

SP MANWEB

Reinforcement to the North Shropshire Electricity Distribution Network



Document Reference: 5.2
Flood Risk Assessment

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November 2018

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Electricity Distribution Network**

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The Planning Act 2008**The Infrastructure Planning (Applications: Prescribed Forms and Procedure)****Regulations 2009****Regulation 5(2)(e)****Reinforcement to the North Shropshire Electricity Distribution Network****Flood Risk Assessment**

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1 INTRODUCTION

1.1 INTRODUCTION

- 1.1.1 This Flood Risk Assessment (FRA) accompanies an application by SP Manweb plc (SP Manweb) under the Planning Act 2008 for an Order granting development consent for the Reinforcement to the North Shropshire Electricity Distribution Network (the 'DCO'). The DCO would grant powers to construct, operate and maintain a new 22.5 kilometre (approximate) 132,000 volt (132kV) connection between the existing Oswestry Substation and Wem Substation within the administrative boundary of Shropshire County (Appendix 1, Location Plan).
- 1.1.2 As this is a significant development a flood risk assessment is required to ensure the project is not impacted by flooding or increases flood risk to others.
- 1.1.3 Consultation with (among others) the Environment Agency and Shropshire County Council, the Lead Local Flood Authority for the area, has already taken place and this FRA incorporates the responses received from these bodies.

2 THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION

2.1.1 The Proposed Development comprises a new 132kV electrical circuit between Oswestry and Wem Substations in North Shropshire, together with associated temporary construction works. The circuit would be a combination of underground cables and overhead line. Works are also required at the existing Oswestry and Wem Substations to accommodate the new circuit.

2.1.2 The Proposed Development includes the following elements:

- Works within the boundary of the existing SP Manweb Substation at Oswestry including underground cabling ('underground cable') and the installation of electrical switchgear and associated equipment;
- Approximately 1.2km of 132kV underground cable between Oswestry Substation and a 132kV terminal structure at Long Wood (SJ 31132 29877);
- Approximately 21.3km of 132kV of overhead conductor supported by Trident wood poles (explained further below) ('overhead line') from the terminal structure at Long Wood to the existing SP Manweb Wem Substation; and
- Works within the existing Wem Substation including the installation of a new 132kV to 33kV transformer ('grid transformer').

2.1.3 The Proposed Development also includes work to facilitate the new electrical circuit including:

- Undergrounding a number of existing lower voltage overhead lines in order to ensure safe electrical clearance for the new overhead line; and
- Temporary works required for the construction of the new overhead line including temporary laydown areas, construction of new accesses

and works to existing access tracks, vegetation clearance and reinstatement planting.

2.1.4 This FRA has not considered the section of 132kV underground cable or the undergrounding of lower voltage diversions since these parts of the Proposed Development would not impact surface water flooding. Temporary lay down areas and proposed access routes to facilitate the construction, have been considered within the FRA.

2.1.5 The construction compound would be located at the existing SP Manweb depot at Maesbury Road, Oswestry Industrial Estate, where site offices and welfare facilities are already in place. The construction compound would cater for the following:

- Bulk delivery (HGV) and storage of materials, the main components being wood poles, wood baulks, conductor, stay wire, crossarm assemblies and insulators; and
- Storage of construction plant and equipment.

2.1.6 It is anticipated that the construction compound would be utilised in the SP Manweb Maesbury Road Depot for a maximum of 18 months. As the depot already serves as a maintenance and construction compound for other SP Manweb works it is not included within the application for an Order granting development consent and is not included within this FRA.

2.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.2.1 The route of the Proposed Development and its components are shown in Appendix 1 Location Plan.

Order Limits

2.2.2 The 'Order Limits' identify the area for which DCO consent is being sought. These Order Limits are in effect a construction and operation corridor, where all the proposed work would be undertaken. The Order Limits include land for the permanent installation of the new 132kV circuit (including works at the

existing substations, the overhead Trident wood pole line, sections of undergrounding (both the proposed 132kV circuit and sections of existing lower voltage line), and temporary works for construction.

- 2.2.3 The width of the Order Limits (excluding the substations) is 25m wide for the overhead line section and 10m wide for the 132 kV underground cable section.
- 2.2.4 The Order Limits also follow the construction and maintenance accesses from public roads. These generally follow existing field tracks or pass alongside existing field boundaries on the edge of fields. Each construction access would be between 3m and 5m wide and, apart from one location where a new gate would be installed, would use existing field gates or openings.

Temporary Lay Down Areas

- 2.2.5 Seven temporary lay-down areas, where poles and other equipment would be temporarily stored, have been identified along the route. These are located adjacent to construction accesses.
- 2.2.6 Each temporary laydown area would be used for a period of up to 3 months, except for the laydown area adjacent to Wem Substation, which may be used for up to 6 months. The laydown areas are located at:
- East of the A5(T) near Long Wood at Middleton;
 - In Middleton between Cabin House and Top House Farm;
 - At Brookfield Farm, at the southern end of Coalpit Lane;
 - At Dandyford Farm near Lower Hordley;
 - At Top House Farm;
 - At Coppice Farm, southwest of Loppington; and
 - On the western edge of Wem, in the field south of Wem substation.

Access Tracks

- 2.2.7 The access tracks would be via existing roads and farm tracks or via crossing fields within the Order Limits. Where ground conditions would not permit tracking of machinery without causing damage it is intended to use either a temporary track system or imported stone. There would be no bridges or culverts constructed as part of the temporary access and the tracks would not be elevated above the surrounding ground level.

Overhead Line Supports (Wood Poles)

- 2.2.8 The proposed wood pole overhead line design (Trident) selected for this route is shown in Diagram 2.2 below.

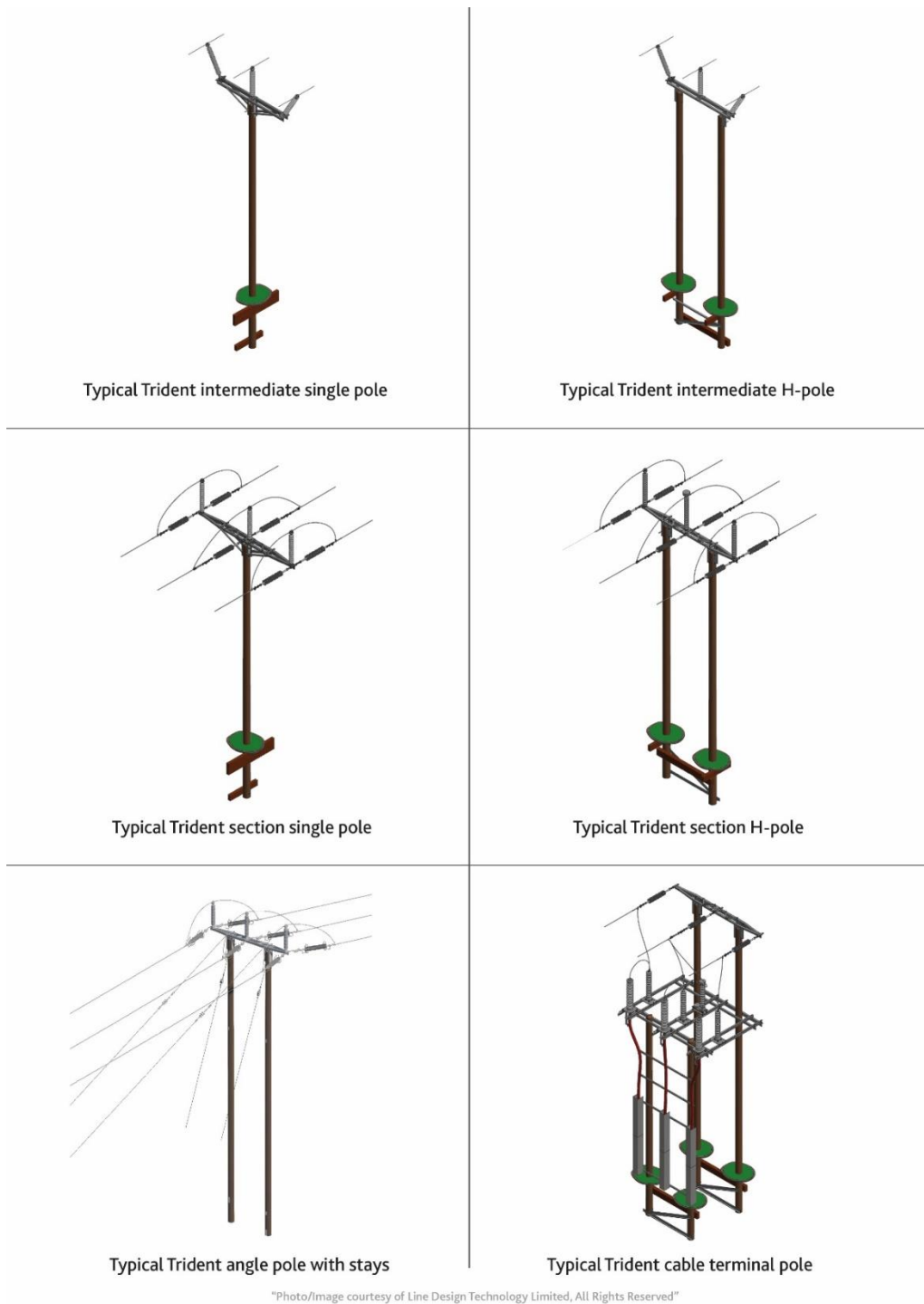


Diagram 2.2 Illustration of different Trident pole types

2.2.9 This design is lower in height and has a more slender and simple appearance than steel lattice towers or alternative heavier duty wood poles. Trident poles are also more flexible in terms of routeing around obstacles, thereby enabling

a better landscape 'fit'. Wood poles have a further advantage in that they do not generally have concrete foundations and so construction methods are typically less intrusive. The wood poles would be between 300mm and 450mm in diameter. The diameter varies subject to the height of the pole.

- 2.2.10 The Final Route Alignment provides an indication of the likely pole positions and alignment of the Proposed Development. The Final Route Alignment follows the centreline of the Order Limits. The indicative pole locations are shown in Appendix 1.
- 2.2.11 The poles would be directly embedded into the ground and the hole backfilled with excavated topsoil or an appropriate crushed-stone aggregate. Additional support where required is provided by a below ground timber foundation block.
- 2.2.12 Where the proposed overhead line crosses the River Perry and the Montgomery Canal, the conductors would be strung across without the need to access the water or banks.

3 HYDROLOGICAL OVERVIEW OF ROUTE

- 3.1.1 The route of the 132kV overhead line lies entirely within the Severn catchment and features many small watercourses and drainage channels (see Appendix 1). The topography is gently rolling with shallow gradients resulting in low flow velocities and extensive flat areas which have been drained by ditching. There are no large rivers, and each of the watercourses crossed by the 132kV overhead line would be spanned without requiring support within watercourse channels.
- 3.1.2 The new overhead line would cross two watercourses recognised by the Environment Agency as main river, the Rivers Perry and Roden. In addition, the line crosses a drainage channel which flows alongside the Roden across low lying land and then flows separately to the north of the Roden, before joining it on the outskirts of Wem. This channel is identified as a part of the River Roden and is also main river. Responsibility for flood risk management in main rivers rests with the Environment Agency.
- 3.1.3 The main rivers have been modelled to show flood extents and provide flood zone maps, and these are shown in Appendix 2.
- 3.1.4 All other watercourses crossed by the Final Route Alignment are not classed as main river and are therefore classed as ordinary watercourses for which responsibility for flood risk management rests with Shropshire Council, the Lead Local Flood Authority within the study area.
- 3.1.5 The most significant of these ordinary watercourses along the Final Route Alignment is the Sleaf Brook, or Wackley Brook, which has also been modelled for flood extent by the Environment Agency.
- 3.1.6 The 132kV overhead line would also cross the Montgomery Canal, which is managed by the Canal and River Trust.
- 3.1.7 The bedrock geology of the area is dominated by permeable sandstones and conglomerates of the Permian and Triassic, which form a nationally important

aquifer and groundwater resource, particularly in the west of the proposed route. These deposits become less permeable in the eastern part of the route, towards Wem.

- 3.1.8 The whole area is overlain by superficial deposits which comprise Till, areas of sand and gravel and deposits of peat.
- 3.1.9 There are therefore significant quantities of groundwater present but these are often sealed from the surface by less permeable superficial deposits.

4 FLOOD RISK POLICY

4.1.1 National policy on planning and flood risk is provided by the National Planning Policy Framework (NPPF)¹ and its supplementary guidance².

4.1.2 The NPPF recognises flood zones for planning purposes, based on the annual probability of flooding from rivers or the sea as shown in Table 4.1.

Flood Zone	Annual Probability of Flooding	Appropriate Land Uses
1 –	Less than 0.1%	All Uses
2 – medium	Between 1% and 0.1% (or 0.5% and 0.1% for tidal flooding)	All but highly vulnerable uses
3a – high	Greater than 1% (or 0.5% for tidal flooding)	More vulnerable and essential infrastructure if the Exception Test is passed.
3b - high	Defined areas where flood water has to flow or be stored.	Only water-compatible uses and essential infrastructure that has to be there

Table 4.1 Flood Zones for Planning

4.1.3 It has been agreed with the EA³ that the Proposed Development is classified, in technical guidance to the NPPF, as “essential infrastructure”, which is defined in the NPPF as including “essential utility infrastructure which has to be located in a flood risk area for operational reasons”.

¹ National Planning Policy Framework; July 2018

² NPPF Supplementary Guidance 6th March 2014 (last updated 27th February 2017)

³ EA response to statutory consultation, dated 22 January 2018

- 4.1.4 All development should be located in areas of least flood risk where possible, i.e. Flood Zone 1, but essential infrastructure is also considered appropriate in flood zone 2, and also in flood zone 3 subject to an exception test.
- 4.1.5 To pass the exception test the NPPF requires that the development (a) provides wider sustainability benefits to the community that outweigh the flood risk and (b) be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, would reduce flood risk overall.
- 4.1.6 Essential infrastructure permitted in zone 3b, the functional floodplain, should be designed and constructed to:
- Remain operational and safe for users in times of flood.
 - Result in no net loss of floodplain storage;
 - Not impede water flows; and
 - Not increase flood risk elsewhere.
- 4.1.7 Functional floodplain is defined in the Strategic Flood Risk Assessment (SFRA) prepared by Shropshire Council. The Shropshire SFRA uses the 5% annual flood extent to define the functional floodplain where suitable modelling exists and elsewhere takes a precautionary approach of equating flood zone 3b with flood zone 3a, meaning the 1% annual flood extent is used in these areas.

5 IDENTIFICATION OF THE FLOOD HAZARD

5.1 FLOODING FROM RIVERS AND THE SEA

- 5.1.1 The Environment Agency have produced flood zone maps for all main rivers with a catchment greater than 3km² and for other watercourse in some cases. These show the extent of flood zone 2 and 3 for flooding from rivers or the sea, but do not include the effect of flood defences or climate change. The extent of flood zone 2 (which includes flood zone 3) along the Proposed Development is shown in Appendix 2.
- 5.1.2 Climate change is expected to increase the probability of flooding and current guidance suggests including an allowance for increased peak flow for future climate scenarios.
- 5.1.3 Studies⁴ have shown that the future flood zone 3 is unlikely to exceed the current flood zone 2 extent in future climate scenarios. In the absence of detailed flow modelling a precautionary approach has been taken of assuming the current flood zone 2 represents the future flood zone 3 extent.
- 5.1.4 Consideration of the flood risk for the 132kV overhead line therefore uses the current flood zone 2 to indicate the potential fluvial flood risk area during its operational lifetime. The constructional phase would be transient and therefore the current flood zones have to be used to assess flood risk for any constructional activities.
- 5.1.5 The existing SP Manweb Substations at Oswestry and Wem where electrical switchgear and associated equipment would be installed are both in flood zone 1 and at very low risk of fluvial flooding.
- 5.1.6 An overview of the modelled flood zone 2 along the Final Route Alignment, including pole locations and temporary laydown areas is provided in

⁴ National Flood Resilience Review. HM Government, September 2016

Appendix 2. This shows that, whilst the majority of the route, and all but one of the laydown areas, is in flood zone 1, some pole locations are inevitably within flood zone 2 as the nature of the topography and the small watercourses draining it means that the flood zones are frequent and wide in extent.

5.1.7 The areas where poles are located in flood zone 2 are detailed below.

5.1.8 The 132kV overhead line crosses an extensive area of flood zone 2 associated with the River Perry adjacent to the Montgomery Canal, as shown in **Figure 5.1**. This is a moorland area of low relief and, although extensive, the flooding would be shallow. The low relief and semi-impoundment by the Montgomery Canal would also lead to low flood flow velocities so the poles would not be at risk of undermining by flood water flow.

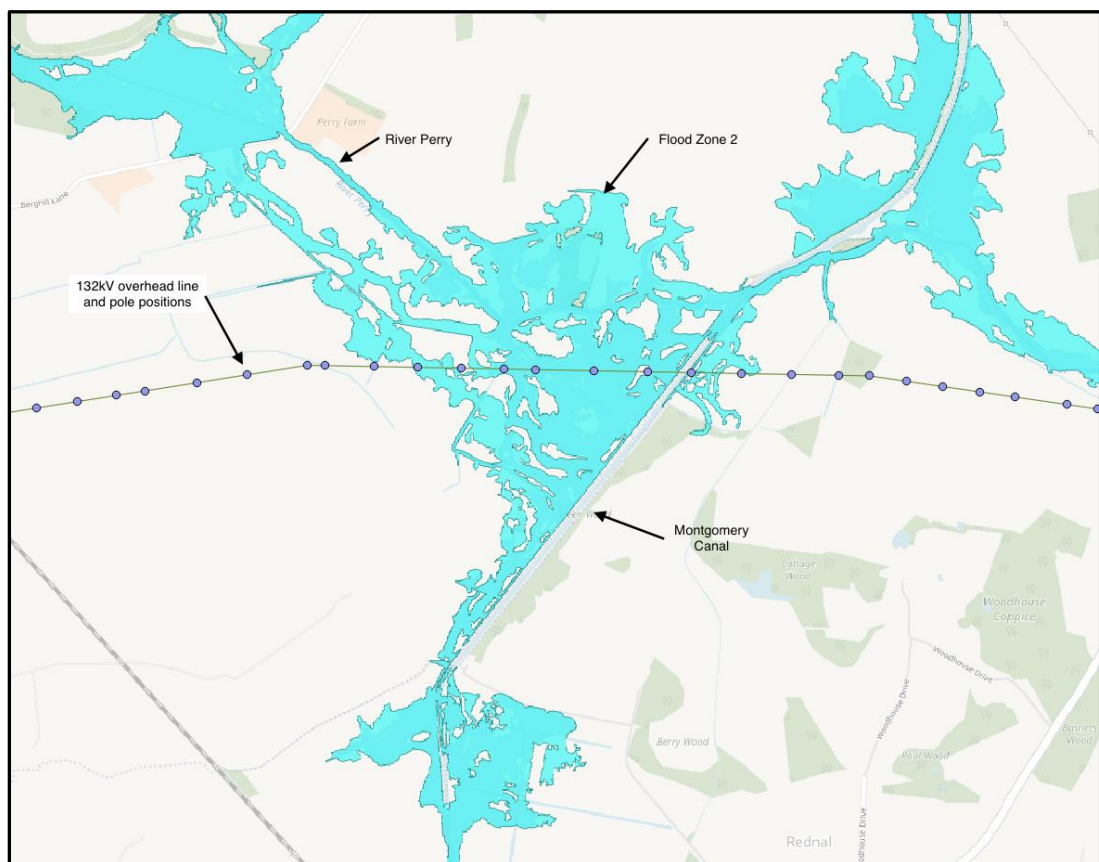


Figure 5.1 Flood zone 2 adjacent to Montgomery Canal

5.1.9 The Final Route Alignment also crosses flood zone 2 associated with the River Perry at three locations close to Rednal (*Figure 5.2*).

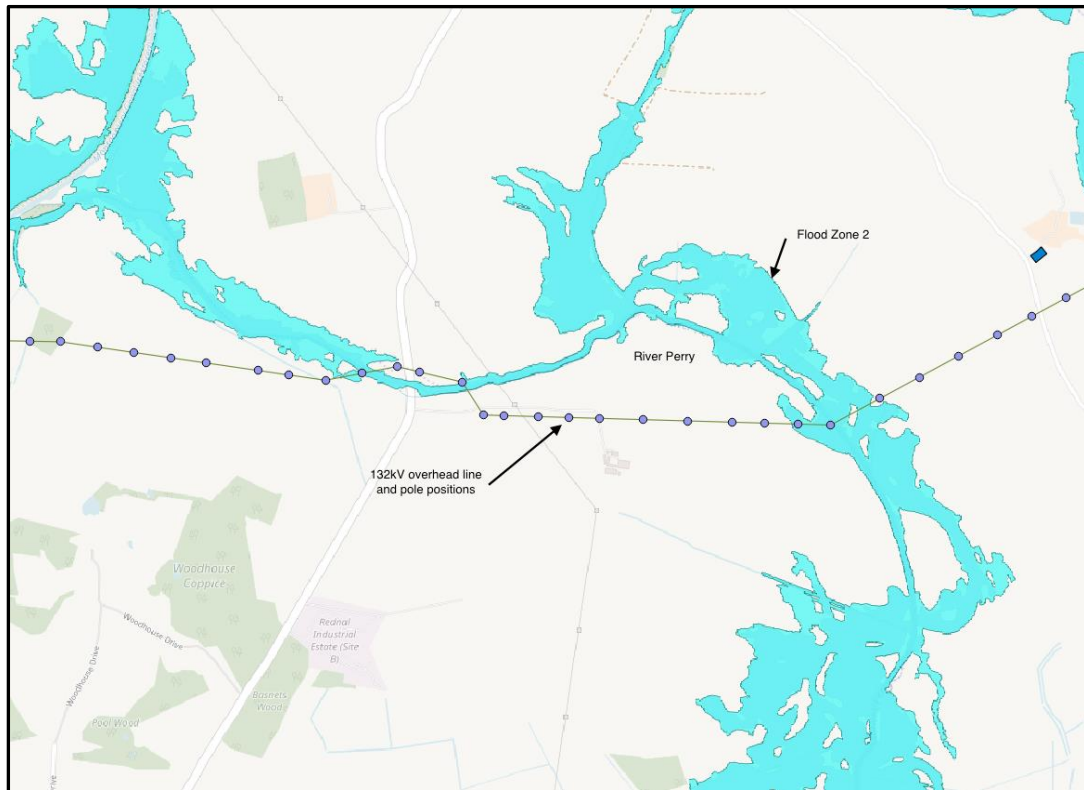


Figure 5.2 Flood zone 2 adjacent at Rednal

5.1.10 These areas are much less extensive but it is also an area of low relief and the flooding would therefore be shallow and flood flow velocities are likely to be low so no risk of erosion of pole foundations is expected.

5.1.11 The Final Route Alignment crosses two small areas of flood zone 2 associated with the Sleep Brook as shown in *Figure 5.3*.

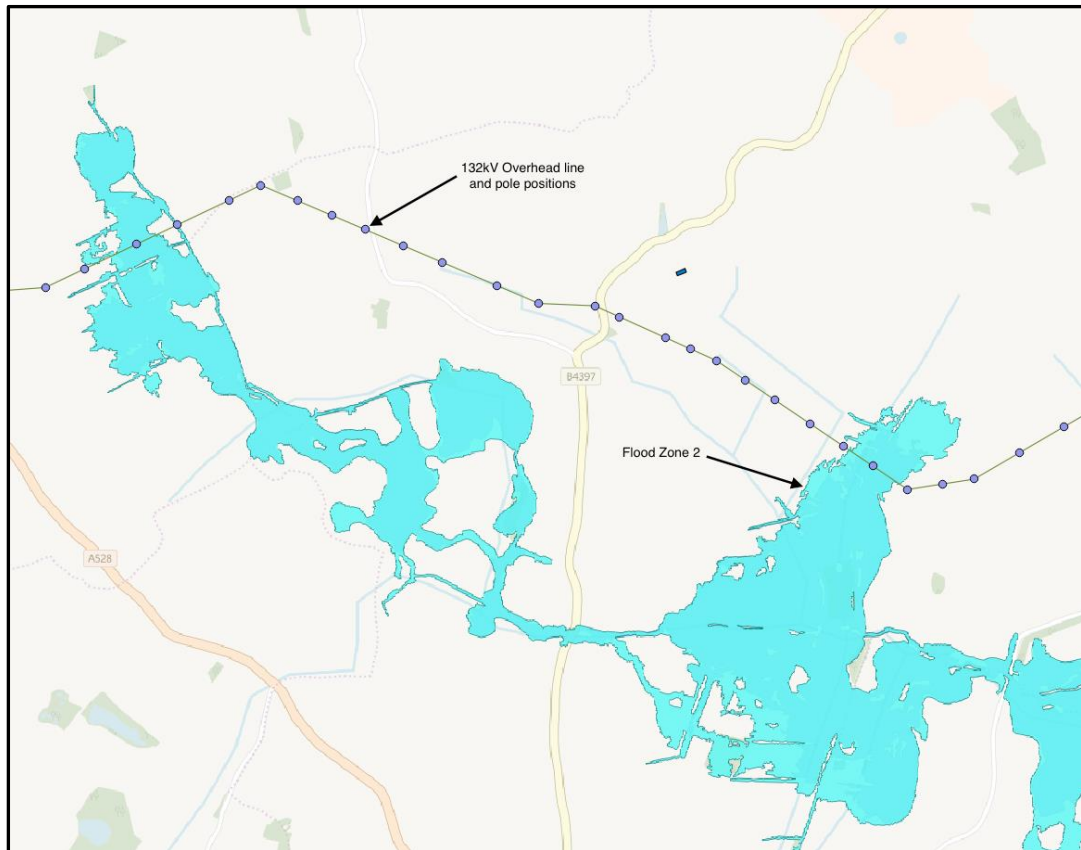


Figure 5.3 Flood zone 2 adjacent to Sleep Brook

5.1.12 These crossing points are relatively short, with only one pole at each location within the flood zone. As with other areas the low relief would lead to shallow flood depths and low flood flow velocities so flood impact is therefore expected to be minimal

5.1.13 The Final Route Alignment then crosses the more extensive area of flood zone 2 associated with the River Roden outside of Wem as shown in *Figure 5.4*.

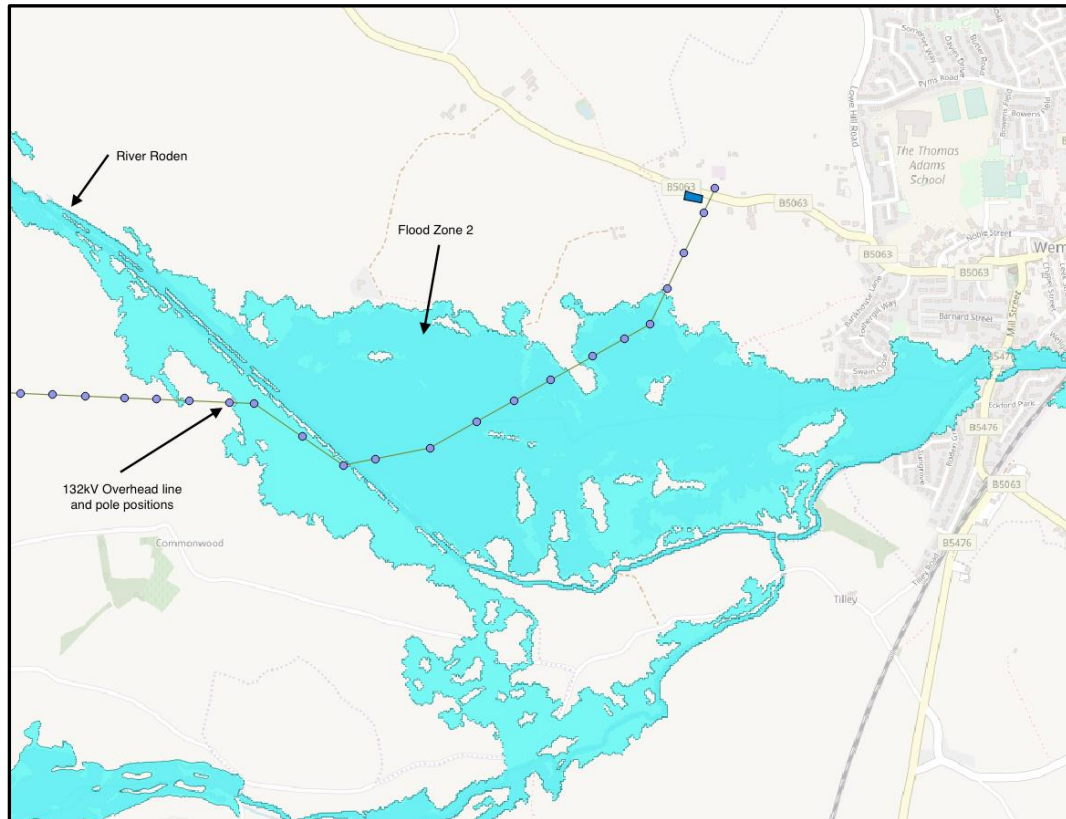


Figure 5.4 Flood zone 2 adjacent to River Roden

- 5.1.14 Although the route has to cross a fairly wide area within flood zone 2 as with other areas the low relief would lead to shallow flood depths and low flood flow velocities so the effect on the poles across this flood area is therefore expected to be minimal
- 5.1.15 None of the areas where the Final Route Alignment crosses flood zone 2 would have substantial flood velocities or flood depths.
- 5.1.16 As flow velocities would be low there is little risk of erosion around the poles and the poles are unlikely to experience significant horizontal forces due to flood flows or accumulation of flood debris. There is therefore little risk to the 132kV overhead line arising from mapped fluvial flooding.

- 5.1.17 All but one of the temporary laydown areas are in flood zone 1. The laydown area at Brookfield Farm is within flood zone 2 but is outside of flood zone 3 as shown in *Figure 5.5*.

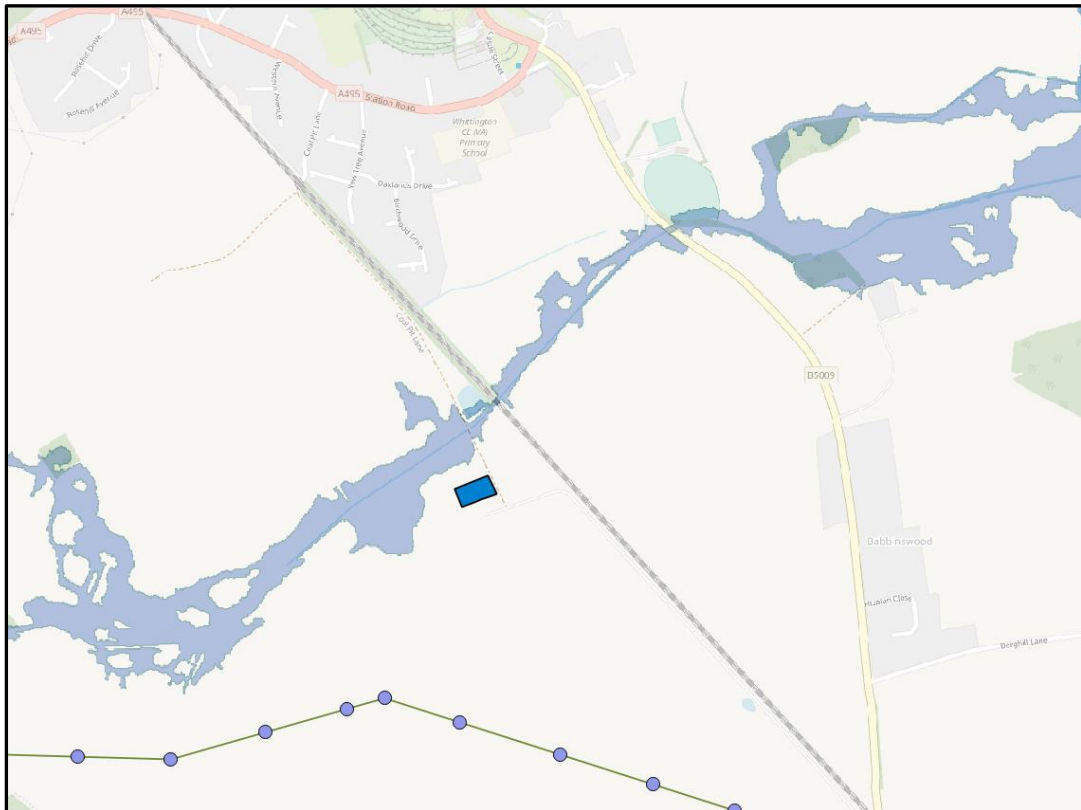


Figure 5.5 Flood Zone 3 in Brookfield Farm Temporary Laydown Area

- 5.1.18 A location within flood zone 2 but outside of flood zone 3 is appropriate as the laydown area is only for temporary use during construction and would not be subject to significant climate change increases in flood zone extent.
- 5.1.19 There are locations where the access tracks would have to be in flood zone 3. There are principally near the Brookfield Farm lay down area, immediately west of the Montgomery Canal and east of the River Roden.
- 5.1.20 There would be no bridges or culverts constructed in association with the access tracks and the tracks would not be elevated above the surrounding ground level. Fluvial flooding is not therefore expected to have any impact on the access tracks.

- 5.1.21 Other fluvial flood risks may arise from unmapped watercourses. These are small streams and ditches which are not designated main rivers and have not been modelled by the Environment Agency.
- 5.1.22 Small watercourses and ditches would receive surface runoff from significant rainfall events but do not receive flows from catchments upstream. It is therefore appropriate to estimate flood risks from these using surface water models which include flow routes from extreme rainfall events with a 0.1% annual probability. These are considered in the next section.

5.2 FLOODING FROM SURFACE WATER

- 5.2.1 An overview of the extent of flooding from surface water (with an annual probability of 0.1%) along the Final Route Alignment, including pole locations and temporary laydown areas, is provided in Appendix 3.
- 5.2.2 This shows that there is scattered flooding possible from surface water throughout the area but there are no significant large areas of surface water flooding along the Final Route Alignment.
- 5.2.3 SP Manweb Substations at Oswestry and Wem where electrical switchgear and associated equipment would be installed are both outside of the modelled 0.1% surface water flood risk area and at very low risk of surface water flooding.
- 5.2.4 All but one of the temporary laydown areas are outside of the modelled 0.1% surface water flood risk areas. Brookfield Farm Temporary Laydown Area is on the edge of an area of surface water flood risk, as shown in *Figure 5.6*.

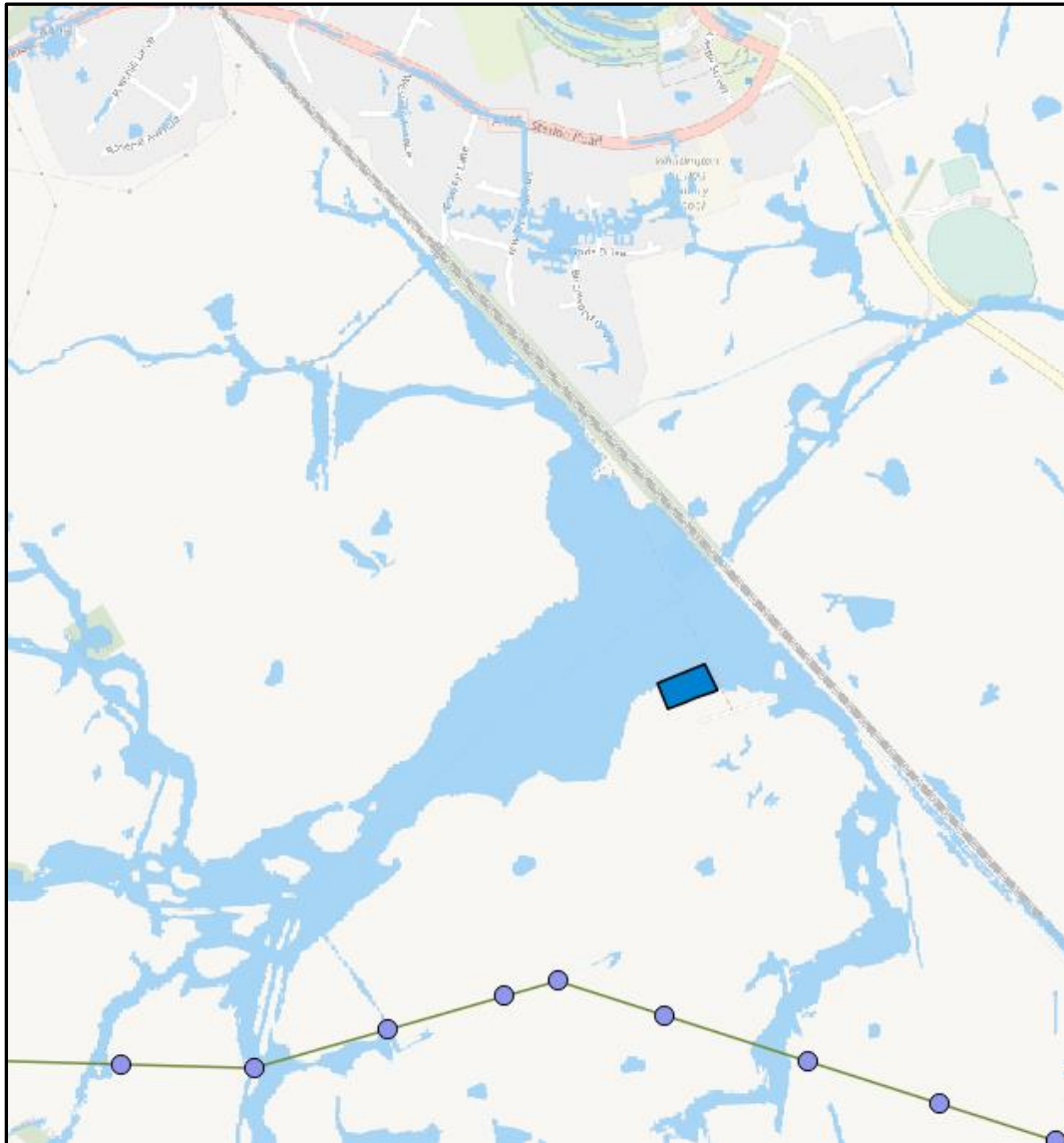


Figure 5.6 Brookfield Farm Temporary Laydown Area showing 0.1% surface water flood risk zone

- 5.2.5 Further detail on the depth of surface water flooding at this site is provided in Figure 5.7 for a medium surface water flood risk with an annual probability of 1%.

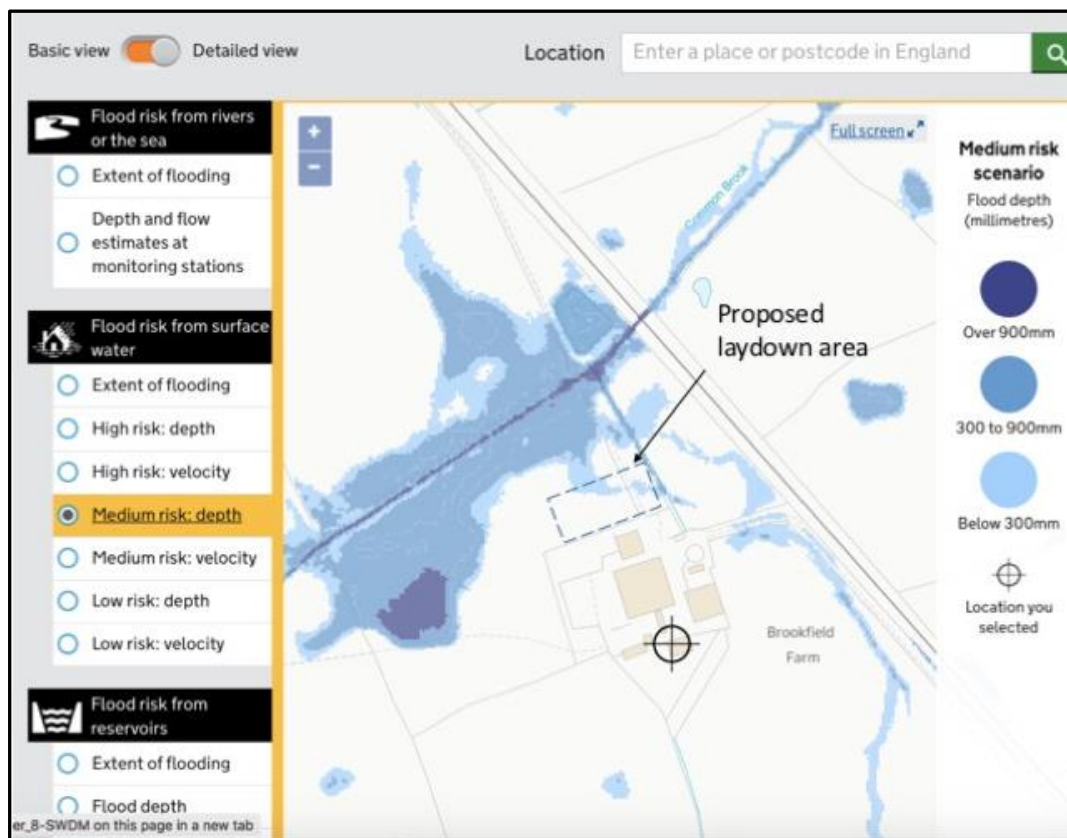


Figure 5.7 Brookfield Farm Temporary Laydown Area - medium surface water flood risk

- 5.2.6 This shows a small area of possible surface water flood risk with a depth of up to 300 mm in the centre of the laydown area. As the site is temporary, and used for a maximum period of 3 months, this is an appropriate level of risk.

5.3 FLOODING FROM GROUNDWATER

- 5.3.1 The Proposed Development is underlain by a significant aquifer but superficial deposits are often of low permeability, including large areas of peat, and prevent movement of groundwater onto the surface.
- 5.3.2 Groundwater flooding is thus not likely to be a significant risk in the area.

5.4 FLOODING FROM OTHER SOURCES

- 5.4.1 Other potential sources of flooding include flooding from sewers, reservoirs and other stored sources of water.
- 5.4.2 Flooding from sewers is likely to be very limited as the area has only scattered settlements and no significant sewer network.
- 5.4.3 There are no large reservoirs in the area which could be a source of flood water in the event of a catastrophic failure.
- 5.4.4 Other stored sources of water are generally not significant in the area apart from the Montgomery Canal which would be crossed by the 132kV overhead line. Catastrophic failure of an elevated part of the canal bank would release a considerable volume of water, although rates of flow would diminish rapidly away from a breach site as the topography is generally slight. The Montgomery Canal crosses the River Perry on an aqueduct to the north of the Proposed Development (132kV overhead line) and is thus elevated above the surrounding land at this point. Failure of the canal bank in this stretch would release water but it is likely to follow the route of the watercourse and thus not have a serious impact on the supporting poles of the 132kV overhead line.

6 EFFECT OF THE PROPOSED DEVELOPMENT ON THIRD PARTY FLOOD RISK

- 6.1.1 The 132kV overhead line could influence flood risk to third parties by displacing flood water or blocking or deflecting flood flows. However, the narrow poles would not significantly deflect flood flows or occupy a significant volume of flood plain storage. Their impact on third party flood risk in the area is therefore expected to be minimal.
- 6.1.2 The temporary laydown areas could also displace or divert flood water and may also cause a hazard if stored material is accessed by flood water.
- 6.1.3 None of the laydown areas are in flood zone 3 and only one of the laydown areas, at Brookfield Farm, is within a 1% surface water flood risk area, and then only marginally. Since the temporary laydown areas are each in use for only 3 months the probability of a flood with an annual probability of less than 1% occurring during their use is very low.
- 6.1.4 The access tracks would not be elevated above the ground surface and would not include any culverts or bridges. These tracks would therefore not occupy flood storage volume and would not present an obstruction to flood flows.
- 6.1.5 Surface runoff from developments can also increase flood risk to others. However, the poles would all be secured with small foundations and would be backfilled with clean material so these would not create additional surface water runoff.
- 6.1.6 The temporary laydown areas and access tracks would not have impermeable surfaces and after their use they would be returned to the original condition. The temporary laydown areas and access tracks would therefore not increase surface water runoff.
- 6.1.7 Any works within 8 metres of the top of the bank of the River Perry or River Roden would require a permit from the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2010. This

would have formerly been called a Flood Defence Consent and is intended to minimise impacts on the watercourse and also allow maintenance of channels and flood defences to continue without hindrance.

6.1.8 DEFRA have issued guidance on 'Exempt flood risk activities: environmental permits' (Updated 13 October 2016), including for 'Electrical cable service crossing over a main river' (FRA2). This exemption allows for the erection of an electrical cable way and associated supports across a main river, if certain conditions are met:

- The service crossing is within 10° of perpendicular to the direction of flow of the main river;
- Permanent hazard markers are erected on both banks of the main river;
- The works do not disturb the bed and banks of the main river; and
- All excavated material not re-used on the site of the works is removed from the floodplain.

6.1.9 The vertical and horizontal clearances of the service crossing also have to comply with specific requirements which for a 132kV connection are as follows:

- Vertical clearance above bank or flood bank crest level – 12 metres; and
- Horizontal clearance of any tower or support landward from the top of the bank of the main river – 15 metres.

6.1.10 Where these conditions would be met an exemption would be sought.

6.1.11 From recent further discussions with the Environment Agency, SP Manweb is aware that as the proposed 132kV overhead line also crosses a flood defence structure across the River Roden, the Environment Agency has advised that a Bespoke Flood Risk Environment Permit (FRAP) is required. The FRAP is

acknowledged in the Other Consents and Licences Report (**DCO Document 5.5**).

7 CONCLUSIONS

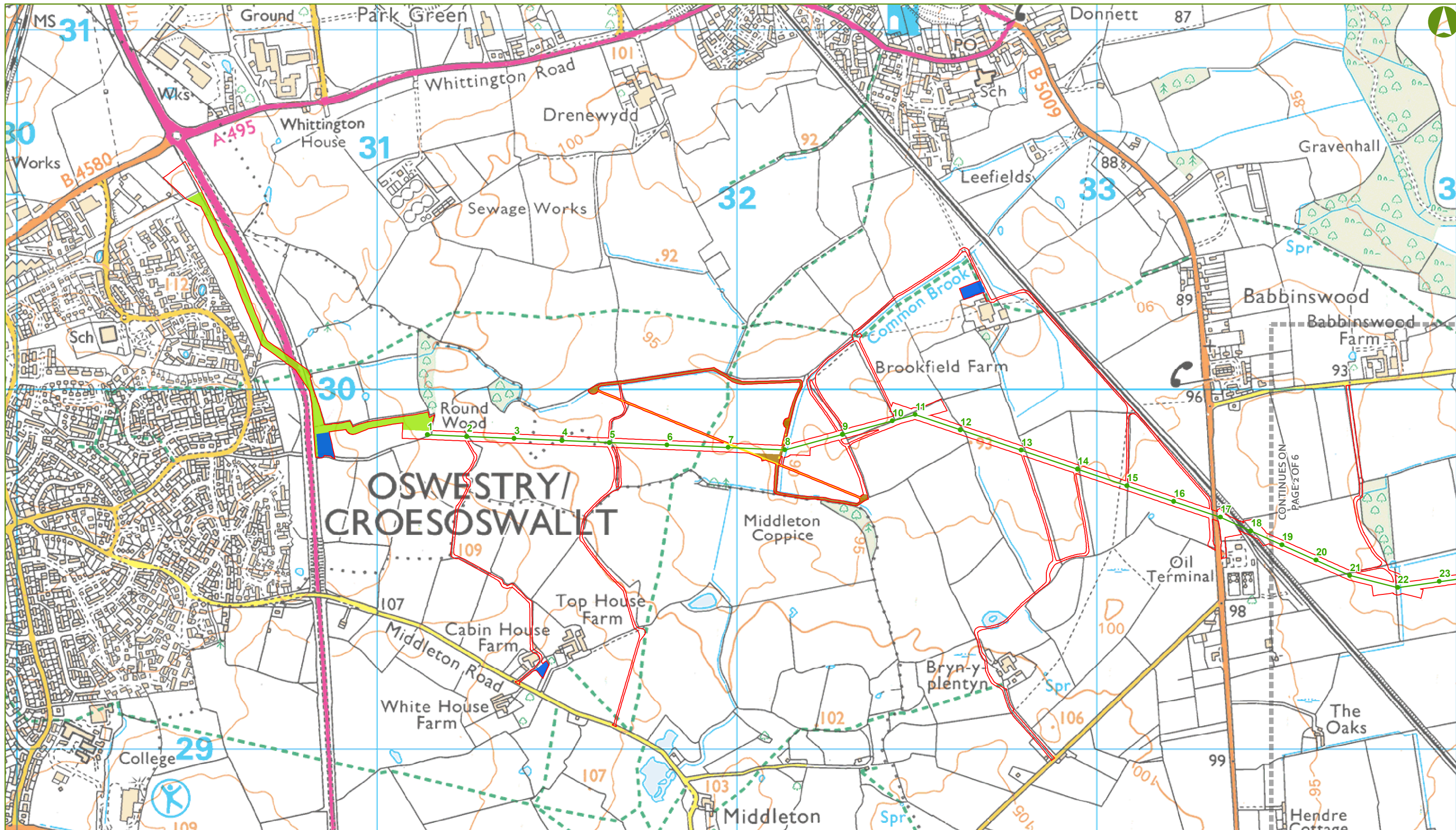
- 7.1.1 The 132kV overhead line would be supported by Trident timber poles. Temporary laydown areas would be required along the route to assist construction.
- 7.1.2 The 132kV overhead line would cross an area of small watercourses and ditches, but limited topography, and include areas identified as subject to fluvial and surface water flood risk.
- 7.1.3 The assessment of fluvial flood risk has used published flood zone 2 extents to identify the possible 1% fluvial flood risk areas including an allowance for climate change. These areas only show flood zones for the Rivers Perry and Roden and the Sleaf Brook.
- 7.1.4 The majority of the 132kV overhead line is in flood zone 1. Some supporting poles are within flood zone 2. This has been judged to have an insignificant impact on the 132kV overhead line due to shallow flood depths and low flow velocities.
- 7.1.5 The fluvial flood risk areas for the remaining small watercourses and ditches has been assessed using the surface water flood modelling, as their primary source of flood water is surface water runoff in extreme rainfall events.
- 7.1.6 Surface water flood areas are very limited in extent and are not likely to have a significant impact on the 132kV overhead line.
- 7.1.7 Other sources of flood risk, including groundwater, sewers, the Montgomery Canal and other stored water sources are all considered to be insignificant.
- 7.1.8 The temporary lay down areas are all outside of flood zone 3 and only one, at Brookfield Farm, includes any area of surface water flood risk. This is a minor part of the site and the risk presented is considered to be insignificant for the 3 month period of use.
- 7.1.9 Access tracks would be at ground level and not include any culverts and bridges. The access tracks would all be restored at the end of the

construction period where necessary. Although some of these have to be within flood zone 3 they would not be significantly affected by flood risk should flooding occur during the limited time they would be present.

- 7.1.10 The narrow poles would not significantly deflect flood flows or occupy a significant volume of flood plain storage. Their impact on third party flood risk in the area is therefore expected to be minimal.
- 7.1.11 The access tracks would be at ground level and would not require any culverts or bridges. Their impact on third party flood risk in the area is therefore also expected to be minimal.
- 7.1.12 Surface water runoff would not be increased by either the 132kV overhead line or the temporary laydown areas and access tracks as no significant impermeable areas would be created.
- 7.1.13 The assessment has shown that the Proposed Development would be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere. The Proposed Development provides wider sustainability benefits to the community that outweigh the flood risk and it is therefore concluded that it passes the Exception test.

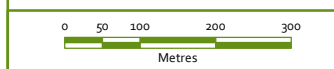
APPENDICES

APPENDIX 1 – LOCATION PLAN

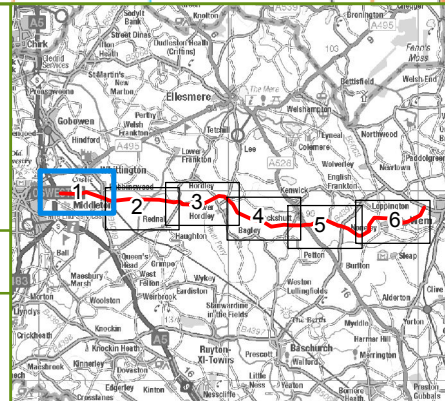


- KEY**
- PROPOSED 132 kV POLE POSITIONS
 - FINAL ROUTE ALIGNMENT
 - ORDER LIMITS
 - PROPOSED 132 kV UNDERGROUND CABLE
 - PROPOSED TEMPORARY LAYDOWN AREAS
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
 - PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

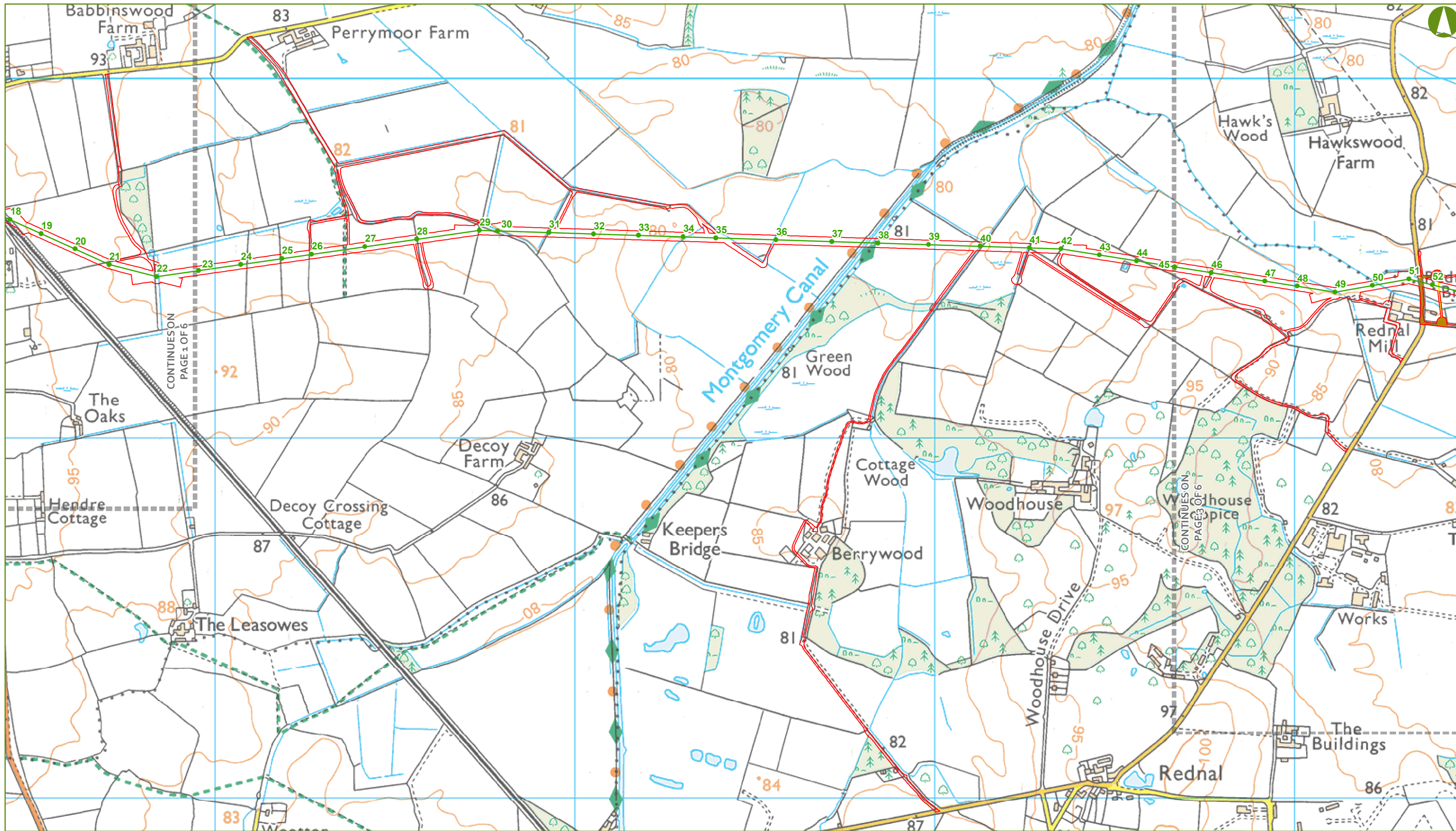
Notes:
This drawing is scaled at an A3 paper size, therefore any prints made at a smaller size will affect the accuracy of measurement units and should not be scaled against.



BACKGROUND MAPPING INFORMATION HAS BEEN REPRODUCED FROM THE ORDNANCE SURVEY MAP BY PERMISSION OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT AND DATABASE RIGHTS 2018. ORDNANCE SURVEY 0100031673. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2018.



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Document: FLOOD RISK ASSESSMENT DCO DOCUMENT 5.2			
Document Title: APPENDIX 1 LOCATION PLAN PAGE 1 OF 6			
Drawn: KC	Checked: ZF	Approved: JC	Date: NOV 18
Document Type: FIGURE		Scale: 1:10,000	Sheet: 1 OF 6
		Sheet Size: A3 (420 mm x 297 mm)	Rev: 1



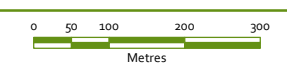
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PAGE 1 OF 6

CONTINUES ON
PAGE 3 OF 6

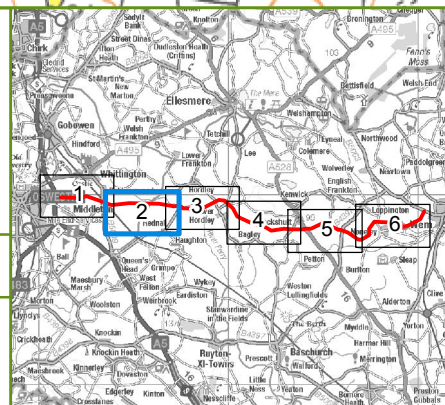
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- PROPOSED 132 kV POLE POSITIONS
 - FINAL ROUTE ALIGNMENT
 - ORDER LIMITS
 - PROPOSED 132 kV UNDERGROUND CABLE
 - PROPOSED TEMPORARY LAYDOWN AREAS

- EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
- EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
- PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

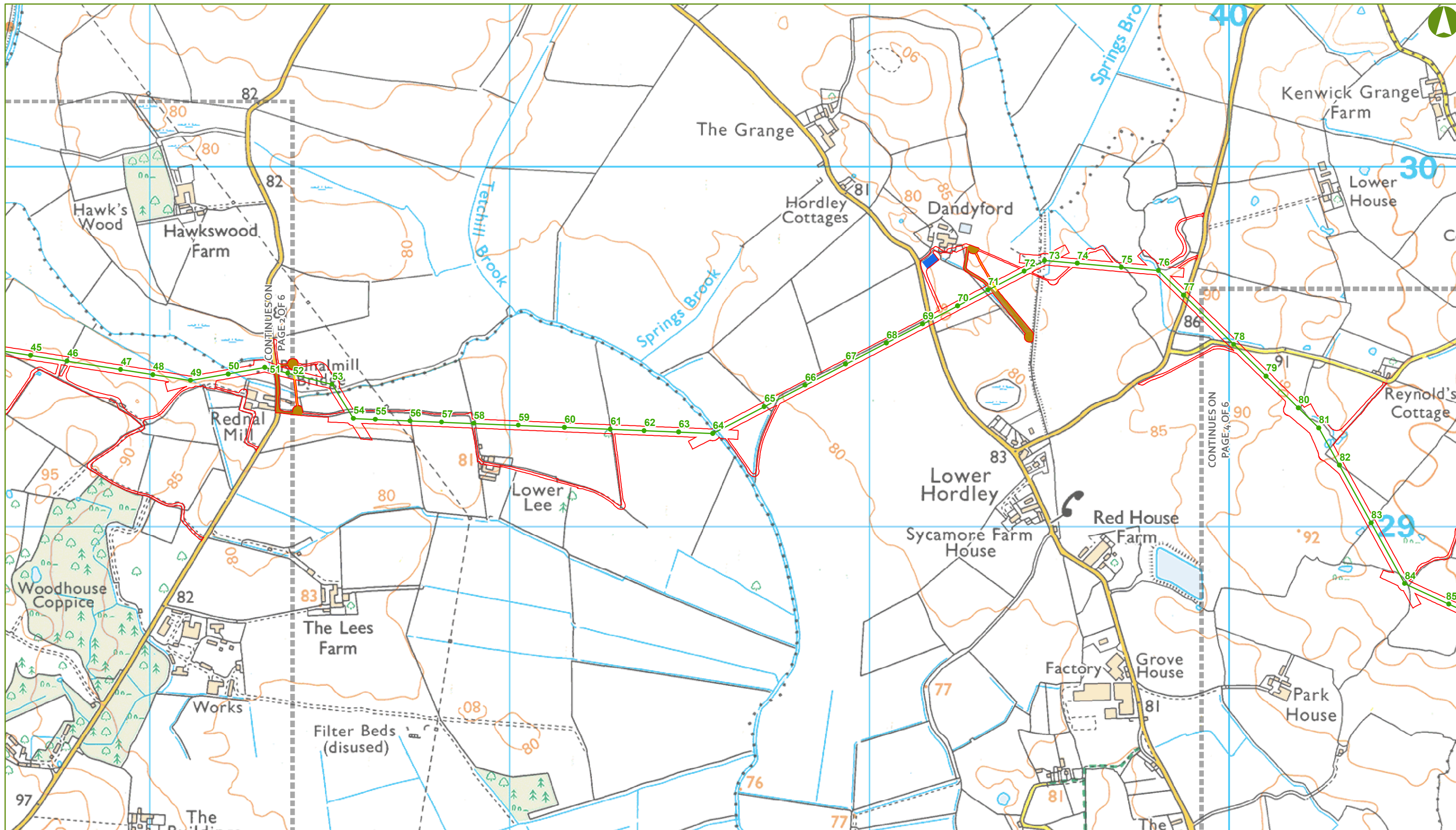
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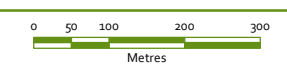


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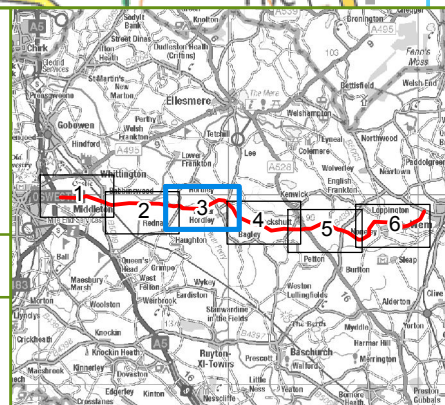


- KEY**
- PROPOSED 132 kV POLE POSITIONS
 - FINAL ROUTE ALIGNMENT
 - ORDER LIMITS
 - PROPOSED 132 kV UNDERGROUND CABLE
 - PROPOSED TEMPORARY LAYDOWN AREAS
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
 - PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

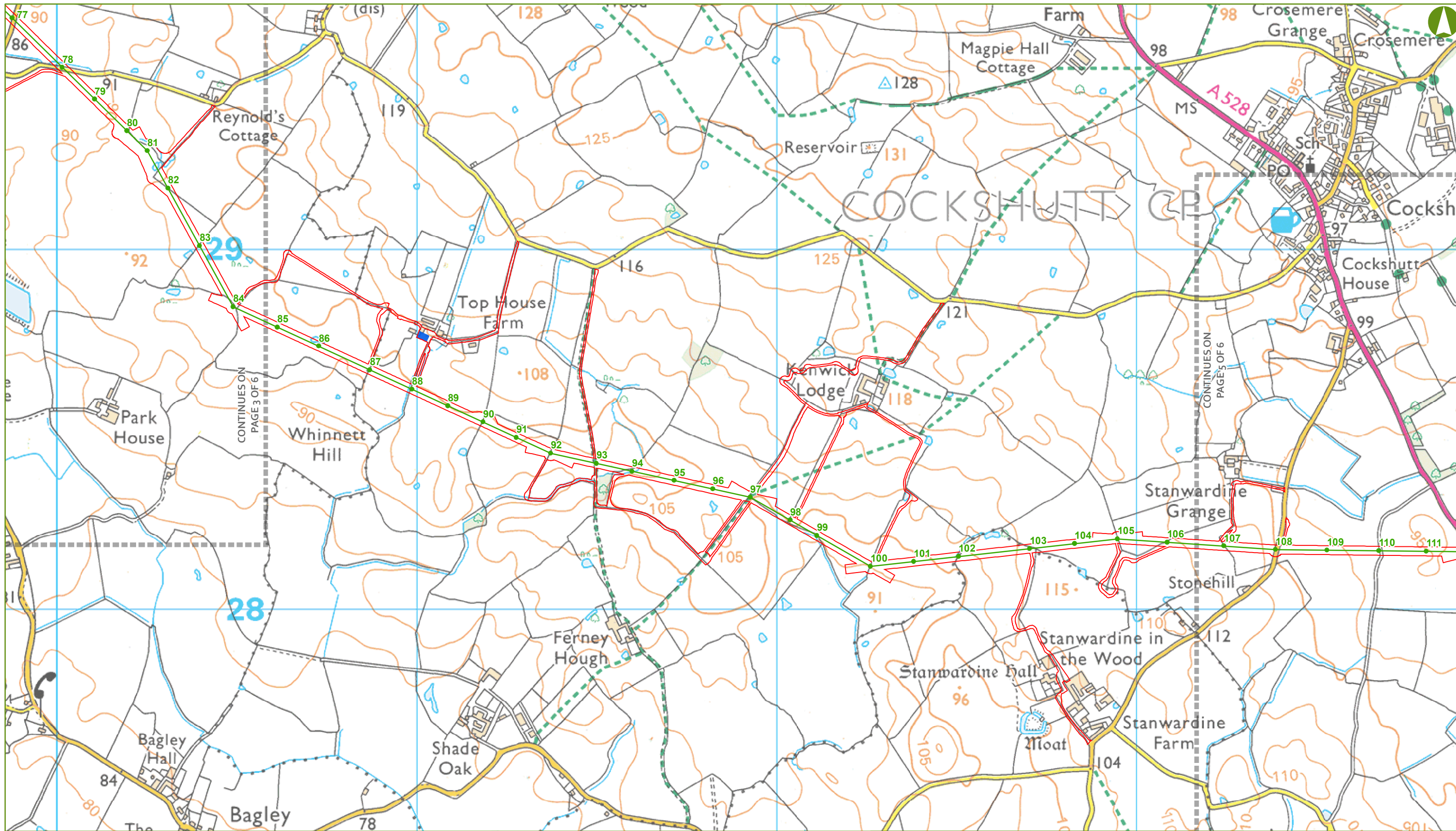
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Document Type: FIGURE		Scale: 1:10,000	Sheet Size: A3 (420 mm x 297 mm)
Sheet: 3 OF 6		Rev: 1	



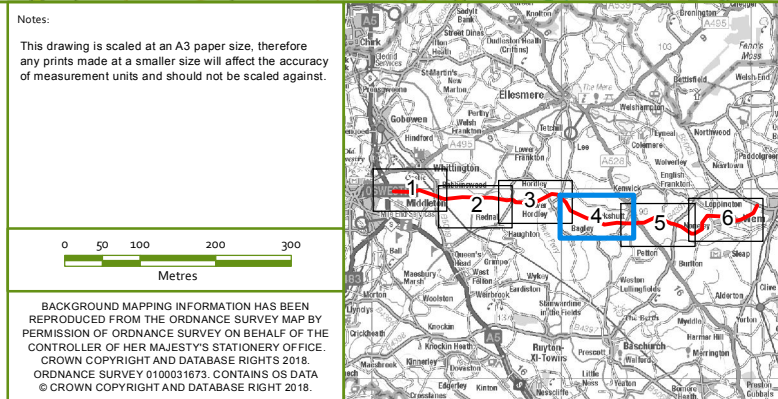
- KEY**
- PROPOSED 132 kV POLE POSITIONS
 - FINAL ROUTE ALIGNMENT
 - ORDER LIMITS
 - PROPOSED 132 kV UNDERGROUND CABLE
 - PROPOSED TEMPORARY LAYDOWN AREAS
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
 - EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
 - PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

Notes:

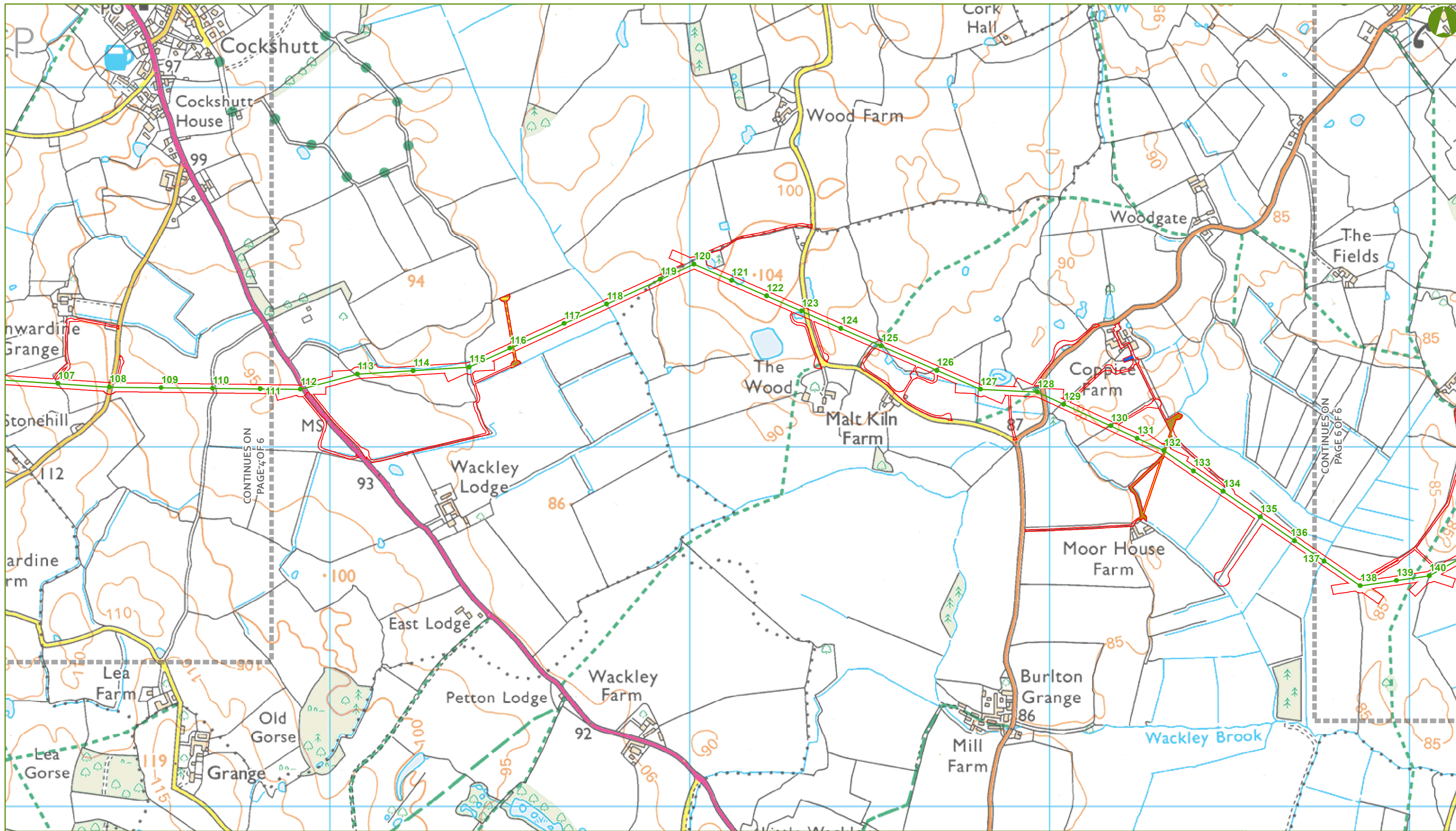
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0 50 100 200 300
Metres

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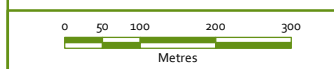
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		Sheet Size: A3 (420 mm x 297 mm)	Rev: 1



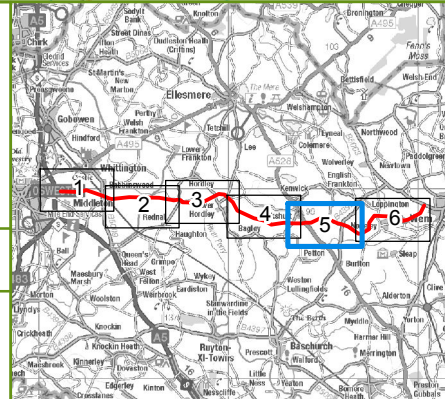
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 - FINAL ROUTE ALIGNMENT
 - ORDER LIMITS
 - PROPOSED 132 kV UNDERGROUND CABLE
 - PROPOSED TEMPORARY LAYDOWN AREAS

- EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
- EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
- PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

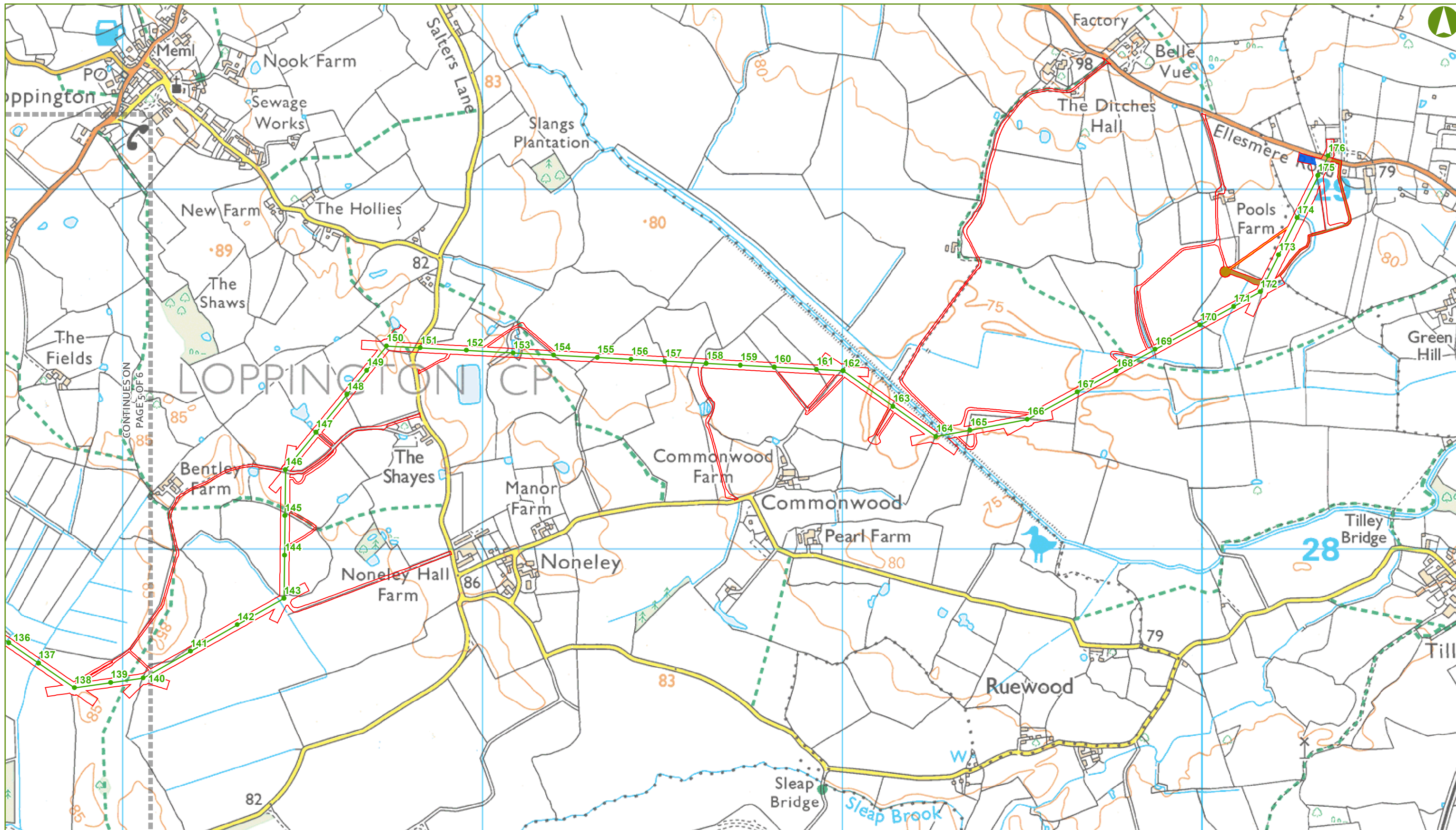
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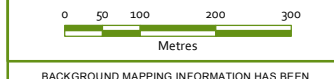


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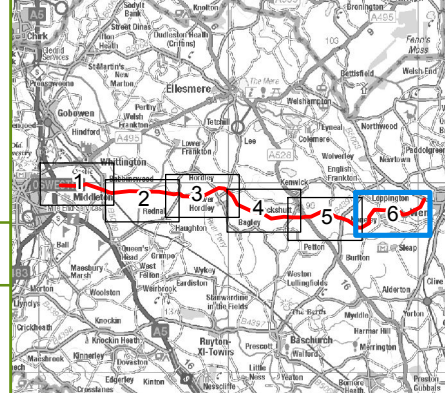


KEY	
●	PROPOSED 132 kV POLE POSITIONS
—	FINAL ROUTE ALIGNMENT
	ORDER LIMITS
	PROPOSED 132 kV UNDERGROUND CABLE
	PROPOSED TEMPORARY LAYDOWN AREAS
	EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REMOVED
	EXISTING LOWER VOLTAGE OVERHEAD LINE TO BE REPLACED WITH NEW UNDERGROUND CABLE ON SAME ALIGNMENT
	PROPOSED UNDERGROUND ROUTE OF EXISTING LOWER VOLTAGE OVERHEAD LINE BEING REMOVED

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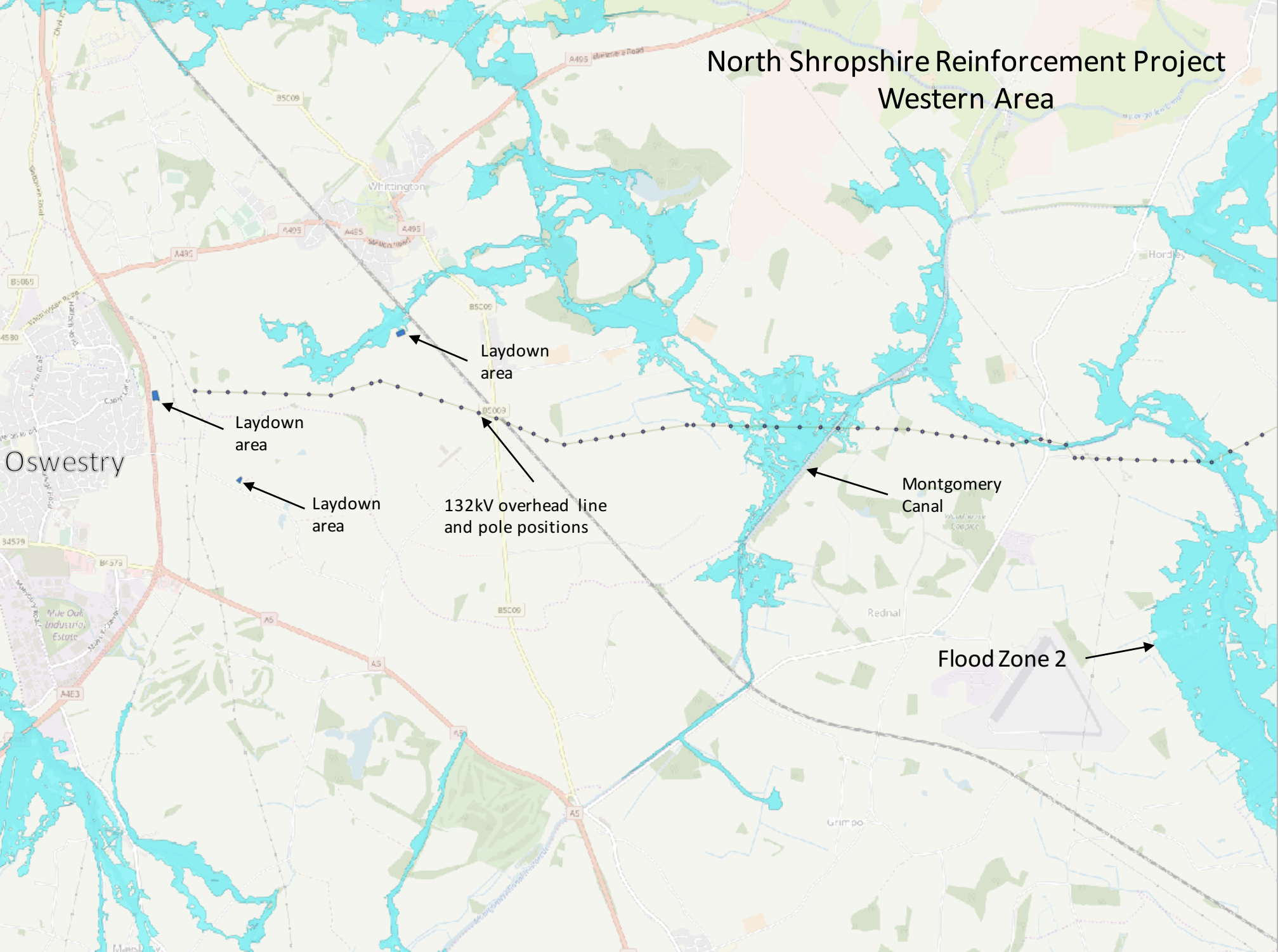
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APPENDIX 2 – FLUVIAL FLOOD RISK OVERVIEW

North Shropshire Reinforcement Project Western Area



Oswestry

Laydown area

Laydown area

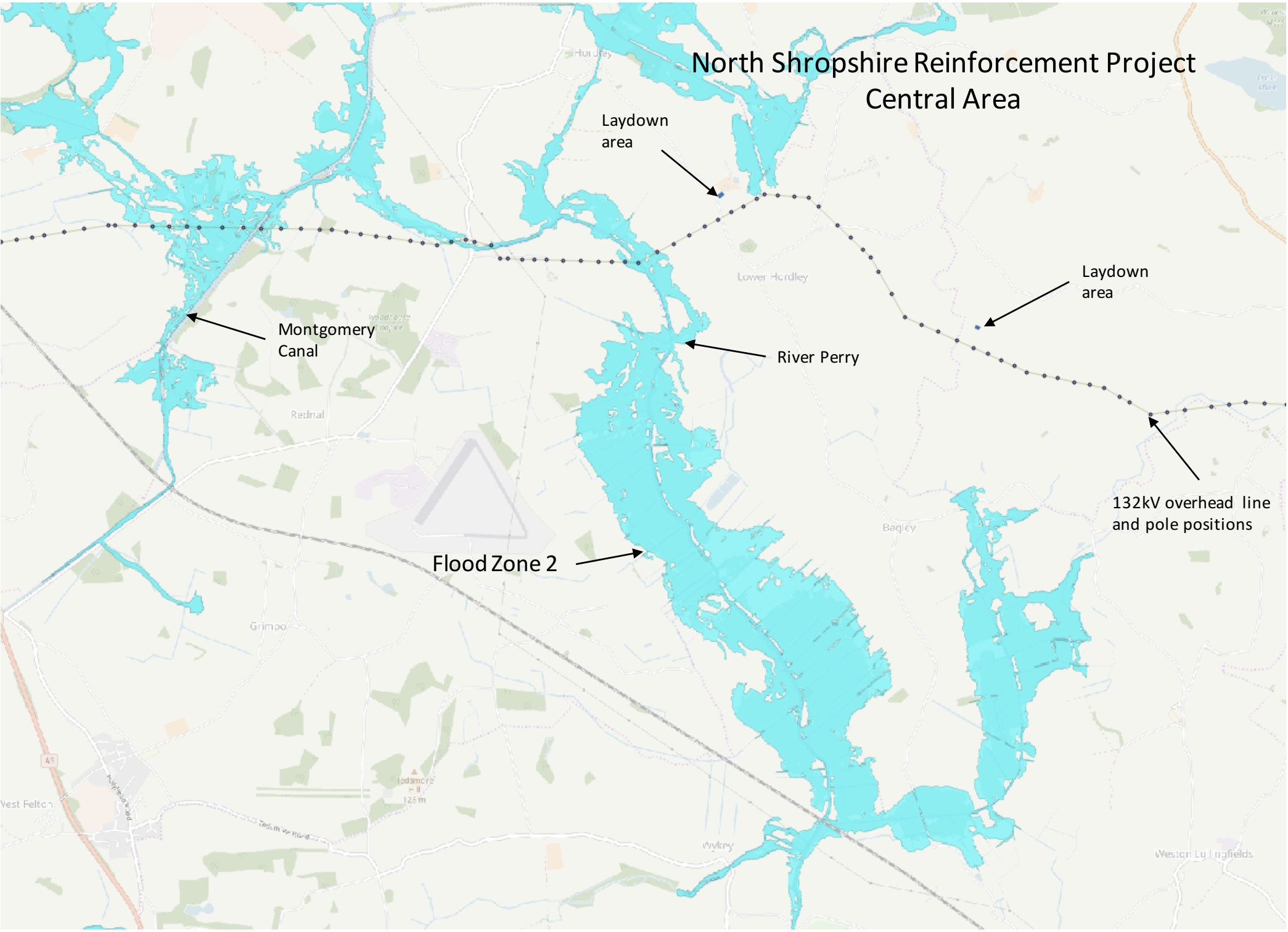
Laydown area

132kV overhead line and pole positions

Montgomery Canal

Flood Zone 2

North Shropshire Reinforcement Project Central Area



Laydown area

Laydown area

Montgomery Canal

River Perry

132kV overhead line and pole positions

Flood Zone 2

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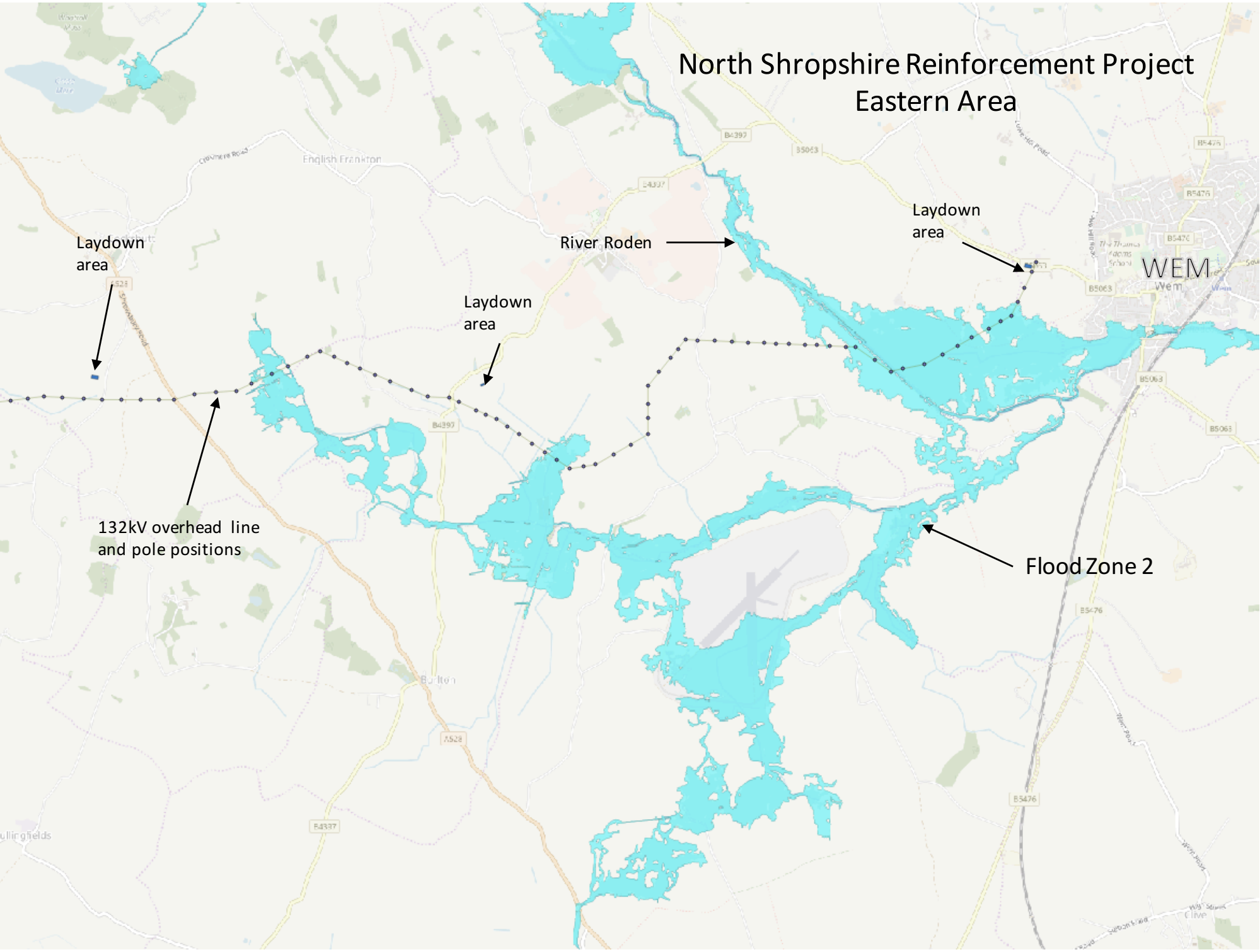
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North Shropshire Reinforcement Project Eastern Area



Laydown area

River Roden

Laydown area

Laydown area

132kV overhead line
and pole positions

Flood Zone 2

APPENDIX 3 – SURFACE WATER FLOOD RISK OVERVIEW

North Shropshire Reinforcement Project Western Area



Surface Water flooding extent, 0.1% probability

Laydown area

Laydown area

Laydown area

132kV overhead line and pole positions

Montgomery Canal

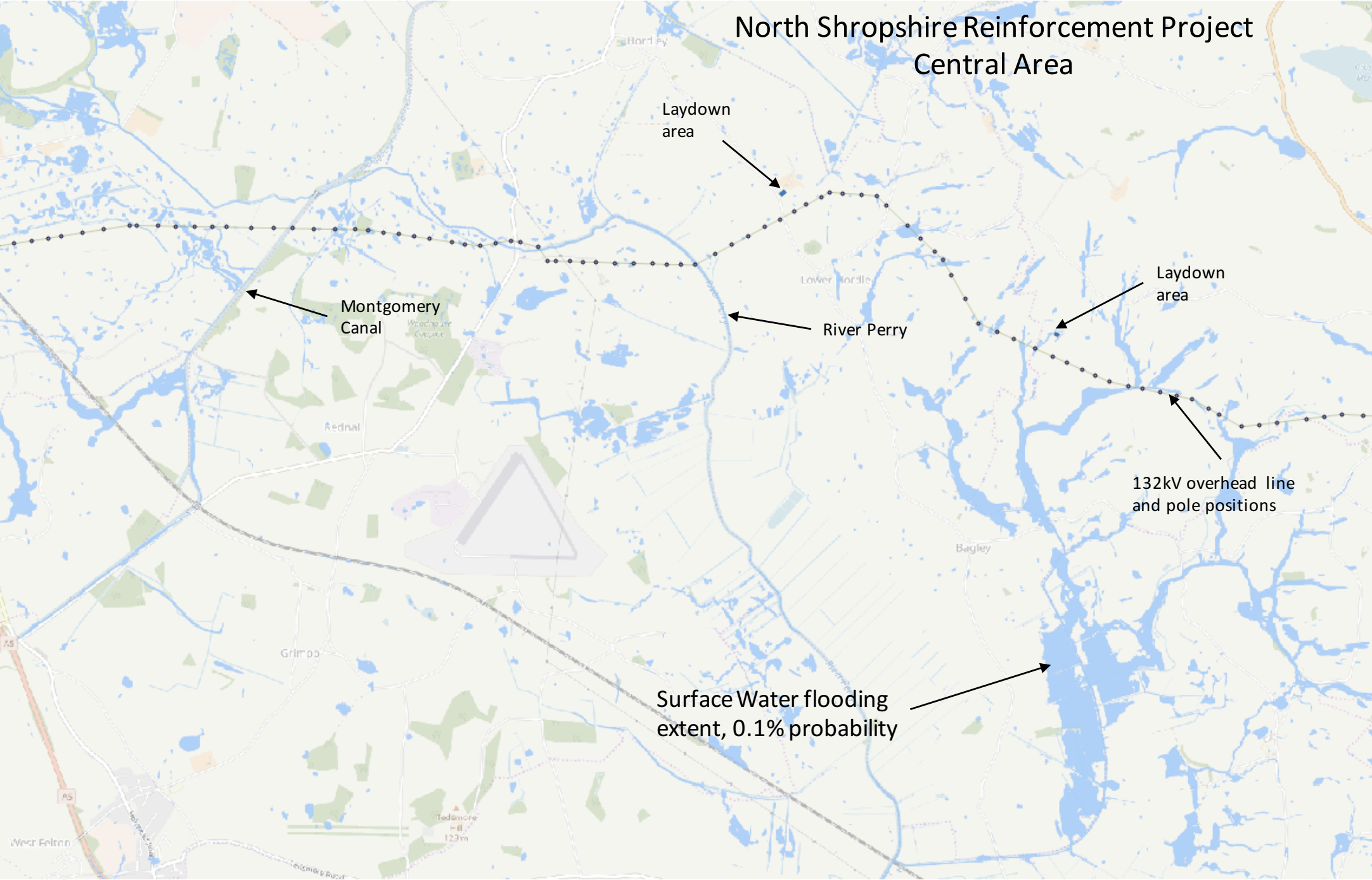
Oswestry

Whitehinton

Rednal

Grimpe

North Shropshire Reinforcement Project Central Area



Laydown area

Montgomery Canal

River Perry

Laydown area

132kV overhead line and pole positions

Surface Water flooding extent, 0.1% probability

North Shropshire Reinforcement Project Eastern Area



Laydown area

132kV overhead line
and pole positions

Laydown area

River Roden

Laydown area

Surface Water flooding
extent, 0.1% probability

WEM