Green Hill Solar Farm
EN010170

Environmental Statement
Appendix 10.2: Flood Risk Assessment and Drainage Strategy
Annex A: Green Hill Cable Route Corridor (Part 1 of 2)

Prepared by: Arthian

Date: May 2025

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APFP Regulation 5(2)(e)

Appendix 10.2: Annex A - Flood Risk Assessment and Drainage Strategy – Cable Route Corridor

Prepared by: Georgia Hirst

For: Green Hill Solar Farm Ltd.

Site: Green Hill Cable Route Corridor

Date: 20/05/2025

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Issue-04

Quality Assurance

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Staff Detail

Initials	Name	Qualifications and Position	Signature
GH	Georgia Hirst	BSc (Hons), MSc, Consultant	[redacted]
LA	Lucy Antell	BSc (Hons), Senior	
IR	Isobel Randall	BSc (Hons), Senior	
JR	Josh Rigby	BSc (Hons), Manager	

Contents

Figures

Annexes

1. Site Details

1.1.1 The aim of this section of the report is to outline key environmental information associated with the baseline environment.

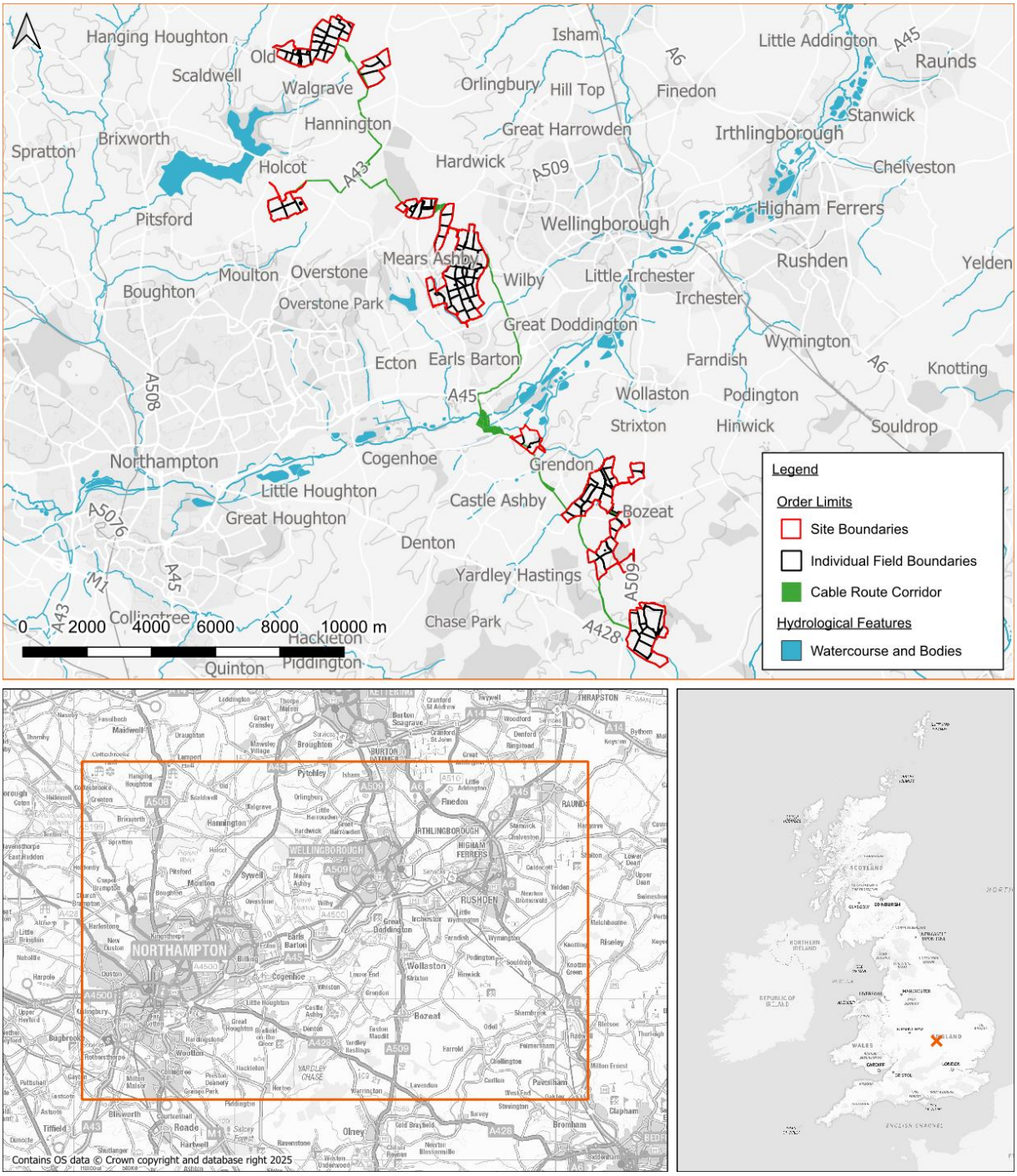

Figure 1: Site Location Plan

1.2 Site Location

1.2.1 The Cable Route Corridor has a typical width of 50m wide buffer with the Cable, however the Cable Route

Corridor incorporates a number of wider areas, for example to allow additional working area for trenchless techniques such as Horizontal Directional Drilling (HDD), enable flexibility around areas of environmental sensitivity and temporary construction compounds. The Cable Route Corridor also narrows at certain points to avoid sensitive receptors such as habitat designations. The Cable Route Corridor will comprise underground electrical cables to connect the Sites to the Point of Connection (PoC) at Grendon Substation.. The National Grid Reference for the Cable Route Corridor's northernmost point is approximately 480770, 273200, and approximately 488750, 254320 in the south.

1.3 Existing Site Conditions

1.3.1 Online mapping (including Google Maps / Google Streetview imagery (accessed March 2025)[i] shows that the Site is greenfield comprising agricultural / arable fields. The Cable Route Corridor crosses several watercourses and land drains.

1.4 Hydrology

1.4.1 The River Nene flows in a northeasterly direction near Grendon, passing through the Cable Route Corridor between Green Hill E and Green Hill BESS.

1.4.2 Due to its length and alignment, the Cable Route Corridor intersects or passes in close proximity to multiple watercourses. These include both Main Rivers and ordinary watercourses. Watercourses not designated as Main Rivers or located within an Internal Drainage Board (IDB) district are classified as ordinary watercourses and fall under the regulatory remit of the Lead Local Flood Authority (LLFA).

1.4.3 Watercourse crossings along the Cable Route Corridor are shown in Annex A and the crossing schedule is shown in supporting document **GH7.18_CrossingSchedule**. While Horizontal Directional Drilling (HDD) is currently identified as the preferred method for crossing watercourses, this approach may not be proportionate or technically appropriate in all locations. For minor or less sensitive watercourses, alternative methods such as open trenching or other suitable techniques may be employed, subject to approval and implementation of appropriate method statements and impact mitigation measures.

1.4.4 The River Nene flows in a northeasterly direction near Grendon, passing through the Cable Route Corridor between Green Hill E and Green Hill BESS.

1.4.5 Due to its length and alignment, the Cable Route Corridor crosses or runs close to multiple watercourses, including both Main Rivers and ordinary watercourses. Watercourses that are not designated as Main Rivers and do not fall within an Internal Drainage Board (IDB) district are classified as ordinary watercourses and fall under the regulatory remit of the Lead Local Flood Authority (LLFA).

1.4.6 Where disapplication of Environment Agency or Lead Local Flood Authority permitting requirements is sought through the DCO, details of any such alternative methods, including site-specific method statements and mitigation measures, will be submitted to and approved by the relevant authority prior to construction. This approach ensures that regulatory control is maintained and environmental protection is secured. As the need for non-HDD crossings is expected to be limited and location-specific, these have not been individually assessed at this stage; however, appropriate scrutiny will be secured through the DCO approval process.

1.5 Water Framework Directive Status

1.5.1 The Scheme (containing the Cable Route Corridor) is located within the Nene Catchment, specifically the following Water Body Catchments[ii]:

- The Pitsford Arm of the Brampton Branch Water Body catchment has a Cycle 3 Ecological status of Good in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- The Sywell Brook Water Body catchment has a Cycle 3 Ecological status of Poor in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- The Swanspool Brook Water Body catchment has a Cycle 3 Ecological status of Moderate in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- The Hardwick Brook Water Body catchment has a Cycle 3 Ecological status of Poor in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- The Malton Arm Water Body catchment has a Cycle 3 Ecological status of Poor in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- Billing Brook (Northampton) Water Body catchment has a Cycle 3 Ecological Status of Moderate in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- Nene (conf Brampton Branch to conf Ise) Water Body catchment has a Cycle 3 Ecological Status of Moderate in 2019 and 2022 and Failing chemical status in 2019 (no data in 2022).
- Grendon Brook Water Body catchment has a Cycle 3 Ecological status of Poor in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- Castle Ashby Arm (Grendon Brook) Water Body catchment has a Cycle 3 Ecological Status of Poor in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).
- Ouse Water Body catchment has a Cycle 3 Ecological Status of Moderate in 2019 and 2022 and a Failing chemical status in 2019 (no data in 2022).

1.5.2 A summary of the Water Body Classification for the catchment is included as Annex B.

1.6 Geology

1.6.1 Reference to the British Geological Survey (BGS) online mappingiii (1:50,000 scale) indicates that the Cable Route Corridor is underlain by the following superficial deposits:

- Glaciofluvial Deposits (mid Pleistocene) consisting of sand and gravel;
- River Terrace Deposits Undifferentiated (Sand and Gravel);
- Ecton Member (Sand and Gravel);
- Milton Sand (Sand and Gravel);
- Alluvium (Clay and Silt); and
- Oadby Member generally comprising Diamicton.

1.6.2 There are also areas of the Cable Route Corridor identified as not being underlain by any superficial deposits.

1.6.3 The Cable Route Corridor is identified as being underlain by the following bedrock deposits:

- Stamford Member, comprising Sandstone and siltstone (interbedded);
- Northampton Sand Formation, consisting of Ironstone (ooidal);
- Whitby Mudstone Formation, comprising Mudstone;
- Rutland Formation, consisting of Mudstone;
- Blisworth Limestone Formation, comprising of Limestone;
- Kellaway Clay Member, consisting of Mudstone; and
- Wellingborough Limestone Member, comprising of Limestone and mudstone (interbedded).

1.6.4 The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a Site-specific basis.

1.7 Hydrogeology

1.7.1 According to the EA's Aquifer Designation data, obtained from MAGIC Map's online mapping[iv] [accessed 21/10/24], the Oadby Member is classified as a Secondary Undifferentiated Aquifer, whereas the Alluvium and Glaciofluvial Deposits are identified as Secondary A Aquifers.

1.7.2 The underlying Northampton Sand Formation, Stamford Member and the Wellingborough Limestone Member are described as Secondary A Aquifers whereas the Rutland Formation is described as a Secondary B Aquifer. The Whitby Mudstone Formation is described as an Unproductive Aquifer.

1.7.3 The EA's 'Source Protection Zones' data, obtained from MAGIC Map's online mapping [accessed 21/10/24], indicates that the Site is not located within a Groundwater Source Protection Zone.

1.8 Proposed Site Conditions

1.8.1 The wider proposed Scheme is for a ground mounted solar photo-voltaic plant and associated electrical equipment battery storage, Cable Route Corridor and access. This Appendix refers solely to the Cable Route Corridor, which will connect the Sites to one another. The Cable Route Corridor is provided to allow additional working area for trenchless techniques such as Horizontal Directional Drilling (HDD), and to enable flexibility around areas of environmental sensitivity and temporary construction compounds. The Cable Route Corridor also narrows at certain points to avoid sensitive receptors such as habitat designations. The Cable Route Corridor is also wider than the final required construction working area, to allow flexibility in the final location (micro-siting) of the cables. The location of the construction working area and cables will be identified and confirmed at the detailed design stage carried out following determination of the DCO application.

2. Assessment of Flood Risk

The aim of this section of the report is to assess and summarise the existing flood risk at the Cable Route Corridor.

2.1 Fluvial Flood Risk

2.1.1 The EA's Flood Map for Planning[v] indicates that the vast majority of the Cable Route Corridor is within Flood Zone 1 (1% AEP) for river flooding. The section of the Cable Route Corridor between solar Sites E and F is in the vicinity of the River Nene and its tributaries, which is situated within Flood Zones 2 and 3 (shown within the figures in Annex C). Flood Zone 2 is defined as land assessed as having between a 1 in 1,000 to 1 in 100 (0.1% to 1% Annual Exceedance Probability (AEP)) chance of river flooding. Flood Zone 3 is defined as land assessed as having a 1 in 100 or greater (>1% AEP) chance of river flooding.

2.1.2 The Cable Route Corridor passes through or comes in close proximity to many watercourses, which can be seen in the figure provided in Annex A. The crossing of watercourses will be implemented by HDD in some locations which will allow the Cable Route to be constructed underneath the watercourses without impact the watercourse or flood risk. Other crossings will be in the form of open trench crossings.

2.1.3 Based on the cables being buried underground it can be concluded that the Cable Route Corridor is at **Very Low** risk of fluvial flooding, therefore no specific mitigation is considered necessary.

2.2 Surface Water Flood Risk

2.2.1 The EA's Long Term Flood Risk Map (Surface Water)[vi] indicates that the majority of the Cable Route Corridor is at Very Low (< 0.1% annual probability) risk of surface water flooding. Surface water flooding with a Low to High risk (0.1% to >3.3% AEP) of occurrence is mainly present in the central extent of the Cable Route Corridor (shown within the figures in Annex D).

2.2.2 The extents of the surface water risk largely concur with the courses of the watercourses which run through the wider area.

2.2.3 Based on the above and considering the nature of the Scheme (sub surface cable), the overall risk of surface water flooding is considered to be **Very Low.**

2.3 Groundwater Flood Risk

2.3.1 A description of the Cable Route Corridor's geology is included within section 1.0.

2.3.2 There is no information within relevant third-party reports to suggest that the Cable Route Corridor has experienced historical groundwater flooding.

2.3.3 The Cable Route Corridor is not located within a groundwater protection zone.

2.3.4 Based on the cables being buried underground it can be concluded that the Cable Route Corridor is at **Very Low** risk of fluvial flooding, therefore no specific mitigation is considered necessary.

2.4 Sewer Flooding

2.4.1 No Site-specific incidents of sewer flooding have been identified from relevant third party reports.

2.4.2 On the basis of the Cable Route Corridor's rural setting, the presence of sewerage infrastructure is unlikely. Utility records have been checked to identify any sewers within or within close proximity to the Cable Route Corridor, the records show the Cable Route Corridor to largely remain outside the extents of any public sewer pipes, with some exceptions where sewers are present within the corridor, these are largely associated with roads that cross the route or lie in close proximity. The utility records also show water mains in some parts of the Cable Route Corridor, these will also be considered with appropriate buffers applied during construction.

2.4.3 It can therefore be concluded that the risk of sewer flooding is **Low.**

2.5 Reservoir and Canal Flooding

2.5.1 There are no canals within the vicinity of the Site. Therefore, there is Negligible associated flood risk.

2.5.2 The EA's 'Flood Risk from Reservoirs' map indicates that the Cable Route Corridor, between solar Green Hill E and F, is at potential risk of reservoir flooding from Daventry Reservoir under both wet and dry conditions. However, it is important to note that the Site is not inherently at risk from typical flooding scenarios, but rather only under the specific circumstance of reservoir failure.

2.5.3 The EA state that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensure that reservoirs are inspected regularly, and essential safety work is carried out.

2.5.4 It can therefore be concluded that there is a **Negligible to Low** risk of flooding from artificial sources.

2.6 Residual Flood Risks

2.6.1 A residual risk is an exceedance event, such as the greater than 1 in 1000 year (<0.1% AEP) flood event that would overtop the land drains and potentially impact the site. As the probability of a 1 in 1000 year flood event occurring is <0.1% in any given year, the probability is low and, therefore, no further mitigation beyond what is proposed is required.

2.6.2 In the event of the defences failing or an exceedance event occurring, the residual risk to people working within the site can be managed through the implementation of an appropriate site management plan, which recognises the residual risks and details what action is to be taken by staff in the event of a flood to put occupants in a place of safety.

2.7 Summary of Flood Risk and Mitigation

2.7.1 It can be concluded that the risk to the Cable Route Corridor from all sources of flooding is **Negligible to Low**, and therefore mitigation is not required in this instance.

2.7.2 No specific mitigations for the proposed Cable Route Corridor are considered to be necessary.

Flood Warnings and Evacuation

2.7.3 Parts of the Cable Route Corridor fall within areas covered by Environment Agency Flood Alerts and Warnings [vii]. It is recommended that site management teams register with the EA's free Floodline Warnings Direct service to receive real-time flood alerts for the relevant areas.

2.7.4 Access to the cable is anticipated to be infrequent and largely limited to scheduled inspections or routine maintenance. These activities can typically be planned to avoid periods of heightened flood risk. In all cases, the safety of maintenance personnel will take precedence and access will be restricted during unsafe conditions.

2.7.5 Where urgent works are required, such as to address damage or failure, these will be managed in line with the Construction Environmental Management Plan (CEMP), including flood risk protocols. If any temporary works such as trenching are required, their potential impact on local flood risk will be assessed and managed through site-specific method statements and mitigation.

2.8 Impact on off-Site Flood Risk

2.8.1 The cables will be below the existing surface level and therefore, there will be no loss of floodplain volume as a result of the proposed development and no increased in flood risk elsewhere.

2.8.2 Surface water management has been considered in Section 5.0 of the Covering Report.

2.9 Other Considerations

2.9.1 The installation of the cable route will require multiple crossings of watercourses, including both Main Rivers and ordinary watercourses. These crossings relate specifically to the installation of the cable itself. Horizontal Directional Drilling (HDD) is the preferred method to avoid direct disturbance of watercourses, particularly where ecological or flood risk sensitivity is higher. However, at minor and less sensitive locations, open cut trenching or alternative techniques may be considered appropriate, subject to permitting and the implementation of suitable environmental controls.

2.9.2 All crossings associated with the cable installation will be subject to the relevant regulatory approvals. Environmental Permits from the EA will be required for works to Main Rivers, while works to ordinary watercourses will require consent from the LLFA. Where disapplication of these consents is sought through the DCO, method statements and impact mitigation details will be secured through the appropriate Requirements.

2.9.3 It is acknowledged that temporary watercourse crossings may also be required to facilitate access for construction vehicles. These access-related crossings are not assessed within this FRA and will be addressed through the CEMP, in line with the approach agreed for other NSIP schemes such as West Burton and Cottam. A map of the identified cable crossings is provided in Annex A.

3. Conclusions and Recommendations

3.1 Conclusions

3.1.1 The Scheme is for a ground mounted solar farm and associated infrastructure and access roads. This Appendix refers solely to the Cable Route Corridor, a typically 50m wide corridor within which underground cables will be located to connect the Sites to the Point of Connection (PoC) at Grendon Substation

Flood Risk

3.1.2 The risk of flooding from all sources has been assessed and the flood risk to the Cable Route Corridor is considered to be Negligible to Low and therefore does not require Site-specific mitigation measures.

3.1.3 The cables will be located within the Cable Route Corridor and will be below the existing surface level and therefore, there will be no loss of floodplain volume as a result of the proposed Cable Route Corridor and no increases in flood risk elsewhere.

Drainage Strategy

3.1.4 Based on the cables being buried underground it can be concluded that no formal drainage will be required at the Cable Route Corridor locations.

3.2 Recommendations

3.2.1 The recommendation below will be considered when determining the final location of the cables:

- 9 m buffers have been established around all watercourses, including Main Rivers, ordinary watercourses and IDB assets. Where crossings of watercourses are required, relevant permissions should be sought from the Environment Agency, LLFA and / or relevant IDB.

Annex A – Watercourse Crossing Maps

473600 476800 480000 483200 486400 489600 492800 496000

275200 272000 268800 265600 262400 259200 256000

Lamport
Clint Hill
Old
Scaldwell
Walgrave
Hannington
Brixworth
Holcot
Pitsford
Sywell
Moulton
Overstone
Boughton
Overstone Park
Moulton Leys
Boughton Green
Moulton Park
Spring Park
Sunnyside
Parklands
Boothville
Goldings
Blackthorn
Lings
Eastfield
Spinney Hill
Great Billing
Kingsthorpe
King's Heath
Kingsthorpe Hollow
Weston Favell
Abington
Abington Vale
St James' End
Northampton
Little Houghton
Briar Hill
Great Houghton
Brafield-on-the-Green
Hardingstone
Merefield
Blacky More
Wootton
Collingtree
Preston Deanery
Hackleton
Horton
Quinton
Ecton
Earls Barton
Great Doddington
Wilby
Cogenhoe
Whiston
Combe Hill
Castle Ashby
Denton
Yardley Hastings
Chase Park
The Wold
Warrington
Pytchley
Isham
Orlingbury
Hill Top
Little Harrowden
Sallow Meadow
Great Harrowden
Hardwick
Burton Latimer
Burton Wold
Great Addington
Little Addington
Finedon
Crow Hill
Irthlingborough
Burrow's Bush
Hatton Park
Wellingborough
Higham Ferrers
Warmonds Hill
Rushden
Knuston
Little Irchester
Irchester
Little Wymington
Wymington
Farndish
Wollaston
Podington
Darnell's Dene
Strixton
Hinwick
Souldrop Wold
Lower End
Grendon
Easton Maudit
Bozeat
Odell
Little Odell
Harrold
Coldharbour Hill
Chellington

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0 5000 10000 15000 m

Project Reference:
Green Hill Solar Scheme

Client:
Green Hill Solar Farm Ltd.

Drawing Title:
Watercourse Crossings

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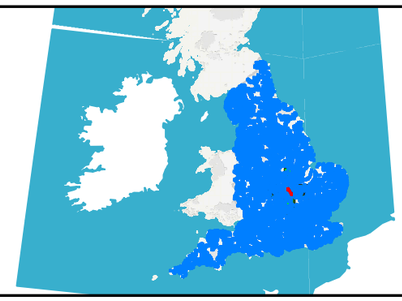
Legend

Order Limits
- Site Boundary
- Individual Field Boundaries

Topographical Features
- Main Rivers

Cable Route Watercourse Crossing Locations
- Main River Crossing
- Ordinary Watercourse Crossing

Other Features
- AIMS Flood Defences
- Cable Route Corridor (50m buffer)



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478800 479200 479600 480000 480400 480800 481200 481600

274800 274400 274000 273600 273200 272800 272400

Red Lodge Cottage
Glebe Farm
Bales Barn
Walgrave Lodge
Mill Lane
Broughton Road
Home Plantation
Walgrave Road
Cherry Hill
Cherry Hill
Walgrave Allotment Gardens
Play Space
Walgrave Primary School
Kettering Road
Manvell Farm
Bridge Field Farm
Zion Hill

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Project Reference:
Green Hill Solar Scheme

Client:
Green Hill Solar Farm Ltd.

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Watercourse Crossings - Green Hill A

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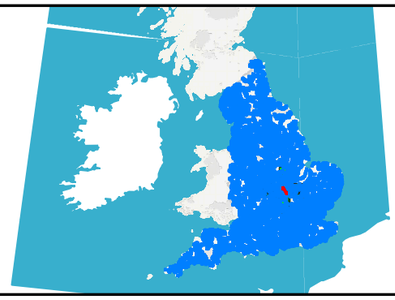

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480960 481280 481600 481920 482240 482560 482880 483200

273280 272960 272640 272320 272000 271680 271360

Gibb Wood
New Lodge Farmhouse
Kettering Road
Bridge Field Farm
Manvell Farm
Rectory Farm
Badsaddle Farm
Badsaddle Wood
A43
Hannington Grange Farm
Ketnor Farm
Redhouse Road
Bush Walk
Red House Lane
Pastures Farm
Brookside Farm
Clarkes Wood

0 500 1000 1500 m

Project Reference:
Green Hill Solar Scheme

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Green Hill Solar Farm Ltd.

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Other Features
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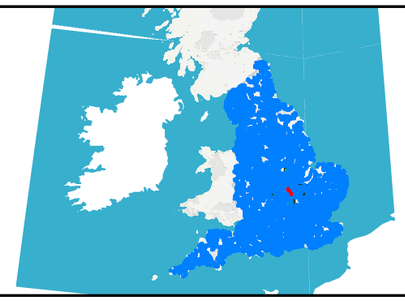

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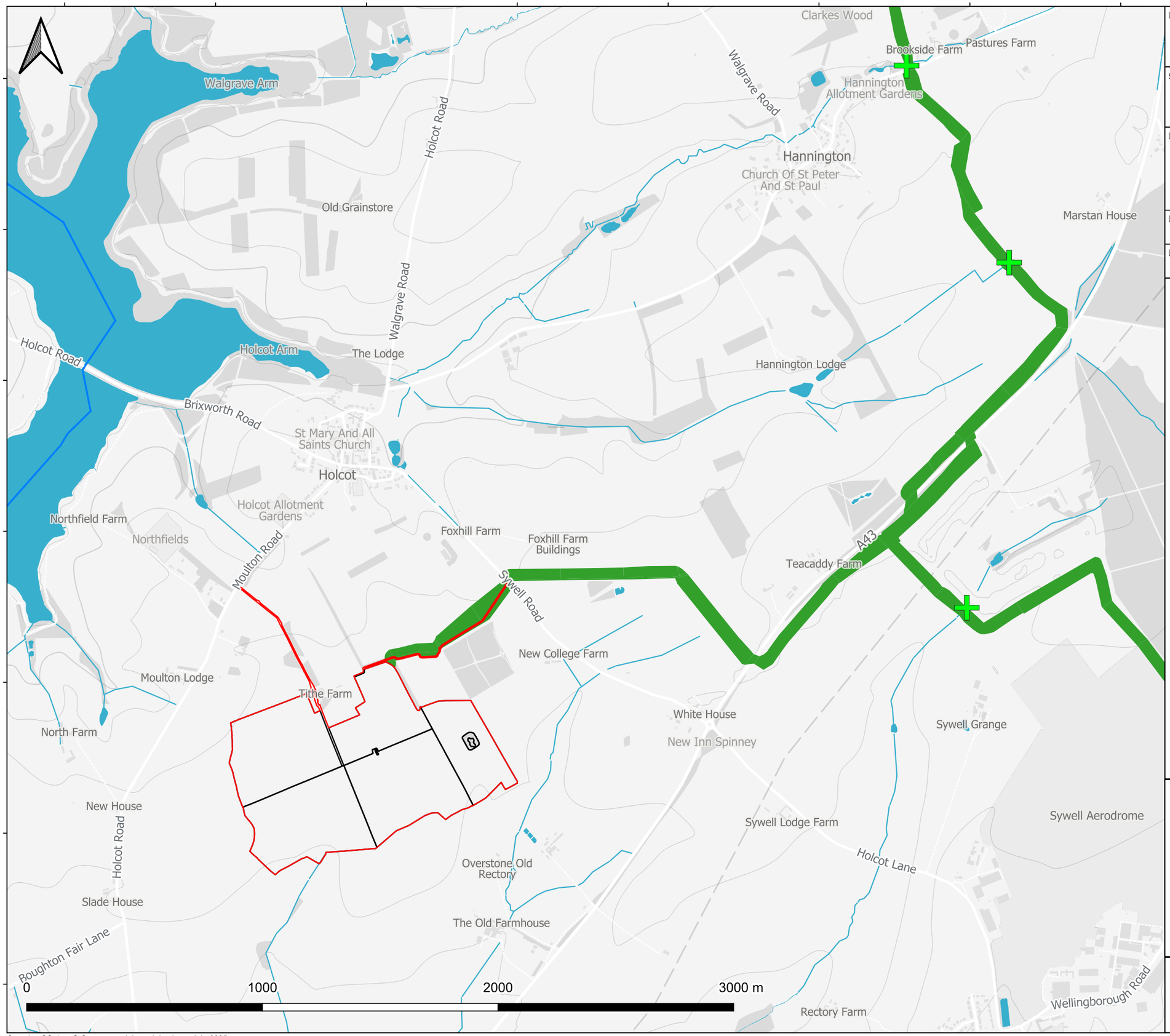

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Order Limits
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- Ordinary Watercourse Crossing

Other Features
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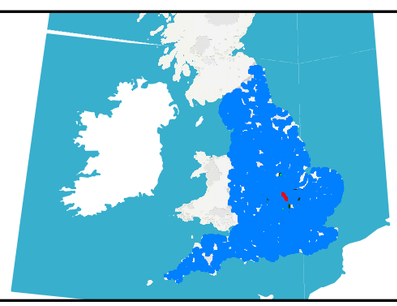
- Cable Route Corridor (50m buffer)



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269280 268560 267840 267120 266400 265680 264960

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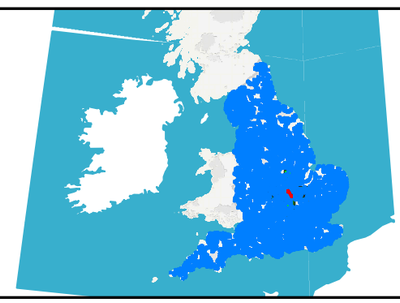

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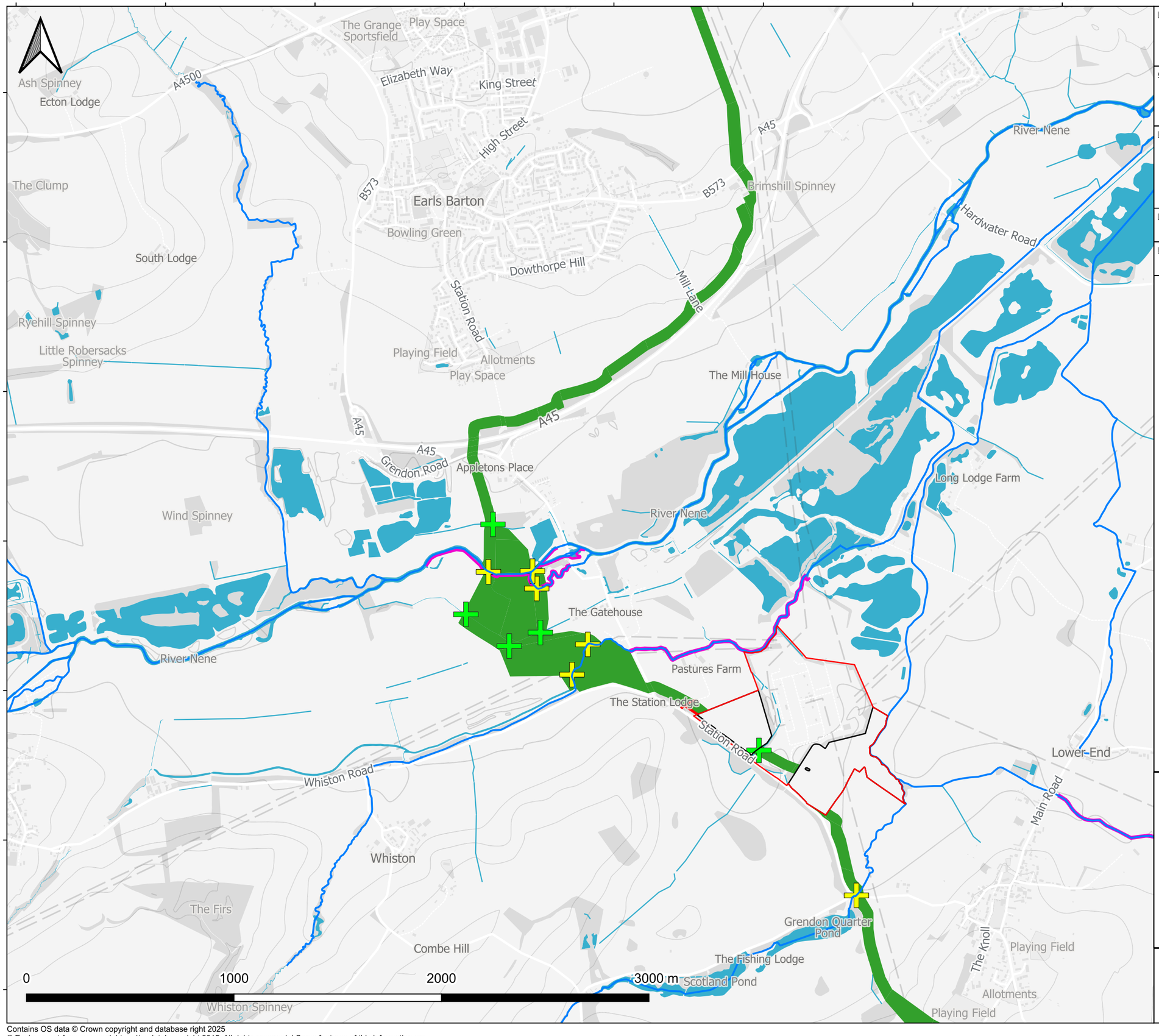

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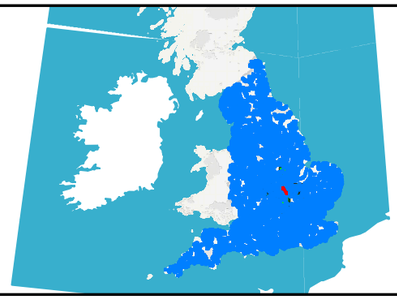

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