Lime Down
Solar Park

Environmental Statement

Volume 3, Appendix 11-6: Flood Risk Assessment and Drainage Strategy - Lime Down D BESS

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Revision 1

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Appendix 11-6: Flood Risk Assessment and Drainage Strategy – Lime Down D / BESS

For: Lime Down Solar Park Ltd

Site: Lime Down Solar Park

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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 of Lime Down D.

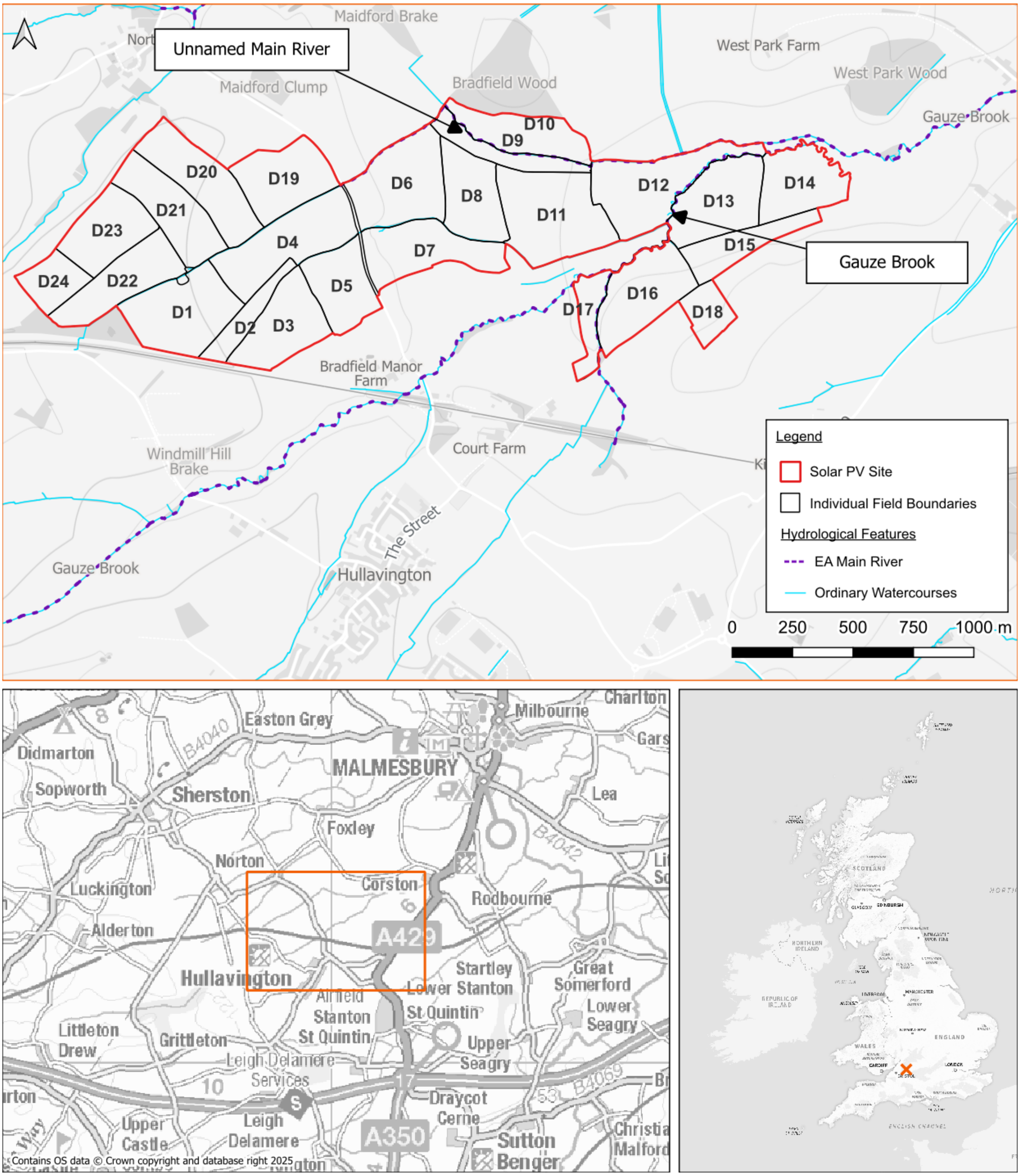


Figure 1: Site Location

1.2 Site Location

1.2.1 Lime Down D is in a rural area situated approximately 820m north-east of Hullavington and 300m south-east of Norton. Grid references are as follows: 387940E, 183590N (western extents); 390070E, 184030N (northern extents); 391720E, 183780N (eastern extents), and 390423, 183192 (southern extents).

1.3 Existing Site Conditions

1.3.1 Online mapping (including Google Maps / Google Streetview imagery[i], (accessed May 2025) shows that Lime Down D is greenfield. Lime Down D is bordered by more rural land in all orientations. Access to the Lime Down D is provided via Bradfield cottages to the south, which runs north and southwards in the western section of the Lime Down D.

1.4 Topography

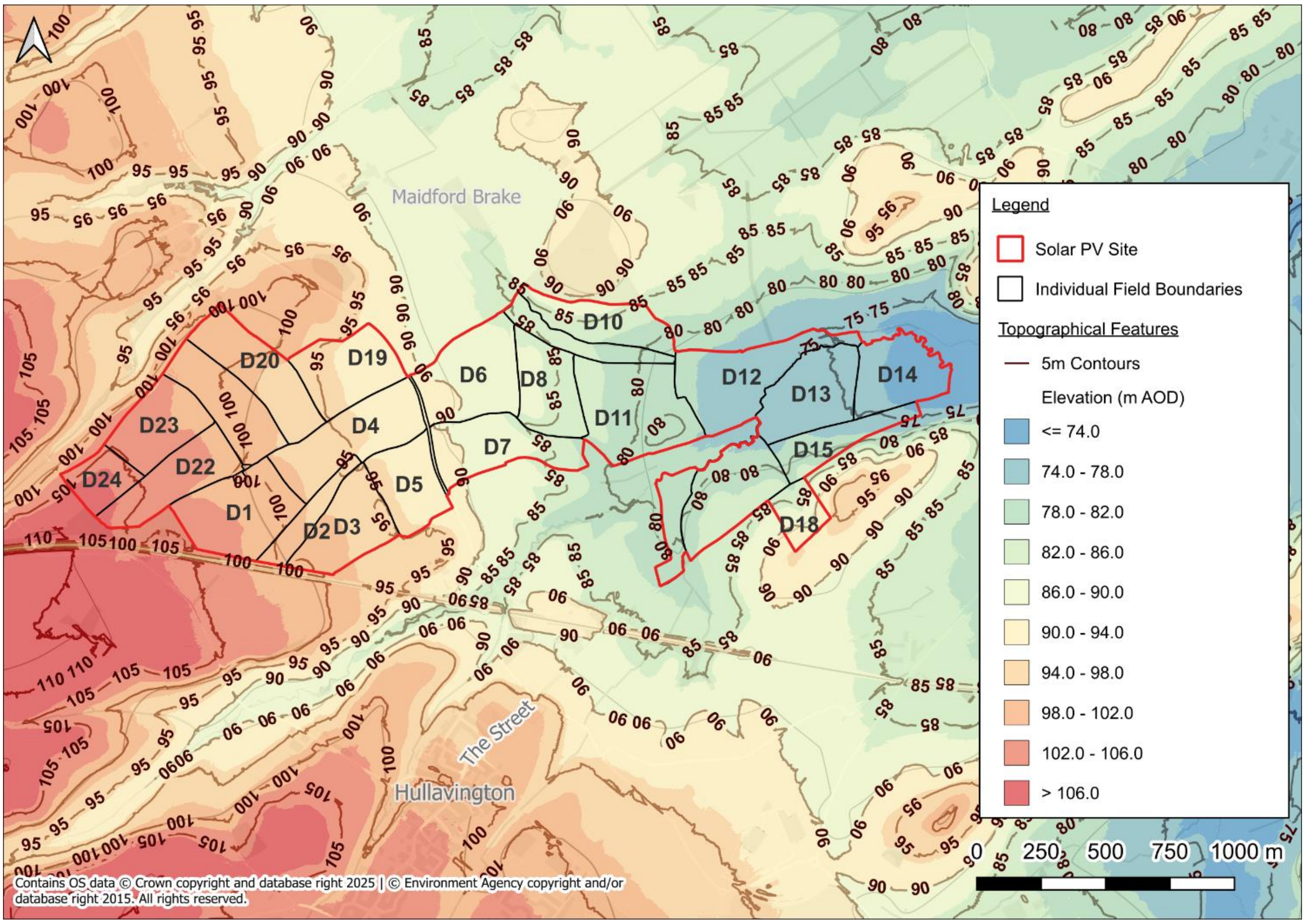


Figure 2: LiDAR Plan

1.4.1 Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR ground elevation data shows that the sub-Site Lime Down D slopes from approximately 107m AOD in the west to approximately 73m AOD in the east (Figure 2).

1.5 Hydrology

1.5.1 The nearest watercourse is Gauze Brook, a Main River, which is located through the eastern extent of Lime Down D flowing from south to north-east of the Lime Down D.

1.5.2 There is also an Unnamed Main River which flows along the northern boundary of the Lime Down D in an easterly direction until its confluence with Gauze Brook at the north-eastern boundary of the Lime Down D.

1.5.3 There are also minor tributaries of both Gauze Brook, and the Unnamed Main River located in the western and central areas on-Site, which are classified as Ordinary Watercourses.

1.5.4 Main Rivers fall within the responsibility of the EA, whereas Ordinary Watercourses fall within the responsibility of the Wiltshire County Lead Local Flood Authority (LLFA).

1.6 Water Framework Directive Status

1.6.1 Lime Down D is located within the Gauze Brook - source to conf R Avon (Brist) Water Body Catchment and the Avon (Brist) conf Tetbury Avon to conf R Marden Water Body Catchment.

1.6.2 The Gauze Brook – source to conf R Avon (Brist) Water Body catchment has a Cycle 3 Ecological status of Moderate in 2019 in 2022 and a Failing chemical status in 2019 (no data in 2022).

1.6.3 The Avon (Brist) conf Tetbury Avon to conf R Marden 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).

1.6.4 A summary of the Water Body Classifications can be found in Annex A.

1.7 Geology

1.7.1 Reference to the British Geological Survey (BGS) online mapping[ii] (1:50,000 scale) indicates that the sub-Site is largely not underlain by any superficial deposits. However, the east of Lime Down D is underlain by Alluvium, comprising clay, silt, sand and gravel (Figure 3).

1.7.2 The superficial deposits are identified as being underlain by differing bedrock deposits as detailed in Figure 4 and below:

- Forest Marble Formation, comprising mudstone;
- Kellaways Clay Member, comprising mudstone;
- Cornbrash Formation, comprising limestone

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

1.7.4 There are no historical BGS borehole records in the near vicinity of Lime Down D.

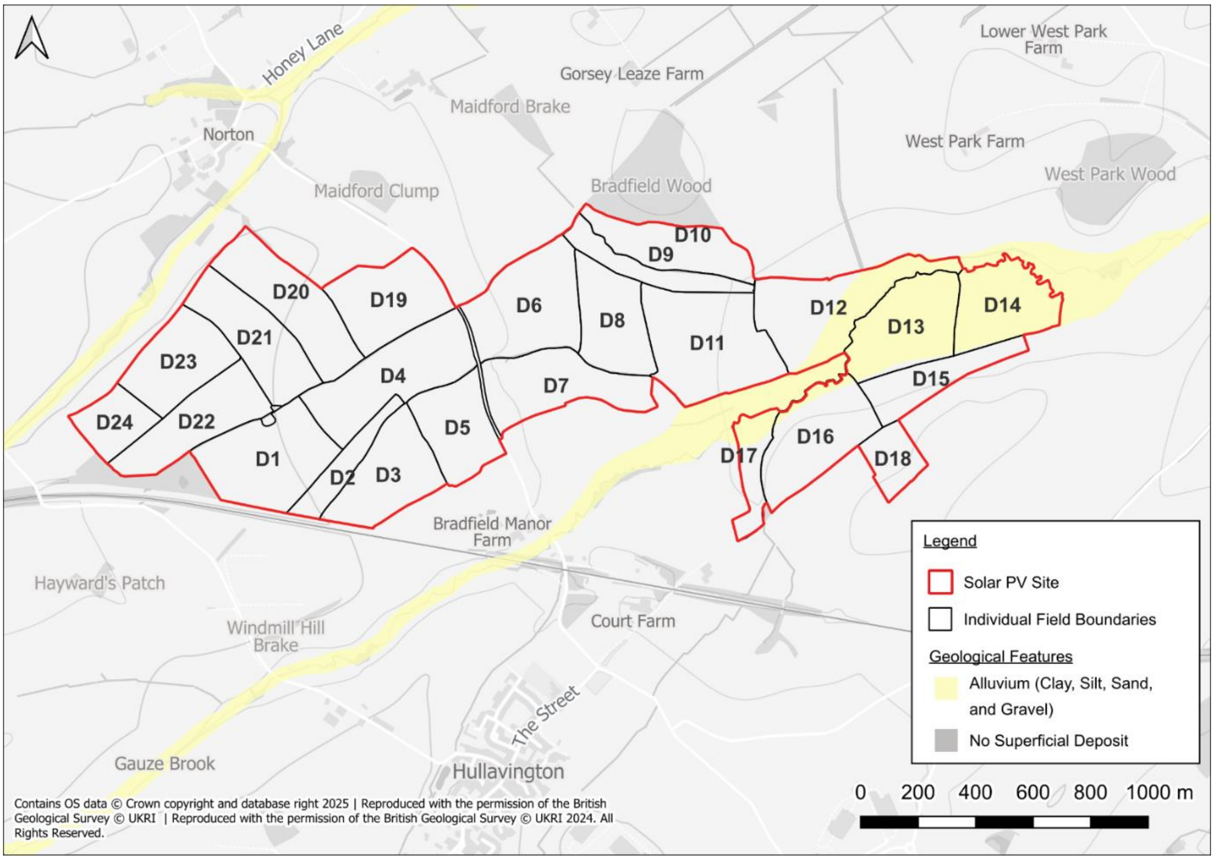


Figure 3: Superficial Deposits

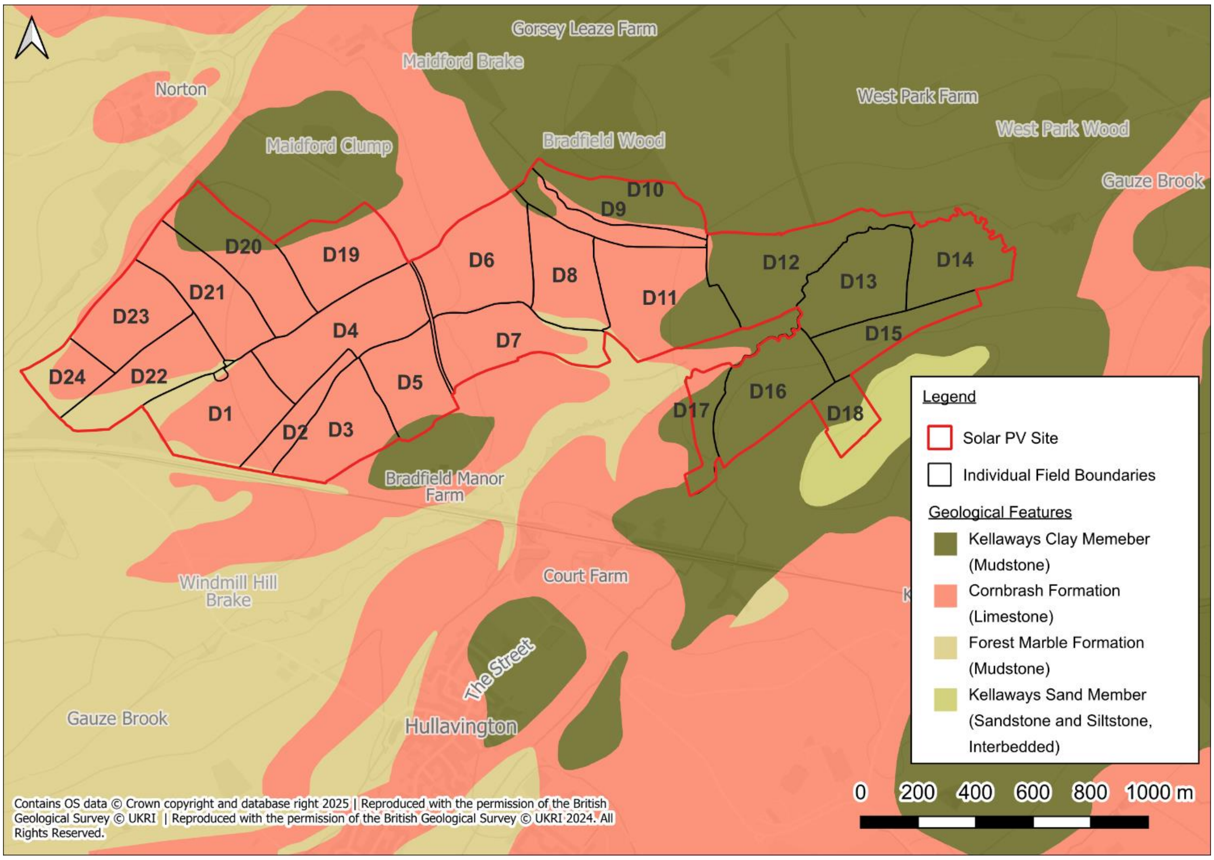


Figure 4: Bedrock Deposits

1.8 Hydrogeology

1.8.1 According to the EA's Aquifer Designation data, obtained from MAGIC Map's online mapping[iii] [accessed 02/06/2025], the Alluvium is identified as a Secondary A Aquifer.

1.8.2 The underlying Kellaways Clay Member is described as an unproductive aquifer, whereas the Forest Marble Formation and the Cornbrash Formation are defined as Secondary A Aquifers.

1.8.3 The EA's 'Source Protection Zones' data, obtained from MAGIC Map's online mapping [accessed 02/06/2025], indicates that the west of Lime Down D is located within a Zone II - Subsurface Activity Groundwater Source Protection Zone and the east is located within a Zone I - Subsurface Activity Groundwater Source Protection Zone.

1.8.4 Further assessment of hydrogeological risk, including HDD-related considerations, is provided in **ES Volume 1, Chapter 19: Ground Conditions and Contamination [EN010168/APP/6.1].**

1.9 Proposed Site Conditions

1.9.1 Lime Down D comprises ground-mounted solar panels, a Battery Energy Storage System (BESS) Area located in Field D1 and associated electrical infrastructure and access. Two substations are also proposed, one adjacent to the BESS in Field D22, and a second standalone substation in Field D18. See Chapter 3: Scheme Description of the ES.

1.9.2 The proposed BESS Area arrangement at Lime Down D is described in Section 3 of this report, which sets out the Drainage Strategy specific to the BESS Area.

1.9.3 An **Outline Landscape and Ecological Management Plan (LEMP) [EN010168/APP/7.18]** has been prepared to support the DCO application. The Outline LEMP confirms that the majority of the site will be used for solar panels, electrical infrastructure and internal access, with peripheral areas providing landscaped buffers, in accordance with the embedded mitigation strategy described throughout the ES.

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 Lime Down D and the location of the BESS Area.

2.2 Tidal Flood Risk

2.2.1 Lime Down D is situated at a minimum of approximately 73m AOD and is significantly above sea level. Therefore, there is **Negligible** risk from tidal flooding.

2.3 Fluvial Flood Risk

2.3.1 According to the EA's Flood Map for Planning (updated in March 2025)[iv], Lime Down D is situated largely within Flood Zone 1 (meaning it is an area considered to have <0.1% annual probability of flooding from rivers or the sea). However, Fields D9 – D14, D16 – D17 have significant areas within Flood Zones 2 / 3. Furthermore, the area bisecting Fields D19 – D22 are also located within Flood Zone 3, however this is considered to be associated with a small watercourse and does not encroach into Lime Down D or into the area allocated for the proposed development.

2.3.2 The BESS Area and substations are located wholly in Flood Zone 1.

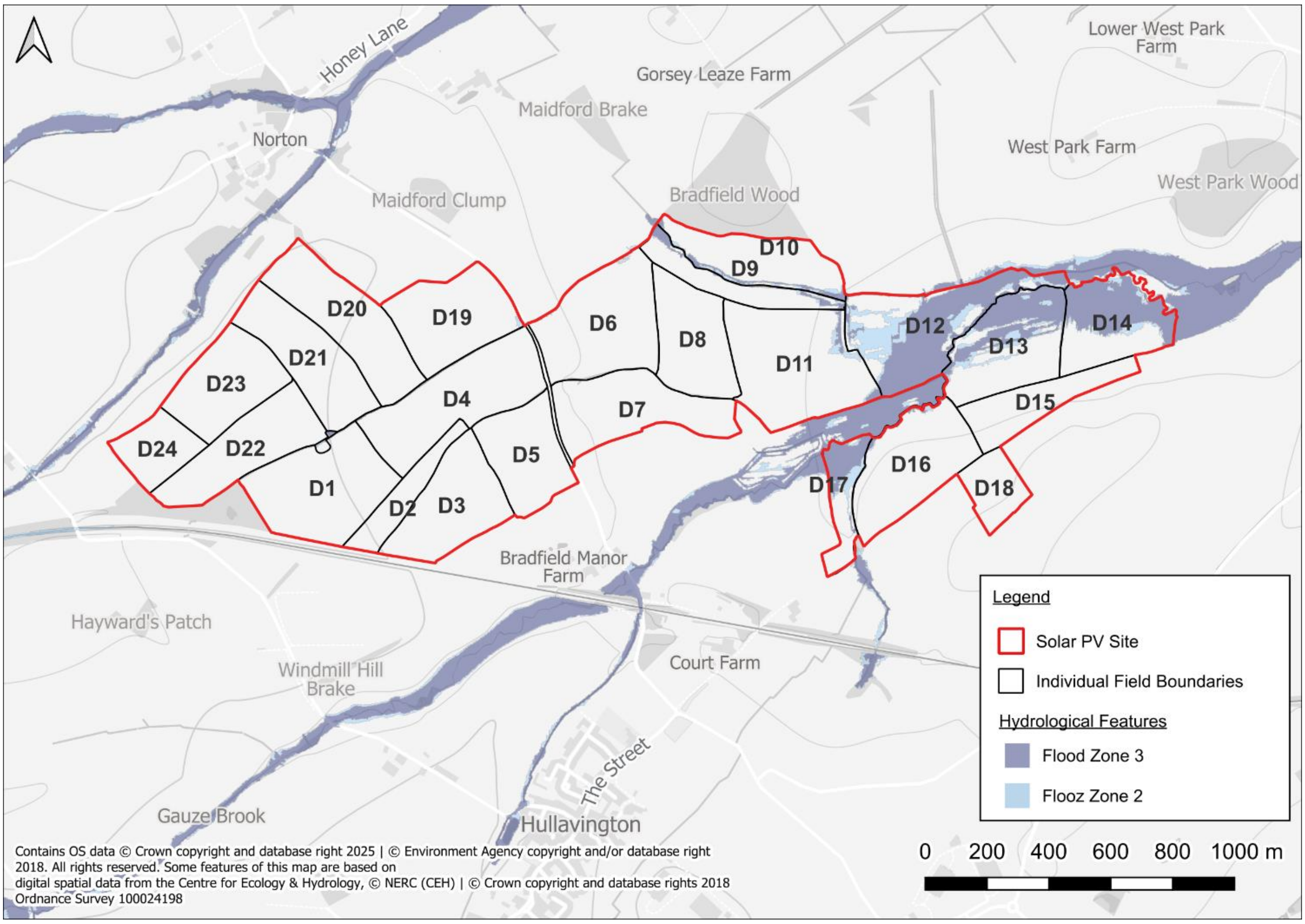


Figure 5: EA's Flood Map for Planning

Local Watercourses and Flooding Mechanisms

2.3.3 The nearest watercourse is Gauze Brook, which flows in a north-easterly direction along the eastern boundary of Lime Down D. An Unnamed Main River flows along the northern boundary before converging with Gauze Brook near the north-east corner of the Site. Several minor ordinary watercourses and ephemeral drainage channels traverse the central and western parts of the Site.

2.3.4 The mapped Flood Zone extents predominantly correspond with areas below 80 m AOD. Fluvial flooding could occur if Gauze Brook or the Unnamed Main River overtopped their banks during or following extreme rainfall events, or in the event of channel blockage from debris or vegetation accumulation. The Environment Agency's Spatial Flood Defences with Standardised Attributes dataset identifies a natural high ground feature providing an indicative Standard of Protection up to a 1 in 2 year event. No formal engineered defences with defined crest levels are present adjacent to the Site.

Historical Flooding

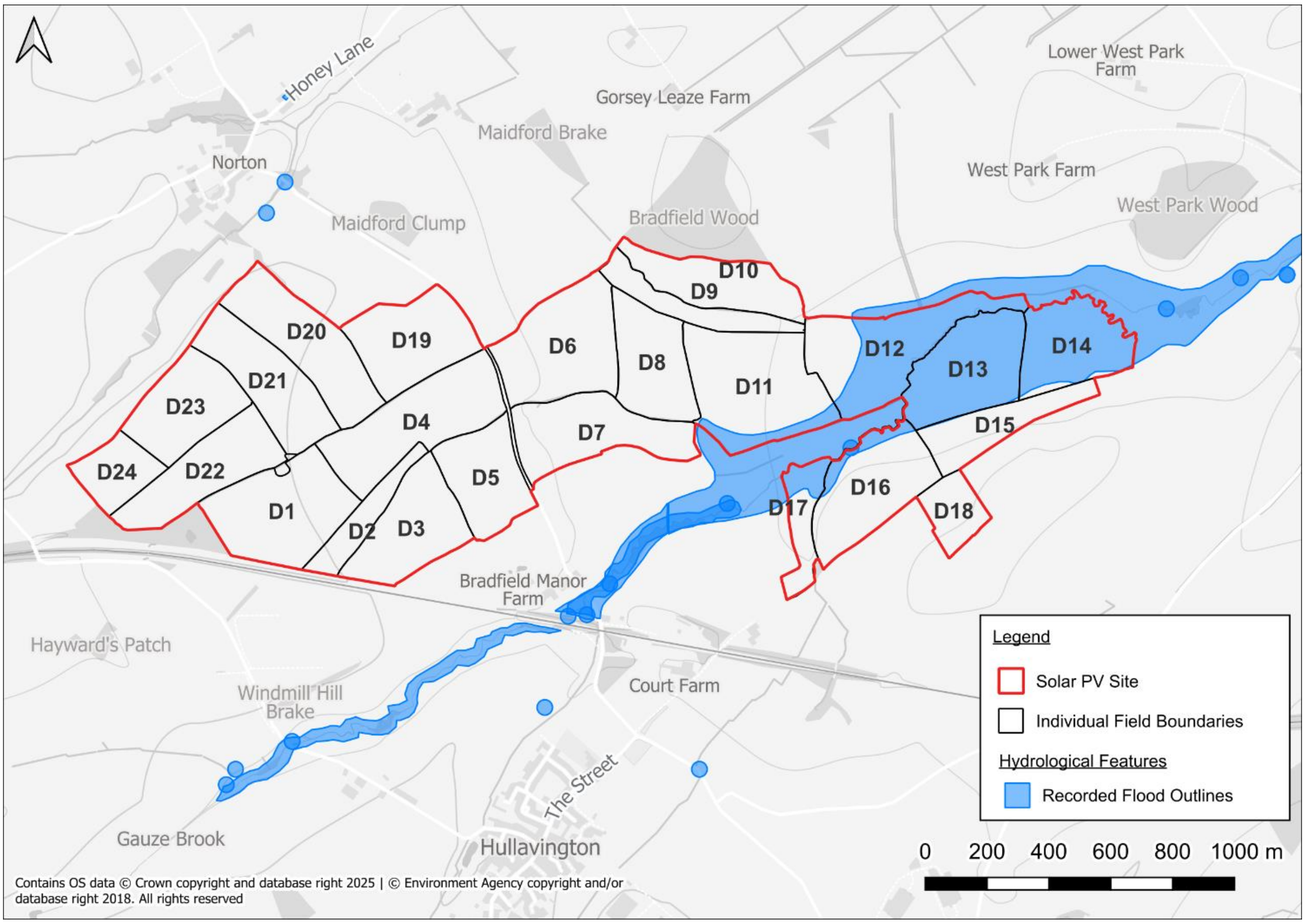


Figure 6: Historic Flood Map

2.3.5 The EA's Historical Flood Map records a flood event in May 1932 affecting the eastern parts of Lime Down D, which is consistent with the mapped Flood Zone extents. No other site-specific records of historic fluvial flooding have been identified in Environment Agency datasets or third-party sources.

Hydraulic Modelling of Gauze Brook

2.3.6 In the absence of detailed Environment Agency model outputs, site-specific hydraulic modelling was undertaken by Arthian to quantify flood extents, depths, and the influence of climate change allowances across a comprehensive range of design and exceedance events. The modelling focused on Gauze Brook and the mapped Flood Zone 3 area in the lower-lying eastern section of Lime Down D.

2.3.7 To ensure a robust and proportionate assessment in accordance with Environment Agency guidance, the following flood scenarios were simulated:

- Q2 (1 in 2-year flood event);
- Q20 (1 in 20-year flood event);
- Q100 (1 in 100-year flood event);
- Q1000 (1 in 1,000-year flood event);
- Q100 with a 39% climate change uplift;
- Q100 with a 71% climate change uplift;
- Q1000 with a 39% climate change uplift; and
- Q1000 with a 71% climate change uplift.

2.3.8 The hydraulic model incorporated a combination of high-resolution Environment Agency LiDAR topographic data and site-specific topographical channel survey to accurately define cross-sectional geometry. This approach allowed refinement of the model to reflect localised channel variations and bank profiles not captured in national datasets alone. Roughness coefficients were specified using conservative values representative of the channel substrate and adjacent floodplain vegetation. The model was built to generate outputs including predicted flood extents, maximum water levels, and depth grids across the Site.

2.3.9 Results indicate that during the Q100 event including a 39% climate change uplift, predicted flood depths within the areas containing the proposed solar PV arrays are shallow, predominantly below 0.2 m, with isolated depressions reaching up to approximately 0.3 m. No flooding is predicted within the BESS area or substation compound under any of the modelled scenarios. The modelling demonstrates that flooding is limited to established low-lying margins adjacent to Gauze Brook, with no significant encroachment into operational or critical infrastructure areas. Access and egress via Bradfield Cottages and the internal track network remain viable during all design events, ensuring continuity of site operation and safe movement for maintenance personnel.

2.3.10 Figure 7 illustrates the spatial distribution of modelled flood extents and maximum water depths across the Site under the Q100 plus 39% climate change scenario. The mapping confirms that inundation is restricted to shallow ponding in discrete depressions adjacent to Gauze Brook, with the majority of the Site remaining flood-free. The figure provides visual confirmation of the limited extent and depth of fluvial flooding predicted to occur under design standard and climate change uplift conditions.

2.3.11 This detailed modelling provides a robust, site-specific evidence base demonstrating that the primary fluvial flood hazard is both predictable and of low magnitude. It confirms that the proposed development footprint is largely located outside the principal flood extents and that residual risk can be managed without the requirement for additional engineered mitigation. Outputs from the hydraulic modelling are included as Annex B.

2.3.12 In line with the embedded mitigation strategy presented in **Appendix 11.1: Flood Risk Assessment and Drainage Strategy – Covering Report [EN010168/APP/6.3],** smaller electrical components such as conversion units, where present, will be made resilient to both fluvial and surface water flood risk. These minor units will either be located outside mapped flood extents, raised above the design flood level with appropriate freeboard, or made robust through localised waterproofing and structural resistance measures. Their limited scale and elevation reduce the likelihood of significant flood impact or obstruction to floodplain flow routes.

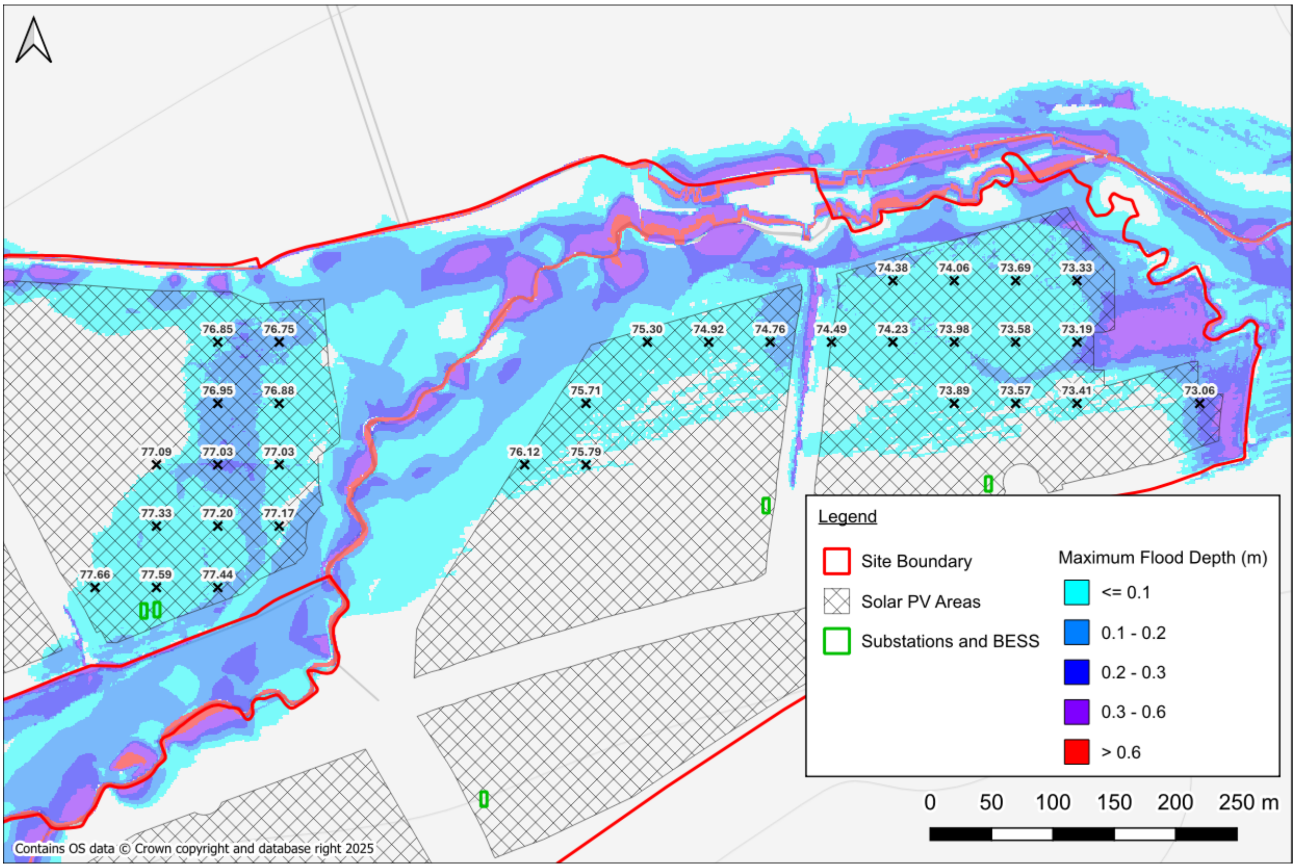


Figure 7: Maximum Flood Depths and Water Levels During the 1 in 100 year +39% CC Flood Event Map

Assessment of Minor Tributaries and Ordinary Watercourses

2.3.13 In the upper reaches of Lime Down D, particularly across the western and central fields where only shallow tributaries and ephemeral channels are present, detailed hydraulic modelling was not considered proportionate due to the limited catchment size, shallow profile, and absence of formalised flow routes. Instead, updated Environment Agency surface water flood mapping (NaFRA2, January 2025) has been used in conjunction with supplementary Manning's open channel calculations to provide a conservative assessment of potential fluvial flooding. The Manning's calculation is included as Annex C.

2.3.14 Surface water mapping shows ponding depths in these areas typically below 0.3 m during extreme rainfall, with occasional isolated depressions predicted to reach up to 0.6 m. No persistent conveyance channels were identified, and any inundation is expected to be transient and low hazard.

2.3.15 Manning's calculations were applied to estimate flood levels for the Q100 flood event incorporating a 71% climate change allowance. Cross-sectional profiles were derived from EA LiDAR survey data captured in Q1 2020, and conservative roughness coefficients were specified to account for potential variability in channel condition and vegetation. The calculated flood levels suggest that extents are expected to be smaller than those shown by the conservative 0.1% EA surface water mapping, reinforcing the conclusion that flood risk from these minor channels is limited. The mapping outputs were included for context only and were not used as inputs to the calculations.

2.3.16 It is noted that the Manning's calculations predate the publication of the NaFRA2 dataset, which shows a reduction in modelled extents. This supports the view that the assessment remains precautionary and appropriately conservative.

Floodplain Storage Compensation

2.3.17 Flood Zone 2 and 3 extents are expected to impact the proposed solar Scheme in Fields D11 – D14 and D17. A flood compensation analysis is detailed below. The potential for floodwaters to interact with the solar panels or their supports is minimal, as the Scheme in these areas is either located outside of the floodplain or raised sufficiently to avoid contact with flood flows. As a result, any associated displacement of floodplain storage is considered negligible, and the implementation of specific flood compensation measures in these locations is not considered necessary or proportionate.

2.3.18 The EA has advised that, for any development located within Flood Zone 3a (i.e. the 1 in 100-year plus climate change flood extent), floodplain storage compensation should be incorporated into the design. Compensation should be provided on a level-for-level and volume-for-volume basis, ensuring direct replacement of any lost storage.

2.3.19 Flood volume loss has been conservatively estimated based on the cross-sectional area of the proposed panel supports (28.65cm^2), multiplied by the number of supports located within Flood Zones 2 and 3 across the Site (assumed as 10 piles per 100 m of panels, equating to approximately 3,371 piles in Lime Down D), and applying a worst-case flood depth of 1.2m. This results in a total displaced volume of just 11.59m^3 across Lime Down D.

2.3.20 To assess the potential uplift in flood levels resulting from the loss of floodplain storage in Fields D11 – D14 and D17, the downstream extent of the floodplain has been defined at the location of the main road crossing (the junction of Mill Lane and Main Road, approx. grid reference 392423E,184108N). This point was selected as a practical hydrological boundary, as the road is likely to act as a flow restriction during flood events, limiting downstream floodplain connectivity. Any potential impact from the minor loss of flood storage would therefore be most likely to affect areas upstream of the road, making it an appropriate and conservative boundary for this assessment. This catchment has been calculated as approximately 275,000m^2. When the conservatively estimated displaced volume of 11.59m^3, representing the total potential flood storage displacement across the entire DCO application area, is spread across the full floodplain extent, the theoretical increase in flood depths is approximately

0.000042mm.

2.3.21 The potential increase of flood depths are considered negligible and well within the natural variability of floodplain behaviour, and would result in no perceptible change in flood levels or flow routes. It therefore represents a highly conservative assessment of worst-case impacts.

2.3.22 Given the extremely limited displacement, the conservative assumptions applied, and the imperceptible increase in flood depth, the impact on flood storage capacity is considered de minimis. On this basis, it is concluded that further consideration or provision of compensatory flood storage resulting from panelled areas encroaching into the flood extents is not necessary or proportionate for the proposed development.

Consultation

2.3.23 The EA were consulted in October 2024 for any Site specific flood data and modelling; a response was received on the 13/11/24 and is included as Annex D. Product 4 data received for the area has been produced using the EA's National Generalised Model- JFLOW. This modelling is fit for the purpose of the Flood Zones; however, it is not based on a specific channel survey. The basic JFLOW water depths for the 1% Annual Exceedance Probability event and the 0.1% Annual Exceedance Probability Event are also included in Annex D. The JFLOW mapping finds that at Lime Down D, flood depths in the area identified as Flood Zone 3 are below 0.5m in depths during both the 1% Annual Exceedance Probability scenario and the 0.1% Annual Exceedance Probability Scenario, with the remainder of the Site shown to not expect any flood depths.

2.3.24 Consultation has been undertaken throughout the EIA process with the Environment Agency and Wiltshire Council in their role as the LLFA. Comments and recommendations received have been noted and applied throughout this Flood Risk Assessment and Drainage Strategy. This includes the methodology applied to undertaking Floodplain Storage Compensation calculations, the approach to which was agreed by the Environment Agency and Wiltshire Council during consultation meetings. A record of consultation and The Applicant's responses are included in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1].**

2.3.25 Lime Down D is not located within an Internal Drainage Board (IDB) area.

Summary

2.3.26 Lime down D is located partially within an area where flooding is at a **Low to Moderate** risk, however given the nature of the Scheme and sensitive design layout in this area, Lime Down D is considered to be at **Low** risk of fluvial flooding. The BESS Area, and substation are proposed to be located wholly outside of Flood Zones 2 and 3 and therefore are considered to be at a **Low** risk.

2.4 Surface Water Flood Risk

2.4.1 The EA's National Flood Risk Assessment Mapping (NaFRA), known as the 'Long Term Flood Risk Map' (Surface Water)[v], was updated in January 2025. The NaFRA mapping provides an updated view of surface water flooding across the Site, however it should be noted that at the time of writing, the NaFRA mapping only delivers climate change insight up to the year 2060.

2.4.2 According to the EA's Long Term Flood Risk Map (Surface Water) the majority of Lime Down D is at Very Low risk of surface water flooding, meaning it has a <0.1% annual probability of flooding. However, there are areas of Low to High risk (0.1 - >3.3% annual chance of flooding), particularly at Fields D11 – D14, which is considered to be associated with the presence of Gauze Brook. Other areas of risk across Lime Down D are associated with isolated topographic depressions within the Fields.

2.4.3 With reference to the depth mapping provided by the NaFRA data, flood depths are anticipated to be low, with depths remaining largely below 300mm which is considered passable to people and vehicles. Some depths between 300mm and 600m are anticipated in Fields D5 and D12 – D14, however these are small and largely isolated areas and can be associated with the existing land drains and isolated topographic depressions.

2.4.4 Any potential surface water flooding arising at or near to Lime Down D would be directed eastwards, away from Lime Down D, following the local topography and the watercourses.

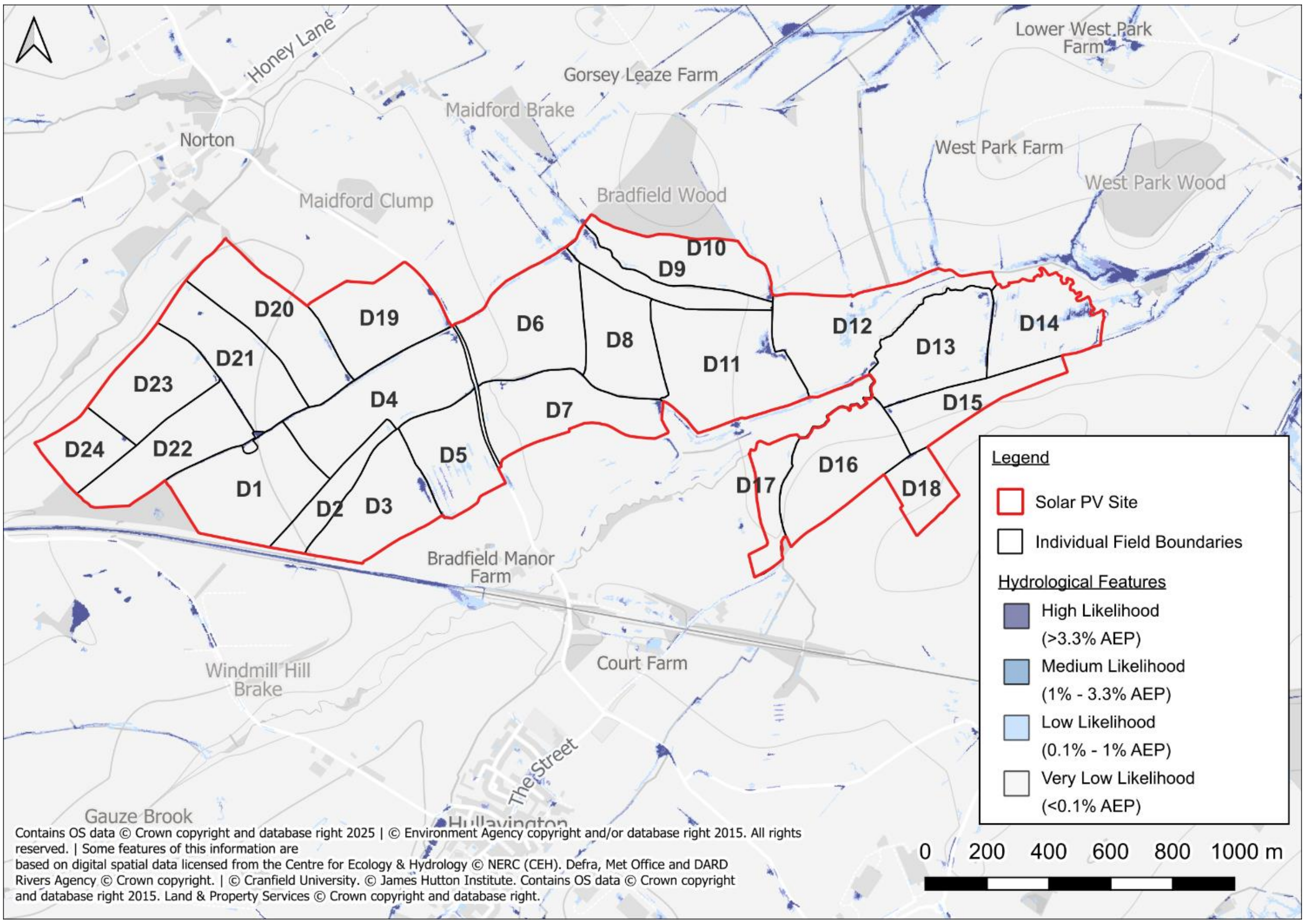


Figure 8: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)

2.4.5 It can therefore be concluded that Lime Down D is at **Low** risk of surface water flooding. The solar panels and other electrical infrastructure (which will be sat on a concrete foundation / pad) will be mounted on frames and raised above ground level allowing flood water to flow freely underneath thereby reducing the potential to be impacted in the event of surface water flooding.

2.4.6 The impact of the Scheme on surface water risk is covered in Section 3.0 below to ensure that surface water risk is not exacerbated through appropriate Sustainable Drainage Systems (SuDS) measures.

2.5 Groundwater Flood Risk

2.5.1 Details of geology can be found in Section 1.0 above.

2.5.2 The 2015 SFRA interactive mapping[vi] details that the Kellaways Clay member has no risk of groundwater flooding with the remainder of Lime Down D (Forest Marble Formation and Cornbrash Formation) is classified as having groundwater levels of between 0.025m and 0.5m below ground level (bgl) or 0.5m and 5m bgl.

2.5.3 Groundwater levels correspond with river levels. As such groundwater flooding could occur during periods of prolonged high water levels at Gauze Brook or the Unnamed Main River.

2.5.4 The BESS Area and substations will be predominantly hardstanding, limiting the vertical migration of groundwater. No buildings and no basement levels are identified on plans which may otherwise be at increased risk from groundwater seepage.

2.5.5 It can therefore be concluded that the risk of groundwater flooding is **Low** and no specific mitigation measures are required.

2.6 Sewer Flooding

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

2.6.2 On the basis of Lime Down D's rural setting the presence of sewerage infrastructure is unlikely. Utility records have been checked and there are no public sewers identified within Lime Down D.

2.6.3 It can therefore be concluded that the risk of sewer flooding is **Negligible**; therefore, no specific mitigation measures are required.

2.7 Reservoir and Canal Flooding

2.7.1 There are no canals within the vicinity of Lime Down D, therefore there is no associated risk.

2.7.2 The EA's 'Flood Risk from Reservoirs' map shows that Lime Down D is not at risk of flooding from reservoirs.

2.7.3 It can therefore be concluded that there is **Negligible** risk of flooding from artificial sources; therefore, no specific mitigation measures are required.

2.8 Residual Flood Risks

2.8.1 A residual risk is an exceedance event, such as the greater than 1 in 1000 year (<0.1% AEP) flood event that would overtop Gauze Brook or the and potentially impact Lime Down D. 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.

2.8.2 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.

2.9 Summary of Flood Risk and Mitigation

2.9.1 It can be concluded that the risk to Lime Down D from all sources of flooding is **Negligible to Low**, however it would be prudent to include the below mitigation measures.

2.10 Embedded Mitigation

2.10.1 Embedded Mitigation is detailed in ES Volume 3, Appendix 11-1: Flood Risk Assessment and Drainage Strategy – Covering Report [EN010168/APP/6.3].

BESS Area/substation:

2.10.2 All equipment will be raised by a minimum of 150mm, or as high as practically possible, above surrounding ground levels

2.10.3 In the unlikely event of a chemical leak and/or fire, an automatic actuating valve would be triggered to lock ensuring that no contaminants are discharged to watercourses.

2.10.4 The BESS infrastructure can be adequately waterproofed to withstand the effect of flooding. Batteries have been located within areas outside of the 1 in 1000 year flood event extent.

Flood Warnings and Evacuation

2.10.5 Flood Warnings/Flood Alerts do cover this area therefore Site management should sign up to the free EA's Floodline service to receive flood alerts.

2.10.6 Access to Lime Down D will be required relatively infrequently, typically by technicians for maintenance and inspection works or Site management. Such works can be scheduled as to avoid Lime Down D during times of flood.

2.11 Impact on Off-Site Flood Risk

2.11.1 Floodplain Storage Compensation has been considered in Section 2.4 above and surface water management has been considered in Section 3.0 below.

3. Drainage Strategy – BESS Area

3.1 Introduction

3.1.1 The Scheme is for a ground mounted solar photo-voltaic plant and associated electrical infrastructure and access, as well as a BESS Area. This Drainage Strategy will assess the BESS Area only. The impact of the Scheme on surface water risk is covered in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Drainage Strategy – Covering Report [EN010168/APP/6.3]** to ensure that surface water risk is not exacerbated through appropriate Sustainable Drainage Systems (SuDS) measures.

3.1.2 Lime Down D currently comprises undeveloped land which is not formally drained and is therefore considered to be 100% permeable.

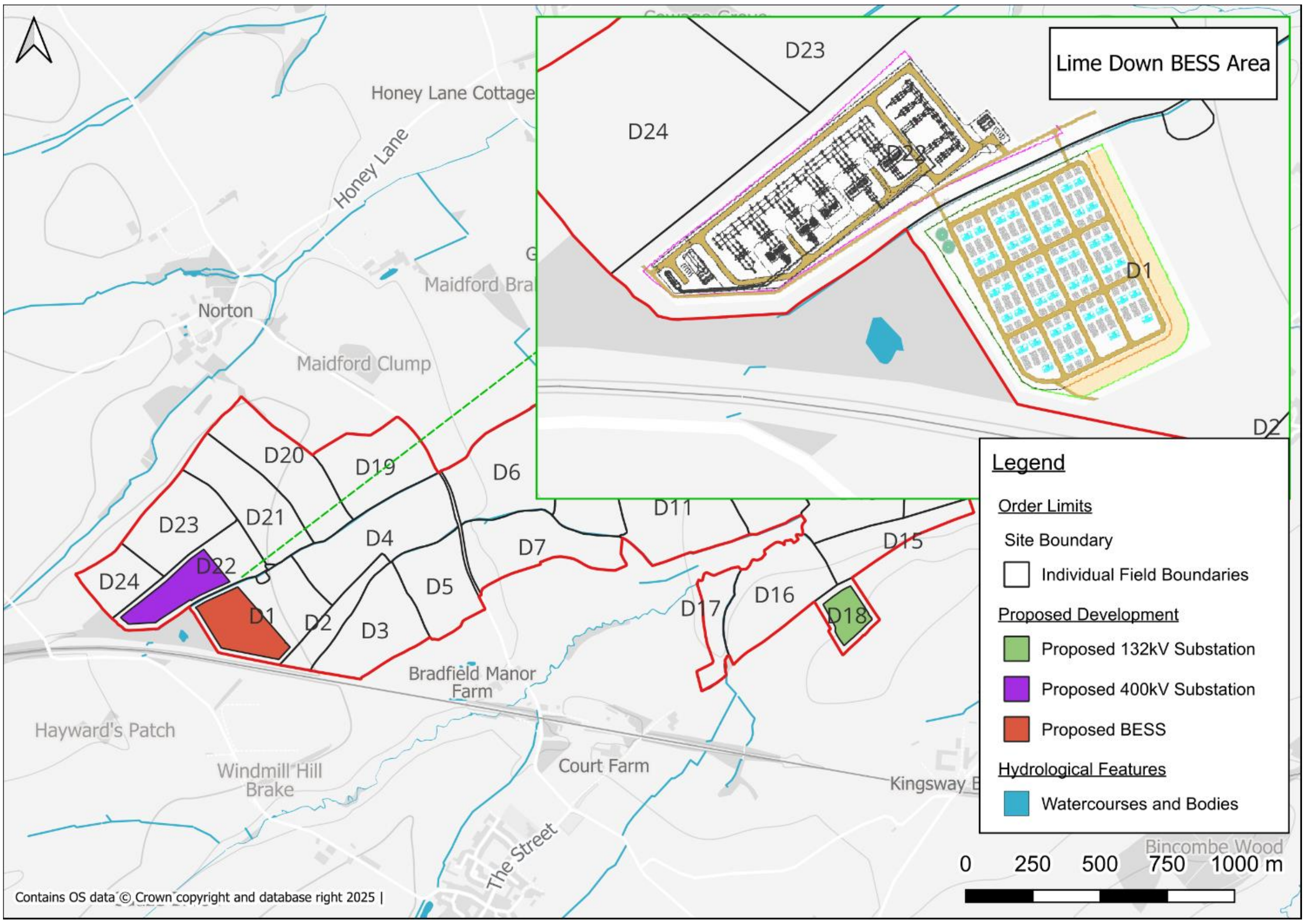


Figure 9: Proposed BESS location and watercourses

3.1.3 The increase in hardstanding area will result in an increase in surface water runoff rates and volumes. In order to ensure the Scheme will not increase flood risk elsewhere, surface water discharge from the BESS and associated substations within Lime Down D will be controlled.

3.2 Drainage Hierarchy

3.2.1 The recommended surface water drainage hierarchy (Paragraph 5.8.15 of the NPS EN-1 and Paragraph 056 (Ref ID: 7-056-20220825) of the PPG: Flood Risk and Coastal Change) is to utilise soakaway systems or infiltration where feasible, followed by discharging to an appropriate watercourse. If neither option is viable, discharge to a public surface water sewer should be considered, followed by a combined sewer. As a last resort, discharge to a highway drain or other drainage system may be considered.

3.2.2 The following options assume normal operation; during a potential pollution event (such as a fire), the system will be isolated by an automatic actuating valve and managed. Firewater management is discussed further below.

Surface Water Discharge to Soakaway

3.2.3 The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above, Lime Down D is largely not underlain by any superficial deposits, and this includes the area where BESS is proposed.

3.2.4 Where underlying ground conditions are permeable, groundwater levels will likely be in conductivity with local watercourses given their close proximity. It can, therefore, be concluded that soakaways may not be suitable for the discharge of surface water runoff.

3.2.5 Infiltration testing was undertaken at Lime Down D (Field D1) in January 2025, with full test results provided in Annex E. Three trial pits were excavated across the Site. The results showed slow infiltration rates which resulted in no infiltration after three hours. It can be concluded that soakaway drainage / infiltration systems will not be a feasible option for surface water disposal.

Surface Water Discharge to Watercourse

3.2.6 Where soakaways are not suitable, a connection to a watercourse is the next consideration.

3.2.7 The nearest watercourse to the BESS Area is the tributary off the Unnamed Main River as shown in Figure 8. Given that BESS Areas is raised above the watercourse, discharge to the watercourse at a limited discharge rate of 8.64l/s (see Section 3.3 for further details on calculations of the rate), appears to be feasible via gravity.

Surface Water Discharge to Sewer

3.2.8 As described above, connections to the unnamed tributary are feasible and therefore a connection to the public surface water sewer is not the preferred option. Should it be determined that direct discharge to the above watercourse is not preferable, a discharge to the public drainage system could be considered.

3.3 Surface Water Discharge for the BESS Area

3.3.1 The existing greenfield runoff rates generated for proposed BESS Area has been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method, provided in Table 1 below. Greenfield runoff calculations are based off the 63,715m^2 proposed hardstanding area.

Table 1: Runoff Rates

Flood Event (Years)	Runoff Rate (l/s/Ha)
1 in 2	12.34
1 in 10	20.65
1 in 30	26.64
1 in 100	34.68
1 in 1000	58.39

3.3.2 A flow rate of 8.64/s is proposed for the BESS Area in Lime Down D, which provides a 30% betterment to the existing 1 in 2 year rate (rate restriction to 70% as per advice from the Wiltshire Council LLFA).

3.4 Attenuation Storage

3.4.1 In order to achieve a discharge rate of 8.64/s, attenuation storage will be required. Storage estimates have been provided using Causeway Flow and are included in Annex F. Table 2 below provides the input parameters for the calculations and the estimated storage volumes required for the proposed BESS Area.

Table 2: Attenuation Storage Volume Parameters

		BESS Area
Proposed Discharge Rate		8.64 l/s
Total Proposed Impermeable Area		63,715 m^2
Design Head		1m
Flow Control Device		HydroBrake
Estimated Storage Volume	**1 in 100 + 45% CC**	6,493.92 m^3
Additional Storage		0m^3/ha

3.4.2 The attenuation volumes are provided for indicative purposes only and should be verified at the detailed design stage.

3.5 Sustainable Drainage Systems

3.5.1 Attenuation storage should be provided in the form of Sustainable Drainage Systems (SuDS) where practical. The following SuDS options have been considered:

Soakaways

3.5.2 As described in Section 3.2, the use of soakaways is not considered to be feasible.

Swales, Detention Basins and Ponds

3.5.3 Sufficient space is available on Site to utilise a pond, basin or swale as an above ground attenuation feature. In order to facilitate gravity drainage, attenuation features should be located towards the topographical lower levels in the east of Lime Down D and outside of the 1 in 1000 year flood event extents.

Filter Drains/Strips

3.5.4 Filter drains are trenches filled with stone/gravel that create temporary subsurface storage for the filtration, attenuation, and conveyance of surface water runoff. Ideally, filter drains receive lateral inflow from adjacent impermeable surfaces pretreated over a filter strip. Filter drains can help manage peak flows by naturally limiting rates of conveyance through the filter medium and by providing attenuation storage when the rate of flow at the outlet is controlled.

Bioretention Systems

3.5.5 Bioretention systems (including rain gardens and raised box planters) are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution. They also provide attractive landscape features and biodiversity. Bioretention systems can help reduce flow rates from a Site by promoting infiltration / evapotranspiration and providing some attenuation storage. Bioretention systems can also provide very effective treatment functionality. Bioretention systems are a very flexible surface water management component that can be integrated into a wide variety of developments / densities using different shapes, materials, planting, and dimensions. Bioretention systems (including rain gardens) should be considered within the detailed drainage design.

Rainwater Harvesting

3.5.6 The attenuation benefits provided through the use of rainwater harvesting are considered to be limited and would only be realised when the tanks were not full. Water usage on Site is unlikely to be significant and therefore the benefit of retaining water is limited.

Green Roofs

3.5.7 Green roofs are not identified on Scheme plans. Given the nature of the Scheme, green roofs are not considered a practical option. The benefits achieved through installing a green roof would be disproportionate to the significant ongoing maintenance and construction costs involved.

Porous/Permeable Surfacing

3.5.8 Permeable surfacing (gravel beds) will be considered, where appropriate, for use on the BESS and substation areas. Fixed areas of the BESS Area are not yet available and therefore accurate permeable surfacing storage estimates must be calculated at the detailed design stage. Typically, the storage offered can be calculated by multiplying the surface area of the permeable surfacing (m^2) by the proposed depth (m) by a porosity ratio of 0.3.

3.5.9 The provision of storage within the sub-grade material would only be feasible in areas with a proposed gradient of <1 in 20 as detailed within CIRIA RP992/28 (Design Assessment Checklists for Permeable/Porous Pavement). Site gradients should be confirmed at the detailed design stage. The amount of storage provided within permeable surfacing is subject to sub-grade depth and gradient. Given the nature of Lime Down D the proposed gravel subgrade should be lined to prevent potential pollution incidents from mobilising to the ground.

3.5.10 The use of permeable surfacing should be considered further at the detailed design stage.

Underground Attenuation Tanks

3.5.11 Storage could be provided within underground attenuation tanks or within oversized pipes. This will be considered further within the detailed design stage.

3.5.12 The use of underground attenuation should be considered at the detailed design stage.

3.6 Preferred Drainage Scheme

3.6.1 The nearest watercourse to the BESS Area is the tributary off the Unnamed Main River as shown in Figure 8. Given that BESS Areas is raised above the watercourse, discharge to the watercourse at a limited discharge rate of 8.64l/s, appears to be feasible via gravity.

3.6.2 Surface water runoff up to the 1 in 100 year + 45% climate change allowance event will be attenuated within the BESS Area. The required attenuation at Lime Down D is 6,494 m^3. The required attenuation can be provided in the form of lined gravel surfacing located under the proposed battery units and substation area. The remaining required attenuation can be provided in a combination of the Sustainable Drainage Systems (SuDS) features detailed in Section 3.5 above.

3.6.3 The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the Scheme.

3.7 Event Exceedance

3.7.1 Storage will be provided for the 1 in 100 year plus 45% CC event. Storm events in excess of the 1 in 100 year plus 45% CC event should be permitted to produce temporary shallow depth flooding within non developed areas including where necessary the access roads.

3.7.2 Surface water on-Site will be managed through a comprehensive drainage system designed to modern standards and guidance (as detailed in Section 3.4). This will ensure there is no surface water ponding or surcharging above ground during events up to the 1 in 100 year + 45% CC flood event. The units will be raised by a minimum of 150mm, or as high as practically possible, above surrounding ground levels to prevent exceedance flooding from impacting Lime Down D and to ensure significant resilience to flooding.

3.8 Surface Water Treatment

3.8.1 In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), other roofs have a 'low' pollution hazard level, with commercial yards classified as having a 'medium' pollution hazard level.

Table 3 below shows the pollution hazard indices for each land use.

Table 3: Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs (typically commercial/industrial roofs)	Low	0.5	0.2**	0.4
Commercial Yard and Delivery Areas, Non-residential Car Parking and all roads except Low Traffic Roads	Medium	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2
* Indices values range from 0-1.
** up to 0.8 where there is potential for metals to leach from the roof

3.8.2 Where practical, runoff from roofs and roads will be directed to the existing drainage or the gravel where it can infiltrate into the ground. Table 4 below demonstrates that the porous surfacing provides sufficient treatment.

Table 4: SuDS Mitigation Indices

Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

3.8.3 It can be concluded that the inclusion of a gravel bed will provide sufficient treatment during normal operation. Where attenuation is provided in a below ground system (tank storage), treatment will need to be provided by a suitably sized separator.

3.9 Firewater Consideration

3.9.1 Given the nature of the Scheme there is a risk of fire, and contamination may be mobilised by fire suppression water. The principal route for any firewater loss from Lime Down D is via the proposed surface water drainage system into the ground, which is associated with the BESS Area. In order to isolate Lime Down D's drainage, the proposed gravel subbase should be lined and the proposed outfalls from the drainage system should be controlled by automatically actuated valves. In the event of a fire, the valve will be designed to activate to close off the BESS Area's drainage system triggered by the fire alarm systems. Flows will then back up in the system. The SuDS system will be designed to accommodate the 1 in 100 plus 40% climate change storm event, therefore a sufficient amount of storage is provided to contain a reasonable worst case 1 in 10 year storm event.

3.9.2 According to National Fire Chiefs Council Grid Scale Battery Energy Storage System planning Guidance for FR Guidance, a tank measuring 228m^3 will be required to supply a fire hydrant located adjacent to the BESS. Guidance also states that Fire and rescue services may wish to increase this requirement, given the size of the Scheme there is available space on-Site to provide additional storage[vii]. The BESS Area will contain a minimum of two firefighting water storage units of no less than 228,000 litres in capacity, capable of delivering 1900 litres per minute for 4 hours (exceeding NFCC guidance). The design approach, including containment, valve operation and emergency response procedures, is further detailed in the **Outline Battery Safety Management Plan [EN010168/APP/7.21].**

3.9.3 Following a fire event, the wastewater will be tested to ascertain the level of contamination. A decision will then be made as to the appropriate methodology to dispose of the attenuated water. This may involve on-Site treatment and release or tankering.

3.10 Maintenance

3.10.1 Maintenance of communal drainage features such as permeable surfacing or an attenuation tank will be the responsibility of the landowner. Maintenance of shared surface water drainage systems can be carried out in accordance with the **Outline Operational Environmental Management Plan (OEMP) [EN010168/APP/7.13]** and **Outline Battery Safety Management Plan [EN010168/APP/7.21].**

3.10.2 Maintenance schedules for an attenuation tank and permeable surfacing are included in Annex G. Maintenance of the separator will be as per the manufacturer's guidance.

4. Conclusions and Recommendations

4.1 Conclusions

4.1.1 The Scheme is for a ground mounted solar photo-voltaic plant and associated electrical infrastructure and access, as well as a BESS Area.

Flood Risk

4.1.2 Lime Down D is situated largely within Flood Zone; however, Fields D9 – D14, D16 – D17 have significant areas within Flood Zones 2 / 3. Furthermore, the area bisecting Fields D19 – D22 are also located within Flood Zone 3, however this is considered to be associated with a small watercourse and does not encroach into Lime Down D or into the area allocated for the proposed development.

4.1.3 The majority of Lime Down D is at Very Low risk of surface water flooding. However, there are areas of Very Low to High risk particularly at Fields D11 – D14, which is considered to be associated with the presence of Gauze Brook. Other areas of risk across Lime Down D are associated with isolated topographic depressions within the Fields.

4.1.4 It is concluded that fluvial flooding is the main source of potential flood risk to Lime Down D. All other sources of flooding are considered to have a **Low to Negligible** risk.

4.1.5 Hydraulic Modelling has been undertaken to ensure the risk remains Low as a result of climate change. The BESS Area is proposed to be sequentially located in Flood Zone 1, and therefore is considered to be at a **Low** risk.

Drainage Strategy

4.1.6 The BESS Area will introduce impermeable drainage area in the form of equipment and access; this will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used, and attenuation provided on-Site in the form of lined gravel surfacing beneath the BESS and substation areas to accommodate storm events up to and including the 1 in 100 year plus 45% climate change event.

4.1.7 Any surface water exceeding the infiltration capacity of the surrounding strata will naturally drain to the surrounding land drains in line with the existing scenario.

4.1.8 The heavily managed agricultural land will be replaced with wildflowers and grassland. This will help to reduce run off rates by increasing the roughness of the ground, helping to increase infiltration by reducing compaction, and improve water quality by reducing erosion and mobilisation of pollutants. As a result, runoff rates may be reduced following Scheme when compared to the existing greenfield scenario.

4.1.9 The proposed drainage scheme therefore meets the four pillars of SuDS (water quality, water quantity, amenity and biodiversity).

4.2 Recommendations

4.2.1 Embedded Mitigation is detailed in ES Volume 3, Appendix 11-1: Flood Risk Assessment and Drainage Strategy – Covering Report [EN010168/APP/6.3].

BESS Area/substations:

4.2.2 All equipment will be raised by a minimum of 150mm, or as high as practically possible, above surrounding ground levels.

4.2.3 Firewater (including water run-off from fire-fighting equipment) and other surface water pollution risks will be managed through the use of impermeable liners, containment systems and isolation valves that close automatically in the event of a fire. With these measures in place, all potential effects on flood risk and water quality are considered to be not significant.

4.2.4 The BESS and substation infrastructure can be adequately waterproofed to withstand the effect of flooding. Proposed batteries and substations have been sequentially located within areas of the Site which are located in Flood Zone 1.

Annexes

Annex A- Water Body Catchment Classifications Summaries

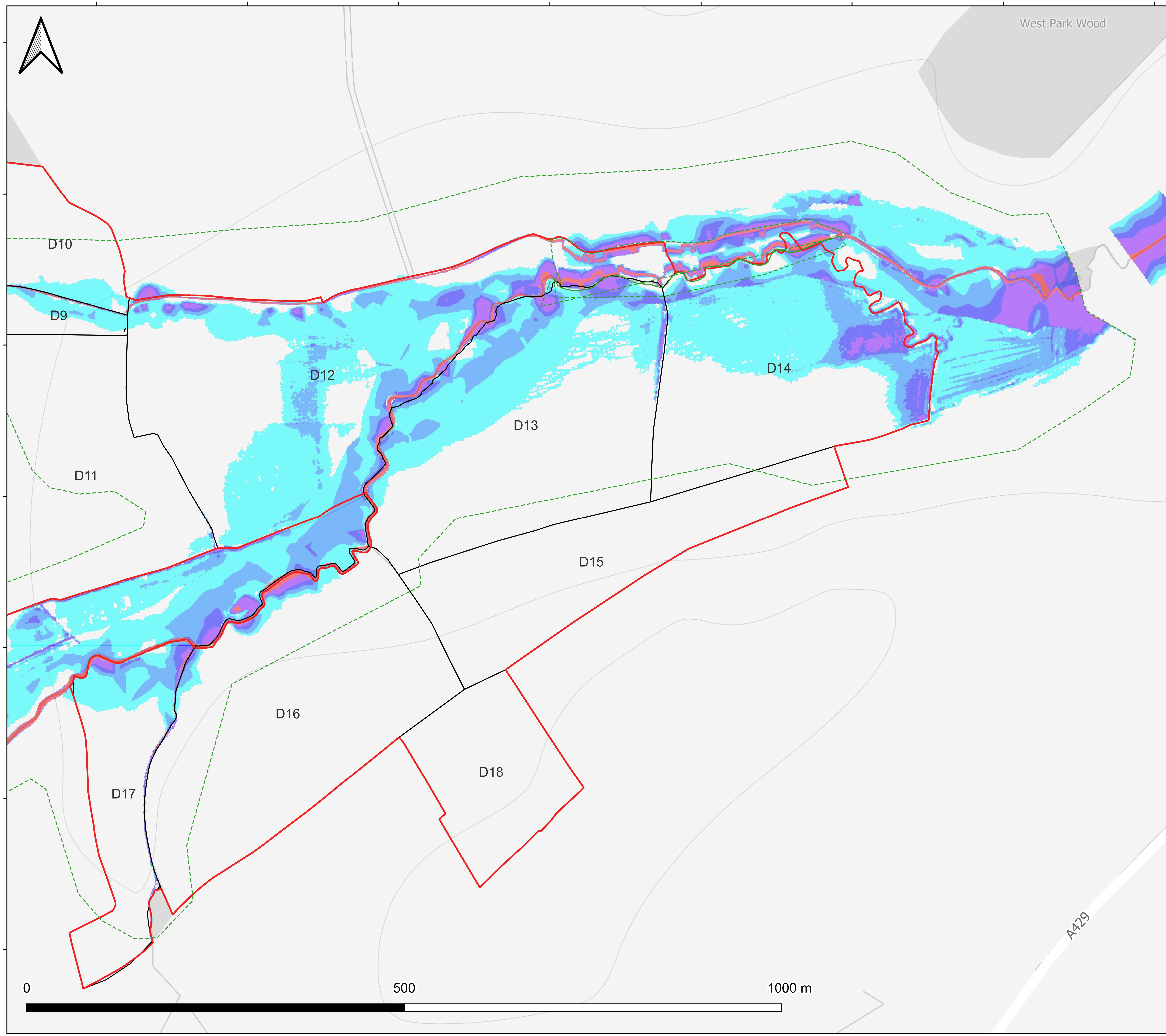
Gauze Bk - source to conf R Avon (Brist) Water Body Classification Summary

Classification Item	2019 Classification		2022 Classification	Cycle 3 Objectives		
	Cycle 2	Cycle 3	Cycle 3	Status	Year	Reasons
Ecological	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Biological Quality Elements	High	High	Good	Good	2015	
Invertebrates	High	High	High	Good	2015	
Macrophytes and Phytobenthos Combined	High	High	Good	Good	2015	
Macrophytes sub element	High	High	Good	Good		
Physio-Chemical Quality Elements	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Acid Neutralising Capacity						
Ammonia (Phys-Chem)	High	High	High	Good	2015	
Dissolved Oxygen	Poor	Poor	Poor	Good	2015	
Phosphate	Poor	Poor	Poor	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Temperature	High	High	High	Good	2015	
pH	High	High	High	Good	2015	
Hydromorphological Supporting Elements	Supports Good	Supports Good	Supports Good	Supports Good	2015	
Hydrological Regime	Does not support good	Does not support good	Supports Good	Does not support good		Disproportionately expensive: Unfavourable balance of costs and benefits
Morphology	Supports Good	Supports Good	Supports Good			
Supporting Elements (surface Water)				N/A	2015	
Specific Pollutants				N/A	2015	
Copper						
Triclosan						
Zinc						
Iron						
Maganese						
Chemical	Fail	Fail	N/A	Good	2063	Natural conditions: Chemical status recovery time
Priority Hazardous Substances	Fail	Fail	N/A	Good	2063	Natural conditions: Chemical status recovery time
Benzo(a)pyrene	Good	Good		Good	2015	
Cadium and Its Compounds						
Dioxins and dioxin-like compounds	Good	Good		Good	2015	
Heptachlor and cis-Heptachlor Epoxide	Good	Good		Good	2015	
Hexabromocyclododecane	Good	Good		Good	2015	
Hexachlorobenzene	Good	Good		Good	2015	
Hexachlorobutadiene	Good	Good		Good	2015	
Mercury and Its Compounds	Fail	Fail		Good	2040	Natural conditions: Chemical status recovery time
Nonylphenol						
Perfluorooctane sulphonate (PFOS)	Good	Good		Good	2015	
Polybrominated diphenyl ethers (PBDE)	Fail	Fail		Good	2063	Natural conditions: Chemical status recovery time
Priority substances	Good	Good	N/A	Good	2015	
Cypermethrin (Priority)	Good	Good	N/A	Good	2015	
Fluoranthene	Good	Good	N/A	Good	2015	
Lead and Its Compunds						
Nickel and Its Compunds						
Other Pollutants	N/A	N/A	N/A	N/A	2015	Did not require assessment

Avon (Brist) conf Tetbury Avon to conf R Marden Water Body Classification Summary

Classification Item	2019 Classification		2022 Classification	Cycle 3 Objectives		
	Cycle 2	Cycle 3	Cycle 3	Status	Year	Reasons
Ecological	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Biological Quality Elements	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Fish	Good	Good	Good	Good	2015	
Invertebrates	Good	Good	Good	Good	2015	
Macrophytes and Phytobenthos Combined	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Macrophytes sub element	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Physio-Chemical Quality Elements	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Acid Neutralising Capacity	High	High	High	Good	2015	
Ammonia (Phys-Chem)	High	High	High	Good	2015	
Dissolved Oxygen	Good	Good	High	Good	2015	
Phosphate	Moderate	Moderate	Moderate	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Temperature	Good	Good	High	Good	2015	
pH	High	High	High	Good	2015	
Hydromorphological Supporting Elements	Supports Good	Supports Good	Supports Good	Supports Good	2015	
Hydrological Regime	Does not support good	Does not support good	Supports Good	Does not support good	2015	Disproportionately expensive: Unfavourable balance of costs and benefits
Morphology	Supports Good	Supports Good	Supports Good			
Supporting Elements (surface Water)				N/A	2015	
Specific Pollutants	High	High	High	High	2015	
Arsenic	High	High	High	High	2015	
Copper	High	High	High	High	2015	
Triclosan	High					
Zinc	High	High	High	High	2015	
Iron	High	High	High	High	2015	
Maganese	High	High	High	High	2015	
Chemical	Fail	Fail	N/A	Good	2063	Natural conditions: Chemical status recovery time
Priority Hazardous Substances	Fail	Fail	N/A	Good	2063	Natural conditions: Chemical status recovery time
Benzo(a)pyrene		Good		Good	2015	
Cadium and Its Compounds	Good	Good		Good	2015	
Dioxins and dioxin-like compounds	Good	Good		Good	2015	
Heptachlor and cis-Heptachlor Epoxide	Good	Good		Good	2015	
Hexabromocyclododecane	Good	Good		Good	2015	
Hexachlorobenzene	Good	Good		Good	2015	
Hexachlorobutadiene	Good	Good		Good	2015	
Mercury and Its Compounds	Fail	Fail		Good	2040	Natural conditions: Chemical status recovery time
Perfluorooctane sulphonate (PFOS)	Good	Good		Good	2015	
Polybrominated diphenyl ethers (PBDE)	Fail	Fail		Good	2063	Natural conditions: Chemical status recovery time
Priority substances	Good	Good	N/A	Good	2015	
Cypermethrin (Priority)	Good	Good		Good	2015	
Fluoranthene	Good	Good		Good	2015	
Lead and Its Compunds	Good	Good		Good	2015	
Nickel and Its Compunds	Good	Good		Good	2015	
Other Pollutants	Good	Good	N/A	Good	2015	

Annex B – Hydraulic Modelling Outputs



Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

Maximum Flood Depth
1% AEP Fluvial Event
Existing Site Layout

Drawing Name:	Revision:	Date:
317212-ENG-DAT-02	1	04 Jul 2025

Drawing Scale (A3):	Drawing Status:	Drawn:	Checked:	Approved:
1:5000	Final	GO	DH	JR

Legend

- Solar PV Site
- Individual Field Boundaries
- 2D Model Extent

Maximum Flood Depth (mm)

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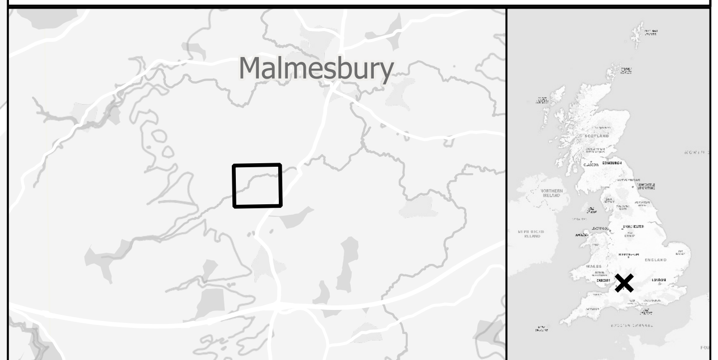
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.6
- > 0.6



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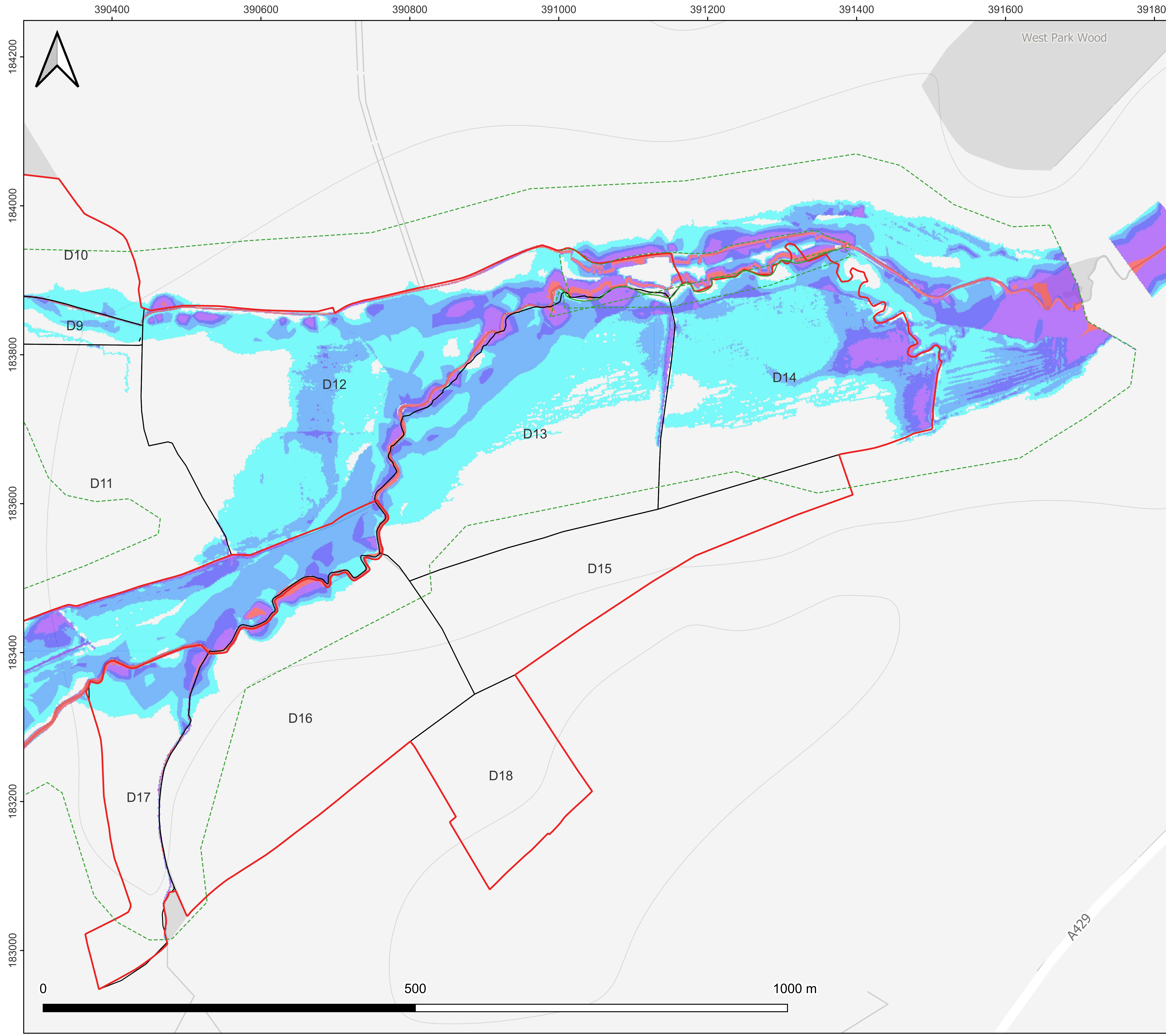

Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

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1:5000	Final	GO	DH	JR

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- Individual Field Boundaries
- 2D Model Extent

Maximum Flood Depth (mm)

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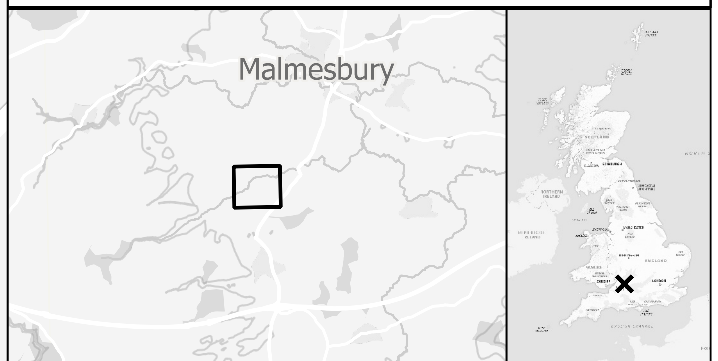

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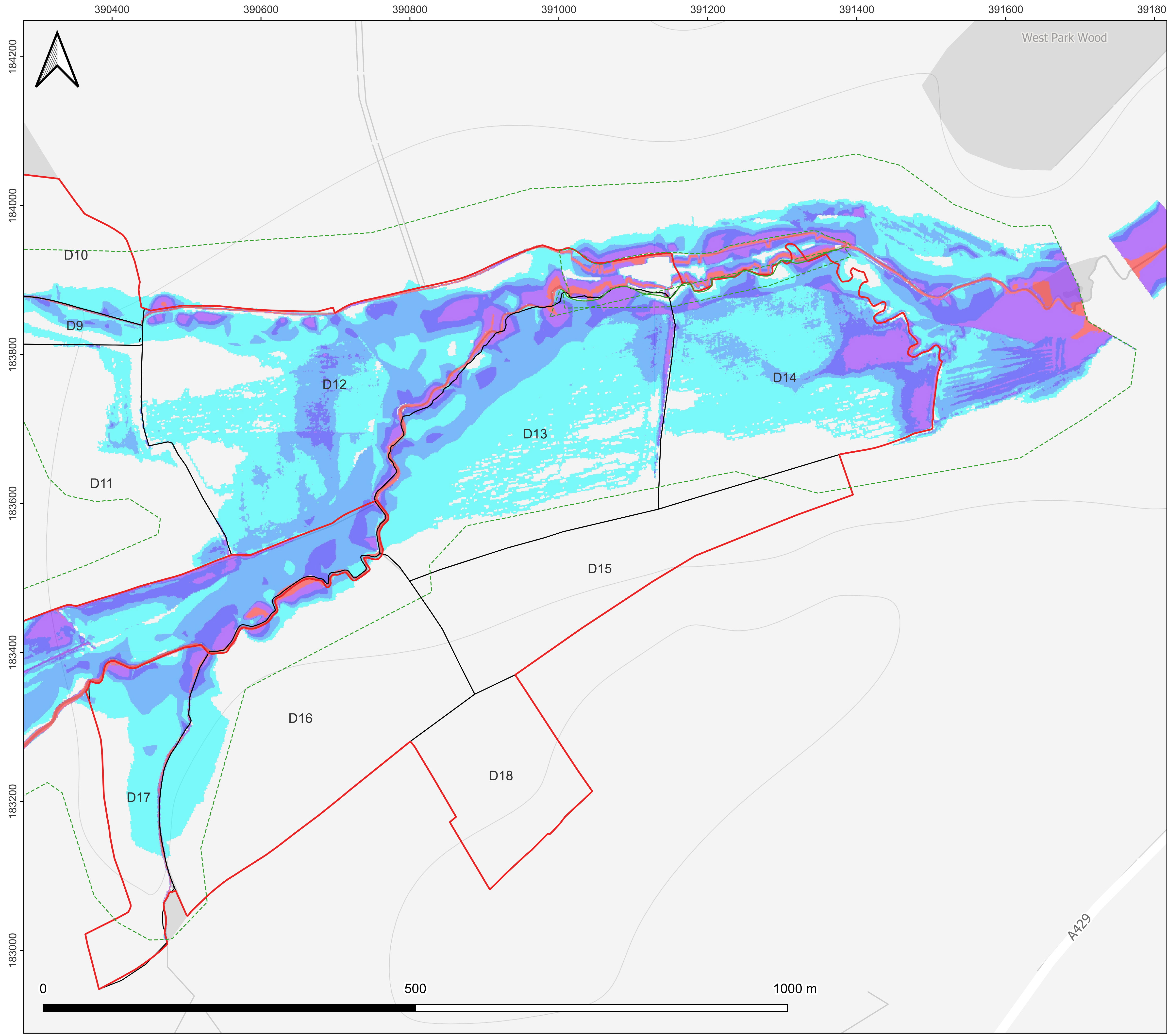

Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

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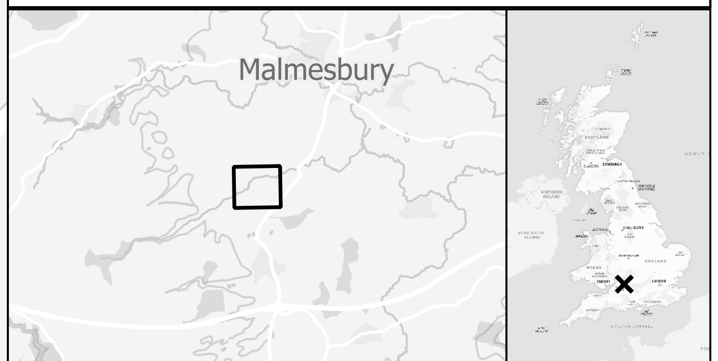

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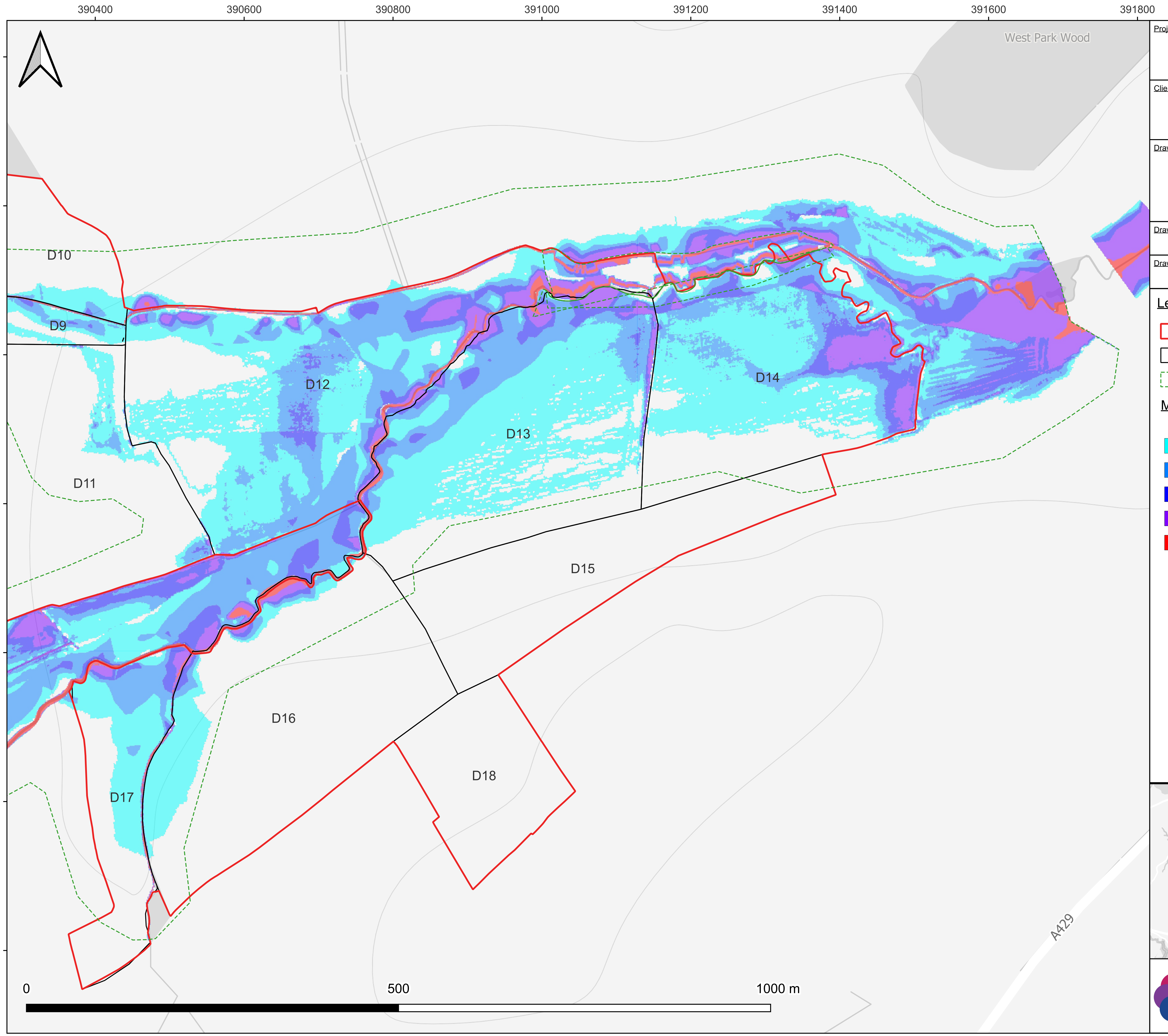

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Client: Island Green Power UK Ltd

Drawing Title: Maximum Flood Depth 0.1% AEP Fluvial Event Existing Site Layout

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1:5000	Final	GO	DH	JR

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- Individual Field Boundaries
- 2D Model Extent

Maximum Flood Depth (mm)

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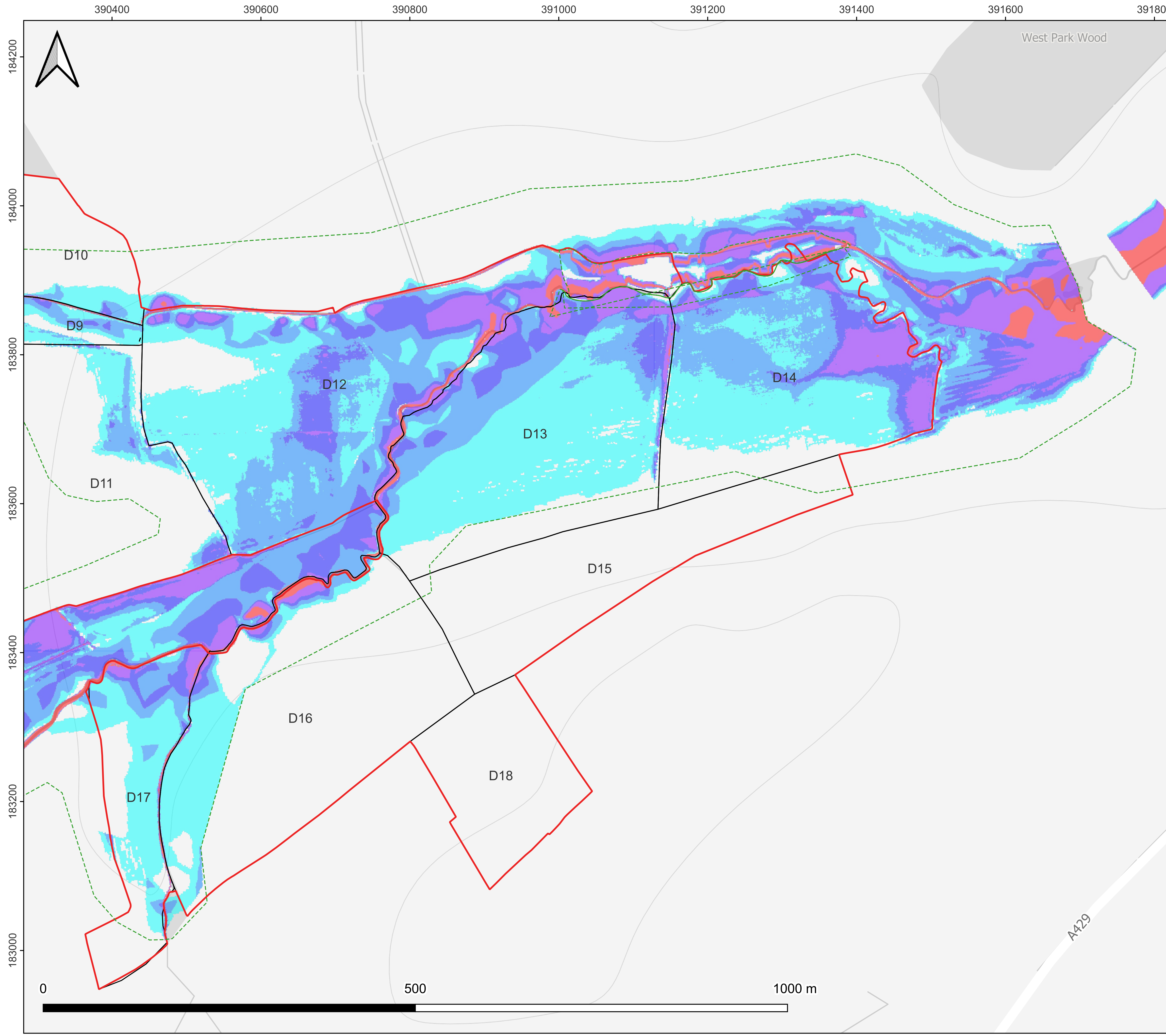
Arthian



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317212 | Lime Down

Client:
Island Green Power UK Ltd

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0.1% AEP + 31% CC Fluvial Event
Existing Site Layout

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- 2D Model Extent

Maximum Flood Depth (mm)

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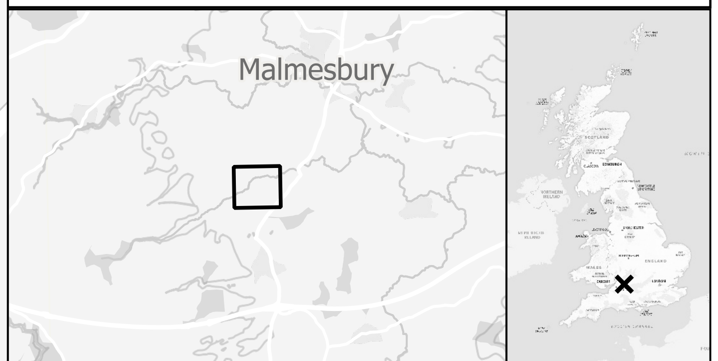

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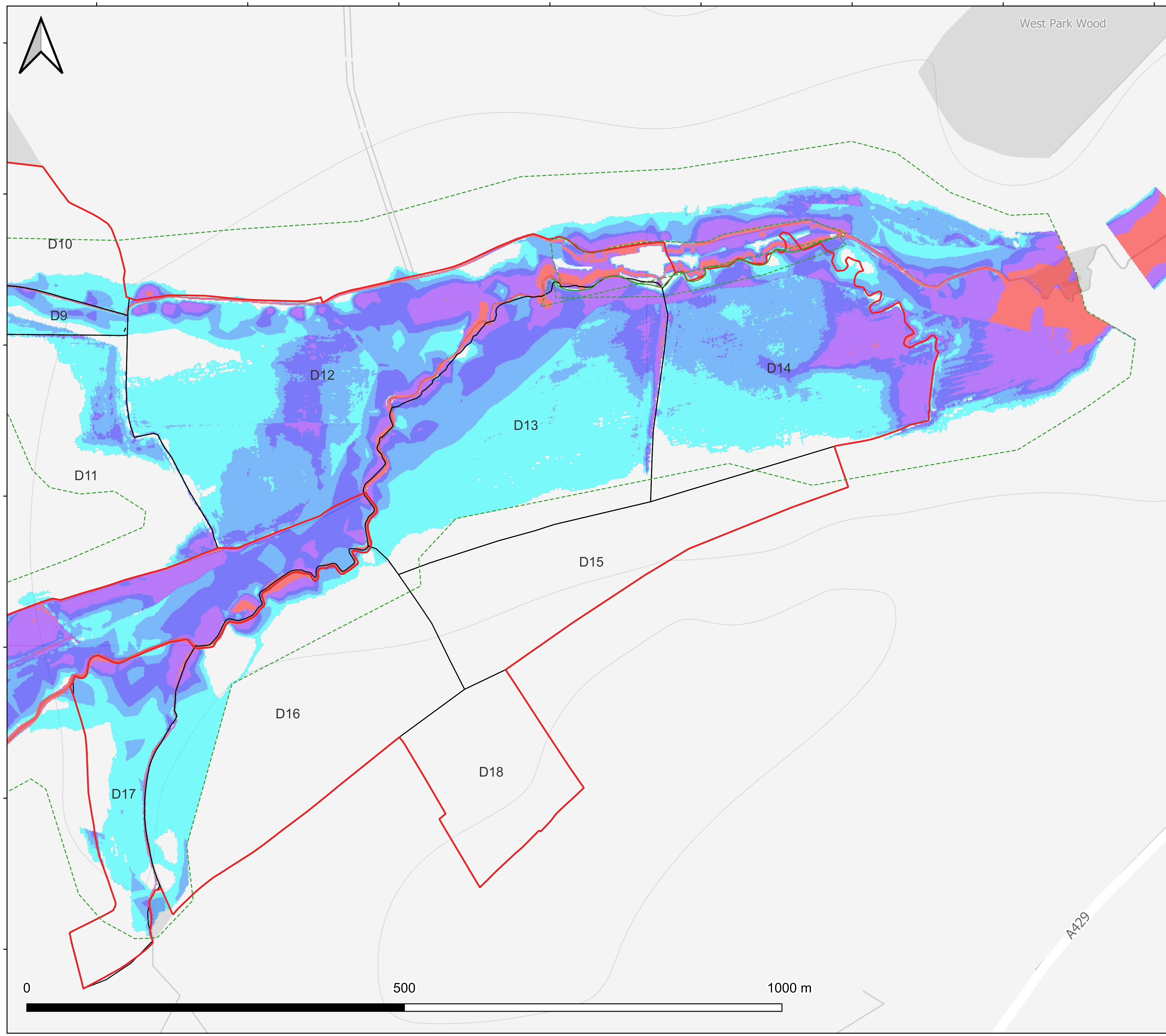

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Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

Maximum Flood Depth
0.1% AEP + 71% CC Fluvial Event
Existing Site Layout

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Legend

- Solar PV Site
- Individual Field Boundaries
- 2D Model Extent

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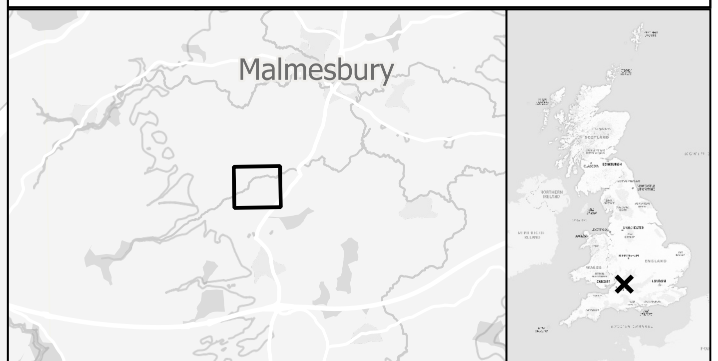

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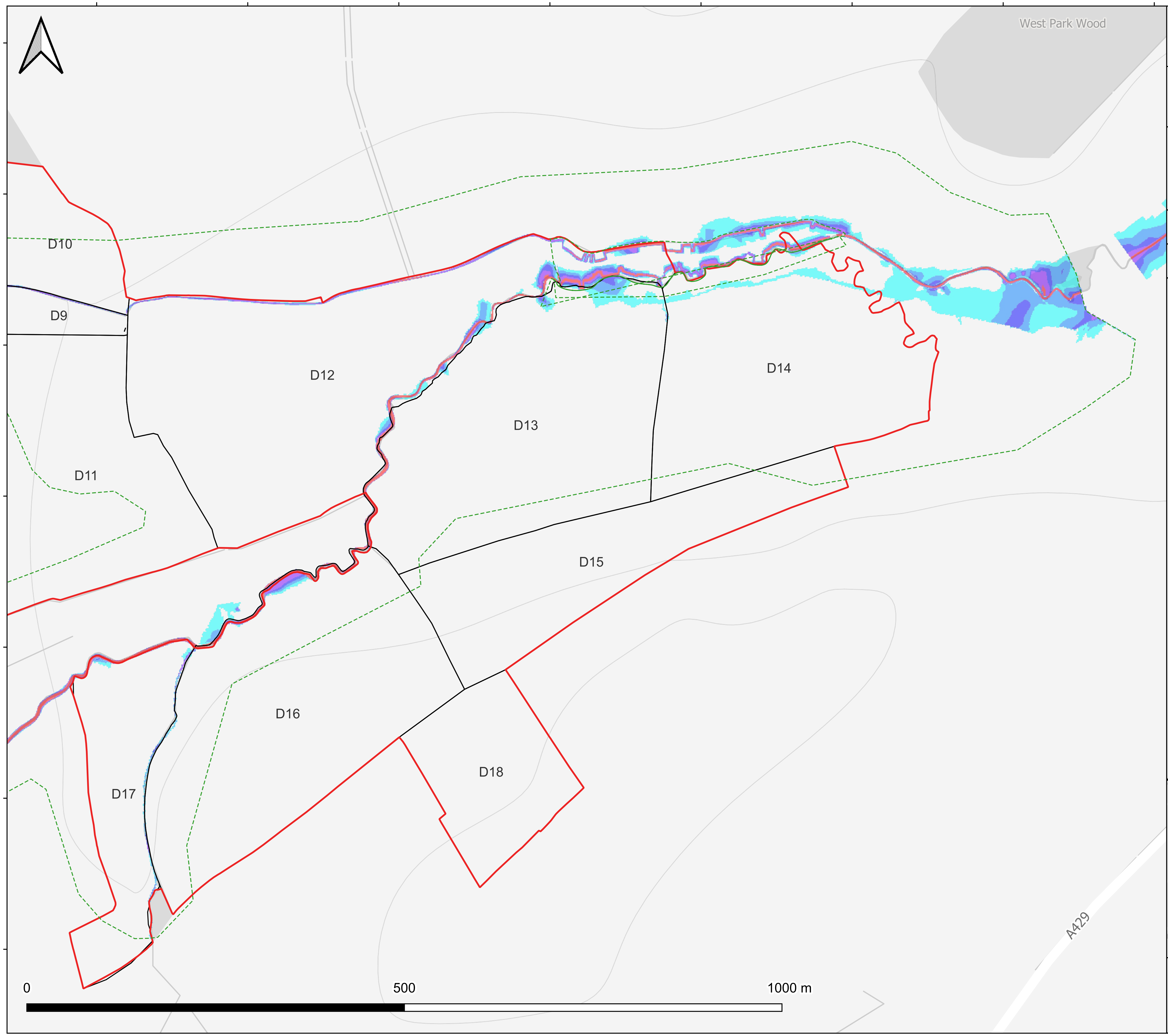

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Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

Maximum Flood Depth
50% AEP Fluvial Event
Existing Site Layout

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317212-ENG-DAT-01	1	04 Jul 2025

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1:5000	Final	GO	DH	JR

Legend

- Solar PV Site
- Individual Field Boundaries
- 2D Model Extent

Maximum Flood Depth (mm)

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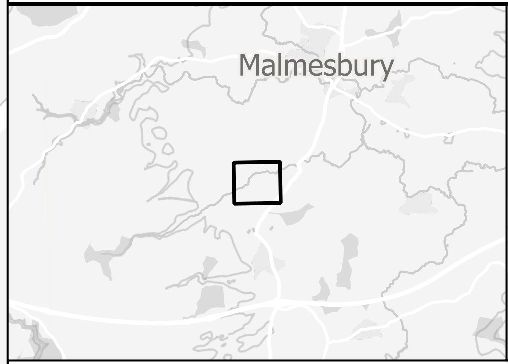

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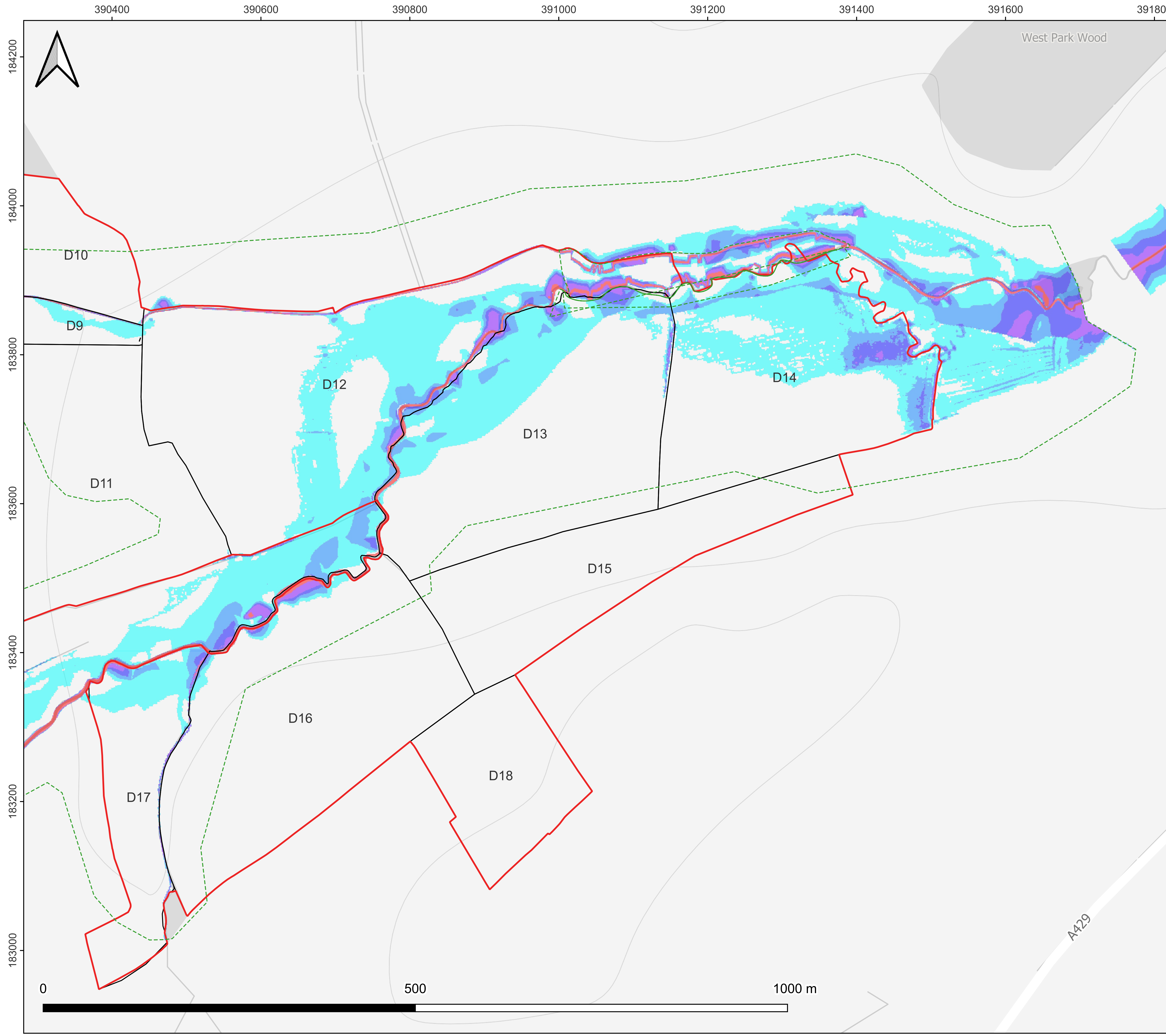

Project Reference:

317212 | Lime Down

Client:

Island Green Power UK Ltd

Drawing Title:

Maximum Flood Depth
5% AEP Fluvial Event
Existing Site Layout

Drawing Name:	Revision:	Date:
317212-ENG-DAT-02	1	04 Jul 2025

Drawing Scale (A3):	Drawing Status:	Drawn:	Checked:	Approved:
1:5000	Final	GO	DH	JR

Legend

- Solar PV Site
- Individual Field Boundaries
- 2D Model Extent

Maximum Flood Depth (mm)

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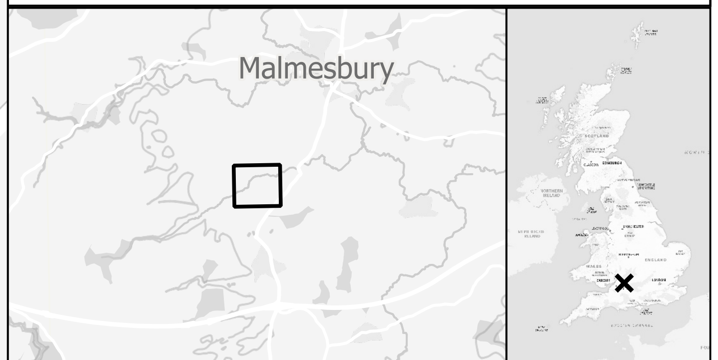


Arthian

Annex C – Manning's Open Channel Flow Mapping

Mabbett See a Difference.

317212 Lime Down Solar D

Manning's Open Channel Flow Calculation

Methodology

Cross-sections through the floodplain were extracted from Environment Agency (EA) LiDAR DTM data (flown March 2020) at the locations shown in Figure 1. These cross-sections can be considered representative of the channel and general floodplain adjacent to the site and at the location of the proposed development. The cross-sections were imported into Flood Modeller and the "tabulate cross section properties" tool was utilised to establish the level-flow relationship for the channel and wider floodplain. This tool utilises the Manning's open channel flow equation. Manning's 'n' roughness was set to 0.03s/m$^{1/3}$ for the channel and 0.04s/m$^{1/3}$ for the floodplain. These values were chosen based on Chow (1959)* and aerial imagery. The channel slope was set for each cross-section based on underlying LiDAR.

In the absence of detailed flood extent data covering the site, the extents of the EA surface water flood map (0.1% AEP event, present day) have been compared to underlying LiDAR data to provide an estimate of water levels. The surface water flood map has been used as a proxy for fluvial flooding given the similarity to the EA Flood Zone 2 extent and the additional detail it affords.

Within this excel workbook, the xlookup function has been used along with the Flood Modeller level-flow relationship for the cross-sections to determine the equivalent flow for each estimated water level, rounding up where a direct match is not found. The appropriate climate change uplifts have then been applied to these flows and a second xlookup used to determine the equivalent level for the increased flow.

Cross-sections have been located at suitable locations throughtout the proposed development. Whilst it is acknowledged that the Manning's open channel flow equation used to determine the level-flow relationship does not constitute detailed hydraulic modelling, the calculation can still be considered suitable to demonstrate the scale of the changes in water level that can be expected when considering a +71% uplift in flows (Avon Bristol and North Somerset Streams Management Catchment, 2080's higher allowance).

Detailed hydraulic modelling of Gauze Brook is being undertaken by Mabbett to provide a site-specific assessment of fluvial flood risk to the site from Gauze Brook and its main tributaries. The anticipated extent of this model is shown in Figure 2.

Chow, V.T. (1959). Open-Channel Hydraulics. New York, NY: McGraw-Hill.

Cross-Section Locations

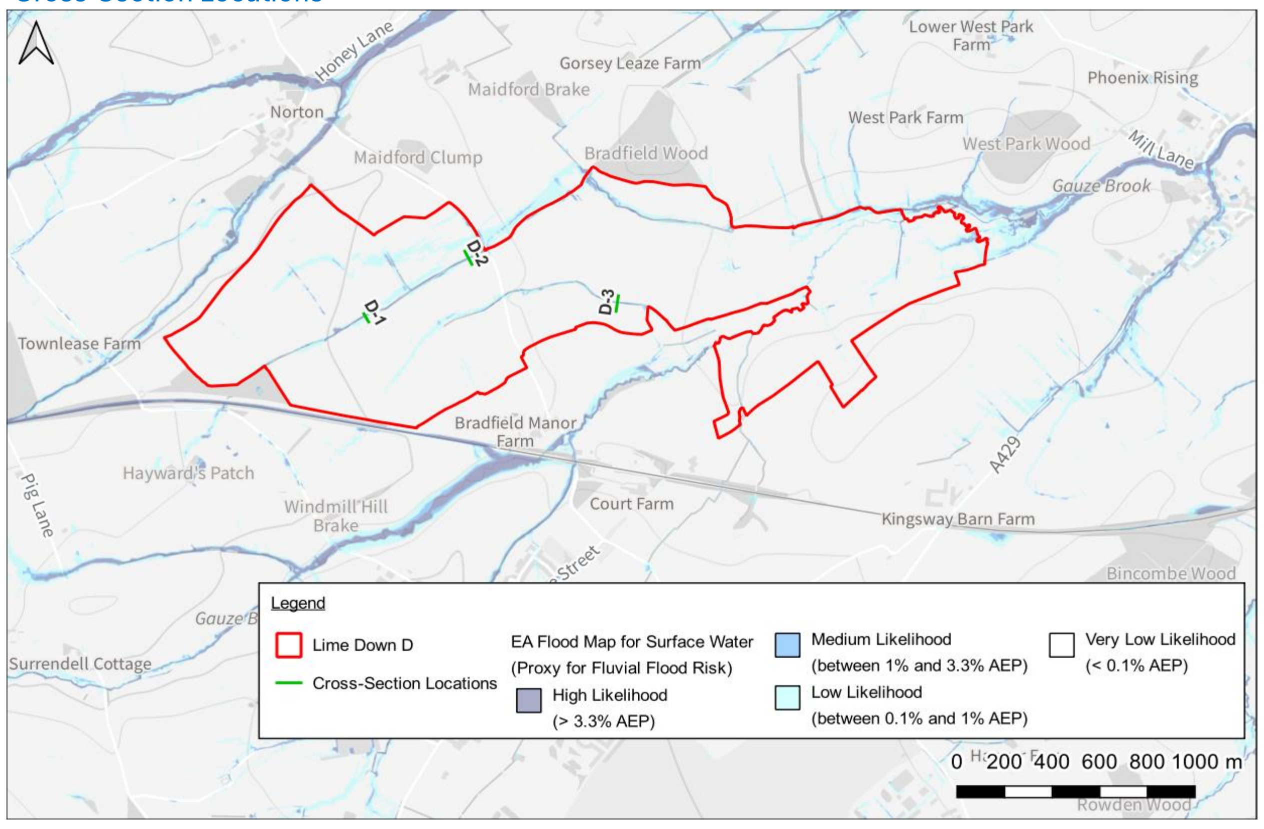


Figure 1: Cross-section locations and EA surface water flood map (data accessed October 2024)

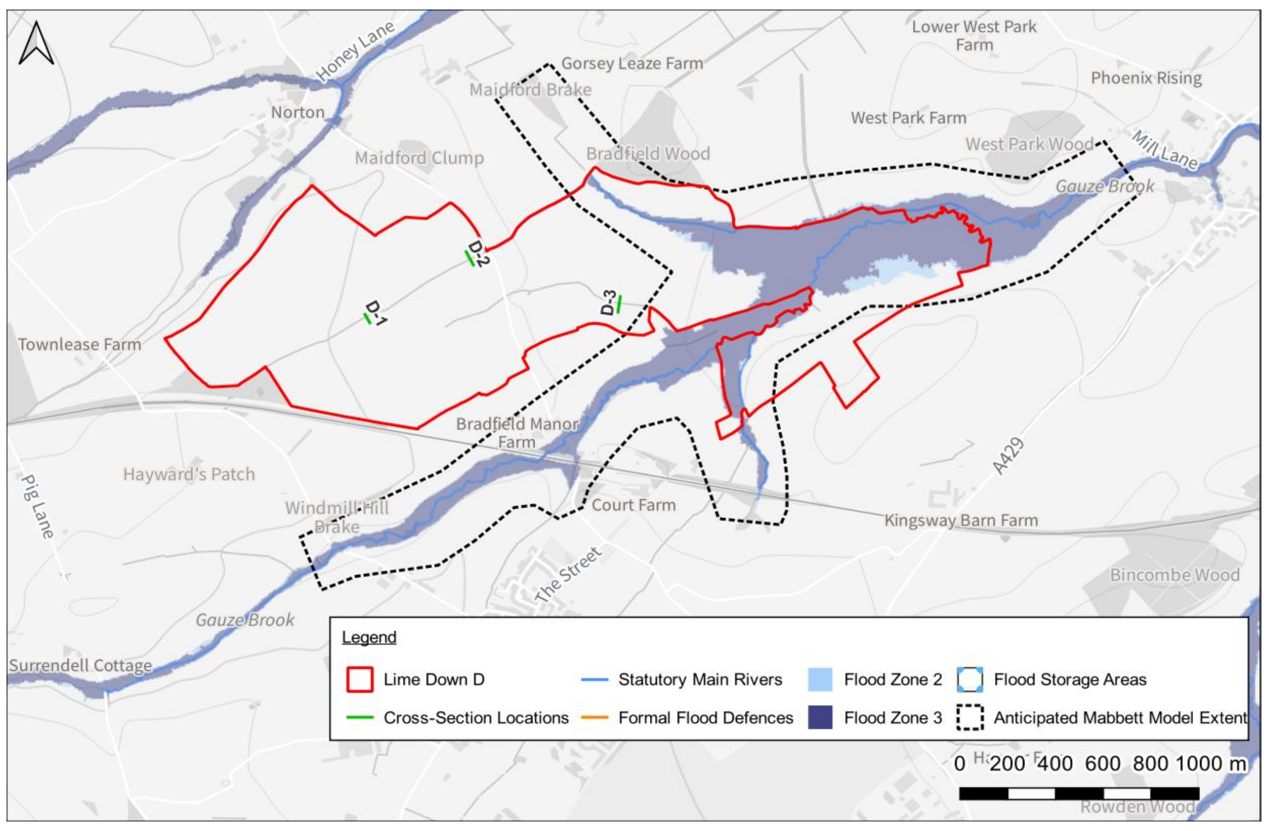


Figure 2: Cross-section locations and EA flood map for planning (data accessed October 2024)

Calculated Flows and Levels

Cross-Section	Level Description	Estimated Flood Level (m AOD)	Estimated Equivalent Flow (m^3/s)	Flow +71% CC Uplift (m^3/s)	Equivalent Flood Level (m AOD)
D-1	0.1% AEP EA FMfSW water level	97.80	1.9	3.2	97.86 (+58mm)
D-2	0.1% AEP EA FMfSW water level	91.70	0.5	0.9	91.75 (+49mm)
D-3	0.1% AEP EA FMfSW water level	83.80	8.3	14.2	83.90 (+103mm)

Tabulated Cross-Section Properties // D-1

(Calculated by Flood Modeller)

Node	Flow (m^3/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m^2)	Conveyance (m^3/s)	Width (m)	W Perim. (m)	Slope
D-1	0.000	97.270	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0076
D-1	0.000	97.286	0.016	0.085	0.306	0.001	0.001	0.152	0.155	0.0076
D-1	0.001	97.301	0.031	0.134	0.344	0.005	0.007	0.303	0.310	0.0076
D-1	0.002	97.317	0.047	0.176	0.368	0.011	0.021	0.455	0.465	0.0076
D-1	0.004	97.332	0.062	0.213	0.386	0.019	0.046	0.607	0.620	0.0076
D-1	0.007	97.348	0.078	0.248	0.400	0.030	0.084	0.759	0.775	0.0076
D-1	0.012	97.364	0.094	0.280	0.413	0.043	0.136	0.911	0.930	0.0076
D-1	0.018	97.379	0.109	0.310	0.423	0.058	0.206	1.062	1.085	0.0076
D-1	0.026	97.395	0.125	0.339	0.433	0.076	0.294	1.214	1.240	0.0076
D-1	0.035	97.410	0.140	0.366	0.442	0.096	0.402	1.366	1.394	0.0076
D-1	0.047	97.426	0.156	0.393	0.449	0.118	0.533	1.518	1.549	0.0076
D-1	0.060	97.442	0.172	0.419	0.457	0.143	0.687	1.669	1.704	0.0076
D-1	0.076	97.457	0.187	0.444	0.463	0.170	0.866	1.821	1.859	0.0076
D-1	0.094	97.473	0.203	0.468	0.469	0.200	1.073	1.973	2.014	0.0076
D-1	0.114	97.488	0.218	0.492	0.475	0.232	1.307	2.125	2.169	0.0076
D-1	0.137	97.504	0.234	0.515	0.481	0.266	1.571	2.276	2.324	0.0076
D-1	0.160	97.517	0.247	0.539	0.486	0.297	1.829	2.369	2.420	0.0076
D-1	0.189	97.532	0.262	0.566	0.492	0.334	2.163	2.474	2.531	0.0076
D-1	0.221	97.548	0.278	0.592	0.497	0.373	2.526	2.580	2.641	0.0076
D-1	0.255	97.563	0.293	0.617	0.502	0.413	2.920	2.685	2.751	0.0076
D-1	0.292	97.579	0.309	0.641	0.507	0.455	3.344	2.791	2.862	0.0076
D-1	0.332	97.594	0.324	0.665	0.511	0.499	3.800	2.896	2.972	0.0076
D-1	0.374	97.609	0.339	0.687	0.515	0.545	4.288	3.002	3.082	0.0076
D-1	0.420	97.625	0.355	0.710	0.519	0.592	4.809	3.107	3.193	0.0076
D-1	0.468	97.640	0.370	0.731	0.523	0.640	5.363	3.213	3.303	0.0076
D-1	0.520	97.656	0.386	0.752	0.527	0.691	5.951	3.318	3.413	0.0076
D-1	0.574	97.671	0.401	0.773	0.530	0.743	6.575	3.424	3.523	0.0076
D-1	0.604	97.679	0.409	0.779	0.620	0.776	6.917	4.824	4.927	0.0076
D-1	0.616	97.682	0.412	0.778	0.688	0.792	7.051	6.080	6.183	0.0076
D-1	0.684	97.697	0.427	0.767	0.692	0.891	7.829	7.098	7.207	0.0076
D-1	0.764	97.712	0.442	0.760	0.690	1.005	8.751	8.116	8.230	0.0076
D-1	0.764	97.712	0.442	0.760	0.690	1.005	8.751	8.116	8.230	0.0076
D-1	0.784	97.716	0.446	0.753	0.752	1.042	8.981	10.203	10.319	0.0076
D-1	0.822	97.722	0.452	0.742	0.788	1.109	9.418	12.280	12.397	0.0076
D-1	0.836	97.724	0.454	0.737	0.792	1.134	9.575	12.840	12.958	0.0076
D-1	0.850	97.726	0.456	0.733	0.796	1.160	9.736	13.439	13.558	0.0076
D-1	0.920	97.735	0.465	0.716	0.763	1.285	10.539	14.333	14.455	0.0076

Node	Flow (m³/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m²)	Conveyance (m³/s)	Width (m)	W Perim. (m)	Slope
D-1	1.005	97.744	0.474	0.708	0.741	1.418	11.506	15.228	15.352	0.0076
D-1	1.015	97.745	0.475	0.708	0.740	1.434	11.620	15.383	15.509	0.0076
D-1	1.087	97.752	0.482	0.703	0.736	1.546	12.444	16.631	16.759	0.0076
D-1	1.189	97.761	0.491	0.698	0.730	1.703	13.613	18.266	18.397	0.0076
D-1	1.307	97.770	0.500	0.698	0.719	1.873	14.966	19.498	19.633	0.0076
D-1	1.392	97.776	0.506	0.699	0.715	1.993	15.945	20.488	20.625	0.0076
D-1	1.422	97.778	0.508	0.699	0.714	2.034	16.284	20.823	20.961	0.0076
D-1	1.577	97.787	0.517	0.708	0.709	2.226	18.062	21.884	22.025	0.0076
D-1	1.746	97.796	0.526	0.717	0.728	2.436	19.995	24.667	24.811	0.0076
D-1	1.868	97.802	0.532	0.722	0.729	2.587	21.388	25.920	26.066	0.0076
D-1	1.924	97.806	0.536	0.715	0.717	2.692	22.039	26.559	26.707	0.0076
D-1	2.184	97.818	0.549	0.721	0.691	3.029	25.011	27.303	27.454	0.0076
D-1	2.513	97.831	0.561	0.745	0.685	3.375	28.783	28.047	28.202	0.0076
D-1	2.653	97.836	0.566	0.755	0.684	3.516	30.385	28.301	28.458	0.0076
D-1	2.884	97.845	0.575	0.764	0.683	3.777	33.027	29.663	29.823	0.0076
D-1	3.307	97.858	0.588	0.792	0.681	4.177	37.876	30.341	30.505	0.0076
D-1	3.764	97.872	0.602	0.821	0.682	4.586	43.102	31.019	31.187	0.0076
D-1	4.253	97.885	0.615	0.850	0.683	5.004	48.705	31.697	31.870	0.0076
D-1	4.710	97.898	0.628	0.868	0.685	5.425	53.940	33.147	33.324	0.0076
D-1	4.909	97.904	0.634	0.872	0.686	5.627	56.213	34.153	34.332	0.0076
D-1	4.976	97.906	0.636	0.874	0.686	5.696	56.989	34.496	34.676	0.0076
D-1	5.530	97.918	0.648	0.905	0.689	6.112	63.326	34.802	34.985	0.0076
D-1	6.112	97.930	0.660	0.936	0.693	6.531	69.998	35.108	35.294	0.0076
D-1	6.724	97.942	0.672	0.967	0.697	6.954	76.998	35.413	35.603	0.0076
D-1	7.543	97.958	0.688	1.004	0.704	7.510	86.380	36.230	36.423	0.0076
D-1	8.413	97.973	0.703	1.042	0.712	8.077	96.344	37.045	37.243	0.0076
D-1	9.129	97.985	0.715	1.071	0.717	8.524	104.544	37.455	37.656	0.0076
D-1	9.874	97.997	0.727	1.100	0.721	8.976	113.073	37.864	38.068	0.0076
D-1	10.687	98.009	0.739	1.132	0.726	9.445	122.385	38.100	38.305	0.0076
D-1	11.530	98.022	0.752	1.163	0.730	9.916	132.043	38.337	38.542	0.0076
D-1	12.402	98.034	0.764	1.194	0.734	10.390	142.031	38.573	38.778	0.0076
D-1	13.409	98.048	0.778	1.226	0.741	10.934	153.562	39.158	39.363	0.0076
D-1	14.456	98.062	0.792	1.259	0.747	11.487	165.548	39.742	39.947	0.0076
D-1	15.365	98.074	0.804	1.285	0.752	11.952	175.956	40.132	40.337	0.0076
D-1	16.301	98.085	0.815	1.312	0.757	12.423	186.678	40.521	40.727	0.0076
D-1	17.263	98.097	0.827	1.338	0.761	12.898	197.700	40.911	41.117	0.0076

Tabulated Cross-Section Properties // D-2

(Calculated by Flood Modeller)

Node	Flow (m³/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m²)	Conveyance (m³/s)	Width (m)	W Perim. (m)	Slope
D-2	0.000	91.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0162
D-2	0.000	91.415	0.011	0.100	0.425	0.001	0.001	0.215	0.217	0.0162
D-2	0.001	91.427	0.023	0.159	0.477	0.005	0.006	0.429	0.435	0.0162
D-2	0.002	91.438	0.034	0.209	0.511	0.011	0.018	0.644	0.652	0.0162
D-2	0.005	91.449	0.045	0.253	0.536	0.019	0.039	0.859	0.870	0.0162
D-2	0.009	91.461	0.057	0.293	0.556	0.030	0.070	1.073	1.087	0.0162
D-2	0.014	91.472	0.068	0.331	0.573	0.044	0.114	1.288	1.305	0.0162
D-2	0.023	91.484	0.080	0.392	0.597	0.060	0.184	1.359	1.380	0.0162
D-2	0.034	91.496	0.092	0.446	0.616	0.076	0.268	1.429	1.455	0.0162
D-2	0.047	91.508	0.104	0.495	0.632	0.094	0.366	1.500	1.530	0.0162
D-2	0.061	91.520	0.116	0.541	0.645	0.112	0.477	1.571	1.604	0.0162
D-2	0.077	91.532	0.128	0.583	0.657	0.132	0.603	1.641	1.679	0.0162
D-2	0.094	91.544	0.140	0.622	0.667	0.152	0.742	1.712	1.754	0.0162
D-2	0.114	91.556	0.152	0.660	0.677	0.173	0.896	1.783	1.829	0.0162
D-2	0.135	91.568	0.164	0.696	0.685	0.195	1.063	1.853	1.904	0.0162
D-2	0.158	91.580	0.176	0.730	0.693	0.217	1.245	1.924	1.979	0.0162
D-2	0.183	91.592	0.188	0.762	0.700	0.241	1.441	1.995	2.054	0.0162
D-2	0.210	91.604	0.200	0.794	0.707	0.265	1.653	2.065	2.129	0.0162
D-2	0.239	91.616	0.212	0.824	0.714	0.290	1.879	2.136	2.203	0.0162
D-2	0.270	91.628	0.224	0.853	0.719	0.316	2.121	2.207	2.278	0.0162
D-2	0.303	91.640	0.236	0.882	0.725	0.343	2.378	2.277	2.353	0.0162
D-2	0.337	91.652	0.248	0.909	0.730	0.371	2.651	2.348	2.428	0.0162
D-2	0.374	91.664	0.260	0.936	0.736	0.400	2.940	2.419	2.503	0.0162
D-2	0.413	91.676	0.272	0.963	0.740	0.429	3.246	2.489	2.578	0.0162
D-2	0.454	91.688	0.284	0.989	0.745	0.459	3.568	2.560	2.653	0.0162
D-2	0.497	91.700	0.296	1.014	0.750	0.490	3.907	2.631	2.728	0.0162
D-2	0.501	91.701	0.297	1.015	0.900	0.494	3.936	3.814	3.912	0.0162
D-2	0.517	91.705	0.301	1.011	0.985	0.511	4.059	4.751	4.849	0.0162
D-2	0.525	91.707	0.303	1.007	1.060	0.521	4.124	5.671	5.771	0.0162
D-2	0.543	91.711	0.307	0.993	1.145	0.547	4.265	7.134	7.235	0.0162
D-2	0.558	91.714	0.310	0.979	1.177	0.570	4.381	8.087	8.190	0.0162
D-2	0.568	91.716	0.312	0.968	1.223	0.587	4.465	9.191	9.294	0.0162
D-2	0.586	91.719	0.315	0.948	1.291	0.618	4.600	11.241	11.345	0.0162
D-2	0.592	91.720	0.316	0.940	1.294	0.629	4.648	11.686	11.791	0.0162
D-2	0.669	91.730	0.326	0.877	1.244	0.763	5.256	15.063	15.171	0.0162
D-2	0.705	91.734	0.330	0.854	1.199	0.825	5.538	15.935	16.045	0.0162
D-2	0.725	91.736	0.332	0.846	1.190	0.857	5.696	16.664	16.775	0.0162
D-2	0.746	91.738	0.334	0.837	1.180	0.891	5.864	17.373	17.485	0.0162
D-2	0.746	91.738	0.334	0.837	1.180	0.891	5.864	17.373	17.485	0.0162
D-2	0.758	91.739	0.335	0.833	1.214	0.910	5.952	18.945	19.057	0.0162
D-2	0.780	91.741	0.337	0.823	1.187	0.948	6.130	19.353	19.466	0.0162
D-2	0.889	91.749	0.345	0.800	1.118	1.110	6.984	21.257	21.374	0.0162
D-2	0.889	91.749	0.345	0.800	1.148	1.110	6.984	22.397	22.514	0.0162
D-2	0.966	91.754	0.350	0.789	1.098	1.225	7.588	23.287	23.406	0.0162
D-2	1.000	91.756	0.352	0.786	1.086	1.272	7.856	23.784	23.903	0.0162
D-2	1.171	91.765	0.361	0.783	1.040	1.495	9.198	25.907	26.030	0.0162
D-2	1.369	91.774	0.370	0.787	1.010	1.738	10.753	28.030	28.157	0.0162
D-2	1.392	91.775	0.371	0.788	1.007	1.766	10.939	28.262	28.390	0.0162
D-2	1.487	91.779	0.375	0.791	0.988	1.880	11.685	28.799	28.929	0.0162
D-2	1.570	91.782	0.378	0.798	0.980	1.967	12.337	29.111	29.242	0.0162
D-2	1.681	91.786	0.382	0.806	0.972	2.085	13.207	29.710	29.841	0.0162
D-2	1.710	91.787	0.383	0.808	0.990	2.115	13.431	31.113	31.245	0.0162
D-2	1.889	91.793	0.389	0.818	0.993	2.308	14.842	33.315	33.448	0.0162
D-2	1.986	91.796	0.392	0.824	0.993	2.410	15.603	34.312	34.446	0.0162
D-2	2.053	91.798	0.394	0.828	0.996	2.479	16.127	35.204	35.339	0.0162
D-2	2.068	91.801	0.397	0.800	0.953	2.586	16.250	36.020	36.155	0.0162
D-2	2.160	91.804	0.400	0.801	0.951	2.696	16.967	37.290	37.427	0.0162
D-2	2.599	91.814	0.410	0.841	0.941	3.092	20.420	38.019	38.159	0.0162
D-2	3.083	91.825	0.421	0.882	0.938	3.495	24.225	38.749	38.891	0.0162
D-2	3.641	91.836	0.432	0.928	0.939	3.925	28.604	39.425	39.571	0.0162
D-2	3.747	91.838	0.434	0.936	0.945	4.004	29.440	40.086	40.233	0.0162

Node	Flow (m^3/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m^2)	Conveyance (m^3/s)	Width (m)	W Perim. (m)	Slope
D-2	3.785	91.839	0.435	0.936	0.949	4.044	29.741	40.770	40.917	0.0162
D-2	3.865	91.841	0.437	0.936	0.960	4.128	30.368	42.544	42.691	0.0162
D-2	4.029	91.844	0.440	0.946	0.974	4.258	31.656	44.247	44.395	0.0162
D-2	4.085	91.845	0.441	0.949	0.978	4.303	32.093	44.815	44.964	0.0162
D-2	4.197	91.847	0.443	0.955	0.992	4.394	32.978	46.457	46.607	0.0162
D-2	4.255	91.848	0.444	0.958	0.997	4.441	33.427	47.207	47.357	0.0162
D-2	4.303	91.852	0.448	0.929	0.961	4.632	33.810	48.584	48.735	0.0162
D-2	4.756	91.859	0.455	0.955	0.967	4.977	37.363	49.997	50.150	0.0162
D-2	4.854	91.862	0.458	0.947	0.946	5.128	38.134	50.241	50.396	0.0162
D-2	4.923	91.863	0.459	0.951	0.948	5.178	38.680	50.518	50.672	0.0162
D-2	4.923	91.863	0.459	0.951	0.948	5.178	38.680	50.518	50.672	0.0162
D-2	5.345	91.869	0.465	0.973	0.973	5.491	41.997	53.774	53.930	0.0162
D-2	5.788	91.875	0.471	0.995	0.976	5.817	45.477	54.911	55.069	0.0162
D-2	6.587	91.885	0.481	1.033	0.982	6.374	51.749	56.529	56.690	0.0162
D-2	6.835	91.888	0.484	1.044	0.992	6.546	53.698	57.998	58.160	0.0162
D-2	7.004	91.890	0.486	1.051	0.997	6.663	55.027	58.788	58.951	0.0162
D-2	7.175	91.892	0.488	1.058	1.004	6.781	56.376	59.903	60.066	0.0162
D-2	7.409	91.897	0.493	1.046	0.979	7.084	58.208	60.932	61.097	0.0162
D-2	8.389	91.907	0.503	1.088	0.977	7.714	65.913	61.038	61.206	0.0162
D-2	9.482	91.918	0.514	1.136	0.982	8.345	74.495	61.144	61.315	0.0162
D-2	10.633	91.928	0.524	1.184	0.988	8.977	83.541	61.250	61.423	0.0162
D-2	11.717	91.938	0.534	1.226	0.992	9.560	92.058	61.426	61.601	0.0162
D-2	12.851	91.947	0.543	1.267	0.997	10.145	100.970	61.602	61.778	0.0162
D-2	14.033	91.957	0.553	1.308	1.002	10.731	110.255	61.778	61.955	0.0162
D-2	15.262	91.966	0.562	1.348	1.007	11.318	119.911	61.954	62.132	0.0162
D-2	16.847	91.978	0.574	1.398	1.014	12.053	132.361	62.268	62.447	0.0162
D-2	18.502	91.990	0.586	1.446	1.021	12.792	145.365	62.582	62.762	0.0162
D-2	20.226	92.002	0.598	1.494	1.029	13.534	158.914	62.896	63.076	0.0162
D-2	22.019	92.013	0.609	1.542	1.036	14.281	172.999	63.209	63.391	0.0162
D-2	23.879	92.025	0.621	1.589	1.043	15.030	187.613	63.523	63.706	0.0162
D-2	25.806	92.037	0.633	1.635	1.050	15.784	202.750	63.837	64.020	0.0162

Tabulated Cross-Section Properties // D-3

(Calculated by Flood Modeller)

Node	Flow (m^3/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m^2)	Conveyance (m^3/s)	Width (m)	W Perim. (m)	Slope
D-3	0.000	82.743	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0155
D-3	0.001	82.777	0.034	0.201	0.491	0.005	0.007	0.272	0.283	0.0155
D-3	0.006	82.811	0.068	0.318	0.551	0.019	0.047	0.544	0.566	0.0155
D-3	0.017	82.845	0.102	0.417	0.590	0.042	0.139	0.816	0.849	0.0155
D-3	0.037	82.879	0.136	0.505	0.619	0.074	0.300	1.088	1.132	0.0155
D-3	0.068	82.913	0.170	0.586	0.642	0.116	0.544	1.360	1.415	0.0155
D-3	0.120	82.951	0.208	0.707	0.669	0.169	0.963	1.489	1.564	0.0155
D-3	0.185	82.989	0.246	0.811	0.690	0.228	1.487	1.618	1.714	0.0155
D-3	0.264	83.026	0.283	0.904	0.706	0.292	2.118	1.747	1.864	0.0155
D-3	0.356	83.064	0.321	0.988	0.720	0.360	2.858	1.876	2.014	0.0155
D-3	0.462	83.102	0.359	1.066	0.732	0.434	3.710	2.005	2.164	0.0155
D-3	0.582	83.140	0.397	1.138	0.742	0.512	4.678	2.134	2.314	0.0155
D-3	0.718	83.177	0.434	1.207	0.752	0.595	5.764	2.263	2.464	0.0155
D-3	0.868	83.215	0.472	1.272	0.760	0.683	6.973	2.392	2.614	0.0155
D-3	1.035	83.253	0.510	1.334	0.768	0.776	8.309	2.521	2.764	0.0155
D-3	1.203	83.288	0.545	1.391	0.775	0.865	9.662	2.631	2.894	0.0155
D-3	1.385	83.322	0.579	1.446	0.781	0.958	11.125	2.741	3.024	0.0155
D-3	1.581	83.357	0.614	1.499	0.787	1.055	12.700	2.851	3.154	0.0155
D-3	1.792	83.391	0.648	1.551	0.793	1.155	14.390	2.961	3.284	0.0155
D-3	2.017	83.426	0.683	1.601	0.798	1.260	16.198	3.071	3.414	0.0155
D-3	2.257	83.461	0.718	1.650	0.803	1.368	18.126	3.181	3.544	0.0155
D-3	2.512	83.495	0.752	1.697	0.808	1.480	20.177	3.291	3.674	0.0155
D-3	2.783	83.530	0.787	1.744	0.813	1.596	22.353	3.401	3.804	0.0155
D-3	2.882	83.542	0.799	1.750	0.981	1.647	23.148	5.071	5.482	0.0155
D-3	2.943	83.549	0.806	1.745	1.091	1.687	23.638	6.470	6.885	0.0155
D-3	2.952	83.550	0.807	1.743	1.093	1.693	23.711	6.534	6.950	0.0155
D-3	3.319	83.585	0.842	1.704	1.103	1.948	26.658	8.017	8.455	0.0155
D-3	3.383	83.591	0.848	1.692	1.153	1.999	27.172	9.116	9.558	0.0155
D-3	3.721	83.616	0.873	1.658	1.143	2.244	29.887	10.465	10.924	0.0155
D-3	4.023	83.635	0.892	1.643	1.118	2.449	32.317	11.138	11.608	0.0155
D-3	4.270	83.651	0.908	1.622	1.095	2.633	34.295	11.768	12.246	0.0155
D-3	4.456	83.662	0.919	1.612	1.079	2.764	35.792	12.154	12.637	0.0155
D-3	4.723	83.678	0.935	1.591	1.078	2.969	37.934	13.379	13.869	0.0155
D-3	5.068	83.696	0.953	1.574	1.071	3.221	40.706	14.631	15.129	0.0155
D-3	5.562	83.718	0.975	1.564	1.055	3.556	44.673	15.889	16.397	0.0155
D-3	5.586	83.719	0.976	1.563	1.089	3.573	44.866	17.007	17.515	0.0155
D-3	6.054	83.739	0.996	1.543	1.057	3.923	48.631	18.048	18.566	0.0155
D-3	6.198	83.744	1.001	1.543	1.065	4.015	49.781	18.757	19.277	0.0155
D-3	6.609	83.757	1.014	1.548	1.079	4.270	53.083	20.338	20.865	0.0155
D-3	6.642	83.758	1.015	1.548	1.079	4.290	53.347	20.440	20.967	0.0155
D-3	7.051	83.770	1.027	1.550	1.112	4.550	56.637	22.983	23.516	0.0155
D-3	7.121	83.772	1.029	1.549	1.138	4.598	57.195	24.364	24.898	0.0155
D-3	7.612	83.785	1.042	1.546	1.129	4.924	61.140	25.746	26.286	0.0155
D-3	7.612	83.785	1.042	1.546	1.129	4.924	61.140	25.746	26.286	0.0155
D-3	8.101	83.797	1.054	1.546	1.124	5.241	65.067	27.182	27.729	0.0155
D-3	8.309	83.802	1.059	1.545	1.122	5.379	66.740	27.831	28.380	0.0155
D-3	8.606	83.809	1.066	1.543	1.130	5.579	69.126	29.338	29.891	0.0155
D-3	8.687	83.811	1.068	1.541	1.144	5.638	69.774	30.497	31.051	0.0155
D-3	9.206	83.822	1.079	1.540	1.127	5.979	73.944	31.433	31.992	0.0155
D-3	9.747	83.832	1.089	1.548	1.114	6.296	78.291	31.954	32.517	0.0155
D-3	9.747	83.832	1.089	1.548	1.114	6.296	78.291	31.954	32.517	0.0155
D-3	11.034	83.853	1.110	1.582	1.095	6.976	88.626	32.788	33.352	0.0155
D-3	12.437	83.874	1.131	1.621	1.083	7.673	99.894	33.623	34.188	0.0155
D-3	12.649	83.877	1.134	1.627	1.082	7.774	101.596	33.730	34.296	0.0155
D-3	14.550	83.903	1.160	1.678	1.081	8.671	116.871	35.282	35.848	0.0155
D-3	16.228	83.924	1.181	1.722	1.079	9.423	130.344	36.322	36.889	0.0155
D-3	17.418	83.938	1.195	1.753	1.080	9.936	139.905	36.981	37.548	0.0155
D-3	19.213	83.958	1.215	1.798	1.081	10.685	154.321	37.848	38.417	0.0155
D-3	21.111	83.978	1.235	1.844	1.082	11.450	169.566	38.716	39.286	0.0155
D-3	21.400	83.981	1.238	1.850	1.083	11.567	171.889	38.884	39.454	0.0155
D-3	23.746	84.005	1.262	1.897	1.088	12.517	190.736	40.361	40.931	0.0155
D-3	25.719	84.024	1.281	1.934	1.091	13.295	206.581	41.504	42.076	0.0155
D-3	26.707	84.033	1.290	1.954	1.093	13.671	214.518	41.996	42.568	0.0155
D-3	30.555	84.066	1.323	2.026	1.100	15.084	245.423	43.617	44.190	0.0155
D-3	32.299	84.080	1.337	2.057	1.102	15.698	259.430	44.204	44.778	0.0155
D-3	35.997	84.109	1.366	2.117	1.107	17.001	289.137	45.596	46.171	0.0155

Node	Flow (m^3/s)	Stage (m AOD)	Depth (m)	Velocity (m/s)	Froude no.	Area (m^2)	Conveyance (m^3/s)	Width (m)	W Perim. (m)	Slope
D-3	37.568	84.122	1.379	2.134	1.112	17.602	301.757	46.860	47.436	0.0155
D-3	37.687	84.123	1.380	2.135	1.112	17.648	302.709	46.966	47.541	0.0155
D-3	41.729	84.153	1.410	2.186	1.117	19.086	335.174	48.854	49.430	0.0155
D-3	42.306	84.157	1.414	2.194	1.118	19.281	339.806	49.076	49.653	0.0155
D-3	46.752	84.187	1.444	2.250	1.124	20.780	375.524	50.861	51.438	0.0155
D-3	47.697	84.193	1.450	2.262	1.125	21.087	383.115	51.153	51.731	0.0155
D-3	54.101	84.231	1.488	2.346	1.133	23.061	434.553	52.740	53.319	0.0155
D-3	57.108	84.248	1.505	2.383	1.136	23.963	458.702	53.449	54.030	0.0155
D-3	62.152	84.275	1.532	2.445	1.143	25.420	499.216	54.458	55.040	0.0155
D-3	68.928	84.310	1.567	2.520	1.151	27.352	553.640	55.973	56.557	0.0155
D-3	70.950	84.320	1.577	2.542	1.153	27.914	569.881	56.377	56.961	0.0155
D-3	76.796	84.349	1.606	2.597	1.159	29.569	616.842	57.765	58.351	0.0155
D-3	80.595	84.367	1.624	2.632	1.162	30.616	647.355	58.564	59.151	0.0155
D-3	86.299	84.394	1.651	2.679	1.167	32.216	693.173	59.964	60.551	0.0155
D-3	88.023	84.402	1.659	2.692	1.168	32.698	707.016	60.401	60.989	0.0155
D-3	95.383	84.434	1.691	2.752	1.174	34.654	766.131	61.897	62.486	0.0155
D-3	99.478	84.450	1.707	2.791	1.177	35.647	799.023	62.237	62.827	0.0155
D-3	106.685	84.479	1.736	2.847	1.181	37.467	856.912	63.258	63.848	0.0155
D-3	116.026	84.514	1.771	2.923	1.187	39.699	931.943	64.278	64.869	0.0155
D-3	121.641	84.534	1.791	2.968	1.191	40.990	977.040	64.788	65.379	0.0155
D-3	127.395	84.554	1.811	3.012	1.195	42.291	1023.262	65.298	65.889	0.0155
D-3	136.931	84.585	1.842	3.089	1.202	44.323	1099.858	65.808	66.400	0.0155
D-3	146.787	84.616	1.873	3.166	1.209	46.371	1179.025	66.318	66.911	0.0155
D-3	156.976	84.649	1.906	3.232	1.215	48.576	1260.859	67.339	67.933	0.0155
D-2	23.879	92.025	0.621	1.589	1.043	15.030	187.613	63.523	63.706	0.0162
D-2	25.806	92.037	0.633	1.635	1.050	15.784	202.750	63.837	64.020	0.0162

Annex D - EA Product Data

From: Wessex Enquiries <WessexEnquiries@environment-agency.gov.uk>
Sent: 04 November 2024 07:50
To: [redacted]
Subject: 381197 WX 241016/SM07 FW: 317212 Lime Down Data Request

Dear [redacted]

Thank you for your enquiry below.

RE: Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental Information Regulations 2004 (EIR)

We do not have any records or modelling of groundwater flooding in any of these areas but some of the groundwater monitoring bores (all located in the valleys) do go artesian.

Water level data for the nearby monitoring boreholes is attached.

- Hullavington 1
- Hullavington 2
- Foxley 1
- Foxley 2
- Sherston STW Prod NGR:
- Luckington 3 NGR: ST8336083140

There are no licensed groundwater abstractions in the areas given but there are licences down gradient as listed in the attached spreadsheet.

We do not have records of known contaminated sites but a list of closed pollution incidents is attached.

There are no licensed or historic landfills, or waste management licences in the areas given.

There are several Source Protection Zones in the areas given. Note the ‘c’ suffix denotes a confined SPZ for deep subsurface activity such as fracking or deep bores, so not applicable to surface activities.

- Lime Down A: SPZ2c and SPZ3
- Lime Down B: SPZ1c and SPZ2c and SPZ3
- Lime Down C1: SPZ2c and SPZ3

- Lime Down C2: SPZ2c and SPZ3
- Lime Down D: SPZ1c and SPZ2c and SPZ3
- Lime Down E1: SPZ1c and SPZ2c
- Lime Down E2: SPZ1c and SPZ2c

The aquifer designations in the areas given are,

- Alluvium – Secondary A Aquifer with Medium to High Vulnerability
- Forest Marble limestone member - Principal Aquifer with High Vulnerability
- Forest Marble mudstone member - Secondary A Aquifer with High Vulnerability
- Cornbrash - Secondary A Aquifer with High Vulnerability
- Kellaways Clay – Unproductive Strata

Provision of FRA Product 4

Thank you for your recent request to use Environment Agency flood data. The information is attached.

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments and our attached advisory text.
https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Further details about the Environment Agency information supplied and the permitted use of this information can be found on the GOV.UK website:
https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather
http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3

We respond to requests under the Freedom of Information Act 2000 (FOIA) and Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

We really value your thoughts on how we are doing and will always make changes where we can to improve our service. Please click on the link below and fill in our survey. [redacted] *Thank you.*

Kind regards

[redacted]

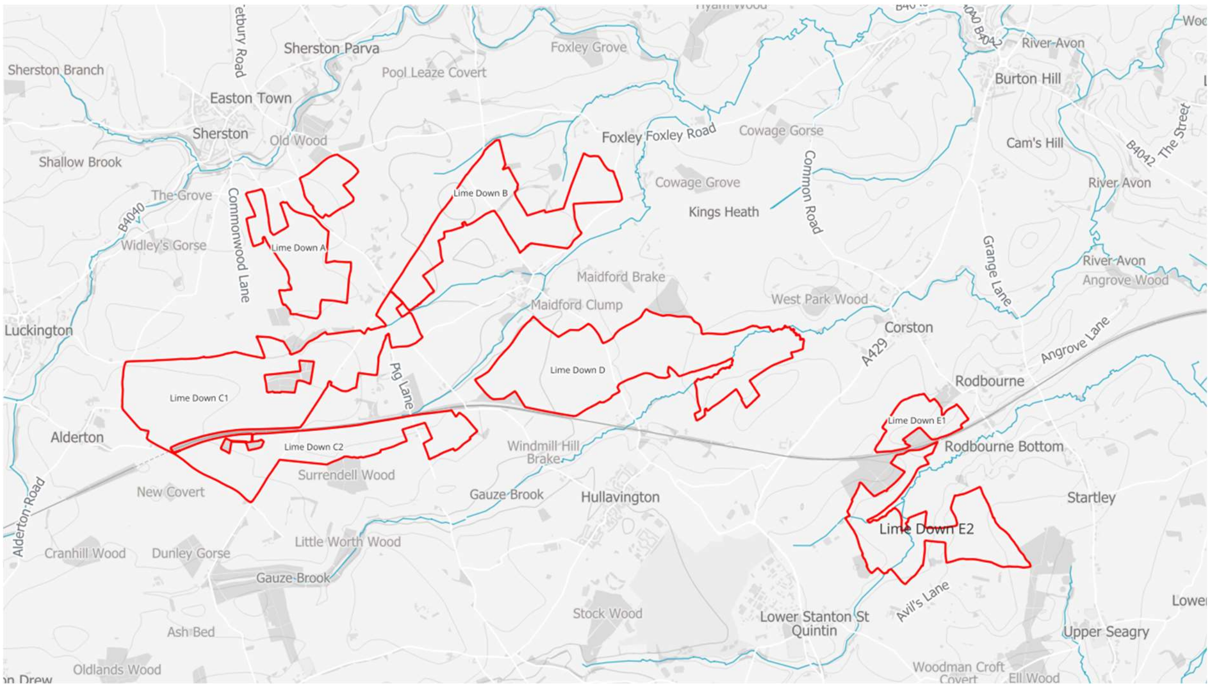
Environment Agency, Wessex Enquiries, Customer & Engagement Team

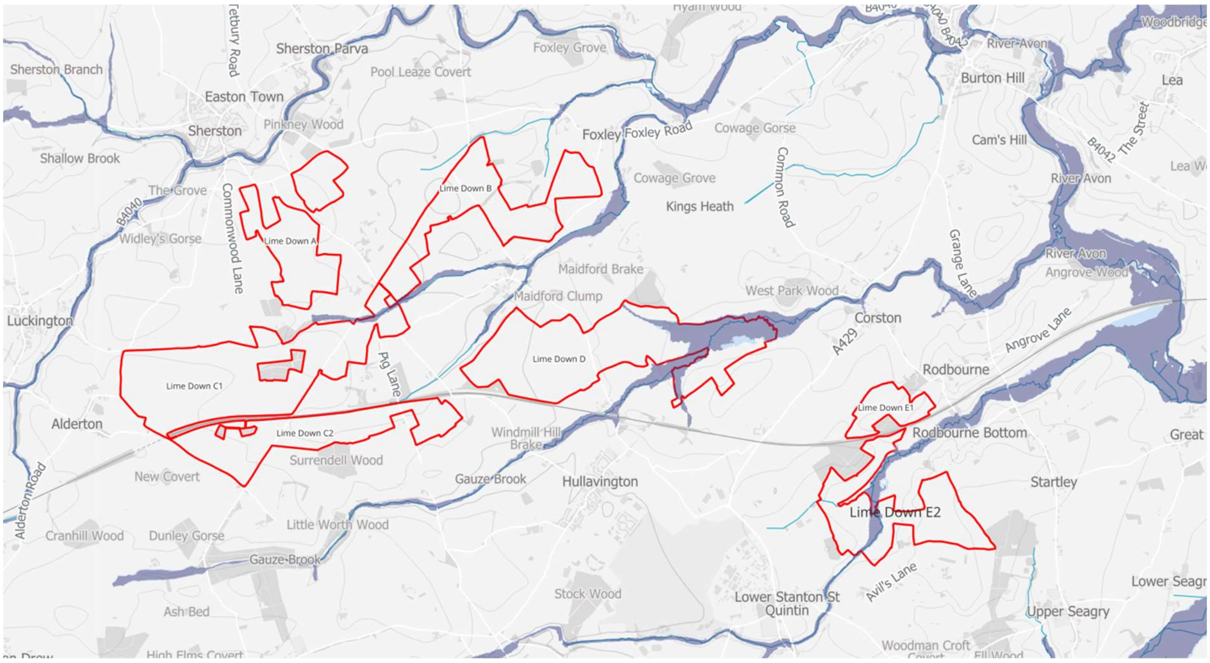
[redacted] Wessex Enquiries

From: [redacted]
Sent: 15 October 2024 14:01
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: 317212 Lime Down Data Request

To whom it may concern,

Mabbett & Associates Ltd have been instructed to undertake a Flood Risk Assessment and Drainage Strategy in support of a proposed solar site in Wiltshire, known as the site hereon. I attach a site location plan and the site details below. The site has been split into parcels which can be seen below (Lime Down A, B, C1, C2, D, E1 and E2).





According to the EA online Flood M Planning, the Site is shown to be located within Flood Zones 1, 2 and 3, however we would be grateful if you could provide **any nearby modelled flood level data** in order to inform our assessment of the Site.

It would therefore be useful if you are able to confirm/provide the followiap forng where available:

Site Details

Site Name	Lime Down SOlar
Address	Lime Down A: SN16 0PU (NGR: 385982, 184814) Lime Down B: SN16 0JS (NGR: 388179, 185419) Lime Down C1: SN14 6NL (NGR: 385300, 183486) Lime Down C2: SN16 0JZ (NGR: 386684, 182717) Lime Down D: SN14 6EU (NGR: 389526, 183654) Lime Down E1: SN16 0EX (NGR: 392655, 183066) Lime Down E2: SN14 6DA (NGR: 393123, 181766)

Data Request

Please provide any of the following information to enable us to complete our assessment:

Historical Flooding Information

- Any records, photographs, flood extents from known historic events in the area

Technical Data

- Any hydraulic models covering the site
- Raw and processed results for the model(s) above
  - Hydraulic modelling report for the model(s) above
  - Modelled floodplain levels and flows for node points within and in the immediate vicinity of the Site taking into account the most recent climate change allowances (where these have been modelled);
- Hydrology report and/or flood estimation calculation records for the model(s) above
- Survey data used to build the model or inform nearby studies

Supporting Data

- Flood/coastal defence survey data
- Operational procedures for hydraulic structures
- Section 19 flood investigation reports
- The date and type of modelling that flood levels have been derived from;
- The technical report summarising the modelling methodology;
- Confirmation that the data is appropriate/relevant to inform flood risk within the Site;
- Details of any flood defences within the vicinity of the Site (i.e type, crest levels, Standard of Protection, condition, etc) and any associated breach and/or overtopping flood extents and depths;
- Hazard mapping detailing the depth, velocity and associated hazard rating for the Site;
- Any information in relation to surface water flooding including confirmation is located within or outside of a Critical Drainage Area;
- Any information in relation to on-Site drainage;
- Any information in relation to groundwater flooding in the area. Where possible, please provide borehole locations and ground water levels;
- Details of sensitive aquifers and known contamination issues;
- Any information/mapping of historical flooding events on Site from all sources of flooding (i.e fluvial, tidal, surface water, groundwater, sewer, reservoir, canal, etc).

Where available please can you provide flood levels, estimated return periods, photographs and other such data that may be relevant to our assessment;

We trust this request is acceptable but please do not hesitate to contact us if you require any further information to assist with your response or wish to discuss the Site in further detail.

We look forward to hearing from you.

Thanks,

[redacted]

Consultant | Water Environment Team

Mobile: [redacted]

[redacted] [redacted]

IOSH & IEMA Training Course Provider

Anglesey | Belfast | Cardiff | Carlisle | Dublin | Dundee | Edinburgh | Forres | Glasgow | Inverness | Leicester | Manchester | Winchester

[redacted]

Our ref: 381197-WX
Date: 4th November 2024

Dear [redacted]

Thank you for your enquiry which was received on 15th October 2024. We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Abstract

Name	Product 4
Description	Flood Risk Information for land at **Lime Down** NGR: ST9009082825
Licence	Open Government Licence
Information Warnings	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2023 Ordnance Survey *AC0000807064*.

Open Data

The following Environment Agency published datasets are now available on the weblink below as part of the Government's 'Open Data' project and are available for you to download free of charge.

Environment Agency published datasets: https://data.gov.uk/data/search?publisher=environment-agency&unpublished=false

You will need to search and select the name of the following datasets to take you directly to the weblink to enable you to download the data:

- Flood Map for Planning (Rivers and the Sea) – Flood Zones 2 and 3
- Flood Map for Planning (Rivers and Sea) – Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Spatial Flood Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Recorded Flood Outlines
- Historic Flood Map
- Risk of Flooding from Surface Water Extent for:
  - → 3 percent annual chance
  - → 1 percent annual chance
  - → 0.5 percent annual chance

You can also access the Flood Map for Planning here: https://flood-map-for-planning.service.gov.uk/

You can also access the Risk of Flooding from Surface Water maps and Risk of Flooding from Reservoirs information here: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

Recorded Historic Flood Events

We no longer produce pdf copies of the Historic Flood Map. This information is available to search, select, and download free of charge as part of the Government's 'open data' as

- Recorded Flood Outlines
- the Historic Flood Map

Our historic records indicate that there was flooding in the area in **1925** (fluvial), **1932** (fluvial), **1954** (fluvial), **1979** (fluvial), **1999** (fluvial/unconfirmed source), **2007** (fluvial), **2009** (fluvial), **2012** (fluvial/unconfirmed source) and **2013** (fluvial).

Additionally, our historic records show a record of possible flooding pre 2012 for the area, however we are currently unable to confirm the date and source of this.

Please note - we cannot guarantee that this is an exhaustive list of all past flood events in this location. All reasonable care has been taken to ensure that the historical flood event data is as accurate as possible. The Environment Agency will update its records if new evidence emerges.

Modelled Fluvial Water Levels

We have not carried out any detailed fluvial flood risk modelling in this location.

The fluvial Flood Map in this area has been produced using our National Generalised Model (JFLOW). This modelling is fit for the purpose of the Flood Zones. However, it is not based on a specific channel survey. Neither water depths nor water levels were outputs specified when we commissioned this generalised modelling for the Flood Zones. Whilst the modelling process does provide some information on depth of water, it would have been possible to produce the flood extents without storing the water depth values, since water depth is only a 'by-product' of the calculation process. As this type of modelling was developed, tested and reviewed for production of the Flood Zone extents only, we have no information on the accuracy of the water depth data. Water depth or level outputs from this model are only suitable to be used for decision making at a broad catchment scale and is not fit for the purpose of a site-specific flood risk assessment.

For your information we have supplied maps showing the water depths derived from JFLOW for the 1% AEP (100yr) and 0.1% AEP (1000yr) fluvial modelled flood scenarios.

Please note - The Environment Agency is currently carrying out a project to update the National Generalised model (JFLOW). The New National Model outputs are expected in Spring 2025. Our published flood risk information for this area will be updated using outputs from the New National Model and this is expected to take place in late 2025 (current programme which may change). This will be carried out as part of the National project to update our National flood risk mapping and modelling information across England and will incorporate outputs from detailed local models together with updated National modelling.
New National Model Details.

The New National Modelling (NNM) is a set of models for rivers, surface water and the sea covering the whole of England. The NNM has been created to fill in gaps where we don't have local hydraulic models, our local models require updating or we need additional model scenarios such as climate change runs.

Please also note - we are currently carrying out a National project to update our flood risk information for the whole of England. We will be updating our flood risk information in 2025 as part of the new National Flood Risk Assessment (NaFRA2). This will include the data displayed on the Check Your Long-Term Flood Risk service and the data displayed in the Flood Map for Planning (Rivers and Sea).

This should result in improvements to our mapping products, especially where we do not currently have any detailed local modelling. This means there will be some changes to our flood risk information in many areas when the new data is published.

You can find further information on the NaFRA2 project here: https://www.gov.uk/guidance/updates-to-national-flood-and-coastal-erosion-risk-information

For more information on climate change allowances please see the guidance on the Gov.UK website here: Flood risk assessments: climate change allowances - GOV.UK. **Please be aware that this information is subject to change, please check the guidance regularly.**

Environmental Permit for Flood Risk Activities

In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For any further advice, please email Blandford.frap@environment-agency.gov.uk.

Ordinary Watercourse

Some of the watercourses adjoining this site are classed as an "Ordinary Watercourse" not a "Main River" under our control. Works to ordinary watercourses may require consent from either the Lead Local Flood Authorities or the Local Drainage Board.

Flood Asset Information

Please find enclosed details of Flood Assets within the area. This information has been taken from our Asset Information Management System database (AIMS).

Please note that flood defences can increase water levels elsewhere eg through channels being restricted by defences, or because defences prevent flood water flowing back into the river channel.

Planning

If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on wx.sp@environment-agency.gov.uk. Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly, there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us. Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Strategic Flood Risk Assessment (SFRA)

When preparing a FRA to support a development proposal in this location you should refer to Wiltshire Council's SFRA Reports Level 1 which is available to download via the following link: https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000

The Wiltshire Council Local Plan is available via this link: https://www.wiltshire.gov.uk/planning-policy-local-plan-review-consultation

Further Information

We advise that you also contact the drainage engineer/ flood risk management team at Wiltshire Council by email: drainage@wiltshire.gov.uk, or by phone: 0300 456 0105, based at: Bythesea Road, Trowbridge, Wiltshire, BA14 8JN, as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful. It is provided subject to the attached notice 'Use of Environment Agency Information for Flood Risk Assessments', which we strongly recommend you read.

Yours sincerely

[redacted]

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)
381197-WX 100yr JFLOW Depth Map (1%AEP)
381197-WX 1000yr JFLOW Depth Map (0.1%AEP)
381197-WX Defence Map
381197-WX Defence Data

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important
Use of Environment Agency data: you should note that

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.

2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.

3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.

4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.

5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Pre-application Charged Service:
https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance
You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:
http://planningguidance.planningportal.gov.uk/

Environment Agency advice on FRAs:

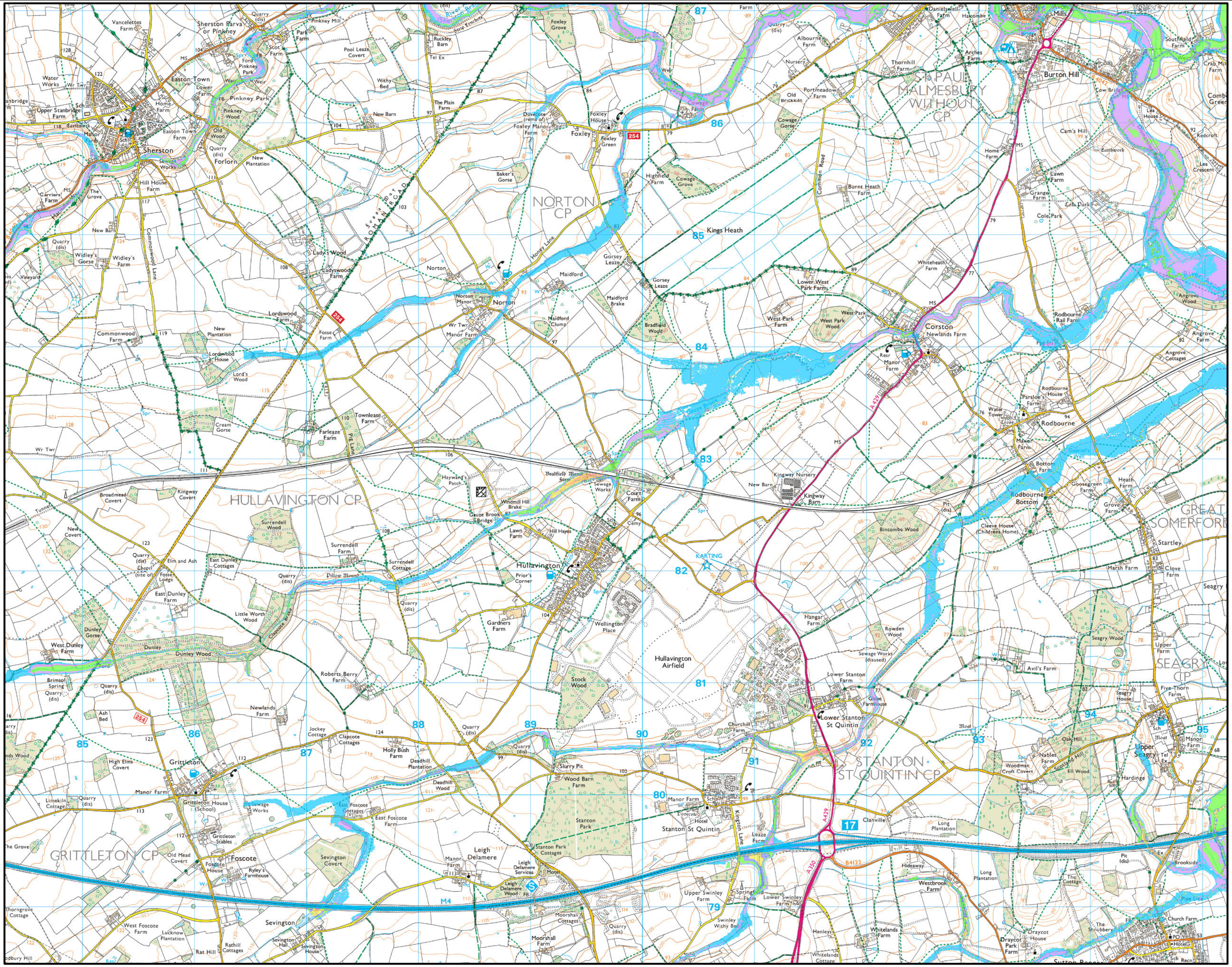
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice

https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

381197-WX - JFLOW Fluvial Water depths (m) Without Flood Defences. 100 year (1% AEP) centred on land at Lime Down [390090,182825].
Created 01.11.2024



Environment Agency

Scale 1:50,000

N E S W

Legend

100yr JFLOW Depth

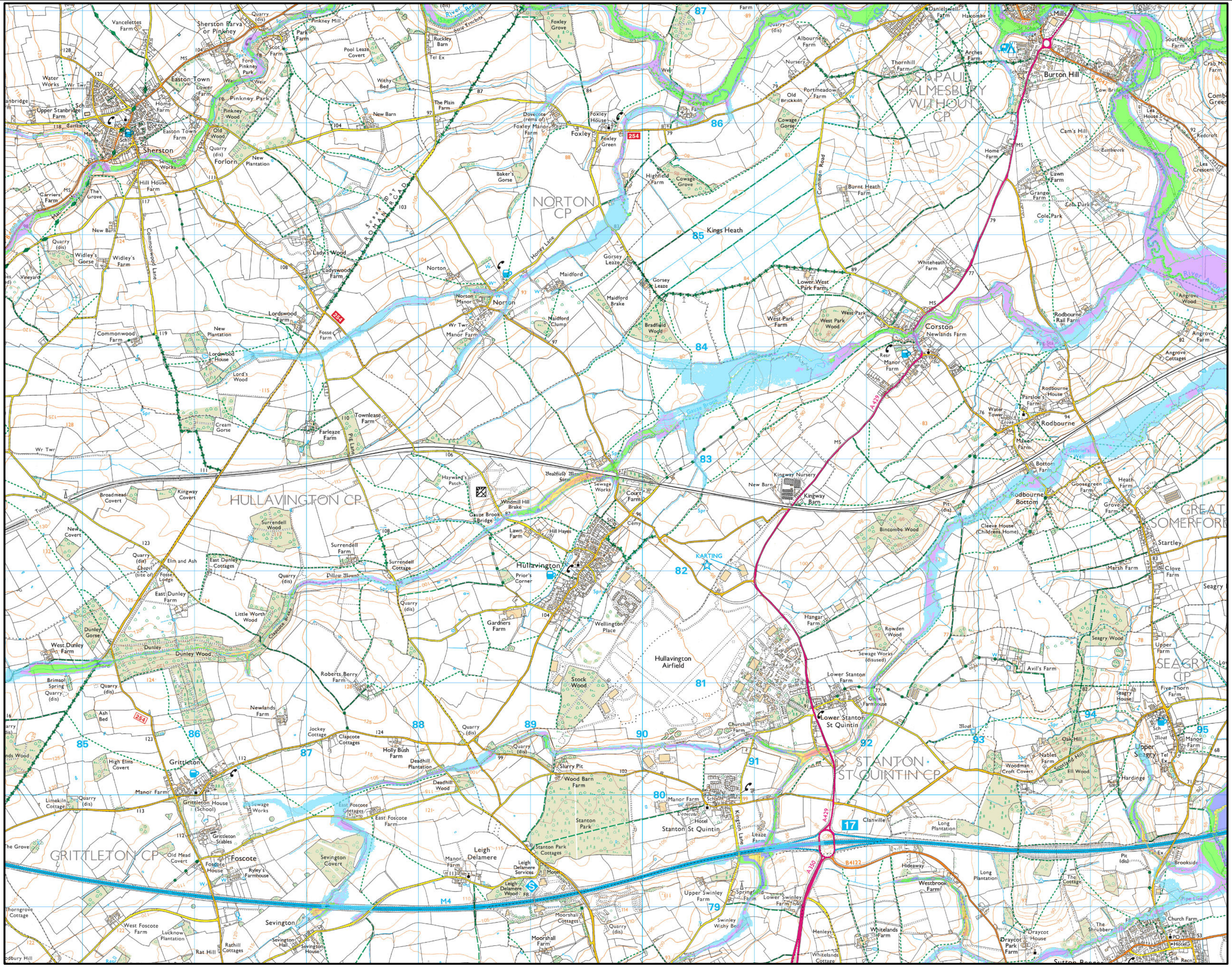
Metres

- 0 - 0.5
- 0.500000000 - 1
- 1.000000001 - 2
- 2.000000001 - 3
- 3.000000001 - 4
- 4.000000001 - 5
- 5.000000001 - 10
- 10.00000001 - 100

Information Warning
We do not recommend the use of water depths/levels derived from JFLOW for site specific investigations such as Flood Risk Assessments.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

381197-WX - JFLOW Fluvial Water depths (m) Without Flood Defences. 1000 year (0.1% AEP) centred on land at Lime Down [390090,182825].
Created 01.11.2024



Environment Agency

Scale 1:50,000

N W E S

Legend

1000yr JFLOW Depth

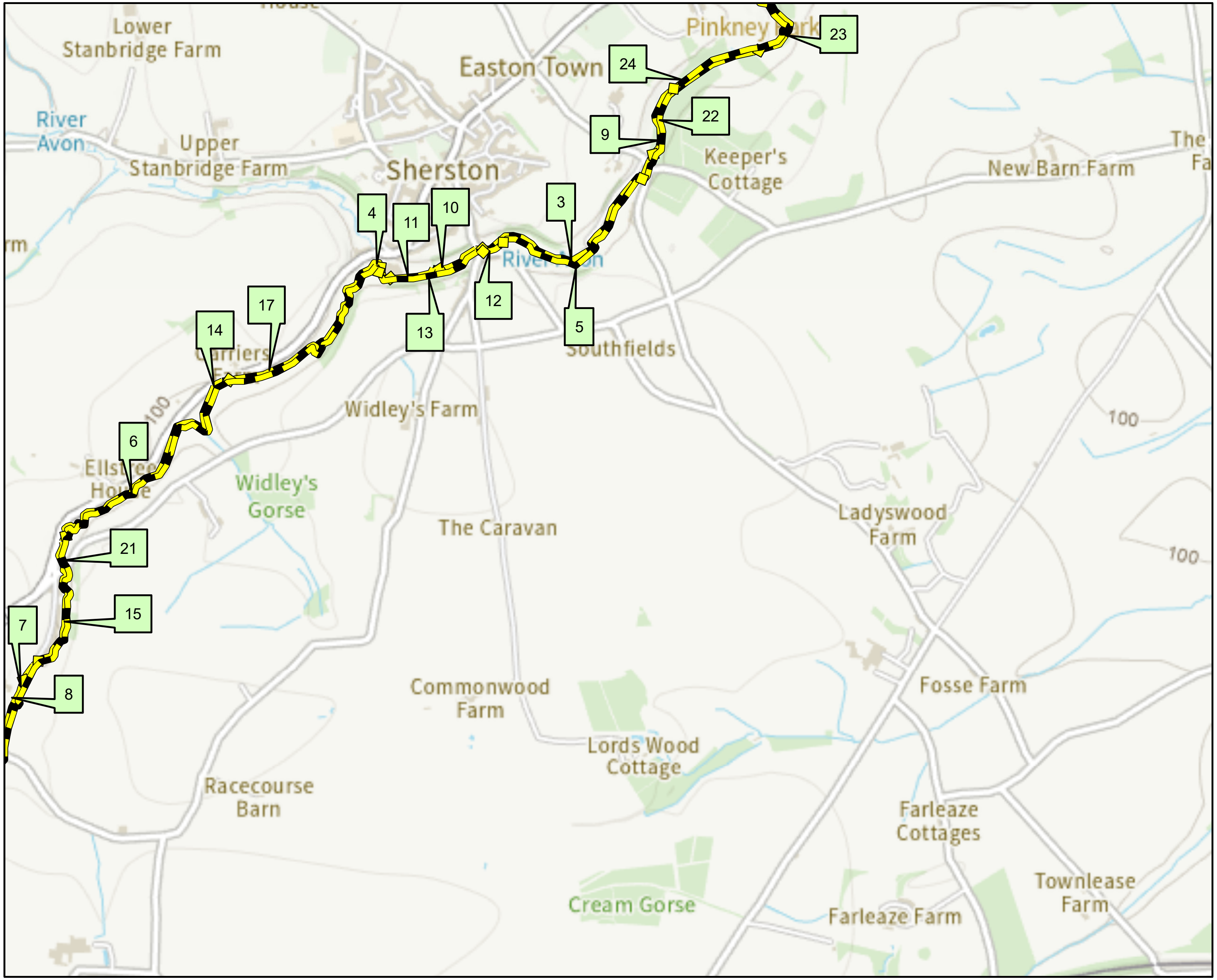
Metres

- 0 - 0.5
- 0.500000000 - 1
- 1.000000001 - 2
- 2.000000001 - 3
- 3.000000001 - 4
- 4.000000001 - 5
- 5.000000001 - 10
- 10.00000001 - 100

Information Warning
We do not recommend the use of water depths/levels derived from JFLOW for site specific investigations such as Flood Risk Assessments.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Current Flood Defences centered on NGR ST 85982 84814 Created 22/10/2024 Ref: 381197-WX



Environment Agency

Scale: 1:20,000

N E S W

Legend

Defences

- Barrier Beach
- Beach
- Bridge Abutment
- Cliff
- Demountable Defence
- Dunes
- Embankment
- Engineered High Ground
- Flood Gate
- Natural High Ground
- Promenade
- Quay
- Spillway
- Wall

This data has been extracted from the Asset Information Management System (AIMS OM) which was created to draw various data sources into one database and has been populated with information of varying quality.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Product 4 - AIMS Information **381197-WX** **Date:** **22/10/2024**

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
3	40115	Natural High Ground	Left	Natural Bank	878.51	DNR	DNR	DNR	DNR	DNR	DNR	ST8592785717	07/04/2009	2 - Good
4	40116	Natural High Ground	Left	Stone wall	63.60	DNR	DNR	DNR	DNR	DNR	DNR	ST85158562	07/04/2009	2 - Good
5	40419	Natural High Ground	Right	Natural Bank	714.43	DNR	DNR	DNR	DNR	DNR	DNR	ST85898565	07/04/2009	2 - Good
6	40420	Natural High Ground	Left	Natural Bank	959.72	DNR	DNR	DNR	DNR	DNR	DNR	ST84218478	19/12/2007	3 - Fair
7	4605	Natural High Ground	Left	Natural channel with masonry retaining wall	89.38	DNR	DNR	DNR	DNR	DNR	DNR	ST8389484163	23/10/1996	3 - Fair
8	4606	Natural High Ground	Left	Natural Bank	1229.01	DNR	DNR	DNR	DNR	DNR	DNR	ST83618359	19/12/2007	3 - Fair
9	4730	Natural High Ground	Left	Natural Bank	275.81	DNR	DNR	DNR	DNR	DNR	DNR	ST8615986133	07/04/2009	3 - Fair
10	4731	Natural High Ground	Left	Natural channel with stone retaining wall	181.67	DNR	DNR	DNR	DNR	DNR	DNR	ST85438562	07/04/2009	2 - Good
11	4849	Natural High Ground	Left	Natural Bank	189.57	DNR	DNR	DNR	DNR	DNR	DNR	ST8525585581	07/04/2009	2 - Good
12	4851	Natural High Ground	Right	Stone Wall	83.61	DNR	DNR	DNR	DNR	DNR	DNR	ST85568567	07/04/2009	2 - Good
13	4852	Natural High Ground	Right	Natural Bank	425.87	DNR	DNR	DNR	DNR	DNR	DNR	ST85348558	07/04/2009	2 - Good
14	4853	Natural High Ground	Left	Natural channel with gabion retaining wall	35.34	DNR	DNR	DNR	DNR	DNR	DNR	ST8458185202	23/10/1996	2 - Good
15	4854	Natural High Ground	Left	Masonry Wall	537.87	DNR	DNR	DNR	DNR	DNR	DNR	ST84028445	23/10/1996	3 - Fair
17	88456	Natural High Ground	Left	Natural Bank	825.00	DNR	DNR	DNR	DNR	DNR	DNR	ST8491285333	19/12/2007	3 - Fair
21	89868	Natural High Ground	Right	Natural Bank	3685.06	DNR	DNR	DNR	DNR	DNR	DNR	ST8404084431	19/12/2007	3 - Fair
22	98384	Natural High Ground	Right	Natural Bank	708.60	DNR	DNR	DNR	DNR	DNR	DNR	ST8619186219	07/04/2009	3 - Fair
23	98385	Natural High Ground	Right	Natural channel with stone retaining wall	561.70	DNR	DNR	DNR	DNR	DNR	DNR	ST86538659	07/04/2009	3 - Fair
24	98386	Natural High Ground	Left	Natural channel with masonry retaining wall	1001.16	DNR	DNR	DNR	DNR	DNR	DNR	ST8650586598	07/04/2009	2 - Good

Notes

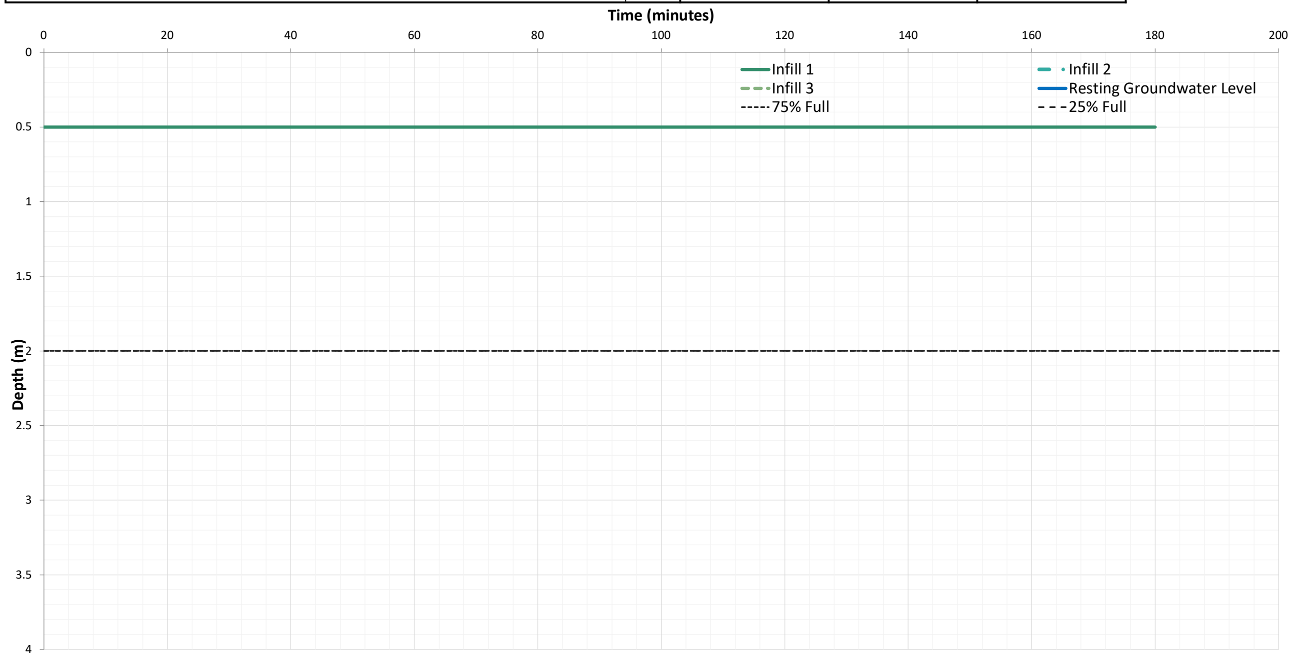
* Overall Condition has been taken from the most recent inspection
* Inspections are of a purely visual nature and do not necessarily reflect the true condition of the asset
* Condition: 1 = very good, Condtion 2 = good, Condition 3 = fair, Condition 4 = poor, Condition 5 = very poor
* Crest level accuracy: 1 = ± 0.01 to 0.05m, 2 = ± 0.05 to 0.15m, 3 = ± 0.15 to 0.75m, 4 = ± 0.75 or greater
* DNR = data not recorded

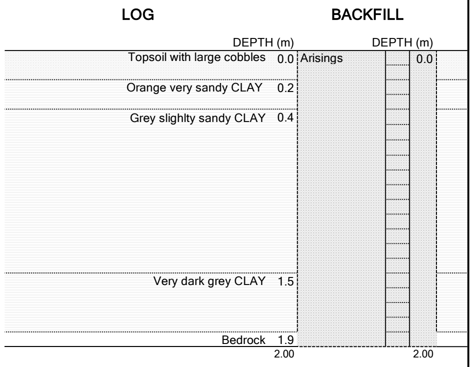
Annex E – Infiltration Testing

	units	Infill 1	Infill 2	Infill 3
Length	m		2.60	
Width	m		0.60	
Depth	m		2.00	
Gravel type			No gravel	
Voids ratio			1.00	
Resting groundwater level at time of testing	m		5.00	
Depth of first reading	m	0.50	0.00	0.00
Depth of final reading	m	0.50	0.00	0.00
Did soakage test reach 25% of maximum fill depth?		No	No	No
Did soakage test reach near empty?		No	No	No
Depth at 75% full/effective depth	m	0.50	0.00	0.00
Depth at 25% full/effective depth	m	0.50	0.00	0.00
Time at 75% full/effective depth	mins	#DIV/0!	#N/A	#N/A
Time at 25% full/effective depth	mins	#DIV/0!	#N/A	#N/A
Vp75 - 25 (volume outflowing between 75% and 25% full/effective depth)	m^3	0.00	0.00	0.00
Mean surface area for outflow (50% full/effective depth)	m^2	1.56	1.56	1.56
tp75 (time for the water level to fall from 75% to 25% full/effective depth)	mins	#DIV/0!	#N/A	#N/A
Soil infiltration rate, f =	m/s	Failed Test	Failed Test	Failed Test
or	m/s	Failed Test	Failed Test	Failed Test

Recommended soil infiltration rate	
Failed Test	m/s

Note:
Where water level reaches nearly empty (5% full), soil infiltration based on 'Full' depth. Where water level did not reach nearly empty (5% full), soil infiltration rate is based on 'Effective' drainage achieved only. Where water level did not fall below 25% of the maximum fill level, this is considered to be a 'Failed' test.



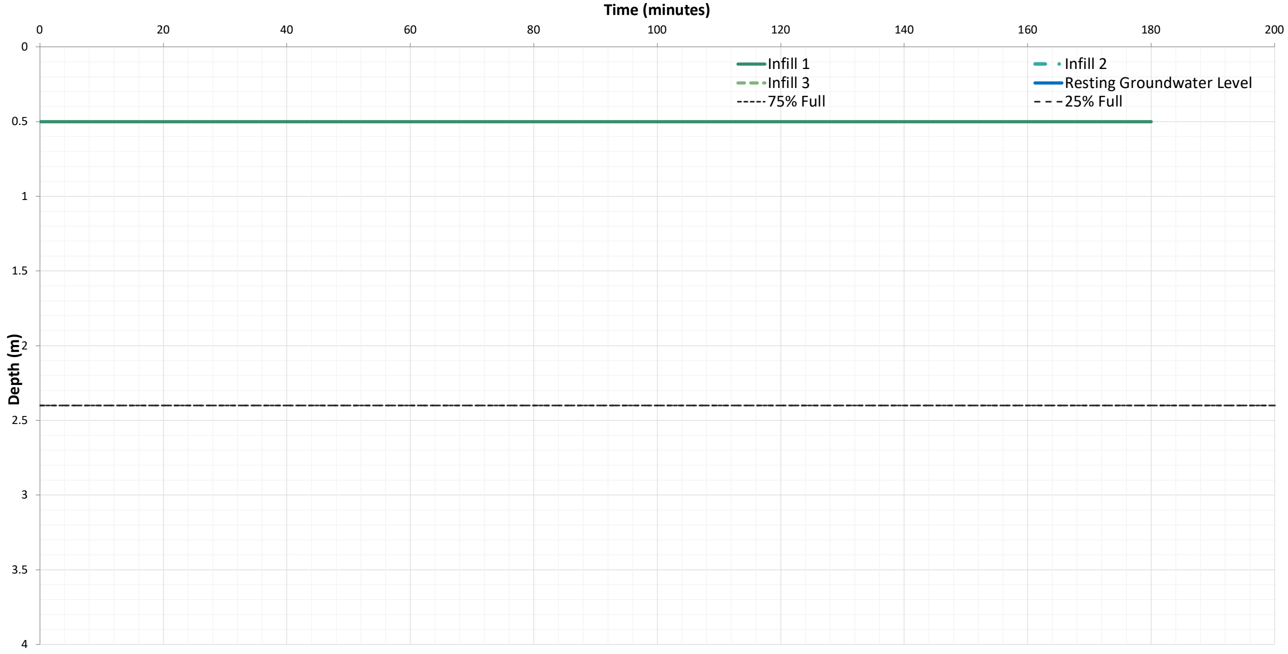


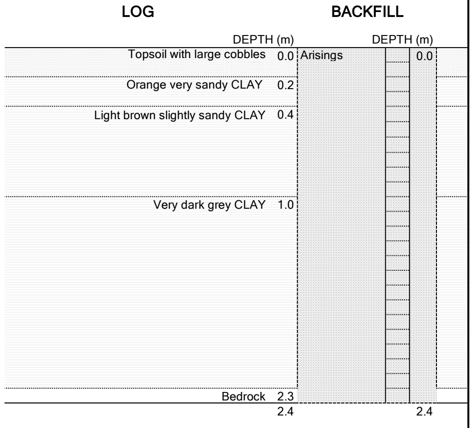
TITLE: Soakaway Test Results Lime Down Island Green Power	*In general accordance with BRE Digest 365 (2016)*	DRAWN BY: GH SCALE: Not to Scale CHECKED BY: JR REVISION: 1 DATE: 23/01/2025	PROJECT NUMBER: 317212.00 SOAKAWAY NUMBER: D1-01

	units	Infill 1	Infill 2	Infill 3
Length	m		2.20	
Width	m		0.60	
Depth	m		2.40	
Gravel type			No gravel	
Voids ratio			1.00	
Resting groundwater level at time of testing	m		5.00	
Depth of first reading	m	0.50	0.00	0.00
Depth of final reading	m	0.50	0.00	0.00
Did soakage test reach 25% of maximum fill depth?		No	No	No
Did soakage test reach near empty?		No	No	No
Depth at 75% full/effective depth	m	0.50	0.00	0.00
Depth at 25% full/effective depth	m	0.50	0.00	0.00
Time at 75% full/effective depth	mins	#DIV/0!	#N/A	#N/A
Time at 25% full/effective depth	mins	#DIV/0!	#N/A	#N/A
Vp75 - 25 (volume outflowing between 75% and 25% full/effective depth)	m^3	0.00	0.00	0.00
Mean surface area for outflow (50% full/effective depth)	m^2	1.32	1.32	1.32
tp75 (time for the water level to fall from 75% to 25% full/effective depth)	mins	#DIV/0!	#N/A	#N/A
Soil infiltration rate, f =	m/s	Failed Test	Failed Test	Failed Test
or	m/s	Failed Test	Failed Test	Failed Test

Recommended soil infiltration rate	
Failed Test	m/s

Note:
Where water level reaches nearly empty (5% full), soil infiltration based on 'Full' depth. Where water level did not reach nearly empty (5% full), soil infiltration rate is based on 'Effective' drainage achieved only. Where water level did not fall below 25% of the maximum fill level, this is considered to be a 'Failed' test.





TITLE: Soakaway Test Results Lime Down Island Green Power	*In general accordance with BRE Digest 365 (2016)*	DRAWN BY: GH CHECKED BY: JR DATE: 23/01/2025	SCALE: Not to Scale REVISION: 1
PROJECT NUMBER: 317212.00	SOAKAWAY NUMBER: D1-09		

Annex F – Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)		Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	10.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Storage	6.370	5.00	100.000	0.000	0.000	2.000

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Volume	✓
Summer CV	0.750	Drain Down Time (mins)	240	100 year 360 minute (m³)	
Winter CV	0.840	Additional Storage (m³/ha)	0.0		
Analysis Speed	Detailed	Check Discharge Rate(s)	x		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node Storage Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	97.500	Product Number	CTL-SHE-0136-8600-1000-8600
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.6	Min Node Diameter (mm)	1200

Node Storage Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	13361.7	0.0	1.000	13361.7	0.0	1.001	0.0	0.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 84.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Storage	1440	98.511	0.511	208.5	6493.9240	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Storage	Hydro-Brake®	8.6	804.5

Annex G - Maintenance Schedules

Pervious Pavements Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required - once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 20.15

Attenuation Storage Tanks Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 21.3

i [redacted]
ii [redacted]
iii https://magic.defra.gov.uk/
iv https://flood-map-for-planning.service.gov.uk/
v [redacted]
vi [redacted]
vii [redacted]