Not recorded	Y
Shelduck	Not recorded	Not recorded	Not recorded	Not recorded	Y
Stock dove	N	Not recorded	N	Y	Y
Swift	Y	Y	Y	N	N
Tawny owl	Y	Y	Y	Not recorded	Not recorded
Teal	Not recorded	N	N	Not recorded	N
Tufted Duck	Y	N	N	N	Not recorded
Willow warbler	Y	Y	Y	Not recorded	Y

6. Conclusion

The 2022 surveys undertaken by WFE along the route of the Broadland Northway represent the fifth of five post-construction surveys stipulated in the Environmental Statement. The 2022 surveys did not experience the constraint of a colder spring compared to temperatures recorded during the 2021 surveys.

Numbers of species found to be nesting within the survey corridor were higher than were recorded in 2021, but lower compared to the previous post construction surveys, 50 as opposed to 44 in 2021, but compared to 54 being recorded during 2019 and 2020. Potential reasons for this increase between 2021 and 2022 include more favourable weather conditions during the majority of the surveys in 2022.

There was also a general increase in numbers of territories of Red and Amber-listed species between 2021 and 2022 notably in species such as dunnock, linnet and skylark. Shelduck was a newly recorded breeding species having not been recorded during the previous surveys.

Notable records in 2022 include a single spotted flycatcher territory and a ring ouzel on a single occasion in the central-eastern section of the route in late April, the latter considered to be a passage migrant.

Overall number of species considered to likely be breeding have decreased following construction, but no information is available for amber-listed species recorded during pre-construction species to provide full details. Most records of red-listed species considered to likely be breeding are fairly similar post-construction to pre-construction. The main difference is no evidence has been recorded of cuckoo breeding during post-construction surveys and mistle thrush and song thrush territories have decreased following construction. This is likely due to habitat changes and disturbance from construction and subsequent use by traffic of the Broadland Northway and these species are declining nationally.

Figure 6: Maximum number BoCC Red and Amber-Listed Territories 2022 (western section)

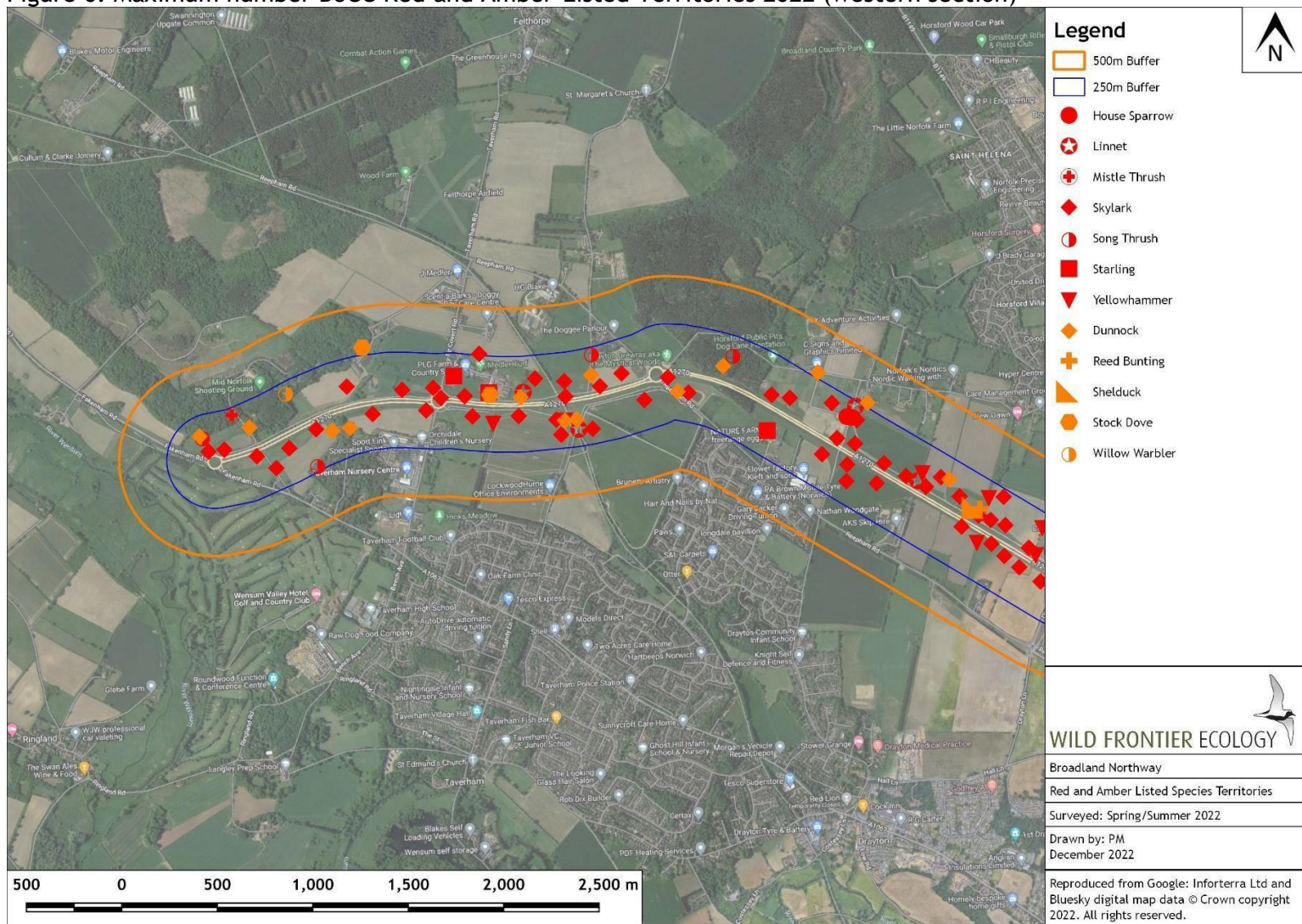


Figure 7: Maximum number BoCC Red and Amber-Listed Territories 2022 (central-western section)

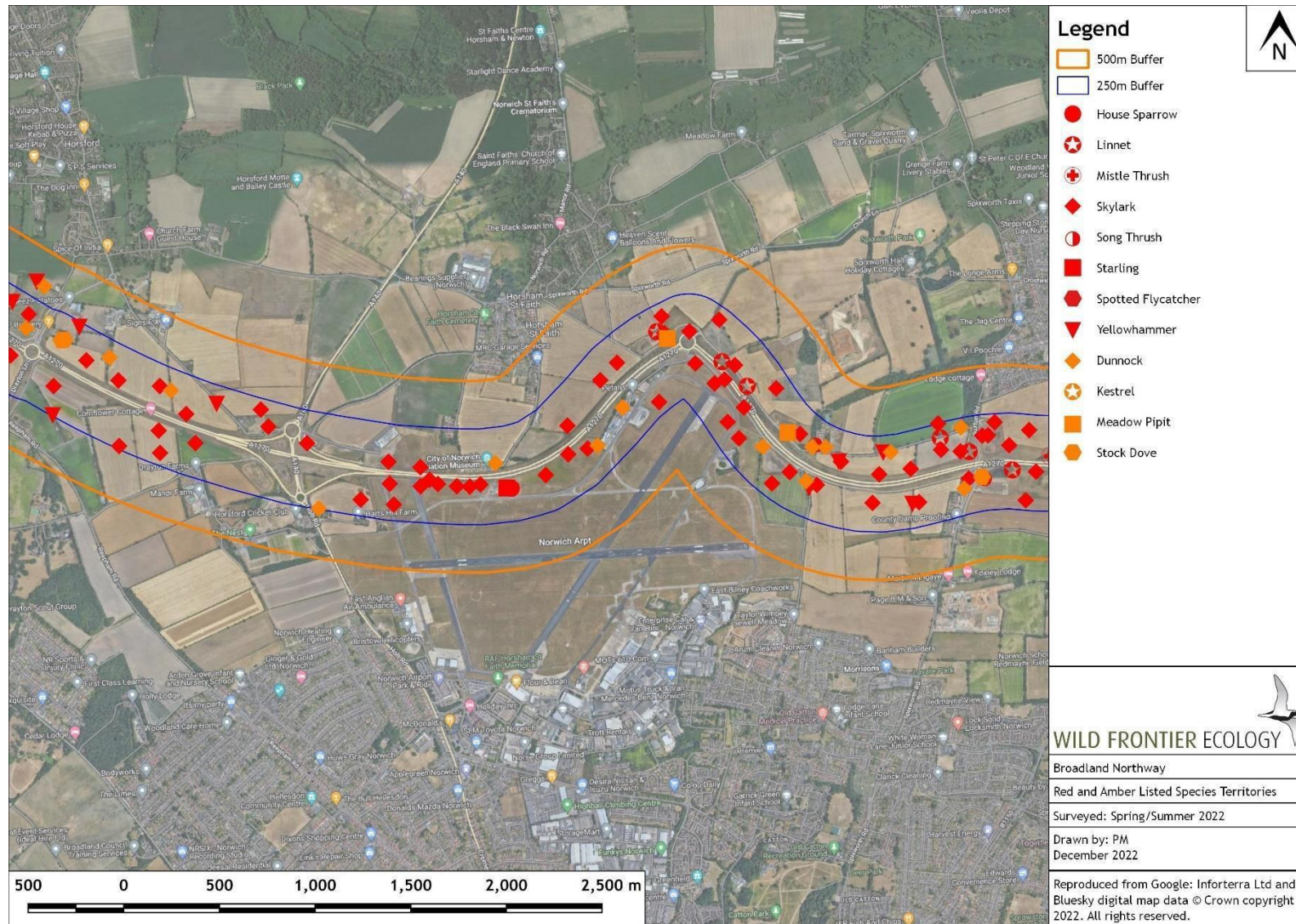


Figure 8: Maximum number BoCC Red and Amber-Listed Territories 2022 (central-eastern section)

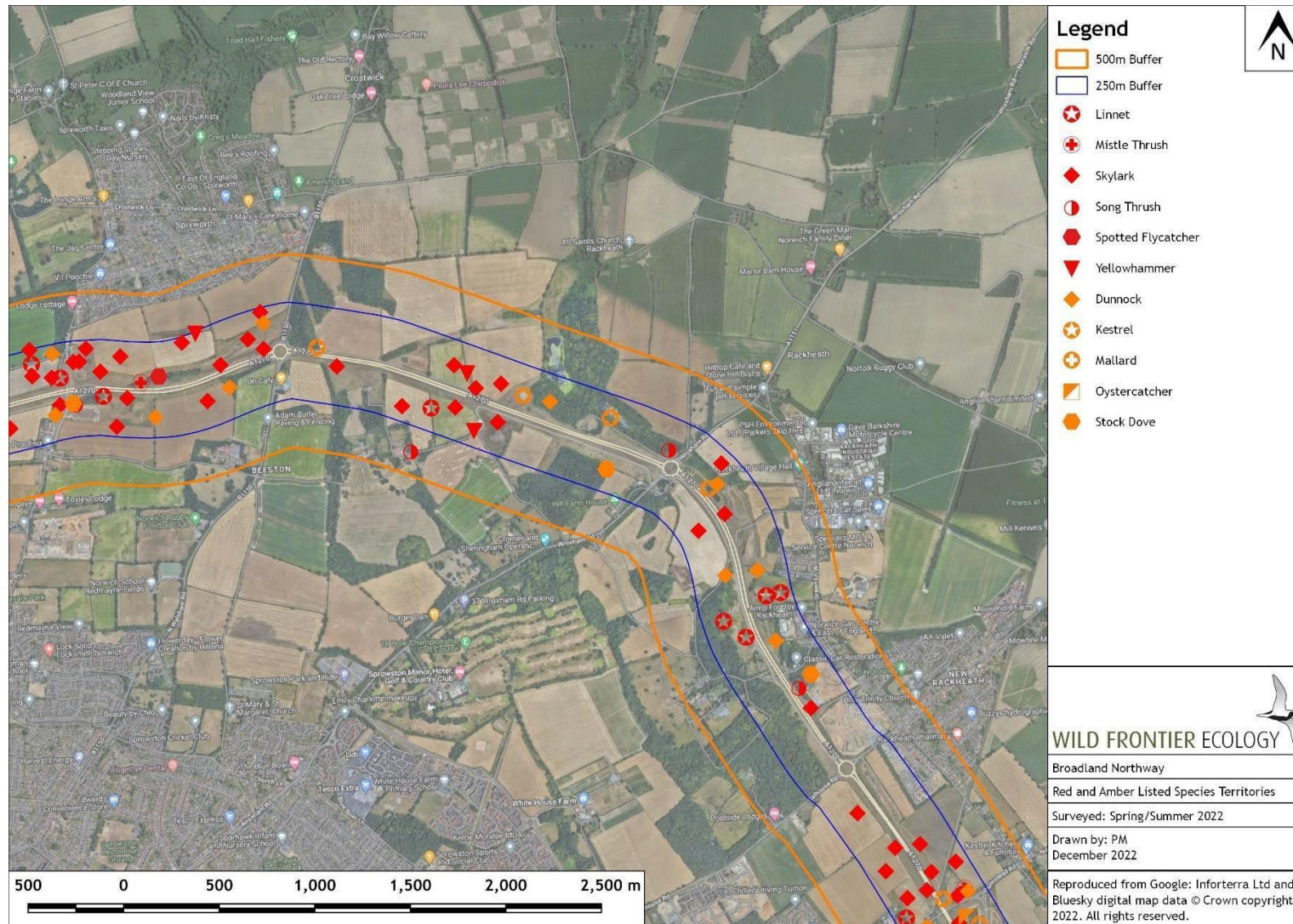


Figure 9: Maximum number BoCC Red and Amber-listed territories 2022 (eastern section)

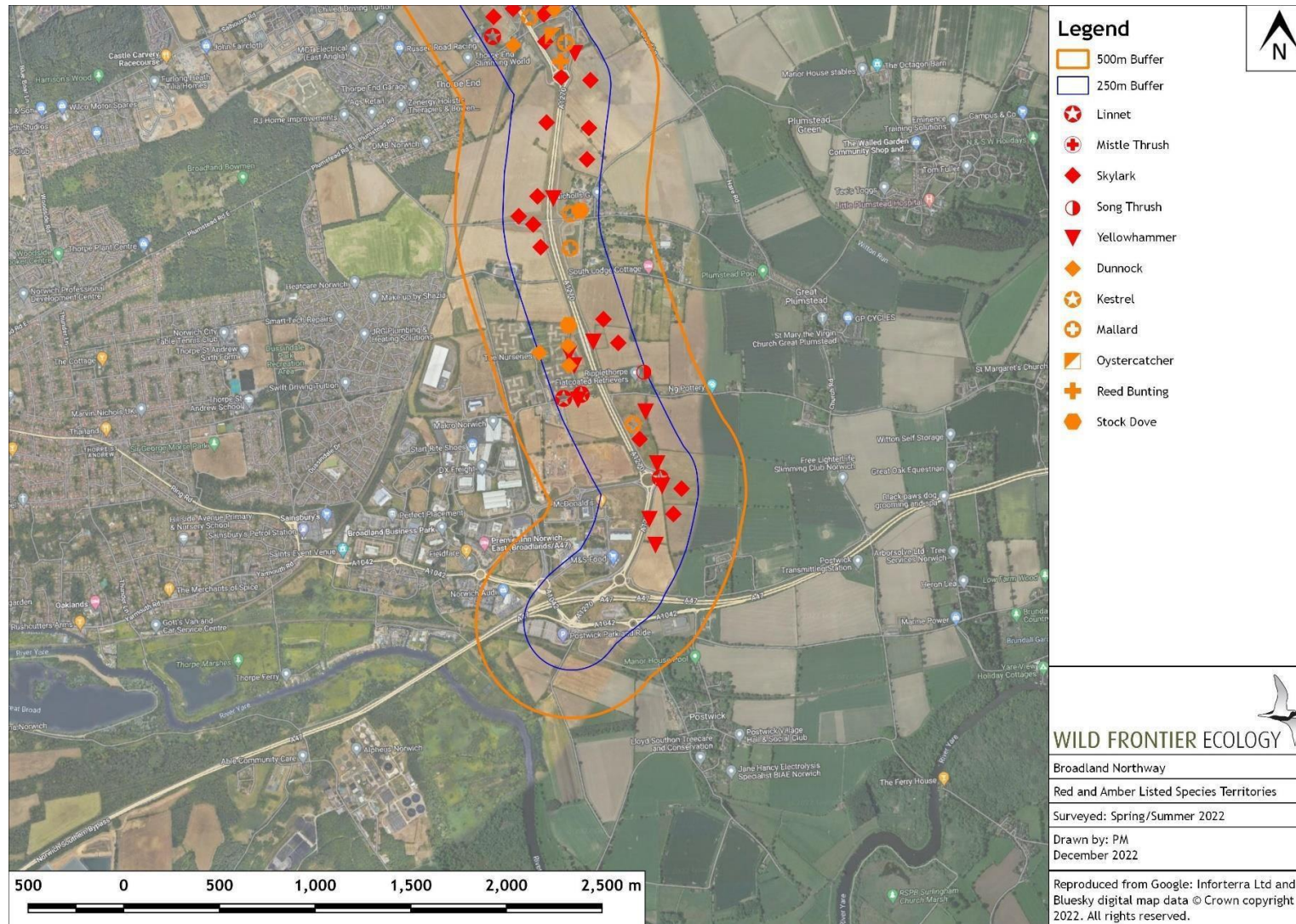


Figure 10: Minimum number BoCC Red and Amber listed Territories 2022 (western section)

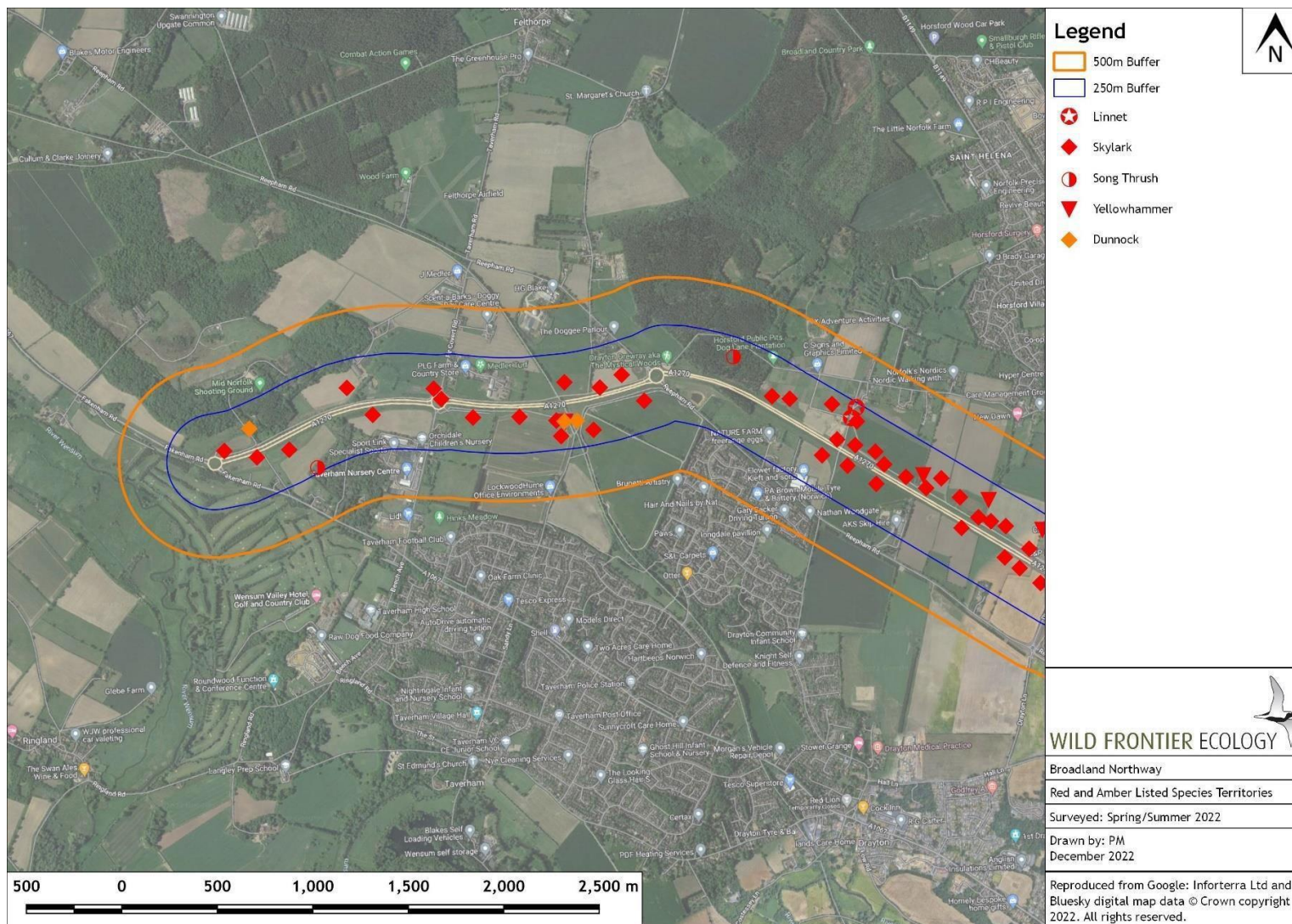


Figure 11: Minimum number BoCC Red and Amber listed territories 2022 (central-western section)

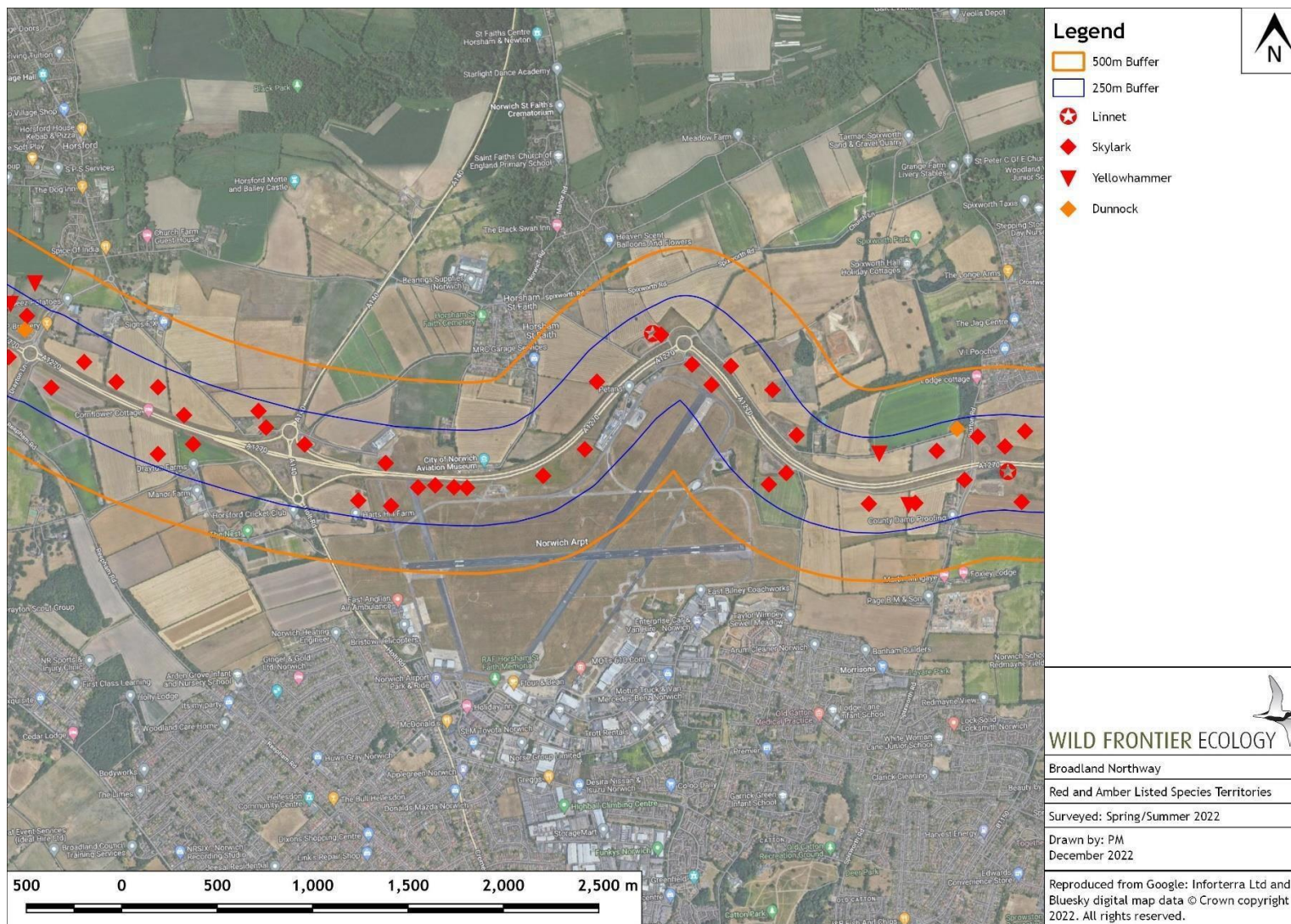


Figure 12: Minimum number BoCC Red and Amber listed territories 2022 (central-eastern section)

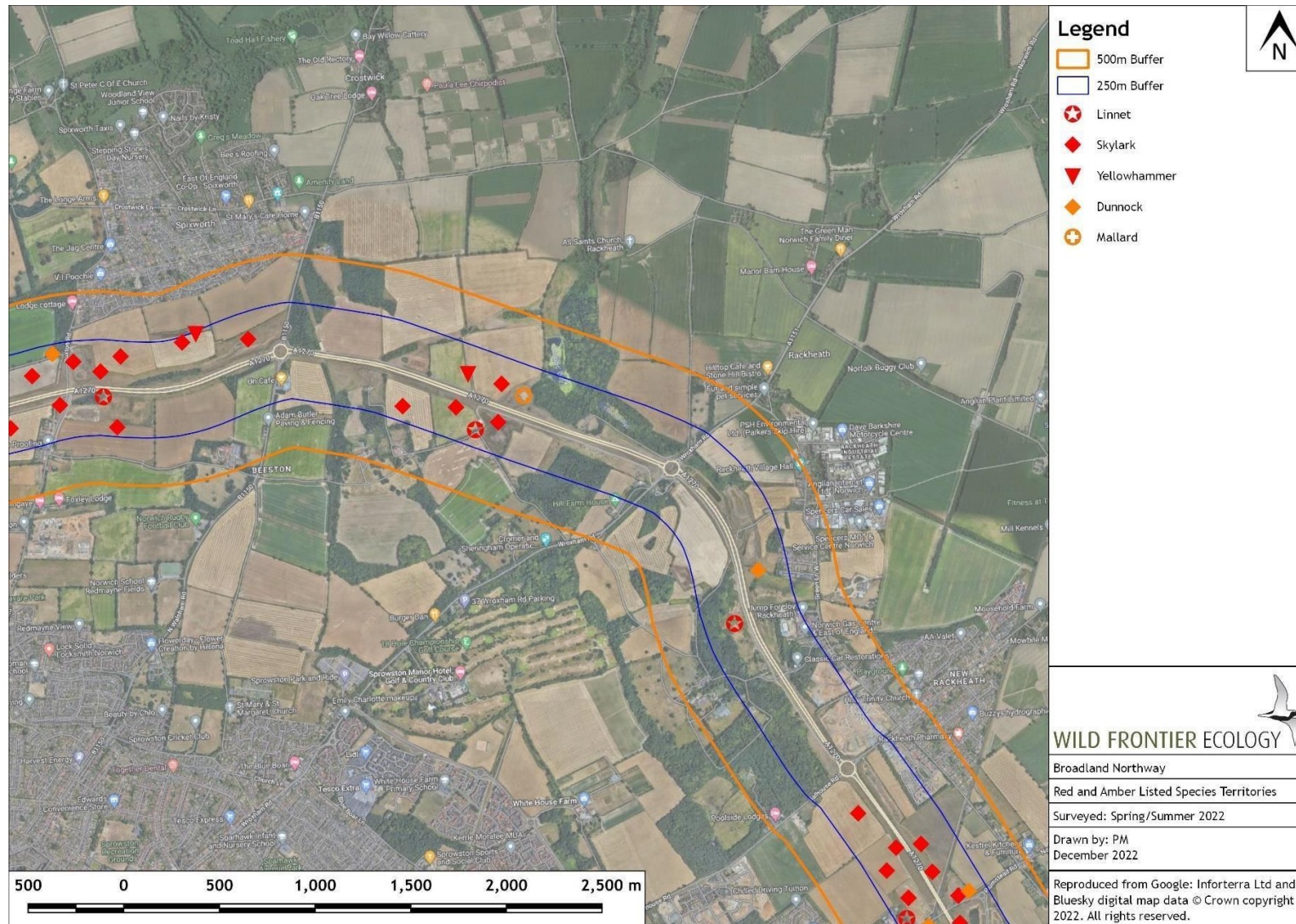


Figure 13: Minimum number BoCC Red and Amber listed species 2022 (eastern section)

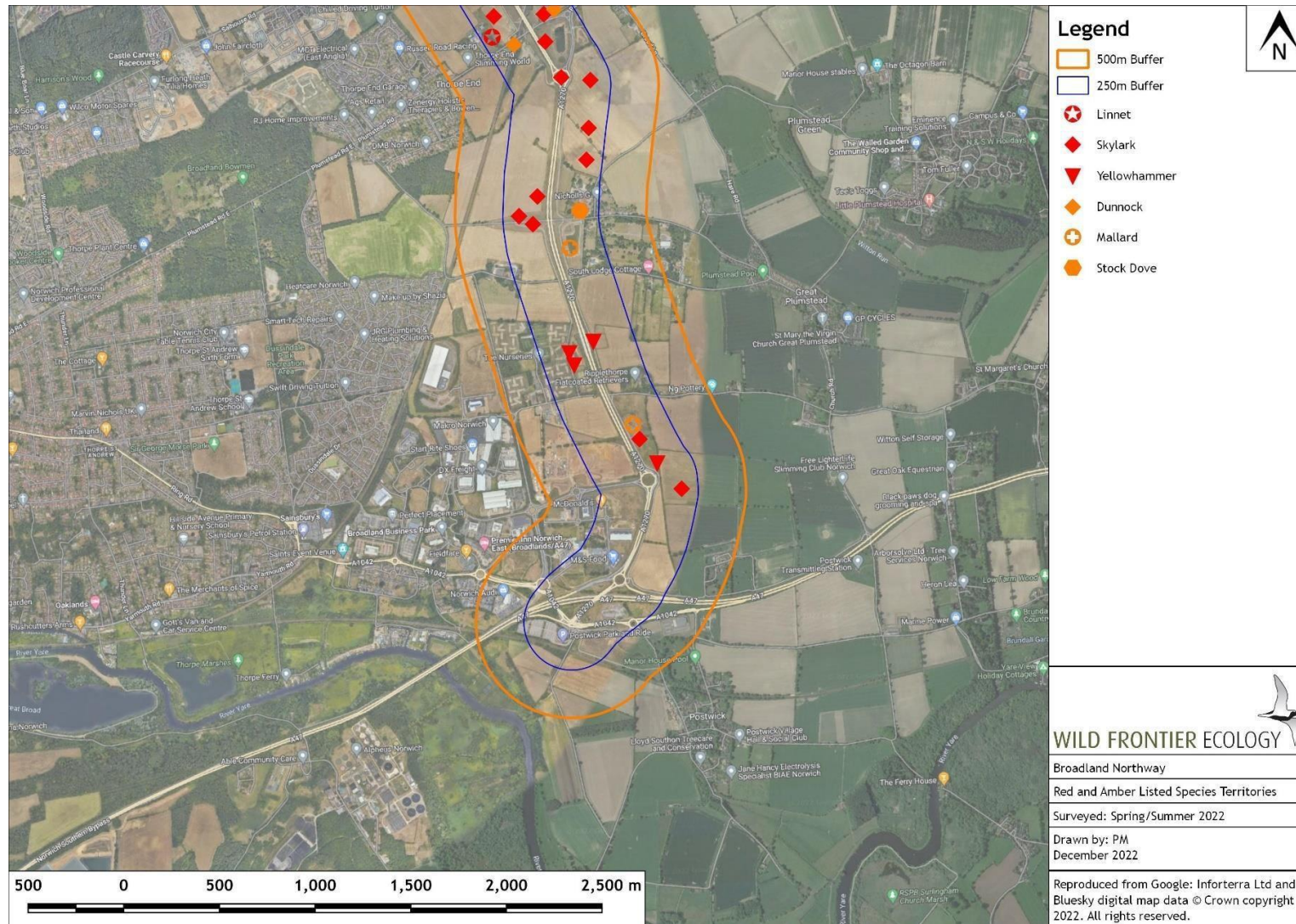


Figure 14: Maximum number BoCC Red and Amber-Listed Territories 2021 (western section)

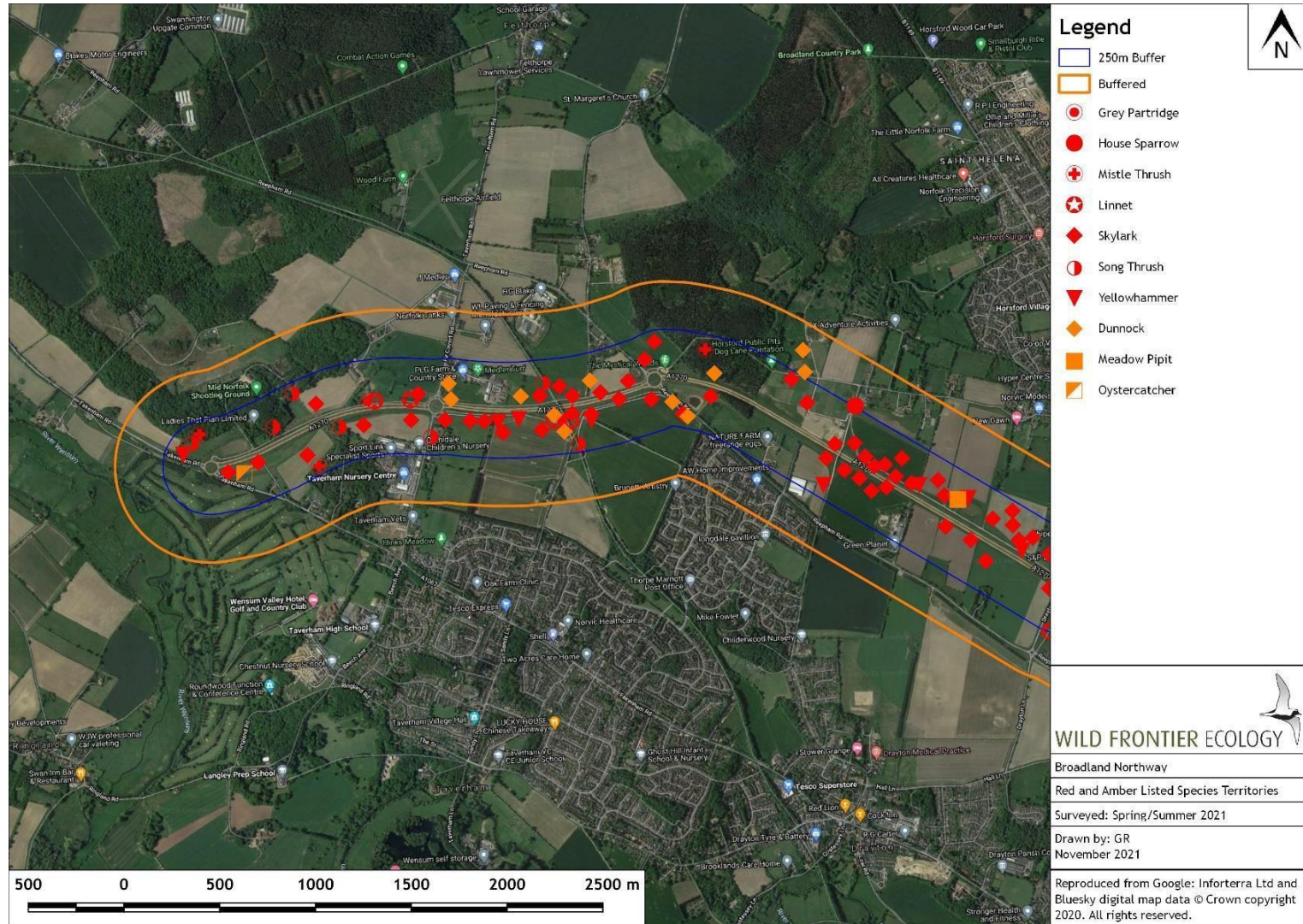


Figure 15: Maximum number BoCC Red and Amber-Listed Territories 2021 (central-western section)

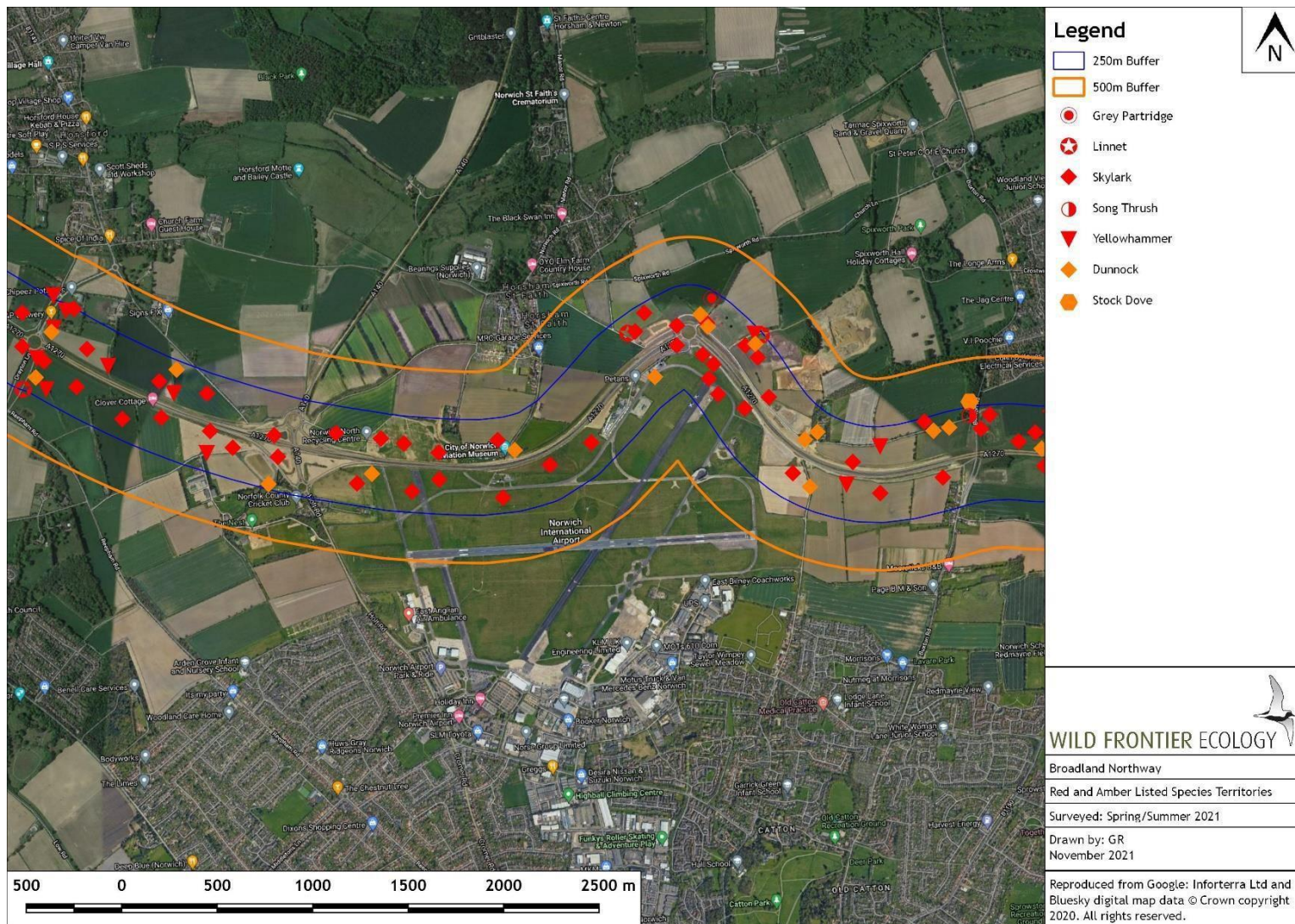


Figure 16: Maximum number BoCC Red and Amber-Listed Territories 2021 (central-eastern section)

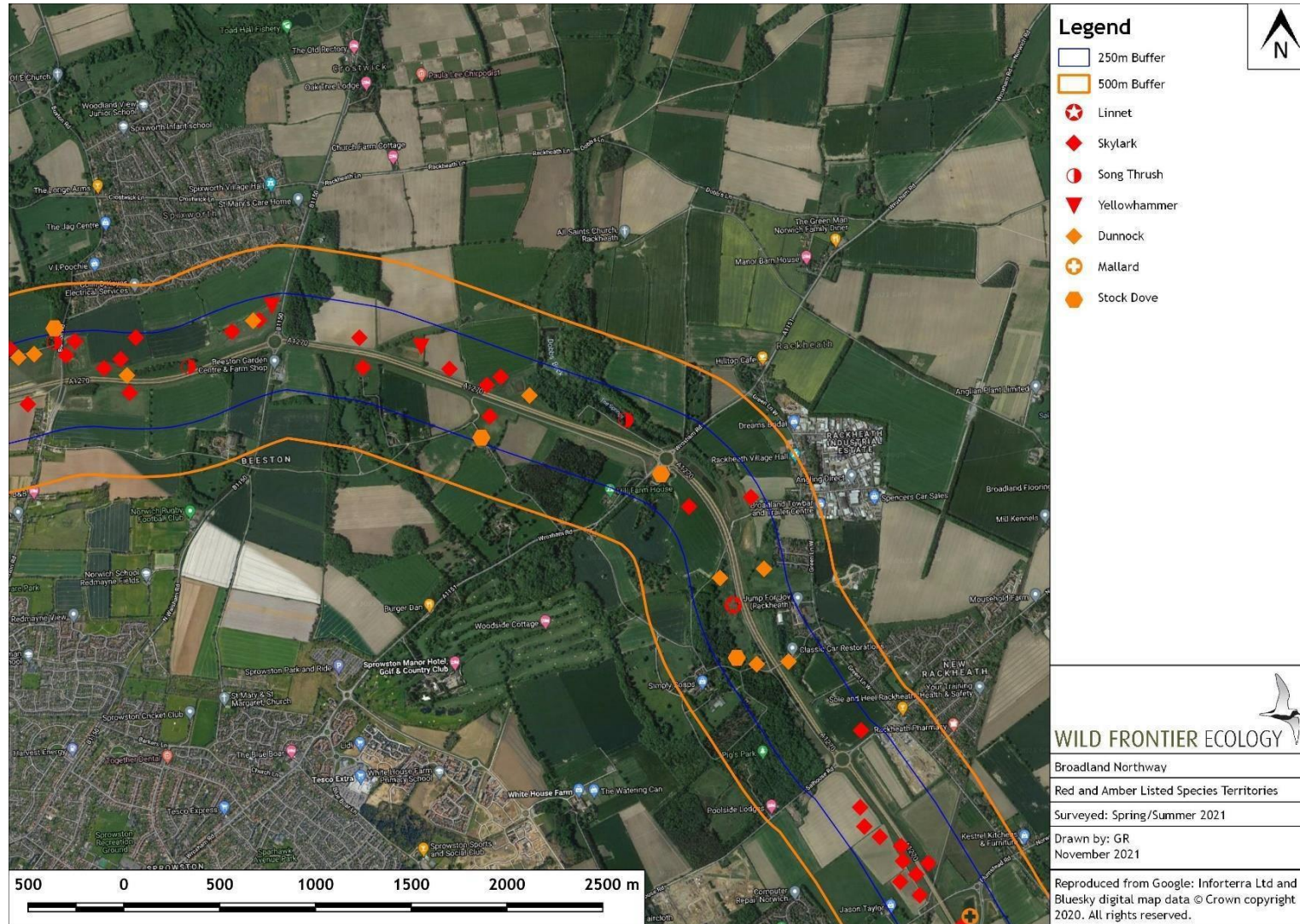


Figure 17: Maximum number BoCC Red and Amber-listed territories 2021 (eastern section)

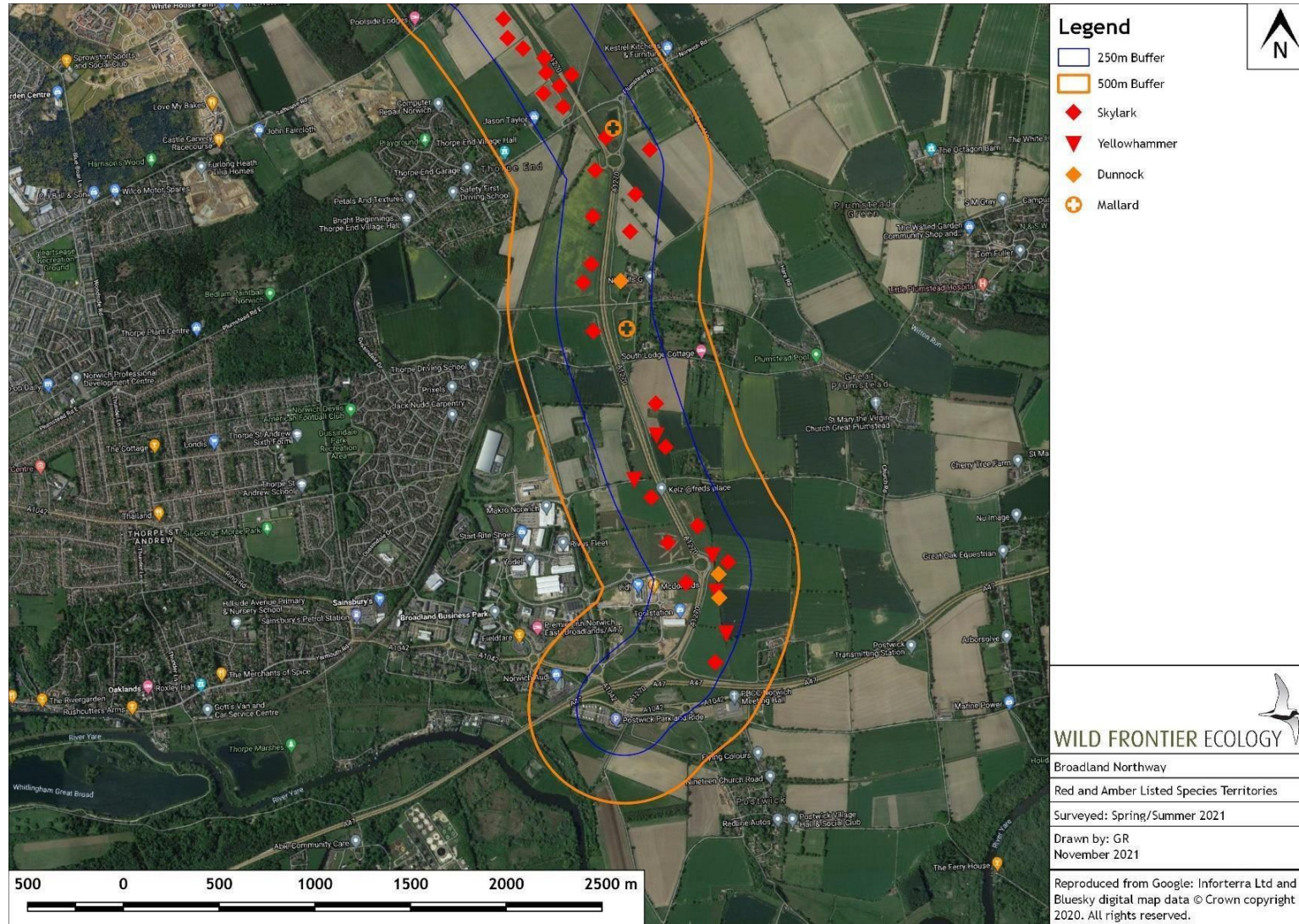


Figure 18: Minimum number BoCC Red and Amber listed Territories 2021 (western section)

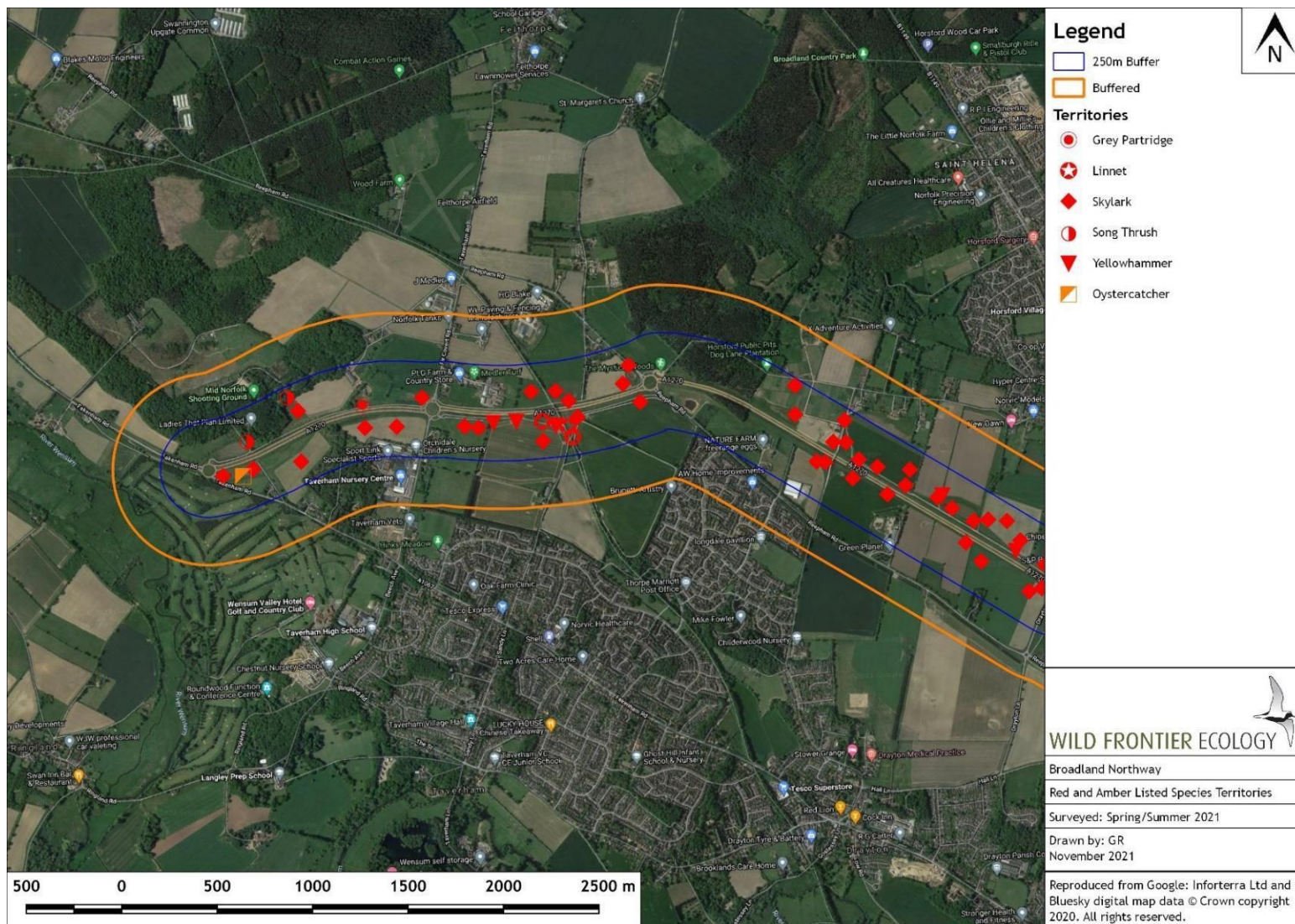


Figure 19: Minimum number BoCC Red and Amber listed territories 2021 (central-western section)

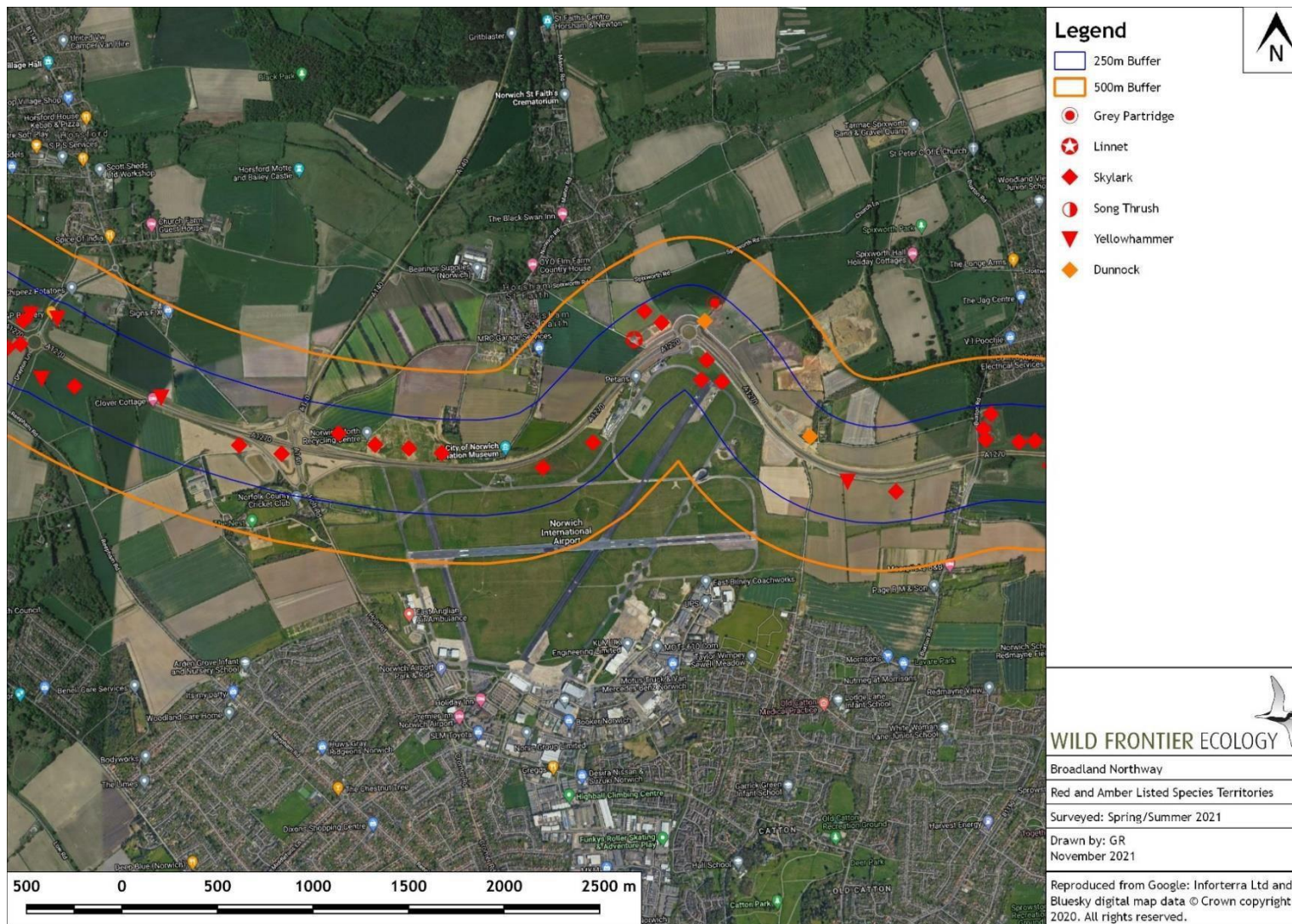


Figure 20: Minimum number BoCC Red and Amber listed territories 2021 (central-eastern section)

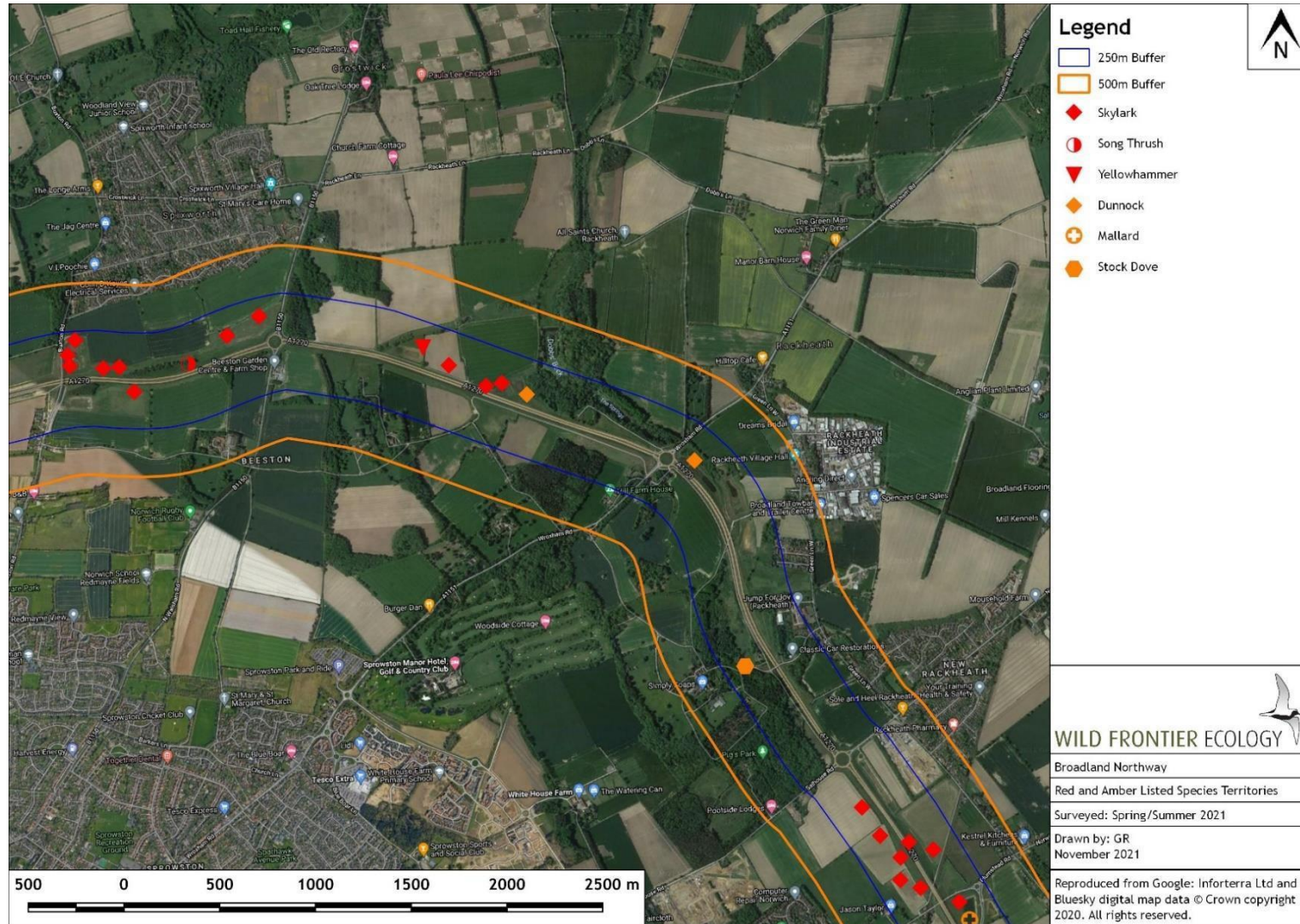


Figure 21: Minimum number BoCC Red and Amber listed species 2021 (eastern section)

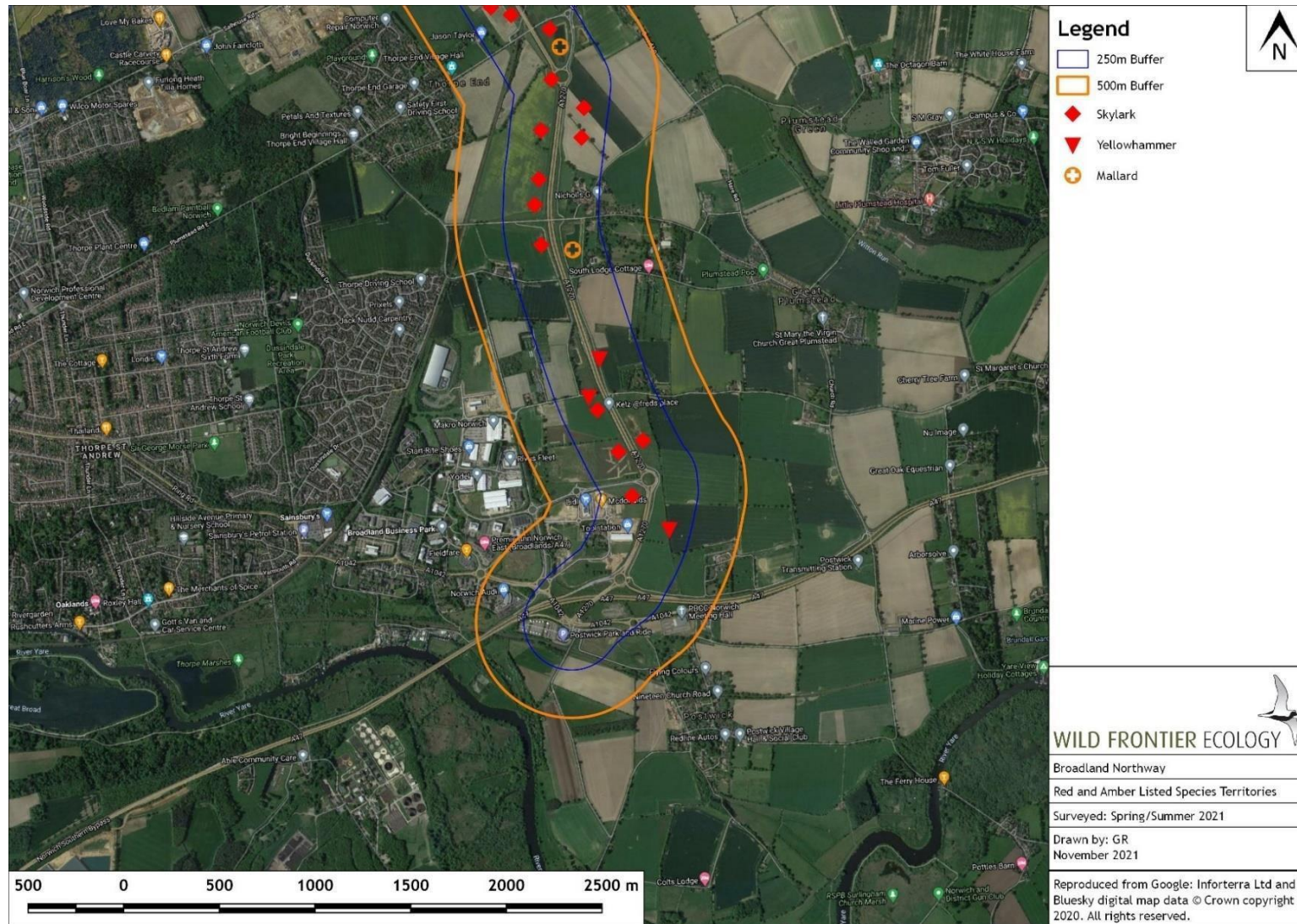


Figure 22: Location of 'Hotspots' containing 8+ nesting species, comparing 2020, 2021 and 2022

