Green Hill Solar Farm
EN010170

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

Prepared by: Arthian

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APFP Regulation 5(2)(e)

Schedule of Changes

Revision	Section Reference	Description of Changes	Reason for Revision
A	[cover]	Updated to Revision A	As required for submission at Deadline 5.
	[throughout]	Updates to document references	As required for submission at Deadline 5.
	Paragraph 2.2.3 – 2.2.4 Paragraph 2.8.3 Paragraph 2.9.2	Updates to reference the Wilby Flood Storage Area and outline mitigation measures.	In response to ongoing discussions with the Environment Agency

Appendix 10.2: FRA and DS, Annex A Cable Route – Revision A

Prepared by: [redacted]

For: Green Hill Solar Farm Ltd.

Site: Annex A – Green Hill Solar Cable Route Corridor

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Contents

1. Site Details 4

1.2 Site Location 5
1.3 Existing Site Conditions 5
1.4 Hydrology 5
1.5 Water Framework Directive Status 5
1.6 Geology 6
1.7 Hydrogeology 7
1.8 Proposed Site Conditions 7

2. Assessment of Flood Risk 8

2.2 Fluvial Flood Risk 8
2.3 Surface Water Flood Risk 8
2.4 Groundwater Flood Risk 9
2.5 Sewer Flooding 9
2.6 Reservoir and Canal Flooding 9
2.7 Residual Flood Risks 9
2.8 Summary of Flood Risk and Mitigation 10
2.9 Impact on Off-Site Flood Risk 10
2.10 Other Considerations 11

3. Conclusions and Recommendations 12

3.1 Conclusions 12
3.2 Recommendations 12

Figures

Figure 1: Site Location Plan 4

Appendices

Annex A- Watercourse Crossing Maps 13
Annex B - The Water Body Catchment Classifications Summaries 14
Annex C – EA's Flood Map for Planning Figures 26
Annex D – EA's Surface Water Flood Map Figures 27

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.

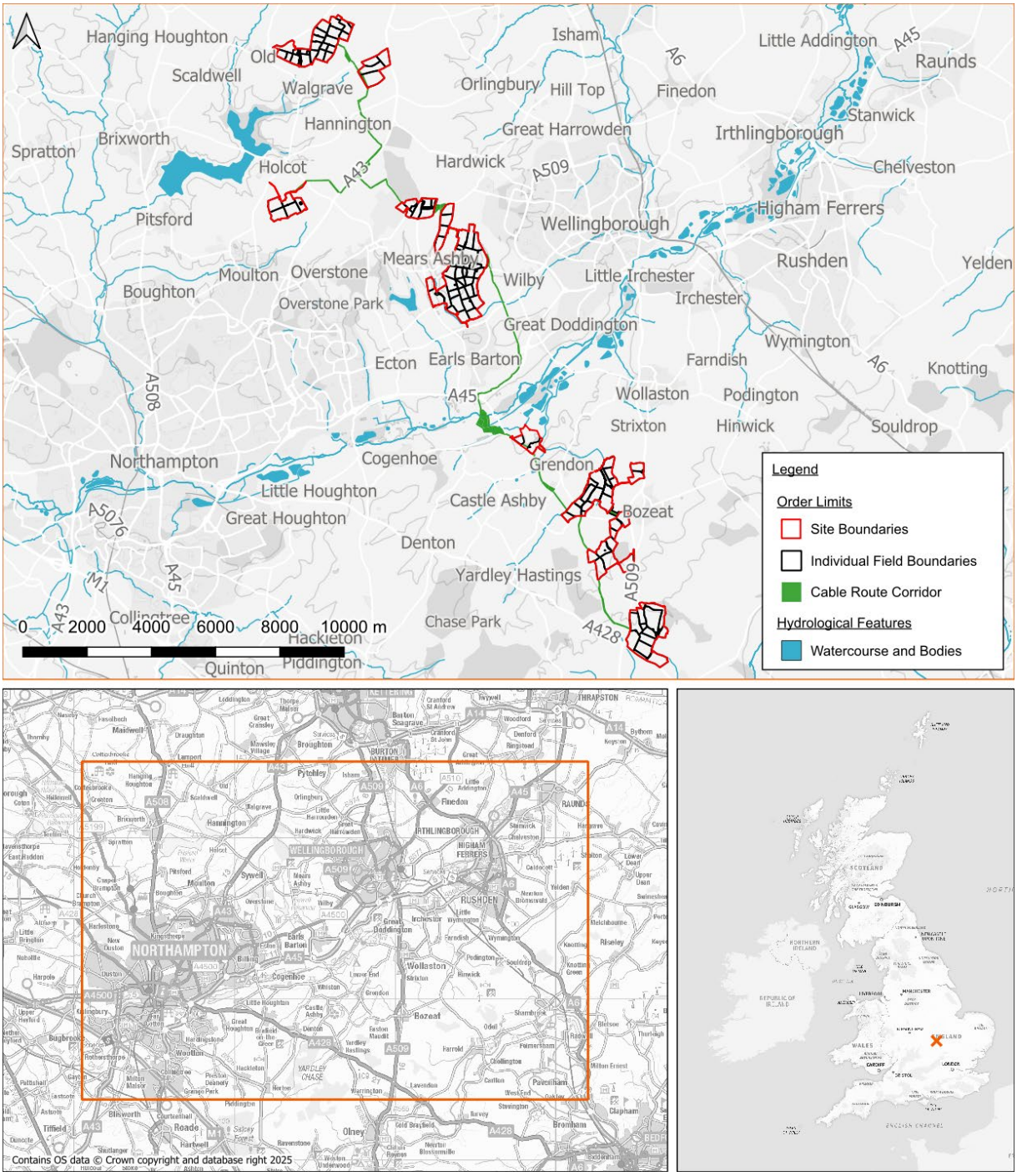


Figure 1: Site Location Plan

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) 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 [REP3-068].** 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 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 :

- 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 mapping (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[i] [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

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

2.2 Fluvial Flood Risk

2.2.1 The EA's Flood Map for Planning[ii] 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.

2.2.2 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.

Wilby Flood Storage Area (NGR: 486108, 265442)

2.2.3 The Cable Route Corridor intersects the Environment Agency's Wilby Flood Storage Area (FSA) at approximately NGR 486108, 265442, associated with Swanspool Brook which passes beneath the A4500. The Cable Route Corridor passes through the mapped FSA extent; however, the Horizontal Directional Drilling (HDD) (or similar trenchless method) alignment associated with crossing the A4500 and Swanspool Brook will be routed to pass beneath the flood storage area while avoiding the control structure and reservoir embankment (NGR: 486164, 265465) (including their footprints and zone of influence). Minimum stand-off distances and HDD depth will be confirmed at detailed design in consultation with the Environment Agency. The cable installation at this location will be undertaken by HDD (or similar trenchless method) to avoid excavation where possible within the flood storage area and to avoid any effect on flood storage function.

2.2.4 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.

2.3 Surface Water Flood Risk

2.3.1 The EA's Long Term Flood Risk Map (Surface Water)[iii] 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).

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

2.3.3 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**.

2.4 Groundwater Flood Risk

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

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

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

2.4.4 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.

2.5 Sewer Flooding

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

2.5.2 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.

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

2.6 Reservoir and Canal Flooding

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

2.6.2 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.

2.6.3 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.

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

2.7 Residual Flood Risks

2.7.1 A residual risk is an exceedance event, such as greater than the 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 greater than 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.

2.7.2 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.

2.8 Summary of Flood Risk and Mitigation

2.8.1 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.

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

2.8.3 Notwithstanding the above, the Wilby Flood Storage Area is specifically acknowledged, and the cable will be installed by HDD (or similar trenchless method) beneath the flood storage area with pits located outside the FSA, with detailed design secured through protective provisions.

Flood Warnings and Evacuation

2.8.4 Parts of the Cable Route Corridor fall within areas covered by Environment Agency Flood Alerts and Warnings [iv]. 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.

2.8.5 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.

2.8.6 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.

2.9 Impact on Off-Site Flood Risk

2.9.1 The cables will be installed below existing ground level so that the Scheme does not introduce built development that would displace floodplain or flood storage volume. At the Wilby Flood Storage Area, the cable will be installed by HDD (or similar trenchless technique) with launch and reception pits located outside the mapped flood storage area. Detailed design, including cable depth, offsets from EA assets and construction methodology, will be agreed with the Environment Agency through the relevant protective provisions. This will ensure there is no loss of flood storage capacity and no increase in flood risk elsewhere.

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

2.10 Other Considerations

2.10.1 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.

2.10.2 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.

2.10.3 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

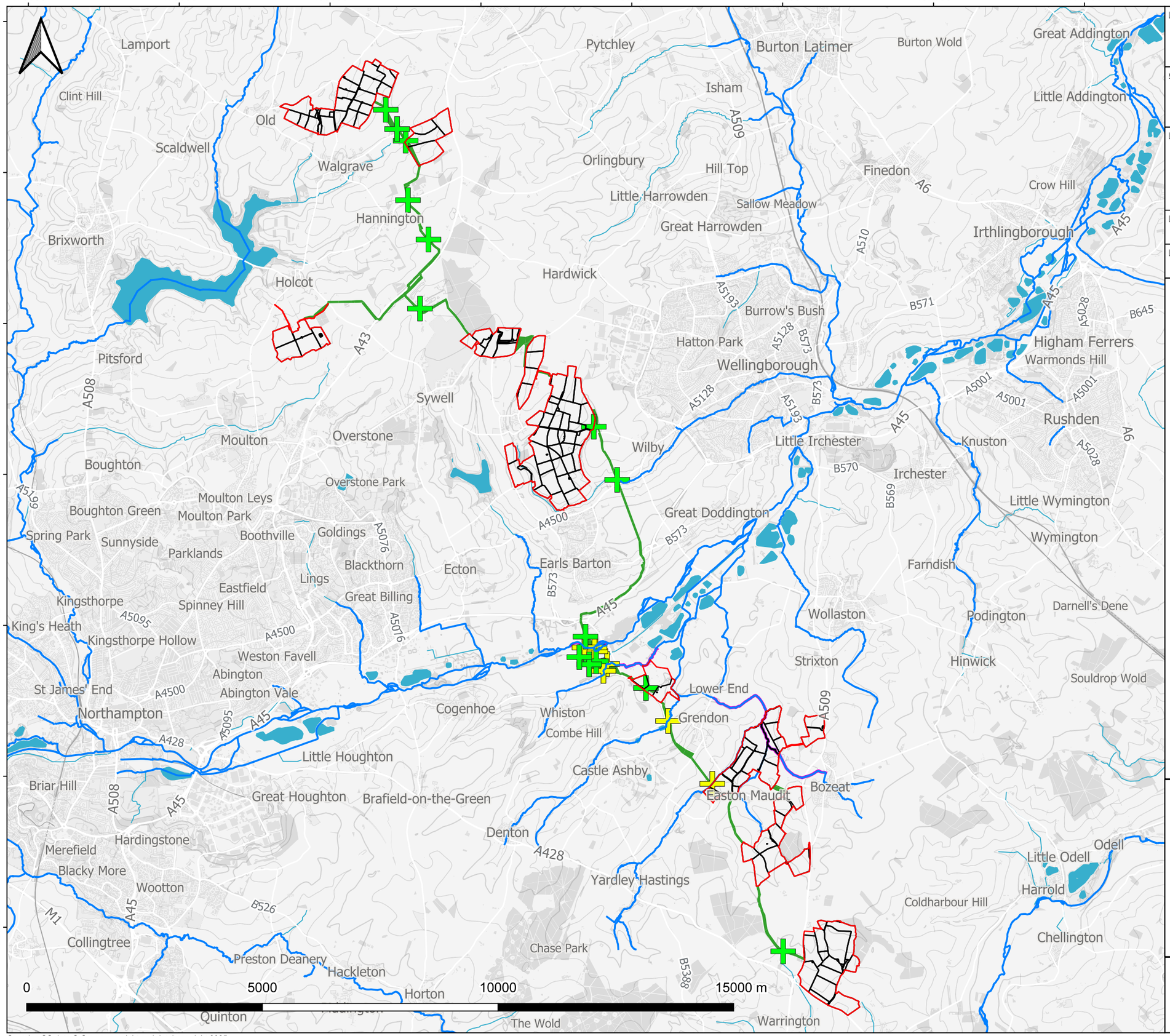
3.1.4 Based on the cables being buried underground it can be concluded that no formal drainage will be required at the Cable Route Corridor locations.

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



Project Reference:

Green Hill Solar Scheme

Client:

Green Hill Solar Farm Ltd.

Drawing Title:

Watercourse Crossings

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Drawing Scale (A3):	Drawing Status:	Drawn:	Checked:	Approved:
1:80000	Final	IR	JR	JR

Legend

Order Limits

- Site Boundary
- Individual Field Boundaries

Topographical Features

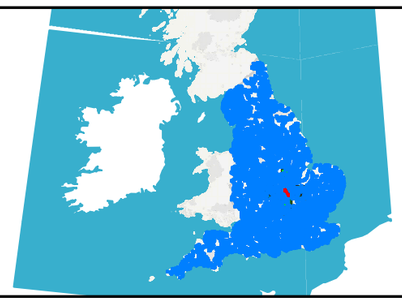
- Main Rivers

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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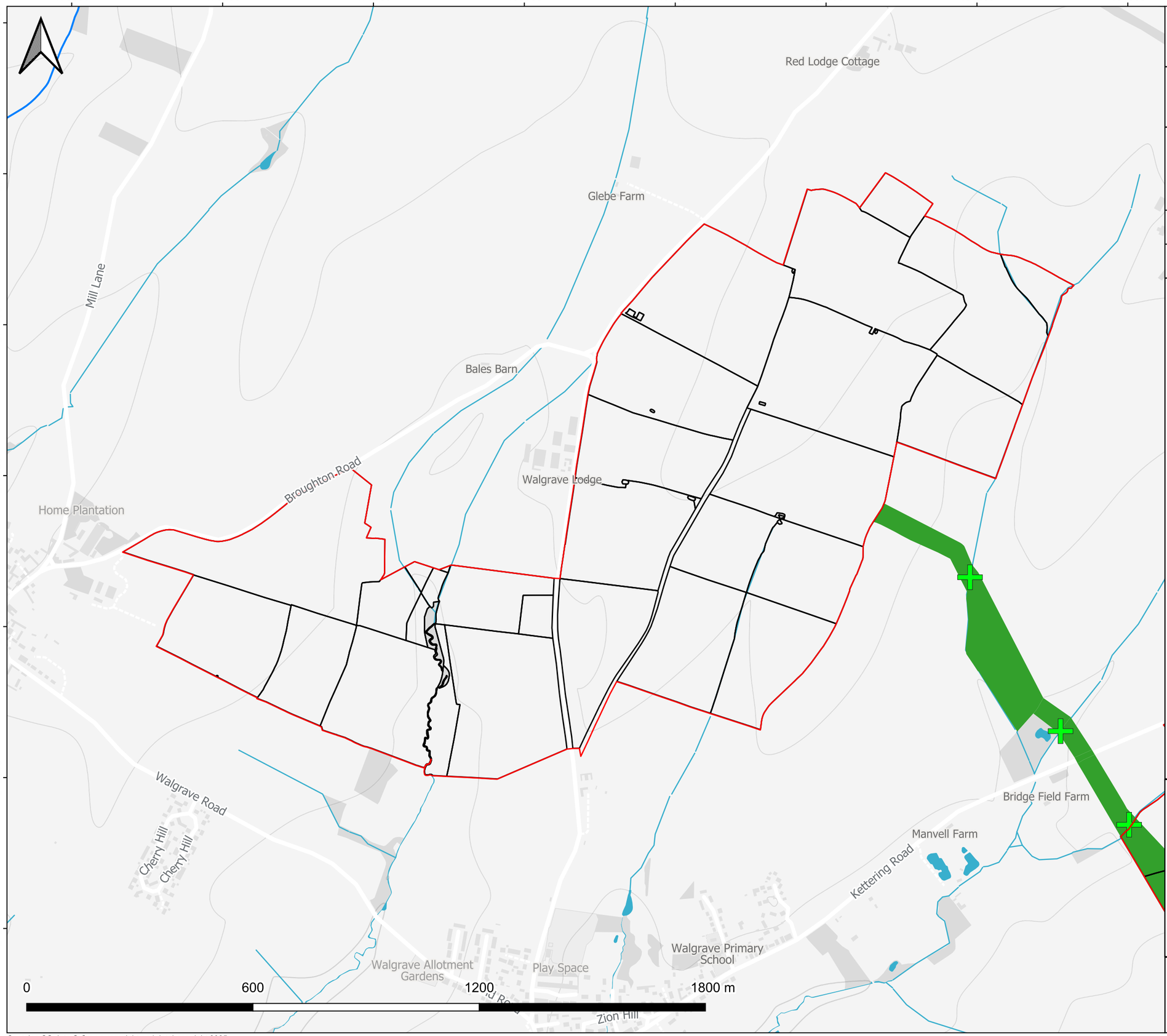

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Green Hill Solar Scheme

Client:

Green Hill Solar Farm Ltd.

Drawing Title:

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Drawing Name:	Revision:	Date:
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1:10000	Final	IR	JR	JR

Legend

Order Limits

- Site Boundary
- Individual Field Boundaries

Topographical Features

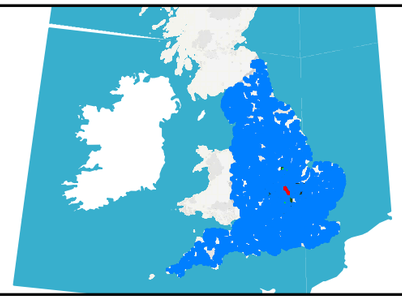
- Main Rivers

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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Watercourse Crossings - Green Hill A.2

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Legend

Order Limits

- Site Boundary
- Individual Field Boundaries

Topographical Features

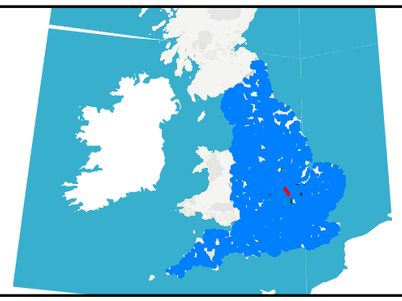
- Main Rivers

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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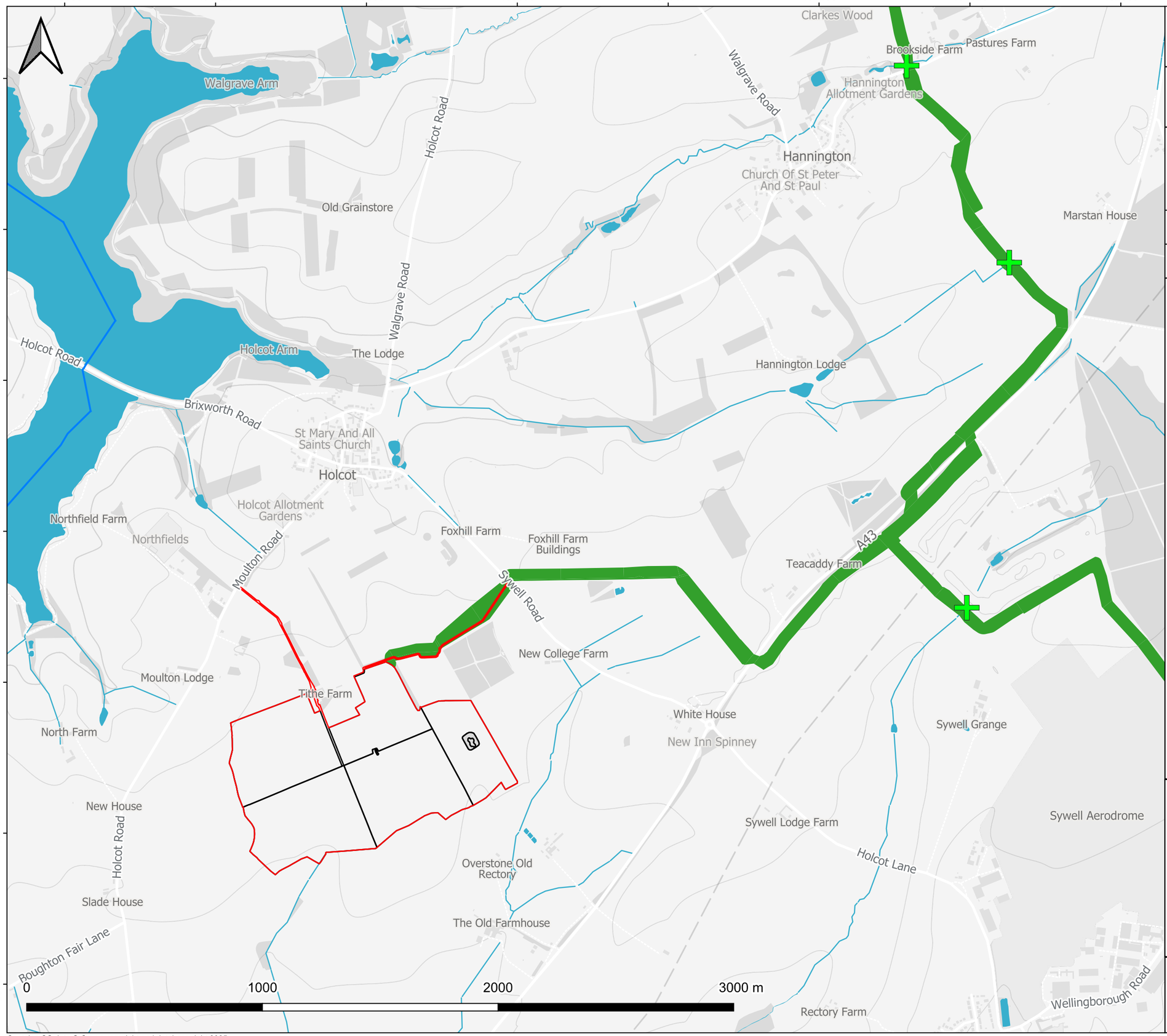

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Green Hill Solar Scheme

Client:

Green Hill Solar Farm Ltd.

Drawing Title:

Watercourse Crossings - Green Hill B

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Legend

Order Limits

- Site Boundary
- Individual Field Boundaries

Topographical Features

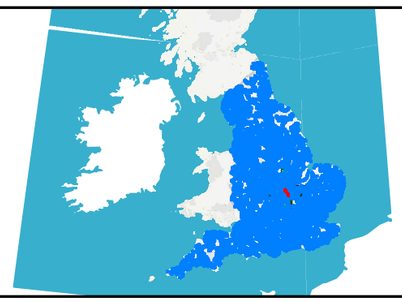
- Main Rivers

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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