



Updated Flood Risk Assessment

Ashton Keynes Anaerobic Digestion Facility, Wiltshire

Acorn Bioenergy Limited

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Basis of Report

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Executive Summary

SLR Consulting Ltd has prepared this updated Flood Risk Assessment (FRA) on behalf of Acorn Bioenergy Limited to accompany proposed minor amendments to Planning Application Ref PL/2023/03359, for the construction of an Anaerobic Digestion (AD) Plant at land north of North End Farm Works, Ashton Keynes, Swindon SN6 6QT (the 'Site'). A summary of the key findings from the FRA are provided below.

Subject	Element	Findings
Site	Name	Land north of North End Farm Works, Ashton Keynes, Swindon SN6 6QT
	Date Inspected	Site inspection undertaken by an experienced hydrologist on 17 th November 2022.
Existing Site	Description	The Site covers an area of c.7ha. The Site is located off Ashton Road and is accessible through a newly constructed gate in the southeast corner of the boundary. Surrounding fields are used for agriculture and pasture. A central ditch and parallel hedgerow run west to east through the middle of the Site. More hedgerows to the north, east and most of the west boundary surrounding the Site. The southwest corner of boundary is an open clearing, providing access for farming vehicles.
	Topography	Ground levels across the Site falls from east to west from a maximum elevation of 102.25m Above Ordnance Direction (AOD) to 89.75m AOD in the southeastern corner. On a regional scale the Site is situated on the east side of an isolated hill known as Ashton Downs.
	Geology & Hydrogeology	The bedrock geology across the Site consists entirely of <i>Kellaways Clay Member – Mudstone</i>. There is a small extent of superficial deposits present along the east boundary. The <i>Kellaways Clay Member</i> is designated as an <i>Unproductive</i> stratum with 'layers of rock or drift deposits that are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.' The <i>Northmoor sand and gravel</i> superficial later is designated as a <i>Secondary A Stratum</i> which is a 'permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers, lakes or wetlands'. The soil has been classified as being 'Slightly acid loamy and clayey soils with impeded drainage'. Groundwater vulnerability across the Site is therefore predominantly designated as 'Unproductive'; The extent of the superficial Northmoor geology is designated as 'Medium – Low'. The Site also lies within a Zone II Source Protection Zone (SPZ) – 'Outer Protection Zone'.
	Hydrology	Several lakes formed from historic gravel extraction make up the Cotswold waterpark to the south of the Site. The closest lake is 500m southeast of the Site. The River Churn flows southeast, 1km northeast of Site. The River Thames, 3km east of the Site flows from the north then meanders to the southeast through Ashton Keynes.



Subject	Element	Findings
		There exists an unnamed watercourse 600m west of Site. There is tributary 350m east of Site which connects to the Thames 4km downstream.
	Drainage	Several drainage ditches are present within or along the boundaries of the Site as follows: The northern ditch follows topography east and discharges into the highways ditch; A ditch to the west captures runoff from the neighbouring field which then drains to; A small 0.5m ² vegetated circular depression, leading to; The central ditch following topography west to east, and; A 1x1m highways ditch along the east boundary along Ashton Road, serviced by a 450mm culvert below the access hardstanding. The Site is considered to drain primarily as overland flow, following topography into the highways ditch. Pooled surface water will both evaporate and <i>slowly</i> infiltrate to ground.
Proposals	Description	The Proposed Development will consist of an AD facility. It is anticipated that the Site will consist of c. 4.52ha of impermeable hardstanding and lagoons that do not allow infiltration. The AD facility would process agricultural crops and manures in the region of c.91,000 tonnes per annum. The AD Plant facility will capture as much rainwater as possible for use in the process. Based on annual average estimates, rainwater capture is expected to be sufficient for up to 100% of the process water demand. The AD facility would generate biomethane, carbon dioxide and digestate. The biomethane would be tankered from the Site to a central 'hub' where it would be injected into the UK gas grid. The carbon dioxide would be sold and the digestate would be spread to local farmland as fertiliser. The AD facility would have the capacity to produce in the region of c. 9,703,744 m ³ per annum of biomethane (subject to change).
	Lifetime	The proposed AD plant has an anticipated operational lifespan of 25 years. A 25-year operational period is therefore assumed for this application.
	Vulnerability	As the AD facility will require a Hazardous Substances Consent, it is classified as: • <i>'Installations requiring hazardous substances consent' classed as 'Highly Vulnerable'; or</i> • <i>'Installations requiring hazardous substances consent located which are required to be in high flood risk areas' classed as 'Essential Infrastructure.'</i> As the Site lies in Flood Zone 1, it is considered <i>'Highly Vulnerable'</i> .
Site Flood Risk	Fluvial	The site is located entirely within Flood Zone 1 which is described as having a low risk of flooding. Climate change is unlikely to increase the risk of fluvial flooding at the Site over the anticipated 25-year lifetime of the development.
	Tidal	Site is remote from any tidal extent and at low risk of tidal flooding.



Subject	Element	Findings
	Surface Water	Site is at <i>very low</i> pluvial flood risk. Low risk areas identified are confined within the highways ditch parallel to the east boundary. A small area of 0.1% AEP flood extent is identified within the Site access but is not expected to inundate the Site drainage as the extent is extremely limited and would likely be confined to the Highways ditch.
	Groundwater	The geology below the Site is considered to have a low overall potential to allow groundwater to rise. Groundwater was identified within the superficial strata 1.4m bgl; it is not expected that groundwater flow can emerge through the mudstone to result in significant risk. Thames Water estimated in their Groundwater Impacted System Plan that groundwater hazard depths within the boundary are negligible. The superficial extent has higher risk but emerging groundwater would drain directly to the highways ditch and be conveyed away from the Site.
	Sewers and Artificial Sources	A utilities search revealed no sewer systems exist near the development boundary. Clay pipes were identified during a utilities survey prior to excavating the infiltration trial pit, assumed redundant field drainage pipes. However, they are not expected to increase flood risk to the Site. There is a quarry reservoir 1.75km northwest, however; should failure occur, flow would follow topography south and is not incident the Site. The nearest upstream lake is located 600m west of Site. Flows are not expected to be incident to Site due to Ashton Downs providing interception, conveying flow west away from Site. Cirencester Waste Treatment Works is located 1.0km northwest of Site, however; should failure occur, there are no incident flow paths to the Site.
Planning Requirements	Sequential Test and Exception Test	As the site lies in Flood Zone 1, the Proposed Development is appropriate regardless of vulnerability classification.
Essential Mitigation	Design Flood Event	The design flood event (DFE) is the defended 1% AEP event. A climate change allowance has been considered for peak rainfall intensity (20%) at the development Site with no anticipated adverse impact. No mitigation is required.
	Development Levels/ Layout	Finished floor levels should ideally be at least 150mm above external hardstanding areas to prevent progression of water into the infrastructure. It is proposed that all elements of the Proposed Development be either located outside the surface water flood risk area or, where this is not possible, be protected from flooding (e.g. by land raising, elevated infrastructure or bunding). These mitigations have been incorporated in the scheme.
	Safe access and egress	Mitigation not required.
	Floodplain compensation	Mitigation not required.



Subject	Element	Findings
	Surface water drainage strategy	Infiltration testing was conducted 7th December 2022, that confirmed discharge to ground is not viable. In line with best practice, Sustainable Drainage Systems (SuDS) will need to be incorporated to control offsite discharge of runoff, provide water treatment and, where possible, biodiversity and amenity enhancement. Attenuation storage will also be required. A drainage impact assessment has been conducted by GPP in 2024 and has been submitted to Wiltshire Council along with this report and drainage plan drawings.
	Residual Risk	Flood events in excess of the design standard have been considered in the development layout and will mimic existing flow paths. A standby pump should be made available in the event of operational failure of the duty pump.
	Conclusion	This Flood Risk Assessment concludes that the requirements of national, county and local planning policy can be achieved at the Site given the nature of development proposed.



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Acronyms and Abbreviations

AD	Anaerobic Digestion
AEP	Annual Exceedance Probability. The probability of a flood occurring in any year expressed as a percentage, or chance, i.e. 1% (1 in 100). This is commonly referred to as a 'Return Period' expressed in years, i.e. a 1% AEP event would be referred to as a 1 in 100 year event.
BGS	British Geological Survey
CIRIA	the Construction Industry Research and Information Association
FRA	Flood Risk Assessment
m AOD	metres above Ordnance Datum. A ground or flood level expressed as a height above the Ordnance Datum located in Newlyn, Cornwall.
NGR	National Grid Reference
NPPF	National Planning Policy Framework
PPG	Planning Policy Guidance
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
SWDS	Surface Water Drainage Strategy



1.0 Introduction

In February 2022, SLR Consulting Limited (SLR) was appointed by Acorn Bioenergy Limited, (the Applicant), to prepare a Flood Risk Assessment (FRA) to accompany a planning application (PL/2023/03359) for the proposed Anaerobic Digestion (AD) Plant at land off Ashton Road, Ashton Keynes, Wiltshire SN6 6QT ('the Site').

The aim of this updated FRA is to consider the updated design of the Proposed Development as amended by the October 2024 Design Changes and the 2025 Design Refinements now proposed.

The October 2024 Design Changes comprised a comprehensive set of updated planning application drawings (c.27 in total) showing design amendments to reduce the bulk, mass and scape of the Proposed Development. The changes were proposed in response to comments made by WC's Landscape Team and were achievable as a result of the Applicant's decision to switch to a different anaerobic technology. Amongst other variations, the updated technology choice uses fewer and lower digestion tanks and is contained within lowered Site ground levels which, in combination with new extended landscape planting proposals, significantly reduces the landscape and visual impact of the Proposed Development. The October 2024 Design Changes were accompanied by new drainage plans and a Drainage Impact Assessment.

Wiltshire Council's Drainage Team, in their capacity as the Local Lead Flooding Authority (LLFA), confirmed, on the 28th November 2024, that they supported the Proposed Development, subject to a number a number of conditions.

The 2025 Design Refinements are now proposed following discussions with WC's planning and landscape officers in March 2025 which agreed the following three additional design improvements would be positive changes from a landscape and visual impact perspective:

- Reducing the height of the proposed manure processing building;
- Including native willow screen planting behind the proposed permitter fence along a section of the Site access bellmouth; and
- Adding a native wildflower meadow to the northeast of the Site.

This FRA has been prepared by SLR, under the direction of a Technical Director for Hydrology at SLR who specialises in flood risk and associated planning matters. Reporting has been completed in accordance with guidance presented within the National Planning Policy Framework¹ (NPPF) and its associated Planning Practice Guidance² (PPG), taking due account of current best practice documents relating to the assessment of flood risk published by the British Standards Institution BS8533³ and local planning policies.

1 Revised National Planning Policy Framework: Communities and Local Government (February 2025)

2 Planning Practice Guidance, Flood Risk and Coastal Change: Communities and Local Government (September 2025)

3 BS8533:2017, Assessing and managing flood risk in development: Code of Practice (2nd Edition, December 2017)



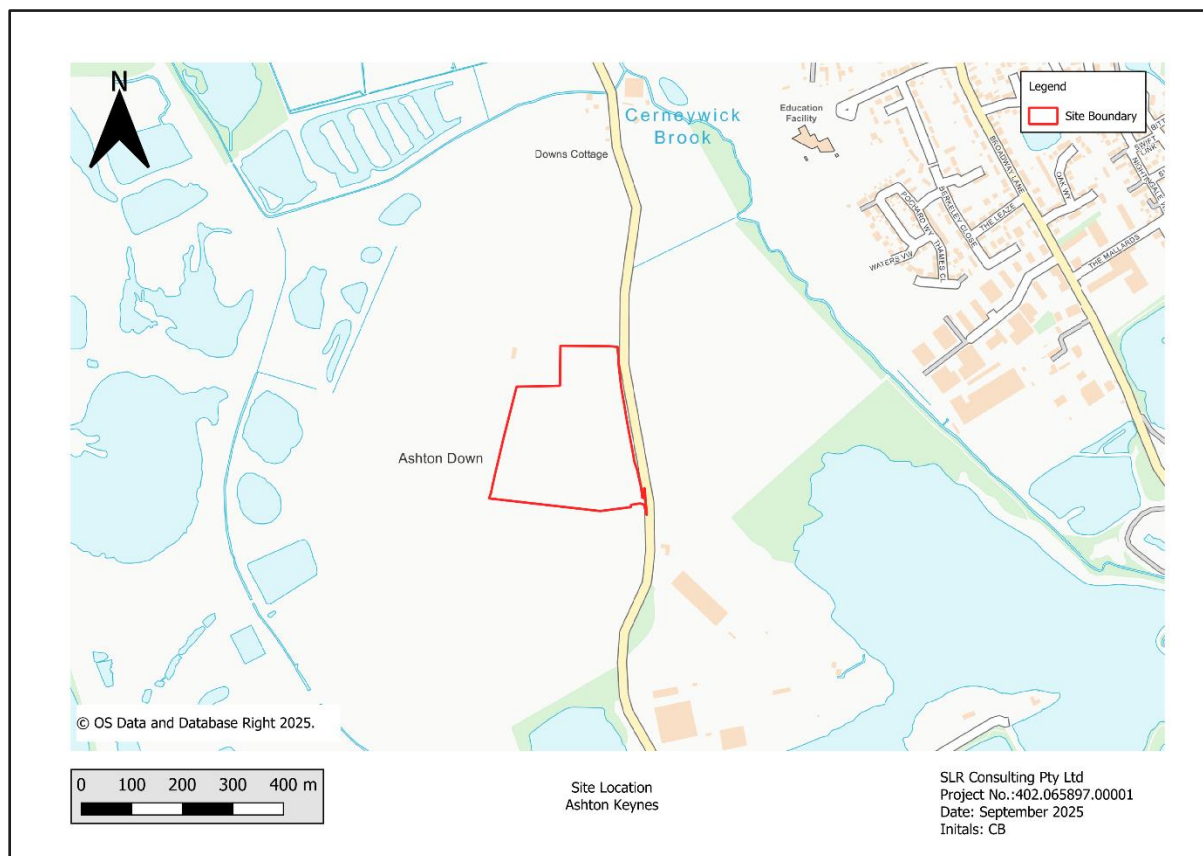
1.1 Administrative Context

The Proposed Development falls completely within the planning jurisdiction of Wiltshire Council (WC) who act as the Lead Local Flood Authority (LLFA) for this area.

1.2 Site Location

The Site is centred on National Grid Reference (NGR) SU 04014 96189, 1.75km north of Ashton Keynes. A site location plan is provided as Figure 1.

Figure 1: Site Location Plan



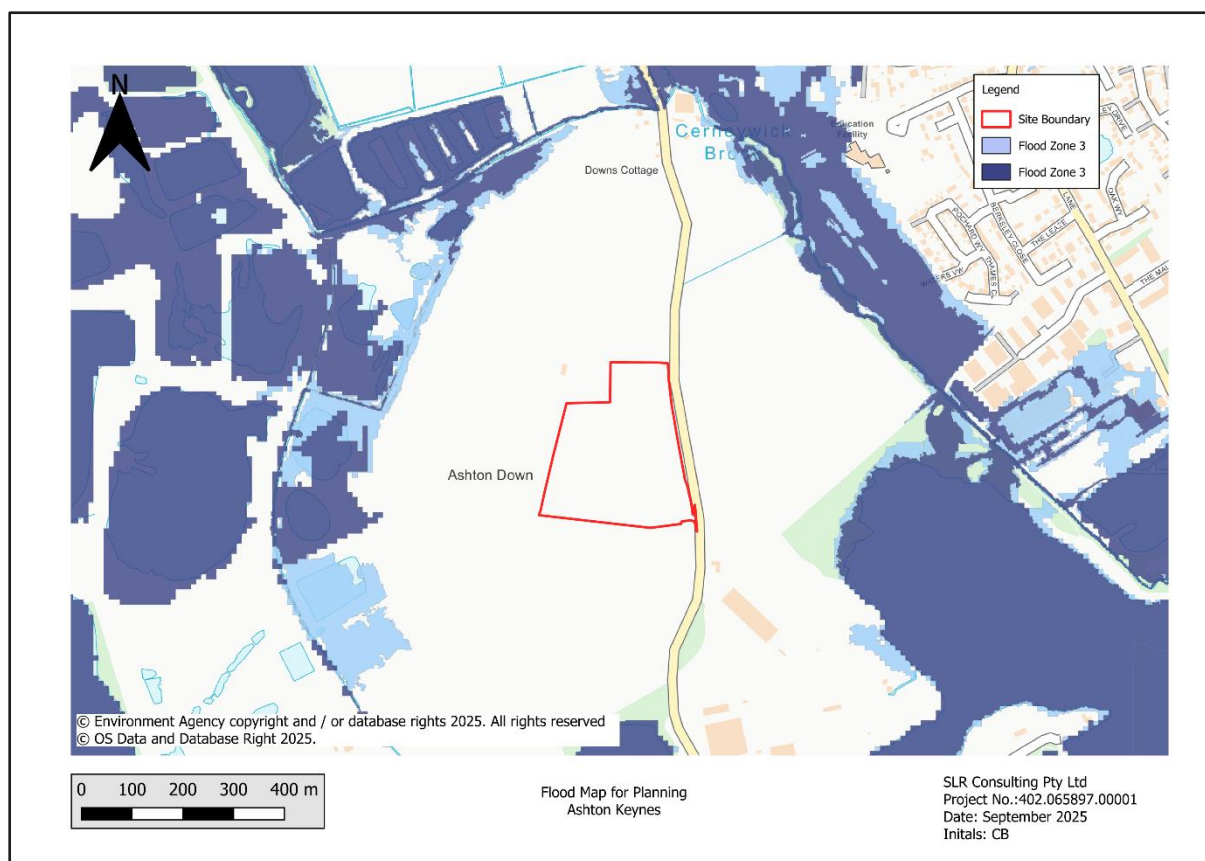
1.3 Background and Aims

With reference to the Flood Map for Planning⁴ (Rivers and Sea) the Site lies within an area that is not considered to be at risk of fluvial or tidal flooding. An extract of the Flood Map for Planning is provided by Figure 2.

4 Flood Map for Planning, <https://flood-map-for-planning.service.gov.uk/>



Figure 2: Extract of the Flood Map for Planning



However, as the Site covers an area greater than 1 hectare (ha), with reference to footnote 63 of the National Planning Policy Framework (NPPF)¹, any planning application for development at the Site needs to be accompanied by a site-specific FRA.

2.0 Site Details

2.1 Existing Site Description

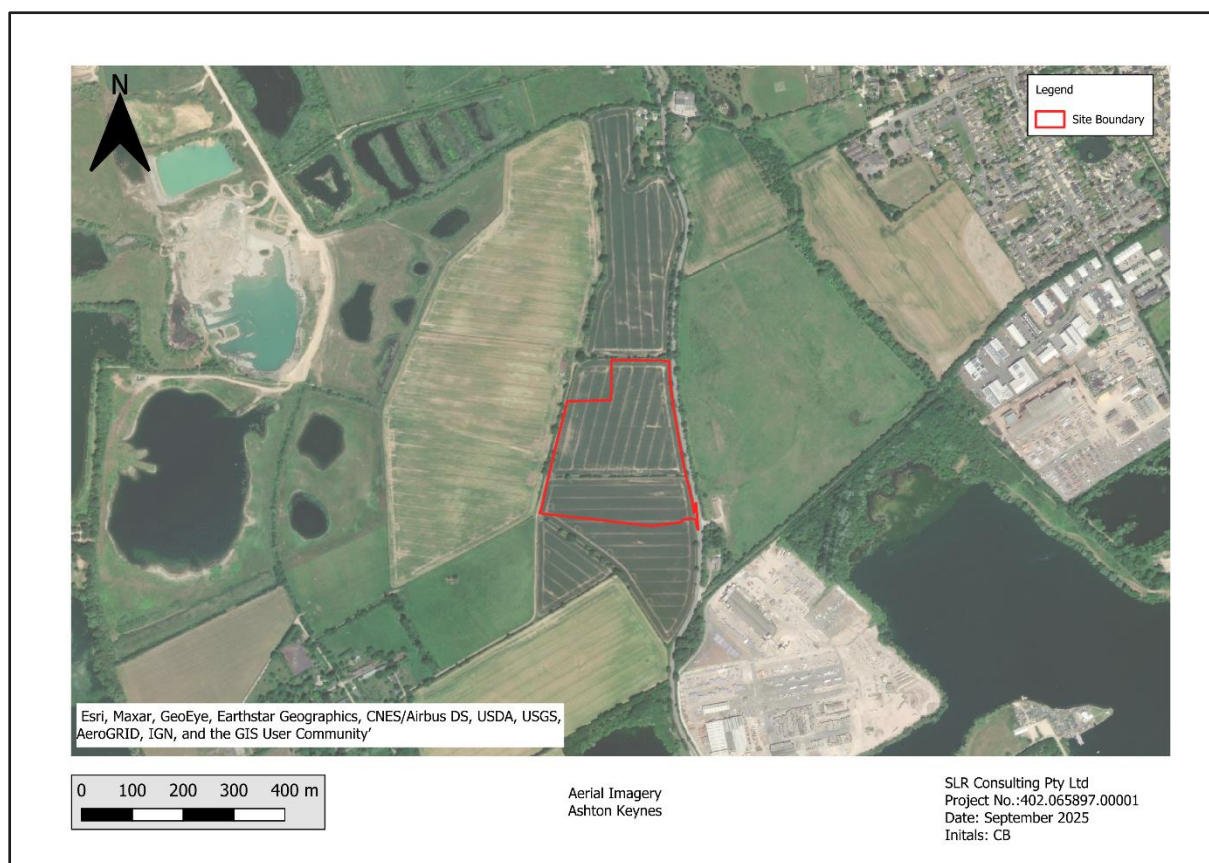
A site visit was undertaken by an experienced hydrologist on the 17th November 2022 that confirmed the Site is greenfield. Although the Site has not been revisited by hydrologists since November 2022, BMD's Ecological Assessment (August 2025) which is appended to the ES Addendum (document ref BMD.25.0155.RPE/P1.001) confirmed that the "*baseline conditions have been rechecked and remain accurate at the time of further survey*". Therefore, we are satisfied that Site baseline, in terms of vegetation, remains unchanged.

The Site encloses an area of 6.99ha as seen by the development boundary in Figure 3. The Site is located off Ashton Road and is accessible through a newly constructed gate in the southeast corner of the development boundary - not shown in satellite data. Surrounding fields are used for agriculture and pasture.

The Site is split by a central ditch and parallel hedgerow through the middle of the development boundary, running west to east. Additional hedgerows run the north, east and most of the west boundary. The southwest corner of the Site, at the junction of neighbouring fields, is an open clearing that provides access for farming vehicles.



Figure 3: Satellite Imagery of the site



2.2 Topography

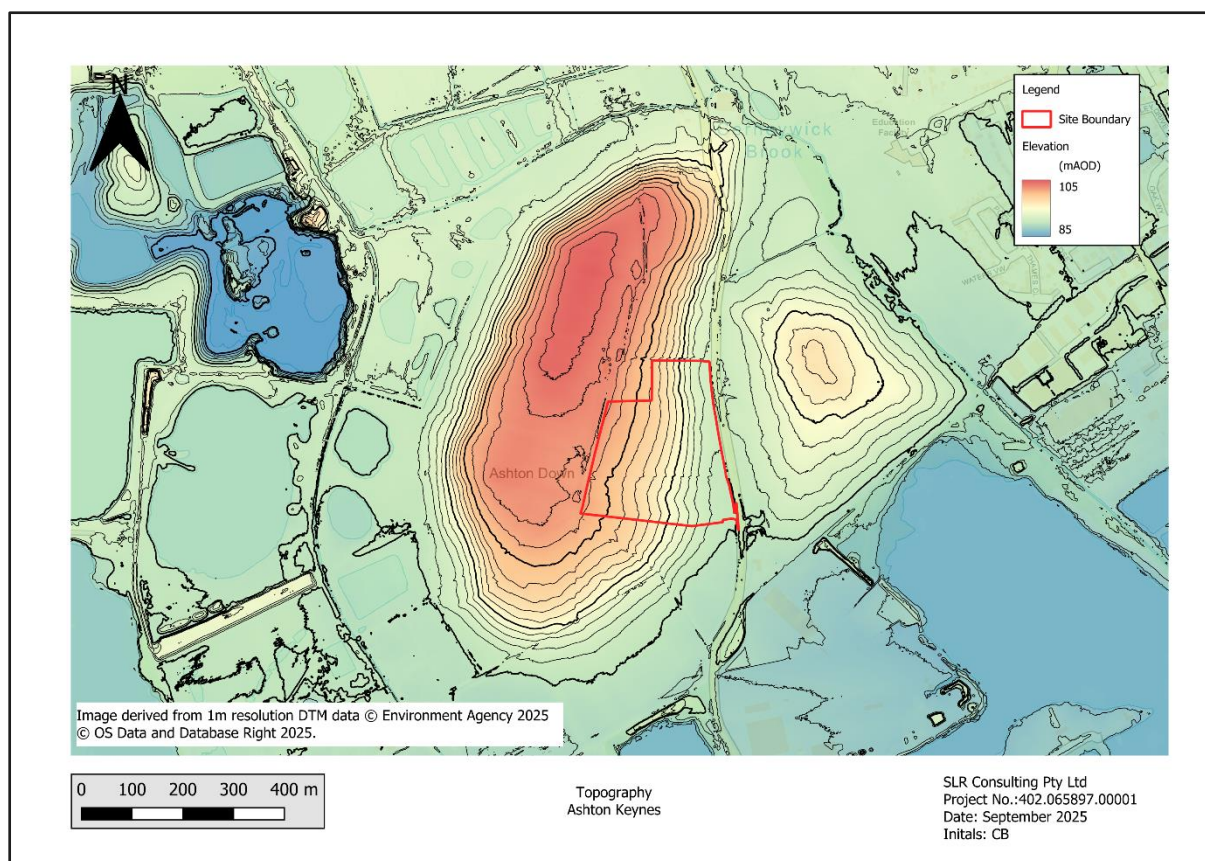
Topographic data for the Site was acquired by Acorn in 2022, with the wider locality provided by 1m resolution Light Detection and Ranging⁵ (LiDAR) aerial photogrammetric data, downloaded from the Environment Agency open data website.

The data has been used to generate contours, as shown in Figure 4. Ground levels slope from west to east from maximum elevation of 102.25m Above Ordnance Datum (AOD) to 89.75m AOD in the southeastern corner of the Site. The data identifies that the Site has been situated on the east side of an isolated hill known as Ashton Downs.

⁵ Environment Agency open data website <http://environment.data.gov.uk>



Figure 4: Topography of the Site



2.3 Geological and Hydrogeological Context

2.3.1 Geology

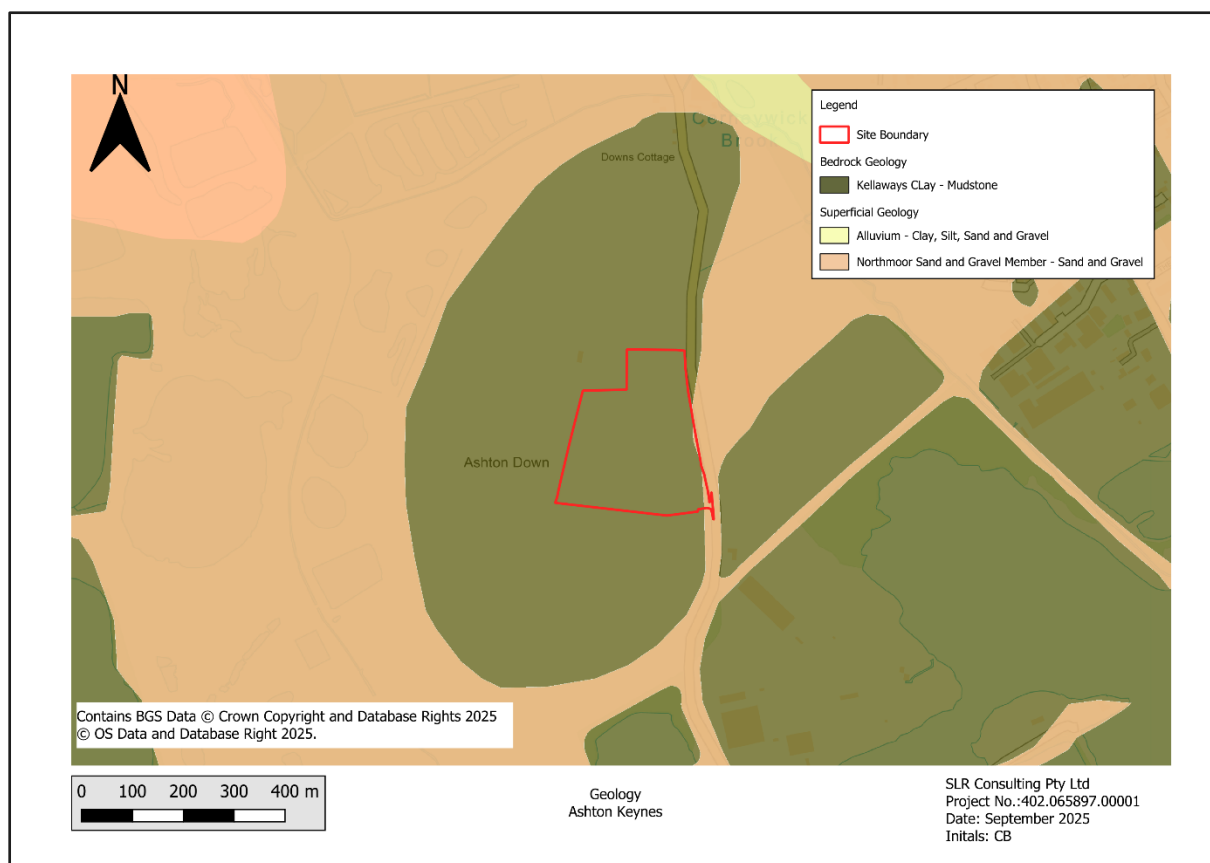
Published British Geological Survey (BGS) online geology maps⁶ indicate that the bedrock geology across Ashton Downs consists of primarily 'Kellaways' Clay Member – Mudstone as shown in Figure 5.

There is a strip of superficial deposits, comprising of 'Northmoor' - Sand and Gravel, adjacent the east boundary of the Site. A trial pit of depth 2.20m revealed the unlaying strata characteristics and confirmed the presence both geologies at along the eastern perimeter.

⁶ BGS Geology of Britain Viewer, Surface Geology available at <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>



Figure 5: Site Geological Conditions



Soil composition⁷ is described as *'Slightly acid loamy and clayey soils with impeded drainage'* across the Site (confirmed during the Site Walkover).

2.3.2 Hydrogeology

Review of the online MAGIC mapping⁸ indicates that the *'Kellaways' Clay Member - Mudstone* is designated as an *Unproductive* stratum with *'layers of rock or drift deposits that are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.'*

The *'Northmoor' - Sand and Gravel* superficial layer is designated as a *Secondary A Stratum* which is a *'permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers, lakes or wetlands.'*

Groundwater vulnerability across the Site predominantly designated as *'Unproductive'*; the extent of the superficial Northmoor geology is designated as *'Medium – Low'*. The Site lies in a Zone II Source Protection Zone (SPZ) – Outer Protection Zone.

⁷ Soilscales, Cranfield Soil and Agrifood Institute, Cranfield University, DEFRA, <http://www.landis.org.uk/soilscales/>

⁸ Magic Map, DEFRA <https://magic.defra.gov.uk/MagicMap.aspx>



2.3.2.1 Infiltration Testing

BRE 365 Digest infiltration testing was carried out at the Site on 7th December 2022. Based on local geological characteristic (high clay content), it was not expected suitable rates for infiltration would be acquired; this is conceptually supported by the results of the testing, where water levels decreased by just 0.06m over 310 mins.

Infiltration rates rely on the underground geological conditions such as soil texture and structure. Other factors such as soil moisture will have some impact on the calculated rates. It is unlikely that the underground geological conditions have significantly changed since the testing was undertaken and therefore, the results are expected to remain valid.

2.4 Hydrological Context

2.4.1 Local Hydrology

Within Ashton Keynes there are several parks, lakes, nature reserves and areas of special scientific interest forming the Cotswold Water Park. The lakes resulted from historic gravel extraction, which allowed high groundwater tables to backfill the voids. By the 1960s, the lakes became a prominent feature of Ashton Keynes and have been a focus of conservation and public amenity⁹. The closest lake to the Site is located approximately 500m to the south east.

Additional local hydrology:

- The River Churn flowing south east is 1km north east of the Site;
- The Thames located 3km west of the Site flows from the north, then east, bisecting Ashton Keynes roughly 2.1km south of Site and meanders the lakes to the southwest of the Site;
- There is a tributary to the River Thames 350m east of the Site flowing south; joining the Thames 4km downstream, and;
- An additional watercourse 600m west of the Site flowing south, joining a highway ditch along Spine Road to the south.

2.4.2 Existing Site Drainage

Several drainage ditches are present within or along the boundary of the Site as follows:

- Ashton Road has a formal highways ditch (approximately 1m deep and 1m wide), owned by WC Highways Authority, that flows south and services Ashton Road;
- The northern ditch follows topography east and discharges into the highways ditch;
- A ditch to the west captures runoff from the neighbouring field and drains through a 200mm culvert connected to a 40mm plastic outfall pipe (assumed). Runoff then attenuates in a 0.5m³ vegetated circular depression then discharges through a 300mm pipe to the central ditch;
- The central ditch follows topography east which then finally discharges to the highways ditch;

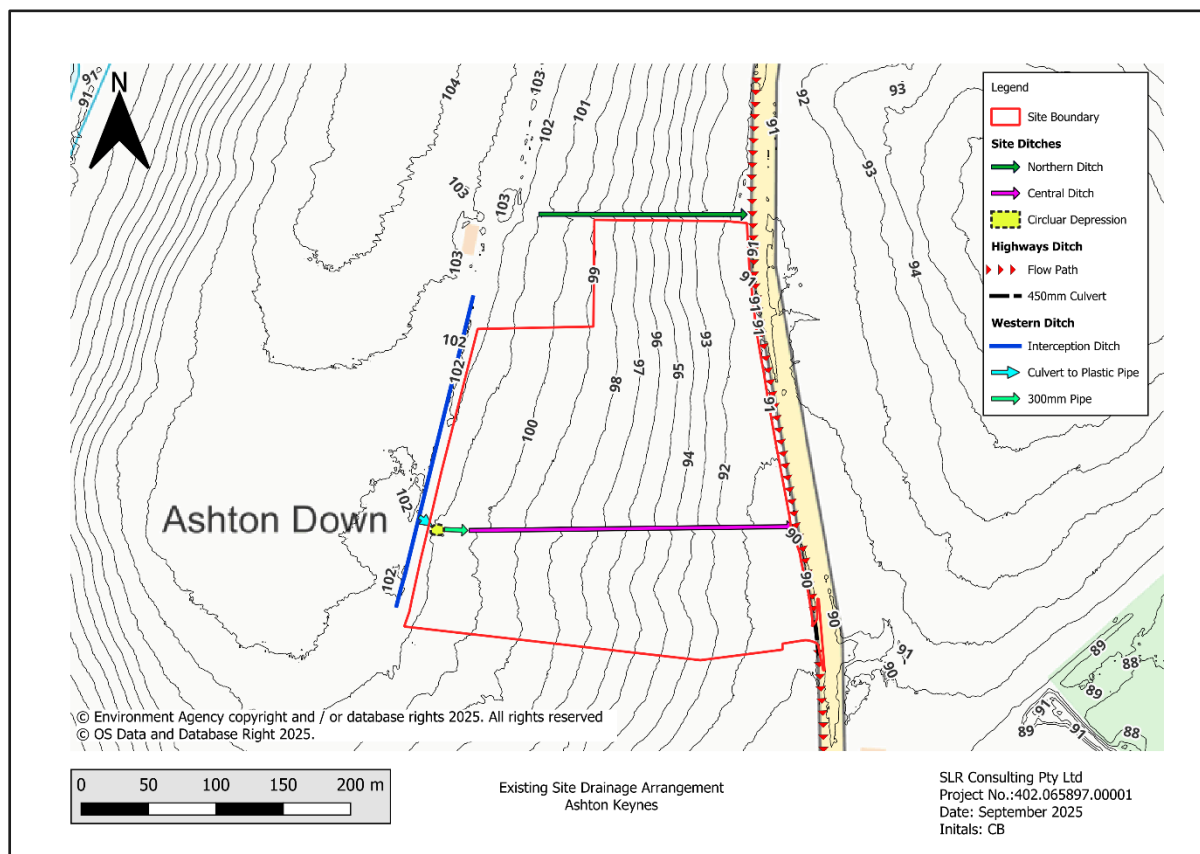
9 Bainbridge. V. "Historic Parishes - Ashton Keynes," in A History of the County of Wiltshire: Volume 18, ed. Virginia Bainbridge (Woodbridge: Boydell & Brewer for Victoria County History, 2011), 109-140 [Accessed November 17, 2022].



- A 450mm culvert allows flow to cross the Site access below the access hardstanding. It is assumed the ditch finally discharges to a nearby downstream lake, 500m to the south, and;
- Prior to breaking ground, clay pipes were detected near where the infiltration trial pit was excavated. The Site may have existing, assumed redundant, drainage or irrigation features within the Site boundary – the full extent of which is unknown.

Figure 6 demonstrates the drainage features with anticipated flow paths identified.

Figure 6: Existing Site Drainage Arrangement



Ponding of surface water was observed at the top of Ashton Downs, outside of the western boundary and inside the eastern boundary in localised depressions. Additionally, soil in the southern half of the Site was found to be waterlogged.

As discussed in the Sections above, soil and ground geology at the Site has low infiltration conditions. Additionally, given the evidence of pooling surface water, the Site is considered to principally drain by overland flow, following topography into the highways ditch. Remaining pooled surface water in localised depressions will both evaporate and slowly infiltrate to ground.

3.0 Development Proposal

3.1 Proposed Development Summary

The Proposed Development would consist of approximately 4.18ha of impermeable hardstanding, ancillary infrastructure and lagoons located on farmland approximately c.550m north of North End Farm Works, Ashton Keynes, Wiltshire.



The total Site area is approximately 7ha. The Proposed Development would accept in the region of 91,000 tonnes per annum of feedstock from local farms. The feedstock material would undergo a process of controlled decomposition (anaerobic digestion) within the proposed facility. The process produces biomethane (biogas) which would be stored on Site prior to being transported by tanker to a central gas injection point. Two important by-products of the biomethane gas generation process comprise a natural digestate fertiliser for use on local farm land, and a high grade CO₂ gas for use in food and beverage, healthcare, construction and other industrial end users.

The Proposed Development requires a Hazardous Substances Consent.

Up to date details of the Proposed Development layout are shown on Drawing Refs 29419/P2/101 Sheets 1 and 2. Drawing 9419/P2/102 Rev P02 Proposed Levels (GGP).

Drawing P24-1022_EN_010_B_A1 L Landscape Strategy Plan (Pegasus) have also been considered during the preparation of the updated FRA report.

3.2 Anticipated Lifetime of Development

The Proposed Development has an anticipated operational lifespan of 25 years. A 25-year operational period is therefore assumed for this application.

3.3 Flood Risk Vulnerability

The National Planning Policy Framework (NPPF) Annex 3 does not explicitly define the flood risk vulnerability classification for anaerobic digestion (AD) facilities. Such facilities could fall under three possible categories:

- Waste treatment (excluding landfill and hazardous waste) classed as *Less Vulnerable*.
- Installations requiring hazardous substances consent classed as *Highly Vulnerable*,
- Installations requiring hazardous substances consent located which are required to be in high flood risk areas classed as *Essential Infrastructure*.

Because anaerobic digestion sites could fit into either category, both classifications should be carefully considered when assessing flood risk. The flood risk compatibility will be further assessed in Section 6.1, however, given that the Site is located in Flood Zone 1, the classification does not impact the outcome of this report.



3.4 Planning Context

3.4.1 National Planning Policy

This FRA report has been completed in accordance with the guidance presented in the NPPF¹ and with reference to PPG². The NPPF states that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and develop policies to manage flood risk from all sources taking account of advice from the Environment Agency. It is crucial that LPAs consider the risks posed by flooding within their boundary when determining planning applications.

3.4.2 Local Planning Policy

In addition to national planning policy and associated guidance, WC, as the LLFA, have emphasised the need to consider flood risk to any Proposed Developments under the following policies which are covered in their Wiltshire Core Strategy¹⁰.

Wiltshire Core Strategy Adopted January 2015:

Core Policy 67

Flood Risk Development proposed in Flood Zones 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.

Core Policy 68

Water resources Development must not prejudice the delivery of the actions and targets of the relevant River Basin or Catchment Management Plan and should contribute towards their delivery where possible.

Non-residential development will be required to incorporate water efficiency measures. Developers will be expected to submit details of how water efficiency has been taken into account during the design of proposals.

Development proposals within a Source Protection Zone, Safeguard Zone or Water Protection Zone must assess any risk to groundwater resources and groundwater quality and demonstrate that these would be protected throughout the construction and operational phases of development.

Wiltshire Local Plan Pre-Submission Draft 2020-2038 (Reg 19) September 2023:

The emerging Wiltshire Local Plan was submitted to the Secretary of State for Housing Communities and Local Government for independent examination on 28th November 2024. Once adopted, this will replace the current out-of-date Wiltshire Core Strategy 2015. The policies of the emerging plan carry significant weight up until the point of adoption, but may be subject to change, prior to adoption.

¹⁰ Wiltshire Council, 2015. 'Wiltshire Core Strategy' pg 307-312.



Policy 95 Flood Risk

The council will follow a sequential approach to flood risk management, in line with national policy and guidance. All development proposals will be required to consider the effect of the on flood risk from all sources, both on and offsite, commensurate with the scale and impact of the development.

Where required, a Site-Specific Flood Risk Assessment, Surface Water Drainage Strategy and Groundwater Assessment should be conducted. This must take account of all flood risk sources and cumulative effects and should incorporate suitable flood risk measures to account for site conditions.

All new development, including where appropriate retrofitting proposals, will include measures to reduce the rate of rainwater run-off and incorporate sustainable drainage systems (SuDS). All major development should achieve a 20% betterment on greenfield runoff rates whereby runoff is managed as close to the source as possible, in line with the surface water discharge hierarchy:

- *rainwater re-use (rainwater harvesting/greywater recycling)*
- *an adequate soakaway or other infiltration system (viability testing required)*
- *hybrid solution of infiltration and discharging to a surface water body*
- *to a surface water body (e.g., an ordinary watercourse)*
- *to a surface water sewer, highway drain, or other drainage system (add justification for no discharge to highway)*
- *to a combined sewer*

As part of drainage strategies, the council, in accordance with national policy guidance, will discourage culverting or the building over of watercourses wherever practicable. In addition, opportunities should be taken to secure the removal of existing culverting and the retention of all existing land drainage features.

The drainage strategy must ensure that flood risk is addressed to flood depths for a 1 in 100-year storm event plus climate change in line with Environment Agency guidance. The drainage strategy must demonstrate that development proposals will remain safe during a flood event throughout its lifetime and consider access, egress and emergency exit routes. The Drainage Strategy must recognise and demonstrate opportunities for SuDS to provide other multiple benefits.

The drainage strategy should be informed by the council's Green and Blue Infrastructure Strategy, the Climate Change Adaptation Plan, and the Wiltshire Design Guide as these all provide guidance on SuDS by incorporating the synergistic benefits and a nature-based approach, dealing with runoff onsite where possible and avoiding methods such as culverting which alters the natural formation of watercourses.

The national and local policies relating to the management of flood risk for Site have been considered in the following Sections of this FRA.



4.0 Assessment of Flood Risk

This report has been prepared in accordance with the advice and requirements prescribed in current best practice documents relating to management of flood risk in development published by the Construction Industry Research and Information Association (CIRIA)¹¹ and BS85333³.

A screening study has been completed to identify whether there are any potential sources of flooding at the Site which may warrant further consideration.

4.1 Potential Sources of Flooding

There are a number of potential sources of flooding and these include:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal flooding;
- Flooding from surface water or pluvial flooding;
- Flooding from groundwater;
- Flooding from sewers;
- Flooding from reservoirs, canals, and other artificial sources; and
- Flooding from infrastructure failure.

The flood risk from each of these potential sources is discussed below.

4.1.1 Flooding from Rivers or Fluvial Flooding

With reference to the 2025 Flood Map for Planning (Rivers and Sea)⁴, The Site lies entirely within an area having less than 0.1% Annual Exceedance Probability (AEP) of flooding from this source.

The flood risk to the Proposed Development is therefore low and is not considered further.

4.1.2 Flooding from Sea or Tidal Flooding

The Site is located in excess of 40km away from the coast and is elevated to levels at least 89m AOD as discussed at Section 2.2.

The flood risk from this source is therefore negligible and is not considered further.

4.1.3 Flooding from Surface Water or Pluvial Flooding

An extract from the *Long Term Flood Risk Information*¹² mapping showing areas potentially at risk of flooding from surface water has been provided as Figure 7.

The surface water flood risk categories are defined as:

- Very Low: less than 1 in 1,000 (0.1% AEP) chance of flooding in any given year;
- Low: less than 1 in 100 (1% AEP) but greater than or equal to 1 in 1,000 (0.1% AEP) chance of flooding in any given year;

11 CIRIA Report C624, Development and flood risk: guidance for the construction industry

12 Long Term Flood Risk, Government Digital Service (Accessed:10/09/2025): Available from: <https://check-long-term-flood-risk.service.gov.uk/risk#>.



- Medium: between 1 in 100 (1% AEP) and 1 in 30 (3.3% AEP) chance of flooding in any given year; and
- High: greater than 1 in 30 (3.3% AEP) chance of flooding in any given year.

Figure 7: Environment Agency Surface Water Flood Risk

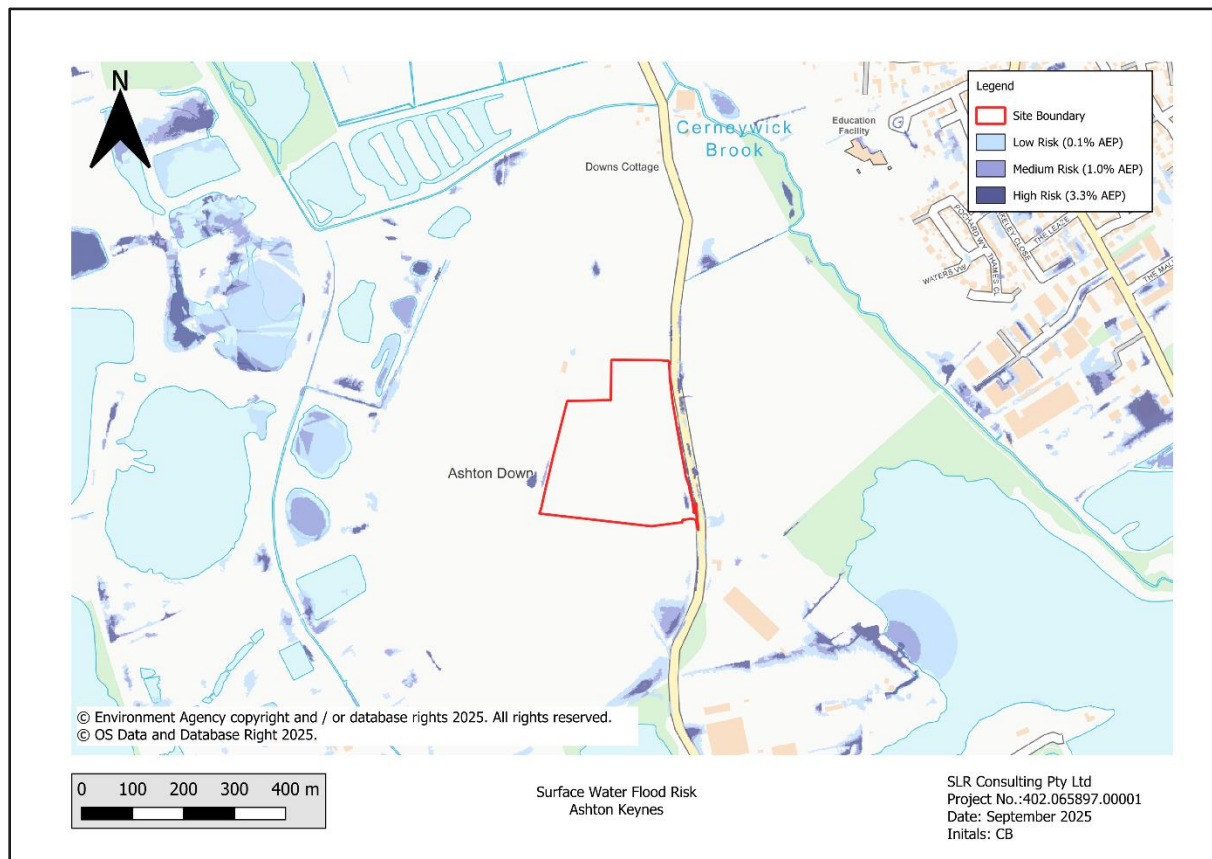


Figure 7 identifies The Site to be at very low pluvial flood risk with higher risk areas confined to the highways ditch along the east boundary as well as a small area along the circular depression and interception ditch (Figure 6). There is an a low-risk extent adjacent to the Site access, but this is likely a result of the limited resolution of the LiDAR data in relation to the 1m wide highways ditch and the topographical depressions. It is expected that the extent will be confined to the ditches, and any exceedance would be conveyed by Ashton Road around the Site access following topographic gradients.

The flood risk from this source is therefore low and is not considered further.

4.1.4 Flooding from Groundwater

Groundwater flooding can occur where sites are located on permeable ground, particularly where there are significant variations in local topography and geology. After a prolonged period of rainfall and groundwater recharge, a considerable rise in the water table can result in this intersecting the ground surface, resulting in flooding. Due to the slow response of groundwater systems any resulting flows and inundation could persist for an extended period.

As discussed in Section 2.3.2, the Kellaways Clay Member - Mudstone is designated as an Unproductive stratum; the bedrock geology of The Site is therefore considered to have an overall low potential to allow for groundwater emergence to surface.



The Northmoor – Sand and Gravel superficial layer is classed as a Secondary A stratum which generally allows for groundwater flow. Groundwater was struck at 1.4m below ground level (bgl) during infiltration testing which was undertaken on the 7th of December 2022. Groundwater was then observed emerging from the superficial layer and is considered likely to be perched above the bedrock. Groundwater is expected to be hydraulically linked with the highway ditch at a similar elevation of 89m AOD.

Groundwater movement through clayey soils is extremely slow, as indicated by the failed infiltration test. When groundwater cannot drain by gravity it is forced horizontally by lateral pressures, however; given the extent of mudstone confining the superficial layer, groundwater is expected to continue to flow south through the more hydraulically conductive superficial layer.

Additionally, Thames Water produced a Groundwater Impacted System Plan¹³ for the Cirencester Sewage Treatment Works in response to high prevalent groundwater. The Plan predicted that groundwater hazard depths within the boundary are negligible with higher risk areas confined within the superficial extent. Any emergence would likely flow directly into the highways ditch and be conveyed away from the Site.

The flood risk to the Proposed Development from this source is considered low and is not considered further.

4.1.5 Flooding from Sewers

A utilities search was completed 18th November 2022 and revealed the area is not serviced by any sewer utilities.

Clay pipes were identified during a utilities survey prior to excavating the infiltration trial pit which are assumed redundant field drainage pipes. However, they are not expected to increase flood risk to the Site.

The flood risk from this source is therefore negligible and is not considered further.

4.1.6 Flooding from Reservoirs, Canals and other Artificial Sources

Based upon Long Term Flood Risk Information¹² mapping, the Site lies outside an area denoted as being at risk of flooding from a breach (failure) of a raised reservoir embankment.

With reference to 1:25,000 scale OS Mapping, there are no canals near the Site. However, there are several artificial sources as follows:

- There is a quarry reservoir 1.75km north west, however; should failure occur, flow would follow topography south. Ashton Downs would intercept and convey flows around the western side, avoiding the Site.
- The nearest upstream lake is located 600m west of the Site. It is anticipated that Ashton Downs would intercept and convey flows around the western side.

The flood risk from these sources is therefore considered low and is not considered further.

4.1.7 Flooding from Infrastructure Failure

With reference to 1:25,000 scale OS Mapping, the Cirencester Waste Treatment Works is located 1.0km north west of the Site, however; should failure occur, there are no incident

¹³ Groundwater Impacted System Management Plan – Cirencester System (including South Cerney), Thames Water, January 2021 (Accessed 11 September 2025) available from: <https://www.thameswater.co.uk/media-library/home/about-us/regulation/drainage-reports/groundwater-infiltration-management-plans/cirencester-groundwater-infiltration-management-plan.pdf>



flow paths to the Site as flow would be directed around the western side of the Ashton Downs, avoiding the Site.

Additionally, Environment Agency¹⁴ data reveals that the Site is not within zones considered at risk of hydrological infrastructure failure.

The flood risk from this source is therefore Negligible and is not considered further.

4.2 Flood Risk Summary

A summary of the potential sources of flooding and the flood risk arising from them is presented in Table 1. Though groundwater inundation risk is low, it has been considered a potential design constraint in section 8.0.

Table 1: Potential Sources of Flooding

Potential Source of flooding	Significant Flood Risk at Site (Y/N)
Rivers or Fluvial Flooding	N
Sea or Tidal Flooding	N
Surface Water or Pluvial Flooding	N
Groundwater	N
Sewers	N
Reservoirs, Canals and other Artificial Sources	N
Infrastructure Failure	N

The flood risk to the Proposed Development is therefore considered to remain low following the updates in the national and local planning policies.

4.3 Flood Zone

The definition of flood zones is provided by Table 1: Flood zones at PPG Paragraph 077 and is summarised below:

- Zone 1 - low probability (Flood Zone 1). Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
- Zone 2 - medium probability (Flood Zone 2) Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
- Zone 3a - high probability (Flood Zone 3a) Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
- Zone 3b - the functional floodplain (Flood Zone 3b) This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

¹⁴ Environment Agency, (2025). Reservoir Flood Extents (Accessed on 11 September 2025) available at: <https://www.data.gov.uk/dataset/8a385f2f-c1ca-4037-b851-11662114b9e1/reservoir-flood-extents-wet-day-national>



- land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

Based on the screening study updated in 2025, the Site remains entirely within Flood Zone 1.

5.0 Climate Change

In July 2021 the Environment Agency issued updated guidance on the impacts of climate change on flood risk in the UK to support NPPF¹. This advice, which was most recently updated in February 2025 sets out that peak rainfall intensity, sea level, peak river flow, offshore wind speed and extreme wave heights are all expected to increase in the future as a result of climate change.

The guidance acknowledges that in relation to certain factors there is considerable uncertainty with respect to the absolute level of change that is likely to occur. As such, in these instances, the guidance provides estimates of possible changes that reflect a range of different emission scenarios.

PPG² recommends that considerations for future climate change are included in FRA's for Proposed Developments. The consideration of climate change for this Site considers the possible changes in peak river flows and peak rainfall intensity.

Concerns relating to offshore wind speed, wave height and sea level are only of relevance in contexts that are in direct proximity to the open coast or other large open bodies of water. This is not the case for this Site; therefore, potential changes in these are not considered further.

5.1 Peak River Flow

An extract of the Environment Agency's Climate change allowances for peak river flow in England map is reproduced in Table 2 for the Gloucestershire and the Vale Management Catchment.

Table 2: Peak River Flow Climate Change Allowances in the Gloucestershire and the Vale Management Catchment

Management Catchment	Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Gloucestershire and the Vale	Upper End	33%	43%	84%
	Higher Central	17%	19%	41%
	Central	11%	11%	26%

The Environment Agency advise that for 'Less Vulnerable' or 'Highly Vulnerable' uses in Flood Zone 2 and 3a, the Higher Central allowance category should be applied to assess the impact of climate change on fluvial flood risk.



While the Site lies entirely within Flood Zone 1, the peak river flow allowances should still be applied to understand the impact of the climate change on the flood risk at the Site over the 25-year lifetime of development (to 2047). As such, and as a conservative approach, a Higher Central allowance of 19% has been assessed.

It is typically expected that the 0.1% AEP peak river flow is roughly equivalent to the 1% AEP inclusive of a 20% uplift.

With reference to the Flood Map for Planning (Rivers and Sea)⁴, the closest Flood Zone 2 is located 300m to the east of the Site and 400m to the west. Comparison of this flood extent against the LiDAR data indicates that there are no incident flow paths and the extent is not anticipated to be incident to the Site.

It is therefore expected that the Site would remain dry when accounting for a 19% uplift to the 1% AEP peak fluvial flow.

5.2 Peak Rainfall Intensity Allowance

The most recent advice on climate change is provided by the Environment Agency. An extract of the Gloucestershire and the Vale Management Catchment peak rainfall allowances is reproduced as Table 3.

Table 3: Peak River Rainfall Climate Change Allowances in the Gloucestershire and the Vale Management Catchment

Management Catchment	Annual Exceedance Probability (%)	Allowance Category	Total potential change anticipated for the 2050s	Total potential change anticipated for the 2070s
Gloucestershire and the Vale	3.3	Upper End	35	35
		Central	20	25
	1	Upper End	40	40
		Central	20	25

As discussed at Section 3, the proposed AD plant has an anticipated operational lifespan of 25 years (to 2050). The Environment Agency recommends that Flood Risk Assessments for developments with a lifetime up to 2060, the central allowance for the 2050s epoch should be assessed. As detailed in Table 3, this equates to a 20% uplift.

6.0 Policy Status for Proposed Development

6.1 Flood Risk Compatibility

As the Proposed Development will require a Hazardous Substances Consent, it is classified as 'highly vulnerable'. Section 4.3 concluded that the Site lies in Flood Zone 1 and therefore it comprises acceptable development at the Site, as all land uses are permitted within Flood Zone 1.

Therefore, with reference to Table 2: Flood risk vulnerability and flood zone 'compatibility' at PPG Paragraph 078 (reproduced as Table 4), the Proposed Development would be considered an 'appropriate' form of development.



Table 4: Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Flood Risk Vulnerability Classification (PPG Table 2)		Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone (PPG Table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	Exception Test Required	✓	✓	✓
	Zone 3a	Exception Test Required	x	Exception Test Required	✓	✓
	Zone 3b (functional floodplain)	Exception Test Required	x	x	x	✓

6.2 Sequential Test

NPPF paragraph 174 advises that the aim the Sequential Test is to ‘steer new development to areas with the lowest risk of flooding from any source’. Furthermore, it states:

‘Development should not be allocated or permitted if there are reasonably available sites appropriate for the Proposed Development in areas with a lower risk of flooding.’

The Flood Map for Planning (Rivers and Sea)⁴ (Figure 2) and the local SFRA provide the basis for applying this test. The Site is located entirely within Flood Zone 1 (i.e., has the lowest risk of flooding). It has therefore been deemed that the Sequential Test has been passed.

6.3 Exception Test

The Exception Test is required to show that the sustainability benefits of the Proposed Development to the community outweigh the flood risk.

As discussed at Section 3.3, PPG identified that developments located within Flood Zone 1 are not required to pass the Exception Test as the development is already deemed appropriate.



6.4 Proposed Drained Area and Drainage Strategy

It is proposed that all impermeable surfaces of the Proposed Development comprising roofs, external hardstanding operational area, parking area and access road, be positively drained using SuDS. All other impermeable areas drain to the dirty water system.

A Drainage Impact Assessment was prepared by GPP in 2024 and submitted to WC in November 2024 for consideration. This was based on the 2024 Design Changes and demonstrated that the proposed drainage system can provide more than sufficient attenuation capacity to avoid any exceedance of the permitted discharge rate. GGP have confirmed that the proposed design changes have no material impact on the drainage impact assessment previously prepared. Furthermore, the proposed design changes do not result in any increase in impermeable area nor a change in the drainage strategy design approach / philosophy.

7.0 Conclusions

SLR Consulting Limited (SLR) was appointed by Acorn Bioenergy Limited to prepare an updated Flood Risk Assessment (FRA) to assess the flood risk implications of both the previously submitted and validated 2024 Design Changes and the now submitted 2025 Design Refinements to the planning application for the construction of an Anaerobic Digestion (AD) Plant.

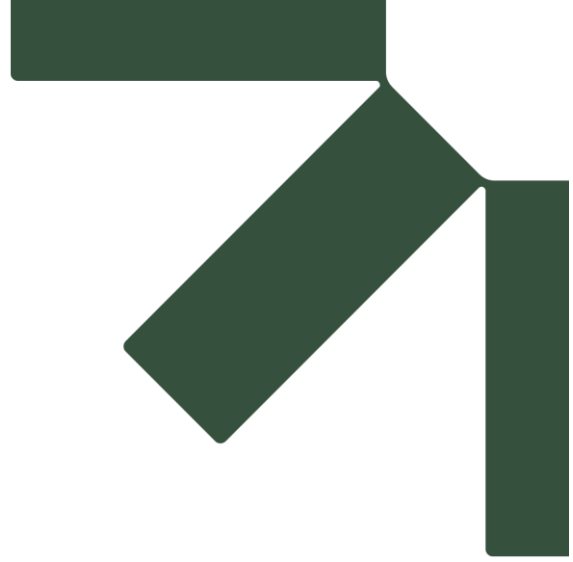
This updated FRA has confirmed that baseline conditions have not changed at the Site. It has been undertaken in line with BS85333, taking account of national and local planning policy and guidance, and all potential sources of flooding to the Site.

Allowances for changes to peak river flows due to climate change have been considered with no changes to the original FRA issued in 2023. The Site has been assessed to be outside of an area at risk of flooding over the 25-year lifetime of the Proposed Development.

A screening assessment, detailed at Section 4.0, has reviewed the flood risk posed by sources including fluvial, tidal, surface water, groundwater, sewer, reservoirs, canals and infrastructure failure. The screening assessment concluded that the Site remains in Flood Zone 1 and, therefore, in terms of both the Exception and Sequential Tests, the Site is suitable for development.

This updated FRA hereby replaces the flood risk assessment element of SLR's March 2023 combined Flood Risk Assessment and Surface Water Drainage Strategy. The Surface Water Drainage Strategy element has been updated by GGP consultants as a separate piece of work and submitted to WC in November 2024.







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