

Lower Thames Crossing

6.3 Environment Statement Appendices

Appendix 8.6 – Reptiles

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6.3 Environment Statement Appendices

Appendix 8.6 – Reptiles

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1 Introduction

- 1.1.1 This document presents the results of the reptile desk study and field surveys carried out between 2017 and 2022 to inform the Environmental Impact Assessment for the A122 Lower Thames Crossing (the Project). It forms an appendix to Chapter 8: Terrestrial Biodiversity (Application Document 6.1) of the Environmental Statement.
- 1.1.2 Based on desk study information and survey results, the reptile features of the Project comprise adder *Vipera berus*, grass snake *Natrix Helvetica*, common lizard *Zootoca vivipara* and slow-worm *Anguis fragilis*. These features are described in turn in the following sections.

2 Legislation and conservation status

- 2.1.1 The four widespread species of reptile that are native to Britain, namely common lizard, slow-worm, grass snake and adder, are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are afforded limited protection under Section 9 of this Act. The Act transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats 1979 (commonly referred to as the 'Bern Convention'). This makes it an offence to intentionally kill, injure or sell any of these species.
- 2.1.2 All four species are also listed as species of principal importance under section 41 of the Natural Environment and Rural Communities Act 2006. Adder are listed on the Essex Red Data List (Essex Field Club, 2002) and adder and grass snake are listed in the Thurrock Local Biodiversity Action Plan (Thurrock Biodiversity Action Group, undated).

3 Background ecology

- 3.1.1 Reptiles inhabit a wide variety of habitat types, including rough grassland, heathland, moorland, woodland, abandoned and derelict land and larger gardens (Edgar et al., 2010). South-facing slopes, such as those of railway embankments and similar man-made slopes and berms, can also be important habitat for reptiles.
- 3.1.2 Reptiles maintain their body temperature through external means (ectothermic) and accomplish this by moving to different areas of their environment to warm up or cool down. The need for external warmth influences many aspects of reptilian biology, including habitat requirements (Joint Nature Conservation Committee (JNCC), 2003).
- 3.1.3 Reptile young are typically born in late summer. Grass snakes produce a clutch of soft-shelled eggs (between 8 and 40, depending upon the size of the female) in June or July. Compost and manure heaps are favoured nest sites, as they provide suitable egg incubation temperatures. Slow-worm, adder and common lizard give birth to live young in August or September (JNCC, 2003).
- 3.1.4 All four species of common reptile hibernate during the winter months, typically between November and March. The exact timing is ultimately dependent on winter temperature, with high temperatures delaying the onset of hibernation and low temperatures bringing it forward. Reptiles will make use of various features for hibernation providing they are free from frost; humid, but not wet; and free from flooding and predators. Features typically used by reptiles during hibernation can include rotting tree trunks, tree root holes, log and brash piles, exposed rocks, cracks in walls, scree, building rubble and burrows made by other animals (for example rabbits). Hibernation sites tend to be south-facing or in partial sun. Grass snakes and adders tend to migrate to and from hibernation sites each year, while common lizard and slow-worm make use of hibernation sites local to their summer habitat. All reptiles, but particularly adders, will hibernate communally. Loss of, or damage to, a communal hibernation site can be extremely detrimental to a local population (JNCC, 2003).

3.2 Adder

- 3.2.1 The adder has a large range in Britain, but has suffered population declines, with the most marked declines in the Midlands (JNCC, 2010a; Baker et al., 2004).
- 3.2.2 Evidence shows that adder populations have declined within Kent and Essex, especially in areas close to urban centres, with development and increased human pressure probably causing local extinctions (Atkins, 2005). Adders are found throughout Kent except the south of the county (Kent Amphibian and Reptile Group, 2020a). Adders are the rarest of the reptiles found in Essex, having a localised distribution in less than 50% of the county (Essex Field Club, 2002).

3.3 Grass snake

- 3.3.1 The grass snake is typically more closely associated with water than other reptile species, with marsh and wetland being favoured habitats, but individuals will also frequent woodland edge, ancient hedgerows, parks, and gardens (JNCC, 2003).
- 3.3.2 According to Kent Reptile and Amphibian Group, grass snake is probably the most widely distributed reptile species in Kent (Kent Biodiversity Partnership, 2011). Increased populations of amphibian species such as marsh frog *Pelophylax ridibundus*, which now forms an important dietary component for grass snake in some areas, are likely to have resulted in local population increases (Kent Biodiversity Partnership, 2011).
- 3.3.3 In Essex, grass snakes are found in the south-west, becoming scarcer towards the north of the county (Essex Field Club, 2020a).

3.4 Slow-worm

- 3.4.1 Historically a widespread species, slow-worm populations have declined in all regions of England with the exception of the north-west, with the biggest declines in the midlands (Baker et al., 2004). This is mainly due to loss of brownfield sites and continuing development pressure in the countryside (JNCC, 2010b).
- 3.4.2 Slow-worms are found throughout Kent (Kent Amphibian and Reptile Group, 2020b) and population estimates at some brownfield sites, which have lots of opportunities for shelter and basking, reveal over 2,000 individuals per hectare (Kent Biodiversity Partnership, 2011). In Essex, slow-worms are more common in the south, becoming scarcer in the north-west of the county (Essex Field Club, 2020b).

3.5 Common lizard

- 3.5.1 Common lizards are widespread throughout the UK, but numbers are declining in southern and south-east England (Hilton-Brown and Oldham, 1991). These declines are mainly due to loss of brownfield sites and continuing development pressure in the countryside (JNCC, 2010c).
- 3.5.2 Common lizards are described as locally abundant and in Kent there are a number of sites where they occur in high numbers (Kent Amphibian and Reptile Group, 2020c). Within Essex, common lizards are widespread, being recorded in habitats such as post-industrial mineral extraction sites, spoil heaps and grassland (Essex Field Club, 2020c).

4 Methodology

4.1 Desk study

- 4.1.1 A desk study was carried out in 2020 and subsequently updated in 2022, which considered all recent protected species records (from 2012 onwards), including reptiles, within 2km of the Order Limits. Records were requested from Kent & Medway Biological Records Centre (KMBRC) (2022), Essex Wildlife Trust Biological Records Centre (EWTBRC) (2020), Essex Field Club (2022) and Greenspace Information for Greater London (GiGL) (2022).
- 4.1.2 The locations of designated sites of importance for biodiversity within 2km of the Order Limits were also obtained. Citations for these sites, which provide information on the reasons for their designation, were reviewed to ascertain whether reptiles were included as interest features for any of the designated sites. All designated sites are shown on Figure 8.1: Designated Sites (Application Document 6.2).
- 4.1.3 In addition, three reports were reviewed for data relating to reptiles:
- Proposed port terminal at former Tilbury Power Station ‘Tilbury2’ – Environmental Statement (Port of Tilbury London Limited, 2017)
 - Tilbury Power Station: Ecology Survey and Mitigation Plan (White Young Green, 2015)
 - A13 Widening A128 (Orsett Cock) to A1014 (The Manorway) Reptile Survey Report (AECOM, 2017)
- 4.1.4 In order to identify suitable reptile habitat that could be affected by the Project, desk study data, aerial imagery and habitat data from the extended Phase 1 habitat survey were reviewed to identify areas within or immediately next to the Order Limits (the survey boundary) that required further investigation for reptiles. A total of 49 areas of potentially suitable reptile habitat were identified within the survey boundary, which were subject to targeted reptile surveys, as outlined below.

4.2 Field survey

- 4.2.1 The targeted presence/absence reptile survey methodology, using artificial refugia, followed guidance given in Froglife’s Advice Sheet 10 (Froglife, 1999) and the Herpetofauna Workers’ Manual (JNCC, 2003). These refugia acted as artificial basking sites and cover and consisted of a mix of roofing felt ‘mats’ (that were approximately 0.5m x 1m in size) and corrugated bitumen roof sheet ‘tins’ (that were approximately 1m x 1m in size).
- 4.2.2 Refugia were deployed in 40 of the 49 survey areas in locations considered to have the highest potential to support reptiles, such as sunny aspects of scattered scrub, scrub edges, south-facing banks and grass tussocks. They were deployed at a density of five to 10 per hectare (or greater), at approximately 10m to 20m apart and to a ratio of four mats to one tin. The refugia were then left to ‘bed in’ for a minimum of two weeks (to allow the

animals to find and start using them). Nine survey areas were not surveyed due to land access restrictions or design changes (areas S14, S16, S17 and S18 south of the River Thames and areas N25, N26, N27, N28 and N29 north of the River Thames).

4.2.3 Table 4.1 provides a summary of the survey areas, including approximate size, month and year surveyed, the number of refugia deployed and the number of survey visits carried out. Reptile survey areas are shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2).

Table 4.1 Reptile survey methodology

Geographical location	Survey area	Size (ha)	Year surveyed	Number of refugia	Number of survey visits
South of the River Thames	S01	0.87	2018	40	7
	S02	0.69	2018	20	7
	S03	2.94	2018	31	7
	S04	0.76	2017	29	7
	S05	0.67	2017	20	7
	S06	0.68	2018	18	7
	S07	0.66	2017	13	7
	S08	3.25	2017	31	7
	S09	1.21	2018	19	7
	S10	0.19	2018	10	7
	S11	0.29	2018	19	7
	S12	1.34	2018	23	7
	S13	1.02	2018	20	7
	S14	4.20	-	-	0
	S15	5.09	2019	80	7
	S16	10.88	-	-	0
	S17	6.62	-	-	0
	S18	7.99	-	-	0
North of the River Thames	N01	1.92	2017	30	8
	N02	0.41	2017	20	7
	N03	2.02	2017	30	7
	N04	2.88	2017	30	7
	N05	2.35	2017	40	7
	N06	1.73	2017	40	7
	N07	0.69	2017	20	7
	N08	0.64	2017	20	7
	N09	0.67	2018	20	7

Geographical location	Survey area	Size (ha)	Year surveyed	Number of refugia	Number of survey visits
	N10	0.80	2018	22	7
	N11	2.71	2017	60	7
	N12	0.13	2017	11	7
	N13	3.09	2018	38	7
	N14	2.97	2017	20	7
	N15	0.48	2018	20	7
	N16	0.60	2018	20	7
	N17	3.89	2018	40	7
	N18	4.00	2018	35	7
	N19	3.52	2018	17	7
	N20	1.26	2018	30	7
	N21	1.40	2018	30	7
	N22	6.06	2018	32	7
	N23	2.46	2018	31	7
	N24	1.15	2018	22	3
	N25	12.53	-	-	0
	N26	22.38	-	-	0
	N27	15.13	-	-	0
	N28	2.32	-	-	0
	N29	2.00	-	-	0
	N30	6.11	2019	31	7
	N31	4.64	2019	18	7

4.2.4 Reptile surveys were carried out from 18 September 2017 to 12 October 2017, 1 May 2018 to 14 June 2018, 5 September 2018 to 31 October 2018, 8 May 2019 to 5 June 2019 and 5 September to 20 September 2019 by experienced ecologists. Surveys were focused on April, May and September, which are key months to identify basking reptiles. Surveys were only conducted outside of these periods where access was restricted and if weather conditions were suitable. Surveys were carried out when weather conditions were as close to optimal as possible: intermittent sunshine with little or no wind when the temperature was between 9°C and 18°C. Where surveys were sub-optimal (i.e., temperatures between 18°C and 21°C), extra survey visits were carried out where possible. A total of seven visits were completed for each site to establish presence/absence, as per best practice guidance (Froglife, 1999).

4.2.5 Suitable reptile habitat in each survey area was inspected by surveyors by walking slowly, scanning the area 3m to 4m in front of them and recording any reptiles observed. Refugia that had been deployed were lifted, whilst wearing suitable protective gloves, and any reptiles present underneath were counted and their species, sex and age-class recorded. Data, including weather conditions, was recorded using an iPad with ArcGIS ‘Survey123’ software.

4.3 Incidental observations

4.3.1 Any incidental observations of reptiles that were made during other ecological surveys, including for example targeted surveys for great crested newts, otters and water vole, were recorded and used to inform this assessment.

4.4 Data analysis

4.4.1 Reptile survey data was analysed using the criteria for key reptile area selection. This allows the classification of the relative size of reptile populations on the basis of peak survey counts (the maximum number of adults seen by observation and/or under refugia (placed at a density of up to 10 per hectare), by one person in one day) to obtain an objective evaluation of the importance of the reptile interest in each survey area (Froglife, 1999).

Table 4.2 Reptile population size category and score matrix

Species	Low population	Good population	Exceptional population
	Score 1	Score 2	Score 3
Adder	<5	5 – 10	>10
Grass snake	<5	5 – 10	>10
Common lizard	<5	5 – 10	>20
Slow-worm	<5	5 – 10	>20

- 4.4.2 To qualify as a key reptile area, the survey area must meet at least one of the following criteria.
- a. Supports three or more reptile species
 - b. Supports two snake species
 - c. Supports an exceptional population of one species (see Table 4.2)
 - d. Supports an assemblage of species with an accumulated score of at least four (see Table 4.2)

5 Results

5.1 Designated sites

- 5.1.1 South of the River Thames there is a single designated site and four non-statutory designated sites within 2km and 500m respectively of the Order Limits that list species of reptile on their citations. Peter's Pit Site of Special Scientific Interest, 1.7km from the Order Limits is an old quarry site that supports grass snake and adder (Natural England 1986). The Ebbsfleet Marshes Local Wildlife Site (LWS), 0.49km west of the Order Limits, is a reedbed and mosaic of other habitats that supports adder, grass snake, common lizard and slow-worm (Kent Wildlife Trust, 2018). Canal and Grazing Marsh Higham LWS, which is situated within the Order Limits, includes grazing marsh and saltmarsh habitats, and supports reptiles (Kent Wildlife Trust, 2009). Blue Bell Hill Banks and Verges LWS is a species rich chalk grassland and is noted for its population of adder, as well as slow worm and common lizard being present (KMBRC, 2022). A227/A20 London Road Roadside Nature Reserve, 0.43km south of the Order Limits, is a grassland roadside bank that supports an adder population (KMBRC, 2022).
- 5.1.2 North of the River Thames there is one designated site and three non-designated sites within 2km and 500m respectively of the Order Limits that list species of reptiles on their citations. Cranham Brickfields Local Nature Reserve (LNR), 0.02km west of the Order Limits, is a former brickfield with large areas of grassland and scrub that supports notable populations of slow-worm and common lizard (Natural England, 2008). Lytag Brownfield LWS, partly within the Order Limits, consists of acid grassland habitat that supports adder, grass snake, common lizard and slow-worm (Thurrock Council, 2007). Mar Dyke LWS, 0.38km west of the Order Limits, is an important wildlife corridor formed by extensive acid and flood-plain grasslands that supports notable populations of adder, grass snake, common lizard, and slow-worm (Thurrock Council, 2007). Cranham Marsh SINC, 0.26km to the west of the Order Limits, consists of marshland and grassland habitat that is noted for its reptile population.

5.2 Existing data

- 5.2.1 Surveys were conducted at Tilbury Power Station over a number of years (2007, 2008, 2009, 2013, 2015, 2016 and 2017).
- 5.2.2 The most recent surveys carried out to inform the Environmental Statement for the proposed port terminal at the power station confirmed the presence of all four species of reptile on the Tilbury Power Station site. Population size estimates were low for adder, grass snake and common lizard, with good to exceptional populations of slow-worm (Port of Tilbury London Limited, 2017). Although not discussed explicitly in the 'Tilbury2' Environmental Statement (Port of Tilbury London Limited, 2017), their results show that seven out of their eight survey areas would qualify as key reptile areas.

- 5.2.3 Additionally, a potential reptile receptor site was identified in an area of scrub and grassland to the north of the Station Approach Road, north-east of the power station (within the Order Limits), which was recorded as having low populations of adder, grass snake and common lizard, and a good population of slow-worm (White Young Green, 2015). This would also qualify as a key reptile area.
- 5.2.4 Surveys carried out for the A13 widening project revealed the presence of reptiles in three areas, one of which was immediately next to the Order Limits (immediately east of the eastbound BP service station between the A13, A128 and A1014 junctions). This survey area supported a low population of common lizard (AECOM, 2017).

5.3 Adder

- 5.3.1 KMBRC (2022) provided 61 records for adder within 2km of the Order Limits south of the River Thames.
- 5.3.2 EWTBRC (2020) provided 18 records of adder within 2km of the Order Limits north of the River Thames. The Essex Field Club (2022) provided 104 records of adder within 2km of the Order Limits. Two records were located within the Order Limits. The GiGL Records Centre (2022) returned 17 records of adder within 2km of the Order Limits.
- 5.3.3 Adders were observed incidentally on six occasions to the north of the River Thames within the Order Limits, as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2). One adder was seen on Tilbury Power Station land, next to survey area N01. Four female adders were observed in Ingrebourne Valley close to survey area N08; further south, next to Goshems Farm LWS; near Low Street Pit LWS during reptile survey refugia deployment; and at Turnpike Lane, near Broom Hill LWS. One male adder was seen at Coles Farm (south).

5.4 Grass snake

- 5.4.1 KMBRC (2022) provided 15 desk study records for grass snake within 2km of the Order Limits south of the River Thames.
- 5.4.2 EWTBRC (2020) provided 21 desk study records for grass snake within 2km of the Order Limits north of the River Thames.
- 5.4.3 The Essex Field Club (2022) provided 40 records of grass snake within 2km of the Order Limits. All records were outside of the Order Limits, the nearest located 67.6m from the Order Limits. The GiGL Records Centre (2022) returned 53 records of grass snake within 2km of the Order Limits. The nearest record was 4m from the Order Limits, but no specific geographical location was provided.
- 5.4.4 There was one incidental sighting of an individual grass snake during the 2017 extended Phase 1 habitat survey and protected species surveys, as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2). It was observed to the north of the River Thames, within arable farmland near Tilbury Power Station (within the Order Limits).

- 5.4.5 Five additional incidental sightings of grass snake were made to the south of the River Thames in 2018, which were seen during water vole and bird surveys, as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2). One observation was to the west of the Metropolitan Police Firing Range, two were within Shorne Marshes and one within Filborough Marshes (within the Order Limits). A grass snake was also seen in Shorne Woods (more than 500m from the Order Limits).
- 5.4.6 Incidental sightings in 2018 to the north of the River Thames (five in total) were from next to Low Street Pit LWS (three sightings), north of the A13 west of Orsett (one sighting) and to the east of the M25 near Thames Chase (one sighting).
- 5.4.7 A further sighting occurred south of Veolia land (north of the River Thames) in 2019.

5.5 Slow-worm

- 5.5.1 KMBRC (2022) provided 385 desk study records for slow-worm within 2km of the Order Limits to the south of the River Thames.
- 5.5.2 There were 45 desk study records for slow-worm provided by EWTBRC (2020) within 2km of the Order Limits to the north of the River Thames.
- 5.5.3 The Essex Field Club (2022) provided 70 records of slow-worm within 2km of the Order Limits. All records were outside of the Order Limits, the nearest located 43.5m from the Order Limits. The GiGL Records Centre (2022) returned 24 records of slow-worm within 2km of the Order Limits. The nearest record was 191m north of the Order Limits, but no specific geographical location was provided.
- 5.5.4 Slow-worm were recorded on two occasions incidentally, south of the River Thames. One was seen during the extended Phase 1 habitat survey, west of the Metropolitan Police Firing Range, and one in a similar location during a water vole survey. North of the River Thames, two slow-worms were incidentally recorded: one slow-worm during reptile survey refugia deployment in Goshems Farm LWS (survey area N02), and one south-east of Low Street Pit during the extended Phase 1 habitat survey (as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2)).

5.6 Common lizard

- 5.6.1 Ninety desk study records of common lizard were provided by KMBRC (2022) within 2km of the Order Limits to the south of the River Thames.
- 5.6.2 EWTBRC (2020) provided 52 desk study records of common lizard within 2km of the Order Limits to the north of the River Thames.
- 5.6.3 The Essex Field Club (2022) provided 109 records of common lizard within 2km of the Order Limits. All records were outside of the Order Limits, the nearest located 67.6m from the Order Limits. The GiGL Records Centre (2022) returned 126 records of common lizard within 2km of the Order Limits. The nearest record was 4m from the Order Limits, but no specific geographical location was provided.

- 5.6.4 There were two incidental sightings of common lizards recorded to the south of the River Thames during the extended Phase 1 habitat survey, as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2). One sighting was within arable farmland, next to the Order Limits, and the other was south of survey area S13, near the A2/M2 junction.
- 5.6.5 An additional seven incidental sightings of common lizard were made to the north of the River Thames, as shown on Figure 8.9: Reptiles Survey Results (Application Document 6.2). Three were outside the Order Limits. Of these, one was next to Fort Road, north of Lytag Brownfield LWS, one was south of Coalhouse Fort, and one was on the edge of Top Meadow golf course, North Ockendon. The remaining were within the Order Limits near Coalhouse Fort, near Low Street Pit and north-west of Orsett (north of the A13).

5.7 Population estimates

- 5.7.1 Table 5.1 below presents the population estimates for each survey area, based on the criteria for key reptile area selection (Froglife, 1999).

South of the River Thames

- 5.7.2 Up to three species of reptiles were recorded in 10 out of the 14 areas surveyed to the south of the River Thames, namely grass snake (recorded in four survey areas), slow-worm (recorded in two survey areas) and common lizard (recorded in nine survey areas).
- 5.7.3 Low populations of grass snake and low to good populations of slow-worm and common lizard were estimated south of the River Thames.
- 5.7.4 Key reptile areas to the south of the River Thames were associated with Shorne and Filborough Marshes. Grass snake, slow-worm and common lizard were also present at Shorne Woods and next to the A2 next to Claylane Wood (survey area S07).

North of the River Thames

- 5.7.5 All four reptile species were recorded to the north of the River Thames. Of the 26 areas surveyed, adder was recorded in 12 areas, grass snake in five areas, slow-worm in 21 areas and common lizard in 22 areas.
- 5.7.6 Low populations of adder and grass snake were estimated, with low to good populations of slow-worm and common lizard.
- 5.7.7 Key reptile areas to the north of the River Thames were associated with the LWSs and nature reserves, especially within Tilbury Power Station land (although this has been subject to disturbance since the reptile surveys were carried out). Goshems Farm LWS and associated ditches and Low Street Pit LWS were also considered to be important. Further north, survey area N30, White Crofts (survey area N17) and Veolia clay pit brownfield site (survey area N18) were also found to be key areas for reptiles. Blackshots nature area (survey area N27), which was not surveyed due to access restrictions, is also likely to be important and may be a key reptile area.

Table 5.1 Reptile population size category estimate results

Survey area	Adder	Grass snake	Slow-worm	Common lizard	Key reptile area
South of the River Thames					
S01	None	Low	Good	Good	Yes
S02	None	Low	None	Low	No
S03	None	None	Low	Good	No
S04	None	None	None	Low	No
S05	None	None	None	Low	No
S06	None	None	None	None	No
S07	None	None	None	Low	No
S08	None	None	None	None	No
S09	None	Low	None	None	No
S10	None	None	None	None	No
S11	None	None	None	None	No
S12	None	None	None	Low	No
S13	None	None	None	Low*	No
S15	None	Low*	None	Low	No
S16	None	None	None	None	No
North of the River Thames					
N01	Low*	None	Good	Good	Yes
N02	Low	Low	Low	Low	Yes
N03	Low	None	Good	Good	Yes
N04	Low	None	Good	Good	Yes
N05	Low	None	Good	Good	Yes
N06	Low	None	Good	Good	Yes
N07	None	None	Low	Low	No
N08	Low	None	Low	Low	Yes
N09	Low	None	Low	None	No
N10	None	Low	Low	Low	Yes
N11	Low	Low	Good	Good	Yes
N12	None	None	Low	Low	No
N13	Low	None	Good	Low	Yes
N14	Low	None	Low	Low	Yes
N15	None	None	Low	Good	No
N16	None	None	Low	Low	No

Survey area	Adder	Grass snake	Slow-worm	Common lizard	Key reptile area
N17	None	None	Good	Good	Yes
N18	None	Low	Low	Good	Yes
N19	None	None	Low	Low	No
N20	None	None	None	None	No
N21	None	None	None	None	No
N22	None	None	None	Low	No
N23	None	None	None	Low	No
N24	None	None	None	None	No
N30	Low	Low	Good	Low	Yes
N31	None	None	Low	Low	No

**Only juveniles recorded, therefore low population assumed.*

6 Limitations and assumptions

- 6.1.1 Surveys could not be carried out at nine of the identified survey areas, due to landowners refusing access (S14, N25, N26, N27, N28 and N29) and changes to the Order Limits (S17 and S18). The assessment therefore assumes presence/absence of reptiles on a precautionary reasonable worst-case basis, based on the habitats present and proximity and connectivity to other known reptile populations, using professional judgement where a lack of survey data exists.
- 6.1.2 Over the course of the field surveys, 10 areas were subject to disturbance from livestock or people, with some reptile refugia being removed or destroyed. Refugia were replaced in most areas where possible, with the exception of survey area N24, where surveys were abandoned when the farmer ploughed the field margin and the soft estate was not accessible.
- 6.1.3 Not all the surveys were carried out within optimal weather conditions, but where weather conditions were sub-optimal or too hot, surveys were repeated to mitigate for this. Generally, surveys were conducted over a range of temperatures, at different times of day and during different times of year.
- 6.1.4 It is recognised that the method of population assessment (Froglife, 1999) is basic in nature, due to the challenges involved in surveying for reptiles. This means that a survey is only likely to reveal a proportion of the population present; therefore, scores are likely to represent an underestimate and should be interpreted with caution. Considering this, the reptile dataset is considered to be sufficiently robust and representative for informing the baseline conditions of the Project.
- 6.1.5 Where necessary, the precautionary principle has been applied during the interpretation of the data where the assessment is likely to be an underestimate (for example where only juveniles have been found), or where there were potential survey limitations. Due to the number of areas surveyed and representative habitats sampled, however, plus the robust survey methods used, it is not envisaged that there are any significant limitations to the dataset that may affect the conclusions drawn within this assessment.
- 6.1.6 The Order Limits were altered in 2022 to include utilities diversions taking place on the existing road network. No surveys were carried out, but desk study data for these areas has been included within this report and habitat suitability assessments for reptiles carried out where necessary. Any gaps in the extended Phase 1 habitat survey data coverage have been satisfied through the use of aerial photos to identify potentially important reptile habitat. Where potentially important reptile habitat has been identified within such areas, then these areas would be subject to targeted reptile surveys (using direct observation and the use of refugia as above) before the start of construction works, and a supplementary information report would be issued with additional survey results and population estimates.

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