



Firewater Drainage Strategy

Studley Solar Farm, Melksham
SN12 8JN

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PREPARED FOR
Verdant Energy Ltd

PREPARED BY
Antea Group UK Limited

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REFERENCE OF TERMS

Climate Change (CC)

A global or regional change in climate patterns. For flood risk, CC is assessed in terms of allowances which are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height. CC data exists across different time periods (epochs) to determine the needs for climate resilience measures.

Digital Terrain Model (DTM)

Digital Terrain Models (DTM) are commonly regarded as synonymous with bare-earth Digital Elevation Models (DEM) created through Light Detecting and Ranging (LiDAR) technology. Vegetation, buildings and other cultural features are removed digitally leaving just the underlying terrain.

Environment Agency (EA) and EA Product Data (EAPD)

The EA is the lead governmental organisation for providing flood and coastal risk management and flood warnings for Main Rivers and the coast. For Sites within or in close elevational proximity to Flood Zone 2 or Flood Zone 3, EA Product data is required to gather more detailed flood risk data such as flood depths, relevant CC data and breach, overtopping, and flood hazard mapping.

Firewater Retention System

A system designed to capture and store firefighting water and contaminated runoff during emergency events to prevent pollution of controlled waters.

Flood Zone 1

Flood Zone 1 is the lowest risk of flooding and is defined as <0.1% annual probability of flooding by rivers or sea.

Groundwater Flooding

Groundwater flooding arises when the water table exceeds ground level, causing prolonged, deep flooding in low-lying areas. It damages properties, infrastructure, and the environment, especially in urban settings, and poses risks to ground stability.

Internal Drainage Board (IDB)

An IDB is a public body that manage water levels in an area, known as an internal drainage district, where there is a special need for drainage, typically across extensive low-lying coastal areas. IDBs often undertake works to reduce flood risk to people and property and manage water levels for agricultural and environmental needs.

Lead Local Flood Authority (LLFA)

LLFAs are County Councils and Unitary Authorities. LLFA's lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and Ordinary Watercourses (smaller watercourses)).

Light Detection and Ranging (LiDAR)

LiDAR is a detection system which works on the principle of radar but uses light from a laser. The technology is used to create high-resolution models of ground elevation with a vertical accuracy of approximately +/-10 to 15 cm and is used to produce Digital Elevation Models (DEM), including Digital Terrain Models which represents bare earth filtered elevation data with structures and vegetation removed.

Main River

Main Rivers are typically larger rivers and streams and are shown on the EA Flood Maps. The EA has a responsibility to carry out maintenance, improvement or construction work on Main Rivers to help manage flood risk. Other rivers including land drains are called Ordinary Watercourses which are smaller watercourses and the responsibility of the LLFA or IDB.

Metres Above Ordnance Datum (m AOD)

Meters Above Ordnance Datum (m AOD). This gives the actual elevation of the groundwater level referenced to the mean sea level at the UK Ordnance Datum at Newlyn, Cornwall for Great Britain.

Ordinary Watercourse

Ordinary Watercourse are typically smaller watercourses that do not form part of an EA designated Main River and includes references to lakes, ponds or other bodies of water which flows into an Ordinary Watercourse. Depending on whether an Ordinary Watercourse falls within the LLFA or IDB area will determine who is responsible for local flood risks from Ordinary Watercourses.

Reduction in Risk of Flooding from Rivers and Sea due to Defences

Reduction in Risk of Flooding from Rivers and Sea due to Defences is a spatial dataset that indicates where areas have reduced flood risk from rivers and sea due to the presence of flood defences. This has superseded the Areas Benefitting from Defences (ABD) dataset and shows all areas that are protected from defences rather than areas that are only protected to the 1 in 100 year (fluvial) or 1 in 200 year (tidal) annual probability flood events.

Residual Risk

A residual risk can take many forms such as the remaining risk post implementation of flood defence measures, risk posed from an extreme exceedance event such as the 1 in 1000 year annual probability flood event or the risk of failure or blockage of an asset such as a culvert.

Sewer Flooding

Sewer flooding occurs when inflow exceeds capacity or blockages disrupt flow. High water levels in receiving watercourses can cause surcharges, leading to contaminated floodwater emerging from manholes and gullies, affecting roads and properties.

Surface Water Runoff

Surface water runoff occurs during intense rainfall exceeding ground infiltration capacity, often on impermeable surfaces or sloped terrain. Urban developments with impervious materials like paving increase runoff risks.

Sustainable Drainage Systems (SuDS)

SuDS manage surface water sustainably, reducing flood risk, improving water quality, and enhancing biodiversity. They typically mimic natural drainage using permeable surfaces such as swales, soakaways, retention ponds, permeable paving and geocellular storage. SuDS slow water flow, filter pollutants, and integrate green spaces, offering environmental, social, and economic benefits over traditional drainage systems.

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Firewater Drainage Strategy
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Appendices

Appendix A – Limitations
Appendix B - Proposed Development Plan
Appendix C - UAV Survey
Appendix D - Greenfield Runoff Rates
Appendix E - Drainage Drawing
Appendix F - InfoDrainage Calculations
Appendix G - Maintenance Schedule

1.0 INTRODUCTION

1.1 APPOINTMENT

Antea Group UK Limited ("Antea UK") has been instructed by Verdant Energy Ltd (the 'Client') to undertake a Firewater Drainage Strategy (FDS) for the proposed Battery Energy Storage System (BESS) compound (Planning Ref PL/2025/07349) within the proposed Studley Solar Farm, Wiltshire ('the Site').

It is understood that there is a wider Flood Risk Assessment by RMA Environmental in 2025 and Drainage Strategy by Pittman Associates in 2021 for the Studley Solar Farm. However, Antea UK has been requested to deal specifically with the firewater and drainage aspect of the BESS compound only, which is at risk of firewater contamination.

1.2 PROJECT UNDERSTANDING

The Environmental Agency (EA) objected to the Client's planning application (Planning Ref PL/2025/07349) on the 31st of October 2025 due to:

"The proposed development would pose an unacceptable risk of pollution to controlled water and recommend that planning permission should be refused on this basis".

The EA detailed the following response:

"There is potential for pollution of the water environment due to abnormal and emergency situations at Battery Energy Storage System (BESS) developments, in particular fires. This would be exacerbated when in close proximity to surface waterbody (Bradford Brook). There is a risk that highly polluting chemicals in batteries could enter surface water in firewater or rainfall. Applicants should assess risks to water quality and ensure mitigation is in place to ensure containment of this water.

While in the event of a fire at a BESS, it is accepted best practice to let the containers on fire burn out, it is likely water will be used to cool neighbouring containers. This water could enter burning containers through surface run off or directly from spray cooling neighbouring containers. Furthermore, during or following a fire at a BESS development, water could enter exposed containers through rainfall during the period of time it takes to remove or cover burnt out containers.

To overcome our objection documents/plans must be submitted which shows that the site has sealed drainage via an engineered soakaway which, in case of a fire, can be diverted to a storage lagoon or tank with sufficient capacity for both the firefighting runoff and maximum potential rainwater.

The system for diverting the discharge from the soakaway to the lagoon / tank should be automatic with a backup system in place in case of power failure.

Sealed drainage will also limit the amount of potential contamination (and later remediation) of the soil and gravel by firefighting runoff. The sealed drainage should be via an impermeable membrane which drains to an engineered soakaway during normal operation. The impermeable membrane(s) in the main

site and the lagoon must be capable of resisting the corrosive chemicals in any firefighting runoff and the heat generated by a fire.

There must be contingencies in place to ensure no firefighting runoff enters either the surrounding local or on-site sewage system (if the site is to be connected to mains sewerage).

The developer should engage with Wessex Water & the Fire Rescue Service to make sure there is an adequate supply of water for the maximum expected duration of a fire.

The site should have plans in place for testing and removal / disposal of any contaminated soil / gravel / post incident, and the lagoon / tank & associated pipework must be cleaned to ensure no residual contamination is released into the environment when normal operation resumes”.

Following the EA’s objection and review of their requirements, the scope of works outlines a FDS for the BESS compound section of the Studley Solar Farm. The primary objective is to ensure full containment of firefighting water and rainfall runoff during an incident, preventing pollution of Bradford Brook or any potential sewer system.

The proposed application will be considered a ‘major application’. Therefore a FDS is required to ensure that surface water flood risk is not exacerbated off-Site as a result of the proposed development within the BESS compound, and assesses and advises on the most appropriate Sustainable Drainage Systems (SuDS) with consideration for firewater contamination for the Site, in line with CIRIA SuDS (C753) Guidance.

1.3 SCOPE OF WORKS

The scope of works for the FDS is as follows:

- Review existing Site conditions, including topographical data, sewer records, and British Geological Survey information;
- Assess Lead Local Flood Authority (LLFA) drainage policies to ensure compliance;
- Coordinate with RMA and Pittman Associates regarding the separate Flood Risk Assessment (FRA), Drainage Strategy (DS), and Fire Suppression teams to align requirements;
- Analyse current and proposed impermeable areas to determine runoff implications;
- Calculate existing surface water runoff rates, excluding any existing drainage system modelling;
- Evaluate disposal options for surface water and firewater runoff in accordance with the drainage hierarchy;
- Determine required attenuation volumes for rainwater and firewater using InfoDrainage software;
- Develop outline design specifications for containment tanks, impermeable surfacing, and bunding solutions;
- Integrate automatic shut-off valves and fail-safe isolation systems into the design;
- Prepare preliminary drainage layout drawings;
- Provide recommendations for drainage system maintenance and surface water treatment methods;
- Advise on remediation measures for firewater treatment in the event of an incident; and
- Produce a combined Drainage Strategy and Firewater Management Report summarising findings.

This report takes into account the following national and local policies:

- National Planning Practice Guidance (NPPG) (2014)¹;
- Wiltshire Council Core Strategy - Council Local Development and Planning Policies;
- CIRIA Guidance: The SuDS Manual (C753) (2017)²;
- Proposed Solar Farm at
- Studley Farm, Atworth,
- Proposed Solar Farm Pittman Associates Drainage Strategy (2021 DS);
- National Planning Policy Framework (NPPF) (2023)³; and
- RMA Environmental - Flood Risk Assessment (2025 FRA).

1.4 SOURCES OF INFORMATION

- British Geological Society (BGS) Interactive Map⁴; and
- MAGIC Interactive Map⁵.

1.5 PROJECT LIMITATIONS

The standard limitations associated with this assessment are presented in Appendix A.

¹ <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

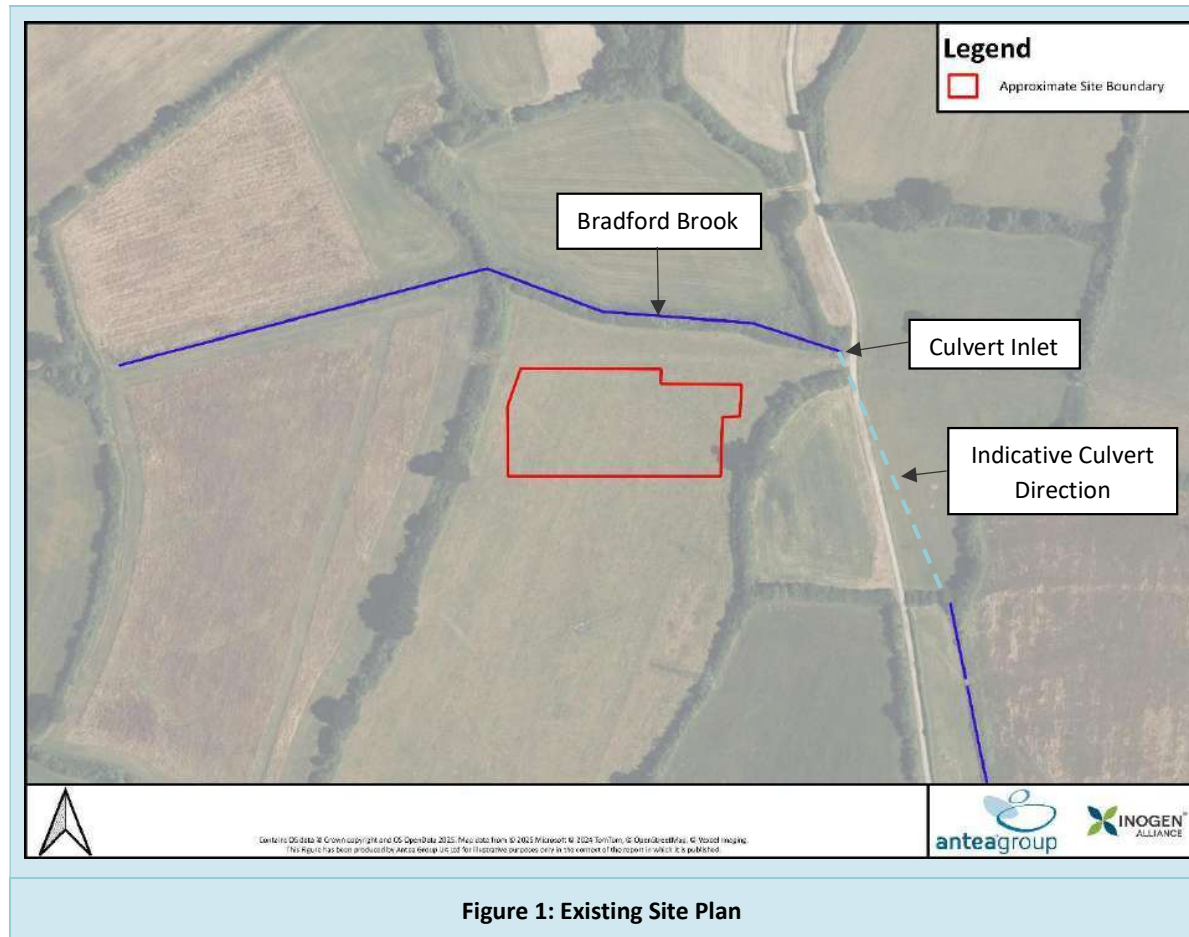
² https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

³ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

⁴ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁵ <http://www.magic.gov.uk/>

2.0 SITE INFORMATION



2.1 SITE LOCATION

The Site is located within an agricultural setting, located approximately 440m to the south of Atworth Village and approximately 3.3km west of Melksham Train station. The Site is approx. 0.65 ha in size and is centred approximately at National Grid Reference 386775, 165397), see Figure 1.

2.2 CURRENT SITE CONDITIONS

Online mapping [accessed 18/12/2025] shows that the Site is entirely greenfield. The Site is bordered on all sides by agricultural land with the Bradford Brook located to the north. Access to the Site is provided from all sides through open field.

As the current Site is entirely greenfield, the Site is considered to be entirely permeable.

2.3 PROPOSED SITE CONDITIONS

The proposed development for this report focuses on is for the Battery Energy Storage System (BESS) compound component of the proposed Studley Solar Farm, Wiltshire (Planning Ref PL/2025/07349). The compound is to

comprise a mixture of battery storage and supporting equipment with an access track through the centre of the Site. A proposed development plan is included in Appendix B.

The proposed development of the BESS compound will introduce 6,497 m² of compound which will occupy the entire redline boundary. Whilst a porous surfacing will be laid, the entire Site will be considered as entirely hardstanding areas.

2.4 TOPOGRAPHY

A topographical survey using UAV technology has been undertaken by Above Surveying Ltd in June 2021 and is included in Appendix C. The topographical survey shows that the Site slopes from 57.81m AOD in the southwest down to approximately 55.79m AOD in the northeast.

2.5 HYDROLOGY

The closest watercourse is the Bradford Brook which is located approximately 25m to the north of the Site, see Figure 1. The Bradford Brook is partially culverted and generally flows in a southeast direction by the north of the Site and then flows in a southeast direction eventually flowing into the River Avon approximately 3.4km southeast of the Site. The Bradford Brook is an Ordinary Watercourse and is the responsibility of the adjacent riparian owner to maintain.

2.6 GEOLOGY

The British Geological Survey (BGS) online mapping indicates that the Site is absent of superficial deposits underlain the BESS compound and is recorded to be underlain directly by the bedrock deposits of the Kellaways Formation-Sandstone, siltstone and mudstone.

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

A FRA and DS for the wider Solar Farm Application (Planning Ref PL/2025/07349) undertaken at the Site in March 2025 referenced borehole testing and infiltration testing undertaken at the Site. The 2025 FRA report identifies that the Site investigation and supporting documentation confirms that the ground conditions are generally unfavourable for infiltration-based drainage. Borehole records adjacent to Studley Farm Lane within the Cornbrash Formation indicate groundwater was encountered at a depth of approximately 2.1 metres below ground level (m bgl). Additional observations during soakaway testing recorded groundwater at 3.35m bgl in one trial pit, while a nearby pond located approximately 100 metres to the northwest of Studley Farm had a water level around 0.40m bgl, suggesting shallow groundwater conditions in these areas of the proposed development.

Six soakaway tests were undertaken in June 2021 in accordance with BRE Digest 365. All tests were identified to fail to achieve the required drawdown, with water levels remaining largely static throughout the monitoring period. Given these results, the report concludes that infiltration techniques cannot be relied upon for surface water management at this location. Instead, an alternative approach involving off-Site discharge combined with on-Site attenuation features such as swales and basins was recommended. This strategy will ensure that runoff is managed effectively and that greenfield runoff rates are mimicked as far as practicable.

2.7 HYDROGEOLOGY

The BGS Aquifer Designation data, obtained from MAGIC Map's online mapping [accessed 18/12/2025], the bedrock deposits underlying the BESS Compound are shown to be classified as an Unproductive Strata Aquifer. Unproductive Strata are 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'. This correlates to the poor infiltration results identified in the Geological section above.

The Soilscape mapping obtained from MAGIC Map's online mapping [accessed 18/12/2025] shows the Site to be located in an area of Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

3.0 RELEVANT PLANNING POLICY AND GUIDANCE

3.1 INTRODUCTION

This section of the report aims to examine the key aspects of local and national planning policies, along with relevant guidance and legislation, which apply to any proposed development on the Site.

3.2 LOCAL POLICY

The Wiltshire Council Core Strategy was formally adopted on 20 January 2015 and contains the following policies relating to flood risk and drainage.

“Core Policy 67 Flood Risk

Development proposed in Flood Z ones 2 and 3 as identified within the Strategic Flood Risk Assessment will need to refer to the Strategic Housing Land Availability Assessment when providing evidence to the local planning authority in order to apply the sequential test in line with the requirements of national policy and established best practice.

All new development will include measures to reduce the rate of rainwater run-off and improve rainwater infiltration to soil and ground (sustainable urban drainage) unless site or environmental conditions make these measures unsuitable.”

3.3 CLIMATE CHANGE

The EA ‘Flood Risk Assessments: Climate Change Allowances’ Guidance states that Essential Infrastructure such as BESS battery component should use the Upper end Allowance which equated to 45% consideration to climate change within the Somerset Streams Management Catchment peak rainfall allowances.

4.0 FIREWATER DRAINAGE STRATEGY

4.1 INTRODUCTION

The Site currently consists of undeveloped greenfield agricultural land with no formal drainage provision and is therefore assumed to behave as fully permeable in its existing condition. The proposed development will introduce approximately 6,497 m² of built infrastructure, comprising a Battery Energy Storage System (BESS) compound and associated facilities. Although the compound will largely be constructed over a granular sub-base intended to provide a porous surface, for design purposes the entire compound will be treated as impermeable. Surface water discharge will therefore be restricted to rates that replicate greenfield conditions as closely as practicable.

The introduction of hardstanding will inevitably increase surface water runoff rates and volumes. To ensure that the development does not exacerbate flood risk elsewhere, discharge from the Site will be controlled through appropriate attenuation measures.

In addition, consideration has been given to the potential for firewater to affect the Site as outlined by the EA Objection. Therefore, any surface water falling on the battery units, together with any firefighting water, will be managed within a dedicated drainage system that can be isolated in the event of a fire. This system will provide separate attenuation for both surface water and firefighting volumes, ensuring they remain segregated from the wider Site drainage network which will be underlain by a granular sub-base.

4.2 DRAINAGE HIERARCHY

The recommended surface water drainage hierarchy as outlined in Paragraph 056 of the NPPG: Flood Risk and Coastal Change) prioritises infiltration to ground as the preferred method. If infiltration is not feasible, discharge to a nearby watercourse is the next option, with discharge to an existing public sewer being the final option.

Infiltration to Ground

The primary consideration for surface water disposal is infiltration to ground through soakaways or permeable surfaces. Infiltration testing was undertaken at the Site as part of the 2025 FRA as outlined in Section 2.6. It was concluded that all tests were identified to fail to achieve the required drawdown, with water levels remaining largely static throughout the monitoring period. Given these results, the report concludes that infiltration techniques cannot be relied upon for surface water management at this location.

Based on the infiltration test results, it can be concluded that soakaways are not a suitable discharge option for managing surface water runoff.

Surface Water Discharge to Watercourse

Where soakaways are not considered suitable, discharge to a watercourse is the next consideration.

The closest watercourse is the Bradford Brook which is located approximately 25m to the north of the Site. The Bradford Brook ranges from 56m AOD (directly to the north of the Site) to 54.5m AOD, approximately 40 to the northeast of the Site. Given that the compound ranges between 57.81m AOD in the southwest down to approximately 55.79m AOD in the northeast. A gravity fed discharge into the Bradford Brook is feasible and therefore proposed.

Surface Water Discharge to Sewer

As described above, a connection to the Bradford Brook is feasible and therefore a connection to the public surface water sewer is not considered to be required.

4.3 SURFACE WATER DISCHARGE

Given that two separate drainage systems are proposed at the Site to separate the majority of the compound and the BESS battery units to ensure any potential firewater is isolated from the rest of the Site, existing runoff rates for both corresponding areas have been calculated separately.

BESS Battery Storage Areas

Greenfield runoff rates for the BESS battery unit area (0.08 ha) have been calculated using the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS) method. The results are summarised in Table 4 below and detailed in Appendix D. The assessment area includes each battery unit together with a 1m buffer around each battery perimeter to provide additional containment protection.

Table 1: Greenfield Runoff Rates

Return Period (Years)	Runoff Rate (l/s)
QBAR	0.3
1 in 1	0.2
1 in 30	0.5
1 in 100	0.7

A flow rate of 0.7 l/s is proposed for the BESS battery storage areas to ensure the drainage system is self-cleansing to prevent blockages.

Compound

The existing greenfield runoff rates for the rest of the Compound Area (0.57ha) has also been estimated using the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS) method which have been summarised as Table 4 below and as Appendix D.

Table 2: Greenfield Runoff Rates

Return Period (Years)	Runoff Rate (l/s)
QBAR	1.9
1 in 1	1.5
1 in 30	3.6
1 in 100	4.6

A flow rate of 1.5 l/s is proposed for the compound catchment area to match the 1 in 1 year greenfield runoff rate for all events up to and including the 1 in 100 year scenario + CC for the proposed development.

4.4 SUSTAINABLE DRAINAGE SYSTEMS

Attenuation storage should be provided in the form of SuDS where practical. The following SuDS options have been considered:

Soakaways

The use of soakaways has been determined by carrying out infiltration tests in accordance with the BRE 365 which identified that the Site is not feasible for infiltration. Therefore, soakaways have not been considered for the Site.

Swales, Detention Basins and Ponds

The Site will be a developed compound with batteries, supporting infrastructure and an access road leaving limited space to accommodate above-ground storage features such as ponds and basins. An above ground feature has not been considered at this stage.

Rainwater Harvesting

The attenuation benefits offered by rainwater harvesting are considered limited, as they would only be effective when the tanks are not full. However, given the nature of the Site there is limited use for re-use of rainwater at this Site.

Green Roofs

Green roofs are not included in the development plans. Considering the nature of the proposed development, the substantial additional costs for installation, ongoing maintenance, and the required structural modifications to accommodate the added load, green roofs are not deemed a practical option. The benefits of installing a green roof would not justify the significant construction and maintenance costs involved.

Porous Surfacing

Porous surfacing could be incorporated into the compound area with storage provided within the sub-grade material before being released in a controlled manner to the receiving watercourse. The storage capacity of permeable paving will depend on factors such as the sub-grade depth and Site gradient. The inclusion of permeable paving has been considered and proposed for the majority of the compound area of the Site.

Underground Attenuation Tanks

Storage could be provided within underground attenuation tanks or within oversized pipes. Sufficient space for an underground tank could be provided in the western and northwestern or northern areas of the Site. A storage tank is proposed to manage surface water flows from the surface water generated by the battery units as well as considerations for firewater volumes.

4.5 PREFERRED DRAINAGE SCHEME

A concept drainage sketch has been provided as Appendix E.

It is proposed to split the drainage of the Site to attenuate the BESS Battery Storage Compound for surface water and firewater volumes within an attenuation tank / isolation tank and the rest of the Site will be attenuated via a porous surfacing comprising sub grade material.

BESS Battery Storage Compound

The planning application confirmed that the Site must provide attenuation for both surface water and firewater in the event of a battery fire. Following consultation with Abbott Risk Consulting Ltd, acting on behalf of the Client, Antea UK was advised to allow for an additional 228 m³ of storage to accommodate firefighting water, in addition

to the volume required for a 1 in 100-year plus climate change event. Any water captured as part of the firewater containment system will remain segregated from the wider Site drainage and can be isolated automatically in an emergency prior to treatment and removal of any contaminated water.

To achieve this, the drainage serving the BESS units has been designed as a separate system from the rest of the compound. A reinforced concrete upstand of 150–300 mm that will surround each battery unit will provide protection so that firewater and surface water remains isolated within the separate system, grading towards a dedicated drainage network that discharges to an isolated attenuation tank in the north of the Site.

InfoDrainage calculations (see Appendix F) confirm that the BESS area, covering approximately 0.08 ha including a 1 m buffer for each unit, requires 117.5 m³ of attenuation to achieve a restricted discharge rate of 0.7 L/s for all events up to and including the 1 in 100-year plus 45% climate change scenario. This will be provided by an upsized attenuation tank with a footprint of 440 m² and a depth of 0.8 m, giving a total storage capacity of 352 m³. This volume includes the additional 228 m³ required for firewater containment.

The tank will be fitted with an automated isolation valve that activates upon fire alarm activation, ensuring no water leaves the system during an emergency. A draw-off point or access hatch will be located so that the firewater can be extracted from the containment tank after the event has passed in order for sufficient treatment to occur. The proposed tank should be designed so that it is resistant to corrosive chemicals and heat.

The automated isolation valve will be supported by a fail-safe backup system to ensure functionality in the event of a power failure. This will include a manual override mechanism and an independent power source (such as a battery backup) to guarantee that the valve can be closed during an emergency scenario.

The firewater containment system is designed as a fully sealed and isolated network, protecting against firefighting runoff or contaminated water entering any local or on-Site sewage systems or watercourse. All discharge routes will remain closed during an emergency until water quality testing confirms compliance for controlled removal.

Post-Incident Remediation Protocol

Following any fire event, a comprehensive remediation protocol will be implemented in agreement with a suitably qualified environmental contractor to prevent contamination of controlled waters and surrounding land. This protocol will include:

- Testing of all captured firewater for pollutants and hazardous substances by an accredited laboratory;
- Safe extraction and transport of contaminated water by an approved specialist to a licensed treatment facility;
- Inspection and sampling of surrounding soil and granular sub-base for contamination;
- Removal and disposal of any contaminated soil or gravel in accordance with environmental regulations, undertaken by a specialist waste management company; and
- Cleaning and decontamination of the attenuation tank, and associated pipework to ensure no residual pollutants remain before the system returns to normal operation.

Formal agreements will be established with a qualified environmental services provider to carry out these activities, ensuring compliance with all relevant legislation and best practice guidance.

Compound Area

InfoDrainage calculations (see Appendix F) confirm that the remainder of the compound, covering approximately 5,701 m² (0.57 ha), requires 760 m³ of attenuation to achieve a restricted discharge rate of 1.5 L/s for all events up to and including the 1 in 100-year plus 45% climate change scenario. This attenuation will be provided within the compound, which is finished with a porous surface over a granular sub-base.

Although InfoDrainage typically models permeable paving systems InfoDrainage doesn't have a porous surfacing option which functions similarly to permeable paving. To replicate these conditions, an attenuation tank was modelled with a 30% porosity factor, representing the storage capacity of the porous surface. The design assumes a 0.45 m depth of porous material across the full 5,701 m² area, delivering the required attenuation volume for the compound.

4.6 EXCEEDANCE EVENT

Storage will be provided to accommodate the 1 in 100-year plus 45% climate change event. Storm events exceeding the 1 in 100-year plus 45% climate change event should be allowed to cause temporary shallow flooding in areas such as the compound. It is recommended to set a small bund around the periphery of the Site to assist in containing surface water within the compound area.

4.7 SURFACE WATER TREATMENT

Using the CIRIA C753 publication 'The SuDS Manual' (2015), the Battery Energy Storage System (BESS) compound has been assessed for pollution risk under normal operational conditions. The Site comprises battery units housed within enclosures, with minimal vehicle movements and no routine handling of hydrocarbons or chemicals on the surface. Based on CIRIA C753 guidance, this land use is considered to present a Low pollution hazard.

Table 3: Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Low Traffic Roads	Low	0.5	0.4	0.4

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

Runoff from the Site will be directed to the porous surfacing. Table 7 below demonstrates that porous surfacing provides sufficient treatment for the Site.

Table 4: SuDS Mitigation Indices

SuDS Type	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Porous Surfacing	0.7	0.6	0.7

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

It can be concluded that the inclusion of porous surfacing will provide sufficient treatment for the compound area. Where attenuation is provided in a below ground system (tank storage), treatment will need to be provided by a suitably sized separator. The drainage serving the BESS battery units will be fully isolated from the compound drainage network via a reinforced concrete upstand and dedicated containment system. Surface water and any firefighting water within this area will be captured and stored in an attenuation tank fitted with an automated isolation valve, ensuring no discharge occurs during an emergency. As the system is designed for containment and controlled removal, water quality treatment through SuDS features is not required for this isolated area. Any disposal will follow appropriate environmental protocols for testing and treatment prior to release.

4.8 MAINTENANCE

The maintenance of communal drainage features, such as porous surfacing or an attenuation tank, will be the responsibility of the Site owner. Maintenance of shared surface water drainage systems can be coordinated through the appointment of a Site management company.

Maintenance schedules for the attenuation tank and porous surfacing are provided in Appendix G. The maintenance of the separator will follow the manufacturer's guidance.

4.9 FOUL WATER DISCHARGE

No foul system is required for the compound.

4.10 OTHER CONSIDERATIONS

A 3m clearance either side of any public sewer in the vicinity of the Site should be provided.

5.0 CONCLUSION & RECOMMENDATIONS

5.1 CONCLUSIONS

The proposed Battery Energy Storage System (BESS) compound at Studley Solar Farm introduces impermeable areas that will increase surface water runoff and pose potential firewater contamination risks. To mitigate these impacts, the drainage strategy incorporates:

- Separate drainage systems for the BESS units and the wider compound, ensuring full isolation of firewater from normal surface water flows.
- Attenuation measures sized for the 1 in 100-year storm event plus 45% climate change allowance, with additional capacity for 228 m³ of firefighting water.
- Automated isolation valves with fail-safe backup systems and impermeable containment designed to resist heat and corrosive chemicals.
- Post-incident remediation protocols, including a formal agreement that will be set up with a qualified environmental contractor for testing, removal, and disposal of contaminated water and soil, and cleaning of containment infrastructure.
- Surface water treatment through porous surfacing for the compound area, meeting CIRIA C753 pollution mitigation standards.

These measures ensure compliance with EA requirements, prevent pollution of controlled waters, and provide robust flood and firewater management for the lifetime of the development.

5.2 RECOMMENDATIONS

Drainage Strategy

- Verify the attenuation volumes included in this report when undertaking detailed drainage design;
- Make provision for sustainable drainage features in the lower northern extent of the Site;
- Confirm if any conflict with drainage infrastructure with any underlying cables or anything else relevant; and
- Set up an agreement with a qualified environmental contractor for testing, removal, and disposal of contaminated water to prepare for in the event of a fire.

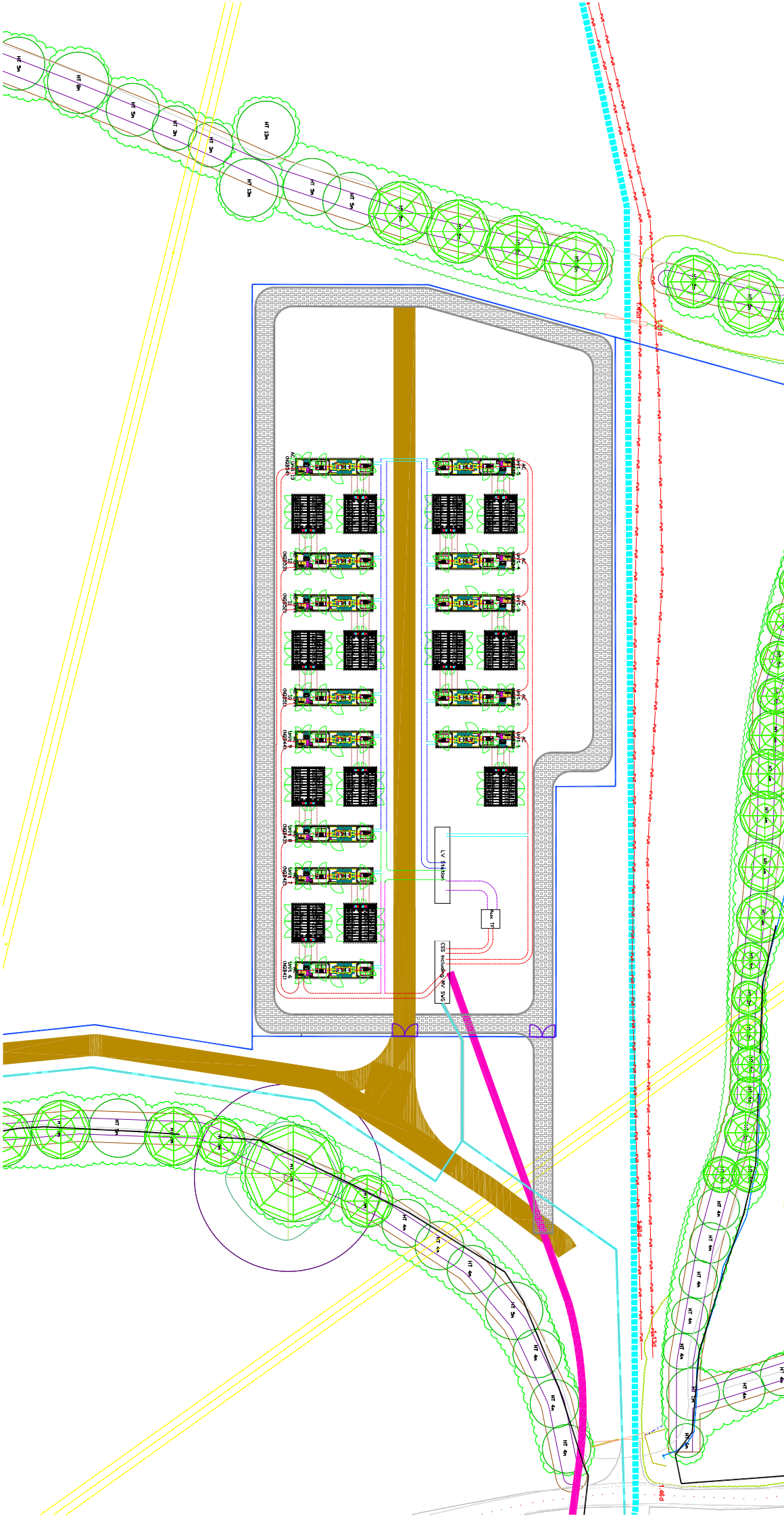
Other

- Consider access constraints to the attenuation tank for removal of contaminated firewater.

Appendix A – Limitations

The recommendations contained in this report represent Antea Group UK Limited's professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea UK and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea UK's client and anyone else specifically identified in writing by Antea UK as a user of this report. Antea UK will not and cannot be liable for unauthorised reliance by any other third party. Other than as contained in this paragraph, Antea UK makes no express or implied warranty as to the contents of this report.

Appendix B – Proposed Development Plan



Appendix C – UAV Topographic Survey

