



Lime Down

Solar Park

Environmental Statement

Volume 3, Appendix 11-3: Flood Risk Assessment and Outline Drainage Strategy – Lime Down B (Tracked)

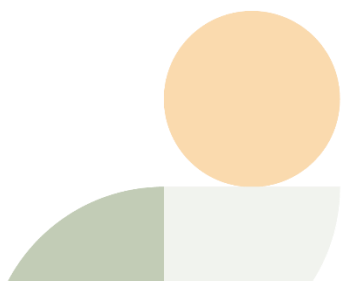
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Appendix 11-3: Flood Risk Assessment and Outline Drainage Strategy – Lime Down B

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 B.

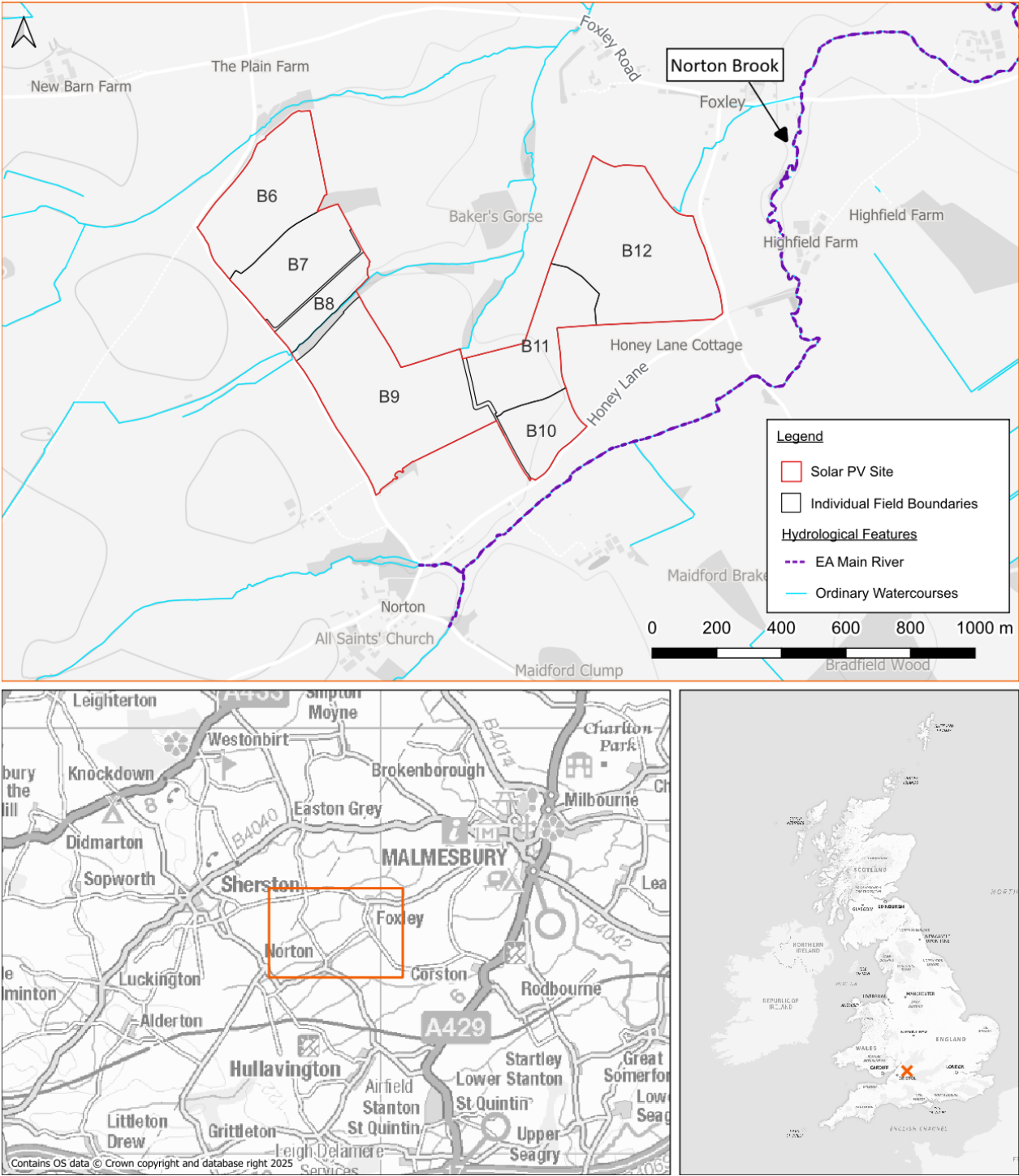


Figure 1: Site Location

1.2 Site Location

1.2.1 Lime Down B is located approximately 280m south-west of Foxley, a village in the South Cotswolds. Additionally, Lime Down B is located approximately 190m south of Foxley Road which runs north adjacent to Lime Down B. Grid references are 389600E, 185200N (south-east), 387100E, 183700N (south-west), 388200E, 185900N (north), and 388500E, 184700N (central south).

1.3 Existing Site Conditions

1.3.1 Online mapping (including Google Maps / Google Streetview imagery (accessed May 2025) shows that Lime Down B is greenfield, comprising agricultural / arable fields, which is subdivided into 7 smaller fields.

1.4 Topography

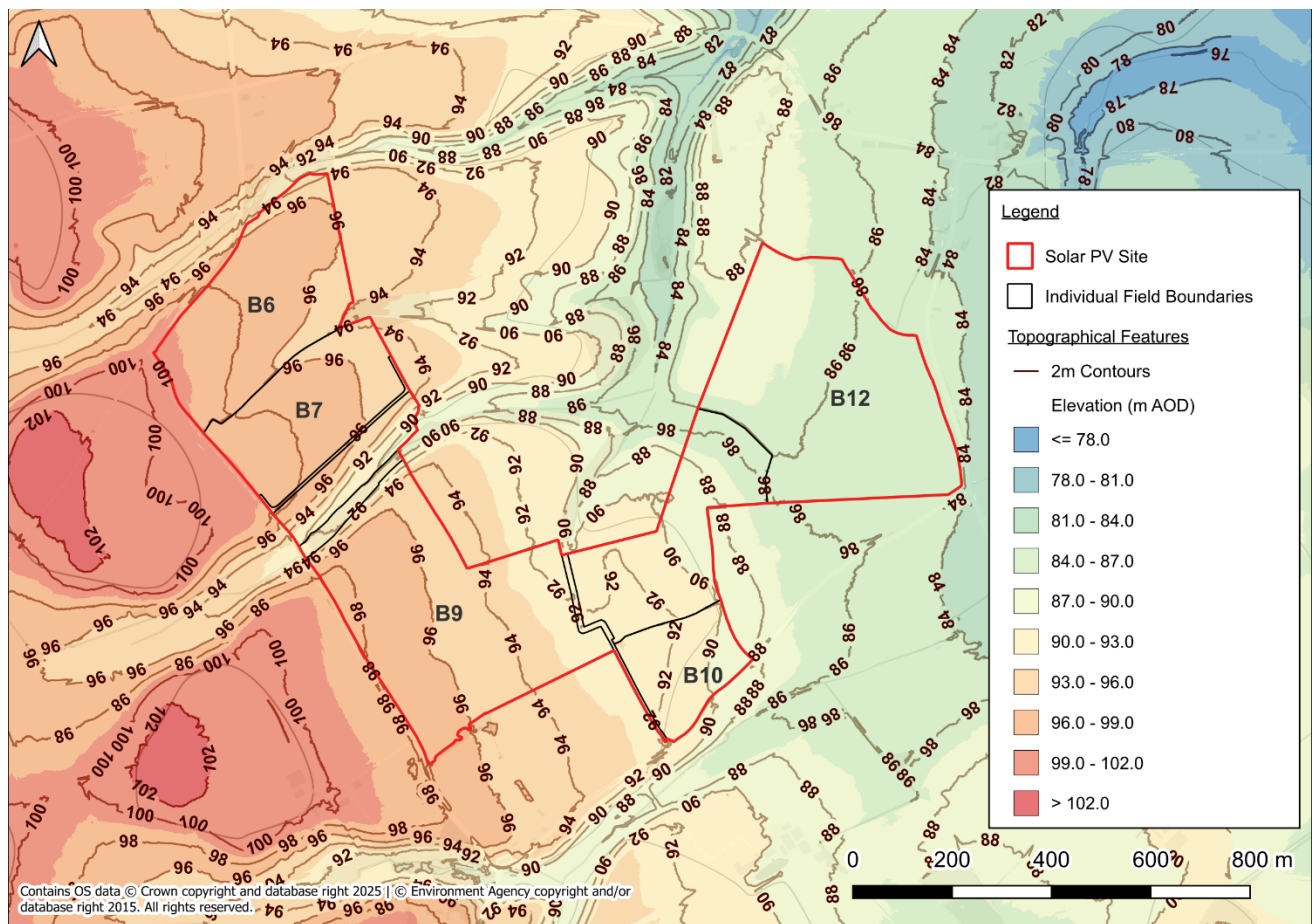


Figure 2: LiDAR Plan

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 Lime Down B slopes from approximately 103m AOD in the south-west to approximately 84m AOD in the west (Figure 2).

1.5 Hydrology

- 1.5.1 The nearest watercourse to Lime Down B is Norton Brook, located approximately 50m south at its closest point. This brook is classified as an EA Main River up to Norton, where it splits into two tributaries. Additionally, there are several unnamed land drainage ditches both within Lime Down B and in the surrounding vicinity.
- 1.5.2 Main Rivers are under the jurisdiction of the EA, while land drainage ditches are classified as ordinary watercourses and fall within the jurisdiction of the Lead Local Flood Authority (LLFA) (Wiltshire Council).

1.6 Water Framework Directive Status

- 1.6.1 Lime Down B is located within the Avon Bristol and North Somerset Streams, specifically the Sherston Avon Water Body and the Tributary (source to conf Sherston Avon) Water Body Catchment.
- 1.6.2 The Sherston Avon Water Body Catchment has a Cycle 3 ecological status of Poor in 2019 and 2022 and a failing chemical status in 2019 (no data in 2022). The Tributary (source to conf Sherston Avon) has a Cycle 3 ecological status of Good in 2019 and 2022 and a failing chemical status in 2019 (no data in 2022). A summary of the Water Body Classifications can be found in Annex A.

1.7 Geology

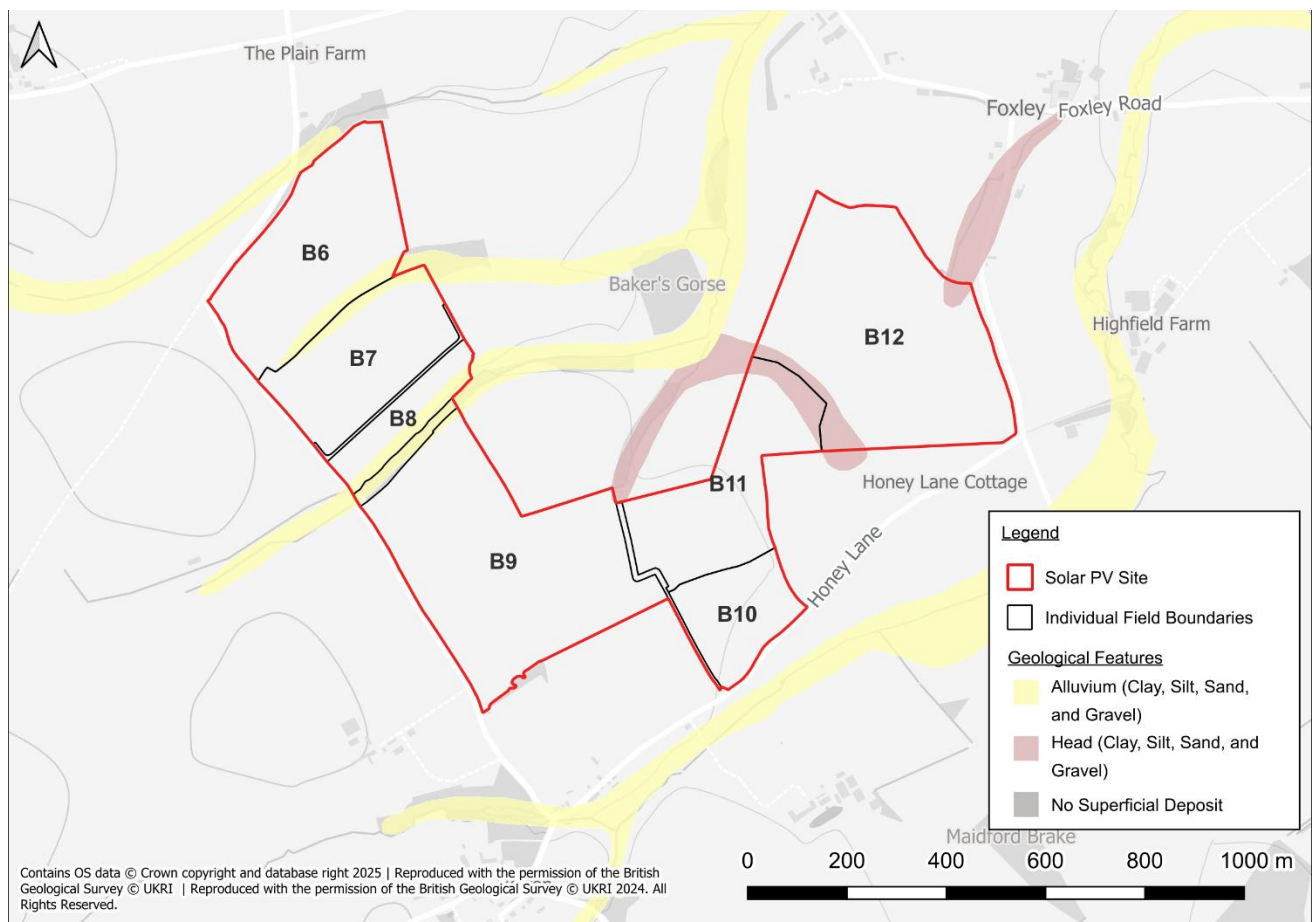


Figure 3: Superficial Deposits

1.7.1 Reference to the British Geological Surveyⁱ (BGS) online mapping (1:50,000 scale) indicates that Lime Down B is underlain by the following superficial deposits (see Figure 4 for the locations of the varying deposits):

- Alluvium (Clay, Silt, Sand & Gravel); and
- Head (Clay, Silt, Sand & Gravel).
- There are also areas within Lime Down B identified as not being underlain by any superficial deposits.

1.7.2 Lime Down B is identified as being underlain by the following bedrock deposits (see Figure 5 for the locations of the varying deposits):

- Forest Marble Formation (Mudstone);
- Cornbrash Formation (Limestone); and
- Kellaways Clay Member (Mudstone).

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.

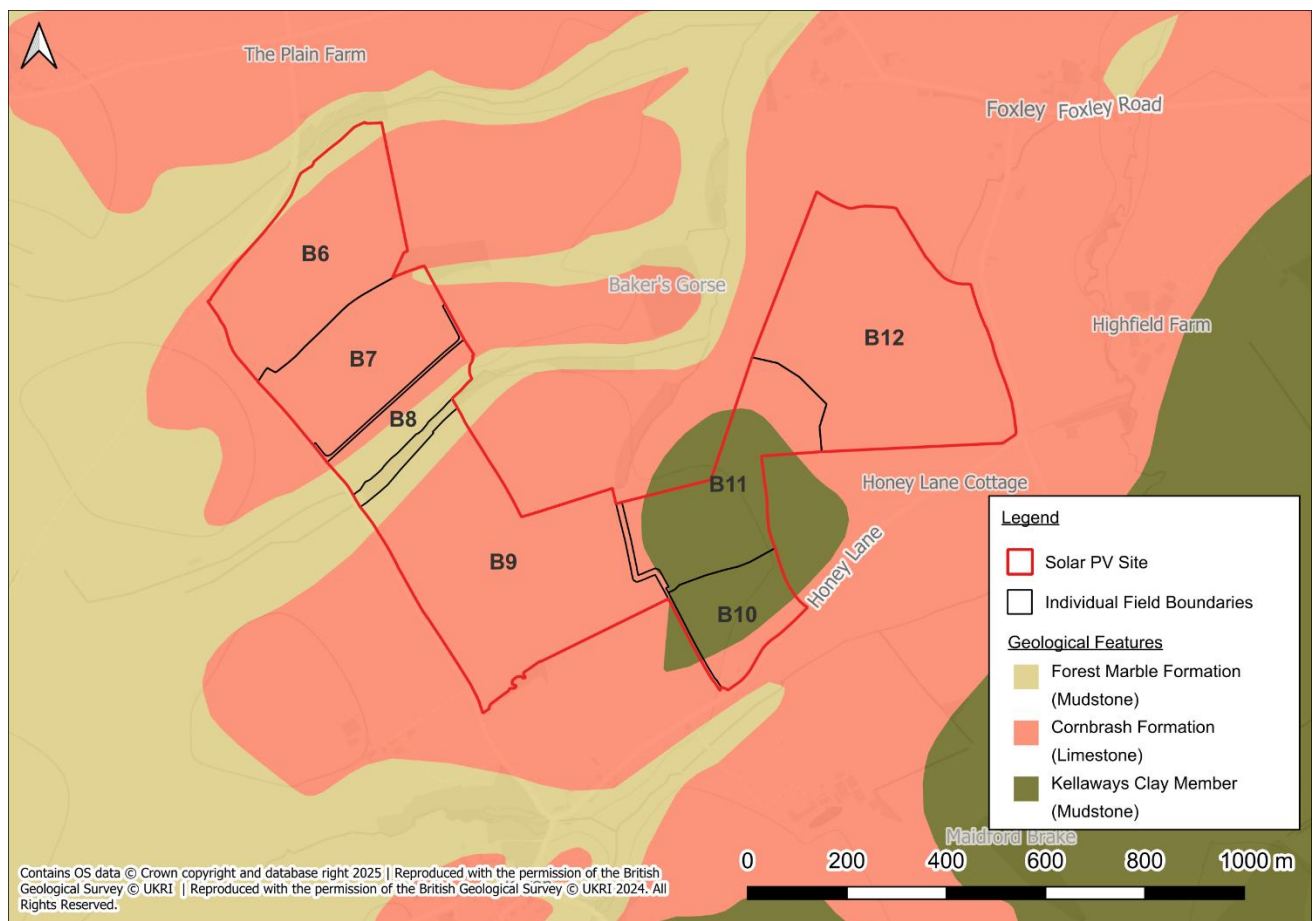


Figure 4: Bedrock Deposits

1.7.4 The closest historical BGS borehole record (BGS Ref: ST88NE51) is located approximately 20m north-

west of Lime Down B (Eastings and Northings: 387300, 185200). The borehole record indicates that the following geology was encountered:

- Medium yellow clay with some white chalk to 2m bgl;
- Medium grey mudstone clay from 2m to 3m bgl;
- Medium hard grey/yellow limestone from 3m to 16m bgl;
- Medium grey mudstone with white chalk from 16m to 19m bgl;
- Medium yellow sandy limestone from 19m to 22m bgl;
- Medium grey limestone & yellow limestone from 22m to 52m bgl;
- Medium grey limestone and clays from 52m to 72m bgl; and
- Multiple water strikes were recorded within this borehole record at depths of 22m, 28m, 31m, 46m, and 62m.

- 1.7.5 It should be noted that, given the size of Lime Down B, this borehole record may not accurately represent the overall geology of the Site.

1.8 Hydrogeology

- 1.8.1 According to the EA's Aquifer Designation data, obtained from MAGIC Map's online mappingⁱⁱ [accessed 02/06/25], the Alluvium and Head Deposits are classified as a Secondary A Aquifer.

- 1.8.2 The underlying Bedrock is described as a Secondary A Aquifer.

- 1.8.3 The EA's 'Source Protection Zones' data, obtained from MAGIC Map's online mapping [accessed 02/06/25], indicates that Lime Down B is located within a Groundwater Source Protection Zone.

1.9 Proposed Site Conditions

- 1.9.1 Lime Down B proposes a ground mounted solar photo-voltaic plant and associated electrical infrastructure and access. See **ES Volume 1, Chapter 3: Scheme Description [EN010168/APP/6.1]**.

- 1.9.2 An **Outline Landscape and Ecological Management Plan (LEMP) [EN010168/APP/7.18]** has been developed to support the DCO application, and details that the vast majority of the Site is proposed to be utilised for Solar PV Panels, supporting infrastructure, internal access and peripheral areas will comprise landscaped buffers in line with the embedded mitigation 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 B.

2.2 Tidal Flood Risk

2.2.1 Lime Down B is situated at a minimum of approximately 84m 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)ⁱⁱⁱ, Lime Down B is situated wholly in Flood Zone 1, meaning it is an area considered to have <0.1% annual probability of flooding from rivers or the sea. Flood maps are included as Figure 5 below and **ES Volume 2, Figure 11-2: Lime Down B Fluvial and Surface Water Risk Map [EN010168/EXAM/6.2] (Rev 2)** produced at Deadline 3 of Examination.

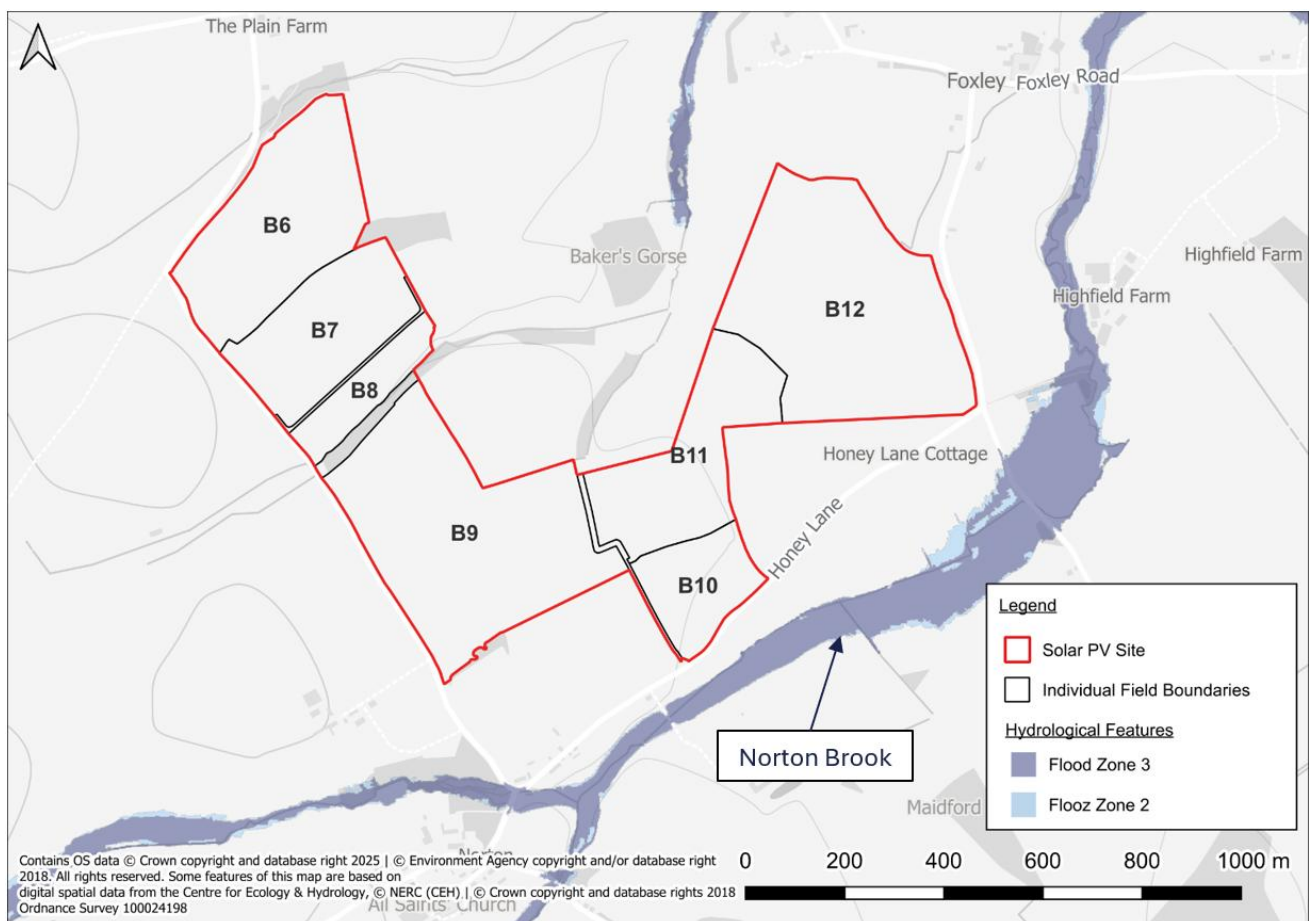


Figure 5: EA's Flood Map for Planning

2.3.2 The Norton Brook channel is located approximately 50m south of Lime Down B at its closest point. Additionally, a network of land drainage ditches is present both on-site and in the immediate vicinity (approximately within 200m) of Lime Down B. Based on the local topography, flows within these ditches

move in a north-easterly direction. All the land drainage ditches are classified as Ordinary Watercourses and fall under the jurisdiction of the Wiltshire Council LLFA.

- 2.3.3 Flow paths identified on the EA's Long Term Flood Risk Map (Surface Water)^{iv} identify the potential flood extent of Norton Brook and the land drainage ditches described above. These maps (updated in January 2025) are considered to effectively illustrate the potential extent of fluvial flooding
- 2.3.4 Fluvial flooding could occur if the land drainage ditches overtop their banks during or following an extreme rainfall event. To estimate flood levels for a 1% Annual Exceedance Probability (AEP) event with a 71% climate change allowance^v, Manning's open channel flow formula was applied. A detailed explanation of the calculation, including sources of data and the chosen coefficients, is provided in Annex B. This method was selected as it provides a practical estimate of flow characteristics based on channel shape, roughness, and gradient, particularly where detailed hydraulic modelling has not been undertaken. Cross-sectional data from EA LiDAR, captured in Q1 2020 and detailed in Annex B, informed the calculations. The estimated flood levels suggest limited extents, expected to be smaller than those shown on the EA's 0.1% surface water mapping. This mapping is referenced for context only and was not used as an input to the calculation. The estimated flood extents derived from the Manning's assessment are anticipated to be more limited in extent than those indicated by the EA's 0.1% AEP surface water mapping. The EA mapping has therefore been used as a precautionary indication of potential exceedance flow routes and extents only, with the 1% AEP plus climate change Manning's assessment adopted as the basis for the design event assessment.
- 2.3.5 It is noted that the Manning's calculation was completed prior to the release of updated NaFRA2 mapping in January 2025. The revised mapping shows a reduction in surface water flood extents across the Site. This supports the view that the current Manning's calculation remains conservative, and there is no requirement to update it.
- 2.3.6 The EA's 'Historical Flood Map' shows no recorded incidents of historical flooding at Lime Down B; however, this does not confirm that Lime Down B has never flooded and only that no documented records exist.
- 2.3.7 There is no site-specific information in third-party reports regarding fluvial flood risk at Lime Down B or in the immediate vicinity.
- 2.3.8 Based on the analysis, the surface water flood maps offer a suitable and conservative basis for assessing fluvial flood risk at Lime Down B. A more detailed exploration of surface water flood risks can be found in Section 2.4.
- 2.3.9 Lime Down B is not located within a Flood Warning Area.

Consultation

- 2.3.10 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 C. 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 C. The JFLOW mapping shows that at Lime Down B, flood depths on-site and in the immediate vicinity, identified as Flood Zone 3, are all below 0.5m during both the 1% and 0.1% Annual Exceedance Probability scenarios, while the remainder of the Site is not expected to experience any flood depths.

2.3.11 Consultation has been undertaken throughout the EIA process with the EA and Wiltshire Council. Comments and recommendations received have been noted and applied throughout this Flood Risk Assessment and Drainage Strategy. A record of consultation and the Applicants responses are included in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]**.

2.3.12 Lime Down B is not located within an Internal Drainage Board (IDB).

Summary

2.3.13 Lime Down B is considered to be at **Low** risk of fluvial flooding.

2.4 Surface Water Flood Risk

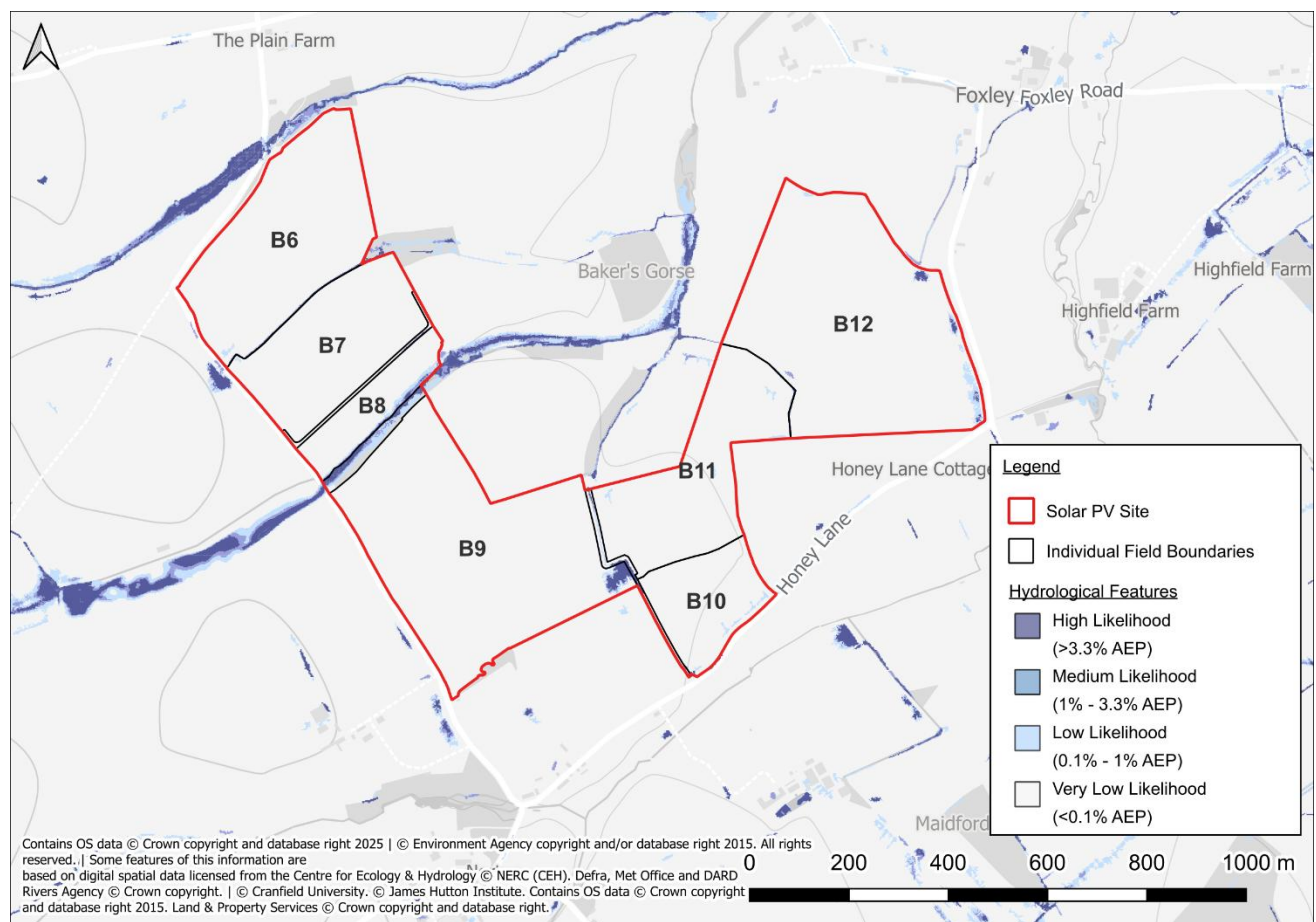


Figure 6: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)

2.4.1 The EA's National Flood Risk Assessment Mapping (NaFRA), known as the 'Long Term Flood Risk Map'

(Surface Water), 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) indicates that the majority of Lime Down B 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 (between 1% and 0.1% AEP) to High risk (> 3.3% AEP) between Fields B8 and B9.
- 2.4.3 The extents of surface water flooding largely follow the courses of the unnamed land drainage ditch located in the immediate vicinity (approximately within 200m) of Lime Down B.
- 2.4.4 Depths are predicted to remain below 300mm during all scenarios across the majority of Lime Down B. Depths of below 300mm are considered passible by vehicles and people, therefore Lime Down B is deemed passible. Depths are not shown to exceed 600mm anywhere within the Site.
- 2.4.5 There is no indication within relevant third-party reports (listed in 'Sources of Information' on the main body of **ES Volume 3, Appendix 11-1: Flood Risk Assessment and [Outline Drainage Strategy – Covering Report \[EN010168/APP/6.3\]](#)**) to suggest that Lime Down B has historically experienced surface water flooding.
- 2.4.6 Based on the above and considering the embedded mitigation as part of the design of the solar panels, the overall risk of surface water flooding is considered to be Low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately waterproofed, thereby reducing the potential to be impacted in the event of surface water flooding.
- 2.4.7 Associated electrical infrastructure, such as inverters, transformers, cabling and substations, will be located outside mapped flood extents where feasible, or otherwise elevated above the design flood level with appropriate freeboard, in line with the embedded mitigation strategy outlined in **Appendix 11.1: Flood Risk Assessment and [Outline Drainage Strategy – Covering Report \[EN010168/APP/6.3\]](#)**.
- 2.4.8 Smaller electrical components such as conversion units, where present, are minor in scale and will be protected through elevation or localised resilience measures, consistent with the approach set out in the Covering Report.
- 2.4.9 The impact of the Scheme on surface water risk is covered in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and [Outline Drainage Strategy – Covering Report \[EN010168/APP/6.3\]](#)** to ensure that surface water risk is not exacerbated through appropriate Sustainable Drainage Systems (SuDS) measures.

2.5 Groundwater Flood Risk

- 2.5.1 The geology is identified above in Section 1.0. There were no legible boreholes in the near vicinity.
- 2.5.2 The Wiltshire Strategic Flood Risk Assessment (SFRA) (listed in the 'Sources of Information' section of the main body of **ES Volume 3, Appendix 11-1: Flood Risk Assessment and [Outline Drainage Strategy – Covering Report \[EN010168/APP/6.3\]](#)**) interactive map^{vi} indicates that groundwater levels across

the majority of Lime Down B range from 0.025m to 0.5m below ground level (bgl). It is stated that within this zone, there is a risk of groundwater flooding to both the surface and subsurface, resulting in the potential for groundwater to emerge at the surface. No buildings and no basement levels are identified on plans which may otherwise be at increased risk from groundwater seepage.

- 2.5.3 Based on the above and considering the embedded mitigation as part of the design of the Solar PV Panels, the overall risk of groundwater flooding is considered to be Low. The proposed Solar PV Panels and other electrical infrastructure, such as inverters, transformers and cabling which is to be sat on a concrete foundation/pad that will be raised above surrounding ground levels and will be appropriately waterproofed thereby reducing the potential to be impacted in the event of groundwater flooding.

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 the rural setting of Lime Down B, the presence of sewerage infrastructure is unlikely. Utility records have been checked and no public sewers are identified as within Lime Down B.
- 2.6.3 It can therefore be concluded that the risk of sewer flooding is **Negligible**, therefore no further mitigation is required.

2.7 Reservoir and Canal Flooding

- 2.7.1 There are no canals within the vicinity of Lime Down B and, therefore, there is no associated risk.
- 2.7.2 The EA 'Flood Risk from Reservoirs' map shows that Lime Down B 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 further mitigation is required.

2.8 Residual Flood Risks

- 2.8.1 A residual risk is an exceedance event, such as the 1 in 1000 year (0.1% AEP) flood event that would overtop Norton Brook or the surrounding land drainage ditches and potentially impact the Lime Down B. 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 additional mitigation beyond the embedded mitigation measures of the Scheme is required.
- 2.8.2 In the event of the defences failing or an exceedance event occurring, the residual risk to people working or present in the vicinity, as construction workers, residents, or Public Right of Way (PRoW) users, within Lime Down B can be managed through the implementation of an appropriate Site management plan. This plan will recognise the residual risks and outline the actions to be taken by staff in the event of a flood to ensure that occupants are placed in a place of safety.

2.9 Summary of Flood Risk

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

2.9.2 During the construction phase, temporary works and construction activities will be managed to maintain existing floodplain storage, floodplain capacity and overland flood flow routes. Temporary compounds, plant and material storage will be located outside areas identified as potentially susceptible to flooding where reasonably practicable, and construction activities will be undertaken in accordance with the **Outline CEMP [REP2-019]** to ensure flood risk is not increased elsewhere.

2.10 Embedded Mitigation

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

2.11 Impact on Off-Site Flood Risk

2.11.1 The Solar PV Panels and associated electrical infrastructure, including inverters, transformers, cabling, and substations, will, where possible, be located outside the flood extent. If this is not feasible, they will be elevated with appropriate freeboard above the local flood level. These components will be installed on concrete foundations or pads mounted on frames, allowing floodwater to flow freely underneath. This approach prevents any loss of floodplain volume and ensures there is no increase in flood risk elsewhere - areas where panels are proposed in Flood Zones 2 / 3 have undergone the appropriate floodplain storage calculations – see **ES Volume 3, Appendices 11-6 and 11-8: Flood Risk Assessment and Drainage Strategy – Lime Down D and Lime Down E2 [EN010168/APP/6.3]**. The components are insignificant in size with detailed dimensions provided in **ES Volume 1, Chapter 3: Scheme [EN010168/APP/6.1]**. Additionally, any units incorporating hardstanding [surfaces](#) will feature SuDS measures to mitigate any increase in surface water runoff. Together, these measures ensure the Scheme does not contribute to an increase in flood risk.

2.11.2 Surface water management has been considered in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and [Outline Drainage Strategy – Covering Report \[EN010168/APP/6.3\]](#)**.

3. Outline Drainage Strategy

3.1.1 Lime Down B forms part of the wider Scheme and includes Solar PV Panelled Areas and eight Conversion Units / 33kV Sub-distribution Switch Rooms. This section provides the Outline Drainage Strategy for Lime Down B. It identifies the areas requiring formal drainage consideration, sets out the basis of the runoff and attenuation calculations, and demonstrates that a feasible drainage solution can be accommodated within the assessed design envelope. Lime Down B will remain largely permeable following development. Solar PV infrastructure is not treated as contributing to the overall extent of positively drained hardstanding surfaces for the purposes of this Outline Drainage Strategy.

3.1.2 For the purpose of this assessment, this Outline Drainage Strategy is split as follows:

- A description of surface water drainage from the Solar PV Panelled Areas excluding the Conversion Units / 33kV Sub-distribution Switch Rooms; and
- An outline drainage strategy for the positively drained hardstanding surfaces, comprising the Conversion Units / 33kV Sub-distribution Switch Rooms. The detailed drainage layout, final SuDS components, conveyance routes, levels, outfalls, flow controls, treatment train and maintenance regime will be confirmed at detailed design and secured through the relevant DCO drainage requirement.

3.2 Solar PV Panelled Areas

3.2.1 Solar PV panelled areas are not treated as formal impermeable drainage catchments within this Outline Drainage Strategy. The panels are elevated above ground level, drain to the existing ground, are not sealed into a drainage network, and do not create a connected impermeable surface.

3.2.2 This approach is supported by national policy and the submitted evidence base. **NPS EN-3 paragraph 2.10.84** recognises that solar PV panels drain to the existing ground and that the drainage impact will not, in general, be significant. This position is also addressed in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [REP3-015]**, **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy - Covering Report [REP3-048]** and the **Applicant's Response to the Lead Local Flood Authority on Hydraulic Modelling Requirements [REP2-045]**.

3.2.3 The Applicant's review of the relevant research and guidance confirms that, where vegetated ground cover is established and maintained, soil compaction is avoided or remediated, and connected preferential flow routes are not created, solar PV panels are not predicted to increase surface water runoff rates or volumes in a manner that requires formal attenuation.

3.2.4 The principal effect of the panels is local redistribution of rainfall within the same field, including potential concentration at panel drip-lines. This does not generate additional rainfall volume. Whether redistributed rainfall becomes runoff is governed by the condition of the receiving ground, including vegetation cover, soil structure, compaction, surface roughness, slope and hydrological connectivity.

3.2.5 Those controlling factors are addressed through the embedded mitigation secured for the Scheme. Construction phase controls are secured through **the Outline Construction Environmental Management Plan [REP3-092]** and **Outline Soil Resources Management Plan [REP3-098]**, including

controls on construction trafficking, soil handling, temporary drainage, decompaction and reinstatement. Operational ground cover and land management controls are secured through the **Outline Landscape and Ecological Management Plan [REP3-100]** and **Outline Operational Environmental Management Plan [REP3-094]**, including the establishment and maintenance of vegetated ground cover beneath and between the arrays.

3.2.6 On this basis, no formal attenuation storage is proposed for the solar PV panelled areas. Additional built SuDS across the panelled fields would not be proportionate, as the policy and evidence base indicate that solar PV panels do not materially increase surface water runoff where the relevant ground condition, vegetation and flow connectivity controls are secured. The Outline Drainage Strategy for these areas is therefore to maintain diffuse drainage to the existing ground, preserve existing field-scale flow behaviour, protect existing drainage features, and manage soil and vegetation condition through the secured construction and operational controls. Internal access tracks within the Solar PV Panelled Areas will be formed using permeable materials and, where practicable, maintained at existing ground levels. These tracks are not treated as positively drained hardstanding surfaces requiring formal attenuation.

Drainage Strategy – Proposed Hardstanding Surfaces

3.2.7 Lime Down B currently comprises agricultural land. For the purposes of the runoff calculations, the undeveloped areas are treated as greenfield and permeable, with existing field drainage and local drainage features forming part of the baseline drainage regime. Table 1 identifies the assessed hardstanding surfaces within Lime Down B. These areas have been included within this Outline Drainage Strategy because they would either be positively drained or have been conservatively assessed as requiring positive drainage.

Table 1: Proposed Hardstanding Surfaces

Hardstanding Infrastructure	Hardstanding Area (m ²)
Conversion Units / 33kV Sub-Distribution Switch Rooms	600

3.2.8 The assessed hardstanding surfaces have been identified using the indicative infrastructure areas currently proposed for Lime Down B, or, where the final equipment layout is not fixed, the relevant maximum design parameters set out in **ES Volume 1, Chapter 3: The Scheme [APP-055]**. Where the Works Plan envelope or indicative infrastructure area is smaller than the relevant Chapter 3 maximum parameter, the assessed area has been limited to the area that can feasibly be accommodated within Lime Down B. This provides a conservative but realistic basis for demonstrating that the required drainage infrastructure can be delivered within the assessed design envelope.

3.2.9 The assessed hardstanding surfaces have the potential to increase surface water runoff rates and volumes if unmanaged. Surface water runoff from these areas will therefore be controlled so that the Scheme does not result in a material increase in flood risk on-site or elsewhere.

3.2.10 Wiltshire Council Sustainable Drainage Systems (SuDS) Guidance states the following:

“With regards the control of surface water discharges from new development, Wiltshire Council requires post development discharges from greenfield sites to provide 30% betterment over pre-development discharges for all storm events between the 1 in 1year and 1 in 100year return period events”.

3.2.11 A fixed detailed drainage layout drawing or sketch is not submitted at this outline stage. The purpose of this Outline Drainage Strategy is to demonstrate that a feasible drainage solution can be accommodated within Lime Down B based on the assessed hardstanding surfaces, greenfield runoff rates, controlled discharge rates, indicative attenuation volumes, SuDS options and maintenance principles. The detailed drainage design, including the final layout, levels, outfall arrangement and maintenance access, will be submitted and approved in accordance with the relevant DCO drainage requirement before the relevant part of the authorised development commences.

3.3 Drainage Hierarchy

3.3.1 The proposed surface water drainage strategy has been prepared in accordance with the drainage hierarchy set out in the National Standards for Sustainable Drainage Systems (SuDS) and in line with Paragraph 080 of the National Planning Practice Guidance (NPPG): Flood Risk and Coastal Change. The hierarchy prioritises reuse and infiltration where feasible, followed by discharge to an above-ground surface water body, discharge to a surface water sewer or other surface water drainage system, and finally discharge to a combined sewer.

3.3.2 The following drainage hierarchy review considers normal operation. In the event of a potential pollution incident, where relevant, the drainage system would be isolated and managed in accordance with the relevant containment strategy.

3.3.3 The hierarchy establishes the following order of preference for runoff destinations:

- **Priority 1:** Collect surface water for reuse within the development (e.g. irrigation or non-potable supply).
- **Priority 2:** Infiltrate runoff to the ground, where ground conditions and groundwater levels permit.
- **Priority 3:** Discharge runoff to an above-ground surface water body such as a watercourse, pond or wetland.
- **Priority 4:** Discharge runoff to a surface water sewer, highway drain or other drainage system.
- **Priority 5:** Discharge runoff to a combined sewer.

3.3.4 Where higher levels of the hierarchy cannot be achieved, proportionate justification must be provided to demonstrate compliance with national policy while ensuring effective flood risk management and long-term sustainability.

Priority 1: Surface Water Collected for non-Potable Use

3.3.5 Rainwater harvesting has been considered for the proposed development. However, Lime Down B does not include a sustained non-potable demand capable of receiving and using runoff from the positively drained hardstanding surfaces during design rainfall events. Reuse therefore cannot provide the sole means of disposal, and a secondary discharge route is required.

Priority 2: Surface Water Infiltrated to Ground

3.3.6 Where surface water collected for non-potable use (Priority 1) cannot be the sole method of disposal, the next consideration is infiltration (soakaways and permeable surfaces).

3.3.7 Lime Down B is underlain by the following superficial deposits:

- Alluvium (Clay, Silt, Sand & Gravel);
- Head (Clay, Silt, Sand & Gravel); and
- No superficial deposits.

3.3.8 Additionally, Lime Down B is also identified as being underlain by the following bedrock deposits:

- Forest Marble Formation (Mudstone);
- Cornbrash Formation (Limestone); and
- Kellaways Clay Member (Mudstone).

3.3.9 Soils mapping describes the majority of the Site, including the area where the Conversion Units / 33kV Sub-distribution Switch Rooms are proposed, as having “lime-rich loamy and clayey soils with impeded drainage”.

3.3.10 In line with the National Standards for SuDS, infiltration should only be used where ground conditions are suitable, groundwater is protected, and land stability is not compromised. The available ground condition information indicates that infiltration potential is likely to be limited, with impeded drainage soils and mudstone bedrock reducing the likelihood of reliable long-term soakaway performance.

3.3.11 Infiltration is therefore not considered suitable as the primary method of surface water disposal for the Conversion Units / 33kV Sub-distribution Switch Rooms drainage catchment. This avoids relying on soakaways where ground conditions are unlikely to provide adequate infiltration capacity, particularly during prolonged or high intensity rainfall.

3.3.12 This does not preclude the use of permeable surfaces, shallow filter drains or local French drain arrangements as source-control features for small, discrete areas of supporting infrastructure, where appropriate. Such features would manage small volumes locally and would not be relied upon as the primary outfall for the Conversion Units / 33kV Sub-distribution Switch Rooms drainage catchment.

Priority 3: Discharge to an Above Ground Surface Water Body

3.3.13 Where surface water collected for non-potable use (Priority 1) cannot be the sole method of disposal, and infiltration to ground (Priority 2) has been demonstrated to be unsuitable, discharge to an above ground waterbody should be the next consideration.

3.3.14 The nearest watercourse is an unnamed land drain located within the western extent of Lime Down B. Discharge to this watercourse at controlled rates is considered feasible by gravity for the majority of the Site, subject to detailed design of the outfall arrangement and any necessary approvals.

Priority 4: Discharged to a Surface Water Sewer, or Another Piped Surface Water Drainage System

3.3.15 As described above, discharge to the unnamed land drain appears feasible; therefore, a connection to a public surface water sewer is not proposed. Should detailed design demonstrate that direct discharge to

the watercourse is not feasible, alternative lower-priority destinations would be reviewed in accordance with the drainage hierarchy and subject to the relevant approvals.

Priority 5: Discharge to a Combined Sewer

3.3.16 As described above, discharge to the unnamed land drain appears feasible; therefore, discharge to a combined sewer is not proposed.

3.4 Surface Water Discharge

3.4.1 In accordance with the 2025 National Standards for SuDS in England Guidance, runoff destinations have been assessed following the required hierarchy.

3.4.2 As infiltration is not considered suitable as the primary discharge route for the Conversion Units / 33kV Sub-distribution Switch Rooms drainage catchment, runoff from the positively drained hardstanding surfaces will be attenuated on site and discharged at controlled rates to the unnamed land drain in line with greenfield runoff principles and the LLFA requirement for 30% betterment. This is subject to the use of minimum practical flow controls where very small catchments would otherwise require flow control orifices that would be at unacceptable risk of blockage.

3.4.3 Greenfield runoff rates have been calculated for each assessed hardstanding surfaces using the FEH Statistical (2025) method and are summarised in Table 2. The proposed discharge rates and associated attenuation volumes are indicative and have been prepared using the indicative infrastructure areas currently proposed, or the maximum relevant design parameters set out in ES Volume 1, Chapter 3: The Scheme [APP-055] where the final equipment layout is not fixed. Where the Works Plan envelope or indicative infrastructure area is smaller than the relevant Chapter 3 maximum parameter, the assessed area has been limited to the area that can feasibly be accommodated within Lime Down B. Greenfield calculation input parameters and results are provided in Annex D.

3.4.4 This approach demonstrates that a feasible drainage solution can be accommodated within Lime Down B and that peak runoff from positively drained hardstanding surfaces can be controlled so that the Scheme does not result in a material increase in flood risk on-site or elsewhere. The attenuation volumes are indicative and are provided to demonstrate the feasibility of the Outline Drainage Strategy. The final drainage design may rationalise the number, location and form of SuDS components, provided the detailed design remains within the assessed design envelope and achieves the drainage principles secured through the relevant DCO drainage requirement.

Table 2: Greenfield Runoff Rates

Infrastructure	1 in 2 year (l/s)	1 in 30 year (l/s)	1 in 100 year (l/s)	1 in 2 year +30% betterment (l/s)	Proposed Discharge Rate (l/s)	Attenuation (m³)
Conversion Unit / 33kV Sub-distribution Switch Room, per unit	0.2	0.5	0.6	0.1	0.1	6.1

** For very small drainage catchments, the calculated 30% betterment discharge rate may require a flow control orifice below the minimum practical size, which would increase blockage risk and reduce long-term reliability. A minimum practical flow control rate may therefore be adopted where required. The final flow control arrangement will be confirmed at detailed design, with appropriate blockage protection, maintenance access and upstream attenuation.*

In order to achieve the negligible runoff rates, any flow control device would have to have a minimal orifice diameter that would be at significant risk of blockage and failure. As per the National standards, any flow control with an orifice diameter of less than 50mm is considered to be at increased risk of and require robust protection from blockage. Therefore, it is proposed to restrict the discharge rate to 1.0l/s to reduce the chance of blockage.

3.5 Sustainable Drainage Systems

3.5.1 The SuDS appraisal approach outlined in the SuDS Manual (C753) has been applied to determine the most suitable methods for achieving sustainable surface water attenuation and conveyance to support the proposed development. The SuDS options summarised in Table 3 below have been considered:

Table 3: SuDS Options for Proposed Development

SuDS Measure	Amenity Benefit	Biodiversity Benefit	Suitability for Proposed Development	Reasoning
Soakaways	Although soakaways are typically below ground, they can contribute to amenity by allowing the land above to be used for landscaping or recreation. When integrated with visible SuDS features or planting, they can enhance the visual quality of a site and support multifunctional, attractive spaces.	Soakaways support biodiversity indirectly by promoting groundwater recharge and maintaining natural hydrological conditions. When combined with vegetated SuDS components, they can enhance habitat connectivity and contribute to ecological networks across a site.	X	As described above, the use of soakaways is not considered to be feasible.
Swales, Detention Basins and Ponds	Swales, detention basins and ponds contribute positively to site amenity by providing visually attractive, multifunctional spaces that enhance the quality and character of a development. These features can be integrated within the landscape as green corridors, linking open spaces and promoting interaction between people and water. When appropriately designed, they offer opportunities for recreation, education and visual interest, creating a more appealing and liveable environment.	Swales, detention basins and ponds deliver significant biodiversity value through the provision of varied and connected habitats. Swales function as linear green corridors, enabling wildlife movement and supporting diverse vegetation. Detention basins create temporary wetland conditions that benefit a range of species, while ponds provide permanent aquatic and marginal habitats supporting invertebrates, amphibians and birds. Collectively, these features enhance habitat diversity, strengthen ecological connectivity and contribute to	✓	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 topographic lower levels.

		the establishment of a resilient green-blue network across the site.		
Filter Drains/ Strips	Filter drains and filter strips can contribute to site amenity by creating attractive, vegetated edges that soften hard surfaces and integrate drainage within the landscape. When aligned along roads or paths, they form part of functional green corridors that enhance visual quality and support a sense of place.	These features provide ecological value through vegetated zones that support invertebrates and small fauna. When linked with other SuDS components, they strengthen habitat connectivity and contribute to the wider green-blue network promoted within the SuDS approach.	✓	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	Bioretention systems, including rain gardens and bioretention planters, provide attractive, vegetated features that enhance the streetscape and create visually appealing focal points within developments. They contribute to high-quality, multifunctional spaces by integrating drainage into the landscape and improving the relationship between people, water and planting.	These systems deliver biodiversity value through diverse planting and soil conditions that support pollinators, invertebrates and small fauna. They also play a key role in improving water quality by filtering and treating pollutants from surface runoff before infiltration or discharge. Collectively, they enhance ecological connectivity and contribute to the wider green-blue infrastructure.	✓	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 stage.

Rainwater Harvesting	Rainwater harvesting systems can contribute to site amenity by visibly demonstrating sustainable water management and promoting environmental awareness. When integrated within building or landscape design, they can enhance the character of a development by supporting water features, irrigation, or other non-potable uses that add functional and aesthetic value to spaces.	By reducing surface water runoff, rainwater harvesting systems help protect downstream SuDS features and receiving watercourses from pollution and erosion. Stored water can also be used to support planting and green infrastructure, indirectly benefiting biodiversity through improved vegetation health and habitat provision.	X	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	Green roofs enhance the visual quality of buildings and contribute to the creation of more attractive and liveable urban environments. They can provide accessible or visual green spaces within dense developments, offering opportunities for recreation, relaxation, and improved wellbeing while demonstrating sustainable design in practice.	Green roofs support biodiversity by providing valuable habitats for invertebrates, birds, and pollinators, particularly where native or species-rich planting is used. They also improve water quality and reduce runoff rates by capturing, filtering, and slowly releasing rainfall, supporting the wider SuDS objectives of managing water quantity, quality, and ecology.	X	Green roofs are not identified on development 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 (infiltration)	Porous and permeable surfaces can enhance the quality and functionality of developed areas by integrating drainage directly into hardstanding such as car parks, footpaths and access roads. They maintain a natural appearance, reduce surface water ponding, and	Infiltration-based permeable surfaces promote natural groundwater recharge and improve water quality by filtering and retaining pollutants within the sub-base before infiltration. When combined with adjacent vegetated SuDS features, they can contribute to	X	Controlled drainage measures, including sealed surfacing or sealed drainage components where required, can be incorporated where infiltration to ground is not appropriate or where additional protection of controlled waters is required.

	contribute to safer, more attractive public spaces while supporting the seamless integration of SuDS within the built environment.	habitat connectivity and support the wider green-blue network across a site.		
Porous/ Permeable Surfacing (Lined)	Lined porous and permeable surfaces provide an attractive, functional drainage solution that manages runoff close to source while maintaining the appearance and usability of hardstanding areas such as car parks, courtyards and footpaths. They support high-quality, multi-functional urban design by integrating water management within the built environment without detracting from site amenity.	Although infiltration is prevented, lined permeable surfaces still contribute to SuDS objectives by providing effective pollutant removal through filtration and sedimentation within the surface and sub-base layers. By controlling and treating runoff before discharge to other SuDS components, they protect downstream water quality and can indirectly support biodiversity by maintaining cleaner flows to connected green-blue infrastructure.	✓	
Underground Attenuation Tanks / Geocellular Storage / Oversized Pipes	Underground attenuation tanks and geocellular storage systems provide essential runoff control while preserving the use and appearance of surface areas. By locating storage below ground, they enable land above to be used for landscaping, parking, or recreation, supporting efficient land use and maintaining overall site amenity.	These systems offer limited direct biodiversity value but can contribute indirectly by facilitating above-ground green spaces and protecting downstream SuDS features. When designed with pre-treatment measures, they assist in pollutant removal, improving water quality prior to discharge and supporting the performance of connected ecological SuDS components.	X	Underground attenuation storage is not proposed, as alternative SuDS features have been selected that provide sufficient on-site attenuation while offering additional water quality, amenity, and biodiversity benefits.

3.6 Attenuation Storage

Extreme Rainfall

- 3.6.1 Attenuation storage will be required to manage surface water runoff from the positively drained hardstanding surfaces and achieve the controlled discharge rates set out below. A combination of SuDS features, and flow control devices is proposed to manage surface water runoff at Lime Down B.
- 3.6.2 The hardstanding surfaces requiring positive drainage have been identified using either the indicative area of the infrastructure proposed at Lime Down B, or, where the final equipment layout is not fixed, the relevant maximum design parameters for that equipment set out in **ES Volume 1, Chapter 3: The Scheme [APP-055]**. The calculations are therefore conservative and are provided for illustrative purposes to demonstrate that a feasible drainage solution can be accommodated within Lime Down B and within the assessed design envelope. A fixed detailed drainage layout drawing or sketch is not submitted at this outline stage, as the final drainage layout will depend on the detailed design of the Conversion Units / 33kV Sub-distribution Switch Rooms and associated drainage features.
- 3.6.3 Greenfield runoff rates have been calculated for each assessed hardstanding surface. The proposed discharge rates have then been restricted in accordance with the LLFA drainage requirement, with attenuation storage sized to manage runoff up to and including the 1% AEP plus 45% climate change event.
- 3.6.4 The Conversion Units / 33kV Sub-distribution Switch Rooms comprise small, discrete areas of supporting electrical infrastructure. Switchgear comprises electrical disconnect switches, fuses and circuit breakers used to control, protect and isolate electrical equipment. For the purposes of this assessment, runoff calculations have been based on the maximum 15m by 5m footprint for Integrated Conversion Units / 33kV Sub-distribution Switch Rooms defined in **ES Volume 1, Chapter 3: The Scheme [APP-055]**, equivalent to 75m² per unit. This provides a conservative basis for assessment.
- 3.6.5 For an individual 75m² unit, the calculated runoff rate is very low, with a proposed discharge rate of approximately 0.1l/s and an indicative local storage volume of approximately 6.1m³. Across Lime Down B, the cumulative assessed area of Conversion Units / 33kV Sub-distribution Switch Rooms is 600m². The calculated cumulative greenfield runoff rates are 0.2l/s for the 1 in 2 year event, 0.5l/s for the 1 in 30 year event and 0.6l/s for the 1 in 100 year event. The proposed cumulative discharge rate is 0.1l/s, with a cumulative storage requirement of 54.9m³.
- 3.6.6 Given the small contributing area, low calculated runoff rates and dispersed nature of the infrastructure, it is not considered proportionate to provide long piped drainage connections from each unit to a formal outfall. Runoff from each unit will therefore be managed locally using a perimeter French drain or filter drain or equivalent source-control SuDS arrangement. These features will provide local storage and source control around the equipment pads and will not be relied upon as strategic attenuation basins or as part of a wider piped drainage network.
- 3.6.7 Final dimensions, aggregate specification, freeboard and maintenance requirements for the French drains will be confirmed at detailed design, having regard to the final equipment layout and local ground conditions. This approach is consistent with the drainage hierarchy and source control principles set out

in CIRIA C753: The SuDS Manual, and avoids creating unnecessary point discharges from small, isolated areas of supporting electrical infrastructure.

3.6.8 Hydraulic calculations carried out in Causeway Flow demonstrate that the illustrative drainage approach has sufficient capacity to manage runoff from the assessed hardstanding surfaces up to and including the 1% AEP plus 45% climate change event. Key details for the proposed attenuation storage and flow control required to manage surface water runoff are summarised in the tables below. Hydraulic calculations are provided in Annex E.

Table 4: Conversion Units / 33kV Sub Distribution Switch Room (8 × 75 m²)

Contributing Area	600m ²
Flow Rate	0.1l/s
Flow Control	HydroBrake
Flow Control Design Head	1.0m
Estimated Required Volume (1 in 100 year +45%CC)	6.17m ³

Everyday Rainfall

3.6.9 In addition to managing extreme rainfall events, measures should be implemented to ensure runoff generated during more frequent everyday rainfall events is sustainably managed. For these events, where practicable, the volume of runoff generated from the first 5mm of rainfall should not leave the Site.

Table 5: Conversion Units / 33kV Sub Distribution Switch Room (8 × 75 m²)

Contributing Area	600m ²
Rainfall Depth	0.005m
Runoff Volume	3m ³
Required Additional Depth	0.03m

**The calculations above assume that the storage is provided within a basin for the purposes of illustration. The final form of storage may differ depending on the detailed layout and may include other SuDS components capable of providing equivalent storage and treatment.*

3.6.10 As shown in the tables above, the everyday rainfall volumes are limited and can be accommodated within the preferred SuDS features by providing the required additional storage depth. This allows the first 5 mm of rainfall to be retained and managed within the drainage system, through infiltration where local ground conditions permit, evaporation, evapotranspiration, or subsequent controlled release depending on the final SuDS arrangement.

3.7 Preferred Drainage Scheme

3.7.1 The viable SuDS features and associated hydraulic calculations have been reviewed above. The final extent and arrangement of hardstanding surfaces will be confirmed at detailed design; however, the calculations presented in this report have been prepared using the indicative infrastructure areas currently proposed, or the maximum relevant design parameters set out in **ES Volume 1, Chapter 3: The Scheme [APP-055]** where the final equipment layout is not fixed. The calculations are therefore

conservative and are provided to demonstrate that a feasible drainage solution can be accommodated within Lime Down B and within the assessed design envelope.

3.7.2 Greenfield runoff rates have been calculated for the assessed hardstanding surfaces and the proposed discharge rates have been restricted in accordance with the LLFA drainage requirement. The identified receiving watercourse is an unnamed land drain, within the central western extent of Lime Down B, with the indicative cumulative controlled discharge rates provided within Table 4. The proposed SuDS features will attenuate surface water runoff from the positively drained hardstanding surfaces up to and including the 1% AEP plus 45% climate change event. The final drainage design will confirm the detailed layout, attenuation volumes, flow controls, outfall arrangement, treatment train and maintenance requirements, and will ensure that peak runoff from positively drained hardstanding surfaces are controlled so that the Scheme does not result in a material increase in flood risk on-site or elsewhere.

3.8 Event Exceedance

3.8.1 The illustrative SuDS approach has been sized to manage surface water runoff from the positively drained hardstanding surfaces up to and including the 1% AEP plus 45% climate change event. Storm events in excess of this design event may result in temporary shallow exceedance flooding within lower-risk areas of Lime Down B.

3.8.2 Finished levels for sensitive electrical infrastructure and equipment plinths will be set above surrounding ground levels where practicable. Exceedance routes will be confirmed at detailed design and will direct residual flows away from critical equipment, buildings and access points where practicable, so that exceedance flooding does not result in a material increase in flood risk on-site or elsewhere.

3.9 Surface Water Treatment

3.9.1 In accordance with DEFRA's National standards for sustainable drainage systems and the Simple Index Approach as described in C753 The SuDS Manual (2015), other roofs have a 'low' pollution hazard level, with commercial yards classified as having a 'medium' pollution hazard level. The table below shows the pollution hazard indices for each land use.

Table 6: 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

3.9.2 Runoff from positively drained hardstanding surfaces will be routed through an appropriate SuDS treatment train before controlled discharge. Table 7 below demonstrates the mitigation indices for typical SuDS components that may be used within the final drainage design.

Table 7: SuDS Mitigation Indices

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Surfacing	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5

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

3.9.3 It is concluded that a suitable combination of SuDS components, such as detention basins, ponds, swales, lined permeable surfacing and/or filter drains, can provide sufficient treatment for the assessed pollution hazard indices. The final treatment train will be confirmed at detailed design and will be coordinated with the required attenuation, isolation and maintenance arrangements.

3.10 Maintenance

3.10.1 Routine inspections and maintenance of the surface water drainage system is required to ensure that the drainage infrastructure continues to operate effectively for the lifetime of the development, without increasing flood risk on or off site.

3.10.2 Maintenance of surface water drainage features will be the responsibility of the undertaker or operator. Maintenance of the operational drainage system will be carried out in accordance with the final drainage design and the principles set out in **Outline Operational Environmental Management Plan [REP3-094]**.

3.10.3 The final maintenance arrangements will be confirmed at detailed design and will reflect the final drainage components, flow controls, treatment measures, isolation valves and outfall arrangements.

3.4. Conclusions and Recommendations

3.14.1 Conclusions

~~3.1.14.1.1~~ Lime Down B comprises land for ground mounted Solar PV panels and associated electrical infrastructure.

Flood Risk

~~3.1.24.1.2~~ Lime Down B is situated wholly in Flood Zone 1, meaning it is an area considered to have <0.1% annual probability of flooding from rivers or the sea.

~~3.1.34.1.3~~ The majority of Lime Down B is at Very Low risk of surface water flooding; however, there are areas of Low to High risk across the Fields B8 and B9. Depths are associated with watercourses in the vicinity of Lime Down B and are expected to largely remain <300mm.

~~3.1.44.1.4~~ The risk of flooding from all sources has been assessed and the flood risk is considered to be **Negligible to Low** and therefore does not require Site-specific mitigation measures.

~~3.1.54.1.5~~ The Solar PV Panels will be mounted on raised frames and therefore raised above surrounding ground level allowing flood water to flow freely underneath. Therefore, there will be no loss of floodplain volume as a result of the Scheme.

Drainage Strategy

4.1.6 Solar PV panelled areas are not treated as formal impermeable drainage catchments within this Outline Drainage Strategy. The panels are elevated above ground level, drain to the existing ground, are not sealed into a drainage network, and do not create a connected impermeable surface.

4.1.7 Greenfield runoff rates have been calculated for the assessed hardstanding surfaces and the proposed discharge rates have been restricted in accordance with the LLFA drainage requirement. The identified receiving watercourse is an unnamed land drain within the central western extent of Lime Down B or align with the receiving watercourse wording used above, with the indicative cumulative controlled discharge rates provided within Table 4. The proposed SuDS features will attenuate surface water runoff from the positively drained hardstanding surfaces up to and including the 1% AEP plus 45% climate change event. In addition, the everyday rainfall volumes are limited and can be accommodated within the preferred SuDS features by providing the required additional storage depth.

4.1.8 It is concluded that a suitable combination of SuDS components, such as detention basins, ponds, swales and/or permeable surfacing, can provide sufficient treatment for the assessed pollution hazard indices.

Recommendations

~~3.1.64.1.9~~ Embedded Mitigation is detailed in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**, in which the FRA has informed.

Annexes

Annex A- Water Body Catchment Classifications Summaries

Sherston Avon Water Body Catchment Classification Summary

Classification Item	2019 Classification		2022 Classification	Cycle 3 Objectives		
	Cycle 2	Cycle 3	Cycle 3	Status	Year	Reasons
Ecological	Poor	Poor	Poor	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Biological Quality Elements	Poor	Poor	Poor	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Invertebrates	High	High	High	Good	2027 - Low Confidence	
Macrophytes and Phytobenthos Combined	Poor	Poor	Poor	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Physio-Chemical Quality Elements	Moderate	Moderate	Good	Good	2027 - Low Confidence	Disproportionately expensive: Disproportionate burdens
Acid Neutralising Capacity	N/A	N/A	N/A	Good	2015	
Ammonia (Phys-Chem)	High	High	High	Good	2015	
Dissolved Oxygen	Moderate	Moderate	N/A	Good	2015	
Phosphate	Good	Good	Good	Good	2027	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	
Supporting Elements (surface Water)	N/A	N/A	N/A	N/A	N/A	
Mitigation Measures Assessment	N/A	N/A	N/A	N/A	N/A	
Specific Pollutants	N/A	N/A	N/A	N/A	N/A	
Iron	N/A	N/A	N/A	N/A	N/A	
Manganese	N/A	N/A	N/A	N/A	N/A	
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	N/A	Good	2015	
Dioxins and dioxin-like compounds	N/A	Good	N/A	Good	2015	
Heptachlor and cis-Heptachlor Epoxide	Good	Good	N/A	Good	2015	
Hexabromocyclododecane	Good	Good	N/A	Good	2015	
Hexachlorobenzene	Good	Good	N/A	Good	2015	
Hexachlorobutadiene	Good	Good	N/A	Good	2015	
Mercury and Its Compounds	Fail	Fail	N/A	Good	2040	Natural conditions: Chemical status recovery time
Perfluorooctane sulphonate	Good	Good	N/A	Good	2015	
Polybrominated diphenyl ethers (PBDE)	Fail	Fail	N/A	Good	2063	Natural conditions: Chemical status recovery time
Priority substances	Good	N/A	N/A	Good	2015	
Cypermethrin (Priority)	Good	Good	N/A	Good	2015	
Fluoranthene	Good	Good	N/A	Good	2015	
Other Pollutants	N/A	N/A	N/A	N/A	2015	Did not require assessment

Tributary (source to conf River Sherston Avon) Catchment Classification Summary

Classification Item	2019 Classification		2022 Classification	Cycle 3 Objectives		
	Cycle 2	Cycle 3	Cycle 3	Status	Year	Reasons
Ecological	Good	Good	Good	Good	2015	
Biological Quality Elements	Good	Good	Good	Good	2015	
Invertebrates	Good	Good	Good	Good	2015	
Macrophytes and Phytobenthos Combined	Good	Good	Good	Good	2015	
Physio-Chemical Quality Elements	Good	Good	Good	Good	2015	
Acid Neutralising Capacity	N/A	N/A	N/A	Good	2015	
Ammonia (Phys-Chem)	Good	Good	Good	Good	2015	
Dissolved Oxygen	High	High	High	Good	2015	
Phosphate	Good	Good	Good	Good	2015	
Temperature	High	High	High	Good	2015	
pH	High	High	High	Good	2015	
Hydromorphological Supporting Elements	Supports Good	Supports Good	Supports Good	Supports Good	2015	
Supporting Elements (surface Water)	N/A	N/A	N/A	N/A	N/A	
Mitigation Measures Assessment	N/A	N/A	N/A	N/A	N/A	
Specific Pollutants	N/A	N/A	N/A	N/A	N/A	
Iron	N/A	N/A	N/A	N/A	N/A	
Manganese	N/A	N/A	N/A	N/A	N/A	
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	N/A	Good	2015	
Dioxins and dioxin-like compounds	N/A	Good	N/A	Good	2015	
Heptachlor and cis-Heptachlor Epoxide	Good	Good	N/A	Good	2015	
Hexabromocyclododecane	Good	Good	N/A	Good	2015	
Hexachlorobenzene	Good	Good	N/A	Good	2015	
Hexachlorobutadiene	Good	Good	N/A	Good	2015	
Mercury and Its Compounds	Fail	Fail	N/A	Good	2040	Natural conditions: Chemical status recovery time
Perfluorooctane sulphonate (PFOS)	Good	Good	N/A	Good	2015	
Polybrominated diphenyl ethers (PBDE)	Fail	Fail	N/A	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	
Other Pollutants	N/A	N/A	N/A	N/A	2015	Did not require assessment

Annex B – Manning’s Open Channel Flow Mapping

317212 Lime Down Solar B

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.

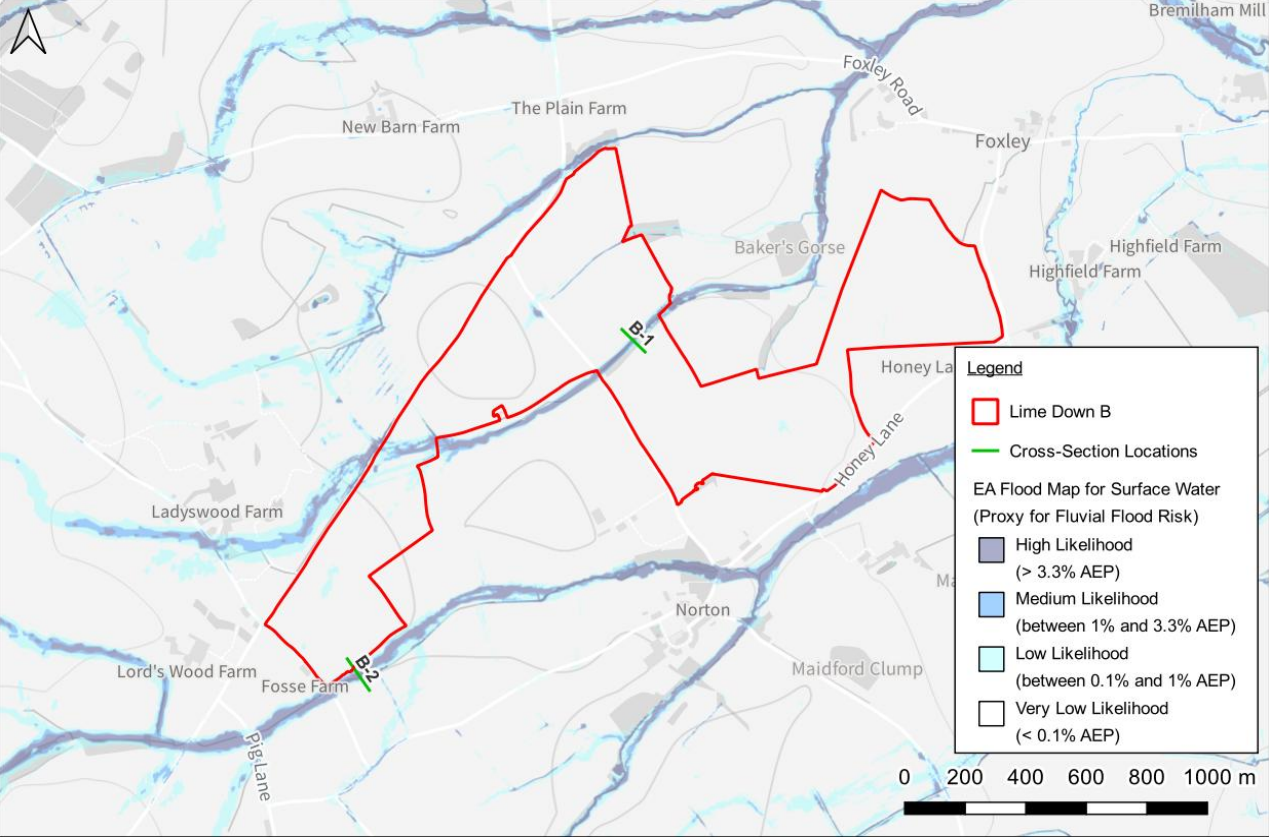
In the absence of detailed flood extent data covering the site, the extents of the EA surface water flood map (0.1% AEP event, present day) have been compared to underlying LiDAR data to provide an estimate of water levels. The surface water flood map has been used as a proxy for fluvial flooding given the similarity to the EA Flood Zone 2 extent and the additional detail it affords. The EA has since released the NaFRA2 mapping, however, a review of the flood extents indicates they are smaller across much of the study area. As such, the calculations presented here can be considered conservative.

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).

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

Cross-Section Locations



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Calculated Flows and Levels

Cross-Section	Level Description	Estimated Flood Level (m AOD)	Estimated Equivalent Flow (m³/s)	Flow +71% CC Uplift (m³/s)	Equivalent Flood Level (m AOD)
B-1	0.1% AEP EA FMFSW water level	91.25	22.3	38.1	91.46 (+211mm)
B-2	0.1% AEP EA FMFSW water level	100.60	39.2	67.0	100.81 (+211mm)

Tabulated Cross-Section Properties // B-1

(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
B-1	0.000	90.212	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0095
B-1	0.008	90.297	0.085	0.380	0.589	0.021	0.081	0.490	0.519	0.0095
B-1	0.050	90.381	0.169	0.603	0.661	0.083	0.512	0.980	1.038	0.0095
B-1	0.147	90.466	0.254	0.790	0.708	0.186	1.511	1.469	1.556	0.0095
B-1	0.317	90.550	0.338	0.957	0.742	0.331	3.253	1.959	2.075	0.0095
B-1	0.575	90.635	0.423	1.110	0.771	0.518	5.898	2.449	2.594	0.0095
B-1	0.613	90.644	0.432	1.122	0.955	0.546	6.292	3.883	4.030	0.0095
B-1	1.057	90.720	0.508	1.172	0.922	0.902	10.846	5.480	5.644	0.0095
B-1	1.642	90.788	0.576	1.246	0.900	1.318	16.851	6.738	6.917	0.0095
B-1	1.867	90.808	0.596	1.281	0.913	1.458	19.160	7.259	7.440	0.0095
B-1	3.362	90.911	0.699	1.442	0.939	2.331	34.495	9.703	9.892	0.0095
B-1	3.433	90.922	0.710	1.404	0.960	2.446	35.226	11.225	11.415	0.0095
B-1	3.563	90.929	0.717	1.411	0.960	2.526	36.553	11.468	11.659	0.0095
B-1	3.618	90.932	0.720	1.413	0.961	2.560	37.121	11.621	11.812	0.0095
B-1	3.751	90.939	0.727	1.418	0.992	2.646	38.480	12.707	12.899	0.0095
B-1	4.075	90.955	0.743	1.415	1.085	2.880	41.804	16.611	16.803	0.0095
B-1	4.251	90.963	0.751	1.408	1.105	3.019	43.611	18.256	18.449	0.0095
B-1	4.295	90.965	0.753	1.405	1.146	3.058	44.069	19.961	20.155	0.0095
B-1	4.640	90.979	0.767	1.386	1.119	3.347	47.603	21.418	21.613	0.0095
B-1	4.750	90.983	0.771	1.383	1.113	3.434	48.733	21.796	21.991	0.0095
B-1	4.807	90.986	0.774	1.373	1.133	3.502	49.317	23.412	23.607	0.0095
B-1	5.774	91.016	0.804	1.368	1.053	4.221	59.238	24.552	24.749	0.0095
B-1	6.568	91.038	0.826	1.374	1.029	4.780	67.385	26.290	26.488	0.0095
B-1	7.737	91.066	0.854	1.399	0.994	5.532	79.379	27.388	27.587	0.0095
B-1	7.915	91.070	0.858	1.402	1.015	5.645	81.208	28.995	29.194	0.0095
B-1	8.097	91.074	0.862	1.405	1.014	5.761	83.070	29.407	29.607	0.0095
B-1	8.339	91.084	0.872	1.374	1.003	6.067	85.553	31.700	31.901	0.0095
B-1	8.940	91.096	0.884	1.385	0.999	6.455	91.724	32.973	33.175	0.0095
B-1	12.856	91.163	0.951	1.473	0.940	8.726	131.899	34.809	35.017	0.0095
B-1	16.607	91.214	1.002	1.577	0.930	10.529	170.384	35.901	36.114	0.0095
B-1	22.305	91.282	1.070	1.711	0.930	13.034	228.844	37.787	38.004	0.0095
B-1	24.204	91.303	1.091	1.749	0.931	13.835	248.323	38.465	38.684	0.0095
B-1	30.732	91.368	1.156	1.875	0.937	16.388	315.304	40.113	40.337	0.0095
B-1	36.781	91.424	1.212	1.968	0.942	18.689	377.365	42.025	42.254	0.0095
B-1	41.400	91.461	1.249	2.044	0.948	20.257	424.755	42.737	42.970	0.0095

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
B-1	49.429	91.524	1.312	2.148	0.957	23.014	507.128	44.798	45.035	0.0095
B-1	54.931	91.561	1.349	2.226	0.963	24.680	563.576	45.280	45.525	0.0095
B-1	69.484	91.650	1.438	2.415	0.977	28.775	712.887	46.230	46.497	0.0095
B-1	85.537	91.740	1.528	2.596	0.992	32.956	877.592	47.181	47.469	0.0095
B-1	99.373	91.812	1.600	2.731	1.002	36.385	1019.542	48.083	48.388	0.0095
B-1	114.153	91.884	1.672	2.862	1.013	39.880	1171.188	48.985	49.306	0.0095
B-1	131.467	91.963	1.751	3.004	1.024	43.760	1348.827	49.867	50.207	0.0095
B-1	149.882	92.041	1.829	3.142	1.035	47.709	1537.753	50.749	51.108	0.0095
B-1	151.773	92.050	1.838	3.151	1.035	48.167	1557.162	51.003	51.362	0.0095
B-1	165.423	92.113	1.901	3.216	1.040	51.436	1697.201	52.797	53.162	0.0095
B-1	189.326	92.209	1.997	3.345	1.050	56.597	1942.442	54.709	55.083	0.0095
B-1	197.659	92.241	2.029	3.387	1.053	58.357	2027.939	55.353	55.731	0.0095
B-1	215.041	92.302	2.090	3.480	1.060	61.789	2206.273	56.225	56.612	0.0095
B-1	233.126	92.364	2.152	3.572	1.066	65.273	2391.827	57.097	57.492	0.0095
B-1	257.271	92.442	2.230	3.688	1.075	69.767	2639.540	58.121	58.529	0.0095
B-1	282.543	92.520	2.308	3.801	1.082	74.340	2898.827	59.145	59.565	0.0095
B-1	288.539	92.539	2.327	3.823	1.084	75.467	2960.346	59.501	59.924	0.0095
B-1	306.831	92.596	2.384	3.891	1.088	78.859	3148.018	60.542	60.971	0.0095
B-1	325.736	92.652	2.440	3.957	1.093	82.309	3341.978	61.582	62.017	0.0095
B-1	350.739	92.722	2.510	4.047	1.099	86.657	3598.509	62.659	63.103	0.0095
B-1	371.876	92.779	2.567	4.120	1.104	90.253	3815.372	63.510	63.963	0.0095
B-1	393.639	92.836	2.624	4.192	1.108	93.897	4038.653	64.362	64.822	0.0095
B-1	425.321	92.916	2.704	4.292	1.114	99.093	4363.699	65.539	66.009	0.0095
B-1	447.201	92.971	2.759	4.353	1.118	102.724	4588.181	66.510	66.987	0.0095
B-1	469.689	93.026	2.814	4.414	1.122	106.409	4818.911	67.482	67.965	0.0095
B-1	480.927	93.054	2.842	4.440	1.124	108.307	4934.207	68.074	68.560	0.0095
B-1	524.296	93.155	2.943	4.548	1.130	115.273	5379.160	69.859	70.357	0.0095
B-1	549.346	93.210	2.998	4.612	1.134	119.102	5636.176	70.663	71.168	0.0095
B-1	574.997	93.264	3.052	4.676	1.138	122.975	5899.343	71.466	71.979	0.0095
B-1	606.870	93.331	3.119	4.749	1.142	127.800	6226.352	72.557	73.078	0.0095
B-1	658.841	93.435	3.223	4.865	1.149	135.427	6759.565	74.129	74.664	0.0095
B-1	713.234	93.537	3.325	4.986	1.156	143.055	7317.624	75.438	75.989	0.0095
B-1	749.959	93.604	3.392	5.063	1.160	148.140	7694.420	76.327	76.888	0.0095
B-1	787.616	93.671	3.459	5.138	1.164	153.283	8080.769	77.215	77.786	0.0095
B-1	821.770	93.731	3.519	5.203	1.168	157.942	8431.186	78.071	78.651	0.0095
B-1	862.674	93.802	3.590	5.276	1.172	163.523	8850.854	79.157	79.746	0.0095
B-1	904.664	93.873	3.661	5.347	1.176	169.182	9281.652	80.243	80.841	0.0095
B-1	921.383	93.901	3.689	5.375	1.177	171.435	9453.192	80.692	81.294	0.0095
B-1	968.236	93.979	3.767	5.448	1.181	177.739	9933.892	81.978	82.589	0.0095
B-1	1016.425	94.056	3.844	5.520	1.185	184.142	10428.299	83.264	83.884	0.0095
B-1	1018.959	94.060	3.848	5.524	1.185	184.475	10454.302	83.328	83.949	0.0095
B-1	1081.030	94.154	3.942	5.618	1.190	192.414	11091.137	84.714	85.348	0.0095
B-1	1145.094	94.249	4.037	5.712	1.195	200.486	11748.412	86.100	86.746	0.0095
B-1	1147.140	94.252	4.040	5.714	1.195	200.744	11769.410	86.146	86.793	0.0095
B-1	1201.885	94.333	4.121	5.786	1.199	207.734	12331.084	87.502	88.158	0.0095
B-1	1258.129	94.413	4.201	5.856	1.203	214.832	12908.129	88.857	89.523	0.0095
B-1	1266.178	94.424	4.212	5.867	1.203	215.811	12990.709	89.016	89.683	0.0095
B-1	1319.404	94.495	4.283	5.940	1.207	222.133	13536.800	89.934	90.612	0.0095
B-1	1373.771	94.565	4.353	6.012	1.210	228.521	14094.592	90.852	91.541	0.0095
B-1	1429.272	94.636	4.424	6.083	1.214	234.974	14664.021	91.770	92.470	0.0095
B-1	1429.272	94.636	4.424	6.083	1.214	234.974	14664.021	91.770	92.470	0.0095
B-1	1475.183	94.699	4.487	6.126	1.216	240.796	15135.061	93.050	93.756	0.0095
B-1	1522.097	94.762	4.550	6.170	1.218	246.698	15616.389	94.330	95.042	0.0095
B-1	1545.208	94.791	4.579	6.195	1.219	249.440	15853.496	94.806	95.522	0.0095
B-1	1612.734	94.873	4.661	6.269	1.223	257.265	16546.305	96.046	96.772	0.0095
B-1	1681.882	94.955	4.743	6.342	1.226	265.192	17255.748	97.285	98.023	0.0095
B-1	1696.287	94.972	4.760	6.357	1.227	266.848	17403.535	97.554	98.294	0.0095
B-1	1753.706	95.041	4.829	6.409	1.230	273.623	17992.646	98.813	99.561	0.0095
B-1	1812.348	95.110	4.898	6.461	1.232	280.484	18594.301	100.073	100.828	0.0095
B-1	1830.671	95.131	4.919	6.478	1.233	282.589	18782.291	100.435	101.192	0.0095
B-1	1887.450	95.197	4.985	6.525	1.235	289.260	19364.826	101.704	102.468	0.0095
B-1	1945.380	95.263	5.051	6.572	1.238	296.015	19959.180	102.974	103.745	0.0095
B-1	1953.352	95.272	5.060	6.578	1.238	296.942	20040.965	103.149	103.921	0.0095
B-1	2007.796	95.334	5.122	6.618	1.240	303.377	20599.549	104.438	105.216	0.0095
B-1	2063.310	95.396	5.184	6.658	1.242	309.893	21169.117	105.728	106.512	0.0095
B-1	2074.562	95.413	5.201	6.656	1.242	311.696	21284.555	106.410	107.195	0.0095
B-1	2097.455	95.442	5.230	6.663	1.242	314.794	21519.438	107.300	108.086	0.0095

Tabulated Cross-Section Properties // B-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
B-2	0.000	99.727	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0037
B-2	0.001	99.757	0.030	0.123	0.320	0.010	0.021	0.676	0.679	0.0037
B-2	0.008	99.788	0.061	0.196	0.359	0.041	0.133	1.352	1.357	0.0037
B-2	0.024	99.818	0.091	0.257	0.384	0.092	0.391	2.028	2.036	0.0037
B-2	0.025	99.820	0.093	0.259	0.416	0.097	0.414	2.442	2.451	0.0037
B-2	0.027	99.822	0.095	0.262	0.441	0.102	0.442	2.838	2.847	0.0037
B-2	0.028	99.823	0.096	0.263	0.475	0.105	0.456	3.368	3.377	0.0037
B-2	0.030	99.826	0.099	0.255	0.593	0.120	0.503	6.352	6.362	0.0037
B-2	0.030	99.826	0.099	0.255	0.593	0.120	0.503	6.352	6.362	0.0037
B-2	0.043	99.835	0.108	0.234	0.500	0.186	0.718	8.331	8.343	0.0037
B-2	0.051	99.839	0.112	0.231	0.489	0.222	0.845	9.776	9.789	0.0037
B-2	0.066	99.845	0.118	0.229	0.466	0.286	1.084	11.568	11.583	0.0037
B-2	0.105	99.857	0.130	0.243	0.424	0.434	1.736	13.009	13.026	0.0037
B-2	0.126	99.862	0.135	0.252	0.419	0.500	2.077	13.608	13.627	0.0037
B-2	0.139	99.865	0.138	0.257	0.417	0.541	2.296	13.980	13.999	0.0037
B-2	0.168	99.871	0.144	0.267	0.416	0.628	2.775	14.937	14.959	0.0037
B-2	0.206	99.878	0.151	0.279	0.417	0.737	3.399	16.138	16.163	0.0037
B-2	0.325	99.896	0.169	0.307	0.422	1.059	5.367	19.666	19.697	0.0037
B-2	0.357	99.900	0.173	0.314	0.423	1.139	5.901	20.377	20.409	0.0037
B-2	0.392	99.904	0.177	0.321	0.423	1.222	6.477	20.788	20.822	0.0037
B-2	0.689	99.930	0.203	0.386	0.430	1.784	11.370	21.700	21.742	0.0037
B-2	1.067	99.957	0.230	0.450	0.443	2.372	17.619	22.611	22.661	0.0037

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
B-2	1.631	99.989	0.262	0.525	0.460	3.109	26.927	23.448	23.510	0.0037
B-2	2.372	100.024	0.297	0.600	0.475	3.952	39.169	24.315	24.391	0.0037
B-2	3.231	100.060	0.333	0.669	0.488	4.827	53.364	25.182	25.272	0.0037
B-2	4.206	100.095	0.368	0.734	0.499	5.732	69.458	26.050	26.153	0.0037
B-2	4.940	100.119	0.392	0.776	0.506	6.364	81.573	26.577	26.691	0.0037
B-2	6.016	100.151	0.424	0.832	0.521	7.235	99.342	27.864	27.987	0.0037
B-2	6.300	100.159	0.432	0.844	0.532	7.462	104.034	29.084	29.210	0.0037
B-2	6.483	100.164	0.437	0.852	0.539	7.610	107.051	29.839	29.967	0.0037
B-2	6.856	100.174	0.447	0.867	0.545	7.912	113.223	30.654	30.786	0.0037
B-2	7.279	100.185	0.458	0.881	0.558	8.260	120.200	32.531	32.667	0.0037
B-2	8.431	100.213	0.486	0.916	0.568	9.199	139.230	34.606	34.755	0.0037
B-2	8.690	100.219	0.492	0.924	0.570	9.409	143.510	35.207	35.359	0.0037
B-2	9.235	100.231	0.504	0.939	0.574	9.837	152.502	36.136	36.292	0.0037
B-2	9.270	100.237	0.510	0.922	0.570	10.059	153.089	37.774	37.931	0.0037
B-2	10.283	100.267	0.540	0.918	0.542	11.200	169.815	38.293	38.457	0.0037
B-2	11.173	100.283	0.556	0.945	0.550	11.820	184.506	39.184	39.351	0.0037
B-2	11.574	100.290	0.563	0.957	0.560	12.099	191.132	40.659	40.828	0.0037
B-2	11.750	100.293	0.566	0.961	0.564	12.222	194.035	41.209	41.379	0.0037
B-2	13.459	100.321	0.594	1.004	0.578	13.410	222.262	43.690	43.867	0.0037
B-2	14.492	100.337	0.610	1.026	0.584	14.119	239.314	44.843	45.025	0.0037
B-2	14.492	100.337	0.610	1.026	0.584	14.119	239.314	44.843	45.025	0.0037
B-2	16.742	100.370	0.643	1.070	0.596	15.644	276.472	47.609	47.800	0.0037
B-2	17.136	100.376	0.649	1.075	0.603	15.934	282.976	49.116	49.308	0.0037
B-2	17.424	100.380	0.653	1.080	0.604	16.132	287.727	49.561	49.753	0.0037
B-2	18.529	100.395	0.668	1.097	0.611	16.888	305.975	51.342	51.538	0.0037
B-2	18.833	100.399	0.672	1.102	0.612	17.095	311.008	51.748	51.945	0.0037
B-2	20.003	100.414	0.687	1.119	0.615	17.881	330.331	53.099	53.302	0.0037
B-2	20.564	100.421	0.694	1.126	0.617	18.255	339.585	53.715	53.921	0.0037
B-2	22.992	100.450	0.723	1.158	0.622	19.847	379.683	56.088	56.303	0.0037
B-2	23.077	100.451	0.724	1.159	0.622	19.903	381.091	56.217	56.433	0.0037
B-2	23.903	100.461	0.734	1.167	0.629	20.476	394.725	58.331	58.549	0.0037
B-2	24.251	100.465	0.738	1.171	0.631	20.710	400.472	58.958	59.178	0.0037
B-2	25.498	100.479	0.752	1.183	0.636	21.551	421.075	61.152	61.377	0.0037
B-2	25.592	100.480	0.753	1.184	0.637	21.613	422.620	61.271	61.496	0.0037
B-2	28.512	100.510	0.783	1.214	0.638	23.485	470.846	63.579	63.815	0.0037
B-2	29.635	100.521	0.794	1.225	0.638	24.189	489.384	64.313	64.552	0.0037
B-2	31.915	100.543	0.816	1.245	0.640	25.626	527.038	66.365	66.612	0.0037
B-2	32.683	100.550	0.823	1.253	0.640	26.092	539.723	66.764	67.013	0.0037
B-2	35.252	100.573	0.846	1.275	0.641	27.649	582.145	68.596	68.853	0.0037
B-2	39.188	100.606	0.879	1.309	0.641	29.943	647.144	70.428	70.697	0.0037
B-2	40.278	100.615	0.888	1.317	0.641	30.580	665.139	71.133	71.405	0.0037
B-2	42.783	100.635	0.908	1.336	0.642	32.016	706.508	72.476	72.755	0.0037
B-2	44.920	100.652	0.925	1.350	0.644	33.262	741.795	74.126	74.411	0.0037
B-2	47.776	100.673	0.946	1.372	0.644	34.830	788.965	75.208	75.501	0.0037
B-2	49.046	100.683	0.956	1.378	0.647	35.590	809.934	76.906	77.201	0.0037
B-2	49.046	100.683	0.956	1.378	0.647	35.590	809.934	76.906	77.201	0.0037
B-2	51.232	100.698	0.971	1.394	0.647	36.749	846.033	77.533	77.829	0.0037
B-2	55.471	100.726	0.999	1.425	0.646	38.934	916.032	78.571	78.868	0.0037
B-2	59.887	100.754	1.027	1.455	0.646	41.149	988.958	79.608	79.907	0.0037
B-2	61.514	100.764	1.037	1.466	0.646	41.946	1015.825	79.946	80.246	0.0037
B-2	65.382	100.787	1.061	1.491	0.647	43.837	1079.703	80.996	81.297	0.0037
B-2	69.375	100.811	1.084	1.516	0.648	45.753	1145.635	82.047	82.348	0.0037
B-2	69.900	100.814	1.087	1.520	0.648	46.000	1154.303	82.155	82.456	0.0037
B-2	70.953	100.820	1.093	1.526	0.654	46.497	1171.697	83.813	84.115	0.0037
B-2	75.565	100.848	1.121	1.546	0.652	48.865	1247.854	85.308	85.611	0.0037
B-2	81.931	100.882	1.155	1.582	0.653	51.789	1352.979	86.683	86.988	0.0037
B-2	85.613	100.901	1.174	1.602	0.654	53.443	1413.786	87.414	87.721	0.0037
B-2	90.679	100.926	1.200	1.628	0.655	55.685	1497.451	88.419	88.727	0.0037
B-2	95.898	100.952	1.225	1.655	0.656	57.953	1583.624	89.424	89.733	0.0037
B-2	97.969	100.962	1.235	1.665	0.657	58.849	1617.826	89.862	90.172	0.0037
B-2	104.821	100.995	1.268	1.695	0.659	61.846	1730.981	91.793	92.103	0.0037
B-2	106.542	101.003	1.276	1.702	0.660	62.582	1759.396	92.201	92.512	0.0037
B-2	112.167	101.028	1.301	1.728	0.661	64.898	1852.300	93.053	93.366	0.0037
B-2	117.939	101.053	1.326	1.754	0.662	67.235	1947.614	93.905	94.219	0.0037
B-2	123.255	101.076	1.349	1.777	0.663	69.356	2035.389	94.680	94.995	0.0037
B-2	128.688	101.098	1.371	1.800	0.664	71.495	2125.115	95.455	95.772	0.0037
B-2	131.631	101.110	1.383	1.812	0.665	72.643	2173.708	95.877	96.194	0.0037
B-2	137.178	101.132	1.406	1.834	0.666	74.811	2265.315	96.797	97.116	0.0037
B-2	142.845	101.155	1.428	1.855	0.667	76.999	2358.898	97.717	98.037	0.0037
B-2	151.513	101.188	1.461	1.888	0.669	80.242	2502.048	98.790	99.112	0.0037
B-2	160.070	101.220	1.493	1.919	0.671	83.422	2643.343	99.998	100.322	0.0037
B-2	169.021	101.253	1.526	1.948	0.673	86.746	2791.159	101.465	101.790	0.0037
B-2	173.129	101.268	1.541	1.961	0.674	88.274	2859.001	102.209	102.535	0.0037
B-2	182.431	101.302	1.575	1.988	0.676	91.784	3012.606	104.254	104.581	0.0037
B-2	183.008	101.304	1.577	1.989	0.676	91.992	3022.146	104.340	104.668	0.0037
B-2	192.281	101.335	1.608	2.019	0.678	95.243	3175.264	105.387	105.717	0.0037
B-2	201.784	101.366	1.639	2.048	0.680	98.526	3332.197	106.435	106.766	0.0037
B-2	208.614	101.388	1.661	2.068	0.681	100.877	3444.993	107.256	107.588	0.0037
B-2	218.720	101.420	1.693	2.096	0.683	104.329	3611.885	108.500	108.834	0.0037
B-2	228.011	101.450	1.723	2.119	0.685	107.609	3765.301	110.211	110.546	0.0037
B-2	232.720	101.464	1.737	2.132	0.685	109.155	3843.064	110.637	110.973	0.0037
B-2	242.328	101.493	1.766	2.157	0.687	112.323	4001.737	111.657	111.995	0.0037
B-2	252.139	101.521	1.794	2.183	0.688	115.520	4163.747	112.677	113.016	0.0037
B-2	257.454	101.536	1.809	2.196	0.689	117.214	4251.526	113.133	113.474	0.0037
B-2	265.643	101.560	1.833	2.216	0.690	119.884	4386.743	114.126	114.468	0.0037
B-2	273.970	101.583	1.856	2.235	0.692	122.578	4524.259	115.119	115.462	0.0037
B-2	278.819	101.597	1.870	2.245	0.692	124.195	4604.339	115.900	116.243	0.0037
B-2	284.775	101.614	1.887	2.257	0.693	126.173	4702.697	116.851	117.195	0.0037
B-2	293.046	101.636	1.910	2.275	0.695	128.813	4839.279	117.833	118.178	0.0037
B-2	301.448	101.659	1.932	2.293	0.696	131.475	4978.016	118.814	119.161	0.0037
B-2	306.416	101.672	1.945	2.303	0.697	133.023	5060.061	119.328	119.675	0.0037
B-2	318.500	101.705	1.978	2.325	0.699	136.994	5259.622	121.320	121.668	0.0037
B-2	321.290	101.712	1.985	2.331	0.699	137.844	5305.695	121.569	121.917	0.0037
B-2	337.169	101.751	2.024	2.365	0.701	142.546	5567.906	122.660	123.011	0.0037
B-2	353.422	101.789	2.062	2.400	0.702	147.289	5836.300	123.750	124.104	0.0037

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
B-2	357.803	101.802	2.075	2.403	0.703	148.907	5908.647	125.138	125.493	0.0037
B-2	358.668	101.804	2.077	2.405	0.703	149.157	5922.943	125.194	125.548	0.0037
B-2	376.368	101.843	2.116	2.443	0.705	154.052	6215.236	125.792	126.148	0.0037
B-2	394.466	101.882	2.155	2.481	0.706	158.969	6514.100	126.390	126.747	0.0037
B-2	397.313	101.891	2.164	2.481	0.707	160.112	6561.104	127.617	127.974	0.0037

Annex C – EA Data

From: Wessex Enquiries <WessexEnquiries@environment-agency.gov.uk>

Sent: 04 November 2024 07:50

To: [REDACTED]@mabbett.eu>

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](https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion) 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](https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather) 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.

<http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=DC> Thank you.

Kind regards

[REDACTED]
Environment Agency, Wessex Enquiries, Customer & Engagement Team

[REDACTED] - Wessex Enquiries

[REDACTED] <[\[REDACTED\]@mabbett.eu](mailto:[REDACTED]@mabbett.eu)>

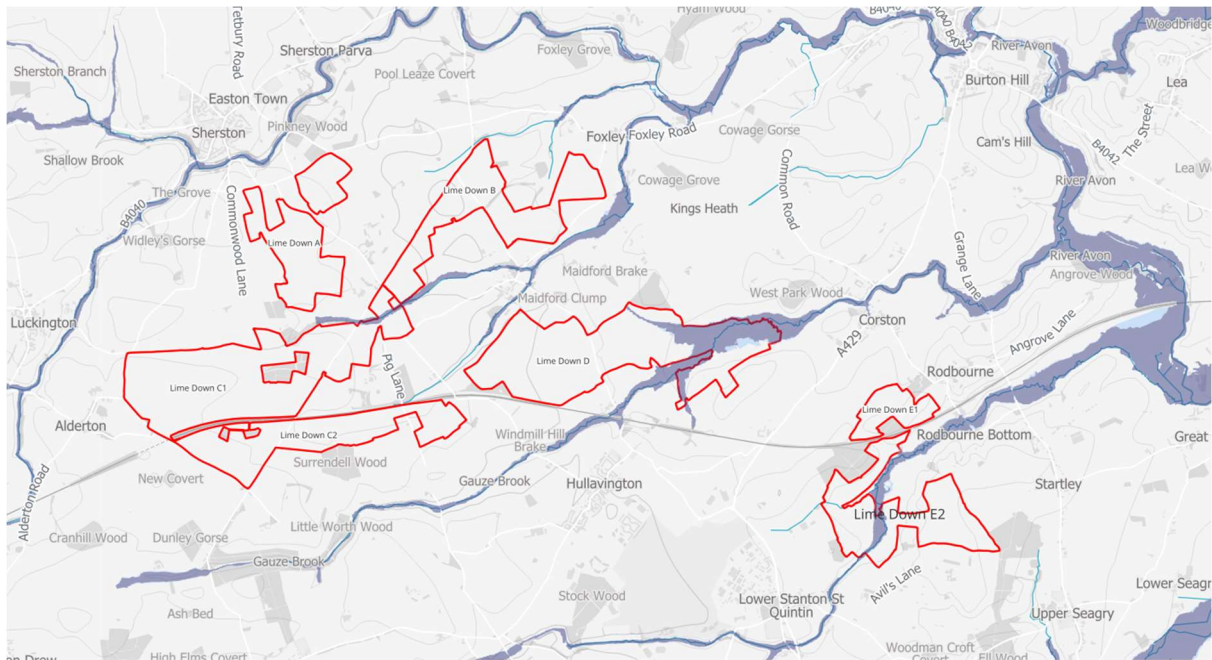
Sent: 15 October 2024 14:01

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 following information 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,



Consultant | Water Environment Team

Mobile:



@mabbett.eu www.mabbett.eu



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Inverness | Leicester | Manchester | Winchester**

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Please consider the environment before printing this e-mail

██████████
Mabbett
██████████@mabbett.eu

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

Dear ██████████

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	<i>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.</i>
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’

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

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


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:

<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>

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



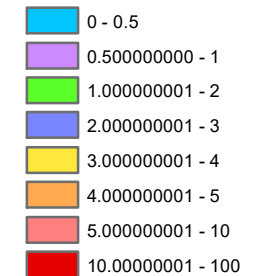
Scale 1:50,000



Legend

100yr JFLOW Depth

Metres



Information Warning

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

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



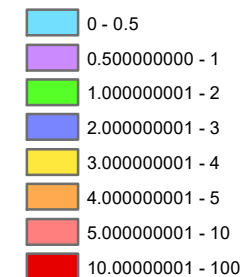
Scale 1:50,000



Legend

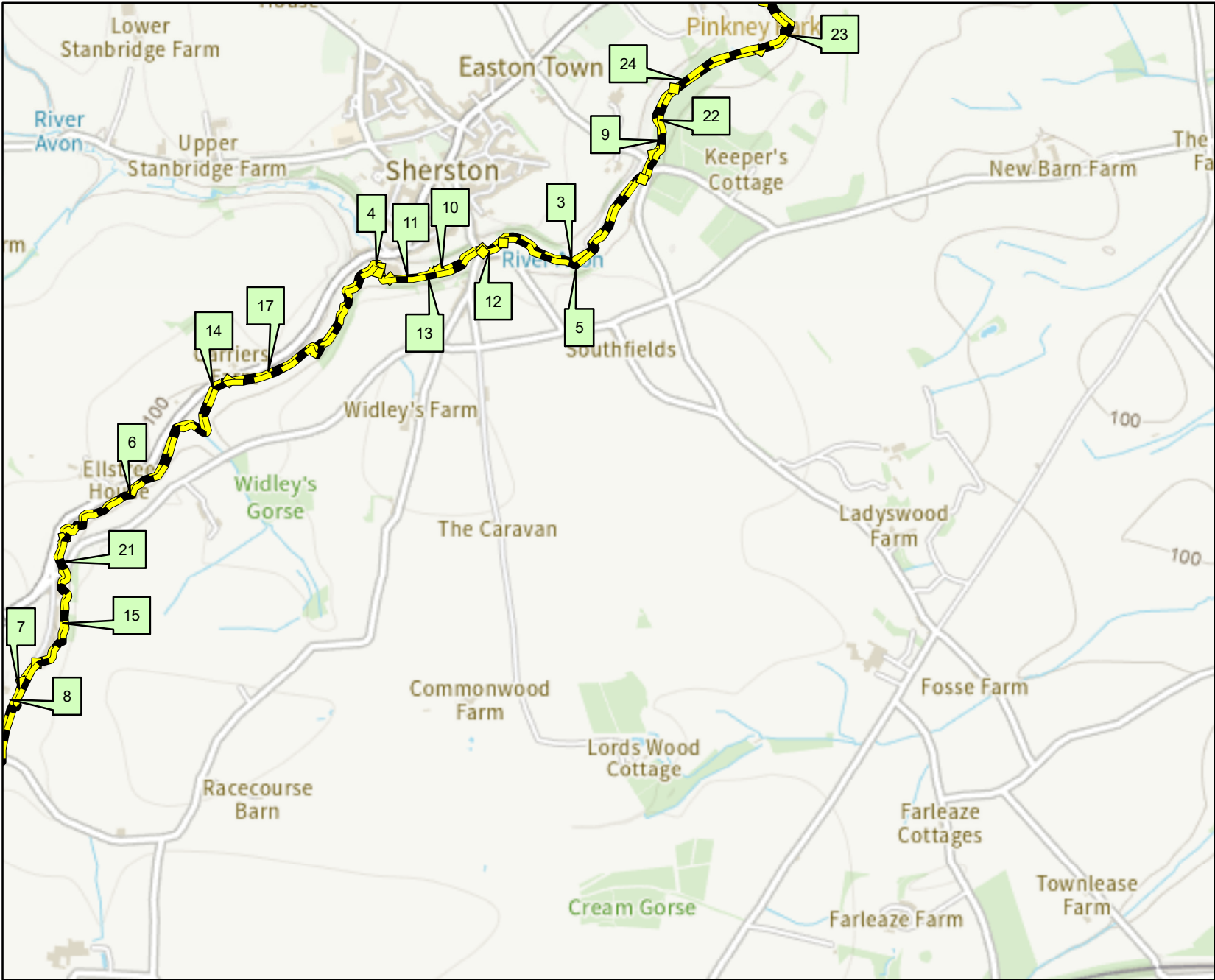
1000yr JFLOW Depth

Metres



Information Warning

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



Scale: 1:20,000



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.

Product 4 - AIMS Information381197-WXDate: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 D – Greenfield Runoff Rates

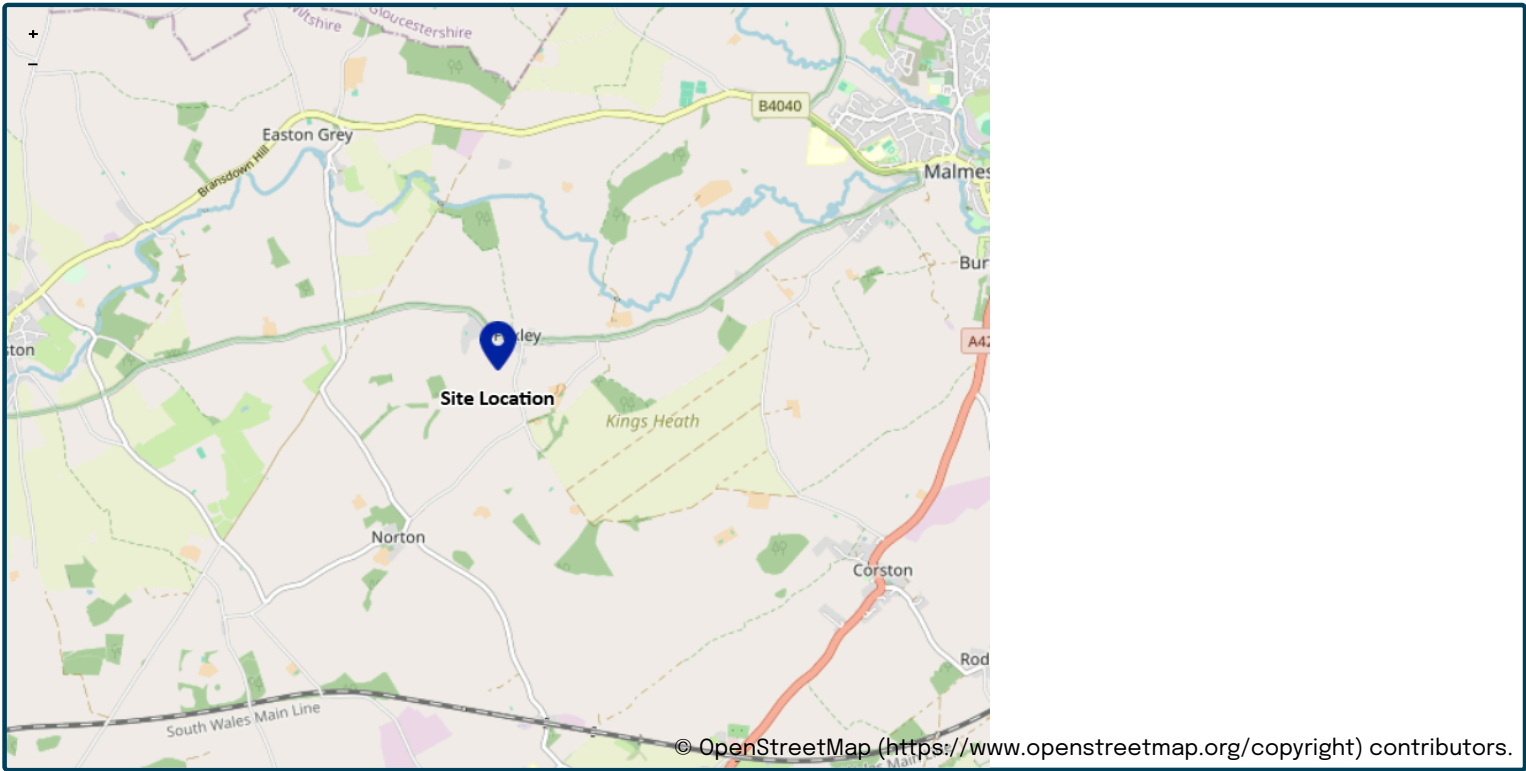
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	23/06/2026
Calculated by	GH
Reference	317212
Model version	2.2.3

Location

Site name	Lime Down B
Site location	



Site easting (British National Grid)	389396
Site northing (British National Grid)	185519

Site details

Total site area (ha)	0.06	ha
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Greenfield runoff

Method

Method	FEH statistical (2025)
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FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	867 mm	
BFIHOST19scaled	0.765	
QMed-QBar conversion	1.075	1.075
QMed (l/s)	0.1 l/s	
QBar (FEH statistical 2025) (l/s)	0.1 l/s	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	8	8
1 year growth factor	0.78	
2 year growth factor	0.93	
10 year growth factor	1.49	
30 year growth factor	1.95	
100 year growth factor	2.43	
200 year growth factor	2.78	

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	0.1 l/s
Flow rate 2 year (l/s)	0.1 l/s
Flow rate 10 years (l/s)	0.1 l/s
Flow rate 30 years (l/s)	0.2 l/s
Flow rate 100 years (l/s)	0.2 l/s
Flow rate 200 years (l/s)	0.2 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Annex E – 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)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Storage	0.008	5.00	100.000	1200	0.000	0.000	0.750	99.250

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Storage Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	99.250	Product Number	CTL-SHE-0014-1000-0750-1000
Design Depth (m)	0.750	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.1	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)	99.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	900

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1.0	1.0	0.750	24.9	26.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Storage	915	99.842	0.592	0.4	6.1706	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
960 minute winter	Storage	Hydro-Brake®	0.1	10.1				

ⁱ <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>

ⁱⁱ <https://magic.defra.gov.uk/>

ⁱⁱⁱ <https://flood-map-for-planning.service.gov.uk/>

^{iv} <https://check-long-term-flood-risk.service.gov.uk/postcode>

^v <https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow>

^{vi}