



Lime Down

Solar Park

Environmental Statement

Volume 3, Appendix 11-4: Flood Risk Assessment and Outline Drainage Strategy – Lime Down C1 (Clean)

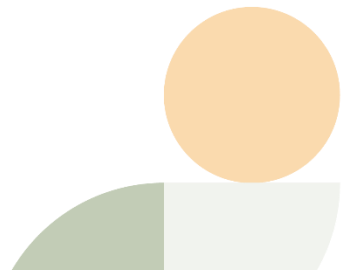
August 2026

Revision 6

Planning Inspectorate Reference: EN010168

Document Reference: APP/6.3

APFP Regulation 5(2)(a)



Appendix 11-4: Flood Risk Assessment and Outline Drainage Strategy – Lime Down C1

Prepared by: [REDACTED]

For: Lime Down Solar Park Ltd

Site: Lime Down Solar Park

Date: 17/08/2026

Document Ref: 317212-04

Issue-06

www.arthian.com

Contents

1. Site Details	5
1.2 Site Location.....	6
1.3 Existing Site Conditions.....	6
1.4 Topography.....	6
1.5 Hydrology	6
1.6 Water Framework Directive Status	7
1.7 Geology	7
1.8 Hydrogeology.....	8
1.9 Proposed Site Conditions.....	8
2. Assessment of Flood Risk	10
2.2 Tidal Flood Risk.....	10
2.3 Fluvial Flood Risk	10
2.4 Surface Water Flood Risk	12
2.5 Groundwater Flood Risk.....	16
2.6 Sewer Flooding	17
2.7 Reservoir and Canal Flooding.....	17
2.8 Residual Flood Risks	17
2.9 Summary of Flood Risk.....	17
2.10 Embedded Mitigation	17
2.11 Impact on Off-Site Flood Risk.....	18
3. Outline Drainage Strategy	19
3.2 Solar PV Panelled Area	19
3.3 Drainage Strategy – Proposed Hardstanding Surfaces	20
3.4 Drainage Hierarchy	21
3.5 Sustainable Drainage Systems	24
3.6 Attenuation Storage	30
3.7 Preferred Drainage Scheme.....	32
3.8 Event Exceedance.....	33
3.9 Surface Water Treatment	33
3.10 Firewater Consideration	34
3.11 Maintenance	35
4. Conclusions and Recommendations	36
4.1 Conclusions	36
4.2 Recommendations	37

Figures

Figure 1: Site Location.....	5
------------------------------	---

Figure 2: LiDAR Plan.....	6
Figure 3: Superficial Deposits.....	7
Figure 4: Bedrock Deposits	8
Figure 5: EA's Flood Map for Planning	10
Figure 6: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)	13
Figure 7: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)	14
Figure 8: Water Level and Depths Map.....	Error! Bookmark not defined.

Tables

Table 1: Hardstanding Surfaces.....	20
Table 2: Greenfield Runoff Rates	23
Table 3: SuDS Options for Proposed Development.....	25
Table 4: 132kV Substation Compound*	31
Table 5: 132kV substation Access Track*	31
Table 6: Conversion Units / 33kV Sub Distribution Switch Room*	31
Table 7: 132kV Substation Compound*	31
Table 8: 132kV Substation Access Track*	32
Table 9: Conversion Units / 33kV Sub Distribution Switch Room*	32
Table 10: Pollution Hazard Indices.....	34
Table 11: SuDS Mitigation Indices.....	34

Annexes

Annex A- Water Body Catchment Classifications Summaries	39
Annex B – Manning’s Open Channel Flow Mapping.....	43
Annex C - EA Product Data	44
Appendix D – Greenfield Runoff Calculations.....	45
Appendix E – Causeway Flow Calculations	46
Annex F – Outline Drainage Sketch	47
Annex G – SuDs Maintenance Schedule.....	48

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 C1.

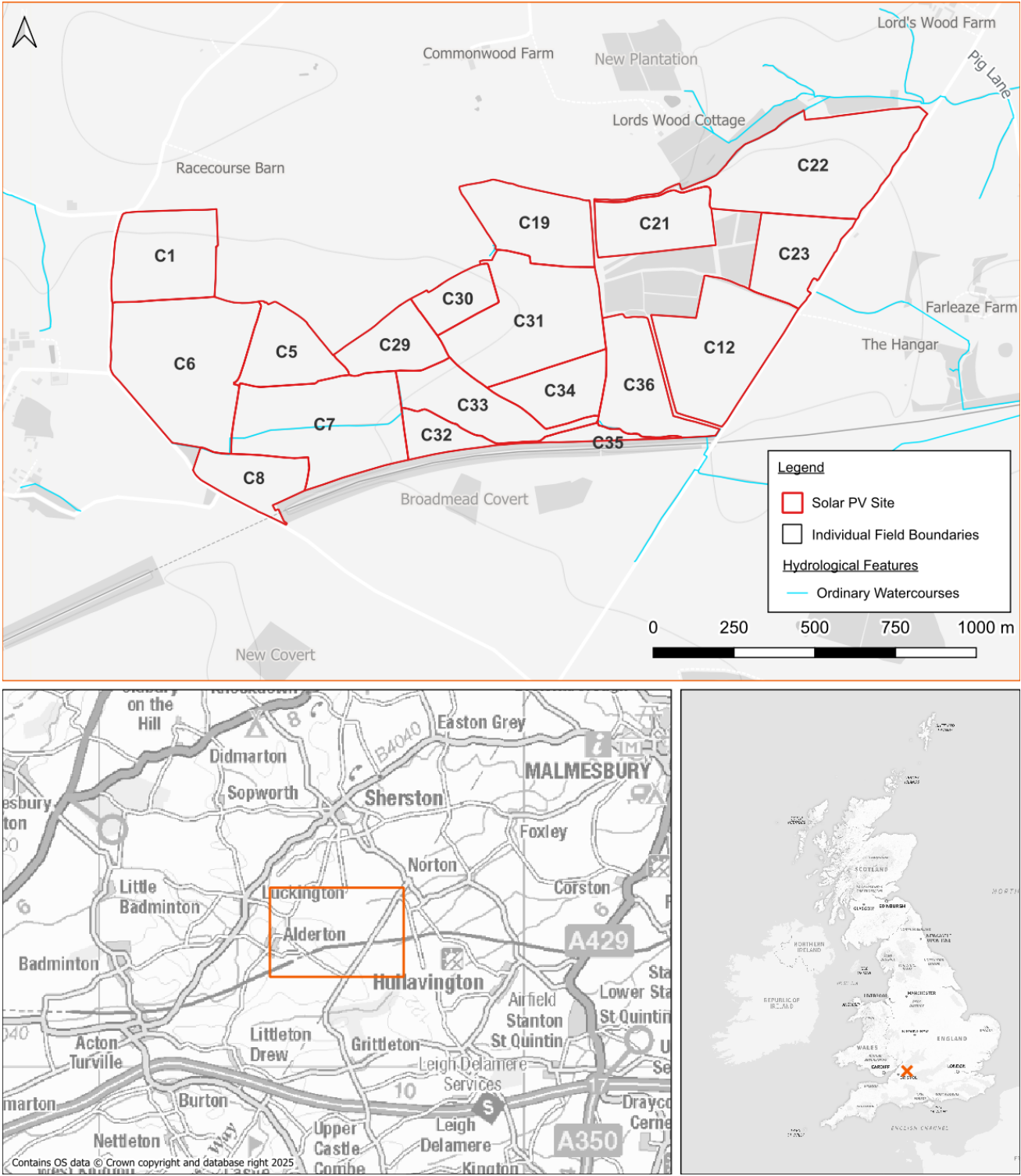


Figure 1: Site Location

1.2 Site Location

1.2.1 Lime Down C1 is located approximately 450m east of Alderton, a village in Wiltshire, and is also situated about 3.5km north of the M4 motorway. The Site is centred at National Grid Reference 384400N, 183100E.

1.3 Existing Site Conditions

1.3.1 Online mapping (including Google Maps / Google Streetview imageryⁱ (accessed May 2025) shows that Lime Down C1 comprises agricultural / arable fields. Additionally, it is noted that Lime Down C1 is subdivided into 18 smaller fields.

1.4 Topography

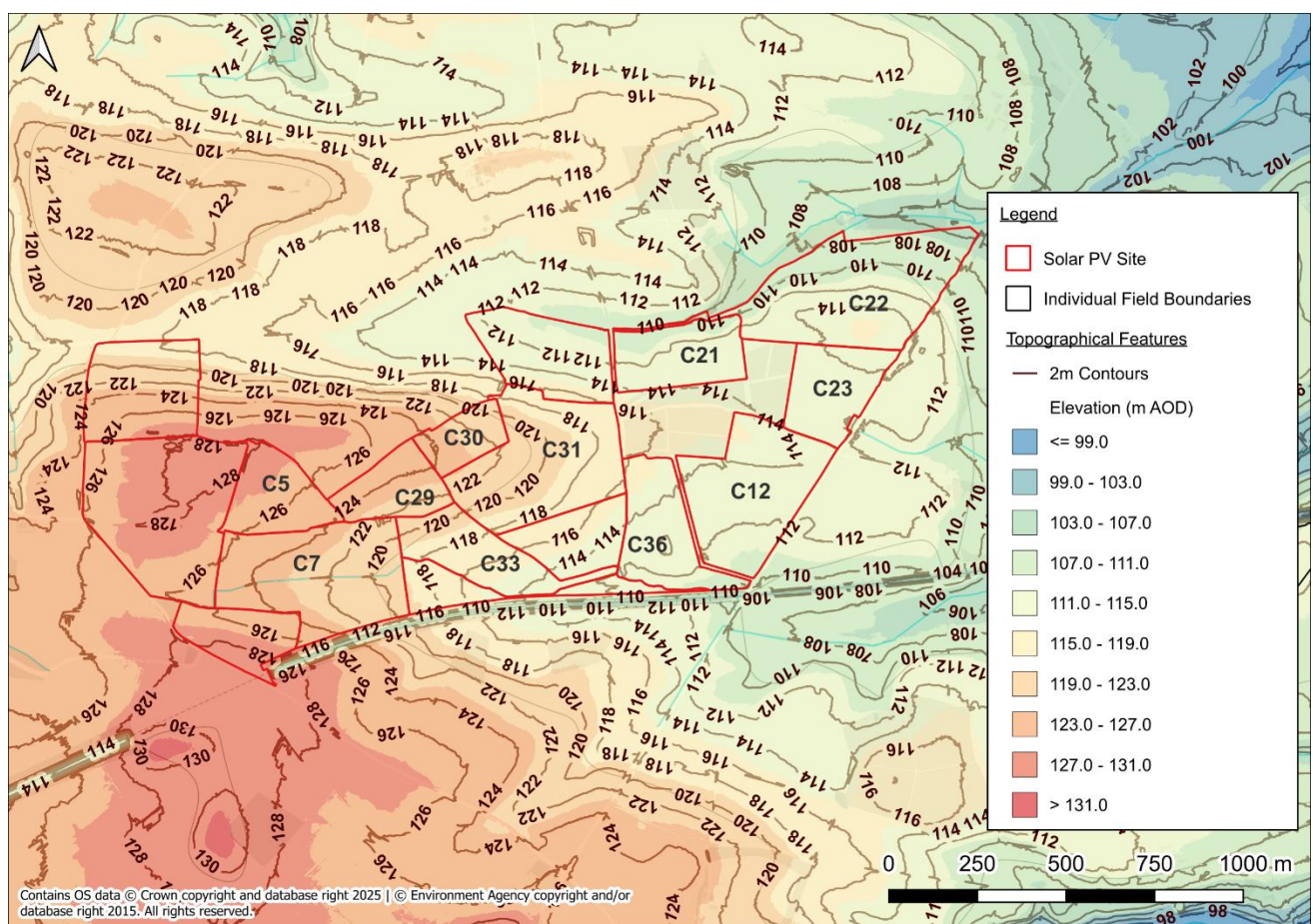


Figure 2: LiDAR Plan

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 C1 slopes from approximately 128m AOD in the west to approximately 102m AOD in the east (Figure 2).

1.5 Hydrology

1.5.1 The nearest watercourses are various unnamed land drainage ditches located within the Lime Down C1

boundary and within a 200m distance of the Site. The land drainage ditches generally flow in a north-easterly direction that follows the local topography.

1.5.2 All land drainage ditches are under the jurisdiction of the Wiltshire Council Lead Local Flood Authority.

1.6 Water Framework Directive Status

1.6.1 Lime Down C1 is located within the Avon Bristol Rural Catchment, within the Luckington Brook Water Body Catchment and the Tributary – Source to Sherston Avon Water Body catchment within the Shertson Avon Water Body Catchment.

1.6.2 The Luckington Brook Water Body catchment has a Cycle 3 Ecological status of Good in 2019 and 2022 and a Fail chemical status in 2019 (no data in 2022). The Tributary – Source to Sherston Avon Water Body catchment has a Cycle 3 Ecological status of Good in 2019 and 2022 and a Fail chemical status in 2019 (no data in 2022). Shertson Avon Water Body catchment has a Cycle 3 Ecological status of Poor in 2019 and 2022 and a Fail chemical status in 2019 (no data in 2022). A summary of the Water Body Classifications for the catchments are included as Annex A.

1.7 Geology

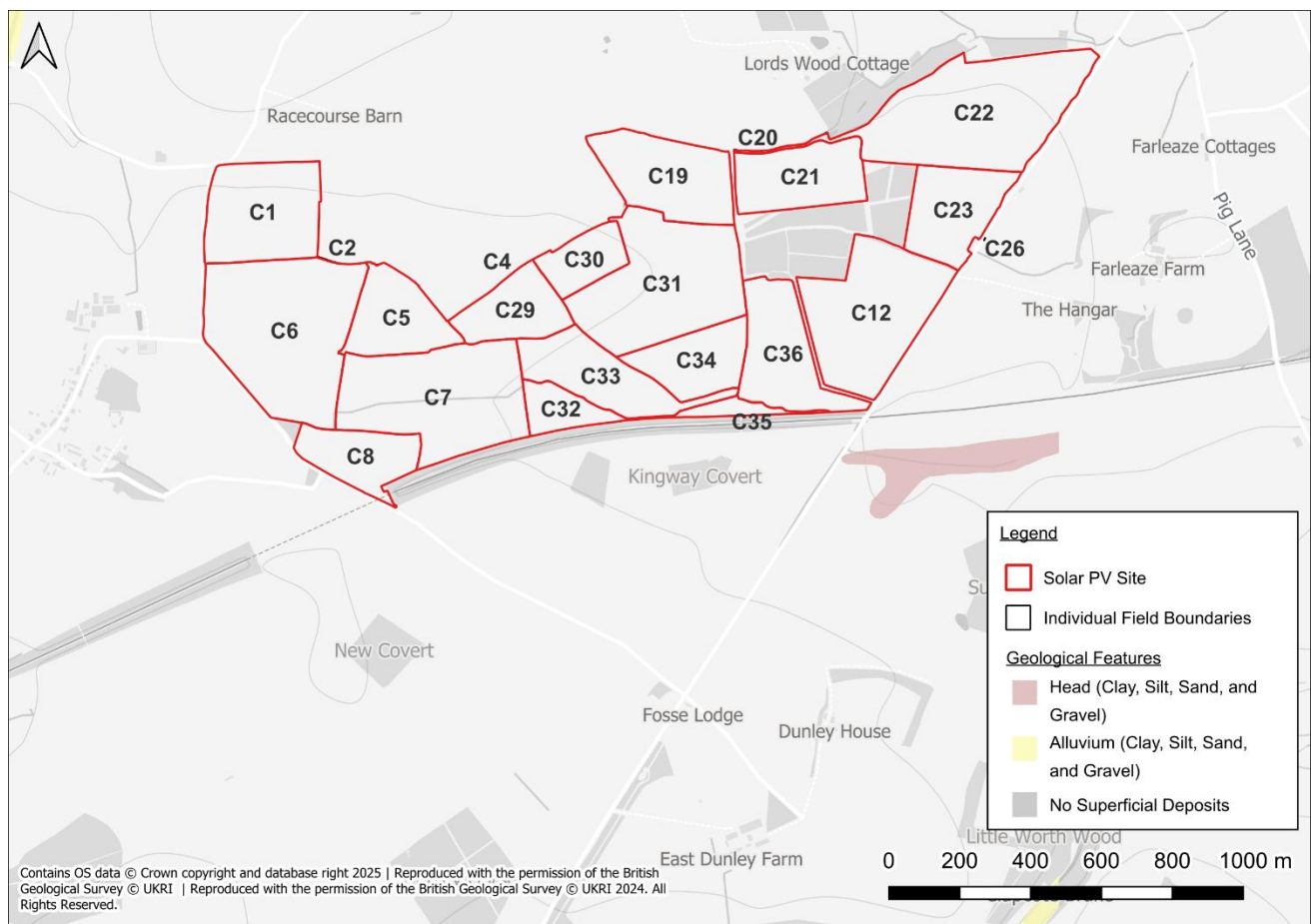


Figure 3: Superficial Deposits

1.7.1 Reference to the British Geological Survey online mappingⁱⁱ (1:50,000 scale) indicates that Lime Down C1

is not underlain by any superficial deposits (see Figure 3). Lime Down C1 is identified as being underlain by the Forest Marble Formations bedrock deposits (Figure 4).

- 1.7.2 The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.
- 1.7.3 There are no legible British Geological Survey boreholes located at Lime Down C1.

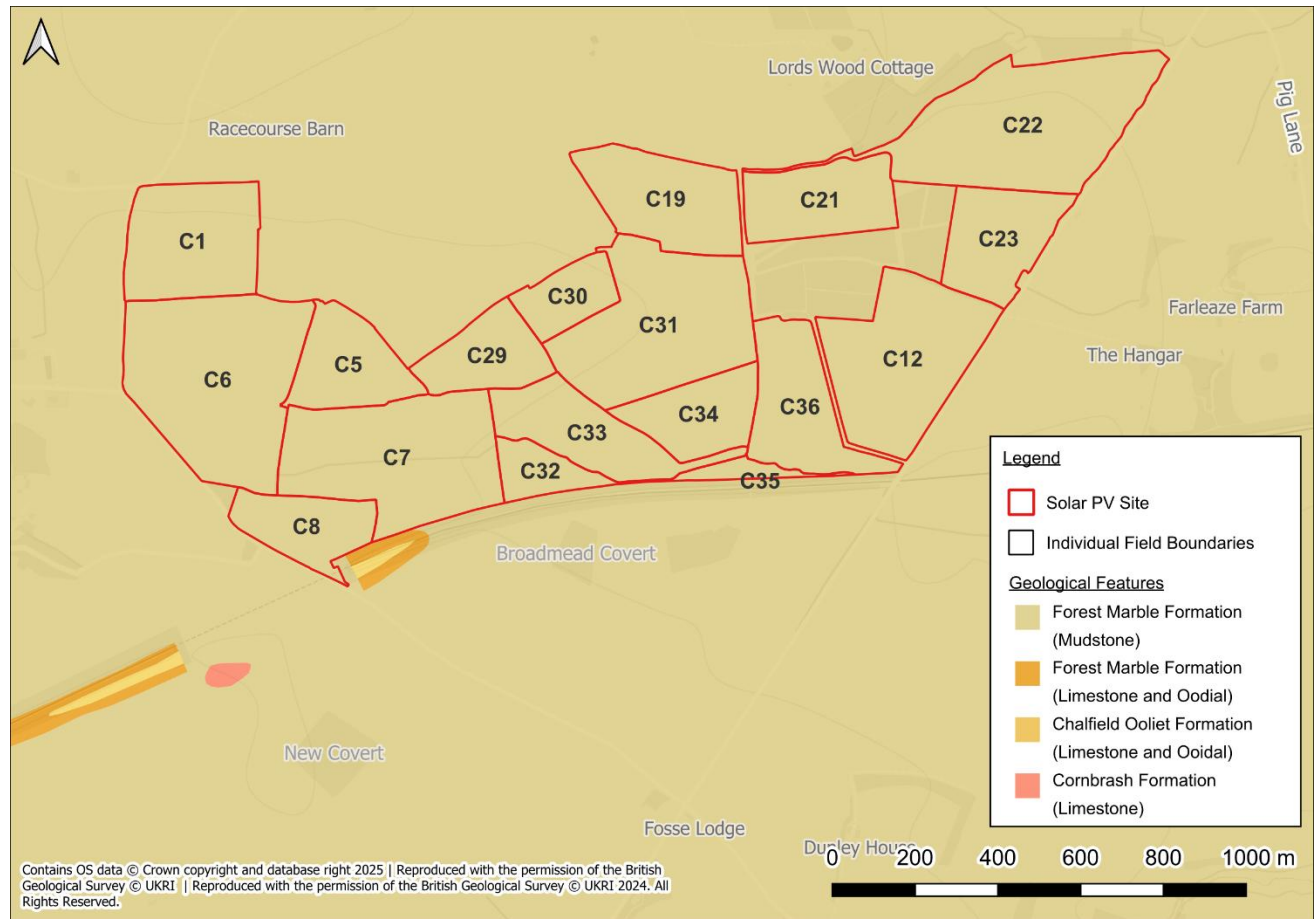


Figure 4: Bedrock Deposits

1.8 Hydrogeology

- 1.8.1 According to the EA's Aquifer Designation data, obtained from MAGIC Map's online mapping [accessed 02/06/25] the underlying bedrock of Forest Marble Formation is described as a Secondary A Aquifer.
- 1.8.2 The EA's 'Source Protection Zones' data, obtained from MAGIC Map's online mapping [accessed 02/06/25], indicates that Lime Down C1 is located within a Groundwater Source Protection Zone.

1.9 Proposed Site Conditions

- 1.9.1 Lime Down C1 comprises ground-mounted Solar PV Panels, a proposed substation, and associated electrical infrastructure and access. See **ES Volume 1, Chapter 3: The Scheme [EN010168/APP/6.1]**.
- 1.9.2 An **Outline Landscape and Ecological Mitigation Plan (LEMP) [EN010168/APP/7.18]** has been

developed to support the DCO application. The plan confirms that the vast majority of the Site will be used for Solar PV Panels, supporting infrastructure, and internal access, with peripheral areas comprising landscaped buffers, in line with the embedded mitigation described throughout the ES.

- 1.9.3 The impermeable substation access roads are required to provide a robust, all weather access route to the compounds at Lime Down. These routes will need to accommodate exceptional loads associated with transformer delivery, installation and maintenance. The proposed transformers weights have individual weights of approximately 180-200tn, these loads will generate high axial loads to the load bearing track surface. In addition, these impermeable substation access tracks are needed for reliable year-round access/egress for emergency vehicles, including fire services. The use of the impermeable tracks in the substation route reflects both the operational requirements of the electrical infrastructure and the need to maintain a safe and resilient emergency access corridor throughout the lifespan of the project.
- 1.9.4 Where a 132kV or 400 kV substation is proposed within this area, the detailed design will include a controlled drainage strategy for the substation compound. This will include sealed drainage or sealed drainage components where required, together with suitable treatment, interception, containment and isolation measures to prevent spills, leaks or firewater from affecting ground or controlled waters. The drainage principles for substations are set out in the **Firewater Containment and Drainage Strategy – Lime Down Substation [EN010168/EXAM/9.9]**, which is the governing reference for containment and release matters.

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 C1.

2.2 Tidal Flood Risk

2.2.1 Lime Down C1 is situated at a minimum of approximately 102m 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 C1 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), with the exception of Field C22 of which the north-easternmost extent is within Flood Zone 2/3. Flood maps are included as Figure 5 below and **ES Volume 2, Figure 11-3: Lime Down C1: Fluvial and Surface Water Risk Map [EN010168/EXAM/6.2] (Rev 2)** produced at Deadline 3 of Examination.

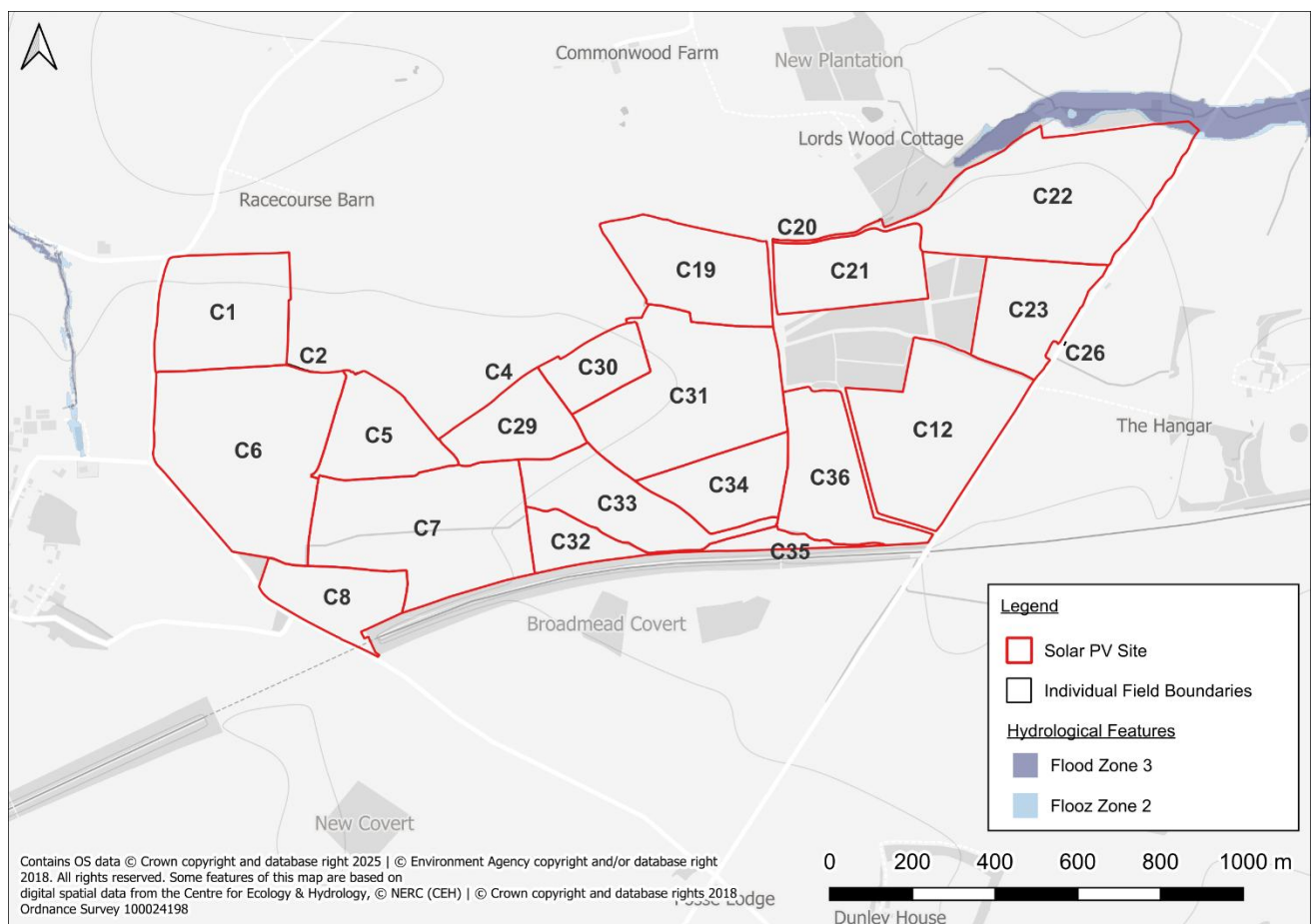


Figure 5: EA's Flood Map for Planning

2.3.2 The EA's 'Historical Flood Map' shows no recorded incidents of historical flooding at Lime Down C1; however, this does not confirm that the Site has never flooded—only that no documented records exist.

- 2.3.3 The Flood Zone 3 extent adjacent to Field C22 is associated with an unnamed land drainage ditch. There is a wider network of land drainage ditches both on-site and within 200m of the Site; however, these are not shown on the EA's fluvial flood extent mapping. This is due to the rural nature of the area and the fact that these land drainage ditches are classified as ordinary watercourses and have not been modelled to determine their fluvial flood extents. However, fluvial flooding could occur if the land drainage ditches overtop their banks during or following an extreme rainfall event.
- 2.3.4 There is no site-specific information in third-party reports regarding fluvial flood risk at Lime Down C1 or in the immediate vicinity.
- 2.3.5 In the absence of specific fluvial flood data, a combination of methods has been used to assess potential fluvial flood risk. Flow paths identified on the EA's Long Term Flood Risk Map (Surface Water)^{iv} identify the potential flood extent of the land drainage ditch that flows through Lime Down C1 and the neighbouring land drainage ditches. These maps (updated in January 2025) are considered to effectively illustrate the potential extent of fluvial flooding, as indicated in Figure 5.
- 2.3.6 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.
- 2.3.7 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.
- 2.3.8 Based on the analysis, the surface water flood maps offer a suitable and conservative basis for assessing fluvial flood risk at Lime Down C1. A more detailed exploration of surface water flood risks can be found in Section 2.4.
- 2.3.9 Lime Down C1 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 finds that at Lime Down C1, flood depths in the area identified as Flood Zone 3 are below 0.5m in depths during both the 1% Annual Exceedance Probability scenario and the 0.1% Annual Exceedance Probability Scenario, with the remainder of Lime Down C1 shown to not expect 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 Applicant's responses are included in ES Chapter 11: Hydrology, Flood Risk and Drainage.

2.3.12 Lime Down C1 is not located within an Internal Drainage Board (IDB).

Summary

2.3.13 Lime Down C1 is therefore considered to be at **Low** risk of fluvial flooding.

2.4 Surface Water Flood Risk

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

2.4.2 According to the EA's Long Term Flood Risk Map (Surface Water) the majority of Lime Down C1 is at Very Low risk of surface water flooding, meaning it has a <0.1% annual probability of flooding. However, there are areas of Low to High risk (0.1 - >3.3% annual chance of flooding), particularly at Fields C6 – C7, across the northern boundaries of Fields C19, C21, and C23 and across Fields C32 – C36.

2.4.3 As described in the Fluvial Flooding Section above, the surface water flooding extents largely match the courses of the unnamed land drainage ditches which flow throughout and bordering Lime Down C1; However, there are some areas of ponding that are not associated with the various land drainage ditches on-site.

2.4.4 With reference to the depth mapping provided by the NaFRA data, flood depths are anticipated to be low, with depths remaining largely below 300mm which is considered passable to people and vehicles. Some depths between 300mm and 600mm are anticipated in some of the Fields referenced above, however these are largely isolated areas and can be associated with the existing land drainage ditches. Depths are not shown to exceed 600mm anywhere within Lime Down C1.

2.4.5 There is no indication within relevant third-party reports (listed in 'Sources of Information' in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**) to suggest that Lime Down C1 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. The potential for the development to exacerbate surface water flood risk off-site is also addressed through the use of appropriate SuDS features, as described in the Covering Report.

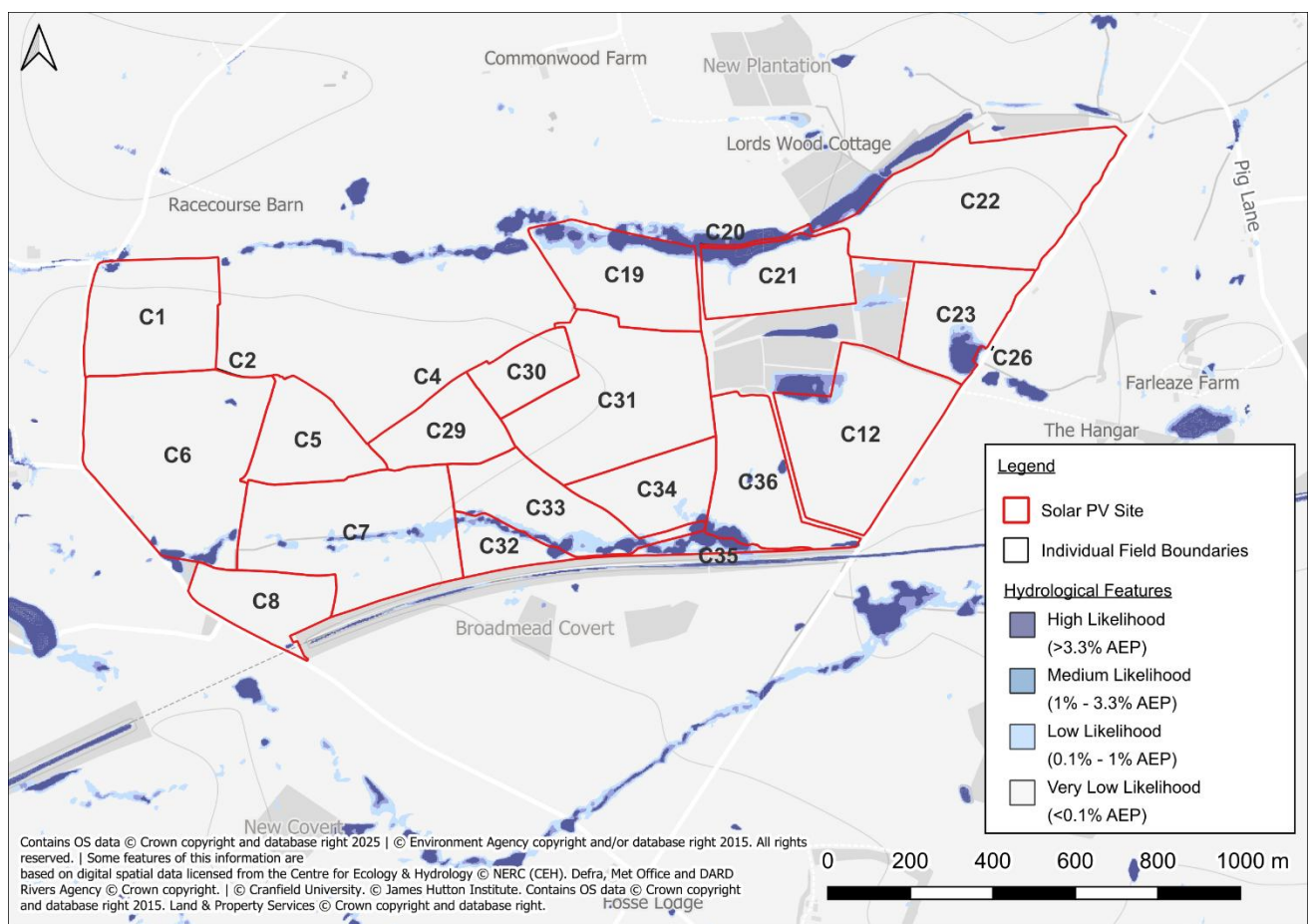


Figure 6: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)

Proposed Substation in Field C33

2.4.9 A substation is proposed within Field C33. The location has been selected to achieve technical requirements for electrical efficiency, providing a centralised connection to the generation areas and effective integration with the internal cable corridors across Lime Down C1.

2.4.10 According to the Environment Agency's Long Term Flood Risk Map (NaFRA, updated January 2025), Field

C33 contains a narrow corridor of elevated surface water flood risk (**see Figure 7**). Areas along the south-western boundary and through the southern part of the field are classified as High Risk (greater than 3.3% annual probability of flooding), associated with an existing land drainage ditch that runs broadly parallel to the adjacent railway line. The remainder of Field C33 is identified as being at Very Low to Low risk.

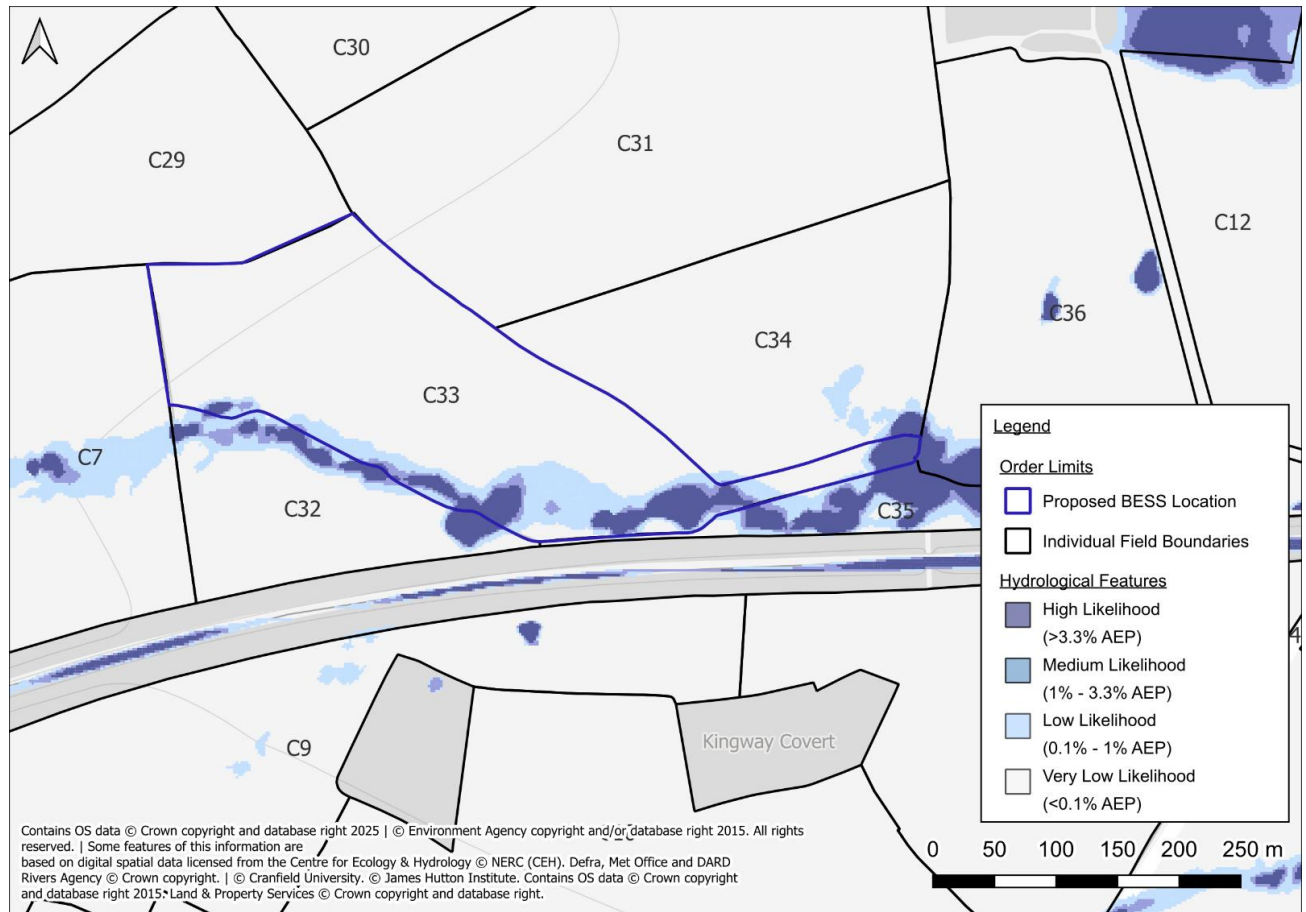


Figure 7: EA's Long-Term Flood Risk Map (Flood Risk from Surface Water)

- 2.4.11 NaFRA flood depth mapping indicates that depths along the flow route are predominantly shallow, generally remaining below 300mm and not exceeding 600mm. These depths can be managed through standard design interventions and are not expected to constrain development of essential infrastructure, subject to appropriate mitigation
- 2.4.12 Flood extents have been compared against EA LiDAR to estimate likely flood depths in more detail, adopting the 0.1% AEP event to provide a factor of safety. As illustrated in **Figure 8**, the northern extent of the proposed substation area remains free of flooding, while the southern extent is predicted to experience flood depths up to 200mm. Such depths are considered passable for pedestrians and vehicles, ensuring that access and functionality would be retained under the assessed conditions.

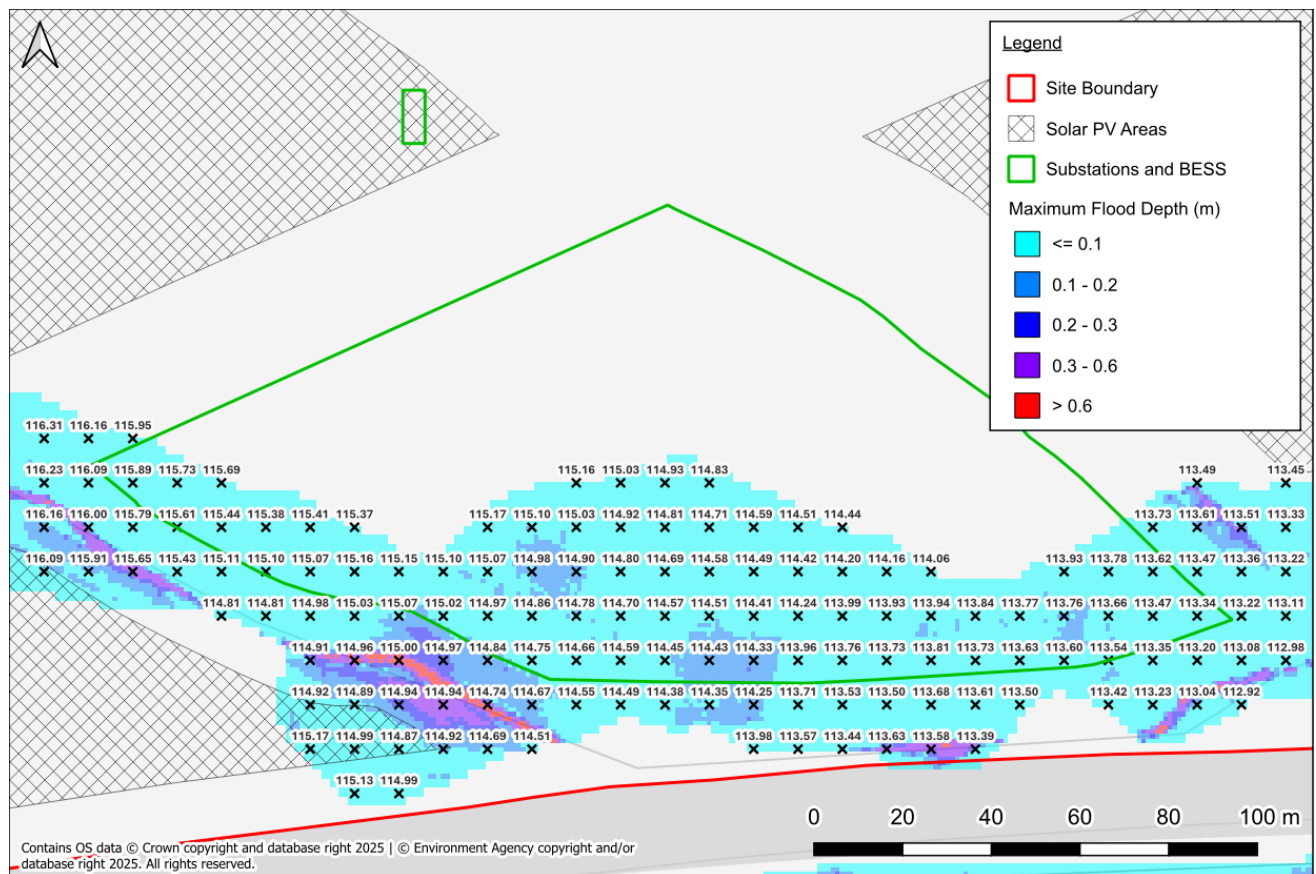


Figure 8: Water Level and Depths Map – 0.1% AEP Present Day Event

- 2.4.13 Following publication by the Environment Agency on 28 May 2026 of the Flood Map for Planning Surface Water Spatial Planning datasets, the 1% AEP event incorporating the Upper End Climate Change Allowance for the 2070s epoch (2061 – 2125) has been reviewed as an additional sensitivity test for the proposed substation within Field C33. The dataset provides the Environment Agency’s latest strategic assessment of potential future surface water flood extents and depths under climate change.
- 2.4.14 The review indicates that the overall surface water flow route through Field C33 remains largely consistent with that identified by the existing NaFRA mapping. However, it should be noted that, when accounting for the Upper End Climate Change Allowance, the surface water flood risk extent associated with each AEP event is slightly increased, extending marginally northwards within the site.
- 2.4.15 Consistent with the NaFRA flood depth mapping, the Surface Water Spatial Planning dataset incorporating the Upper End Climate Change Allowance indicates that the flood depths along the flow route remain predominantly shallow, generally remaining below 300mm and not exceeding 600mm.
- 2.4.16 The additional sensitivity check therefore does not materially alter the surface water flood risk previously identified within Field C33. The approach to design remains to locate the substation preferentially outside the mapped surface water flow route, and on higher ground within the field. Where any part of the final substation layout cannot avoid the identified surface water flow route, the site-specific assessment and mitigation measures outlined in this FRA will apply to ensure that the existing flow conveyance and storage are maintained, and that flood risk is not increased elsewhere.

2.4.17 At detailed design stage, should any substation infrastructure be required within areas affected by mapped surface water flow paths, further site-specific assessment will be undertaken to confirm that flood risk is not increased elsewhere and that any necessary mitigation measures, including compensatory storage where required, are incorporated into the detailed design. These measures will be secured through Requirement 5, with drainage measures secured through Requirement 11.

2.4.18 At this stage of design, the final platform location, elevation, and layout have not been finalised, which is appropriate given the stage of the DCO application. The final design will be confirmed post-consent and guided by the following embedded mitigation commitments:

- The substation infrastructure will be located preferentially outside the mapped surface water flow route where practicable, with preference given to higher ground within Field C33 where flood risk is negligible.
- The platform will be raised above surrounding ground levels, incorporating sufficient freeboard above predicted flood depths to ensure continued operation during extreme events.
- Where necessary, localised surface water management measures will be included, such as permeable drainage, minor regrading, or intercept ditches to direct overland flows away from critical infrastructure.
- All sensitive equipment will be constructed to be water resilient, with transformers, switchgear, and control systems elevated or sealed in accordance with best practice and relevant guidance.
- The final platform levels, drainage measures, and any required flood mitigation measures will be confirmed through the detailed design process and secured through Requirement 5, with drainage measures secured through Requirement 11.

2.4.19 On the basis of the mapped flood risk, predicted depths, and the ability to avoid or mitigate risks through embedded design, the flood risk to the proposed substation is considered low and manageable. This approach aligns with the requirements of NPS EN-1, the NPPF (2024), and the CIRIA SuDS Manual (C753) for essential infrastructure.

2.4.20 The wider Lime Down C1 development, including the Solar PV Panels and associated infrastructure, incorporates embedded mitigation by raising equipment above ground level and applying appropriate Sustainable Drainage Systems (SuDS) measures to ensure there is no increase in flood risk on- or off-site. Further details of the surface water management strategy are provided in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**.

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 SFRA map (listed under ‘Sources of Information’ in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**) indicates that there is no risk of surface water flooding on Site, owing to the characteristics of the local geological deposits.

2.5.3 No buildings and no basement levels are identified on plans which may otherwise be at increased risk from groundwater seepage.

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

2.6 Sewer Flooding

- 2.6.1 No site-specific incidents of sewer flooding have been identified from relevant third-party reports.
- 2.6.2 On the basis of Lime Down C1's rural setting, the presence of sewerage infrastructure is unlikely. Utility records have been checked and there are no public sewers identified within Lime Down C1.
- 2.6.3 It can therefore be concluded that the risk of sewer flooding is **Negligible**.

2.7 Reservoir and Canal Flooding

- 2.7.1 There are no canals within the vicinity of Lime Down C1 and, therefore, there is **Negligible** associated risk.
- 2.7.2 The EA 'Flood Risk from Reservoirs' map shows that Lime Down C1 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 site-specific mitigation measures are 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 the land drainage ditches and potentially impact Lime Down C1. 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 C1 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 C1 from all sources of flooding is **Negligible to Low**, however, it would be prudent to include the below mitigation measures.

2.10 Embedded Mitigation

- 2.10.1 Embedded Mitigation is detailed in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**.
- 2.10.2 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.

2.11 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 areas at elevated flood risk. Where this is not feasible, these components will be installed on raised concrete pads or steel frames with appropriate freeboard above predicted flood levels, allowing floodwater to pass freely beneath. This ensures there is no loss of floodplain volume and no increase in flood risk elsewhere.
- 2.11.2 The proposed substation within Field C33 will be located sequentially within the field to avoid the identified surface water flow path and will be raised above ground level in line with the design approach for flood-resilient infrastructure. Further detail is provided in Section 2.4 of this report.
- 2.11.3 Where panels or other infrastructure are located in Flood Zones 2 or 3, the approach has been informed by floodplain compensation calculations – see **ES Volume 3, Appendix 11-6** and **Appendix 11-8 [EN010168/APP/6.3]**. These components are minor in scale, with dimensions detailed in Chapter 3: Scheme Description.
- 2.11.4 In addition, any infrastructure incorporating impermeable surfacing will include appropriate Sustainable Drainage Systems to manage runoff. Together, these measures ensure the Scheme does not result in increased flood risk on- or off-site.
- 2.11.5 Surface water management has been addressed in **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Outline Drainage Strategy – Covering Report [EN010168/APP/6.3]**, which confirms that runoff will be controlled and discharged at greenfield rates or better.

3. Outline Drainage Strategy

3.1.1 Lime Down C1 forms part of the wider Scheme and includes Solar PV Panelled Areas, one 132kV Substation with associated access track, and fifteen Conversion Units / 33kV Sub-distribution Switch Rooms. This section provides the Outline Drainage Strategy for Lime Down C1. 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. Excluding the 132kV Substation, the 132kV Substation access track where conservatively assessed as hardstanding surfaces, and the fifteen Conversion Unit / 33kV Sub-distribution Switch Room equipment pads, Lime Down C1 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 132kV Substation, the 132kV Substation access track and the fifteen Conversion Units / 33kV Sub-distribution Switch Rooms; and
- An outline drainage strategy for the positively drained hardstanding surfaces, comprising the 132kV Substation, the 132kV Substation access track where conservatively assessed as hardstanding surfaces, and the fifteen Conversion Units / 33kV Sub-distribution Switch Rooms. The detailed drainage layout, final SuDS components, conveyance routes, levels, outfalls, flow controls, treatment train, isolation arrangements and maintenance regime will be confirmed at detailed design and secured through the relevant DCO drainage requirement.

3.2 Solar PV Panelled Area

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 [REP3-039]** 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, except where specifically and conservatively assessed within this Outline Drainage Strategy, such as the 132kV Substation access track.

3.3 Drainage Strategy – Proposed Hardstanding Surfaces

- 3.3.1 Lime Down C1 currently comprises agricultural land. For the Purpose 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 C1. 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: Hardstanding Surfaces

Hardstanding Infrastructure	Hardstanding Area (m ²)
132kV substation compound	9,000
132kV substation access track	3,558
15 x Conversion Units / 33kV Sub Distribution Switch Room	1,125 (15 x 75m ²)

- 3.3.2 The assessed hardstanding surfaces have been identified using the indicative infrastructure areas currently proposed for Lime Down C1, 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 C1. This provides a conservative but realistic basis for demonstrating that the required drainage infrastructure can be delivered within the assessed design envelope.

3.3.3 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.

3.3.4 Wiltshire Council Sustainable Drainage Systems (SuDS) Guidance¹ 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.”

3.4 Drainage Hierarchy

3.4.1 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.

3.4.2 The following drainage hierarchy review considers normal operation. In the event of a potential pollution incident, including a firewater scenario where relevant, the drainage system would be isolated and managed in accordance with the relevant containment strategy. Firewater management is discussed further below.

3.4.3 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.

3.4.4 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.

3.4.5 Priority 1: Surface Water Collected for non-Potable Use

3.4.6 Rainwater harvesting has been considered for the proposed development. However, Lime Down C1 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.

3.4.7 Priority 2: Surface Water Infiltrated to Ground

3.4.8 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).

3.4.9 As described above, the Site is not underlain by superficial deposits and the underlying bedrock comprises the Forest Marble Formation, consisting of mudstone. Soils mapping describes the majority of the Site, including the area where the 132kV Substation is proposed, as having “lime-rich loamy and clayey soils with impeded drainage”.

3.4.10 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.

3.4.11 Infiltration is therefore not considered suitable as the primary method of surface water disposal for the 132kV Substation drainage catchment. This avoids relying on soakaways where ground conditions are unlikely to provide adequate infiltration capacity, particularly during prolonged or high intensity rainfall.

3.4.12 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 132kV Substation drainage catchment.

3.4.13 Surface water from the 132kV Substation and other positively drained hardstanding surfaces will therefore be managed through a controlled drainage system, with attenuation and restricted discharge to an appropriate receiving drainage feature or watercourse.

3.4.14 Priority 3: Discharge to an Above Ground Surface Water Body

3.4.15 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.

3.4.16 The nearest watercourse is an unnamed land drain located within the southern extent of Lime Down C1. Discharge to this watercourse at controlled rates is considered feasible by gravity, subject to detailed design of the outfall arrangement and any necessary approvals.

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

3.4.18 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.

3.4.19 Priority 5: Discharge to a Combined Sewer

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

3.4.21 Surface Water Discharge

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

3.4.23 As infiltration is not considered suitable as the primary discharge route for the 132kV Substation 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.

3.4.24 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 [EN010168/APP/6.1] where the final equipment layout is not fixed. Greenfield calculation input parameters and results are provided in Appendix D.

3.4.25 This approach demonstrates that a feasible drainage solution can be accommodated within Lime Down C1 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 (m ³)
132kV substation compound	3.4	7.1	8.9	8.9	2.3	1,065.3
132kV substation access track	1.3	2.8	3.5	3.5	0.9*	415.0
Conversion Units / 33kV Sub Distribution Switch Room	0.5	1.0	1.2	1.2	0.4	3.1**

* For 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. Minimum practical flow control rates 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.

***The Conversion Unit / 33kV Sub-distribution Switch Room attenuation volume is calculated on a per-unit basis. For Lime Down C1, each unit requires approximately 3.1m^3 of indicative local storage, to be provided through source-control SuDS such as perimeter French drains, filter drains or equivalent features. Fifteen units are proposed at Lime Down C1, giving a cumulative indicative local storage requirement of approximately 46.5m^3 .*

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	✓	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.

		connectivity and contribute to 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	Infiltration-based permeable surfaces promote natural groundwater recharge and improve water quality by	X	Controlled drainage measures, including sealed surfacing or sealed drainage components where required, can be incorporated within the substation areas to

	directly into hardstanding such as car parks, footpaths and access roads. They maintain a natural appearance, reduce surface water ponding, and contribute to safer, more attractive public spaces while supporting the seamless integration of SuDS within the built environment.	filtering and retaining pollutants within the sub-base before infiltration. When combined with adjacent vegetated SuDS features, they can contribute to habitat connectivity and support the wider green-blue network across a site.		prevent uncontrolled infiltration of spills, leaks or firewater into ground or controlled waters. The detailed drainage design should include appropriate treatment, interception, containment and isolation measures proportionate to the substances stored and the sensitivity of the receiving environment. The drainage principles are set out in the Firewater Containment and Drainage Strategy – Lime Down Substation [REP3-120] .
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.	✓	Fixed areas of the substation area are not yet available and therefore accurate permeable surfacing storage estimates must be calculated at the detailed design stage. Typically, the storage offered can be calculated by multiplying the surface area of the permeable surfacing (m ²) by the proposed depth (m) by a porosity ratio of 0.3.
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	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	✗	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.

	for landscaping, parking, or recreation, supporting efficient land use and maintaining overall site amenity.	assist in pollutant removal, improving water quality prior to discharge and supporting the performance of connected ecological SuDS components.		
--	--	---	--	--

3.6 Attenuation Storage

- 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 C1.
- 3.6.2 The hardstanding surfaces requiring positive drainage have been identified using either the indicative area of the infrastructure proposed at Lime Down C1, or, where the final equipment layout is not fixed, the 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 C1 and within the assessed design envelope.
- 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 larger hardstanding surfaces, including the 132kV Substation Area and associated access track where conservatively assessed as hardstanding surfaces, will be collected and conveyed to formal attenuation and flow control features prior to discharge at the restricted rate.
- 3.6.5 The fifteen 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 15 m by 5 m footprint for Integrated Conversion Units / 33kV Sub-distribution Switch Rooms defined in **ES Volume 1, Chapter 3: The Scheme [APP-055]**, equivalent to 75 m² per unit. This provides a conservative basis for assessment.
- 3.6.6 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 3.1m³. Across Lime Down C1, the cumulative assessed area of the fifteen Conversion Units / 33kV Sub-distribution Switch Rooms is 1,125m². 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 46.5m³.
- 3.6.7 Given the small contributing area, low calculated discharge 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 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.
- 3.6.8 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.

- 3.6.9 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 Appendix E.

Table 4: 132kV Substation Compound*

Contributing Area	9,000
Flow Rate	2.3
Flow Control	HydroBrake
Flow Control Design Head	1.0m
Estimated Required Volume (1 in 100 year +45%CC)	338.6m ³

Table 5: 132kV substation Access Track*

Contributing Area	3,558
Flow Rate	1.0
Flow Control	HydroBrake
Flow Control Design Head	1.0m
Estimated Required Volume (1 in 100 year +45%CC)	415.0m ³

Table 6: Conversion Units / 33kV Sub Distribution Switch Room*

Contributing Area	1,125
Flow Rate	0.3
Flow Control	HydroBrake
Flow Control Design Head	1.0m
Estimated Required Volume (1 in 100 year +45%CC)	3.1m ³

Everyday Rainfall

- 3.6.10 In addition to managing extreme rainfall events, measures should be implemented to ensure runoff generate 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 7: 132kV Substation Compound*

Contributing Area	9,000m ²
Rainfall Depth	0.005m
Runoff Volume	45m ²
Required Additional Depth	0.045m

Table 8: 132kV Substation Access Track*

Contributing Area	3,558m ²
Rainfall Depth	0.005m
Runoff Volume	17.8m ²
Required Additional Depth	0.03m

Table 9: Conversion Units / 33kV Sub Distribution Switch Room*

Contributing Area	75m ³
Rainfall Depth	0.005m
Runoff Volume	0.4m ³
Required Additional Depth	0.4m

**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.*

- 3.6.11 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 approach.

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-051]** 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 C1 and within the assessed design envelope.
- 3.7.2 Greenfield runoff rates have been calculated for the assessed hardstanding surfaces areas and the proposed discharge rates have been restricted in accordance with the LLFA drainage requirement. The identified receiving watercourse is an unnamed land drain adjacent to the southern boundary of Lime

Down C1, with the indicative cumulative controlled discharge rates provided within Tables 4, 5 and 6. The proposed SuDS features will attenuate surface water runoff from the positively drained hardstanding surfaces areas 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, isolation measures 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.

- 3.7.3 The drainage strategy is necessarily proportionate to the current stage of design. As such, an outline drainage sketch is provided in Annex F, however, a fixed detailed drainage layout drawing will not be submitted at this outline stage, as the final drainage layout will depend on the detailed design of the site.
- 3.7.4 The final technology, equipment layout, finished levels, drainage catchments and configuration of the drainage system remain subject to detailed design. It is therefore neither possible nor appropriate at this stage to define separate drainage arrangements, dimensions and attenuation volumes for each individual item of infrastructure. For the purposes of demonstrating feasibility, the Causeway Flow calculation applies the total assessed hardstanding area and the committed restricted discharge rate to determine the indicative attenuation storage requirement. The generic tank shown within the calculation is a nominal software storage unit used solely to derive the required storage volume and does not represent a proposed tank or other drainage feature. The dimensions assigned to that unit should therefore not be interpreted as proposed drainage dimensions.
- 3.7.5 The assessment conservatively assumes that runoff from the identified hardstanding areas is managed through a controlled drainage system and demonstrates that sufficient attenuation can be provided within the available land using one or more appropriate SuDS or other attenuation features. Undertaking separate calculations and fixing dimensions for each component at this stage would imply a degree of design certainty that does not exist, unnecessarily constrain the subsequent optimisation of the Scheme and would not materially improve the assessment of flood risk. The final drainage arrangement, including the contributing catchments, conveyance system, storage type, dimensions and required volumes, will be recalculated and verified against the final technology and layout at detailed design stage. It will remain subject to the discharge limits, design standard and drainage principles established by this strategy and secured through Requirement 5 of the **Draft Development Consent Order [REP4-004]**.

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 C1.
- 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 10: 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 11 below demonstrates the mitigation indices for typical SuDS components that may be used within the final drainage design.

Table 11: 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 through the proposed surface water drainage system or any uncontrolled discharge to ground, 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 Firewater Consideration

- 3.10.1 The firewater containment and pollution control principles apply to the 132kV Substation drainage at Lime Down C1. Detailed design will identify the appropriate containment, isolation and treatment

measures for the substation compound, in accordance with the principles set out in **Firewater Containment and Drainage Strategy – Lime Down Substation [REP3-120]**.

- 3.10.2 The principal potential pathway for contaminated firewater or polluted runoff from the 132kV Substation Area would be through the proposed surface water drainage system. The drainage system will therefore be designed so that it can be isolated in the event of a pollution incident or firewater containment scenario. Where required, this will include lined drainage components, controlled outfalls and shut-off valves to prevent uncontrolled discharge from the substation drainage system to ground or surface water receptors.
- 3.10.3 In the event of a fire or pollution incident, the relevant outfall valve would be closed and retained water would be held within the drainage system. The retained water would then be sampled and tested to determine the appropriate disposal route. Depending on the results, this may comprise treatment and controlled discharge subject to the relevant approval, or removal from Site by tanker.
- 3.10.4 The detailed containment volume, valve arrangement, testing procedure, treatment requirements and maintenance regime will be confirmed through detailed design and will be consistent with the substation firewater containment strategy. This does not alter the outline drainage assessment, which demonstrates that normal operational surface water runoff can be managed without increasing flood risk.

3.11 Maintenance

- 3.11.1 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.
- 3.11.2 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]**. Firewater-related inspection, testing and maintenance requirements for the 132kV Substation drainage system will be confirmed in accordance with **Firewater Containment and Drainage Strategy – Lime Down Substation [REP3-120]**.
- 3.11.3 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.

4. Conclusions and Recommendations

4.1 Conclusions

4.1.1 Lime Down C1 is for a ground mounted Solar PV Panels and associated development and access roads.

Flood Risk

4.1.2 Lime Down C1 is predominantly located within Flood Zone 1 (an area with less than 0.1% annual probability of flooding from rivers or the sea), with the exception of the north-easternmost part of Field C22, which lies within Flood Zones 2 and 3.

4.1.3 The majority of Lime Down C1 is at Very Low risk of surface water flooding. Localised areas of Low to High risk (0.1% to greater than 3.3% annual probability) are present in Fields C6–C7, along the northern boundaries of Fields C19 and C21, and in Fields C32–C36. These areas are associated with existing land drainage ditches / ordinary watercourses, with predicted depths largely remaining below 300mm.

4.1.4 The risk of flooding from all sources has been assessed and is considered to be **Negligible to Low**. As such, no strategic site-wide mitigation is required; however, infrastructure in areas of elevated flood risk will be designed with embedded flood resilience measures.

4.1.5 The Solar PV Panels will be mounted on raised frames above existing ground levels, allowing floodwater to flow freely underneath. This avoids obstruction of overland flow routes and prevents any loss of floodplain volume.

4.1.6 The proposed substation in Field C33 will be located sequentially within the field to avoid mapped surface water flow paths and will be raised above predicted flood levels. Further detail on substation design considerations is provided in Section 2.4.

Drainage Strategy

4.1.7 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.

4.1.8 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 located in the southern extent of Lime Down C1, with the indicative cumulative controlled discharge rates provided within Tables 4, 5 and 6. 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.

4.1.9 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.

- 4.1.10 In the event of a firewater incident, the drainage system will be designed so that it can be isolated in the event of a pollution incident or firewater containment scenario.

4.2 Recommendations

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

Annexes

Annex A- Water Body Catchment Classifications Summaries

Luckington Brook Water Body 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	2027 - Low Confidence	Disproportionately expensive; Disproportionate burdens
Biological Quality Elements	Good	Good	Good	Good	2027 - Low Confidence	Disproportionately expensive; Disproportionate burdens
Invertebrates	High	High	High	Good	2015	
Macrophytes and Phytobenthos Combined	Good	Good	Good	Good	2027 - Low Confidence	Disproportionately expensive; Disproportionate burdens
Macrophytes sub element	Good	Good	Good			
Physio-Chemical Quality Elements	Good	Good	Good	Good	2027 - Low Confidence	Disproportionately expensive; Disproportionate burdens
Ammonia (Phys-Chem)	High	High	High	Good	2015	
Dissolved Oxygen	Moderate	Good	Good	Good	2015	
Phosphate	Moderate	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	
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	Good	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)	Fail	Fail	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)	N/A	N/A	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 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

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 (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	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

Annex B – Manning’s Open Channel Flow Mapping

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.

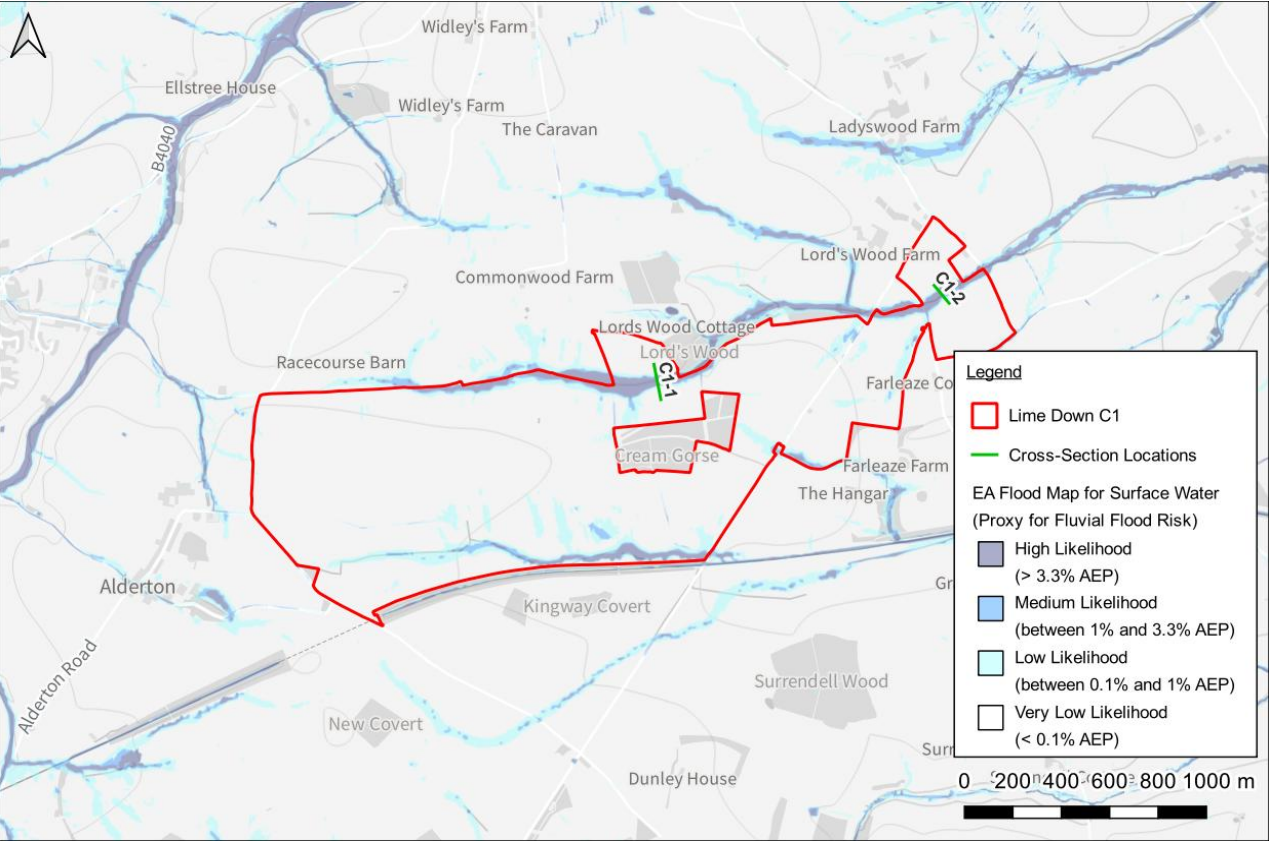
In the absence of detailed flood extent data covering the site, the extents of the EA surface water flood map (0.1% AEP event, present day) have been compared to underlying LiDAR data to provide an estimate of water levels. The surface water flood map has been used as a proxy for fluvial flooding given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



Contains OS data © Crown copyright and database right 2024 | © Environment Agency copyright and/or database right 2015. All rights reserved. | Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. | © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2015. Land & Property Services © Crown copyright and database right.

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)
C1-1	0.1% AEP EA FMFSW water level	110.90	40.7	69.6	111.17 (+271mm)
C1-2	0.1% AEP EA FMFSW water level	103.60	154.2	263.7	103.94 (+336mm)

Tabulated Cross-Section Properties // C1-1

(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
C1-1	0.000	109.501	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0024
C1-1	0.001	109.544	0.043	0.093	0.205	0.012	0.023	0.583	0.597	0.0024
C1-1	0.007	109.586	0.085	0.148	0.230	0.050	0.149	1.167	1.194	0.0024
C1-1	0.024	109.634	0.133	0.212	0.250	0.116	0.495	1.588	1.632	0.0024
C1-1	0.053	109.682	0.181	0.262	0.264	0.202	1.071	2.010	2.070	0.0024
C1-1	0.094	109.730	0.229	0.306	0.274	0.309	1.909	2.432	2.509	0.0024
C1-1	0.156	109.782	0.281	0.350	0.283	0.446	3.163	2.860	2.955	0.0024
C1-1	0.237	109.834	0.333	0.391	0.291	0.606	4.798	3.288	3.402	0.0024
C1-1	0.338	109.886	0.385	0.429	0.298	0.788	6.847	3.717	3.849	0.0024
C1-1	0.461	109.941	0.440	0.458	0.303	1.007	9.325	4.320	4.470	0.0024
C1-1	0.613	109.995	0.494	0.487	0.307	1.259	12.402	4.923	5.091	0.0024
C1-1	0.780	110.042	0.541	0.519	0.312	1.503	15.770	5.343	5.527	0.0024
C1-1	0.970	110.090	0.589	0.549	0.317	1.767	19.628	5.762	5.963	0.0024
C1-1	0.996	110.096	0.595	0.553	0.331	1.803	20.153	6.355	6.559	0.0024
C1-1	1.032	110.104	0.603	0.554	0.374	1.862	20.877	8.320	8.526	0.0024
C1-1	1.090	110.116	0.615	0.555	0.376	1.965	22.052	8.851	9.062	0.0024
C1-1	1.184	110.133	0.632	0.557	0.387	2.126	23.957	10.073	10.287	0.0024
C1-1	1.214	110.138	0.637	0.558	0.394	2.177	24.555	10.679	10.893	0.0024
C1-1	1.214	110.138	0.637	0.558	0.394	2.177	24.555	10.679	10.893	0.0024
C1-1	1.293	110.149	0.648	0.559	0.437	2.313	26.159	13.878	14.094	0.0024
C1-1	1.308	110.151	0.650	0.559	0.441	2.341	26.467	14.311	14.527	0.0024
C1-1	1.308	110.151	0.650	0.559	0.441	2.341	26.467	14.311	14.527	0.0024
C1-1	1.339	110.155	0.654	0.558	0.446	2.399	27.079	15.064	15.282	0.0024
C1-1	1.380	110.160	0.659	0.557	0.462	2.479	27.908	16.731	16.949	0.0024
C1-1	1.414	110.164	0.663	0.555	0.462	2.547	28.606	17.305	17.523	0.0024
C1-1	1.555	110.179	0.678	0.550	0.465	2.825	31.450	19.815	20.035	0.0024
C1-1	1.586	110.182	0.681	0.550	0.465	2.885	32.076	20.256	20.477	0.0024
C1-1	1.743	110.196	0.695	0.549	0.453	3.176	35.249	21.191	21.414	0.0024
C1-1	1.787	110.200	0.699	0.548	0.458	3.263	36.141	22.418	22.641	0.0024
C1-1	1.824	110.203	0.702	0.548	0.456	3.331	36.890	22.680	22.903	0.0024
C1-1	2.061	110.221	0.720	0.549	0.448	3.755	41.691	24.522	24.747	0.0024
C1-1	2.147	110.227	0.726	0.549	0.462	3.910	43.429	27.184	27.410	0.0024
C1-1	2.147	110.227	0.726	0.549	0.462	3.910	43.429	27.184	27.410	0.0024
C1-1	2.148	110.228	0.727	0.546	0.460	3.938	43.452	27.442	27.667	0.0024
C1-1	2.221	110.233	0.732	0.545	0.461	4.078	44.918	28.709	28.935	0.0024

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
C1-1	2.370	110.242	0.741	0.546	0.452	4.338	47.949	29.143	29.370	0.0024
C1-1	2.689	110.260	0.759	0.552	0.440	4.874	54.401	30.335	30.562	0.0024
C1-1	2.922	110.272	0.771	0.557	0.433	5.242	59.111	31.086	31.314	0.0024
C1-1	3.130	110.283	0.782	0.560	0.430	5.592	63.317	32.424	32.652	0.0024
C1-1	3.411	110.296	0.795	0.567	0.427	6.020	68.990	33.534	33.762	0.0024
C1-1	3.524	110.301	0.800	0.569	0.426	6.189	71.274	33.974	34.202	0.0024
C1-1	4.237	110.329	0.828	0.592	0.421	7.162	85.711	35.511	35.740	0.0024
C1-1	4.657	110.344	0.843	0.605	0.419	7.700	94.209	36.263	36.493	0.0024
C1-1	5.381	110.368	0.867	0.627	0.418	8.585	108.845	37.453	37.683	0.0024
C1-1	6.038	110.388	0.887	0.646	0.418	9.343	122.135	38.329	38.560	0.0024
C1-1	7.008	110.416	0.915	0.671	0.419	10.438	141.757	39.927	40.159	0.0024
C1-1	7.077	110.418	0.917	0.673	0.419	10.518	143.146	40.096	40.329	0.0024
C1-1	7.366	110.427	0.926	0.677	0.420	10.884	148.992	41.216	41.448	0.0024
C1-1	7.531	110.432	0.931	0.679	0.427	11.095	152.337	42.967	43.200	0.0024
C1-1	7.568	110.435	0.934	0.674	0.422	11.224	153.078	43.210	43.443	0.0024
C1-1	9.329	110.476	0.975	0.716	0.425	13.032	188.699	44.981	45.216	0.0024
C1-1	9.555	110.481	0.980	0.721	0.425	13.257	193.272	45.228	45.463	0.0024
C1-1	11.130	110.514	1.013	0.753	0.428	14.775	225.135	46.756	46.992	0.0024
C1-1	12.156	110.534	1.033	0.773	0.430	15.718	245.897	47.597	47.835	0.0024
C1-1	13.509	110.559	1.058	0.798	0.432	16.921	273.262	48.632	48.871	0.0024
C1-1	15.235	110.589	1.088	0.828	0.435	18.398	308.165	49.845	50.085	0.0024
C1-1	16.259	110.606	1.105	0.845	0.437	19.252	328.880	50.545	50.786	0.0024
C1-1	18.534	110.642	1.141	0.878	0.441	21.099	374.897	52.080	52.322	0.0024
C1-1	19.028	110.650	1.149	0.884	0.441	21.518	384.900	52.582	52.825	0.0024
C1-1	20.178	110.668	1.167	0.898	0.443	22.474	408.152	53.668	53.911	0.0024
C1-1	22.383	110.699	1.198	0.927	0.446	24.157	452.750	54.939	55.184	0.0024
C1-1	23.865	110.719	1.218	0.945	0.448	25.265	482.745	55.777	56.023	0.0024
C1-1	25.965	110.746	1.245	0.969	0.451	26.785	525.215	56.835	57.082	0.0024
C1-1	28.593	110.778	1.277	0.999	0.454	28.622	578.365	57.997	58.247	0.0024
C1-1	30.498	110.800	1.299	1.020	0.456	29.906	616.914	58.716	58.966	0.0024
C1-1	35.358	110.853	1.352	1.069	0.461	33.062	715.207	60.376	60.630	0.0024
C1-1	35.827	110.858	1.357	1.074	0.462	33.364	724.704	60.554	60.808	0.0024
C1-1	38.251	110.885	1.384	1.092	0.464	35.020	773.736	62.064	62.320	0.0024
C1-1	40.695	110.910	1.409	1.112	0.466	36.585	823.181	63.110	63.367	0.0024
C1-1	42.504	110.928	1.427	1.127	0.468	37.727	859.760	63.868	64.126	0.0024
C1-1	46.573	110.966	1.465	1.159	0.471	40.179	942.071	65.145	65.405	0.0024
C1-1	49.851	110.995	1.494	1.185	0.474	42.080	1008.378	66.020	66.282	0.0024
C1-1	54.550	111.035	1.534	1.219	0.477	44.746	1103.428	67.235	67.500	0.0024
C1-1	57.610	111.061	1.560	1.239	0.479	46.506	1165.329	68.231	68.497	0.0024
C1-1	59.765	111.080	1.579	1.250	0.480	47.813	1208.909	69.273	69.539	0.0024
C1-1	61.352	111.093	1.592	1.259	0.481	48.717	1241.013	69.835	70.103	0.0024
C1-1	66.935	111.136	1.635	1.293	0.485	51.752	1353.954	71.343	71.613	0.0024
C1-1	71.739	111.171	1.670	1.322	0.488	54.268	1451.132	72.427	72.699	0.0024
C1-1	73.926	111.188	1.687	1.332	0.489	55.507	1495.358	73.275	73.548	0.0024
C1-1	76.117	111.205	1.704	1.341	0.490	56.760	1539.676	74.192	74.466	0.0024
C1-1	79.822	111.231	1.730	1.360	0.491	58.702	1614.620	75.193	75.468	0.0024
C1-1	86.449	111.275	1.774	1.393	0.494	62.043	1748.675	76.642	76.920	0.0024
C1-1	88.310	111.287	1.786	1.403	0.495	62.965	1786.311	77.031	77.309	0.0024
C1-1	94.481	111.327	1.826	1.430	0.498	66.078	1911.148	78.617	78.898	0.0024
C1-1	97.884	111.348	1.847	1.445	0.499	67.736	1979.984	79.342	79.625	0.0024
C1-1	102.603	111.377	1.876	1.465	0.501	70.053	2075.439	80.450	80.733	0.0024
C1-1	107.677	111.406	1.905	1.487	0.503	72.397	2178.076	81.220	81.506	0.0024
C1-1	119.201	111.469	1.968	1.537	0.507	77.564	2411.176	82.806	83.098	0.0024
C1-1	123.319	111.492	1.991	1.552	0.508	79.478	2494.472	83.631	83.924	0.0024
C1-1	125.774	111.507	2.006	1.558	0.509	80.739	2544.144	84.501	84.795	0.0024
C1-1	128.890	111.525	2.024	1.567	0.510	82.269	2607.167	85.422	85.716	0.0024
C1-1	134.925	111.558	2.057	1.585	0.511	85.111	2729.239	86.890	87.186	0.0024
C1-1	136.594	111.567	2.066	1.590	0.512	85.896	2762.999	87.298	87.595	0.0024
C1-1	140.728	111.591	2.090	1.599	0.513	88.009	2846.624	88.825	89.123	0.0024
C1-1	143.831	111.607	2.106	1.608	0.514	89.436	2909.384	89.517	89.815	0.0024
C1-1	149.863	111.637	2.136	1.626	0.515	92.139	3031.410	90.715	91.015	0.0024
C1-1	155.612	111.665	2.164	1.643	0.517	94.695	3147.699	91.847	92.148	0.0024
C1-1	159.170	111.682	2.181	1.654	0.518	96.262	3219.666	92.529	92.831	0.0024
C1-1	168.487	111.724	2.223	1.682	0.520	100.177	3408.125	93.874	94.179	0.0024
C1-1	174.939	111.752	2.251	1.701	0.521	102.817	3538.633	94.700	95.006	0.0024
C1-1	179.624	111.775	2.274	1.711	0.522	105.011	3633.396	96.066	96.373	0.0024
C1-1	183.778	111.793	2.292	1.722	0.523	106.746	3717.430	96.734	97.043	0.0024
C1-1	190.224	111.821	2.320	1.738	0.525	109.470	3847.813	97.870	98.180	0.0024
C1-1	196.661	111.849	2.348	1.752	0.526	112.228	3978.021	99.138	99.449	0.0024
C1-1	198.994	111.859	2.358	1.758	0.526	113.222	4025.209	99.591	99.903	0.0024
C1-1	209.913	111.904	2.403	1.783	0.528	117.745	4246.081	101.440	101.754	0.0024
C1-1	210.163	111.905	2.404	1.783	0.528	117.846	4251.146	101.477	101.791	0.0024
C1-1	221.055	111.949	2.448	1.807	0.530	122.353	4471.464	103.352	103.668	0.0024
C1-1	223.123	111.957	2.456	1.811	0.531	123.181	4513.296	103.659	103.975	0.0024
C1-1	234.193	112.000	2.499	1.834	0.532	127.678	4737.207	105.500	105.819	0.0024
C1-1	234.891	112.003	2.502	1.835	0.532	127.994	4751.342	105.697	106.015	0.0024
C1-1	239.097	112.022	2.521	1.839	0.533	130.017	4836.415	107.123	107.442	0.0024
C1-1	243.277	112.039	2.538	1.845	0.533	131.846	4920.975	108.119	108.439	0.0024
C1-1	247.797	112.056	2.555	1.854	0.534	133.691	5012.397	108.932	109.253	0.0024
C1-1	259.250	112.097	2.596	1.876	0.536	138.192	5244.063	110.633	110.956	0.0024
C1-1	259.808	112.099	2.598	1.877	0.536	138.413	5255.359	110.721	111.044	0.0024
C1-1	268.193	112.130	2.629	1.890	0.537	141.871	5424.960	112.369	112.693	0.0024
C1-1	273.345	112.148	2.647	1.900	0.538	143.901	5529.175	113.181	113.505	0.0024
C1-1	279.893	112.171	2.670	1.910	0.539	146.517	5661.635	114.291	114.616	0.0024
C1-1	285.460	112.192	2.691	1.917	0.539	148.932	5774.233	115.677	116.003	0.0024
C1-1	286.307	112.195	2.694	1.918	0.539	149.279	5791.369	115.849	116.175	0.0024
C1-1	307.500	112.260	2.759	1.960	0.542	156.874	6220.063	117.826	118.156	0.0024
C1-1	308.211	112.262	2.761	1.962	0.543	157.110	6234.436	118.265	118.596	0.0024
C1-1	308.962	112.265	2.764	1.962	0.545	157.465	6249.629	119.100	119.430	0.0024
C1-1	311.750	112.276	2.775	1.963	0.546	158.783	6306.026	120.375	120.706	0.0024
C1-1	316.283	112.289	2.788	1.972	0.548	160.353	6397.715	121.214	121.545	0.0024
C1-1	321.203	112.303	2.802	1.982	0.550	162.059	6497.251	122.543	122.875	0.0024
C1-1	328.307	112.323	2.822	1.996	0.552	164.521	6640.943	123.662	123.995	0.0024
C1-1	331.050	112.333	2.832	1.997	0.553	165.763	6696.417	124.687	125.020	0.0024
C1-1	332.434	112.338	2.837	1.998	0.553	166.388	6724.427	125.193	125.526	0.0024

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
C1-1	342.333	112.364	2.863	2.018	0.556	169.658	6924.664	126.395	126.729	0.0024
C1-1	347.718	112.378	2.877	2.028	0.559	171.436	7033.582	127.604	127.939	0.0024
C1-1	362.573	112.416	2.915	2.056	0.562	176.313	7334.060	129.077	129.414	0.0024
C1-1	363.348	112.418	2.917	2.058	0.562	176.572	7349.734	129.162	129.499	0.0024
C1-1	374.288	112.446	2.945	2.077	0.565	180.209	7571.032	130.665	131.004	0.0024
C1-1	386.217	112.476	2.975	2.097	0.566	184.145	7812.326	131.758	132.098	0.0024
C1-1	395.665	112.499	2.998	2.114	0.568	187.185	8003.438	132.512	132.854	0.0024
C1-1	402.275	112.515	3.014	2.125	0.570	189.315	8137.156	133.753	134.095	0.0024
C1-1	417.423	112.551	3.050	2.150	0.573	194.157	8443.559	135.264	135.608	0.0024
C1-1	417.848	112.552	3.051	2.151	0.573	194.293	8452.151	135.307	135.651	0.0024
C1-1	431.409	112.585	3.084	2.170	0.575	198.786	8726.469	137.022	137.367	0.0024
C1-1	437.242	112.599	3.098	2.178	0.576	200.709	8844.462	137.715	138.061	0.0024
C1-1	447.229	112.622	3.121	2.194	0.578	203.888	9046.479	138.715	139.062	0.0024
C1-1	463.547	112.659	3.158	2.217	0.580	209.050	9376.548	140.323	140.672	0.0024
C1-1	465.772	112.664	3.163	2.221	0.580	209.753	9421.559	140.616	140.965	0.0024
C1-1	473.689	112.683	3.182	2.230	0.582	212.437	9581.706	141.982	142.332	0.0024
C1-1	480.432	112.699	3.198	2.238	0.583	214.717	9718.102	143.106	143.456	0.0024
C1-1	484.496	112.708	3.207	2.243	0.584	216.008	9800.311	143.634	143.985	0.0024
C1-1	504.253	112.751	3.250	2.269	0.586	222.223	10199.943	145.419	145.772	0.0024
C1-1	507.042	112.757	3.256	2.273	0.586	223.097	10256.360	145.706	146.059	0.0024
C1-1	520.273	112.785	3.284	2.290	0.588	227.194	10524.002	146.998	147.353	0.0024
C1-1	537.569	112.821	3.320	2.312	0.590	232.515	10873.850	148.600	148.956	0.0024
C1-1	537.569	112.821	3.320	2.312	0.590	232.515	10873.850	148.600	148.956	0.0024
C1-1	551.256	112.847	3.346	2.332	0.592	236.392	11150.710	149.625	149.981	0.0024

Tabulated Cross-Section Properties // C1-2

(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
C1-2	0.000	102.303	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0126
C1-2	0.000	102.310	0.007	0.065	0.349	0.005	0.003	1.342	1.343	0.0126
C1-2	0.012	102.337	0.034	0.245	0.486	0.049	0.107	1.896	1.901	0.0126
C1-2	0.038	102.365	0.062	0.350	0.532	0.108	0.338	2.450	2.459	0.0126
C1-2	0.079	102.392	0.089	0.433	0.560	0.183	0.706	3.005	3.017	0.0126
C1-2	0.166	102.428	0.125	0.557	0.596	0.298	1.477	3.348	3.368	0.0126
C1-2	0.281	102.464	0.161	0.661	0.622	0.425	2.503	3.691	3.719	0.0126
C1-2	0.425	102.501	0.198	0.752	0.642	0.565	3.785	4.035	4.070	0.0126
C1-2	0.598	102.537	0.234	0.834	0.658	0.717	5.330	4.378	4.421	0.0126
C1-2	0.802	102.573	0.270	0.910	0.673	0.881	7.147	4.721	4.772	0.0126
C1-2	1.038	102.609	0.306	0.981	0.685	1.058	9.247	5.065	5.123	0.0126
C1-2	1.155	102.624	0.321	1.012	0.739	1.141	10.291	5.962	6.022	0.0126
C1-2	1.188	102.628	0.325	1.018	0.781	1.167	10.582	6.738	6.798	0.0126
C1-2	1.230	102.633	0.330	1.022	0.860	1.204	10.961	8.382	8.443	0.0126
C1-2	1.304	102.641	0.338	1.017	0.948	1.281	11.616	10.910	10.972	0.0126
C1-2	1.304	102.641	0.338	1.017	0.948	1.281	11.616	10.910	10.972	0.0126
C1-2	1.333	102.644	0.341	1.012	1.008	1.317	11.878	12.807	12.870	0.0126
C1-2	1.368	102.647	0.344	1.008	1.011	1.356	12.185	13.378	13.441	0.0126
C1-2	1.507	102.658	0.355	0.993	1.024	1.517	13.424	15.802	15.866	0.0126
C1-2	1.549	102.661	0.358	0.988	1.075	1.568	13.798	18.215	18.278	0.0126
C1-2	1.563	102.662	0.359	0.985	1.089	1.587	13.927	19.018	19.082	0.0126
C1-2	1.593	102.664	0.361	0.980	1.111	1.626	14.195	20.509	20.572	0.0126
C1-2	1.593	102.664	0.361	0.980	1.111	1.626	14.195	20.509	20.572	0.0126
C1-2	1.636	102.667	0.364	0.969	1.095	1.689	14.578	21.163	21.227	0.0126
C1-2	2.482	102.706	0.403	0.976	0.930	2.543	22.116	22.674	22.741	0.0126
C1-2	3.308	102.734	0.431	1.033	0.895	3.202	29.469	23.584	23.653	0.0126
C1-2	4.289	102.763	0.460	1.103	0.884	3.888	38.210	24.494	24.565	0.0126
C1-2	5.067	102.783	0.480	1.156	0.884	4.384	45.137	25.132	25.205	0.0126
C1-2	6.281	102.811	0.508	1.226	0.912	5.125	55.958	27.810	27.885	0.0126
C1-2	6.507	102.817	0.514	1.229	0.919	5.296	57.969	29.046	29.122	0.0126
C1-2	6.547	102.818	0.515	1.229	0.921	5.325	58.322	29.321	29.398	0.0126
C1-2	6.628	102.820	0.517	1.231	0.931	5.384	59.043	30.188	30.265	0.0126
C1-2	6.539	102.821	0.518	1.207	0.936	5.415	58.253	31.911	31.987	0.0126
C1-2	6.539	102.821	0.518	1.207	0.936	5.415	58.253	31.911	31.987	0.0126
C1-2	6.567	102.822	0.519	1.205	0.958	5.448	58.504	33.744	33.821	0.0126
C1-2	6.692	102.828	0.525	1.183	0.955	5.658	59.615	36.161	36.238	0.0126
C1-2	6.737	102.830	0.527	1.176	0.949	5.731	60.018	36.646	36.723	0.0126
C1-2	7.722	102.847	0.544	1.212	0.953	6.371	68.794	38.674	38.753	0.0126
C1-2	8.994	102.867	0.564	1.256	0.954	7.164	80.124	40.597	40.677	0.0126
C1-2	10.422	102.888	0.585	1.299	0.943	8.026	92.846	41.502	41.583	0.0126
C1-2	12.212	102.911	0.608	1.358	0.942	8.991	108.793	42.431	42.513	0.0126
C1-2	14.004	102.933	0.630	1.408	0.948	9.944	124.754	44.180	44.263	0.0126
C1-2	15.913	102.954	0.651	1.462	0.950	10.881	141.763	45.090	45.174	0.0126
C1-2	16.416	102.962	0.659	1.459	0.948	11.248	146.243	46.588	46.672	0.0126
C1-2	19.201	102.989	0.686	1.534	0.955	12.519	171.058	47.567	47.653	0.0126
C1-2	21.786	103.012	0.709	1.596	0.961	13.648	194.085	48.525	48.612	0.0126
C1-2	24.534	103.036	0.733	1.658	0.968	14.800	218.563	49.484	49.572	0.0126
C1-2	27.988	103.064	0.761	1.727	0.976	16.203	249.337	50.786	50.876	0.0126
C1-2	29.314	103.075	0.772	1.748	0.979	16.766	261.151	51.546	51.636	0.0126
C1-2	32.726	103.101	0.798	1.806	0.984	18.122	291.543	52.764	52.856	0.0126
C1-2	35.824	103.123	0.820	1.857	0.989	19.293	319.141	53.671	53.764	0.0126
C1-2	39.065	103.145	0.842	1.907	0.994	20.483	348.020	54.578	54.672	0.0126
C1-2	42.648	103.167	0.864	1.964	1.000	21.719	379.938	55.256	55.352	0.0126
C1-2	46.381	103.190	0.887	2.019	1.006	22.970	413.195	55.934	56.031	0.0126
C1-2	50.355	103.215	0.912	2.065	1.013	24.389	448.601	57.573	57.672	0.0126
C1-2	50.847	103.218	0.915	2.070	1.014	24.562	452.980	57.770	57.869	0.0126
C1-2	56.906	103.252	0.949	2.146	1.022	26.518	506.961	59.017	59.118	0.0126
C1-2	63.302	103.285	0.982	2.220	1.030	28.516	563.940	60.264	60.366	0.0126
C1-2	64.086	103.289	0.986	2.228	1.031	28.758	570.926	60.415	60.517	0.0126
C1-2	69.321	103.316	1.013	2.282	1.038	30.374	617.559	61.583	61.686	0.0126
C1-2	74.769	103.342	1.039	2.335	1.044	32.022	666.094	62.750	62.855	0.0126
C1-2	77.099	103.353	1.050	2.357	1.046	32.714	686.852	63.224	63.329	0.0126
C1-2	81.975	103.375	1.072	2.403	1.051	34.114	730.290	64.052	64.159	0.0126
C1-2	87.001	103.397	1.094	2.448	1.056	35.533	775.064	64.880	64.988	0.0126
C1-2	92.751	103.422	1.118	2.498	1.062	37.134	826.288	65.837	65.946	0.0126

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
C1-2	98.689	103.446	1.143	2.546	1.067	38.759	879.191	66.793	66.903	0.0126
C1-2	99.182	103.448	1.145	2.550	1.078	38.893	883.582	68.213	68.324	0.0126
C1-2	99.443	103.449	1.146	2.552	1.079	38.962	885.909	68.254	68.365	0.0126
C1-2	107.054	103.477	1.174	2.620	1.087	40.861	953.712	69.058	69.171	0.0126
C1-2	114.929	103.504	1.201	2.686	1.096	42.783	1023.869	69.862	69.977	0.0126
C1-2	123.062	103.532	1.229	2.751	1.104	44.727	1096.325	70.666	70.783	0.0126
C1-2	126.669	103.544	1.241	2.779	1.108	45.577	1128.461	71.086	71.203	0.0126
C1-2	134.415	103.569	1.266	2.838	1.116	47.365	1197.467	71.883	72.002	0.0126

Annex C - EA Product Data

[REDACTED]

[REDACTED]

- 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] [mabbett.eu](mailto:info@mabbett.eu)>

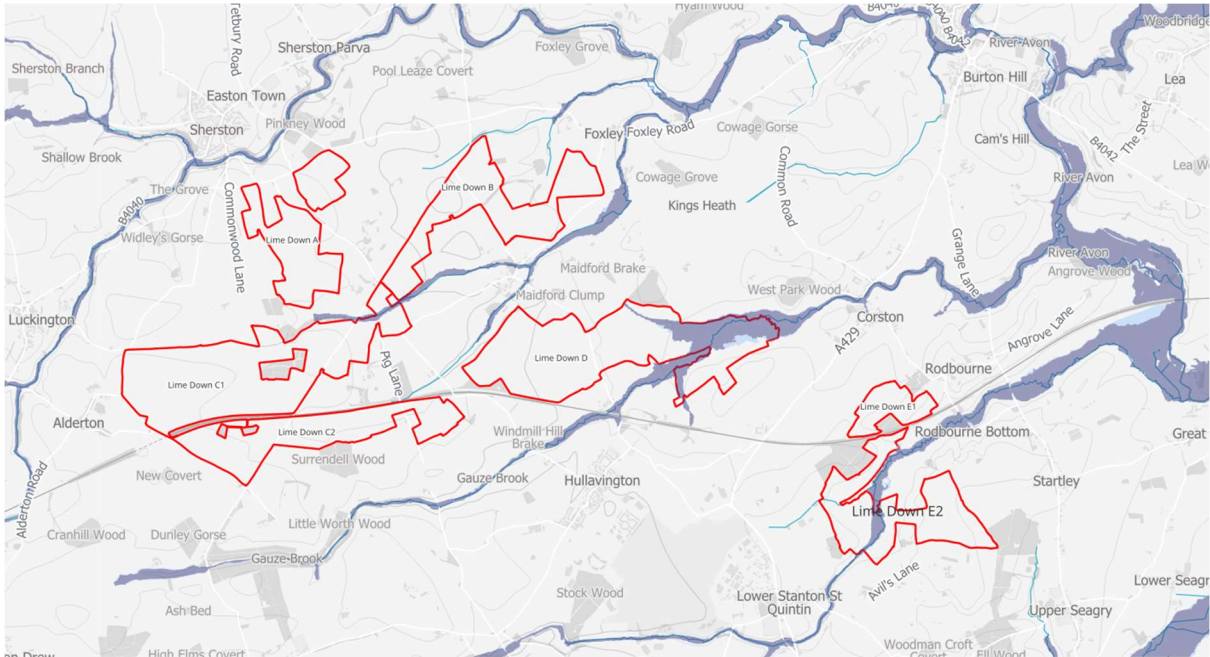
Sent: 15 October 2024 14:01

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;

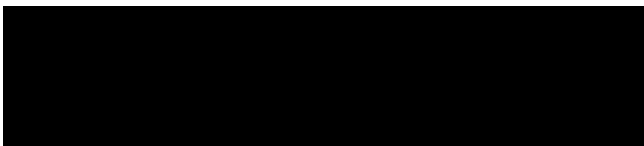
We trust this request is acceptable but please do not hesitate to contact us if you require any further information to assist with your response or wish to discuss the Site in further detail.

We look forward to hearing from you.

Thanks,



Consultant | Water Environment Team



IOSH & IEMA Training Course Provider

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

Mabbett & Associates Ltd, Registered Office: 13 Henderson Road, Inverness, IV1 1SN.
Registered in Scotland No. SC 163378.

This e-mail is from Mabbett & Associates Ltd. It may contain private and confidential information. If you have received this message in error, please delete it and contact us on 0141 227 2300. Emails are not secure and may contain viruses. Mabbett & Associates Ltd may monitor email traffic data. Any views or other information in this message which do not relate to our business are not authorised by us. This message does not form part of any contract unless so stated. Please refer to our Privacy Policy <https://www.mabbett.eu/privacy-policy/>

© 2024, Mabbett & Associates Ltd.

Please consider the environment before printing this e-mail

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

Dear [REDACTED]

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

Abstract

Name	Product 4
Description	Flood Risk Information for land at Lime Down NGR: ST9009082825
Licence	Open Government Licence
Information Warnings	<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



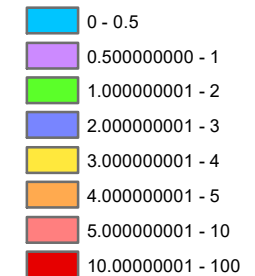
Scale 1:50,000



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



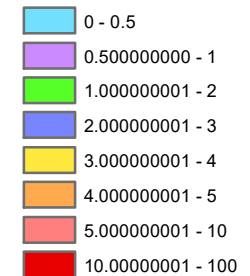
Scale 1:50,000



Legend

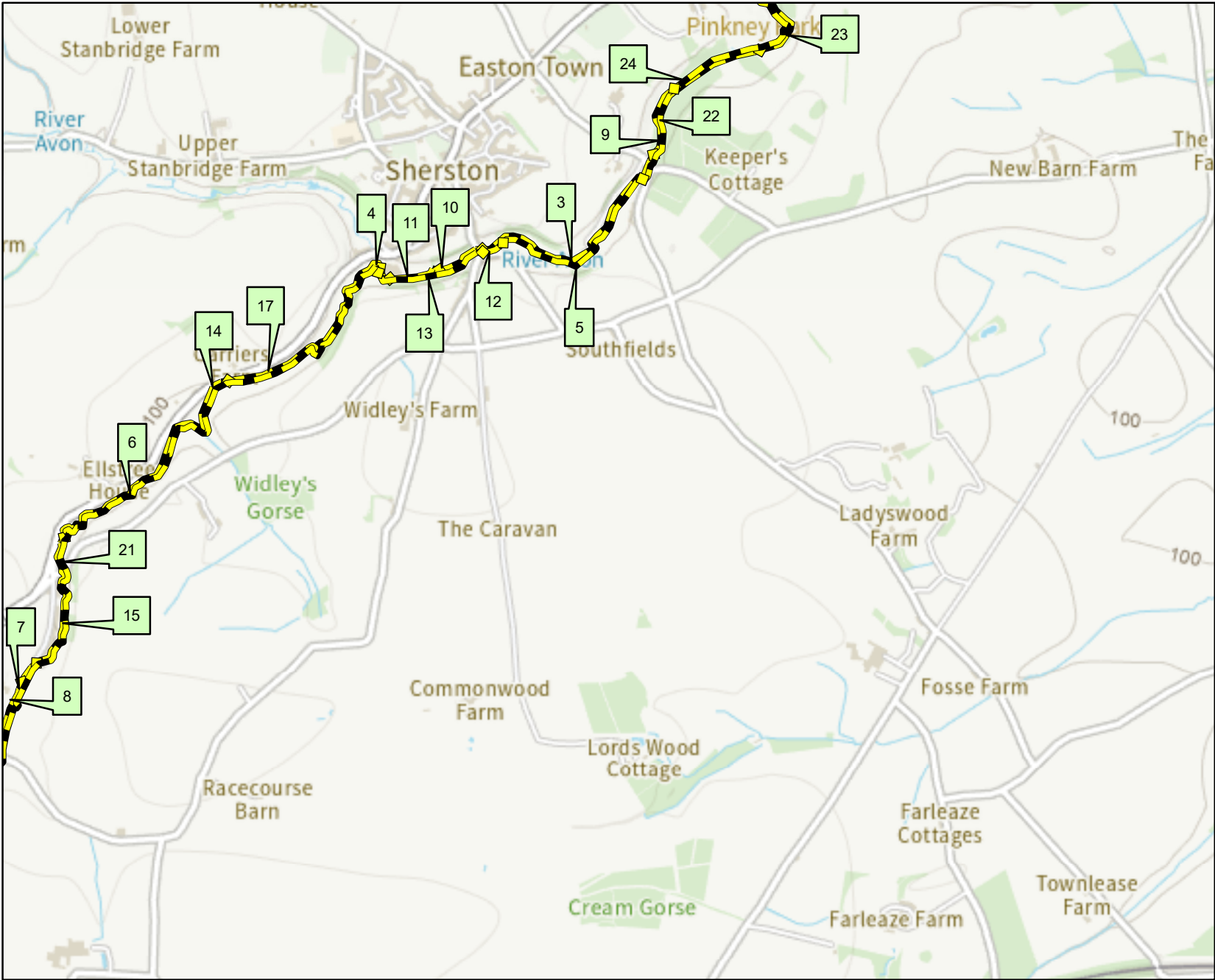
1000yr JFLOW Depth

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

Appendix D – Greenfield Runoff Calculations

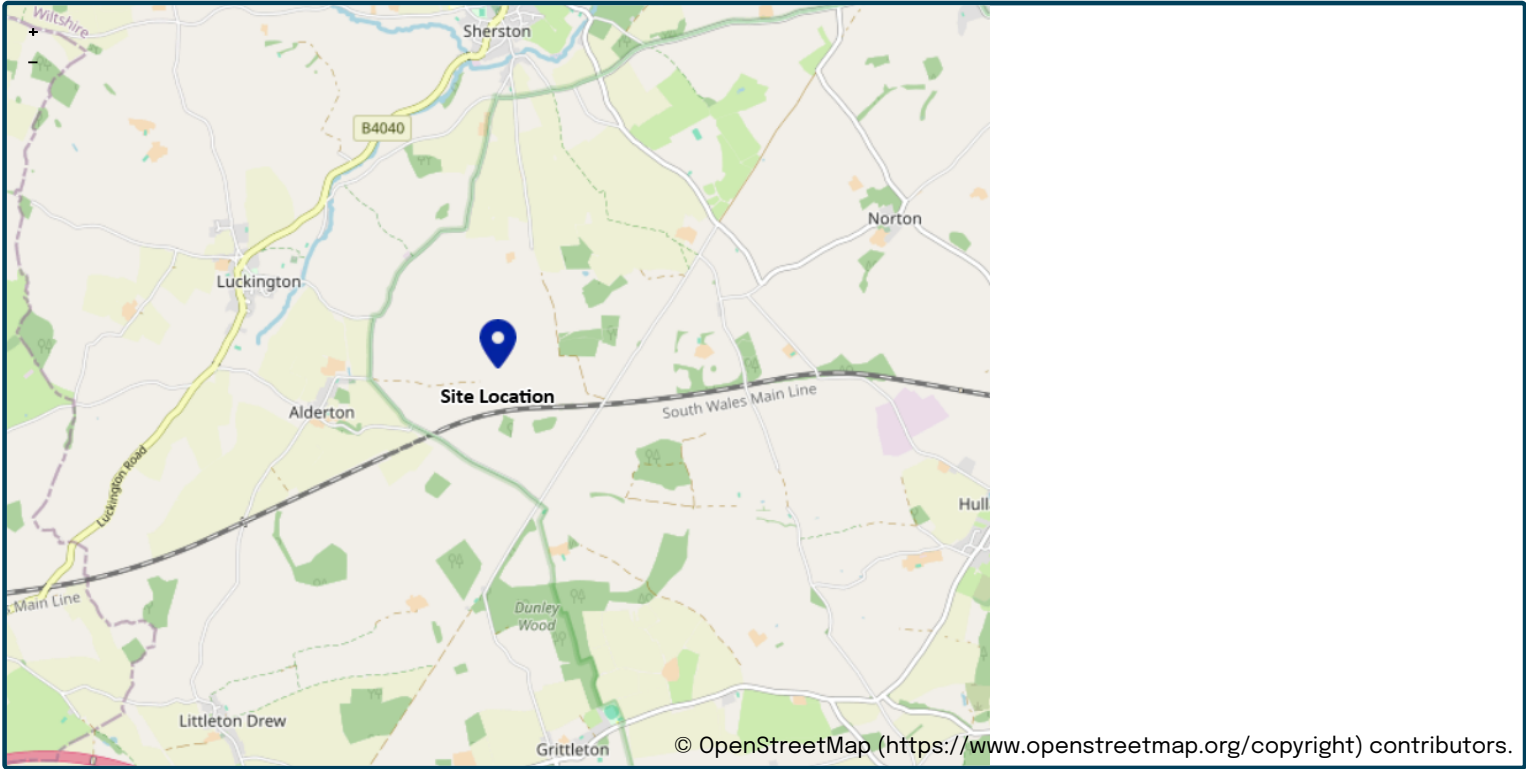
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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 C1
Site location	



Site easting (British National Grid)	385375
Site northing (British National Grid)	182974

Site details

Total site area (ha)	0.12	ha
----------------------	-----------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	889	mm
BFIHOST19scaled	0.554	
QMed-QBar conversion	1.075	1.075
QMed (l/s)	0.5	l/s
QBar (FEH statistical 2025) (l/s)	0.5	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)	0.4
Flow rate 2 year (l/s)	0.5
Flow rate 10 years (l/s)	0.7
Flow rate 30 years (l/s)	1.0
Flow rate 100 years (l/s)	1.2
Flow rate 200 years (l/s)	1.4

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>). 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.

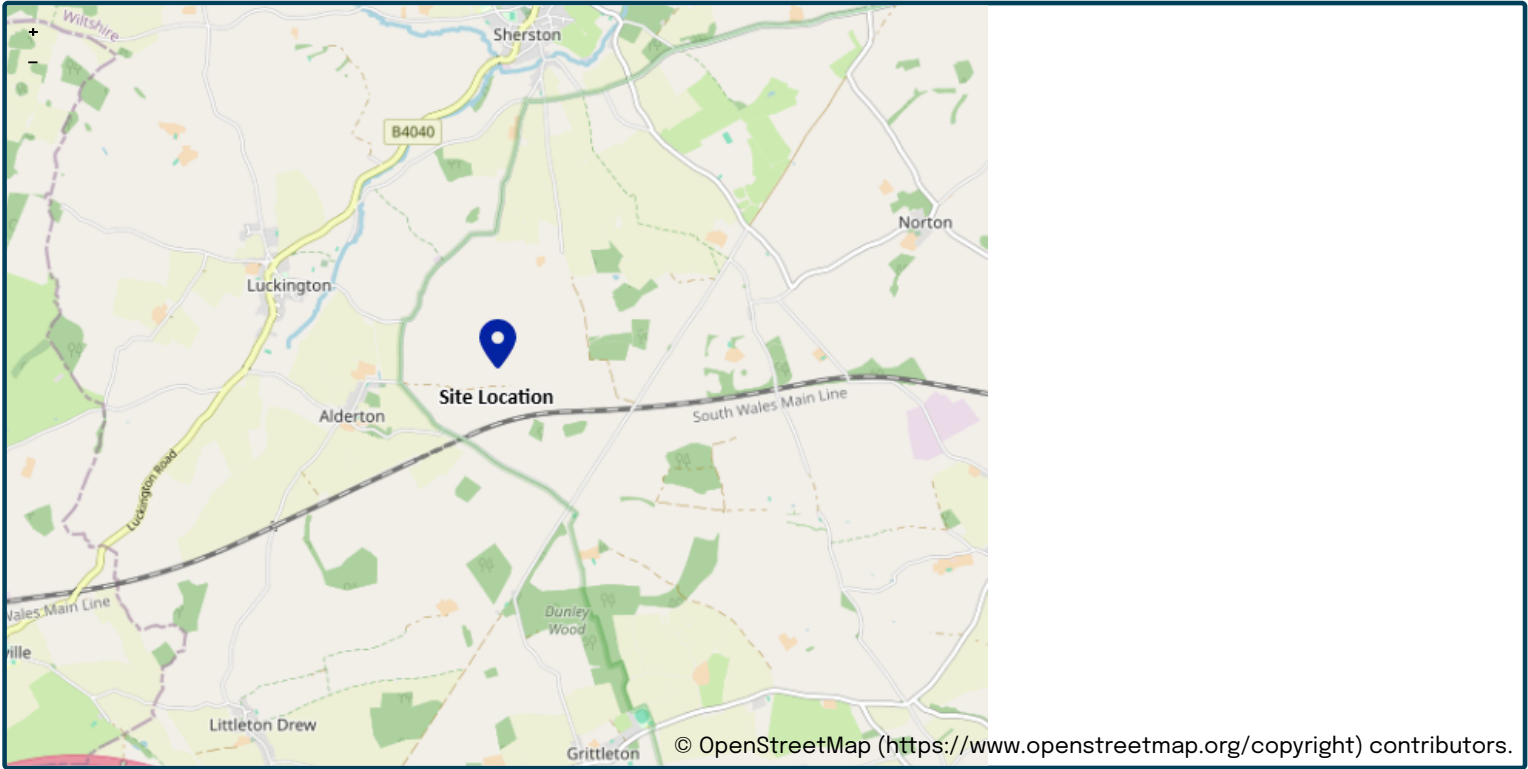
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	08/07/2026
Calculated by	GH
Reference	317212
Model version	2.2.3

Location

Site name	Lime Down C1
Site location	



Site easting (British National Grid)	385124
Site northing (British National Grid)	183008

Site details

Total site area (ha)	0.3558	ha
----------------------	-------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	889	mm
BFIHOST19scaled	0.554	
QMed-QBar conversion	1.075	☒ 1.075
QMed (l/s)	1.3	l/s
QBar (FEH statistical 2025) (l/s)	1.4	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)	1.1	l/s
Flow rate 2 year (l/s)	1.3	l/s
Flow rate 10 years (l/s)	2.2	l/s
Flow rate 30 years (l/s)	2.8	l/s
Flow rate 100 years (l/s)	3.5	l/s
Flow rate 200 years (l/s)	4.0	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>). 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.

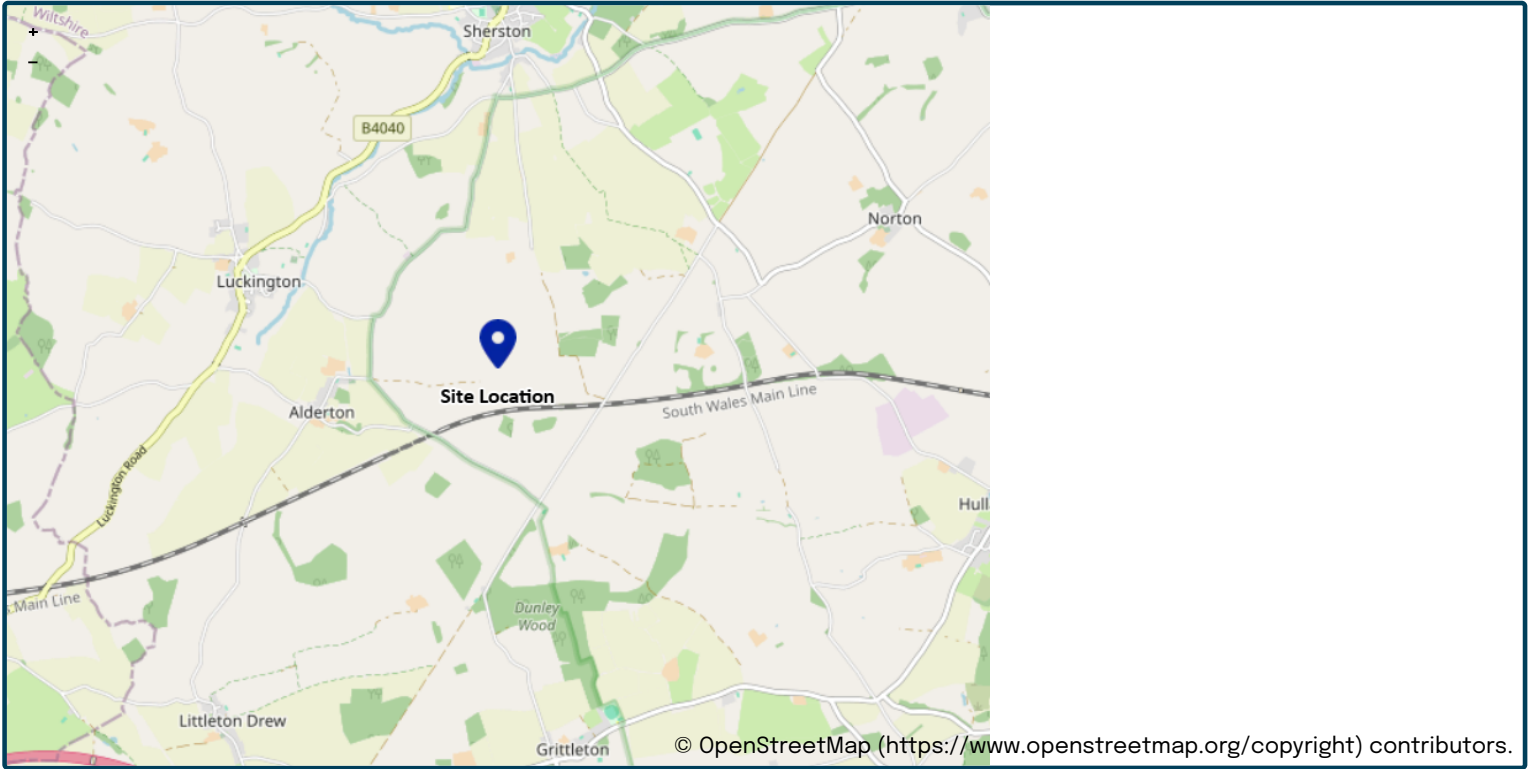
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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 C1
Site location	



Site easting (British National Grid)	385375
Site northing (British National Grid)	182974

Site details

Total site area (ha)	0.9	ha
----------------------	----------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	889	mm
BFIHOST19scaled	0.554	
QMed-QBar conversion	1.075	1.075
QMed (l/s)	3.4	l/s
QBar (FEH statistical 2025) (l/s)	3.7	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)	2.9
Flow rate 2 year (l/s)	3.4
Flow rate 10 years (l/s)	5.5
Flow rate 30 years (l/s)	7.1
Flow rate 100 years (l/s)	8.9
Flow rate 200 years (l/s)	10.2

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>). 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.

Appendix 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	0.356	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
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

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-0050-1000-0750-1000
Design Depth (m)	0.750	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	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)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	475.0	475.0	0.750	664.7	675.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Storage	1410	99.981	0.731	14.0	415.0386	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Storage	Hydro-Brake®	1.0	150.6

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
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

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-0031-4000-0750-4000
Design Depth (m)	0.750	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.4	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)	76

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
60 minute winter	Storage	60	99.663	0.413	2.8	3.1348	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
60 minute winter	Storage	Hydro-Brake®	0.3	4.1				

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	0.900	5.00	100.000	1200	0.000	0.000	1.000	99.000

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
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

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)	99.000	Product Number	CTL-SHE-0072-2300-1000-2300
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.3	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)	99.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1000.0	1000.0	1.000	1364.6	1384.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Storage	1440	99.913	0.913	35.5	1065.3280	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
1440 minute winter	Storage	Hydro-Brake®	2.3	338.6				

Annex F – Outline Drainage Sketch

Annex G – SuDs Maintenance Schedule

Bioretention Systems Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 18.3

Detention Basins Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Cut grass - for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasion Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 22.1

Filter Drains Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly, or as required
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six Monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 16.1

Filter Strip Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris, leaf litter, and other accumulated material from the filter strip surface	Monthly, or as required
	Inspect the filter strip for bare patches, erosion, rutting, ponding, channel formation, and signs of compaction	Monthly
	Check inflow areas, level spreaders, and downstream outfalls to ensure runoff is evenly distributed across the strip	Monthly
	Mow vegetation to maintain an appropriate grass height and remove arisings where necessary	3 to 6 times per year during the growing season
	Inspect vegetation cover and re-seed sparse or damaged areas	Six Monthly
	Remove accumulated sediment at the upstream edge and other areas where deposition occurs	Six Monthly, or as required
Occasional Maintenance	Aerate compacted ground to restore infiltration performance	As required
	Re-grade the surface where flow paths have become concentrated or bypassed sections have developed	As required
	Undertake partial or complete re-seeding where vegetation cover has significantly deteriorated	As required

Green Roofs Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required - clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilized with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 12.5

Headwall Outfall Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris, sediment and vegetation from around headwalls, flap valves and outfalls	Monthly (or as required)
	Visual inspection of headwalls, outfall structures and surrounding banks for damage or erosion	Monthly
	Check for blockage or restriction at outfall and through flap valve	Monthly
	Ensure flap valves open and close freely and are not jammed	Monthly
	Inspect watercourse immediately upstream and downstream for signs of scour, deposition or pollution	Monthly
	Inspect structural condition of concrete, masonry or prefabricated elements	Half yearly
	Check protection measures such as rip-rap, gabions or aprons	Half yearly
Occasional Maintenance	Clear accumulated silt or debris from outfall channel and apron	Annually (or as required)
	Lubricate flap valve hinges and moving parts where applicable	Annually
	Vegetation management to maintain clear access and flow paths	Annually
	Replace damaged or corroded flap valves	As required
	Reinstate scour protection where displaced or degraded	As required
Remedial Actions	Clearance following flooding, blockage or pollution incident	As required
	Stabilise banks and reinstate channel morphology at outfall location if their failure occurs	As required

Infiltration Basins Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut grass - for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass - meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional Maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 13.2

Pervious Pavements Maintenance Schedule

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

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

Pipes Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inlets, outlets and surface control structures – Inspect surface structures, removing obstructions and silts as necessary. Check there is no physical damage. Strim Vegetation 1 m min. surround to structures and keep hard aprons free from silt and debris.	Monthly
	Inspect chambers and below-ground control chambers – Remove cover and inspect, ensuring that water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Monthly
Occasional Maintenance	Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage.	As necessary
Remedial Works	Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.	As required
	Repair physical damage if necessary.	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Box B.2

Pipes, Gullies, Catchpits, and Manholes Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris, leaves and floatables from grating and chamber	Monthly (or as required)
	Visual inspection of grating, cover and frame for damage or displacement	Monthly
	Check for evidence of blockage, surcharge, standing water, or odours	Monthly
	Inspect inlet and outlet pipes for blockage, damage or silt build-up	Monthly
	Check chamber walls and benching for cracks or structural deterioration	Half yearly
	Measure silt and debris accumulation within the sump	Half yearly
	Ensure grating slots and covers are clear and safe for traffic/pedestrians	Half yearly
Occasional Maintenance	Structural repair to chamber, benching or pipe connections	As required
	Replace damaged or corroded gratings, covers or frames	As required
	Remove silt and debris from sump once 50% of sump depth is full	Annually (or as required)
	Jet and cleanse inlet pipework	Annually (or as required)
Remedial Actions	Clearance following flooding, pollution incident, or blockage occurrence	As required
	Upgrade or modify catchpits if capacity is observed as insufficient	As required

Ponds and Wetlands Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass - public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May - October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25-50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 23.1

Soakaway Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspection for sediment and debris in pre-treatment components and flood of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any routes that may be causing blockages	Annually (or as required)
Occasional Maintenance	Inspection for sediment and debris in pre-treatment components and flood of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As Required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As Required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 13.1

Attenuation Storage Tanks Maintenance Schedule

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

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

Swales Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass - to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or Reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 17.1

I [REDACTED]
II [REDACTED] /

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>