## **Springwell Solar Farm** Environmental Statement Appendix 7.7: Riparian Mammal And Aquatic Habitat Assessment

Volume 3

EN010149/APP/6.3 November 2024 Springwell Energyfarm Ltd APFP Regulation 5(2)(a) Planning Act 2008

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

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## 1. Introduction

#### 1.1. Purpose of this report

- 1.1.1. This report presents the results of an aquatic habitat walkover assessment plus water vole and otter surveys of six ditches within the Order Limits of the proposed Springwell Solar Farm, near Blankney, Lincolnshire. The six ditches are likely to be impacted by proposed internal road crossings or proximity to proposed access or cable works. The surveys were required to identify:
  - any ecologically important aquatic habitats within the Order Limits of the Proposed Development with particular emphasis on proposed cable routes or crossing areas;
  - any other aquatic ecological constraints present; and
  - provide recommendations to enable compliance with legislation and policy; and, if necessary, identify the need for avoidance and mitigation.

#### 1.2. Ecological context

- 1.2.1. The survey area is located on land surrounding the villages of Blankney, Scopwick, and Ashby de la Launde in the district of North Kesteven, Lincolnshire. The survey area is dominated by agricultural land and improved grassland with accompanying hedgerows, interspersed with multiple small to medium sized areas of broadleaved woodland. There are four ponds within the survey area and ditches intersect some of the agricultural fields, mostly in Springwell East, although most were dry at the time of the survey.
- 1.2.2. The surrounding landscape is largely arable land, with hedgerows, broadleaved and mixed woodland. Several villages, residential properties, farm complexes and a Royal Air Force Station (RAF Digby) are also present. The majority of the fields are bordered by hedgerows or dry-stone walls. The A15, a major connecting road between Lincoln and Sleaford, runs north-south through the western half of the Site. Smaller roads and farm tracks intersect the remainder of the Site.
- 1.2.3. An aquatic habitat assessment and riparian mammal survey was undertaken in 2024 of six ditches within the Order Limits of the proposed Springwell Solar Farm (referred to as Proposed Development), in Lincolnshire (the locations of ditches are shown in **Figure 1**).
- 1.2.4. The Preliminary Ecological Appraisal carried out in 2022 **[Ref.1]** determined that wet ditches within the Order Limits could have potential as aquatic habitat and for riparian mammals such as water vole (*Arvicola amphibius*) or used by foraging otter (*Lutra lutra*) and recommended further survey if any ditches would likely be affected. The six ditches were targeted for survey as they were either located close to proposed cable or track installation works (within < 10m) or would be traversed by proposed



internal access roads thereby requiring culverted sections for crossings. Other ditches within the Order Limits were not surveyed as they are not connected and not anticipated to be affected by works.

#### 1.3. Development Proposals

- 1.3.1.1. The Proposed Development comprises the construction, operation and maintenance of Solar Photovoltaic (PV) generating modules, energy storage facilities, and grid connection infrastructure, across a proposed site in North Kesteven, Lincolnshire.
- 1.3.1.2. The Proposed Development is located within the administrative boundary of North Kesteven District Council and Lincolnshire County Council.

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### 2. Legislation

#### 2.1. Overview

2.1.1. Relevant legislation and guidance relating to riparian mammals is summarised below.

#### 2.2. Legislation

- 2.2.1. Otters and water voles are legally protected under Schedule 5 of the Wildlife and Countryside Act, 1981 (as amended) **[Ref.2]** and received full protection under Schedule 9. Under this Act it is an offence to:
  - Intentionally kill, injure or take them.
  - Intentionally possess, or control them (alive or dead).
  - Intentionally and recklessly damage or destroy a structure or place used for shelter or protection.
  - Intentionally and recklessly disturb them in a place used for shelter or protection.
  - Intentionally and recklessly obstruct access to a place used for shelter or protection.

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### 3. Methods

#### 3.1. Survey timings

3.1.1. The aquatic habitat assessment, water vole and otter surveys were conducted between 3 and 5 June 2024 by ecology consultants with approximately eight years experience of aquatic assessment and water vole/otter surveys.. At the time of survey, the weather was cloudy and dry with high cloud cover, 12mph winds and an air temperature of c.18°C.

#### 3.2. Survey locations

3.2.1. Survey locations are detailed below in **Table 1** and **Figure 1**.

#### Table 1 Survey locations

Site Name	Crossing point national grid reference	Survey type	
Crossing 1	TF 08855 59567	Aquatic habitat walkover, otter and water vole	
Crossing 2	TF 08109 59244	Aquatic habitat walkover, otter and water vole	
Crossing 3	TF 07975 58936	Aquatic habitat walkover, otter and water vole	
Crossing 4	TF 06965 58800	Aquatic habitat walkover, otter and water vole	
Crossing 5	TF 06529 57211	Aquatic habitat walkover, otter and water vole	
Crossing 6	TF 05871 56714	Aquatic habitat walkover, otter and water vole	

#### 3.3. Aquatic Habitat Walkover

3.3.1. The bespoke aquatic habitat survey methodology was adapted from that described in Hendry & Cragg-Hine (1997) **[Ref.3]**, such that it had been modified to incorporate habitat types for all species of fish (including salmonids, coarse fish, eels, lamprey, and small species such as bullhead (*Cottus gobio*) and minnow (*Phoxinus phoxinus*). The method provided a visual overview of the aquatic habitats present, including those featured which may provide opportunities for other protected species, such as white-clawed crayfish (*Austropotamobius pallipes*), otter, and water vole. Target Notes for invasive non-native species (INNS) were recorded and mapped.



- 3.3.2. In this field mapping technique, the surveyor manually annotated key river features onto a high-resolution map (e.g., 1:10,000 scale). This involved outlining the river and marking significant landmarks like bridges and buildings. Additional detail was added to the maps as the surveyor advanced along the watercourse, resulting in a mosaic of the dominant or most important habitat features observed.
- 3.3.3. Habitat features recorded during the walkover survey included:
  - flow type (e.g. glide, run, riffle, cascade, pool and rapid);
  - substrate type (e.g. boulder, cobble, pebble, gravel, sand, silt as defined using the Wentworth scale);
  - macrophyte presence / type (e.g. emergent linear, emergent broad-leaf, submerged linear, submerged broad-leaf, floating linear, floating broadleaf);
  - Other key features (e.g. side bar, mid-stream bar, man-made dams, weirs, large woody material, coarse woody material, spawning area, fry / juvenile fish refuge area);
  - evidence of protected species (e.g., field signs or incidental observations); and
  - evidence of invasive non-native species.
- 3.3.4. Digital photographs of important habitat features were also obtained during surveys and these, together with the maps, provided a record of the habitats present at the time of the surveys against which future changes can be compared.

#### 3.4. Water Vole surveys

- 3.4.1. Water vole surveys followed methods outlined in the best practice guidelines published in the Water Vole Conservation Handbook **[Ref.4]** and the Water Vole Mitigation Handbook **[Ref.5]**. The best period to determine water vole presence is during the breeding season when latrines are regularly visited and marked. Most water vole investigations need at least two survey visits during this time to allow for seasonal variation in habitat suitability. Therefore, two surveys are generally undertaken at least two months apart, with the first between middle April and the end of June.
- 3.4.2. At each survey location, surveyors searched the entire length of the ditch for evidence of water voles including burrows, feeding platforms, evidence of feeding (including food remains), latrines, footprints. Evidence of key predators, such as mink (*Mustela lutreola*) would also be recorded if detected. The location of any field signs if encountered during the surveys would be marked using a handheld global positioning system (GPS) and evidenced with photographs.



3.4.3. Water vole surveys were undertaken at the six proposed crossing points (**Table 1**) due to the potential direct impacts associated from these works on water vole populations.

#### 3.5. Otter surveys

- 3.5.1. European otter surveys followed methods detailed in **[Ref.6]**. Active searches were therefore conducted along the entire length of the ditch, where possible both banks and also in the terrestrial habitat within the riparian corridor for otter signs, which may include spraint, couches and slides, holts, footprints and feeding evidence.
- 3.5.2. Any evidence of otter identified during the surveys would be recorded onto maps with features of interest target notes and photographed.
- 3.5.3. Otter surveys will be undertaken at the six proposed crossing points (**Table 1**) due to the potential direct impacts associated from these works on otter populations.

#### 3.6. Survey constraints

- 3.6.1. At the time of surveys, water levels within the ditch network were stable with no significant rainfall recorded in the week prior to undertaking both surveys. It was therefore unlikely that the surveys were impacted by weather or high river levels.
- 3.6.2. Bankside and in-channel vegetation along most of the surveyed ditches limited visibility of the channel and bed. However, surveyors were able to carry out visual inspections as well as physical inspections using ranging poles to infer approximate depths, bed substrates, flow types, in channel vegetation etc. where gaps in the vegetation allowed. As such, impacts to the survey results are considered likely to be minimal.

#### 3.7. Data validity

3.7.1. Unless the Site changes significantly, the surveys carried out for this report will remain valid for at least 18 months.

#### 3.8. Biosecurity

3.8.1. Upon completion of the survey at each survey location, all equipment which had come into contact with the watercourse was inspected for any invasive non-native species. All plant material was removed prior to leaving site and personal protective equipment and survey equipment was sprayed using Virkon Aquatic disinfectant. Upon return to base, full disinfection and drying of all equipment/PPE was undertaken.

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### 4. Results

4.1.1.1. This section presents the results of the water vole/otter surveys and aquatic assessment of the six ditches proposed to be impacted by internal road crossings or cable works. Refer to **Figure 1** for the locations of the ditches and crossing points.

#### 4.2. Crossing 1

- 4.2.1. The ditch at Crossing 1 was surveyed in three directions centring around the proposed crossing location close to a culvert beneath Acre Lane (**Plate 1**). To the north of the culvert a *c*.250m long surveyed section of ditch was dry and heavily choked with aquatic vegetation. The surveyed section to the east was *c*.220m in length and comprised a short section of shallow run, and a deeper section with no perceptible flow, reaching depths of up to 0.4m. A *c*. 200m section surveyed to the west of the culvert comprised predominately of shallow (< 0.1m depth) run leading to a vegetation choked area of no perceptible flow. The substrate primarily comprised silt and clay (**Figure 2**).
- 4.2.2. Habitat within the wetted sections of the Crossing 1 ditch had potential to support European eel (*Anguilla anguilla*) and smaller fish species (i.e. three-spined stickleback *Gasterosteus aculeatus*), this is discussed in further detail in **Section 4.**



4.2.3. No evidence of otter, water voles, nor any other small mammal field signs were identified at Crossing 1. The ditch could not be accessed for a full survey due to the density of vegetation, although partial observations were possible. However, the habitat was considered unsuitable for water voles and otter as the banks do not provide suitable burrowing opportunities for water vole and much of the ditch was dry and completely choked with terrestrial vegetation (unsuitable for foraging otter) (**Figure 2**).



#### Plate 1 Culvert located at Crossing 1

#### 4.3. Crossing 2

4.3.1. The ditch located at Crossing 2 is located in Springwell East within the Order Limits, bordered by arable fields, modified grassland, hedgerows, and a line of trees. The ditch was surveyed in three directions centring around a culvert (TF 08067 59247). A section of ditch to the north of the culvert was c. 380m in length and comprised a long dry section that was heavily choked with dense vegetation and a small section that held shallow water with no perceptible flow, the substrate within the ditch was primarily composed of silt (**Plate 2**). To the east of the culvert the ditch is comprised of a short dry, choked section which leads to a c. 300m section of shallow water with no perceptible flow that is choked with emergent linear leaved vegetation. To the south there is a small section directly in front of the culvert that holds shallow water, which forms a shallow run (approximately 1cm deep), the remainder of the c. 280m section is comprised of shallow water



with no perceptible flow that is choked by vegetation. An additional culvert is present in the southern section of ditch, which runs under the road and leads to Crossing 3.

- 4.3.2. Habitat within the wetted sections of the Crossing 2 ditch had potential to support European eel and smaller fish species (i.e. three-spined stickleback), this is discussed in further detail in **Section 4**.
- 4.3.3. No evidence of otter, water voles, or any other small mammal field signs were recorded in any of the sections of this ditch. Full access to survey this ditch was not possible due to the density of vegetation. The habitat was considered unsuitable for water voles as the banks do not provide suitable burrowing opportunities and the ditch was completely choked with terrestrial vegetation (unsuitable for foraging otter).



Plate 2 View of the choked dry channel at Crossing 2

#### 4.4. Crossing 3

4.4.1. The northern extent of the ditch at Crossing 3 is marked by a culvert, to the north of this a choked section of no perceptible flow is present which has been surveyed under Crossing 2. Habitats within the ditch to the south of the culvert are comparable to those present at Crossing 1 and 2, with the notable exception of the presence of macrophytes. Floating macrophyte, primarily duckweed (Lemna sp.) was present in several sections of the ditch, there is a small area of emergent linear-leaved macrophytes immediately to the south of the culvert. The entire length of the ditch (*c*. 800m long) holds water with depths reaching up to 0.2m, however there was no perceptible flow observed throughout the ditch (**Plate 3** and **4**). The substrate was a mix of silt and clay (**Figure 2**).



- 4.4.2. Habitat within the Crossing 3 ditch had potential to support European eel and smaller fish species (i.e. three-spined stickleback), this is discussed in further detail in **Section 4**.
- 4.4.3. No evidence of otter, water voles, or any other small mammal field signs were recorded in any sections of this ditch. Full access to survey this ditch was not possible due to the density of vegetation. The habitat was considered unsuitable for water voles as the banks do not suitable provide burrowing opportunities. The surrounding habitat was unsuitable for foraging otter and due to a lack of connectivity to the wider area it is unlikely that this location supports otter.



Plate 3 View of duckweed sp. in southern section of Crossing 3





Plate 4 View of no perceptible flow type observed through dense vegetation in the southern section of Crossing 3

#### 4.5. Crossing 4

4.5.1. Crossing 4 was located in Springwell East within the Order Limits, bordered by arable fields, hedgerow and a road. This ditch was *c*. 250m in length and was dry, heavily choked with dense vegetation, and had a substrate primarily composed of silt (**Plate 5**).





Plate 5 View of Crossing 4 ditch, choked with dense vegetation

- 4.5.2. Crossing 4 was dry and therefore unsuitable for fish at the time of survey.
- 4.5.3. No evidence of otter, water voles or any other small mammal field signs were recorded during the June surveys. Full access to the survey ditch was not possible, however the ditch was dry at the time of surveying, making it unsuitable for water voles and otters and was also deemed unlikely to increase in suitability over the summer (i.e. likely to remain dry).



#### 4.6. Crossing 5

4.6.1. Crossing 5 was located in Springwell Central within the Order Limits, bordered by hedgerows, and arable fields. The primary section of this ditch runs adjacent to a farm track and is *c*. 600m in length. The ditch was primarily dry, heavily choked with dense vegetation, and had a substrate primarily composed of silt. Small, isolated sections of shallow water were visible with depths up to 0.1m and no perceptible flow (**Plate 6**). A culvert runs under the farm track forming a c. 250m southern section of this ditch, which comprised shallow areas of water with no perceptible flow, however the substrate was mix of gravel and silt (**Figure 2**).



#### Plate 6 View of wetted section of ditch at Crossing 5

- 4.6.2. Habitat within the wetted sections of the Crossing 5 ditch had potential to support European eel and smaller fish species (i.e. three-spined stickleback), this is discussed in further detail in **Section 4**.
- 4.6.3. No evidence of otter, water voles or any other small mammal field signs were recorded during the June surveys. The ditch was dry at the time of surveying, making it unsuitable for water voles and otters. It was also deemed unlikely to increase in suitability over the summer (i.e. likely to remain dry).



#### 4.7. Crossing 6

4.7.1. Crossing 6 was a *c*.700m section of ditch that is located in Springwell Central within the Order Limits, bordered by hedgerows and arable fields (**Plate 7**). This ditch was primarily dry, heavily choked with dense vegetation, and had a substrate primarily composed of silt. Short sections of shallow water were present with no perceptible flow (**Figure 2**).



#### Plate 7 View of arable fields and hedgerow bordering Crossing 6

- 4.7.2. Habitat within the wetted sections of the Crossing 6 ditch had potential to support European eel and smaller fish species (i.e. three-spined stickleback), this is discussed in further detail in **Section 4**.
- 4.7.3. No evidence of otter, water voles or any other small mammal field signs were recorded during the June surveys. There were sections of the ditch that could not be accessed in order to survey, however, it was dry at the time of surveying, and combined with the near vertical banks, this ditch was deemed unsuitable for water voles. It was also deemed unlikely to increase in suitability over the summer (i.e. likely to remain dry).



## 5. Evaluation and recommendations

- 5.1.1. The watercourses surveyed were all homogenous, man-made drainage ditches, some of which may be ephemeral, being observed to be dry and heavily choked with dense vegetation at the time of survey. Those that were wetted were predominantly shallow, with no perceptible flow with small areas of shallow run present at some ditch locations. Substrate was largely comprised of silt or compacted earth.
- 5.1.2. Water quality was not tested during the surveys but is considered likely to be a constraint with regards to habitat suitability for fish. Given the limited amount of water present and general lack of flow low dissolved oxygen saturation may be a factor. This could be exacerbated in ditches with submerged macrophyte or algal growth which are likely to be subject to large diurnal fluctuations in oxygen saturation.
- 5.1.3. In ditches where water was present the lack of flow, water depth and habitat variety, coupled with risk of drying out and limited connectivity at the time of survey meant they were considered unlikely to support significant fish populations. However, taking into consideration the presence of occasional ponded areas, potential connectivity of the ditch network to the River Witham and River Slea [Ref.1] and due the ability of eels to occasionally adopt an amphibious feeding regime and commute between aquatic habitats over land, the use of the habitat as temporary refuge and foraging habitat cannot be entirely discounted. Habitat for species other than eel was limited at the time of survey, with only hardy species such as three-spined stickleback considered likely to be able to survive.
- 5.1.4. The surveys were undertaken during dry weather in summer when water levels were low, it is likely that habitat suitability and connectivity for fish (primarily eels) throughout the ditch network would increase during winter/following periods of wet weather.
- 5.1.5. Given the potential for fish to be present it is recommended that an ecological clerk of works with aquatic experience be present at the installation of the crossings to supervise the works and provide ecological support if required. If crossing works are to be undertaken on wetted sections of the ditch, particularly when water levels are higher, then a fish rescue may also be required.
- 5.1.6. No macroinvertebrate sampling was undertaken however habitats within the ditches were considered likely capable of supporting a diverse array of aquatic invertebrate species, such as water beetles, water snails, dragonflies, and hoverflies. Invertebrates such as these serve as important foraging resources for other wildlife, including amphibians. Furthermore,



the dense riparian vegetation along the banks of these ditches offered valuable shelter and additional foraging opportunities for amphibians.

- 5.1.7. While water present in the ditches may potentially provide habitat for amphibians, it should be noted that nearby ponds offered more suitable and stable habitats. This includes various invertebrates, amphibians and / or possibly fish species. Due to its potential ecological significance in the context of the site, it is recommended to avoid works which may impact upon this pond.
- 5.1.8. As is best practice for water vole surveys, two visits were scheduled within two months of each other, to assess the ditch network, within (and connected to) the Order Limits considered to be directly impacted by the Proposed Development. However, the habitat withing the order limits was deemed unsuitable for both otter and water vole due to the ditches being ephemeral, lacking foraging opportunities and the banks being deemed unsuitable for burrowing for water vole. Therefore, a second visit for water vole is not recommended.

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## 6. Summary conclusion

- 6.1.1. The surveyed ditches were either dry, or of shallow water depths, homogenous substrate (predominately silt), lack of variance in flow types and low flow velocities. As a result of these factors water quality in the ditches is considered likely to be relatively poor particularly with regards to dissolved oxygen, which is likely to be of low concentration, or to be subject to considerable diurnal variations in ditches with dense macrophyte growth. These factors coupled with limited connectivity to other watercourses and the fact that many ditches are likely to be ephemeral means that in general these ditches are considered unlikely to support significant fish populations. However, due to the ditches having some connectivity to the River Witham and River Slea via the wider ditch network and given the ability of eels to occasionally adopt an amphibious feeding regime and commute between aquatic habitats over land, the use of the habitat as temporary refuge and foraging habitat cannot be entirely discounted. Habitat for species other than eel was limited at the time of survey, with only hardy species such as three-spined stickleback considered likely to be able to survive.
- 6.1.2. The six ditches surveyed were deemed unsuitable for otter and water vole due to the network being at high risk of drying out, a lack of suitable foraging opportunities being available and the banks being deemed unsuitable for burrowing opportunities. No evidence of water vole or otter was found.
- 6.1.3. It is recommended that an ecological clerk of works with aquatic experience be present during the installation of the internal road crossings to supervise the works, provide ecological support and ensure that adequate pollution control measures are in place. In addition, habitat suitability and connectivity is likely to increase in periods of prolonged wet weather and should the crossing works be undertaken when water levels are higher a fish rescue may also be required at some locations.



## References

**Ref.1:** RSK Biocensus (2023) Springwell Solar Farm: Preliminary Ecological Appraisal Report. 2483765. RSK Biocensus, Coventry.

**Ref.2:** The Wildlife and Countryside Act (WCA) (1981) as amended. Available online: https://www.legislation.gov.uk/ukpga/1981/69

**Ref.3:** Hendry, K. & Cragg-Hine, D. (1997). Restoration of Riverine Salmonid Habitats, Fisheries Technical Manual 4.

**Ref.4:** Strachan, R., Moorhouse, T. and Gelling, M. (2011) *Water Vole Conservation Handbook*. Third Edition. Wildlife Conservation Research Unit, Oxford.

**Ref.5:** Dean, M., Strachen, R., Gow, D and Andrews, R. (2016) *The Water Vole Mitigation Handbook* (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

**Ref.6:** Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

# Appendix 1- Target Notes for Aquatic Habitat Assessment in Figure 2



Application Document Ref: EN010149/APP/6.3 Planning Inspectorate Scheme Ref: EN010149



Polygon ID	Flow type	Depth	Velocity	Substrate	Comments
C1.1	Dry			SI	CHOKED
C1.2	Shallow run	В	0		
C1.3	Shallow run	А	1	SI	
C1.4	NoFlow	А	0	CL	CHOKED
C1.5	Noflow	А	0		No access
C1.6	Noflow	А	0	Si	
C1.7	Shallow run	А	1	Si	
C1.8	Dry				CHOKED
C2.1	NoFlow	А	0		No access
C2.2	Shallow run	А	0	NV	CHOKED
C2.3	Shallow run	А	0	NV	CHOKED
C2.4	Dry			SI	CHOKED
C2.5	NoFlow	А	0		CHOKED
C2.6	NoFlow	А	0	NV	CHOKED

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Polygon ID	Flow type	Depth	Velocity	Substrate	Comments
C2.7	Dry				CHOKED
C3.1	Channel				Emergent linear- leaved
C3.2	NoFlow	А	0	CL	
C3.3	NoFlow	А	0	SI	FLO
C3.4	NoFlow				
C3.5	NoFlow	А	0		FLO
C3.6	NoFlow				
C3.7	Dry				
C3.8	Dry			SI	Dense veg
C3.9	NoFlow				
C4	Dry			SI	CHOKED
C5.1	NoFlow	А	0	SI	CHOKED
C5.2	Dry				

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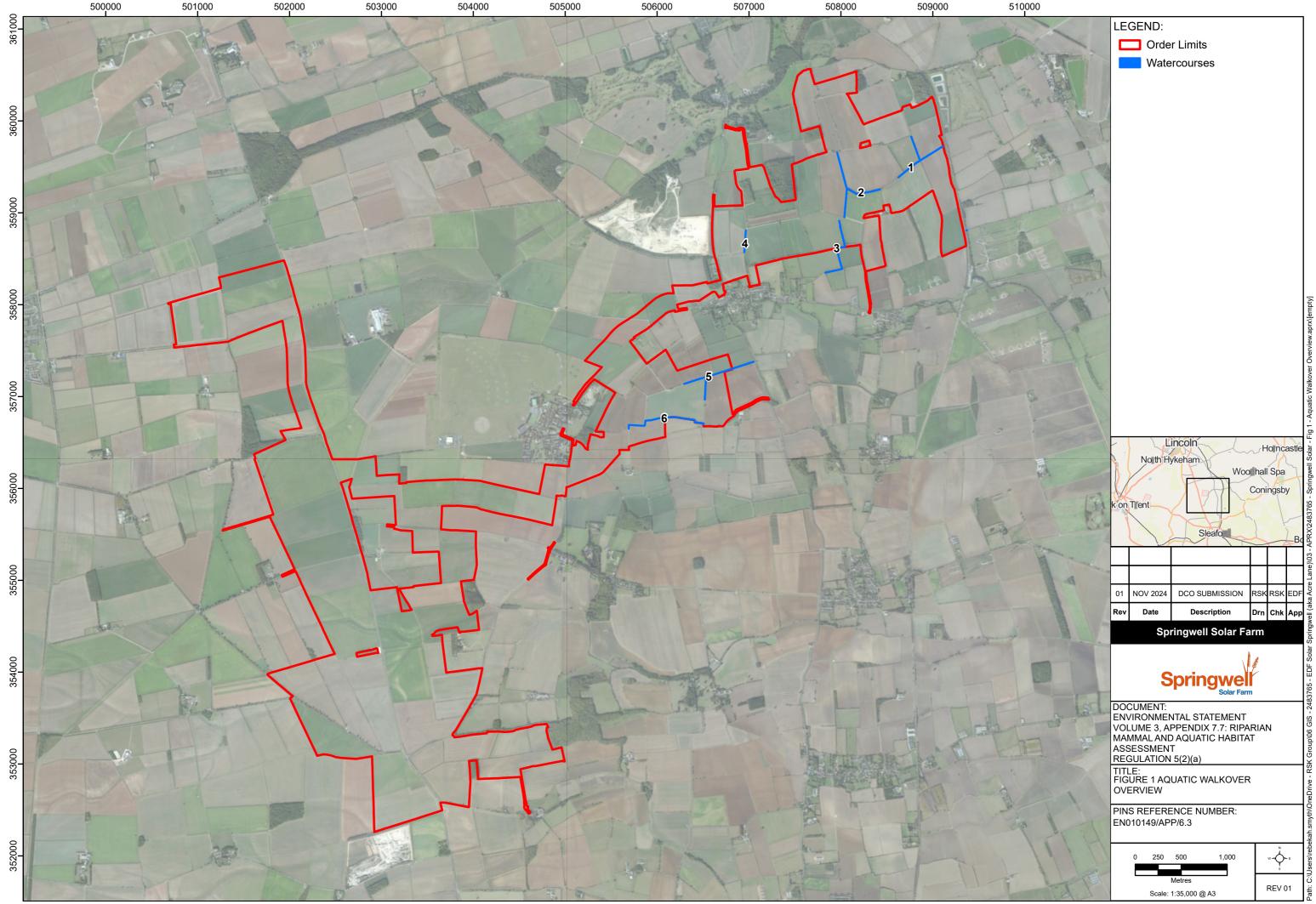


Polygon ID	Flow type	Depth	Velocity	Substrate	Comments
C5.3	NoFlow	A	0	SI	CHOKED, Substrate: Silt/Gravel
C5.4	Dry			SI	CHOKED
C6.1	Dry				
C6.2					No access
C6.3	NoFlow	А	0	SI	CHOKED
C6.4	Dry			SI	CHOKED
C6.5	NoFlow	А	0	SI	CHOKED

## Figure 1 - Aquatic Walkover Overview



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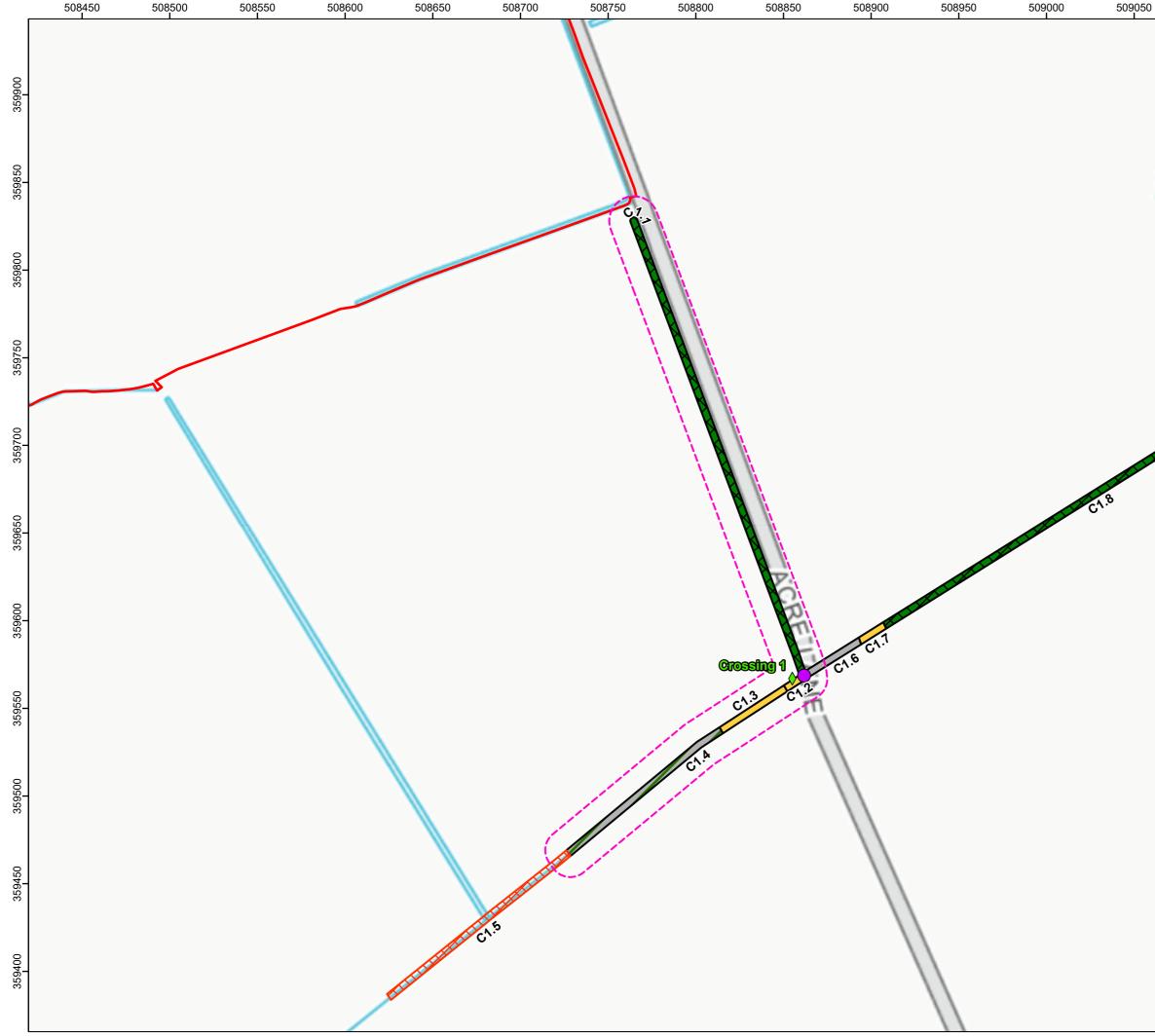


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# Figure 2 - Aquatic Walkover Habitats Crossing



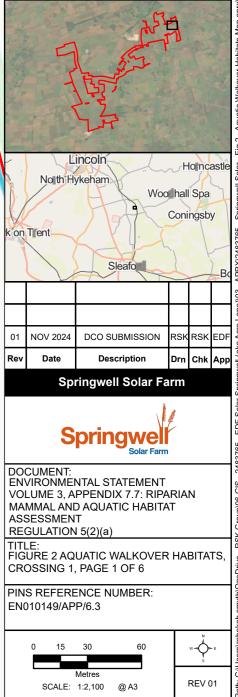
Application Document Ref: EN010149/APP/6.3 Planning Inspectorate Scheme Ref: EN010149

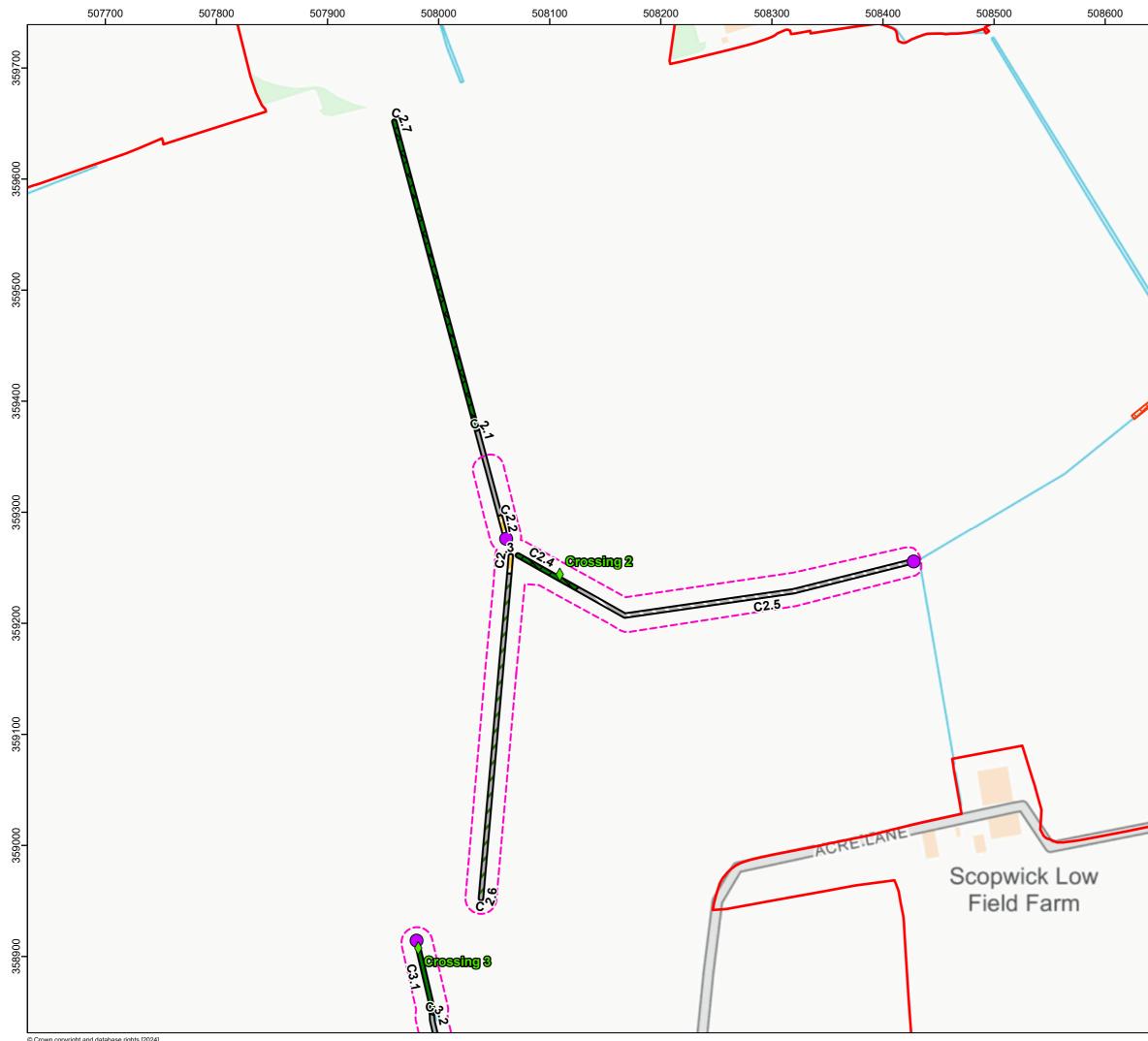


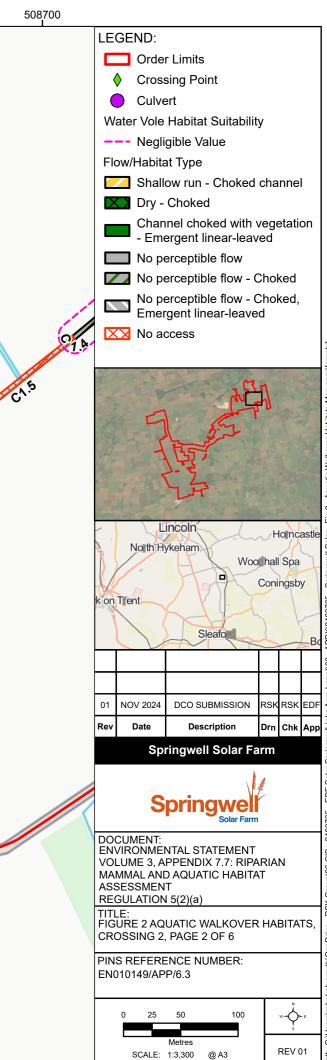
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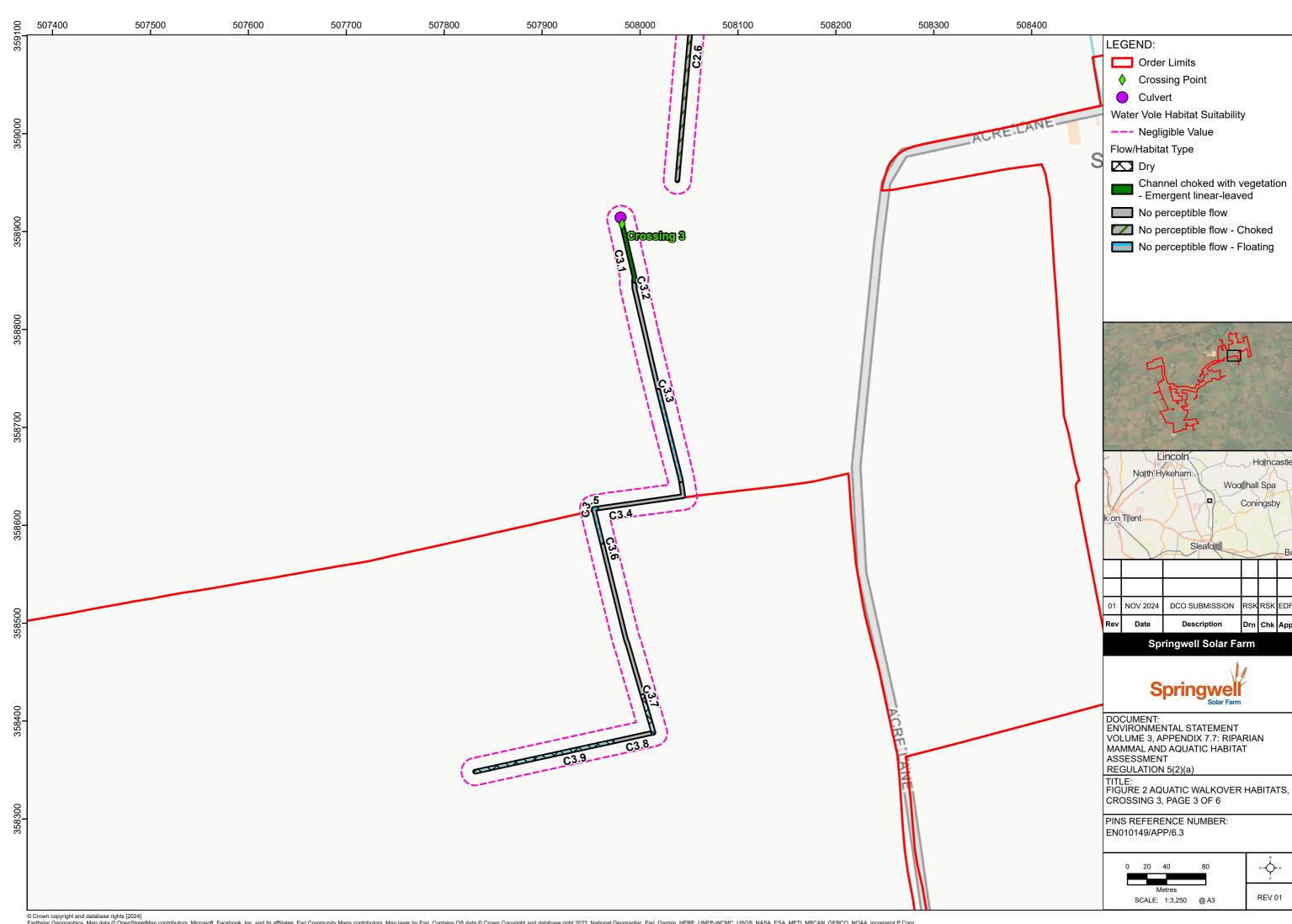
#### LEGEND: Order Limits Crossing Point Culvert Water Vole Habitat Suitability --- Negligible Value Flow/Habitat Type Shallow run Dry - Choked

- No perceptible flow
- No perceptible flow Choked
- No access









RSK ED

Chk App

~**\** 

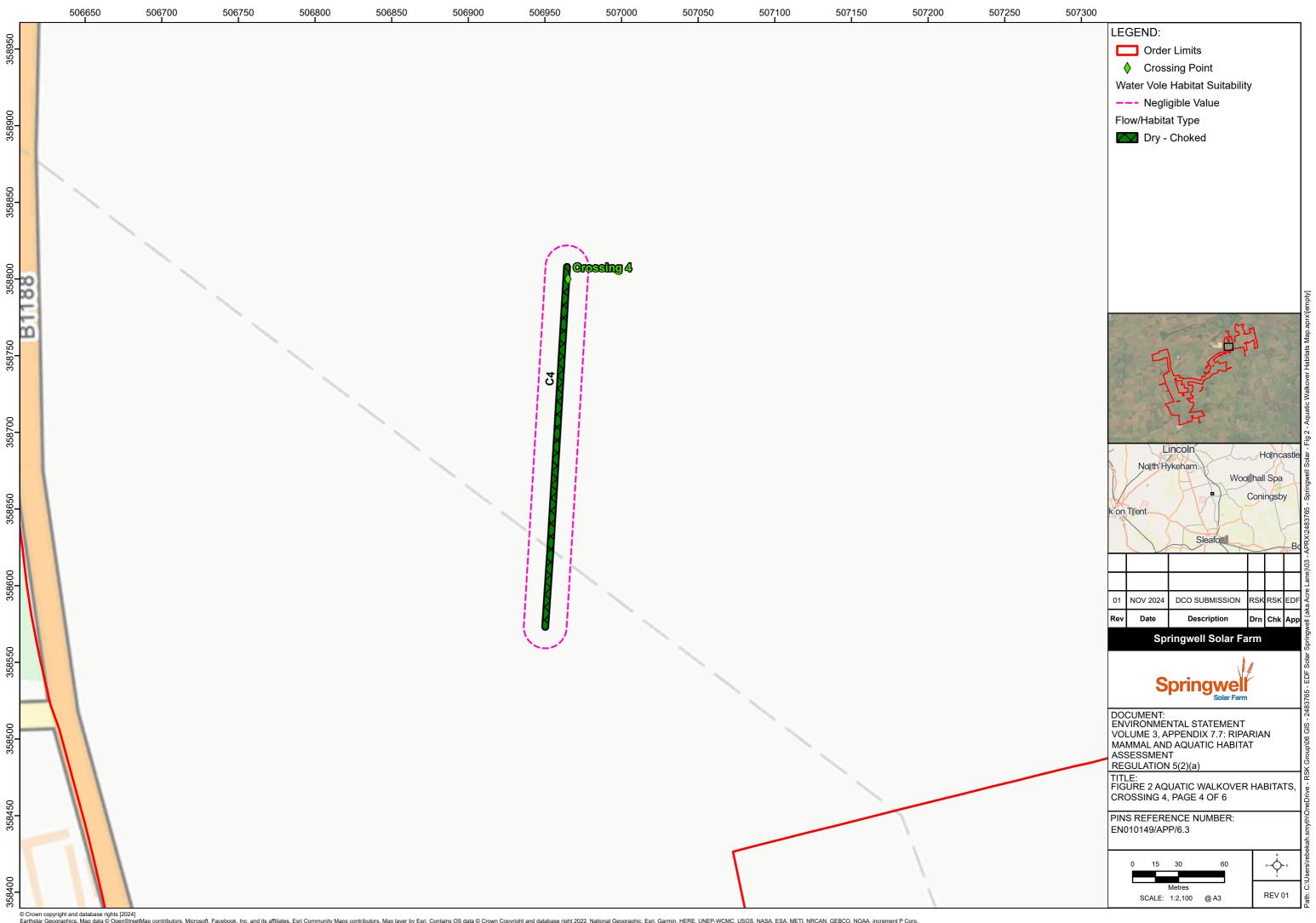
**REV 01** 

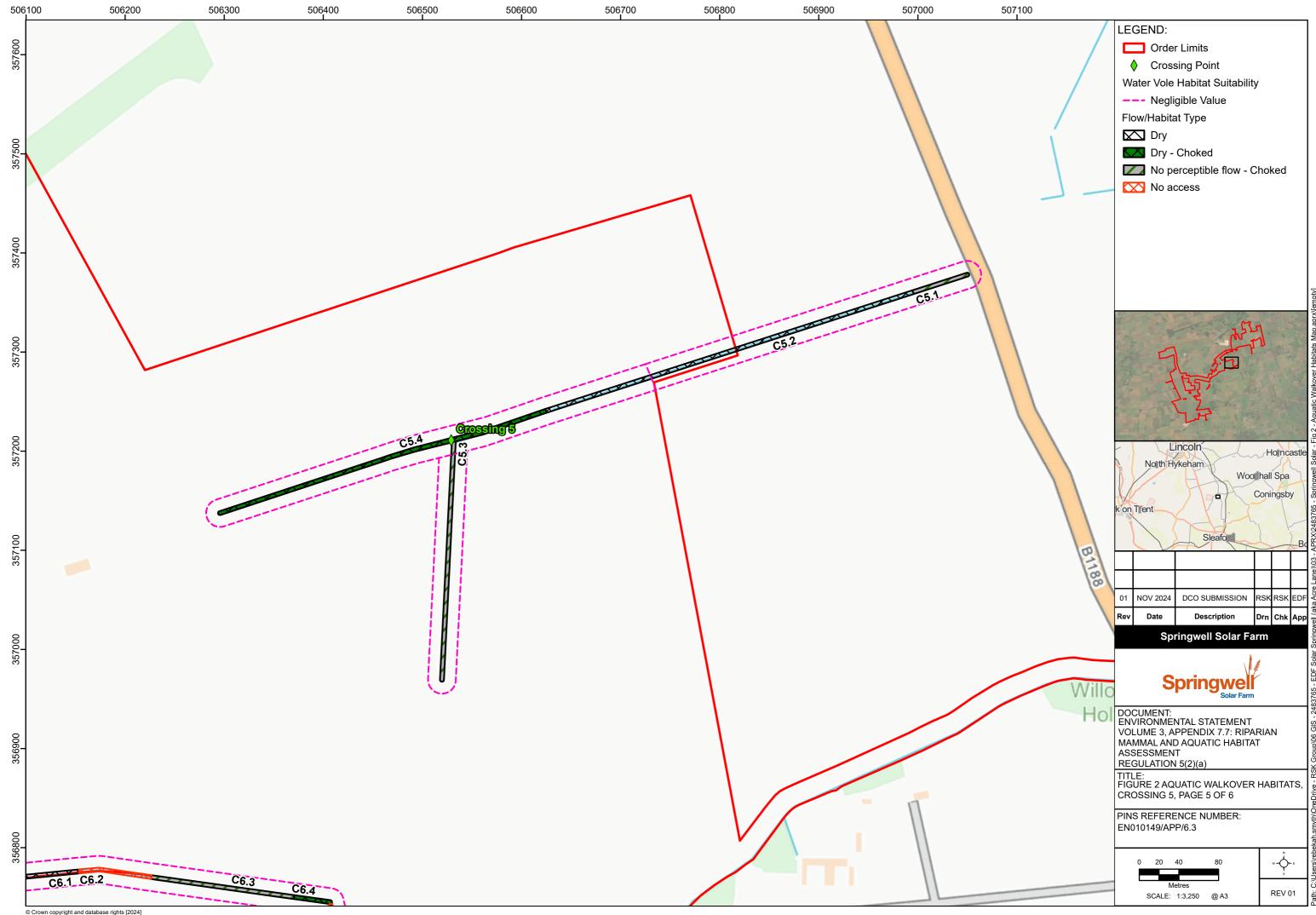
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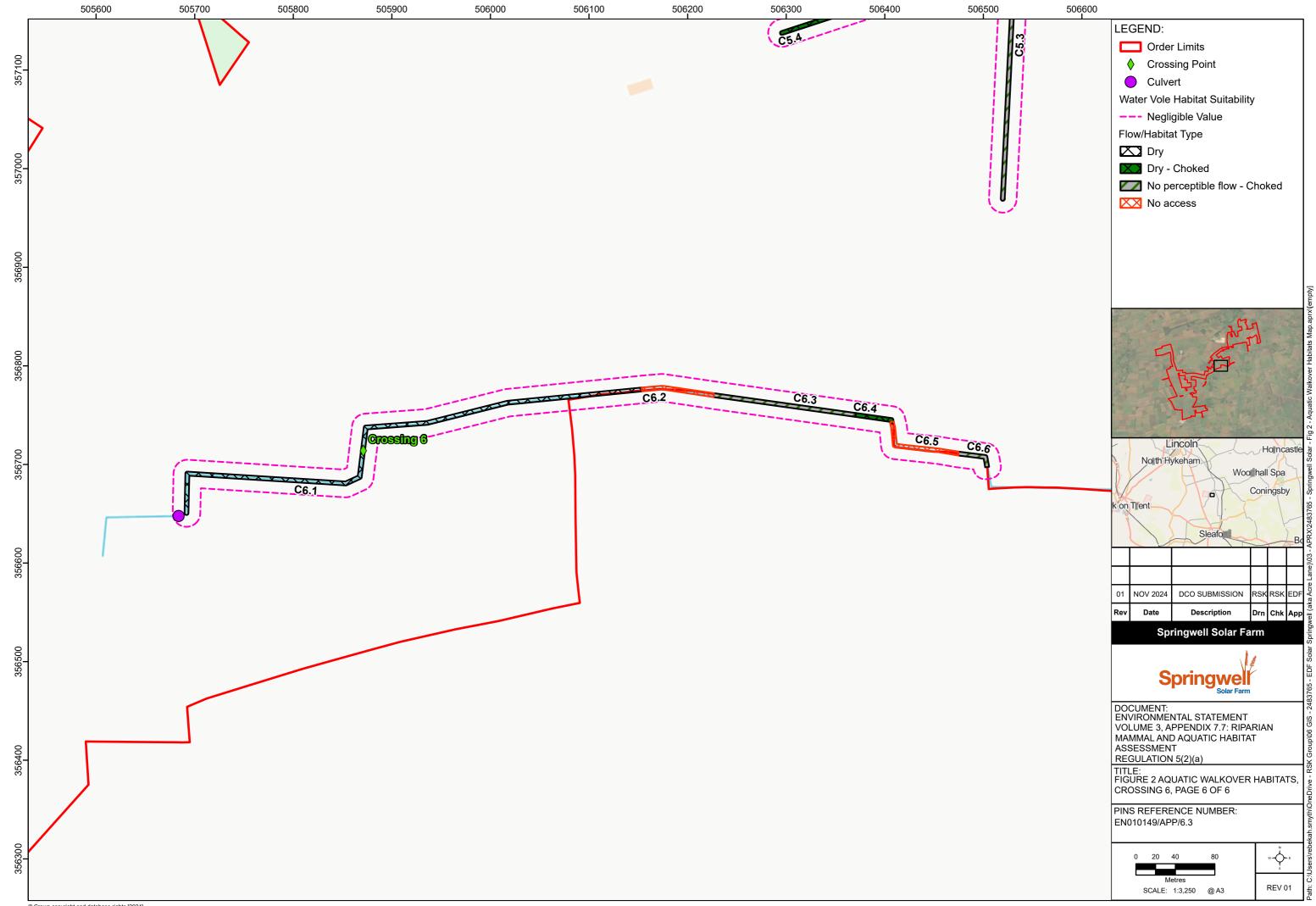
Drr

Homcast

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