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6 HYDROLOGY AND HYDROGEOLOGY

Introduction

- 6.1 This chapter of the Environmental Statement (ES) details the water resources (including both groundwater and surface water), flood risk and drainage of the Proposed Development and the surrounding area at land north of North End Farm Works, Ashton Keynes, SN6 6QT. It also identifies possible hydrogeological and hydrological impacts associated with the Proposed Development.
- 6.2 The assessment is based on the hydrological and hydrogeological regimes and the specific mitigation measures which have been incorporated into the design of the Proposed Development. It should be noted that, as an impact assessment, this chapter does not consider the risk of flooding posed to the Proposed Development but does consider flood risk implications with regard to the existing water environment and surrounding sensitive users. Flood risk to the Proposed Development is considered separately in a Flood Risk Assessment (FRA).

Content of the Assessment

- 6.3 This assessment contains the following sections:
- *Introduction: setting out the context of the assessment, the approach taken, the description of the location and nature of the Proposed Development;*
 - *Assessment methodology: describing the guidance relevant to the assessment, the methods used and the level of effects;*
 - *Planning context: outlining the key policies of relevance to the assessment;*
 - *Baseline conditions: describes the water environment of the Proposed Development Site based on desktop reviews, site visits, and consultations and identifies the residual effects of the Proposed Development on local hydrological and hydrogeological receptors*
 - *Development design and mitigation: summary of the design and embedded measures included within the design to avoid or minimise the hydrological and hydrogeological effects of the Proposed Development;*
 - *Assessment of effects on the water environment: assesses the potential effect of the proposed development on the hydrological and hydrogeological setting, taking into account the embedded mitigation measures in place. Additional mitigation (if required) is subsequently outlined in addition to an assessment of residual effect; and*
 - *Conclusions.*

Approach

- 6.4 The assessment follows best practice guidance produced by the British Standards Institution's 'Assessing and managing flood risk in development: Code of Practice' (BS8533: 2017) and evaluates the likely effects of the Proposed Development on the water environment of the site and the surrounding area.

- 6.5 The assessment has involved the following:
- detailed desk-based study to establish current baseline hydrological and hydrogeological conditions;
 - site visit carried out on the 17th of November 2022;
 - identification of potential adverse changes (impacts) resulting from the proposed construction and operation of the development;
 - specification of proposed measures to avoid or mitigate these impacts; and
 - evaluation of the residual significance of these impacts following mitigation.
- 6.6 The desk-based study and site visit were undertaken in order to:
- describe the hydrological and hydrogeological setting;
 - describe any surface water hydrology within and adjacent to the Site;
 - describe existing drainage arrangements on and around the Site;
 - identify flooding risks to the existing water environment and surrounding sensitive users; and
 - identify sensitive hydrogeological and hydrological features which may potentially be impacted by the Proposed Development.
- 6.7 The extent of the desk-based study and site visits was based on professional judgment and is based on both proximity and the direction of flow pathways leading to and from the Proposed Development.

The Site, Context and Project Description

- 6.8 The Proposed Development would be located at land north of North End Farm Works, Ashton Keynes, SN6 6QT.
- 6.9 Acorn intends to apply to Wiltshire Council for planning permission to construct and operate an Anaerobic Digestion (AD) facility, which would process rotational arable crops and manures to generate carbon negative biomethane. The facility would accept in the region of c.91,000 tonnes per annum of feedstock from local farms. The Proposed Development would consist of a range of new buildings and structures (as outlined below), hardstanding, soft landscaping and attenuation and conveyance features to discharge surface water run-off to the highways ditch that is present along the eastern boundary.
- 6.10 Key components of the Proposed Development are shown in the Site Layout Drawing ref 29419/P/101 and include:
- Five large digester tanks with storage capacity of 35,000m³ with seven smaller tanks, pump building and three feed hoppers;
 - Two digestate lagoons with a combined storage capacity of c.20,000m³;
 - Two Silage clamps measuring 101.25m x 35.0m x 3.52m;
 - Silage Clamp measuring 123.75m x 35.0m x 3.52m;
 - Rainwater harvesting lagoon c.2,000m³;

- Manure Shed at 26.0m x 19.5m;
- Straw building at c.30m2;
- Buried Propane Tank;
- Separator building;
- Two offices;
- Four HGV Trailer bays;
- Gas Flare;
- Boiler;
- Chiller;
- Pump Unit;
- Trailer Earth system and Filling Dispenser;
- CO2 Tanks;
- Biogas upgrade plant
- Heat exchanger;
- Tech Container;
- Weighbridge; and
- Earth bunds.

Consultation

- 6.11 The Client 'Acorn Bioenergy Limited' have decided to complete a voluntary Environmental Impact Assessment in absence of a formal screening opinion response from Wiltshire Council. The Proposed Development has potential to generate significant environmental impact and could be classified as an EIA Development.
- 6.12 Data pertaining to sensitive hydrological and hydrogeological receptors has been validated through a Groundsure EnviroInsight report. Full details of the EnviroInsight report received are contained within Appendix 6A.
- 6.13 The report confirmed details of the following with regard to the hydrological and hydrogeological environment:
- Licensed Abstractions
 - Groundwater Levels
 - Surface Water Quality
 - Licensed Water Discharges
 - Historic Landfills
 - Flood Zones
 - Existing and Proposed flood defence measures
 - Historic Flood Events
 - Groundwater Flood Risk and Historic Events
 - Surface Water Drainage Flooding and Historic Incidents
 - Environmental Designations

Assumptions and Limitations

- 6.14 No technical difficulties or practical problems were encountered in conducting the Hydrological and Hydrogeological Impact Assessment presented in this document.
- 6.15 A number of assumptions have been made during preparation of this chapter, as set out below. The assumptions are:
- The principal land uses around the Site remain as they are at the time of submission of the planning application;
 - Information provided by third parties, including publicly available information and databases is/are correct at the time of submission;
 - Baseline conditions have not changed since the time of physical surveys; and
 - To ensure appropriate environmental protection, a Construction Environmental Management Plan (CEMP) will be prepared providing a mechanism to prevent, reduce, and mitigate environmental effects.
- 6.16 It is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on hydrology and hydrogeology.

Assessment Methodology

Introduction

- 6.17 Regard has been given to technical guidance and other codes of best practice in designing the Proposed Development, in order to limit the potential for contamination of ground and surface waters, the potential for flooding to be caused to the existing water environment and surrounding sensitive users by the Proposed Development, and other potential impacts on the water environment. The Proposed Development would therefore be in accordance with the following:
- The Water Framework Directive (2000/60/EC);
 - The Groundwater Directive (2006/118/EC);
 - The Flood Directive (2007/60/EC);
 - The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
 - The Groundwater (England and Wales) Regulations 2009 implements in England and Wales Article 6;
 - The Environmental Permitting (England and Wales) Regulations 2016;
 - The Flood Risk Regulations 2009;
 - Flood and Water Management Act 2010;
 - The Water Resources Act 1991 and amendment (England and Wales) Regulations 2009;
 - The Land Drainage Act 1994;

- Environment Act, 2021;
- The Private Water Supplies (England) (Amendment) Regulations 2018; and
- Town and Country Planning (Environmental Impact Assessment (EIA) Regulations 2017.

6.18 The assessment has involved the following:

- Detailed desk-based study to establish current baseline hydrological and hydrogeological conditions;
- Site visits conducted on 17th November 2022;
- Identification of potential adverse impacts resulting from the proposed construction and operation of the development;
- Specification of proposed measures to avoid or mitigate these impacts; and
- Evaluation of the residual significance of these impacts following mitigation.

6.19 The desk-based study and site visit were undertaken in order to:

- Describe the hydrological and hydrogeological setting;
- Describe any surface water hydrology within and adjacent to the site;
- Describe existing drainage arrangements on and around the site;
- Identify flooding risks to the existing water environment and surrounding sensitive users; and
- Identify sensitive hydrological and hydrogeological features which may potentially be impacted by the Proposed Development.

6.20 A qualitative risk assessment methodology has been used to assess the significance of the potential effects associated with the Proposed Development. Two factors have been considered using this approach:

- the sensitivity of the receiving environment; and
- the potential magnitude of impact, should that potential impact occur.

6.21 This approach provides a mechanism for identifying the areas where site specific mitigation measures are required and for identifying mitigation measures appropriate to the risk presented by the Proposed Development. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

6.22 Criteria for determining the significance of effects are provided in Table 6-1 to Table 6-3 below. Effects of 'major' and 'moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Hydrological and Hydrogeological effects

Nature of effects

- 6.23 Hydrological and Hydrogeological effects can be positive, negative or neutral in nature. Positive effects are those which enhance and/or reinforce water quality and water resource management. Negative effects are those which worsen water quality or water resource management. Neutral effects are changes which are consistent with the characteristics of the existing hydrology and hydrogeology.
- 6.24 The level of effects is ascertained through a combination of the sensitivity of the receptor and the magnitude of change that would arise as a result of the Proposed Development.

Sensitivity

- 6.25 The sensitivity of the receiving environment (i.e., the baseline quality of the receiving environment as well as its ability to absorb the impact without perceptible change) is defined in Table 6-1.

Table 6-1
Receptor Value/Sensitivity Assessment

Receptor value / sensitivity	Receptor type
High	International importance. Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement.
Medium	National importance. Receptor with a high quality, local scale and limited potential for substitution / replacement; or Receptor with a medium quality and rarity, regional or national scale and limited potential for substitution / replacement.
Low	Regional importance. Receptor with a medium quality and rarity, local scale and limited potential for substitution / replacement; or Receptor with a low quality and rarity, regional or national scale and limited potential for substitution / replacement.
Negligible	Local importance. Receptor with a low quality and rarity, local scale. Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character.

Magnitude of Change

- 6.26 The criteria that have been used to assess the magnitude of potential impacts (i.e., the potential scale of change) to the hydrological and hydrogeological environment are defined in Table 6-2.

Table 6-2
Magnitude of Impact

Magnitude	Description	Definition
High	Results in loss of attribute	Fundamental (long term or permanent) changes to hydrology, hydrogeology or water quality, such as: - Wholesale changes to watercourse channel, route, hydrology or hydrodynamics. - Changes to the application site resulting in an increase in runoff with flood potential and also significant changes to erosion and sedimentation patterns. - Major changes to the water chemistry or hydro-ecology. Major changes to groundwater levels, flow regime and risk of groundwater flooding.

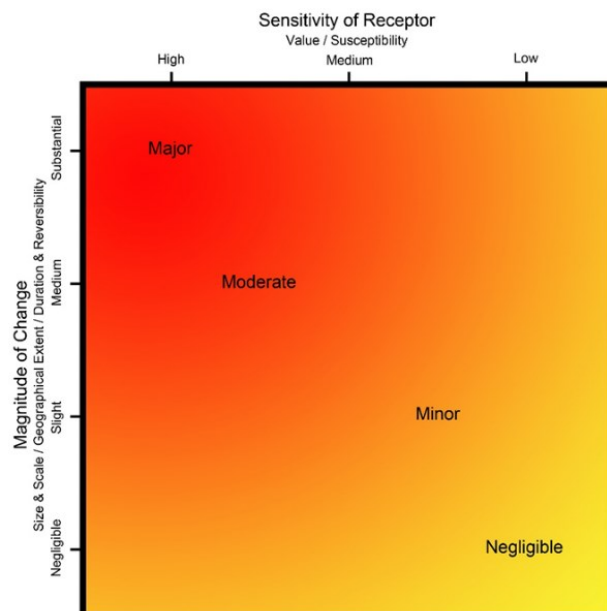
Magnitude	Description	Definition
Medium	Results in impact on integrity of attribute or loss of part of attribute.	Material but non-fundamental and short to medium term changes to hydrology, hydrogeology or water quality, such as: - Some measurable changes to watercourses, hydrology or hydrodynamics. Changes to land cover within the application site resulting in an increase in runoff within system capacity. - Moderate changes to erosion and sedimentation patterns. - Moderate changes to the water chemistry of surface runoff and groundwater. - Moderate changes to groundwater levels, flow regime and risk of groundwater flooding.
Low	Results in minor impact on attribute.	Detectable but non-material and transitory changes to hydrology, hydrogeology or water quality, such as: - Minor or slight changes to the watercourse, hydrology or hydrodynamics. - Changes to application site resulting in slight increase in runoff well within the drainage system capacity. - Minor changes to erosion and sedimentation patterns. - Minor changes to the water chemistry of surface runoff and groundwater. - Minor changes to groundwater levels, flow regime and risk of groundwater flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity.	No perceptible changes to geology, hydrology, hydrogeology or water quality, such as: - No impact or alteration to existing important geological environs. - No alteration or very minor changes with no impact to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns. - No pollution or change in water chemistry to either groundwater or surface water. - No alterations to groundwater recharge or flow mechanisms.

- 6.27 It should be noted that many potential hydrological and hydrogeological impacts are probabilistic in nature (i.e., pollution could occur but only given a rare extreme storm). This type of impact is clearly different from one that has a higher probability to occur and as such where appropriate, and with justification, professional judgement would be used to adjust the stated magnitude of an impact for low probability impacts.

Assessment of the Overall Level of Effects

- 6.28 The assessment of the overall hydrological and hydrogeological effects is defined in terms of the relationship between the sensitivity of the receptors and the magnitude of the change. In this assessment, effects are assessed as 'minor,' 'moderate,' 'major', and 'negligible'. It should be noted that for the assessment intermediate levels may also be included such as medium-high or medium-low where the change falls between definitions. This is based on professional judgement.
- 6.29 This evaluation is conducted for each receptor described in the baseline section of this report.
- 6.30 Figure 6-1 summarises the nature of the relationship, but it is not formulaic. Judgements are made about each effect using this diagram as a guide.

Figure 6-1
Level of Effect



- 6.31 The sensitivity of the receiving environment together with the magnitude of the impact defines the significance of the potential effect, as identified within Table 6-3. Effects of 'major' and 'moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Table 6-3
Level of Effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Minor	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

- 6.32 The characteristics of the impacts are described in terms of direct/indirect, secondary, cumulative, transboundary, temporary (reversible) / permanent (irreversible), together with timescales (short, medium, long term).

Method of baseline data collation

Desk study

- 6.33 A desk study has been conducted as part of this assessment. The study identified aspects of hydrological resource that may need to be considered as receptors in the hydrological and hydrogeological impact assessment including designated ecological sites, designated rivers, ordinary watercourses, and groundwater designations.

- 6.34 The following sources have been referred to in the desk study:

- British Geological Survey (BGS) Onshore GeoIndex online maps (<http://mapapps2.bgs.ac.uk/geoindex/home.html>) for details of geology and borehole logs;
- Gov.uk website and open-source data for details on flood risk and, Water Framework Directive classifications for groundwater and rivers;
- MAGIC Map website for details on aquifer classification, source protection zones, groundwater vulnerability and designated ecological sites
- Groundsure EnviroInsight Report acquired 17th February 2023;
- EA LiDAR topographic data sourced from open survey website (<http://environment.data.gov.uk/ds/survey/#/survey>);
- Observation and photographs from walkover survey completed by SLR in November 2022;
- Wiltshire council Core Strategy adopted 2015; and
- Aerial Imagery available on Google Earth.

Site visit

- 6.35 A walkover survey of the application site and surrounding watercourses were conducted in November 2022. The visit concentrated on gaining a good overall understanding of the water environment of the application site, including any existing surface water drainage. Visual inspections of the channels within the watercourses local to the Proposed Development were also undertaken.

Planning Context

National and Local Planning Policy and Strategy

- 6.36 The following national and local policy and guidance is considered relevant in relation to the water environment:
- National Planning Policy Framework (NPPF)
 - Wiltshire Core Strategy
 - Ashton Keynes Neighbourhood Plan

National Policy

National Planning Policy Framework

- 6.37 The National Planning Policy Framework (NPPF), prepared by the Department for Communities and Local Government was published in March 2012 and revised in July 2018, February 2019 and July 2021.
- 6.38 Chapter 14 of the NPPF, *Meeting the challenge of climate change, flooding and coastal change*, along with the National Planning Practice Guidance which expands on policies contained in the NPPF, recommends a proactive strategy to mitigate and adapt to climate change and requires that flood risk, sustainability and water quality are considered. In addition, the NPPF requires that account is taken of the potential for pollution arising from previous use of the land when determining suitability for a proposed use.

Local Policy

Wiltshire Council Core Strategy

- 6.39 Consideration has been given to policies contained within the Wiltshire Council Core Strategy adopted in 2015. The adopted Core Strategy includes the following policies which are relevant to the water environment:

Core Policy 67 Flood Risk

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

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.

Core Policy 69 Protection of the River Avon SAC

In order to avoid and reduce potential environmental effects on the River Avon SAC, development will need to incorporate measures during construction and operation to avoid and prevent pollution and mitigate potential disturbance effects; appropriate measures may include consideration of suitable buffer zones along watercourses, habitat enhancements and river access management measures. All development within 20m of the riverbanks should submit a construction management plan to the local planning authority to ensure measures proposed during construction are satisfactory. Where additional sewage discharges to a STW cannot be accommodated without measures to offset phosphate loading, development will be required to undertake proportionate measures (which may include contributions towards those measures identified in the Nutrient Management Plan) to demonstrate that the proposals would have no adverse effects upon the SAC.

Ashton Keynes Neighbourhood Plan

6.40 The following policy is of relevance to the assessment and should be read in conjunction with the planning statement which accompanies the application:

Policy INP1 Flood Risk Mitigation in New Developments

Development should not increase flood risk. The development of sustainable drainage systems to address flood risk is supported.

Policy ENP1 Protection of Biodiversity and Wildlife Sites

Development should minimise impacts on biodiversity and provide net gains in biodiversity where possible.

Other Relevant Guidance

- 6.41 Relevant UK guidance on good practice for construction projects is detailed in the following documents.
- Control of Water Pollution from Construction Sites (C532), Construction Industry Research and Information Association (CIRIA) 2001;
 - Environmental Good Practice on Site (C741), CIRIA 2015;
 - The Environment Agency's approach to groundwater protection, version 1.2, February 2018; and
 - The SuDS Manual (C753), CIRIA 2015.
- 6.42 The CIRIA guidance provides help on environmental good practice for the control of water pollution arising from construction activities. It focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.
- 6.43 The EA guidance is part of a wider suite of documents and guidance relating to groundwater protection which sets out principles for assessing risk, protecting groundwater and permitting of abstractions and discharges from groundwater. The full suite can be found on the GOV.UK website at <https://www.gov.uk/government/collections/groundwater-protection>.
- 6.44 The SuDS Manual incorporates the latest research, industry practice and guidance for design, delivery and maintenance of Sustainable Drainage Systems (SuDS).

Planning Summary

- 6.45 The site is located within Cotswold Water Park which is a designated SSSI (Site of Special Scientific Interest) and is in proximity to a number of watercourse and waterbodies. The River Churn is present approximately 1km to the northeast of the site, Cerney Wick Brook is present approximately 350m to the east of the site and the River Thames is present 2km to the south. There are a number of lakes, the closest being Lake 26 approximately 350m to the southeast and Lake 62 approximately 400m to the south. Additionally, the site lies within an area that is classified as a Source Protection Zone 2 (Outer Protection), a Nitrate Vulnerable Zone (Surface Water), a Drinking Water Safeguard Zone (Surface Water) and a SSSI Impact Risk Zone.

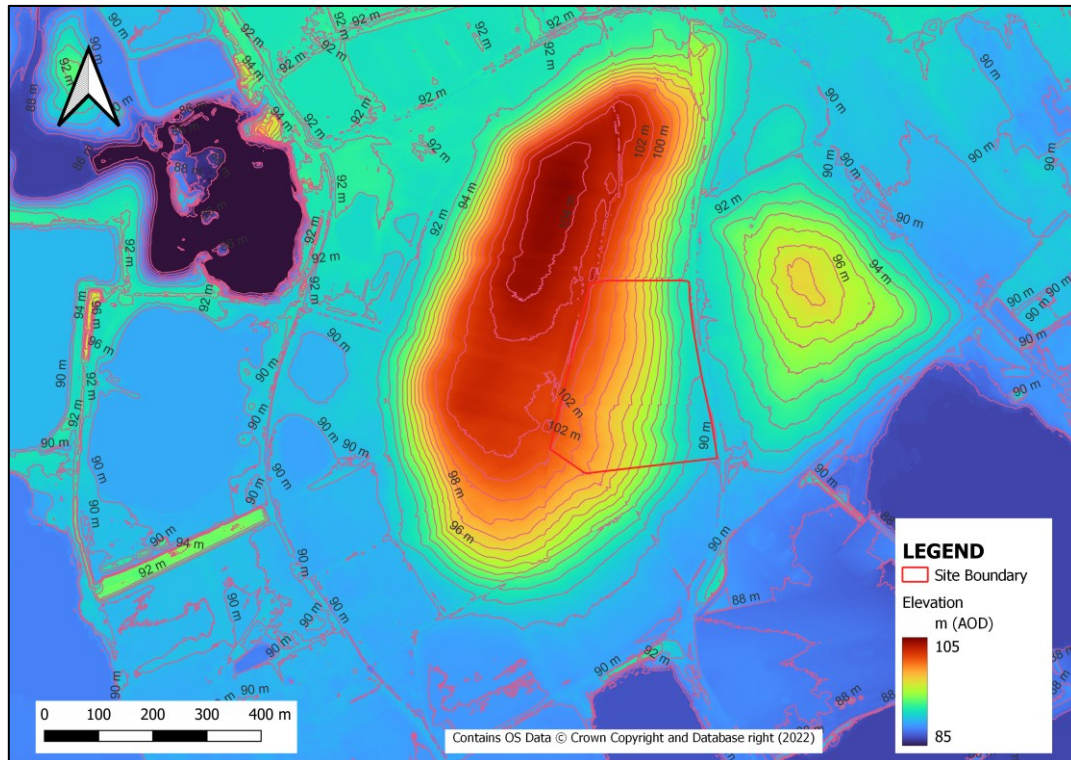
Baseline conditions

- 6.46 The land that will accommodate the Proposed Development comprises:
- 7.0 hectares of undeveloped, greenfield land across two fields that are referred to as ‘the Site;’
 - Of this, approximately 4.7 hectares are to be impermeable hardstanding.
- 6.47 Full detail of land within the Red Line Boundary is shown in Figure 6.2 below.

Topography and Land Cover

- 6.48 The EA have collected and compiled a Light Detection and Ranging (LiDAR) database for the UK. LiDAR is an airborne mapping technique to measure distance between the land surface and the aircraft. This gives a suggestion of the topography of the land underneath. The LiDAR for the Red Line Boundary and surrounding areas can be seen in Figure 6-2, based on a 1m resolution.
- 6.49 Topographic data was provided by Environment Agency’s open data website in order to define the ground elevations and the natural and man-made features of the area covered by the Proposed Development. The survey shows that that levels across the site range between approximately 102.1m along the western boundary and 89.7m above Ordnance Datum (aOD) in the south-east with elevations falling towards the east.
- 6.50 Across the wider area, there is an area of topographic high immediately to the west of the site which forms an island of elevated ground surrounded by lower lying topography of the Cotswold Water Park SSSI to the north, east, south and west.

Figure 6-2
Extract of Environment Agency's LiDAR Database



Hydrogeology

Geology

- 6.51 As outlined in the British Geological Survey (BGS) GeoIndex, the bedrock beneath the Proposed Development comprises of Kellaways Clay Member – Mudstone.
- 6.52 The mudstone bedrock is present at or close to the surface across most of the site, with no overlying superficial deposits with the exception of a strip of Northmoor sand and gravel superficial geology present along the eastern edge of the Site. This is a result of the River Thames conveyed debris over time.
- 6.53 The superficial sand and gravels extend across a significant area to the north, east, south and west of the site with the deposits only absent across the extent of the elevated area of land upon which the Site is located.
- 6.54 The Kellaways clays are typically described as a silicate mudstone with occasional thin bands of sandstones and siltstones. The Kellaways Clays are underlain by Limestones of the Cornbrash Formation.

- 6.55 A trial pit of depth 2.20m located in the southeast corner of the Site revealed the underlying strata characteristics and confirms the presence both the superficial sands and gravels and mudstone bedrock. A summary of the trial pit log is presented in Table 6-4.

Table 6-4 Geological summary of Trial Pit

Description	Thickness (m)	Depth (m)
Topsoil	0.35	0.35
Sandy Silty Clay	1.05	1.40
Gravelly Sandy Silty Clay	0.05	1.45
Fine and Medium Gravel	0.55	2.00
Clay	-	2.20

- 6.56 Borehole record SU09NW20 is present approximately 200m southeast of the site and is within the Kellaways Clay Member and Northmoor Sand and Gravel geologies. The gravel superficial deposit was observed in the borehole to a depth of 4.6m. Solid bedrock of the Kellaways Clay Member was observed in the borehole to a depth of 19.8m and was described as being '*Clay with Limestone Stringers.*'
- 6.57 Other regional boreholes indicate that the Kellaways Clay Member is typically 25-30m in thickness with the underlying Cornbrash 3-5m in thickness. The geological sequence is summarised in Table 6-5.

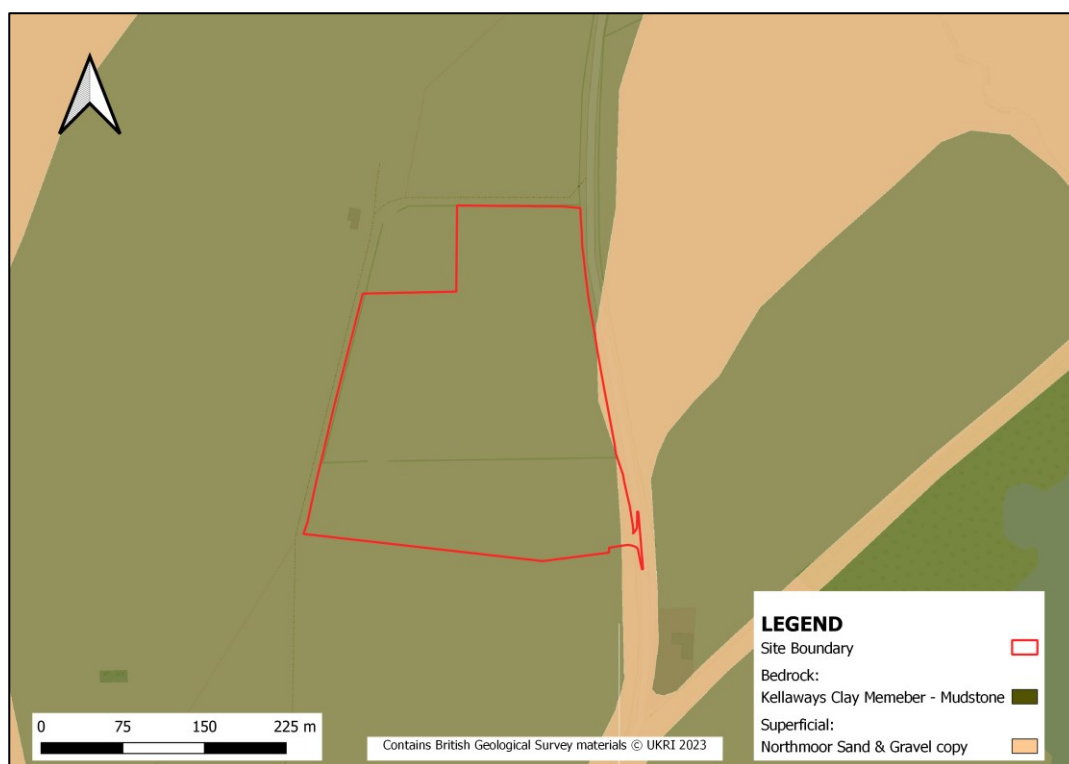
Table 6-5 Geological Summary

Age	Strata	Description	Thickness
Quaternary	Northmoor Sand and Gravel Member	Fluvial sands and gravels	0 – 5m
Jurassic	Kellaways Clays	Silicate mudstone, locally with thin beds of siltstone and sandstone, and nodules of argillaceous limestone	25 -30m
	Cornbrash Formation	Limestone, medium- to fine-grained, predominantly bioclastic wackestone and packstone with sporadic peloids	3-5m
	Forest Marble Formation	Silicate-mudstone, greenish grey, variably calcareous and in the south notably sandy, with lenticular typically cross-bedded limestone	c.25m

Age	Strata	Description	Thickness
	White Limestone Formation	A pale grey to off-white or yellowish limestone, peloidal wackestone and packstone with subordinate ooidal and shell fragmental grainstone	Up to 30m

6.58 The geology that is present across the site is displayed in Figure 6-3.

Figure 6-3 Site Geological Conditions



Aquifer Characteristics

- 6.59 The local Kellaways Clay Member is designated by the Environment Agency as being '*Unproductive Strata*', meaning it is '*largely unable to provide usable water supplies*' and therefore is of low importance and low sensitivity.
- 6.60 Nearby borehole logs typically describe the Kellaways Member as "*blue clay*." These deposits are considered to be low permeability and unlikely to provide significant water supplies or baseflow to rivers.
- 6.61 The overlying superficial deposits of Northmoor Sand and Gravel, where present, are classified as '*Secondary A*' aquifers. These are regarded as rocks that '*provide modest amounts of water, but the*

nature of the rock limits their use. They are considered to be able to support water supplies on a strategic scale.

- 6.62 The underlying Cornbrash Formation is classified as a Secondary A aquifer with both the Forest Marble and White Limestone classified as Principal Aquifers.
- 6.63 The Proposed Development lies within a Zone II (Outer Protection) groundwater Source Protection Zone (SPZ). This is defined as a 400-day travel time of pollutant to source with a 250-500 metre minimum radius around the source.
- 6.64 The SPZ relates to a number of groundwater extractions from sand and gravels in the superficial deposits that have limited extent across the Site. Therefore, there is limited direct hydraulic connection with the application site.
- 6.65 Significant groundwater recharge to the bedrock is unlikely to occur across the site due to the limited permeability of the clay. Where there are confined strips of gravel present, there may be lateral groundwater recharge. However, groundwater will be largely recharged regionally at off-site areas, most probably to the north of the Site where Cornbrash Formation – Limestone outcrops are present or to the superficial sands and gravels.
- 6.66 BGS Borehole records within 2km of the red line boundary, in addition to observations during infiltration testing, indicate high groundwater levels at 1.4m below ground level (bgl). Groundwater was observed to be emerging from the Northmoor sand and gravel superficial layer as well as any confined layers of gravel within the Kellaways Clay. Given the nature of the Kellaways Clays, any sand horizons within this geology are unlikely to be laterally extensive and are therefore only likely to consist of minor groundwater seepages.
- 6.67 In the immediate vicinity of the Development Site, the extensive thickness of overlying Kellaways Member will limit the potential for any hydraulic connectivity between the groundwater present within the underlying limestone aquifers and the waterbodies in proximity of the site. However, the presence of gravels observed in nearby boreholes and the trial pit indicate there is likely to be lateral groundwater flow within the superficial sands and gravels.
- 6.68 The EA classify the groundwater vulnerability that underlies the Proposed Development as unproductive with a soluble rock risk. This reflects the presence of low permeability Kellaways Member overlying the deeper limestone aquifer which will provide groundwater protection in the event of spillages or pollution events occurring.
- 6.69 As the Kellaways Clay Member is classified as unproductive strata this is not considered to be a potential groundwater receptor. The extensive thickness of the Kellaways Clays (25-30m) will also ensure that there is no potential pathway to the underlying limestone and therefore risk to the limestone aquifer has not been assessed further.
- 6.70 The shallow sands and gravels will provide baseflow to nearby watercourses and the extensive network of waterbodies of the Cotswold Water park therefore the superficial sands and gravels are considered to have a high sensitivity.

Hydrology

Surface Water and Drainage

- 6.71 The main watercourses in the vicinity of the Proposed Development are the River Thames, and its tributaries, the River Churn and Cerney Wick Brook. The main channel of the River Thames flows some 2km south of the proposed development in a primarily easterly direction. The River Churn is also in the vicinity of the site. At the closest point, it is 1km northeast of the site. It flows in a southerly direction until its confluence with the River Thames some 4.5km southeast of the site. Cerney Wick Brook is a tributary of the River Thames that is present at its closest point approximately 350m northeast of the site and joins the Thames some 4km southeast of the site.
- 6.72 The site is serviced by three drainage ditches. They are present to the west and north of the site boundaries. There is an additional drainage ditch that is present through the centre of the Site, bisecting the north and south. All of these are assumed to discharge to the nearby Ashton Road highways ditch that runs south parallel to the road.
- 6.73 Additionally, as the site is situated within Cotswold water park there are a number of waterbodies within the area. There are approximately 20 lakes present within 2km of the site boundary. The closest lakes are Lake 26 approximately 350m to the southeast and Lake 62 approximately 400m to the south.
- 6.74 The local hydrology within 2km is displayed in Figure 6-4.

River Thames

- 6.75 The River Thames is designated as a main river by the EA from Thames Head, approximately 6km northwest of the site. It flows from its source approximately 6.7km to the northeast of the site in a generally south-easterly direction towards Somerford Keynes and Ashton Keynes. As it enters Ashton Keynes, the river splits into three channels with one flowing north-eastwards around the Site and then back down towards the south to re-join the main channel. Swill Brook, Derry Brook and Flagham Brook all join the River Thames in this area. The River Churn joins the River Thames just east of Cricklade, approximately 4.5km to the southeast of the Site where it flows in a generally eastern direction towards London until its mouth at the Thames estuary in Essex.
- 6.76 The River Thames (from Kemble to Waterhay Bridge) drains a catchment of 48.628 square kilometres mostly upstream of the Proposed Development.
- 6.77 Main River is a statutory designation defining usually larger streams or rivers which are regulated by the EA in England.

River Churn

- 6.78 The River Churn is designated as a main river and flows in a southerly direction approximately 1km to the northeast of the site. It rises over 20km north of the site and flows until its confluence with

the River Thames approximately 4.5km to the southeast of the site where it flows in a generally east direction towards the Thames Estuary in Essex.

- 6.79 The River Churn (from Baunton to Cricklade, at its confluence with the Thames) drains a catchment of 30.7 square kilometres, mostly upstream of the Proposed Development.

Cerney Wick Brook

- 6.80 Cerney Wick Brook arises approximately 550m to the northwest of the site, on the far side of the area of high elevation. Due to this topography, the watercourse diverges into two channels that flow either side of the site, approximately 400m away from each boundary. The channel that flows to the west of the site joins the River Thames approximately 1.8km to the south of the site and the channel that flows to the east of the site joins the Thames some 4km to the southeast.

- 6.81 It is designated as a main river and from its confluence with the Thames drains a catchment area of 18.27ha, mostly upstream of the Proposed Development.

Highways Ditch

- 6.82 Ashton Road has a formal highways ditch that is approximately 1x1m that is owned by the Wiltshire Council Highways Authority. It flows south servicing Ashton Road and provides an outflow for the existing ditches that serve the Site. Below the Site access, there is a 450mm culvert that allows flow below the access hardstanding. It is assumed that the outfall of this ditch is a nearby lake approximately 500m downstream.

Northern Field Ditch

- 6.83 Adjacent to the northern boundary there is a ditch which follows the topography to the east. During the walkover the ditch was observed to have a depth of 1m upstream and 0.5m downstream with an approximate width of 1m with 300mm shoulder mounds. The ditch discharges to Ashton Road highways ditch that runs south, parallel to the road.

Western Field Ditch

- 6.84 There is a ditch that runs along the western boundary of the Proposed Site with a depth of 1m and a width of 1m. It captures runoff from the neighbouring field and drains through a 200mm culvert that is connected to a plastic outfall pipe that has an assumed diameter of 40mm. The surface water is attenuated in a circular ditch prior to discharge through a 300mm pipe to the central ditch.

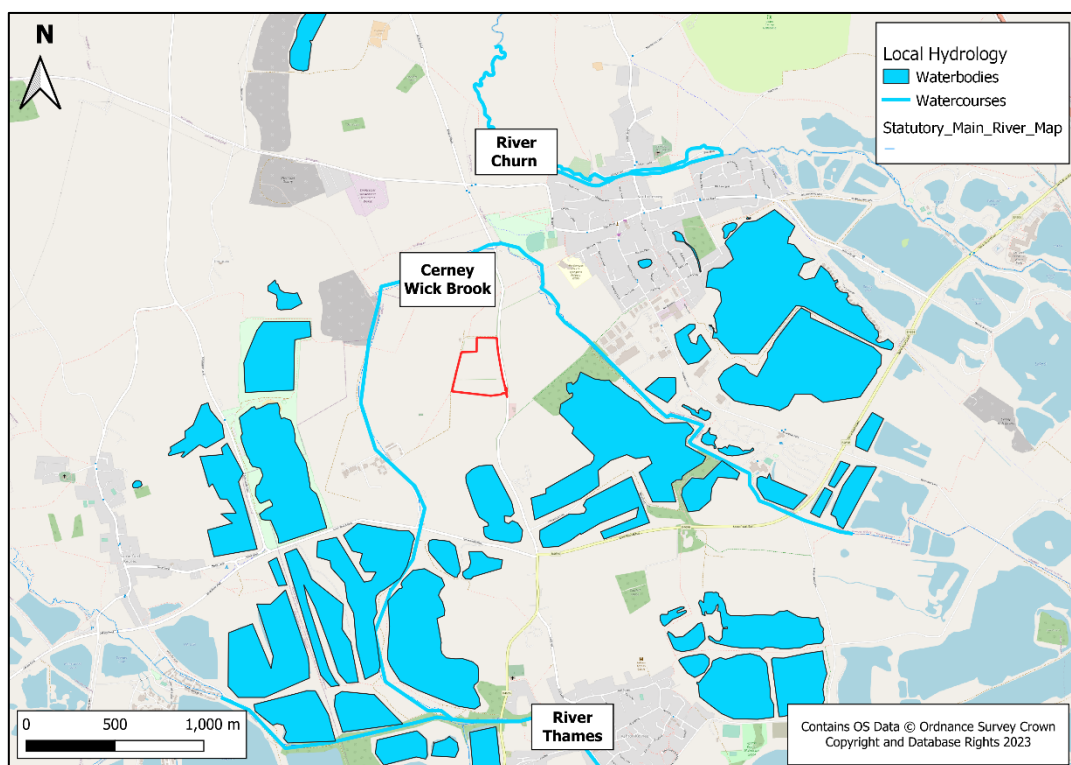
Central Ditch

- 6.85 There is another ditch that runs through the Proposed Site and bisects the north and south. The ditch flows in an easterly direction and discharges to Ashton Road highways ditch.

Lakes

- 6.86 Due to the Site being situated within Cotswold Water Park, there are a number of lakes present within 2km of the Site Boundary.
- 6.87 Figure 6-4 indicates the hydrological features that are within 2km of the site boundary. There are over 20 waterbodies in proximity to the site. These are primarily formed within former quarry voids and are not considered to be hydraulically connected to the site, except where groundwater is present within the superficial sands and gravels.

Figure 6-4 Local hydrology



Flood Risk

- 6.88 The Flood Risk Assessment (FRA) provided within the Groundsure Report attached at Appendix 6A indicates that the Proposed Development is located entirely within Flood Zone 1 (low flood probability from fluvial flooding). The majority of the site is at a very low risk of surface water flooding, however there are areas just outside the eastern boundary that present a low to high risk of pluvial flooding relating to the highways ditch. Towards the south of this boundary, the risk does extend slightly into the site, however it is expected for surface water to positively drain out of the site towards the east. Flooding from coastal, groundwater, sewer, infrastructure and artificial sources are all also deemed to present a low risk of flooding.
- 6.89 There are not any recorded incidents of flooding within 250m of the site.

- 6.90 Due to the risk of flooding from all sources being low, detailed flood risk assessment and modelling is not required for this site and flood sensitivity is classed as low.

Surface Water Quality

- 6.91 The EA surveys and samples all Main Rivers in England and Wales routinely to classify and identify pressures on water bodies against the Water Framework Directive objectives set out for them. The Directive requires all water bodies to maintain or improve their classification status, preventing any decline in classification.
- 6.92 For surface waters, Good status is a statement of 'overall status', which in turn consists of a chemical and ecological component. Chemical status measures priority substances that present a significant risk to the water environment. Chemical status is classified as 'good' or 'fail'. Ecological status is measured on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The ecological status takes into account physico-chemical elements, biological elements, specific pollutants and hydromorphology. To achieve good ecological status or potential, good chemical status or good groundwater status every single element assessed must be at good status or better. If one element is below its threshold for good status, then the whole water body's status is classed as less than good.

River Thames

- 6.93 River Thames (EA ID GB106039023760) is recognised by the EA as currently having a moderate ecological status and a poor chemical status based on 2019 reporting, which represents the latest EA reporting detailed on the EA Catchment Data Explorer (<https://environment.data.gov.uk/catchment-planning/>).
- 6.94 Good ecological potential (for all quality elements) was anticipated to be achieved by 2015. Based on 2019 reporting, this has been met for 'fish' however the other elements are yet to meet this objective. Good chemical status is anticipated by 2063.
- 6.95 The River Thames is monitored, and findings reported every three years, with a target of achieving good quality in the future. Based on the most recent reporting period (2019), the sensitivity of the surface water catchment is classified as Medium.

River Churn

- 6.96 The River Churn (EA ID GB106039029750) is recognised by the EA has currently having a moderate ecological status and a poor chemical status based on 2019 reporting, which represents the latest EA reporting detailed on the EA Catchment Data Explorer (<https://environment.data.gov.uk/catchment-planning/>).
- 6.97 Good ecological potential is anticipated to be met for this watercourse by 2027 and good chemical status is anticipated by 2063.

- 6.98 The River Churn is monitored, and findings reported every three years, with a target of achieving good quality in the future. Based on the most recent reporting period (2019), the sensitivity of the surface water catchment is classified as Medium.

Cerney Wick Brook

- 6.99 Cerney Wick Brook (EA ID GB106039023800) is recognised by the EA as currently having a poor ecological status and a poor chemical status based on 2019 reporting, which represents the latest EA reporting detailed on the EA Catchment Data Explorer (<https://environment.data.gov.uk/catchment-planning/>).
- 6.100 Moderate ecological status is expected to be met for the watercourse by 2039 and good chemical status is expected by 2063.
- 6.101 Cerney Wick Brook is monitored, and findings reported every three years, with a target of achieving good quality in the future. Based on the most recent reporting period (2019), the sensitivity of the surface water catchment is classified as Low.

Licensed Groundwater Abstractions

- 6.102 The influence of any activity on the groundwater environment can have an effect over large distances. In order to ensure that all potential receptors are afforded appropriate assessment, all recorded abstraction points within 2km of the Red Line Boundary have been considered.
- 6.103 There are nine active groundwater uses recorded within 2km of the Proposed Development. These relate to five Groundwater Abstraction License Numbers. Table 6-6 shows the detail of these licensed groundwater abstractions, including location details. These abstractors are considered as potential receptors to impacts that might arise from the Proposed Development. Due to the proximity of some of the abstraction points, the sensitivity of the abstraction is considered to be medium.

Table 6-6
Active Groundwater Abstraction Licences within 2km of the Site

Operator	Licence Number	Location	Grid Reference	Abstraction use
Aggregate Industries LTD	28/39/01/0081	472m SE	4044553 195659	General Use Relating to Secondary Category
Hills Quarry Products Limited	TH/039/0001/006	548m W	403083 196658	Dewatering
Hills Quarry Products Limited	28/39/01/0089	1224m NW	402931 197017	Mineral Washing
				Process Water
Hills Quarry Products Limited	TH/039/0001/005	1378m NW	402705 198427	Dewatering
Thames Water Utilities Ltd	28/39/01/0009	1879m S	404170 194130	Potable Water Supply - Direct
		1891m S	404220 194120	Potable Water Supply - Direct
		1909m S	404120 194100	Potable Water Supply - Direct
		1970m S	404190 194040	Potable Water Supply – Direct

Pollutants

6.104 The Detail of all pollution incidents reported to the EA are held on the National Incident Recording System. Each incident is assessed and assigned an environmental impact categorisation which defines the likely environmental impact with regard to air, water and land. Incidents are classified as category 1 (major, serious, persistent and/or extensive impact or effect on the environment), category 2 (significant impact or effect on the environment), category 3 (minor or minimal impact on the environment) or category 4 (substantiated incident with no impact).

6.105 There have not been any recorded pollution incidents within 2km of the Site.

Designations

6.106 The influence of any activity on the water environment can have an effect over large distances, either through direct impact to surface water runoff volumes or water quality altering down-gradient hydrological regimes or through changes to groundwater regimes. In order to ensure that all potential receptors are afforded appropriate assessment, all recorded designated areas within 2km of the Red Line Boundary have been considered. Land within 2km of the Site designated for its nature conservation value relative to marginal and aquatic habitats and associated species are listed in Table 6-7.

- 6.107 As the site is located within Cotswold Water Park, which is designated as a SSSI, 21 sites have been identified within 2km of the red line boundary as being Sites of Special Scientific interest. The closest of which is 304m to the west and extends to 1949m east of the Site.

Table 6-7
Sites Designated for Hydrological Interest

Site Name	Designation	Distance and Direction	Linkage
Cotswold Water Park	Site of Special Scientific Interest (SSSI)	Closest: 304m W of the Site	The site lies within the SSSI Impact Risk Zone regarding a number of categories. Most notable to this chapter are discharges of more than 20m³ a day and water supply for where net additional floor spaces floor space exceeds 1000m². Shallow groundwater that is within the Northmoor Gravel and Sand Formation may be in continuity with the closest features and could be impacted through dewatering or pollution however, any groundwater that is confined within the bedrock is likely to have limited continuity. There is potential for surface water linkage through the drainage ditches that serve the site as they are assumed to discharge to one of the nearby lakes within the Cotswold Water Park SSSI.
Coke's Pit Lake	Local Nature Reserve (LNR)	1260m SW of the Site	Designated feature does not have any surface water linkage. Shallow groundwater that is within the Northmoor Gravel and Sand Formation may be in continuity with the closest features and could be impacted through dewatering or pollution incidents however any groundwater that is confined within the bedrock is likely to have limited continuity. Groundwater flow in the superficial deposits is considered to follow the local topography in a south-easterly direction and therefore it is unlikely there is any hydraulic connection.
Thames (Churn to Colne) NVZ	Nitrate Vulnerable Zone (NVZ)	Within the Site	The site lies within the NVZ with surface water linkage to Thames (Churn to Colne).
Zone 3 – Total Catchment Supply	Source Protection Zone	326m SW	Groundwater in the superficial sands and gravels (where present) is in continuity with the water supply where all groundwater ends up

Site Name	Designation	Distance and Direction	Linkage
			at abstraction point. Could potentially be impacted through dewatering or pollution of the superficial aquifer.
Zone 2C – Outer Catchment within Confined Aquifer	Source Protection Zone	Within the Site	The confined aquifer within the limestone bedrock will be offered protection by the overlying low permeability mudstone geology which is believed to be up to 30m in thickness locally. There is therefore considered to be no potential pathway between the application site and this abstraction.

Development Design, Mitigation and Potential Impacts

Introduction

- 6.108 The following attributes of both the Site and the Proposed Development are those which are the most likely to result in hydrological and hydrogeological effects. The nature of proposal is described alongside the loss of hydrological elements and proposed mitigation measures. Potential impacts resulting from the Proposed Development are also summarised below and are considered in relation to the assessment of effects.

Nature of Proposals

- 6.109 This section provides a summary of the potential effects of the Proposed Development on the water environment. The summary does not consider the risk of flooding posed to the Proposed Development but does consider flood risk implications with regard to the existing water environment and surrounding sensitive users. The assessment is based on a review of activities that will occur during the construction and operation. It also assesses the magnitude of each identified impact and the significance of the associated effect on local hydrological and hydrogeological receptors following construction and during operation (Year 0 and Year 15).
- 6.110 The hydrological and hydrogeological assessment is based upon a desk top assessment of existing hydrological regimes as well as a site-based survey. The main hydrological and hydrogeological receptors which have the potential to be affected by the proposed development have been identified and their sensitivity to the proposed development has been assessed by considering their value and susceptibility. The magnitude of change which would be experienced by each of these receptors has then been assessed by determining the size and scale of change, the geographical extent of that change, and the duration and reversibility of that change.
- 6.111 In this assessment the sensitivity of the potential receptors is designated as follows, based on the review of baseline conditions:
- Shallow Groundwater in Northmoor Sand and Gravel Formation – High Sensitivity
 - Watercourses (including River Thames, Cerney Wick Brook, River Churn – Medium sensitivity
 - Flood Risk – Low Sensitivity
 - Licensed groundwater abstractions (Surface Water) – High Sensitivity
 - Cotswold Waterpark SSSI – High Sensitivity
- 6.112 Given that there is considered to be no pathway from the site to underlying limestone aquifer both the limestone and clay bedrock and the associated abstractions from the limestone bedrock have been excluded as potential receptors.
- 6.113 The Coke's Pit LNR has also not been assessed as a potential receptor as there is considered to be no hydrological or hydrogeological connection to the Site.
- 6.114 It should be noted that the magnitude of the impact has been assessed as described in Table 6-2. The significance of any potential effect has then been assessed (based on the sensitivity of the receptor) as described in Table 6-3.

- 6.115 The general approach used has been to seek to avoid any potential effects as part of the inherent design process. This includes using suitable water-resistant construction materials, ensuring drainage provision does not significantly alter existing run off regimes to the downstream hydrological regime.
- 6.116 Site access would be granted via a new access track off Ashton Road. The access road would enter the site at the southeastern corner.
- 6.117 The key elements of the Proposed Development, in terms of their potential to affect hydrological and hydrogeological receptors are largely related to the following elements:
- Five large digester tanks with storage capacity of 35,000m³ with seven smaller tanks, pump building and three feed hoppers;
 - Two digestate lagoons with a combined storage capacity of c.20,000m³;
 - Two Silage clamps measuring 101.25m x 35.0m x 3.52m;
 - Silage Clamp measuring 123.75m x 35.0m x 3.52m;
 - Rainwater harvesting lagoon;
 - Hardstanding at approximately 8650m²;
 - Chicken Shed at 26.0m x 19.5m;
 - Straw building at c.30m²;
 - Two heat exchangers at approximately 35m²;
 - Five HGV Trailer Bays at approximately 115.3m² each;
 - Pump Unit at approximately 95m²;
 - Gas Flare at approximately 25m²;
 - Biogas Upgrading Plant at approximately 330m²;
 - Chiller and Boiler at approximately 40m² each;
 - Separator Building at approximately 265m²;
 - Co2 Tanks at approximately 440m²; and
 - Two Compressors at approximately 27m² each;
- 6.118 Any remaining structures do not contribute to an increase in impermeable area and/or do not generate contaminated water runoff.
- 6.119 It is also notable that the baseline conditions incorporate a series of drainage ditches serving the site. The 'central ditch' as discussed in Paragraph 6.85, runs through the site from west to east. The Proposed Development will alter this system and will migrate the ditch so that it runs along the southern perimeter of the Site. The diversion of the existing ditch to the 'Open Land Drain' has potential to alter the hydrological regime at the Site. However, as the drain that is proposed to be developed over is to be replaced with another that merely diverts the surface water around the southern boundary and is not constrained by topography there is expected to be minimal effect to the hydrological regime as a whole.

Baseline

- 6.120 The site and its 2KM boundary lie within a SSSI Impact Risk Zone, a Nitrate Vulnerable Zone (NVZ) for surface water and a Source Protection Zone II and III.
- 6.121 Once constructed, the Proposed Development would introduce a number of new features into the previously greenfield site that will contribute to the impermeable area of the site. The digestate tanks, digestate lagoons, silage clamps, chicken shed, straw store, hardstanding, north lagoon digestate lagoons and other process equipment comprises 4.60ha of impermeable area.

Proposed Embedded Mitigation

- 6.122 Embedded or inherent mitigation measures to protect the water environment have been incorporated into the design of the Proposed Development as well as into the construction methods. Such measures will prevent or reduce potential impacts both during construction and once the Proposed Development is operational.
- 6.123 The potential for mitigation is described in the following two sections covering the assessment of hydrological and hydrogeological effects.
- 6.124 A proposed hydrological mitigation plan has been prepared as part of this application attached as Appendix 6B (clean water) and Appendix 6C (contaminated water).
- 6.125 The Drainage Strategy includes:
- 1200m³ volume below ground containment tanks for contaminated water collected through drainage, channels, pipes, and chambers
 - 1500m³ Storage crates below ground to attenuate surface water and pump to the rainwater lagoon
 - 278m³ volume attenuation lagoon that collects water from underground pipes, channel drains and pumped water from the storage crates
 - Full retention petrol interceptor
- 6.126 The Site has been designed in accordance with CIRIA C736 and Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations (SSAFO). The silage clamps have been designed in accordance with the latest SSAFO regulations and in accordance with CIRIA 759. An Environmental Management System (EMS) will be in place prior to the commencement of site operations. The scope for the EMS applies to all processes and activities undertaken by the operator at the installation.
- 6.127 Additionally, the proposed AD plant will operate under an Environmental Permit, with a strict operational & maintenance procedure in place. These procedures are developed to ensure compliance and protection of the local receptors.
- 6.128 As part of the environmental permit a detailed maintenance schedule will be regulated against. This shall cover the drainage, external surfacing, buildings & concrete containment bund as a

minimum. The drainage maintenance document typically outlines daily, weekly, biweekly, monthly, quarterly & yearly inspection work to be carried out, along with the necessary actions required.

- 6.129 As part of the actions under the permit, water quality checks will be required on the outfall locations, covering TSS, PH, volume & hydrocarbons. These will be recorded and submitted to the Environment Agency under the permit conditions annually or more frequently (pending permit conditions).
- 6.130 Therefore, the proposed surface water drainage system shall conform and be regulated to a robust, audited & recorded operational & maintenance plan. This will ensure the performance of the drainage system is maintained throughout the life of the plant.
- 6.131 The general approach used has been to seek to avoid any potential effects as part of the inherent design process. This includes using suitable water-resistant construction materials, ensuring drainage provision does not significantly alter existing run off regimes to the downstream hydrological network and minimising drainage channel crossings for site access.

Potential Impacts (Hydrological and Hydrogeological)

- 6.132 Despite the extent of embedded mitigation, potential remains for impacts to arise in relation to the development during construction and operation. Potential impacts may result from the following:

Potential impacts during construction (Temporary)

- *Spills of fuels, oils or other polluting substances;*
 - *Increase in impermeable surface cover creating higher volume of surface water runoff;*
 - *Generation of turbid runoff which could enter downstream drainage and pollute nearby lakes, Cerney Wick Brook, the River Thames or the River Churn;*
 - *Potential need for dewatering could lead to local lowering of the groundwater table;*
 - *Potential need for dewatering could lead to discharge of groundwater with elevated suspended sediments to downstream surface water; and*
 - *Potential need for dewatering could lead to local lowering of the groundwater table which may partially support the SSSIs.*
- 6.133 The construction period assessment considers the temporary effects of the construction activities. The long-term effects of the introduction of the Proposed Development are considered as operational period permanent impacts, although it is acknowledged that they occur progressively during the construction period.
- 6.134 The construction phase environmental impacts of the Proposed Development would be managed through the implementation of a CEMP which would be part of a discharge of requirements and include mitigation measures under the 'Considerate Contractors' process.
- 6.135 Construction good practice measures include but should not be limited to:
- To prevent erosion and run-off, minimise land disturbance and leave maximum vegetation cover;

- Minimise water entering excavations by using cut-off ditches;
- Materials storage areas will be established, managed and maintained throughout the construction process;
- Locate earthwork stockpiles away from open drainage channels to prevent sediment migration into the downstream SuDS network and drainage ditches;
- Collect runoff from construction areas (including dewatering from excavations) into a system where it can be recycled or treated (e.g., settlement tanks, silt lagoons, screens);
- Conduct activities involving potential pollutants, e.g., concrete or fuel, in dedicated areas which are designed so that spills, leaks, drips and contaminated run-off can be captured and disposed of;
- Cover piles of building materials like cement, sand and other powders and regularly inspect for spillages, and locate them where they will not be washed into drainage areas.

- 6.136 Foundations may be formed through the pouring of concrete. Concrete is highly alkaline and corrosive and can have a detrimental impact on water quality. Without controls on this process, concrete spillages could potentially result in pollutants coming into contact with local groundwater and surface water features. Concrete will be brought to the Proposed Development ready mixed, temporary bunds will be placed around any pouring operations to contain spillages and a spill response protocol will be developed for use by contractors. The preference will be for all vehicle washouts to take place off-site. Any drainage or water used for on-site washing will need to be collected and directed to a sump located in a suitably lined and contained area for treatment prior to discharge. Any discharge will be in agreement with the EA.
- 6.137 It may be necessary to form a barrier within the excavation to ensure liquid concrete does not come into contact with strata that could provide a pathway to underlying groundwater. If required, either a geotextile liner or a sand layer would line the excavation in order to restrict the potential migration of concrete into the surrounding substrata. This would only be necessary if there was evidence following excavation of a potential connection to any confined aquifers and significant fracturing which could give rise to a potential for vertical groundwater flow (although given that it is overlain by clay this is considered to be of low potential).
- 6.138 The storage of oils and other potentially polluting substances will be within impervious storage bunds with 110 % capacity, so that any spillages or leaks are contained. Construction machinery will be checked regularly. Any maintenance required would occur over a hardstanding surface within the construction compound or on an alternative suitable impermeable ground cover. Spill kits comprising absorbent mats or absorbent sands will be available on-site at all times and all relevant staff will be trained in their appropriate use. Any spills will be cleaned up as soon as possible with any contaminated sands bagged up and disposed of correctly.
- 6.139 Potential effects from the Construction of the Site (Temporary) are shown in Table 6-8. These relate to construction site activities.

Table 6-8
Potential Impacts during Construction (Temporary)

Receptor	Nature of potential impact	Sensitivity of Receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
Watercourses	Spills of fuels, oils or other polluting substances	Medium	Low	Minor Any impact would be indirect (through drainage ditches) and temporary (short term)	Good construction practice including managing spills and storage of chemicals will be adopted in accordance with CEMP.
Groundwater in Superficial Deposits	Spills of fuels, oils or other polluting substances	High	Low	Minor Any impact would be direct and temporary (short term)	Good practice construction methods including managing spills and storage of chemicals will be adopted. The minimal extent of the superficial deposits across the site limits the potential magnitude of impact.
Licensed Abstractions (Surface Water)	Spills of fuels, oils, or other polluting substances	High	Low	Minor Any impact would be secondary (through infiltration) and temporary (short term)	Good practice construction methods including managing spills and storage of chemicals will be adopted. The minimal extent of the superficial deposits across the site limits the potential magnitude of impact.
Cotswold Water Park SSSI	Spills of fuels, oils or other polluting substances	High	Low	Minor Any impact would be secondary (from groundwater) or direct (from drainage	Good practice construction methods including managing spills and storage of chemicals will be adopted. Any spillage on the surface will be unlikely to migrate to groundwater due to lack of

Receptor	Nature of potential impact	Sensitivity of Receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
				ditches) and temporary (short term)	superficial geology across most of site.
Flood Risk	Increase in impermeable surface cover creating higher volume of surface water runoff	Low	Low	Minor Any impact would be secondary (from drainage ditches leading to nearby lakes in SSSI) and temporary (short term)	Construction of proposed development involves the construction of a surface water drainage strategy that will be designed to accommodate increased surface water runoff. Existing drainage that serves the Site will remain (rerouted where necessary) with no discernible effect on downstream flood risk.
Watercourses	Generation of turbid runoff which could enter downstream drainage and pollute the River Thames	Medium	Low	Minor Any impact would be indirect (through drainage ditches) and temporary (short term)	Adoption of good practice construction will minimise generation of turbid runoff at source. Any generation of turbid water would be temporary in duration.
Shallow Groundwater in Superficial Deposits	Potential need for dewatering could lead to local lowering of the groundwater table for excavations and foundations	High	Low	Minor Any impact would be direct and temporary (short term)	Any dewatering would be temporary and short term while excavations are completed, foundations and lower levels constructed. The thinness of the superficial deposit means that groundwater flow rates will be low which reduces the magnitude of any potential impact to Low. However, mitigation is needed to ensure that there is no water quality impact on shallow groundwater.

Receptor	Nature of potential impact	Sensitivity of Receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
					The limited extent of superficial deposits across the Site further reduces the magnitude of impact.
Watercourses	Potential need for dewatering could lead to discharge of groundwater with elevated suspended sediments to downstream surface water	Medium	Low	Minor Any impact would be direct and temporary (short term)	Adoption of good practice construction methods will minimise generation of turbid runoff at source. Any dewatering discharge will be directed into surface silt traps or screening and oil traps to control and reduce sediment entrainment and pollution. This reduces the magnitude of any potential impact to Low.
Cotswold Waterpark SSSI	Potential need for dewatering could lead to local lowering of the groundwater table which may partially support the SSSI	High	Low	Minor Any impact would be direct and temporary (short term)	Any dewatering would be temporary while excavations are completed, and foundations and lower levels are constructed. The superficial deposits comprise only a very thin horizon along the eastern edge of the site therefore need for significant dewatering is highly unlikely.
Surface Water	Cable trenches could act as small drainage channels and lead to turbid water entering adjacent local and downstream watercourses	Medium	Low	Minor Any impact would be direct and temporary (short term)	Any generation of turbid water would be temporary in duration. Adoption of good practice construction methods will minimise generation of turbid runoff at source. Design of cable trenches will include requirements for backfilling with materials of

Receptor	Nature of potential impact	Sensitivity of Receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
	through alteration of local runoff				suitable permeability to prevent trenches acting as runoff conduits. This will limit the magnitude of any potential impact to low.

Potential impacts during operation (Year 0 permanent)

- 6.140 Key inherent mitigation for operation of the Proposed Development, as relevant to the water resources, flood risk and drainage assessment, is the provision of attenuation features and water quality measures. The drainage strategy has been developed to meet the requirements of *Wiltshire Council's Core Strategy*, through managing and reducing flood risk for new developments. The consented drainage strategy will result in the creation of below ground crates to attenuate surface water runoff before pumping it to a rainwater lagoon to attenuate the clean runoff and discharge at greenfield rates to the highways ditch that is assumed to have a discharge to a nearby lake within the Cotswold Waterpark. The strategy plans to incorporate a full retention petrol interceptor to remove potential petrochemicals. Contaminated runoff is to be collected and pumped to holding tanks within a containment bund for reuse.
- 6.141 Channel drains and underground pipes are to be used to intercept and convey runoff across the site. The surface water will be conveyed to a lagoon in the southeastern part of the site, at the lowest elevation.
- 6.142 Potential effects from the Operation of the Site are shown in Table 6-9 below. These relate to operational site activities which include operation and regular maintenance. The following impacts could be experienced:
- Spills of fuels or other polluting substances; and
 - Increase in impermeable surface cover creating higher volume of surface water runoff.
 - Leaks from the AD plant

Table 6-9
Potential Impacts during Operation

Receptor	Nature of Potential Impact	Sensitivity of receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
Flood Risk	Increase in impermeable surface cover creating higher volume of surface water runoff	Low	Low	Minor Any impact would be secondary (from watercourses and waterbodies) and temporary (short term)	The SWDS for the Proposed Development will be designed to accommodate increased surface water runoff. Construction of proposed development involves the construction of a surface water drainage strategy that will be designed to accommodate increased surface water runoff so that there is no effect on downstream flood risk.
Watercourses	Spills of fuels or other polluting substances	Medium	Low	Minor Any impact would be direct and temporary (short term)	Drainage design for the site will include full retention petrol interceptors which will reduce the magnitude of potential impact to low. Operation and Maintenance procedures will be documented and will include procedures for control of waste/fuel and operational procedures for managing spills or pollution incidents.

Receptor	Nature of Potential Impact	Sensitivity of receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
Superficial Groundwater	Spills of fuels or other polluting substances	Medium	Low	Minor Any impact would be secondary (through infiltration) and temporary (short term)	The drainage system will provide a level of water quality treatment and contaminated water will be separated for storage in holding tanks that is surrounded by containment bunds. No formally drained areas will discharge to infiltration which will reduce the magnitude of potential impact. The limited extent of the superficial deposits will also reduce the magnitude of impact.
Cotswold Waterpark SSSI	Spills of fuels or other polluting substances	Medium	Low	Minor Any impact would be direct and temporary (short term)	The SWDS will provide a level of water quality treatment and allow containment of any spill. Drainage design will include full retention petrol interceptors which will reduce the magnitude of potential impact.

Receptor	Nature of Potential Impact	Sensitivity of receptor	Magnitude of Potential Impact	Evaluation of Significance	Comment
					The small extent of the superficial deposits and the low permeability of the bedrock geology means that groundwater flow rates will be low which reduces the magnitude of any potential impact to low. Operation and Maintenance procedures will be documented and will include procedures for control of waste/fuel and operational procedures for managing spills or pollution incidents.
Watercourses	Leakages from AD plant	Medium	Low	Minor Any impact would be direct and temporary (short term)	The AD plant will be constructed on a concrete pad and will include double bunding and leak detection systems to ensure that any leaks are collected and mitigated and there is no discharge to drainage ditches and therefore watercourses
Superficial Groundwater	Leakages from AD plant	High	Low	Minor Any impact would be direct and temporary (short term)	The AD plant is to be constructed on areas of the site where superficial sands and gravels are absent. The AD plant will be constructed on a concrete pad and will include double bunding and leak detection systems to ensure that any leaks are collected and mitigated

Potential impacts during operation (Year 15 permanent)

6.143 At Year 15 the following permanent impacts could be experienced:

- Spills of fuels or other polluting substances; and
- Increase in impermeable surface cover creating higher volume of surface water runoff.
- Leaks from the AD plant.

6.144 Potential effects from the Operation of the Site (Year 15 Permanent) are the same as the potential effects from the Operation of the Site (Year 0 Permanent) as shown in Table 6-9 above. These relate to operational site activities which include operation and regular maintenance.

Additional Mitigation

6.145 Embedded or inherent mitigation measures to protect the water environment have been incorporated into the design of the Proposed Development and well as into the construction methods. Such measures will prevent or reduce potential impacts during both construction and once the Proposed Development is operational.

6.146 Where prevention and reduction measures have not been possible, additional mitigation measures will be utilised to offset potential significant effects identified for the construction and operation phases. These measures are included below.

Design Requirements

6.147 Where the design process has not managed to avoid potential impacts, additional precautionary mitigation measures have been identified, preventing any significant effects occurring. These measures are included below for the potential significant effects identified for the Proposed Development.

Construction

6.148 To limit potential impacts of hardcore and excavated material entering drainage channels or sediment levels increasing within surface water runoff, the contractors that will be engaged for the construction of the project will be required to adhere to a CEMP during construction activities. The CEMP will be developed to control the risk of pollution and sediment and will be agreed with the planning authority prior to the start of the site works. Measures incorporated within the CEMP include requirements for storage of excavated soil away from any identified watercourse or drainage channel. Measures will also include the routine working and emergency procedures for the control and mitigation of erosion and dust generation during excavations and soil handling.

6.149 Construction activities have the potential to generate turbid runoff. Measures described in the CIRIA guidance will be formalised within the CEMP and the contractors will be required to comply

with this document. Management of surface water runoff will be required during the construction phase and will be part of a construction phase site drainage plan. The potential for turbid runoff to enter watercourses downstream would be localised and short term only. Runoff will be actively managed to control silt and potential pollution inputs.

- 6.150 Where areas of the Proposed Development will require a piling solution to support foundations, a Piling Risk Assessment will be secured through planning condition. The risk assessment will ensure that any risk contamination to the Secondary A aquifer is controlled.
- 6.151 Any underground routing of electric cable will be within small trenches. Where possible, trenches will be dug during dry weather conditions to prevent runoff. The cables will be placed within an appropriate subbase and soils will be replaced as quickly as possible to avoid trenches becoming drainage pathways. Clay or other appropriate soils will be used as an impermeable barrier at intervals along each trench to ensure the excavations do not become preferential flow paths and thus change drainage regimes.
- 6.152 Throughout the construction phase, good working practices will be adopted and measures to protect the water environment will be incorporated in accordance with those set out within CIRIA guidance. Adherence to this best practice will ensure minimal risk to receiving environments from development of the site and general construction activities.

Table 6-10
Summary of Effects

Receptor	Nature of Potential Impact	Potential Effect	Proposed Mitigation	Residual Effect	Significance
Construction Phase					
Watercourses		Minor Adverse	Good Construction Practice	Minor Adverse	Not Significant
Shallow Groundwater in Superficial Deposits		Minor Adverse	Good Construction Practice	Negligible	Not Significant
Licensed Abstractions		Minor Adverse	Good Construction Practice	Minor Adverse	Not Significant

Receptor	Nature of Potential Impact	Potential Effect	Proposed Mitigation	Residual Effect	Significance
Cotswold Waterpark SSSI	Spills of fuels, oils or other polluting substances	Minor Adverse	Good Construction Practice	Minor Adverse	Not Significant
Flood Risk	Increased Volume of surface water runoff	Minor Adverse	SWDS, Good Construction Practice	Minor Adverse	Not significant
Watercourses	Generation of Turbid Runoff	Minor Adverse	Good Construction Practice	Minor Adverse	Not significant
Shallow Groundwater	Lowering of Groundwater Table	Minor Adverse	Good Construction Practice, Piling Risk Assessment	Negligible	Not Significant
Licensed Abstractions	Opening up of Pollution Pathways	Minor Adverse	Good Construction Practice	Negligible	Not Significant
Watercourses	Discharge of groundwater from dewatering with elevated suspended sediments	Minor Adverse	Good Construction Practice	Minor Adverse	Not Significant
Cotswold Waterpark SSSI	Dewatering could lead to lowering of local groundwater table	Minor Adverse	Good Construction Practices	Minor Adverse	Not Significant

Receptor	Nature of Potential Impact	Potential Effect	Proposed Mitigation	Residual Effect	Significance
Surface Water	turbid water entering adjacent local and downstream watercourses	Minor Adverse	Good Construction Practices	Minor Adverse	Not significant
Operational Phase					
Watercourses	Spills of fuels or other polluting substances	Minor Adverse	Surface Water Drainage Strategy, Operation and Maintenance Procedures	Minor Adverse	Not Significant
Shallow Groundwater		Minor Adverse	SWDS, Operation and Maintenance Procedures, Good construction practice	Minor Adverse	Not Significant
Cotswold Waterpark SSSI		Minor Adverse	SWDS, Operation and Maintenance Procedures, Good construction practice	Minor Adverse	Not significant
Flood Risk	Increased volume of surface water runoff	Minor Adverse	SWDS	Minor Adverse	Not Significant

Residual Effects on Surface Water

- 6.153 Measures for management of surface water are detailed in the FRA and SWDS Report and for the Proposed Development, the Site will have two separate drainage schemes, one that drains to drainage channels, pipes, and chambers to convey contaminated water to holding tanks and a separate scheme for clean runoff. Clean runoff will drain to channel drains and underground pipes to convey water to a rainwater lagoon. The presence of this lagoon feature means that surface water can be discharged at greenfield rates for all design conditions to the Highways Ditch. The inclusion of an onsite full retention petrol interceptor will serve to improve water quality prior to runoff reaching the ditch. The magnitude of change to surface water runoff is predicted to be **Minor** and is not considered to be significant in terms of the EIA regulations.
- 6.154 As with any construction project there will be the potential for accidental spillages of pollutants used on the Proposed Development. Impervious storage bunds are likely to prevent leakage of potential contaminants to nearby surface water features. In the unlikely event of an emergency pollution incident, emergency response procedures for response to this event will be included and secured through the CEMP. These measures will be in place to reduce the potential of these occurrences and to respond to such occurrences. Therefore, the predicted effects resulting from spillages are assessed to be **Minor** and are not considered to be significant and will be temporary in nature.
- 6.155 With the application of appropriate design and mitigation measures, it is assessed that there will be no significant residual effects on surface water.

Residual Effects on Groundwater

- 6.156 Measures preventing effects to surface water will significantly reduce potential for groundwater effects from spillages and leaks. Therefore, the predicted effects on all groundwater resulting from spillages are assessed to be **Negligible** and are not considered to be significant in terms of the EIA regulations and will be temporary in nature.
- 6.157 The design of foundations and any piling solutions will be in line with EA guidance contained within the document Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (2001). This document considers that migration of concrete would only occur in highly fractured and fast flowing groundwater environments which are considered unlikely to be encountered on site.
- 6.158 In addition, the potential for migration of concrete in such groundwater conditions would only occur for a short duration until it begins to set. Given the depth of groundwater in the Principal Aquifer, such conditions will not be encountered on this Proposed Development and therefore there are no anticipated effects from concrete in groundwater. The residual risk to bedrock groundwater is assessed to be **Negligible** from excavation and foundation works.
- 6.159 Any dewatering of shallow groundwater during excavations would be temporary and short term while works are completed, and the foundations and lower levels constructed. The low permeability of the superficial deposits means that groundwater flow rates are not anticipated to

be significant. The residual risk to shallow groundwater from dewatering is assessed to be **Negligible** from the excavation works.

- 6.160 Accordingly, with the application of appropriate design and mitigation measures, it is assessed that there will be no significant residual effects on groundwater.

Residual Effects on Groundwater Abstractions

- 6.161 The design and mitigation measures proposed for management of potential impacts on groundwater quality, relating to prevention of pollution to groundwater are considered to be suitable for protecting the superficial groundwater quality at local licensed abstractions.
- 6.162 All licensed abstractions are remote from the Proposed Development and any impact on water quality would be diffused by the time groundwater reached a point of abstraction. It is therefore assessed that the magnitude of change to licenced abstractions is **Negligible** and is not considered to be significant in terms of the EIA Regulations.

Residual Effects on Environmentally Designated Areas

- 6.163 Cotswold Waterpark SSSI is the only designated feature in continuity and downstream of the Site. The Waterpark consists of an area of approximately 104km² that encompasses 177 lakes. The Proposed Development site is situated within the SSSI and has over 20 lakes within a 2km vicinity. The design and mitigation measures proposed for management of potential impacts on surface water quality are considered to be suitable for protecting Cotswold Waterpark SSSI. The surface water drainage strategy will provide a level of water quality treatment and allow for the containment of spills upstream of the lakes.
- 6.164 It is considered that there will be no significant residual effects on environmentally designated area. The residual effect on both Cotswold Waterpark SSSI is assessed as being **Minor**.

Conclusions

- 6.165 This Hydrological and Hydrogeological Assessment has been prepared in support of the application following best practice guidance. It evaluates the level of effect on the water environment.
- 6.166 The assessment found that, overall, the adverse residual effects of the Proposed Development on the water environment following the implementation of mitigation measures are considered **Negligible** or **Minor** for the construction and operational phases, with the effects generally limited to minor short term changes in surface water runoff, potential for increased sediment leading to local runoff and a higher potential for pollution from spillages of substances.
- 6.167 Taking into consideration the mitigation measures already embedded within or inherent to the design of the project including the incorporation of good practice techniques as defined in the CEMP, the changes to the water environment are not predicted to be significant.

- 6.168 This report concludes that although there is potential for adverse effects for a number of hydrological and hydrogeological receptors, through the appropriate use of a CEMP detailing good construction practices as well as the surface water drainage strategy being constructed as part of the development, there would be a limited effect on the hydrological and hydrogeological receptors within the Site boundary and within the surrounding area.

APPENDIX 01

EnviroInsight Report



Order Details

Date: 17/02/2023
Your ref: EMS_845636_1045147
Our Ref: EMS-845636_1085212

Site Details

Location: 403993 196152
Area: 7.35 ha
Authority: [Wiltshire Council](#)



Summary of findings

p. 2

Aerial image

p. 6

OS MasterMap site plan

p.11

groundsure.com/insightuserguide

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
12	1.1	<u>Historical industrial land uses</u>	0	0	2	2	-
13	1.2	<u>Historical tanks</u>	0	1	0	0	-
13	1.3	<u>Historical energy features</u>	0	0	0	1	-
14	1.4	Historical petrol stations	0	0	0	0	-
14	1.5	Historical garages	0	0	0	0	-
14	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
15	2.1	<u>Historical industrial land uses</u>	0	0	2	2	-
16	2.2	<u>Historical tanks</u>	0	2	0	0	-
16	2.3	<u>Historical energy features</u>	0	0	0	2	-
17	2.4	Historical petrol stations	0	0	0	0	-
17	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
18	3.1	<u>Active or recent landfill</u>	0	1	0	1	-
19	3.2	Historical landfill (BGS records)	0	0	0	0	-
19	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
19	3.4	<u>Historical landfill (EA/NRW records)</u>	0	0	0	1	-
20	3.5	Historical waste sites	0	0	0	0	-
20	3.6	<u>Licensed waste sites</u>	0	0	4	0	-
21	3.7	Waste exemptions	0	0	0	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
22	4.1	<u>Recent industrial land uses</u>	0	0	2	-	-
23	4.2	Current or recent petrol stations	0	0	0	0	-
23	4.3	Electricity cables	0	0	0	0	-
23	4.4	Gas pipelines	0	0	0	0	-
23	4.5	Sites determined as Contaminated Land	0	0	0	0	-



23	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
24	4.7	Regulated explosive sites	0	0	0	0	-
24	4.8	Hazardous substance storage/usage	0	0	0	0	-
24	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
24	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
24	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	0	3	-
25	4.12	Radioactive Substance Authorisations	0	0	0	0	-
25	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	2	-
26	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
26	4.15	Pollutant release to public sewer	0	0	0	0	-
26	4.16	List 1 Dangerous Substances	0	0	0	0	-
26	4.17	<u>List 2 Dangerous Substances</u>	0	0	0	1	-
27	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
27	4.19	Pollution inventory substances	0	0	0	0	-
27	4.20	Pollution inventory waste transfers	0	0	0	0	-
27	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Geology (basic)					
28	5.1	<u>Superficial geology (625k)</u>	Identified (within 500m)				
28	5.2	<u>Bedrock geology (625k)</u>	Identified (within 500m)				
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
29	6.1	<u>Superficial aquifer</u>	Identified (within 500m)				
30	6.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
31	6.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
33	6.4	<u>Groundwater vulnerability- soluble rock risk</u>	Identified (within 0m)				
33	6.5	Groundwater vulnerability- local information	None (within 0m)				
34	6.6	<u>Groundwater abstractions</u>	0	2	0	1	23
40	6.7	Surface water abstractions	0	0	0	0	0
40	6.8	<u>Potable abstractions</u>	0	0	0	0	4
41	6.9	<u>Source Protection Zones</u>	0	0	0	1	-



42	6.10	<u>Source Protection Zones (confined aquifer)</u>	1	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
43	7.1	<u>Water Network (OS MasterMap)</u>	0	0	1	-	-
44	7.2	<u>Surface water features</u>	0	0	1	-	-
44	7.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
44	7.4	<u>WFD Surface water bodies</u>	0	0	0	-	-
45	7.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
46	8.1	Risk of flooding from rivers and the sea	None (within 50m)				
46	8.2	Historical Flood Events	0	0	0	-	-
46	8.3	Flood Defences	0	0	0	-	-
47	8.4	Areas Benefiting from Flood Defences	0	0	0	-	-
47	8.5	Flood Storage Areas	0	0	0	-	-
48	8.6	Flood Zone 2	None (within 50m)				
48	8.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
49	9.1	<u>Surface water flooding</u>	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding					
51	10.1	<u>Groundwater flooding</u>	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
52	11.1	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	3	18
53	11.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
54	11.3	Special Areas of Conservation (SAC)	0	0	0	0	0
54	11.4	Special Protection Areas (SPA)	0	0	0	0	0
54	11.5	National Nature Reserves (NNR)	0	0	0	0	0
54	11.6	<u>Local Nature Reserves (LNR)</u>	0	0	0	0	1
55	11.7	Designated Ancient Woodland	0	0	0	0	0
55	11.8	Biosphere Reserves	0	0	0	0	0
55	11.9	Forest Parks	0	0	0	0	0



55	11.10	Marine Conservation Zones	0	0	0	0	0
55	11.11	Green Belt	0	0	0	0	0
56	11.12	Proposed Ramsar sites	0	0	0	0	0
56	11.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
56	11.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
56	11.15	Nitrate Sensitive Areas	0	0	0	0	0
57	<u>11.16</u>	<u>Nitrate Vulnerable Zones</u>	2	2	0	0	0
58	<u>11.17</u>	<u>SSSI Impact Risk Zones</u>	2	-	-	-	-
60	<u>11.18</u>	<u>SSSI Units</u>	0	0	0	3	18
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
79	12.1	World Heritage Sites	0	0	0	-	-
80	12.2	Area of Outstanding Natural Beauty	0	0	0	-	-
80	12.3	National Parks	0	0	0	-	-
80	12.4	Listed Buildings	0	0	0	-	-
80	12.5	Conservation Areas	0	0	0	-	-
81	<u>12.6</u>	<u>Scheduled Ancient Monuments</u>	0	0	1	-	-
81	12.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
82	<u>13.1</u>	<u>Agricultural Land Classification</u>	Grade 2 (within 250m)				
83	13.2	Open Access Land	0	0	0	-	-
83	13.3	Tree Felling Licences	0	0	0	-	-
83	13.4	Environmental Stewardship Schemes	0	0	0	-	-
84	<u>13.5</u>	<u>Countryside Stewardship Schemes</u>	0	1	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
85	14.1	Priority Habitat Inventory	0	0	0	-	-
85	14.2	Habitat Networks	0	0	0	-	-
85	14.3	Open Mosaic Habitat	0	0	0	-	-
85	14.4	Limestone Pavement Orders	0	0	0	-	-

Recent aerial photograph



Capture Date: 13/09/2019

Site Area: 7.35ha



Recent site history - 2016 aerial photograph



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Capture Date: 20/04/2016

Site Area: 7.35ha



Recent site history - 2013 aerial photograph



Capture Date: 05/09/2013

Site Area: 7.35ha



Recent site history - 2006 aerial photograph



Capture Date: 03/06/2006

Site Area: 7.35ha



Recent site history - 1999 aerial photograph



Capture Date: 15/11/1999

Site Area: 7.35ha



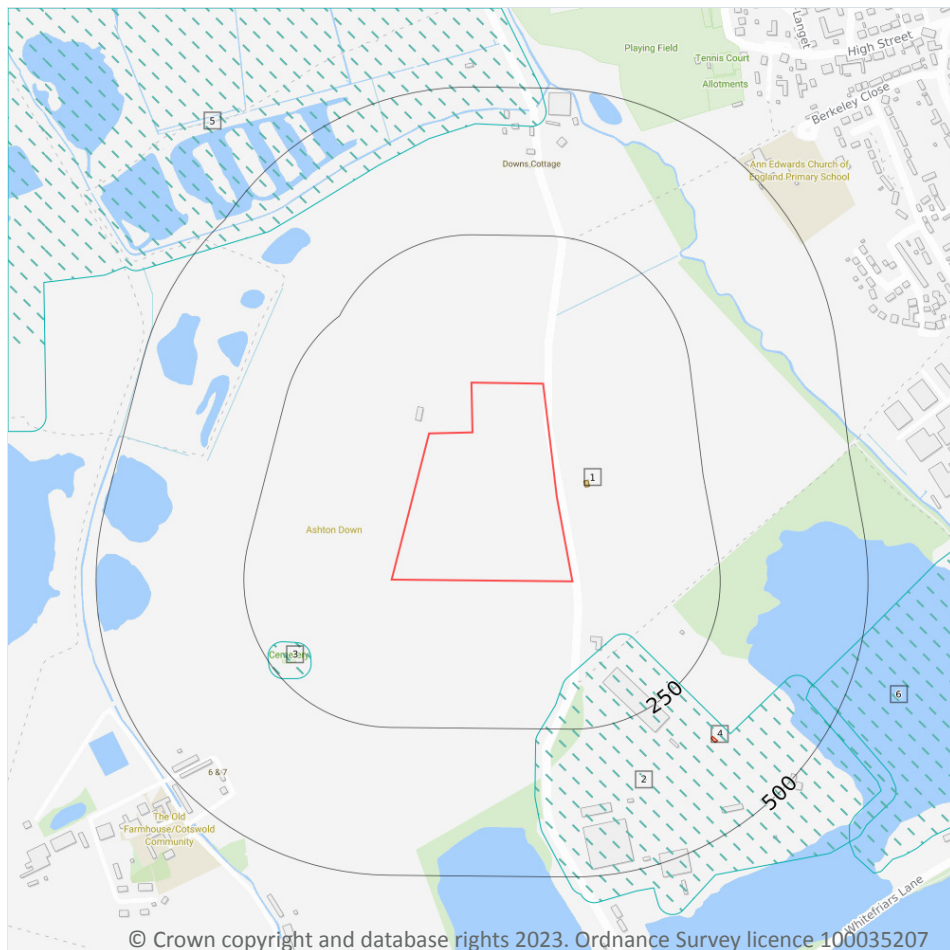
OS MasterMap site plan



Site Area: 7.35ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

1.1 Historical industrial land uses

Records within 500m

4

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
2	117m SE	Unspecified Works	1974	1860249



ID	Location	Land use	Dates present	Group ID
3	184m SW	Burial Ground	1974	1874385
5	395m NW	Sewage Farm	1974	1968956
6	440m SE	Gravel Pit	1974	1871439

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

1

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
1	49m E	Tanks	1990 - 1997	315350

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

1

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
4	353m SE	Electricity Substation	1988 - 1997	199791

This data is sourced from Ordnance Survey / Groundsure.



1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

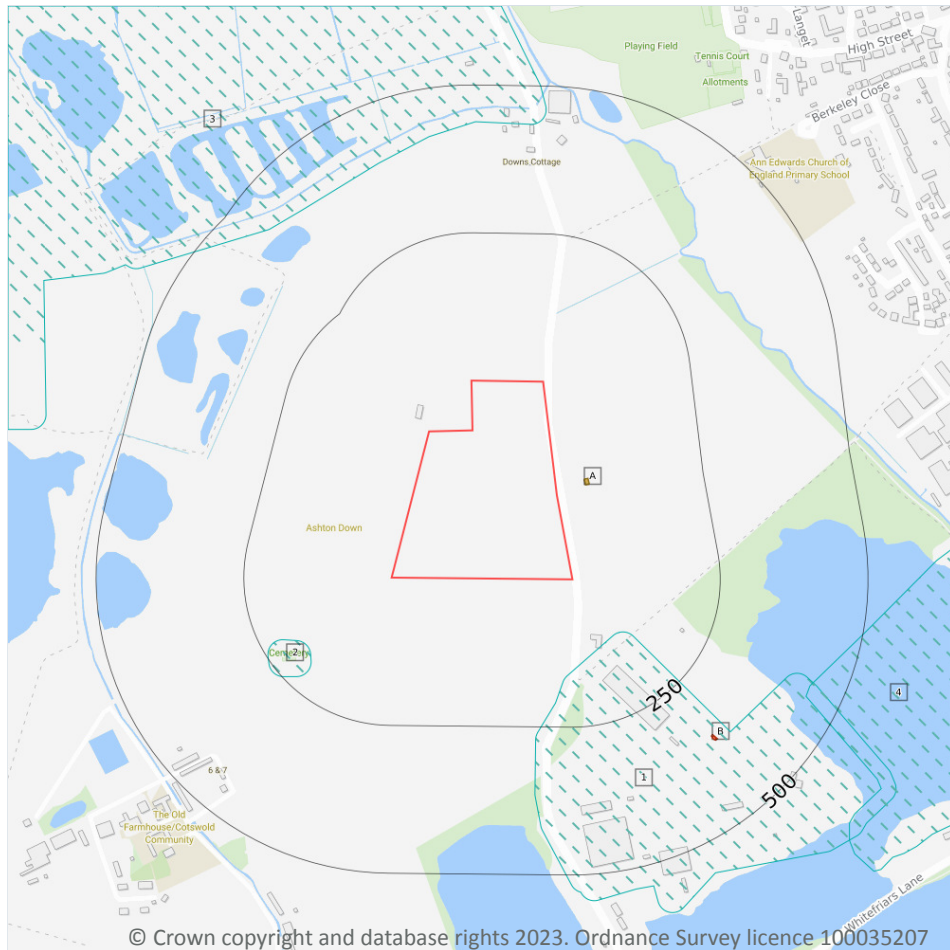
Records within 500m

0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

2.1 Historical industrial land uses

Records within 500m

4

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 15**

ID	Location	Land Use	Date	Group ID
1	117m SE	Unspecified Works	1974	1860249
2	184m SW	Burial Ground	1974	1874385
3	395m NW	Sewage Farm	1974	1968956



ID	Location	Land Use	Date	Group ID
4	440m SE	Gravel Pit	1974	1871439

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	2
----------------------------	----------

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 15**

ID	Location	Land Use	Date	Group ID
A	49m E	Tanks	1990	315350
A	50m E	Tanks	1997	315350

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	2
----------------------------	----------

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 15**

ID	Location	Land Use	Date	Group ID
B	353m SE	Electricity Substation	1997	199791
B	357m SE	Electricity Substation	1988	199791

This data is sourced from Ordnance Survey / Groundsure.



2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m

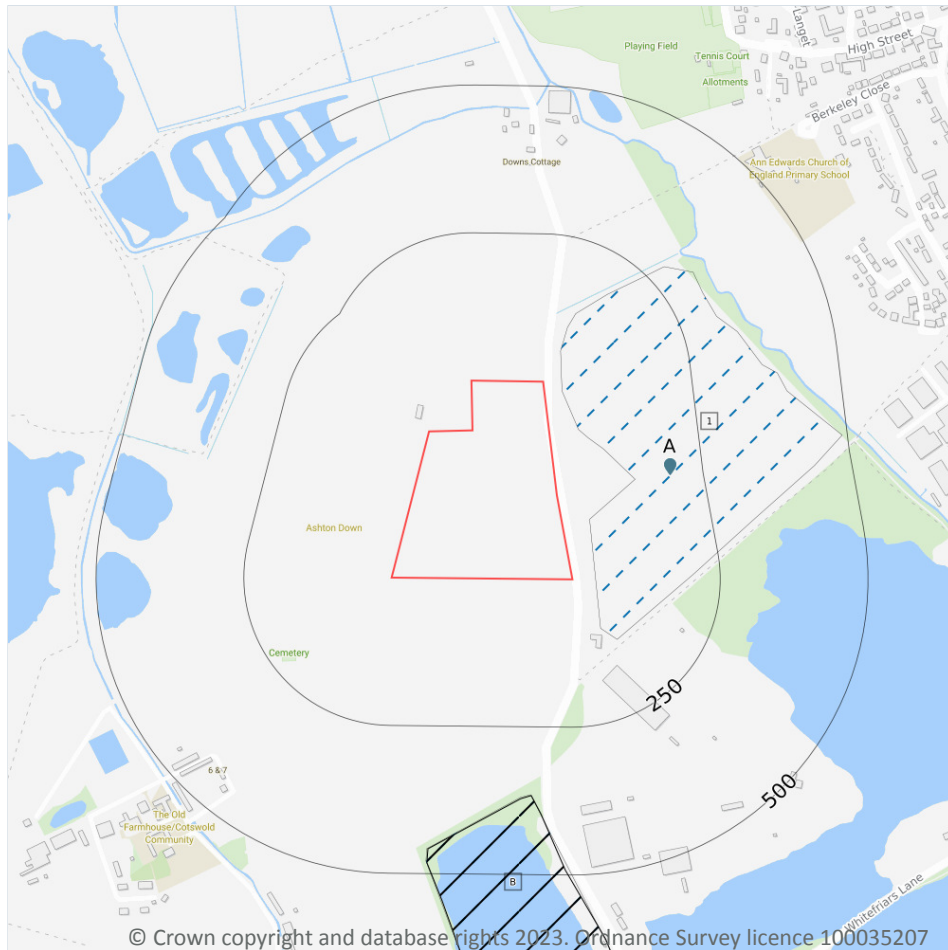
0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Active or recent landfill
- Historical landfill (EA/NRW)
- Licensed waste sites

3.1 Active or recent landfill

Records within 500m

2

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation. Features are displayed on the Waste and landfill map on **page 18**

ID	Location	Details	
1	29m NE	Operator: Hills Waste Solutions Ltd Site Address: Hills Minerals & Waste Ltd, Barnground Landfill, Ashton Keynes, Swindon, Wiltshire, SN6 6QS	WML Number: 86172 EPR Reference: HIL011 Landfill type: A05: Landfill taking Non-Biodegradable Wastes Status: Closure IPPC Reference: - EPR Number: EA/EPR/AP3799ES/V007



ID	Location	Details	
B	364m S	Operator: CAMAS U K Ltd Site Address: CAMAS Building Materials, North End Works, Ashton Keynes, Swindon, Wiltshire, SN6 6QX	WML Number: 86174 EPR Reference: CAM002 Landfill type: A07: Industrial Waste Landfill (Factory curtilage) Status: Closure IPPC Reference: - EPR Number: EA/EPR/RP3099EU/A001

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0
----------------------------	----------

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0
----------------------------	----------

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	1
----------------------------	----------

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 18**

ID	Location	Details		
B	366m S	Site Address: North End Works (Lake 62), Ashton Keynes, Swindon, Wiltshire Licence Holder Address: -	Waste Licence: Yes Site Reference: NW/90/0080/WD, TP0236 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: TF1/L/CAM003 Licence Issue: 29/01/1991 Licence Surrender: 06/02/2002	Operator: Hills Aggregates Limited Licence Holder: Camas Aggregates First Recorded 01/04/1992 Last Recorded: -

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0
----------------------------	----------

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	4
----------------------------	----------

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

Features are displayed on the Waste and landfill map on **page 18**

ID	Location	Details		
A	194m E	Site Name: Barnground Site Address: Hills Minerals & Waste Ltd, Barn Ground, Ashton Keynes, Swindon, Wiltshire, SN6 6QS Correspondence Address: Hills Minerals & Waste Ltd, Ailesbury Court, High Street, Marlborough, Wiltshire, SN8 1AA	Type of Site: Landfill taking Non-Biodegradable Wastes Size: >= 25000 tonnes 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HIL011 EPR reference: - Operator: Hills Minerals & Waste Ltd Waste Management licence No: 86172 Annual Tonnage: 24999	Issue Date: 07/07/1994 Effective Date: - Modified: 27/03/2003 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified



ID	Location	Details		
A	194m E	Site Name: Barnground Landfill Site Address: Hills Minerals & Waste Ltd, Barnground Landfill, Ashton Keynes, Swindon, Wiltshire, SN6 6QS Correspondence Address: -	Type of Site: Landfill taking Non-Biodegradable Wastes Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HIL011 EPR reference: EA/EPR/AP3799ES/V007 Operator: Hills Waste Solutions Limited Waste Management licence No: 86172 Annual Tonnage: 0	Issue Date: 07/07/1994 Effective Date: - Modified: 18/02/2015 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure
A	194m E	Site Name: Barnground Site Address: Hills Minerals & Waste Ltd, Barn Ground, Ashton Keynes, Swindon, Wiltshire, SN6 6QS Correspondence Address: -	Type of Site: Landfill taking Non-Biodegradable Wastes Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HIL011 EPR reference: EA/EPR/AP3799ES/V007 Operator: Hills Minerals & Waste Ltd Waste Management licence No: 86172 Annual Tonnage: 24999	Issue Date: 07/07/1994 Effective Date: - Modified: 27/03/2003 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure
A	194m E	Site Name: Barnground Landfill Site Address: Hills Minerals & Waste Ltd, Barnground Landfill, Ashton Keynes, Swindon, Wiltshire, SN6 6QS Correspondence Address: -	Type of Site: Landfill taking Non-Biodegradable Wastes Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HIL011 EPR reference: EA/EPR/AP3799ES/V007 Operator: Hills Waste Solutions Ltd Waste Management licence No: 86172 Annual Tonnage: 0	Issue Date: 07/07/1994 Effective Date: - Modified: 18/02/2015 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

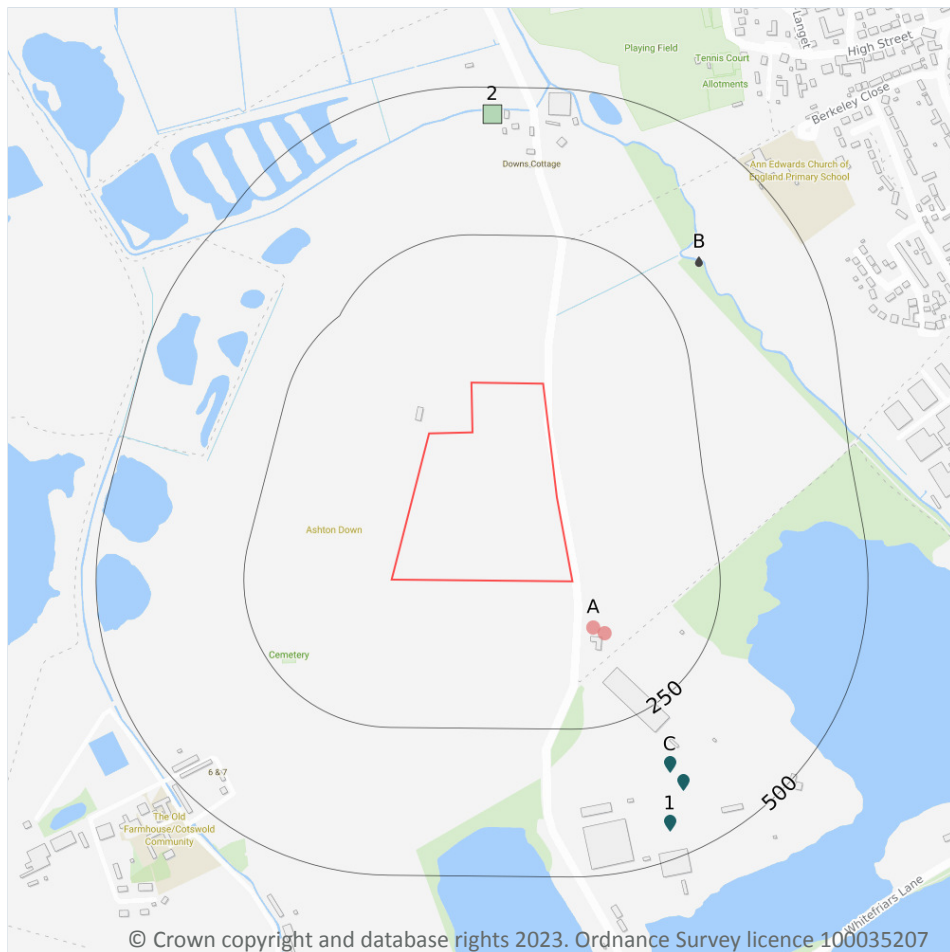
Records within 500m	0
----------------------------	----------

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

This data is sourced from the Environment Agency and Natural Resources Wales.



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- Licensed pollutant release (Part A(2)/B)
- Licensed Discharges to controlled waters
- List 2 Dangerous Substances

4.1 Recent industrial land uses

Records within 250m

2

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 22**

ID	Location	Company	Address	Activity	Category
A	85m SE	Telephone Exchange	Wiltshire, SN6	Telecommunications Features	Infrastructure and Facilities
A	104m SE	Mast (Telecommunication)	Wiltshire, SN6	Telecommunications Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.



4.2 Current or recent petrol stations

Records within 500m

0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m

0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m

0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m

0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m

0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m

0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m

0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m

0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m

0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

3

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 22**

ID	Location	Address	Details	
C	350m SE	Camas North End Wks	Process: Other Mineral Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
C	388m SE	Aggregate Industries, North End, Ashton Keynes, SN6 6QX	Process: Use of Bulk Cement; Di-isocyanate Processes Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
1	441m SE	Tarmac Topmix	Process: Other Mineral Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	0
----------------------------	----------

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	2
----------------------------	----------

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 22**

ID	Location	Address	Details	
B	334m NE	BARN GROUND LANDFILL SITE, ASHTON K, BARN GROUND LANDFILL SITE ASHTO, N KEYNES WILTSHIRE	Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: CAWM.0073 Permit Version: 1 Receiving Water: TO THE CERNEY WICK BROOK	Status: CONSENT REVOKED OR REVISED - NEW CONSENT ISSUED (37(1)) Issue date: 06/12/1999 Effective Date: 11/11/1999 Revocation Date: 02/11/2001
B	334m NE	BARN GROUND LANDFILL SITE, ASHTON K, BARN GROUND LANDFILL SITE ASHTO, N KEYNES WILTSHIRE	Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: CAWM.0397 Permit Version: 1 Receiving Water: CERNEY WICK BROOK	Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 05/11/2001 Effective Date: 05/11/2001 Revocation Date: 17/05/2005



This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0
---------------------	---

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	0
---------------------	---

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0
---------------------	---

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	1
---------------------	---

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

Features are displayed on the Current industrial land use map on **page 22**

ID	Location	Name	Status	Receiving Water	Authorised Substances
2	455m N	Cirencester 'd' Stw	Active	Cerney Wick Brook	Iron

This data is sourced from the Environment Agency and Natural Resources Wales.



4.18 Pollution Incidents (EA/NRW)

Records within 500m

0

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory radioactive waste

Records within 500m

0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



5 Geology (basic)

5.1 Superficial geology (625k)

Records within 500m

2

Generalised geology data based on BGS's published poster maps of the UK (North and South). Superficial related themes digitised from 1977 first edition Quaternary map (North and South).

Location	Lex code	Description	Rock type
On site	RTDU-SAGR	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND AND GRAVEL
18m NE	ALV-CLSS	ALLUVIUM	CLAY, SILT AND SAND

This data is sourced from the British Geological Survey.

5.2 Bedrock geology (625k)

Records within 500m

1

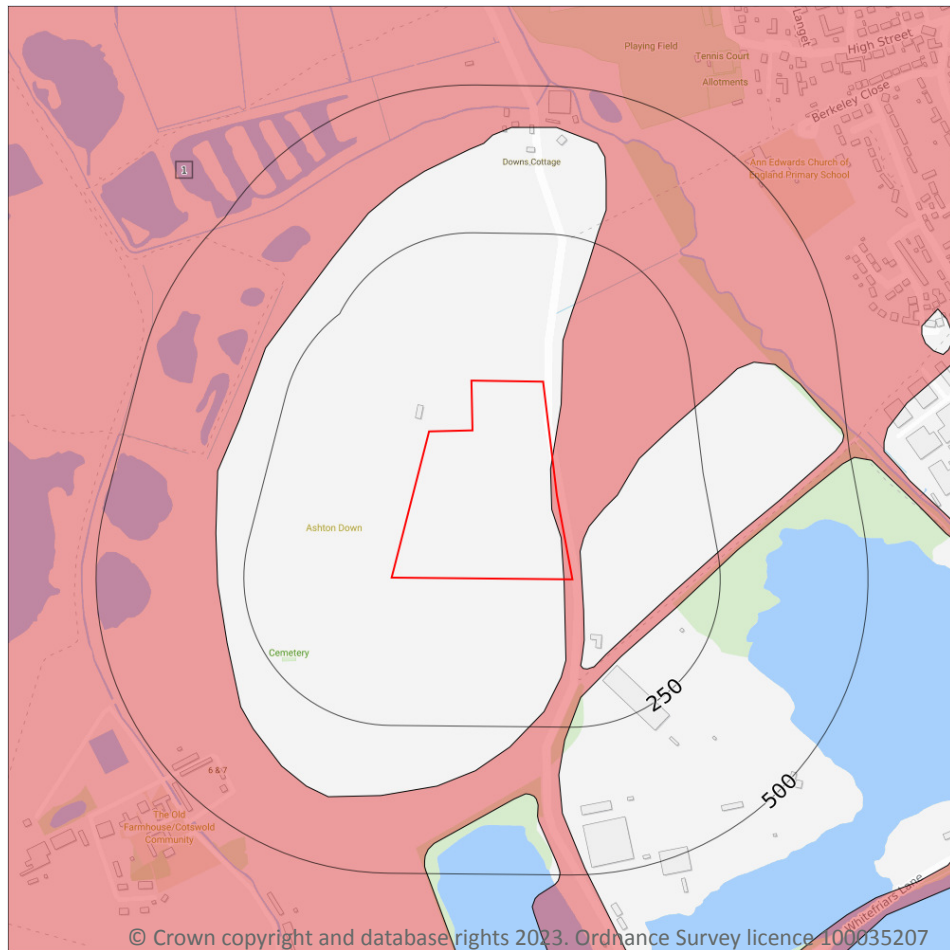
Generalised geology data based on BGS's published poster maps of the UK (North and South). Bedrock related themes created through generalisation of 1:50,000 data.

Location	Lex code	Description	Rock type
On site	KLOX-MDSS	KELLAWAYS FORMATION AND OXFORD CLAY FORMATION (UNDIFFERENTIATED)	MUDSTONE, SILTSTONE AND SANDSTONE

This data is sourced from the British Geological Survey.



6 Hydrogeology - Superficial aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive
 - Unknown

6.1 Superficial aquifer

Records within 500m

1

Aquifer status of groundwater held within superficial geology.

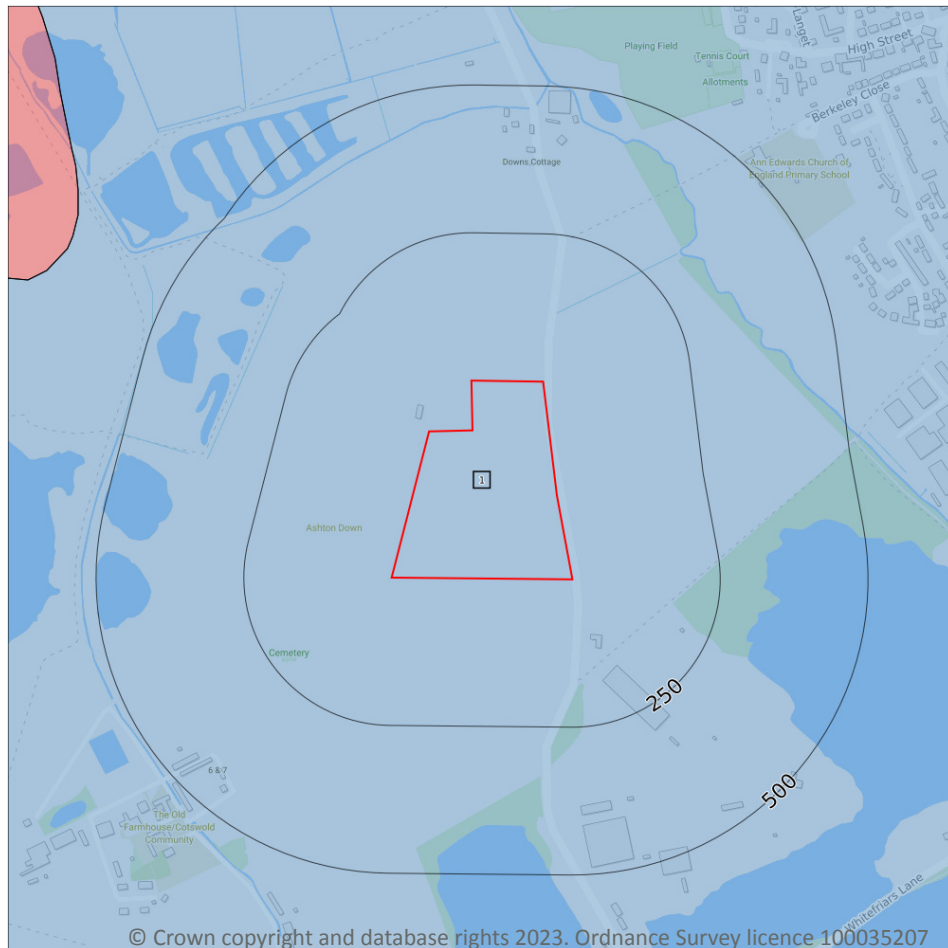
Features are displayed on the Hydrogeology map on **page 29**

ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers 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. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Bedrock aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive

6.2 Bedrock aquifer

Records within 500m

1

Aquifer status of groundwater held within bedrock geology.

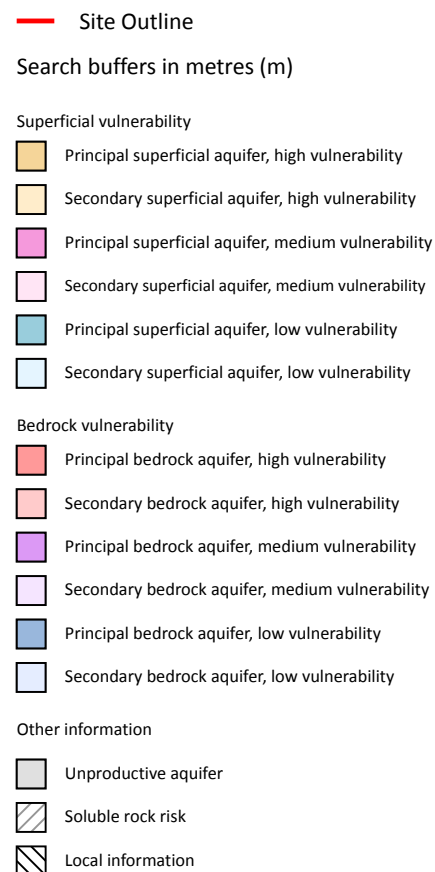
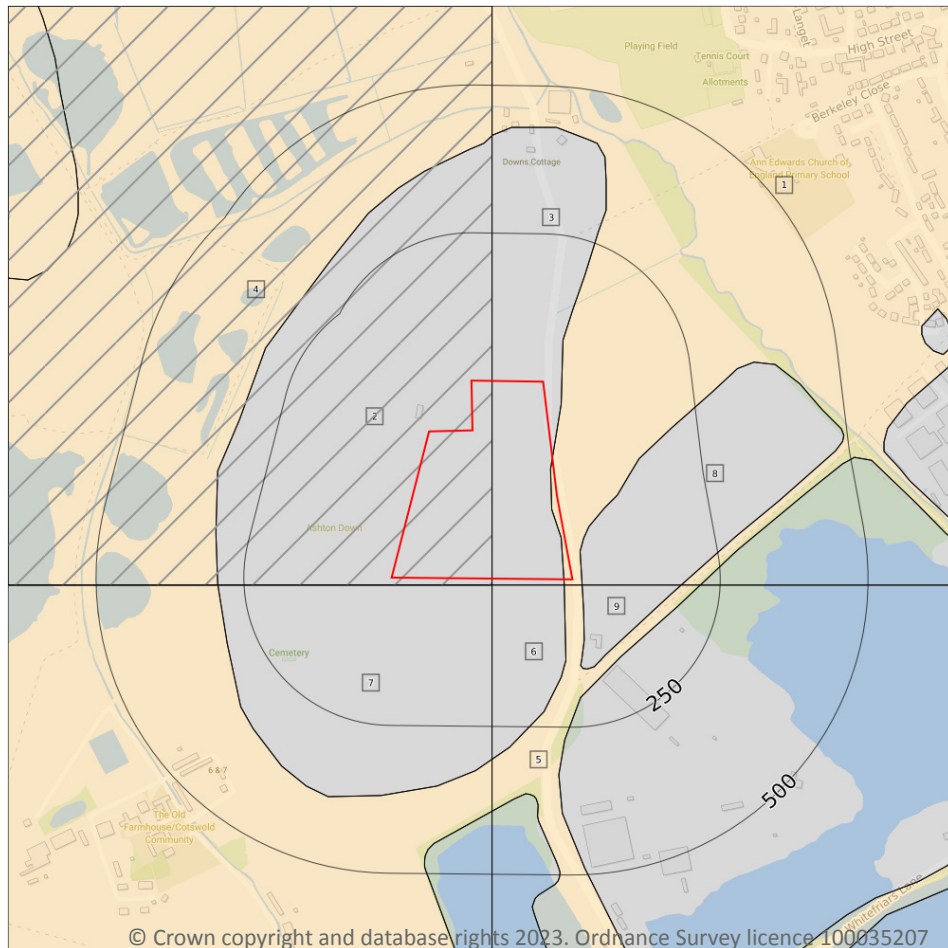
Features are displayed on the Bedrock aquifer map on **page 30**

ID	Location	Designation	Description
1	On site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Groundwater vulnerability



6.3 Groundwater vulnerability

Records within 50m

8

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 31**



ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Unproductive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
2	On site	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: - Aquifer type: - Thickness: 3-10m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
3	On site	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
5	9m SE	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Unproductive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: High Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
6	9m SE	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
7	10m S	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures



ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
8	15m SE	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures
9	19m SE	Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

6.4 Groundwater vulnerability- soluble rock risk

Records on site	1
------------------------	----------

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

ID	Maximum soluble risk category	Percentage of grid square covered by maximum risk
4	Significant soluble rocks are likely to be present. Low possibility of localised subsidence or dissolution-related degradation of bedrock occurring naturally, but may be possible in adverse conditions such as high surface or subsurface water flow.	10.0%

This data is sourced from the British Geological Survey and the Environment Agency.

6.5 Groundwater vulnerability- local information

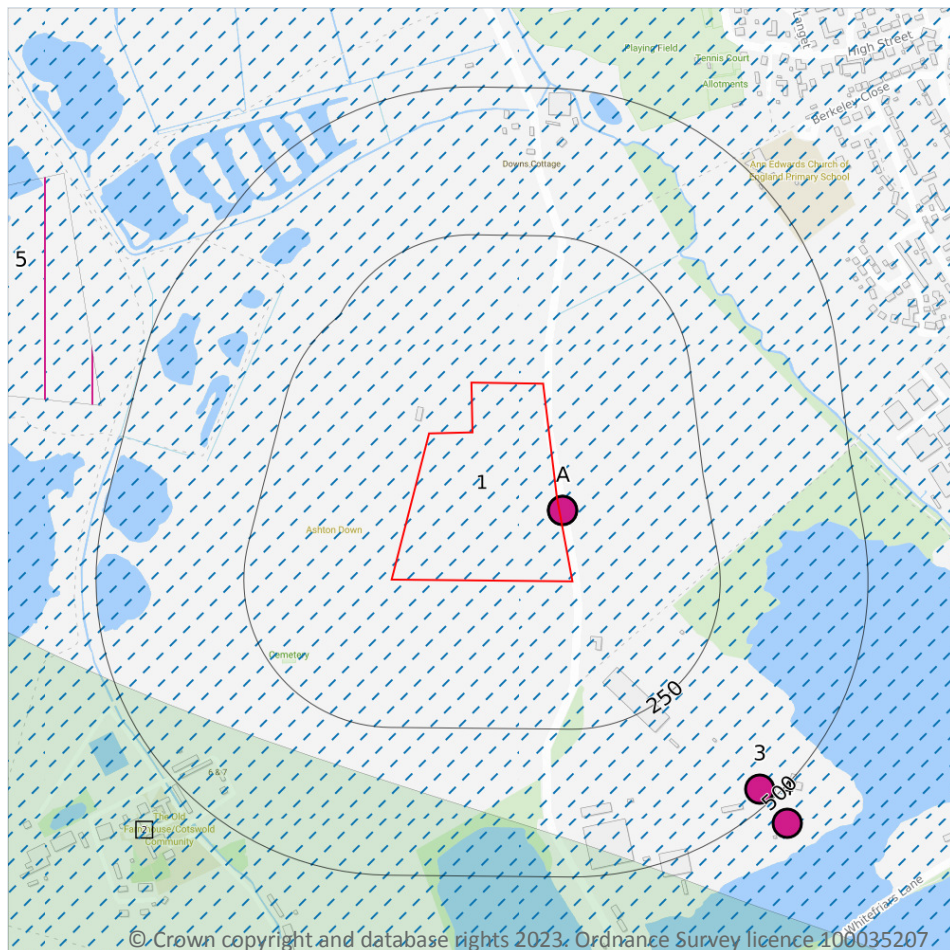
Records on site	0
------------------------	----------

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.



Abstractions and Source Protection Zones



- Site Outline
- Search buffers in metres (m)
- Source Protection Zone 1
Inner catchment
- Source Protection Zone 2
Outer catchment
- Source Protection Zone 3
Total catchment
- Source Protection Zone 4
Zone of Special Interest
- Source Protection Zone 1c
Inner catchment - confined aquifer
- Source Protection Zone 2c
Outer catchment - confined aquifer
- Source Protection Zone 3c
Total catchment - confined aquifer
- Drinking water abstraction licences
Polygon features
- Drinking water abstraction licences
Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

6.6 Groundwater abstractions

Records within 2000m

26

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 34**

ID	Location	Details	
A	6m E	Status: Historical Licence No: 28/39/01/0095 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: SOUTH CERNEY PLANT B/H Data Type: Point Name: TARMAC LIMITED Easting: 404120 Northing: 196130	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 07/06/1995 Expiry Date: 31/05/2005 Issue No: 101 Version Start Date: 20/11/2000 Version End Date: -
A	6m E	Status: Historical Licence No: 28/39/01/0102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: SOUTH CERNEY PLANT B/H Data Type: Point Name: TARMAC LIMITED Easting: 404120 Northing: 196130	Annual Volume (m ³): 27594 Max Daily Volume (m ³): 75.6 Original Application No: - Original Start Date: 25/05/2005 Expiry Date: 31/03/2015 Issue No: 1 Version Start Date: 25/05/2005 Version End Date: -
3	472m SE	Status: Active Licence No: 28/39/01/0081 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: NORTH END FARM, ASHTON KEYNES B/H Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 404453 Northing: 195659	Annual Volume (m ³): 114,545 Max Daily Volume (m ³): 381.80 Original Application No: NPS/WR/13837 Original Start Date: 10/08/1977 Expiry Date: - Issue No: 102 Version Start Date: 31/07/2013 Version End Date: -
4	548m SE	Status: Historical Licence No: 28/39/01/0081 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: NORTH END FARM, ASHTON KEYNES B/H Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 404500 Northing: 195600	Annual Volume (m ³): 114545 Max Daily Volume (m ³): 381.8 Original Application No: - Original Start Date: 10/08/1977 Expiry Date: - Issue No: 101 Version Start Date: 01/01/1998 Version End Date: -



ID	Location	Details	
5	548m W	Status: Active Licence No: TH/039/0001/006 Details: Dewatering Direct Source: THAMES GROUNDWATER Point: UNDERGROUND STRATA OF KEMBLE FOREST AT SHORNCOTE QUARRY Data Type: Poly4 Name: Hills Quarry Products Limited Easting: 403083 Northing: 196658	Annual Volume (m ³): 66,709 Max Daily Volume (m ³): 2,040 Original Application No: NPS/NA/001207 Original Start Date: 05/07/2021 Expiry Date: 31/03/2028 Issue No: 1 Version Start Date: 05/07/2021 Version End Date: -
-	980m NE	Status: Historical Licence No: 28/39/02/0062 Details: Process water Direct Source: THAMES GROUNDWATER Point: SOUTH CERNEY, (POINT B WELL) Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 405000 Northing: 196700	Annual Volume (m ³): 900127 Max Daily Volume (m ³): 3000.42 Original Application No: - Original Start Date: 10/08/1977 Expiry Date: - Issue No: 101 Version Start Date: 01/01/1998 Version End Date: -
-	1035m NE	Status: Historical Licence No: 28/39/02/0062 Details: Dust Suppression Direct Source: THAMES GROUNDWATER Point: GRAVELS AT SOUTH CERNEY, GLOUCESTERSHIRE Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 405030 Northing: 196770	Annual Volume (m ³): 83930 Max Daily Volume (m ³): 282.77 Original Application No: - Original Start Date: 10/08/1977 Expiry Date: - Issue No: 102 Version Start Date: 24/07/2006 Version End Date: -
-	1035m NE	Status: Historical Licence No: 28/39/02/0062 Details: Process Water Direct Source: THAMES GROUNDWATER Point: GRAVELS AT SOUTH CERNEY, GLOUCESTERSHIRE Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 405030 Northing: 196770	Annual Volume (m ³): 83930 Max Daily Volume (m ³): 282.77 Original Application No: - Original Start Date: 10/08/1977 Expiry Date: - Issue No: 102 Version Start Date: 24/07/2006 Version End Date: -
-	1042m SE	Status: Historical Licence No: 28/39/01/0080 Details: Spray Irrigation - Direct Direct Source: THAMES GROUNDWATER Point: CHURCH FARM, ASHTON KEYNES Data Type: Point Name: BOWLEY Easting: 404900 Northing: 195300	Annual Volume (m ³): 7192 Max Daily Volume (m ³): 1017 Original Application No: - Original Start Date: 13/08/1976 Expiry Date: - Issue No: 100 Version Start Date: 02/10/1990 Version End Date: -



ID	Location	Details	
-	1130m NW	Status: Historical Licence No: 28/39/01/0089 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: HILLS MINERAL AND WASTE LIMITED AT SHORNCOTE Data Type: Point Name: HILLS MINERAL & WASTE LTD Easting: 402900 Northing: 196800	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 08/04/1988 Expiry Date: - Issue No: 100 Version Start Date: 01/01/1997 Version End Date: -
-	1142m E	Status: Historical Licence No: 28/39/02/0062 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: SOUTH CERNEY (WET GRAVEL PIT) Data Type: Point Name: AGGREGATE INDUSTRIES UK LTD Easting: 405200 Northing: 196600	Annual Volume (m ³): 900127 Max Daily Volume (m ³): 3000.42 Original Application No: - Original Start Date: 10/08/1977 Expiry Date: - Issue No: 101 Version Start Date: 01/01/1998 Version End Date: -
-	1221m NW	Status: Historical Licence No: 28/39/01/0089 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: HILLS MINERAL & WASTE LTD Easting: 402930 Northing: 197010	Annual Volume (m ³): 600000 Max Daily Volume (m ³): 1818 Original Application No: - Original Start Date: 08/04/1988 Expiry Date: - Issue No: 101 Version Start Date: 07/06/2005 Version End Date: -
-	1221m NW	Status: Historical Licence No: 28/39/01/0089 Details: Process Water Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: HILLS MINERAL & WASTE LTD Easting: 402930 Northing: 197010	Annual Volume (m ³): 600000 Max Daily Volume (m ³): 1818 Original Application No: - Original Start Date: 08/04/1988 Expiry Date: - Issue No: 101 Version Start Date: 07/06/2005 Version End Date: -
-	1224m NW	Status: Active Licence No: 28/39/01/0089 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: Hills Quarry Products Limited Easting: 402931 Northing: 197017	Annual Volume (m ³): 600,000 Max Daily Volume (m ³): 3,636 Original Application No: NPS/WR/018015 Original Start Date: 08/04/1988 Expiry Date: - Issue No: 103 Version Start Date: 19/05/2015 Version End Date: -



ID	Location	Details	
-	1224m NW	Status: Active Licence No: 28/39/01/0089 Details: Process Water Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: Hills Quarry Products Limited Easting: 402931 Northing: 197017	Annual Volume (m ³): 600,000 Max Daily Volume (m ³): 3,636 Original Application No: NPS/WR/018015 Original Start Date: 08/04/1988 Expiry Date: - Issue No: 103 Version Start Date: 19/05/2015 Version End Date: -
-	1245m NW	Status: Historical Licence No: 28/39/01/0089 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: HILLS MINERAL & WASTE LTD Easting: 402900 Northing: 197010	Annual Volume (m ³): 600000 Max Daily Volume (m ³): 1818 Original Application No: - Original Start Date: 08/04/1988 Expiry Date: - Issue No: 101 Version Start Date: 07/06/2005 Version End Date: -
-	1245m NW	Status: Historical Licence No: 28/39/01/0089 Details: Process Water Direct Source: THAMES GROUNDWATER Point: SHORNCOTE QUARRY - GRAVEL PIT Data Type: Point Name: HILLS MINERAL & WASTE LTD Easting: 402900 Northing: 197010	Annual Volume (m ³): 600000 Max Daily Volume (m ³): 1818 Original Application No: - Original Start Date: 08/04/1988 Expiry Date: - Issue No: 101 Version Start Date: 07/06/2005 Version End Date: -
-	1303m W	Status: Historical Licence No: 28/39/01/0096 Details: Mineral Washing Direct Source: THAMES GROUNDWATER Point: LAKE 33, COTSWOLD WATER PARK, SOMERFORD KEYNES Data Type: Point Name: GLOUCESTERSHIRE SAND & GRAV CO Easting: 402560 Northing: 195720	Annual Volume (m ³): 720000 Max Daily Volume (m ³): 2867 Original Application No: - Original Start Date: 05/03/1997 Expiry Date: 31/12/2006 Issue No: 101 Version Start Date: 04/02/2002 Version End Date: -
-	1378m NW	Status: Active Licence No: TH/039/0001/005 Details: Dewatering Direct Source: THAMES GROUNDWATER Point: UNDERGROUND STRATA OF KEMBLE FOREST MARBLE AT DRYLEAZE Data Type: Poly4 Name: Hills Quarry Products Limited Easting: 402705 Northing: 198427	Annual Volume (m ³): 515,662 Max Daily Volume (m ³): 3,216 Original Application No: NPS/NA/001158 Original Start Date: 05/07/2021 Expiry Date: 31/03/2028 Issue No: 1 Version Start Date: 05/07/2021 Version End Date: -



ID	Location	Details	
-	1496m NE	Status: Historical Licence No: 28/39/02/0023 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: BERRY FARM Data Type: Point Name: MRS J L WEBB Easting: 404900 Northing: 197600	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/01/1992 Version End Date: -
-	1879m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH A Data Type: Point Name: Thames Water Utilities Ltd Easting: 404170 Northing: 194130	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1891m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH C Data Type: Point Name: Thames Water Utilities Ltd Easting: 404220 Northing: 194120	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1909m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH D Data Type: Point Name: Thames Water Utilities Ltd Easting: 404120 Northing: 194100	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1929m SE	Status: Historical Licence No: 28/39/01/0062 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: KENT END FARM, ASTON KEYNES, WILTSHIRE Data Type: Point Name: MORETON C CULLIMORE (GRAV) LTD Easting: 405200 Northing: 194400	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 10/04/1967 Expiry Date: - Issue No: 100 Version Start Date: 11/02/1974 Version End Date: -



ID	Location	Details	
-	1929m SE	Status: Historical Licence No: 28/39/01/0079 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: KENT END FARM, ASTON KEYNES, WILTSHIRE Data Type: Point Name: CULLIMORE Easting: 405200 Northing: 194400	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 11/02/1974 Expiry Date: - Issue No: 100 Version Start Date: 11/02/1974 Version End Date: -
-	1970m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH B Data Type: Point Name: Thames Water Utilities Ltd Easting: 404190 Northing: 194040	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

6.7 Surface water abstractions

Records within 2000m	0
-----------------------------	----------

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

6.8 Potable abstractions

Records within 2000m	4
-----------------------------	----------

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 34**

ID	Location	Details	
-	1879m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH A Data Type: Point Name: Thames Water Utilities Ltd Easting: 404170 Northing: 194130	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1891m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH C Data Type: Point Name: Thames Water Utilities Ltd Easting: 404220 Northing: 194120	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1909m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH D Data Type: Point Name: Thames Water Utilities Ltd Easting: 404120 Northing: 194100	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -
-	1970m S	Status: Active Licence No: 28/39/01/0009 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: ASHTON KEYNES PS BH B Data Type: Point Name: Thames Water Utilities Ltd Easting: 404190 Northing: 194040	Annual Volume (m ³): 3,182,270 Max Daily Volume (m ³): 11,593 Original Application No: RG253 Original Start Date: 14/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1988 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

6.9 Source Protection Zones

Records within 500m

1

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination. Features are displayed on the Abstractions and Source Protection Zones map on **page 34**



ID	Location	Type	Description
2	326m SW	3	Total catchment

This data is sourced from the Environment Agency and Natural Resources Wales.

6.10 Source Protection Zones (confined aquifer)

Records within 500m	1
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Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

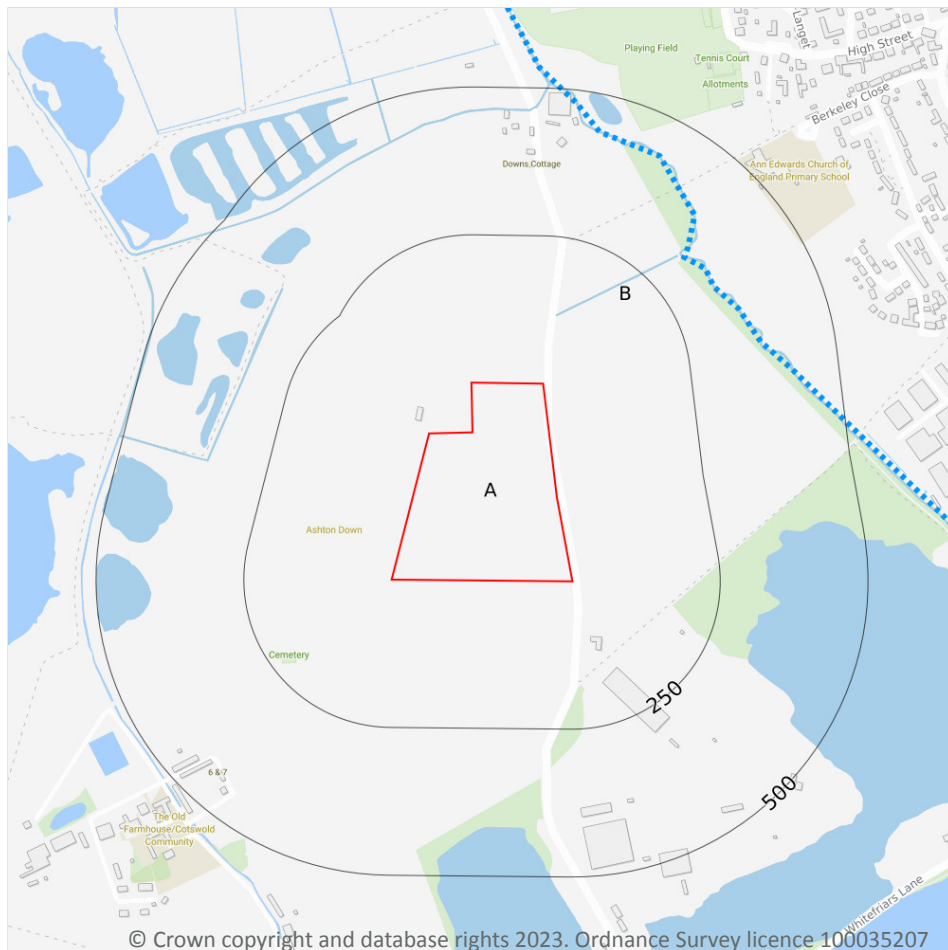
Features are displayed on the Abstractions and Source Protection Zones map on **page 34**

ID	Location	Type	Description
1	On site	2c	Outer catchment within confined aquifer

This data is sourced from the Environment Agency and Natural Resources Wales.



7 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)
- ⋯ WFD River, canal and surface water transfer water bodies
- WFD Lake water bodies
- WFD Transitional and coastal water bodies
- WFD Surface water body catchments boundaries
- WFD Groundwater body boundaries

7.1 Water Network (OS MasterMap)

Records within 250m

1

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 43**

ID	Location	Type of water feature	Ground level	Permanence	Name
B	117m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.



7.2 Surface water features

Records within 250m

1

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 43**

This data is sourced from the Ordnance Survey.

7.3 WFD Surface water body catchments

Records on site

1

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 43**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
A	On site	River	Cerney Wick Brook (source to Thames)	GB106039023800	Thames Upper	Gloucestershire and the Vale

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 WFD Surface water bodies

Records identified

1

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on **page 43**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
4	321m NE	River	Cerney Wick Brook (source to Thames)	GB106039023800	Poor	Fail	Poor	2019



This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 WFD Groundwater bodies

Records on site

1

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 43**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
A	On site	Kemble Forest Marble	<u>GB40602G600500</u>	Poor	Poor	Good	2019

This data is sourced from the Environment Agency and Natural Resources Wales.



8 River and coastal flooding

8.1 Risk of flooding from rivers and the sea

Records within 50m

0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

8.2 Historical Flood Events

Records within 250m

0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.3 Flood Defences

Records within 250m

0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.



8.4 Areas Benefiting from Flood Defences

Records within 250m

0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.5 Flood Storage Areas

Records within 250m

0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.



River and coastal flooding - Flood Zones

8.6 Flood Zone 2

Records within 50m

0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.7 Flood Zone 3

Records within 50m

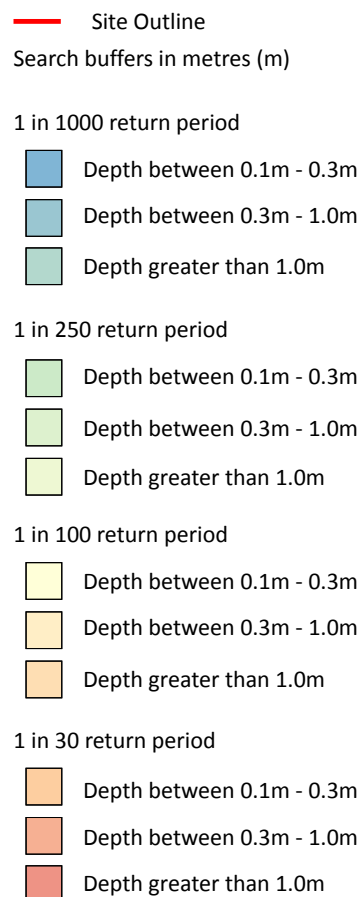
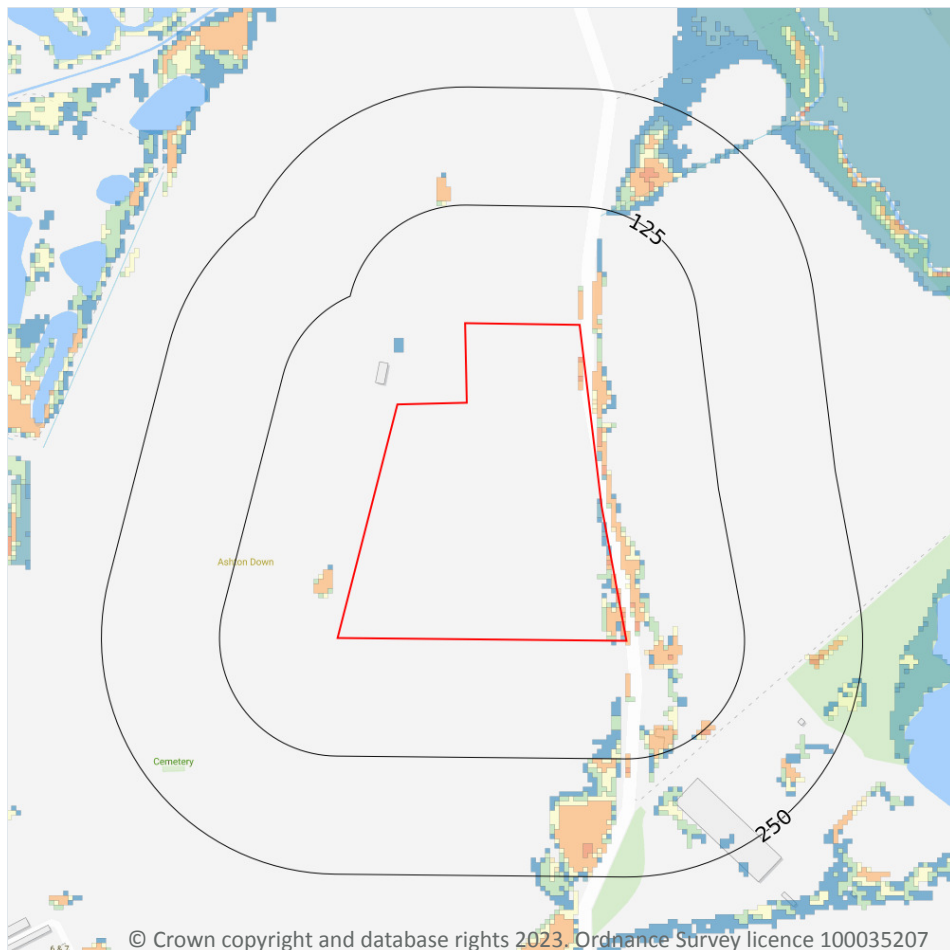
0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.



9 Surface water flooding



9.1 Surface water flooding

Highest risk on site

1 in 30 year, 0.3m - 1.0m

Highest risk within 50m

1 in 30 year, 0.3m - 1.0m

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 49**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

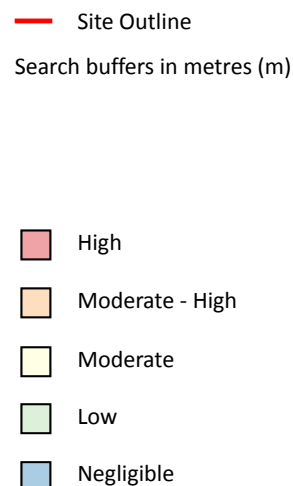
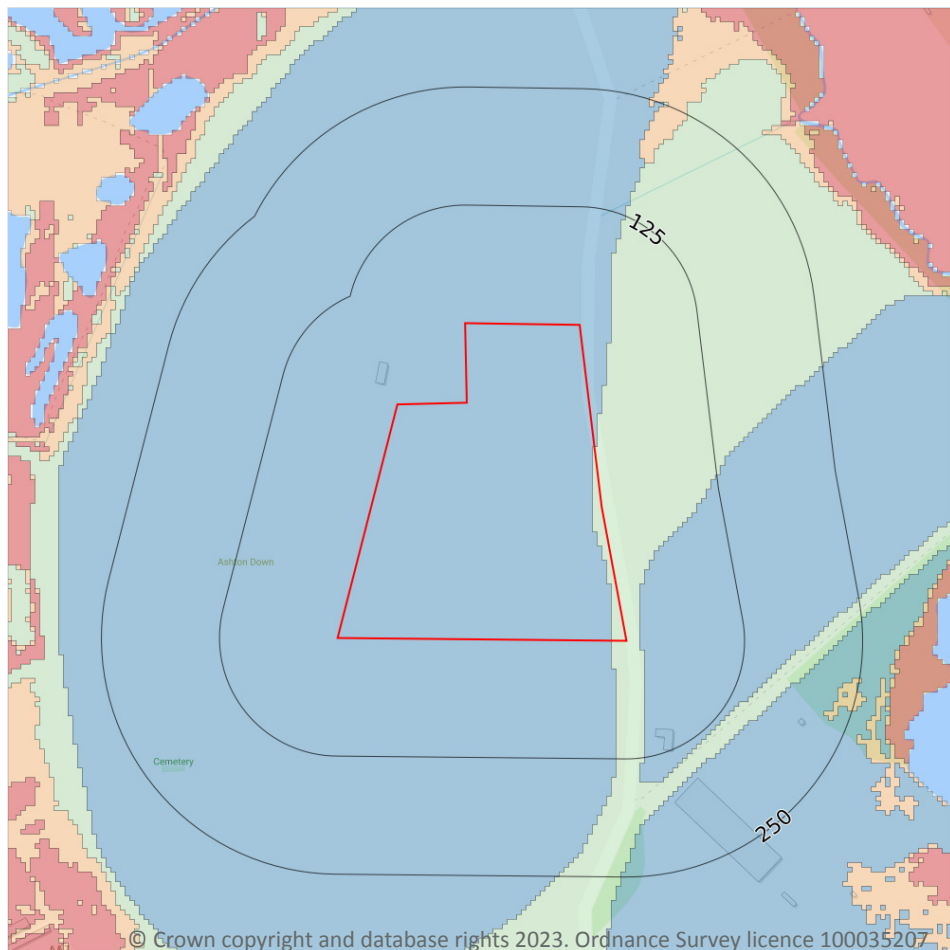
The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.3m and 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.3m and 1.0m

This data is sourced from Ambiantal Risk Analytics.



10 Groundwater flooding



10.1 Groundwater flooding

Highest risk on site

Low

Highest risk within 50m

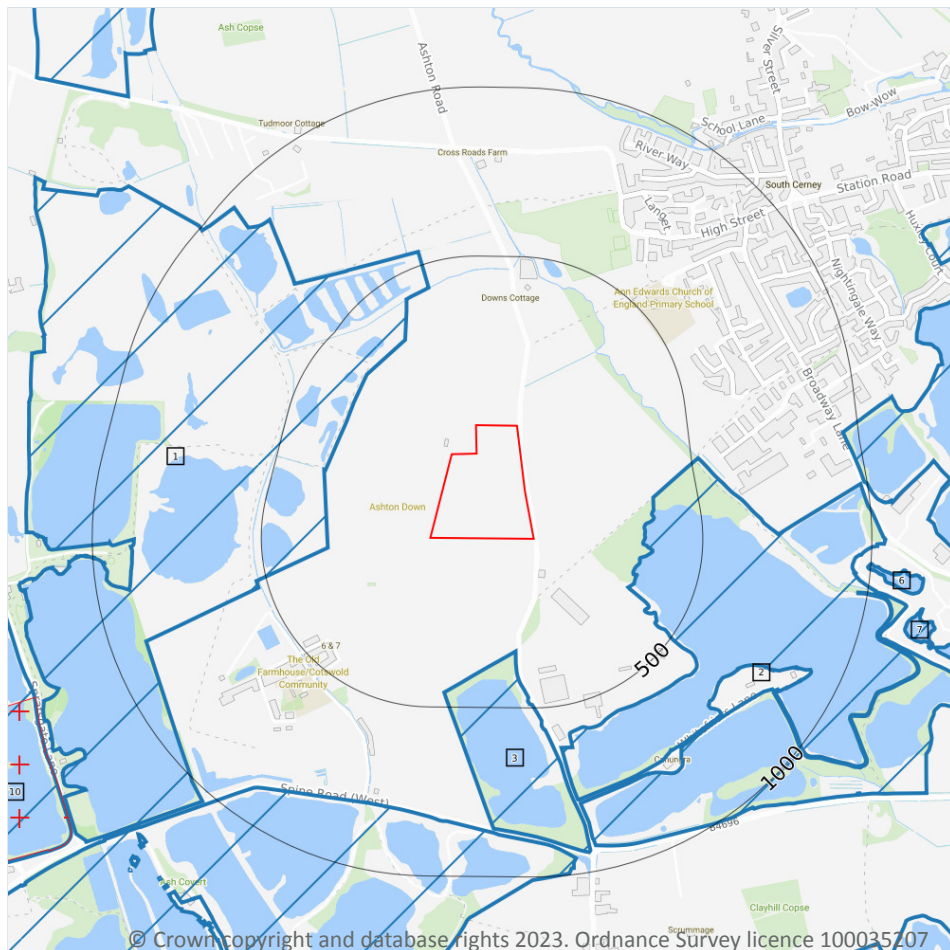
Low

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 51**

This data is sourced from Ambiantal Risk Analytics.

11 Environmental designations



- Site Outline
- Search buffers in metres (m)
- 1 Sites of Special Scientific Interest (SSSI)
- + Local Nature Reserves (LNR)

11.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

21

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on **page 52**

ID	Location	Name	Data source
1	304m W	Cotswold Water Park	Natural England



ID	Location	Name	Data source
2	310m SE	Cotswold Water Park	Natural England
3	333m S	Cotswold Water Park	Natural England
4	805m S	Cotswold Water Park	Natural England
5	954m E	Cotswold Water Park	Natural England
6	992m E	Cotswold Water Park	Natural England
7	1130m E	Cotswold Water Park	Natural England
8	1232m E	Cotswold Water Park	Natural England
9	1259m SW	Cotswold Water Park	Natural England
11	1415m NW	Cotswold Water Park	Natural England
-	1473m E	Cotswold Water Park	Natural England
13	1518m SE	Cotswold Water Park	Natural England
-	1720m NE	Cotswold Water Park	Natural England
-	1792m NE	Cotswold Water Park	Natural England
-	1798m SE	Cotswold Water Park	Natural England
-	1813m SE	Cotswold Water Park	Natural England
-	1873m E	Cotswold Water Park	Natural England
-	1883m NE	Cotswold Water Park	Natural England
-	1913m SE	Cotswold Water Park	Natural England
-	1928m SW	Cotswold Water Park	Natural England
-	1949m E	Cotswold Water Park	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.2 Conserved wetland sites (Ramsar sites)

Records within 2000m

0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.



This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 Special Areas of Conservation (SAC)

Records within 2000m

0

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.4 Special Protection Areas (SPA)

Records within 2000m

0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.5 National Nature Reserves (NNR)

Records within 2000m

0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.6 Local Nature Reserves (LNR)

Records within 2000m

1

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on **page 52**

ID	Location	Name	Data source
10	1260m SW	Coke's Pit Lake	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.



11.7 Designated Ancient Woodland

Records within 2000m

0

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.8 Biosphere Reserves

Records within 2000m

0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.9 Forest Parks

Records within 2000m

0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

11.10 Marine Conservation Zones

Records within 2000m

0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.11 Green Belt

Records within 2000m

0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.



11.12 Proposed Ramsar sites

Records within 2000m

0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

11.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m

0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

11.14 Potential Special Protection Areas (pSPA)

Records within 2000m

0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

11.15 Nitrate Sensitive Areas

Records within 2000m

0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.



11.16 Nitrate Vulnerable Zones

Records within 2000m**4**

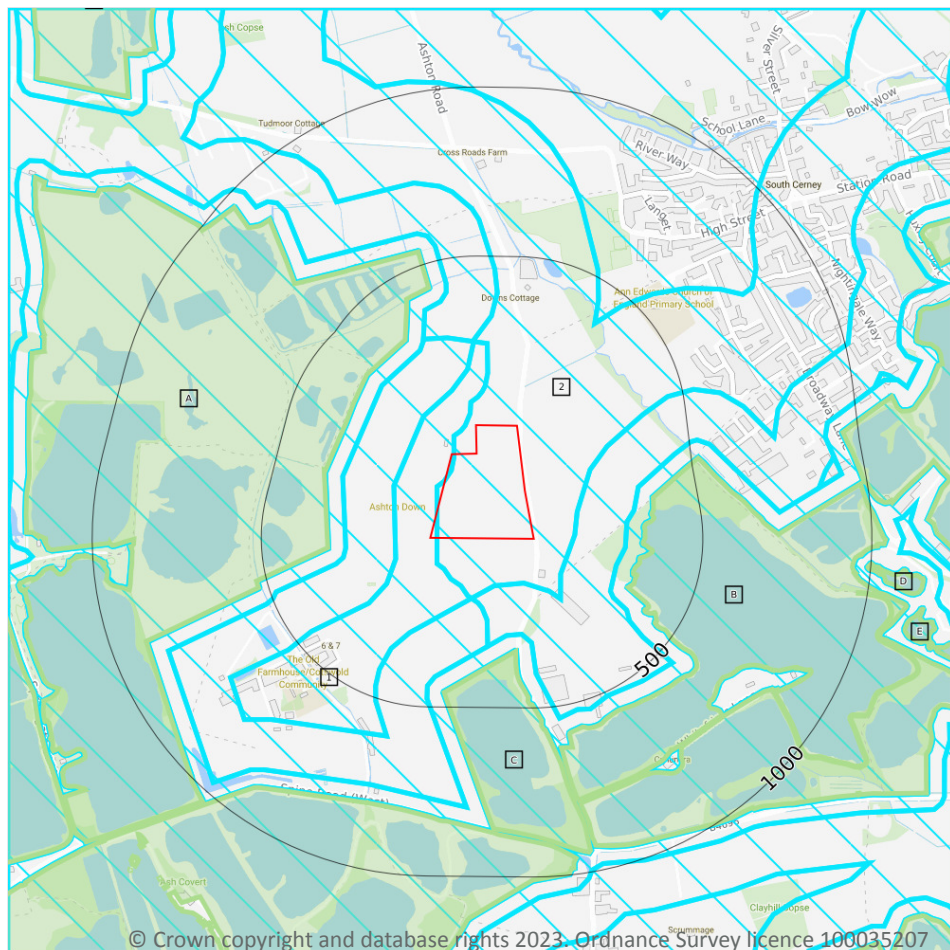
Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status
On site	Thames (Churn to Coln) NVZ	Surface Water	457	Existing
On site	Thames (Churn to Coln) NVZ	Surface Water	457	Existing
28m SE	Thames (Churn to Coln) NVZ	Surface Water	457	Existing
28m SE	Thames (Churn to Coln) NVZ	Surface Water	457	Existing

This data is sourced from Natural England and Natural Resources Wales.



SSSI Impact Zones and Units



- Site Outline
- Search buffers in metres (m)
- SSSI Impact Risk Zones
- SSSI Units
- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

11.17 SSSI Impact Risk Zones

Records on site

2

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 58**

ID	Location	Type of developments requiring consultation
1	On site	All applications - All planning applications (except householder) outside or extending outside existing settlements/urban areas affecting greenspace, farmland, semi natural habitats or landscape features such as trees, hedges, streams, rural buildings/structures. Infrastructure - Pipelines, pylons and overhead cables. any transport proposal including road, rail and by water (excluding routine maintenance). airports, helipads and other aviation proposals. Wind and Solar - Solar schemes with footprint > 0.5ha, all wind turbines. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, review of minerals permissions (romp), extensions, variations to conditions etc. oil & gas exploration/extraction. Rural non-residential - Large non residential developments outside existing settlements/urban areas where net additional gross internal floorspace is > 1,000m² or footprint exceeds 0.2ha. Residential - Residential development of 50 units or more. Rural residential - Any residential developments outside of existing settlements/urban areas with a total net gain in residential units. Air pollution - Any development that could cause air pollution (incl: industrial/commercial processes, livestock & poultry units, slurry lagoons & digestate stores, manure stores). Combustion - All general combustion processes. incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion. Waste - Mechanical and biological waste treatment, inert landfill, non-hazardous landfill, hazardous landfill, household civic amenity recycling facilities construction, demolition and excavation waste, other waste management. Composting - Any composting proposal. incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management. Discharges - Any discharge of water or liquid waste of more than 5m³/day to ground (ie to seep away) or to surface water, such as a beck or stream. Water supply - Large infrastructure such as warehousing / industry where net additional gross internal floorspace is > 1,000m² or any development needing its own water supply . Notes: New residential/tourist accommodation in this area requires an hra and financial contributions towards samm/sang to mitigate increased effects from recreational use of north meadow sac. consult the lpa.



ID	Location	Type of developments requiring consultation
2	On site	All applications - All planning applications (except householder) outside or extending outside existing settlements/urban areas affecting greenspace, farmland, semi natural habitats or landscape features such as trees, hedges, streams, rural buildings/structures. Infrastructure - Pipelines, pylons and overhead cables. any transport proposal including road, rail and by water (excluding routine maintenance). airports, helipads and other aviation proposals. Wind and Solar - Solar schemes with footprint > 0.5ha, all wind turbines. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, review of minerals permissions (romp), extensions, variations to conditions etc. oil & gas exploration/extraction. Rural non-residential - Large non residential developments outside existing settlements/urban areas where net additional gross internal floorspace is > 1,000m² or footprint exceeds 0.2ha. Residential - Residential development of 50 units or more. Rural residential - Any residential developments outside of existing settlements/urban areas with a total net gain in residential units. Air pollution - Any development that could cause air pollution (incl: industrial/commercial processes, livestock & poultry units, slurry lagoons & digestate stores, manure stores). Combustion - All general combustion processes. incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion. Waste - Mechanical and biological waste treatment, inert landfill, non-hazardous landfill, hazardous landfill, household civic amenity recycling facilities construction, demolition and excavation waste, other waste management. Composting - Any composting proposal. incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management. Discharges - Any discharge of water or liquid waste of more than 20m³/day to ground (ie to seep away) or to surface water, such as a beck or stream. Water supply - Large infrastructure such as warehousing / industry where net additional gross internal floorspace is > 1,000m² or any development needing its own water supply . Notes: New residential/tourist accommodation in this area requires an hra and financial contributions towards samm/sang to mitigate increased effects from recreational use of north meadow sac. consult the lpa.

This data is sourced from Natural England.

11.18 SSSI Units

Records within 2000m	21
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Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

Features are displayed on the SSSI Impact Zones and Units map on **page 58**

ID:	A
Location:	304m W
SSSI name:	Cotswold Water Park
Unit name:	Whole Site (Was Units 1 To 10)
Broad habitat:	Standing Open Water And Canals
Condition:	Favourable



Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: B
 Location: 310m SE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: C
 Location: 333m S
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: 9
 Location: 805m S
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: <i>Chara curta</i> , Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitella mucronata</i> , Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitellopsis obtusa</i> , Starry Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Tolypella glomerata</i> , Clustered Stonewort	Favourable	06/10/2020

ID: 12
 Location: 954m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, <i>Egretta garzetta</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, <i>Charadrius dubius</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, <i>Fulica atra</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, <i>Anas strepera</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, <i>Tringa ochropus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, <i>Larus fuscus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, <i>Aythya ferina</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: <i>Chara curta</i> , Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitella mucronata</i> , Pointed Stonewort	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: D
 Location: 992m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020



ID: E
 Location: 1130m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: F
 Location: 1232m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:



Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: 18
 Location: 1259m SW
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: 20
 Location: 1415m NW
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Lesser black-backed gull, <i>Larus fuscus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, <i>Aythya ferina</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: <i>Chara curta</i> , Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitella mucronata</i> , Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitellopsis obtusa</i> , Starry Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Tolypella glomerata</i> , Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1473m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, <i>Egretta garzetta</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, <i>Charadrius dubius</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, <i>Fulica atra</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, <i>Anas strepera</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, <i>Tringa ochropus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, <i>Larus fuscus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, <i>Aythya ferina</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: 23
 Location: 1518m SE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1720m NE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020



ID: -
 Location: 1792m NE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1798m SE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:



Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1813m SE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1873m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Lesser black-backed gull, <i>Larus fuscus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, <i>Aythya ferina</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: <i>Chara curta</i> , Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitella mucronata</i> , Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Nitellopsis obtusa</i> , Starry Stonewort	Favourable	06/10/2020
Charophyte Species: <i>Tolypella glomerata</i> , Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1883m NE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, <i>Egretta garzetta</i>	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, <i>Charadrius dubius</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, <i>Fulica atra</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, <i>Anas strepera</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, <i>Podiceps cristatus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, <i>Tringa ochropus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, <i>Larus fuscus</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, <i>Aythya ferina</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, <i>Aythya fuligula</i>	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1913m SE
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020



Feature name	Feature condition	Date of assessment
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

ID: -
 Location: 1928m SW
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020



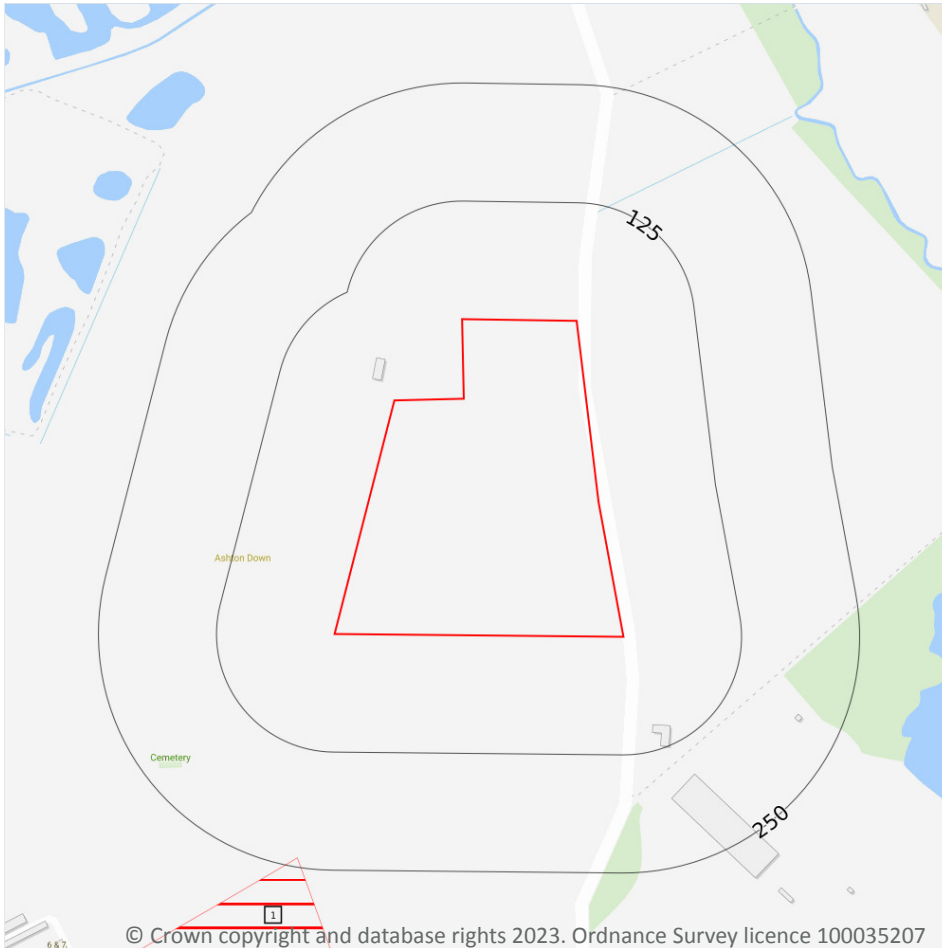
ID: -
 Location: 1949m E
 SSSI name: Cotswold Water Park
 Unit name: Whole Site (Was Units 1 To 10)
 Broad habitat: Standing Open Water And Canals
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
>20,000 Non-breeding waterbirds	Favourable	06/10/2020
Aggregations of breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of breeding birds - Little egret, Egretta garzetta	Favourable	06/10/2020
Aggregations of breeding birds - Little ringed plover, Charadrius dubius	Favourable	06/10/2020
Aggregations of non-breeding birds - Coot, Fulica atra	Favourable	06/10/2020
Aggregations of non-breeding birds - Gadwall, Anas strepera	Favourable	06/10/2020
Aggregations of non-breeding birds - Great crested grebe, Podiceps cristatus	Favourable	06/10/2020
Aggregations of non-breeding birds - Green sandpiper, Tringa ochropus	Favourable	06/10/2020
Aggregations of non-breeding birds - Lesser black-backed gull, Larus fuscus	Favourable	06/10/2020
Aggregations of non-breeding birds - Pochard, Aythya ferina	Favourable	06/10/2020
Aggregations of non-breeding birds - Shoveler, Anas clypeata	Favourable	06/10/2020
Aggregations of non-breeding birds - Tufted duck, Aythya fuligula	Favourable	06/10/2020
Assemblages of breeding birds - Mixed: Lowland open water, Scrub	Favourable	06/10/2020
Charophyte Species: Chara curta, Lesser Bearded Stonewort	Favourable	06/10/2020
Charophyte Species: Nitella mucronata, Pointed Stonewort	Favourable	06/10/2020
Charophyte Species: Nitellopsis obtusa, Starry Stonewort	Favourable	06/10/2020
Charophyte Species: Tolypella glomerata, Clustered Stonewort	Favourable	06/10/2020

This data is sourced from Natural England and Natural Resources Wales.



12 Visual and cultural designations



- Site Outline
- Search buffers in metres (m)
- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

12.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

12.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

12.4 Listed Buildings

Records within 250m

0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.



This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12.6 Scheduled Ancient Monuments

Records within 250m

1

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

Features are displayed on the Visual and cultural designations map on **page 79**

ID	Location	Ancient monument name	Reference number
1	240m SW	Settlement E of Ashtonfield (Cotswold Community)	1004691

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12.7 Registered Parks and Gardens

Records within 250m

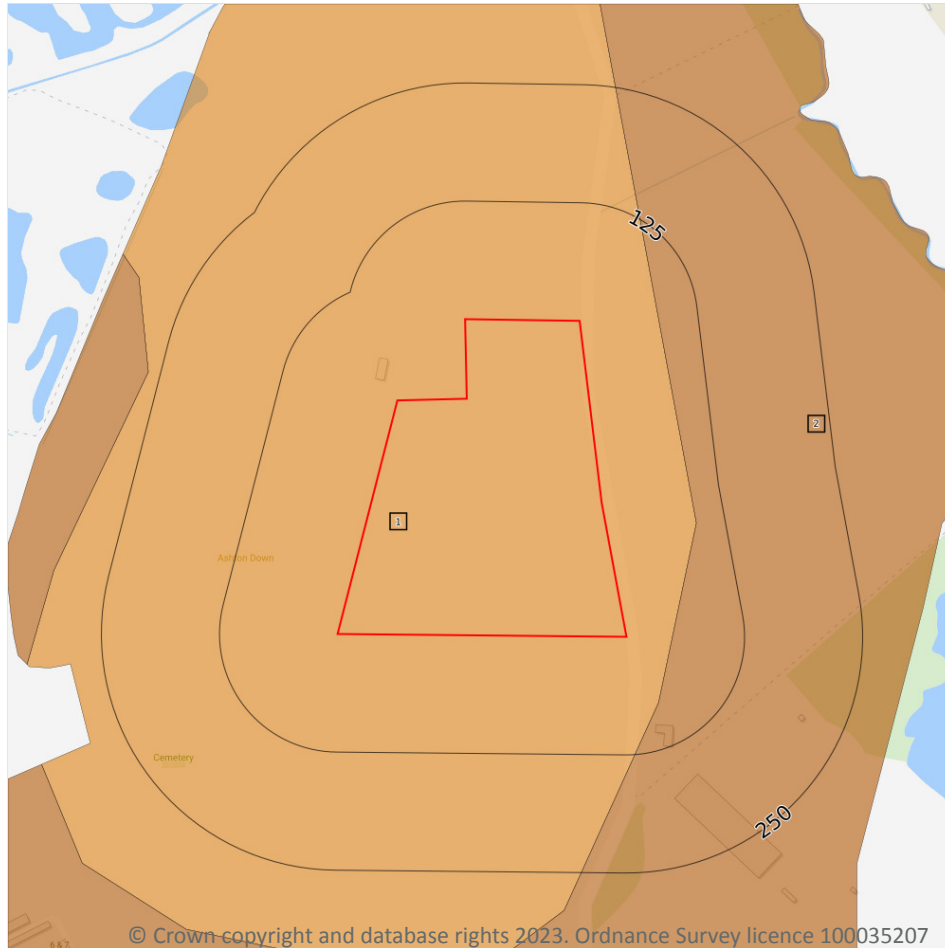
0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.



13 Agricultural designations



- Site Outline
- Search buffers in metres (m)
- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

13.1 Agricultural Land Classification

Records within 250m

2

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 82**

ID	Location	Classification	Description
1	On site	Grade 3	Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.



ID	Location	Classification	Description
2	48m SE	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

This data is sourced from Natural England.

13.2 Open Access Land

Records within 250m

0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

13.3 Tree Felling Licences

Records within 250m

0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

13.4 Environmental Stewardship Schemes

Records within 250m

0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.



13.5 Countryside Stewardship Schemes

Records within 250m**1**

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

Location	Reference	Scheme	Start Date	End Date
6m NE	830165	Countryside Stewardship (Middle Tier)	01/01/2020	31/12/2024

This data is sourced from Natural England.



14 Habitat designations

14.1 Priority Habitat Inventory

Records within 250m	0
---------------------	---

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

14.2 Habitat Networks

Records within 250m	0
---------------------	---

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

14.3 Open Mosaic Habitat

Records within 250m	0
---------------------	---

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

14.4 Limestone Pavement Orders

Records within 250m	0
---------------------	---

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.



Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference>.

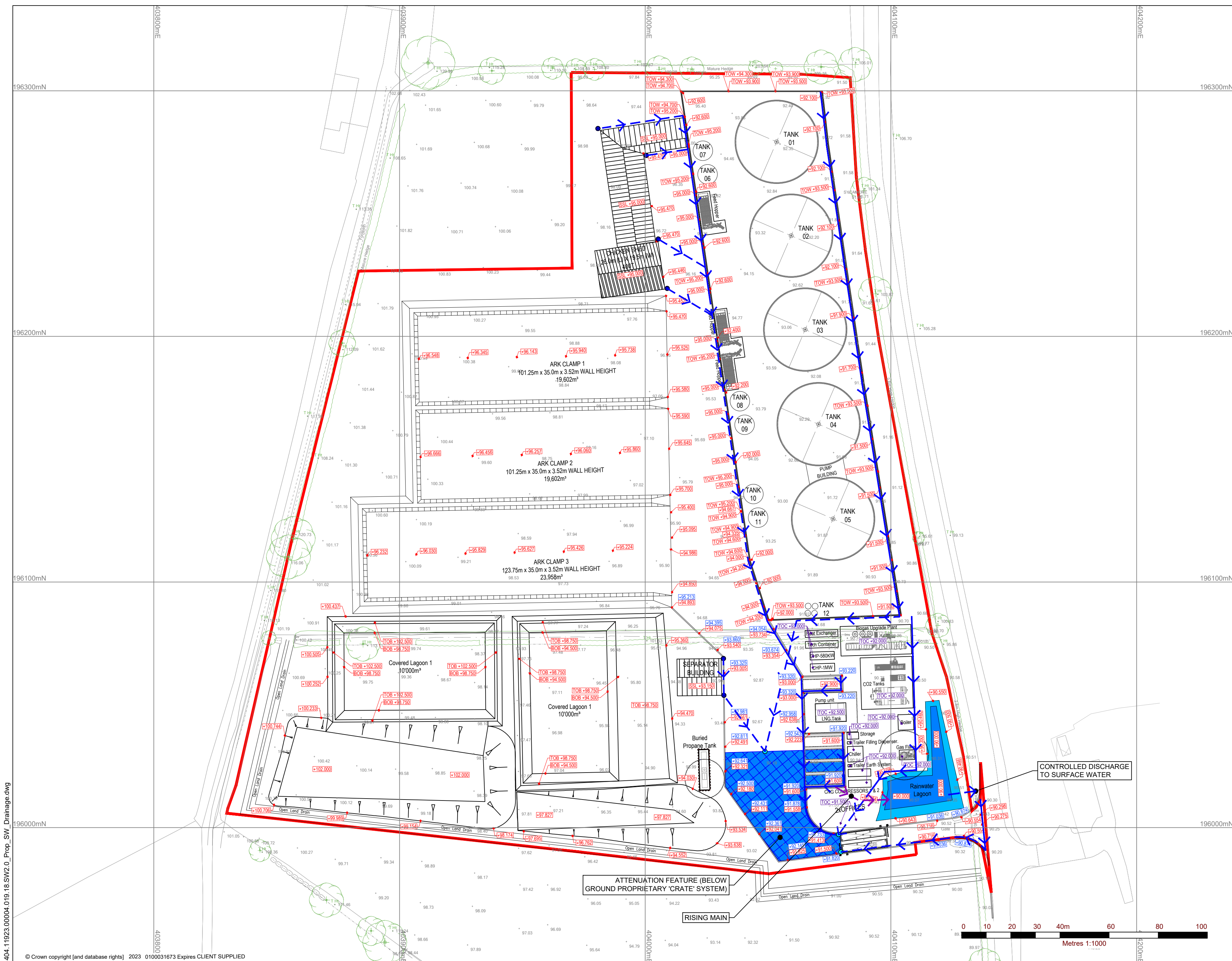
Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: <https://www.groundsure.com/terms-and-conditions-jan-2020/>.



APPENDIX 02

Clean Water Strategy



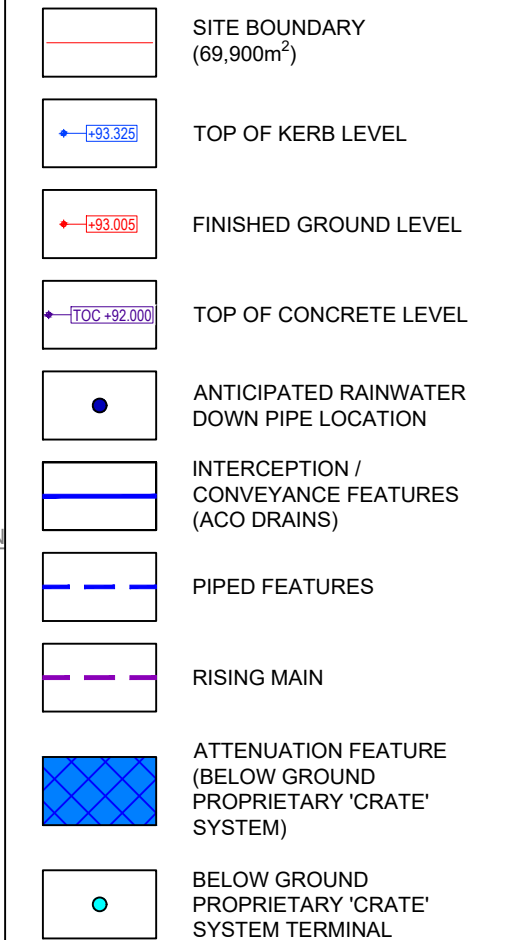
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NOTES

1. DRAWING GENERATED FROM
INFORMATION SUPPLIED BY THE CLIENT,
REF: GGP-29419-P-101-E-Ashton
Keynes-Site Layout (1).DWG, DATED:
OCTOBER 2022.

LEGEND



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ASHTON KEYNES

SURFACE WATER DRAINAGE
STRATEGY

**PROPOSED SURFACE WATER
DRAINAGE STRATEGY PLAN**

SW2

Scale 1:1000 @ A2	Date MARCH 2023
----------------------	--------------------

APPENDIX 03

Contaminated Water Strategy

**ANAEROBIC DIGESTION PLANT DIRTY
WATER USAGE STRATEGY**

FOR

PROPOSED ANAEROBIC DIGESTION PLANT

ON BEHALF OF



Project ref: 29346/DWS/JHC

Date First Issued: 5th July 2022

Issue: 01

Revision Date: N/A

Prepared by: J. Collins
BSc. (Hons), MCIWEM

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CONTENTS

1. Introduction
2. Description of Proposed Site
3. Catchment Areas
4. Design Philosophy
5. Proposed Discharge Rates
6. Clean/Contaminated Bund Runoff
7. Contaminated Silage Clamp Runoff
8. Plant Water Demand Against Annual Average Rainfall

APPENDICES

- I Bund Calculations
- II Silage Clamp 2l/s Calculations
- III Silage Clamp Amended Discharge Rate Calculations

Document Revision Box			
Revision	Date	Description	Author
01	5 th July 2022	Draft	JHC

1.0 Introduction

GGP Consult has been instructed by Acorn Bioenergy Ltd to prepare a dirty water usage strategy drainage impact assessment to establish the storage requirements associated with the operation function of the proposed anaerobic digestion plant.

The calculations will detail how surface water from the site will be managed, in compliance with local policy and an environmental permit.

2.0 Description of Proposed Site

It is typically proposed to develop an anaerobic digestion plant, consisting of 5nr digestate tank, silage clamps, a digestate lagoon, gas equipment, material storage buildings, a pond or similar, offices, parking and additional miscellaneous equipment.

3.0 Catchment Areas

Various areas within the site will be subject to different operation functions, causing some areas being contaminated, some clean, and some with the potential to be contaminated. Therefore, to improve water quality and optimise site efficiency, the site is split into catchments and subject to different drainage philosophies.

4.0 Design Philosophy

As stated within section 3.0, the site has been split into different catchments based on level of contamination. These catchments will be split into different drainage systems.

Two primary drainage systems will be adopted: clean and contaminated.

Contaminated runoff, caused by silage residue, from the silage clamps and sections of hardstanding area will be collected through a series of drainage channels, pipes, and chambers and be brought into a below ground holding tank. From this tank, runoff will be pumped to 3nr 400m³ holding tanks within the bund where it will be reused within the process.

The process has a yearly demand of 62,000m³, equating to 2l/s continuous flow. This offers a sustainable drainage system, compliant with the hierarchy.

Clean runoff will be collected from buildings and sections of hardstanding and discharged into the pond or similar. Petrochemicals will be present within the clean hardstanding runoff, which will be mitigated through a full retention petrol interceptor.

Runoff will then be discharged into the adjacent watercourse at greenfield rates.

Bund runoff has the potential to become contaminated through process residue. This will be collected through a channel drain and discharged into a pump chamber where it will be sampled and pumped to a pond feature (if clean) or reused in the process (if contaminated).

5.0 Clean / Contaminated Bund Runoff

Rainfall collected within the bund has the potential to be contaminated through process residue. Therefore, runoff is collected and contained within the bund until it is sampled to determine if contamination is present.

If clean, runoff will be pumped to the pond or similar. If contaminated, runoff will be pumped into the process for reuse.

Runoff must be sampled prior to discharge, therefore, when the site is unmanned, the bund will store runoff until sampling can be undertaken. The longest period the site will be unmanned is over a 12hr night period. Therefore, the bund will be modelled within no outfall with the 12hr storm events will be taken as the critical event.

A typical bund has a slab level of between 72.500m - 73.000m AOD (AOD levels Site specific) with a top of wall level of 75.000m AOD. A internal area of 9,727m², 3,889m² of which is taken by the tanks, resulting in an available bund area of 5,836m².

These parameters have been used to model the bund within MicroDrainage 'Source Control'. An extract of the structure can be seen below.

Depth (m)	Area (m ²)
0.000	0.0
0.500	5836.0
2.500	5836.0

The model has been run over a variety of storm events with the resultant volumes and depths detailed below.

Storm Event	Volume	Depth
1:1 Yr 12hr + 40%CC	305.6m ³	340mm
1:2 Yr 12hr + 40%CC	368.0m ³	362mm
1:10 Yr 12hr + 40%CC	518.8m ³	405mm
1:30 Yr 12hr + 40%CC	651.6m ³	437mm
1:100 Yr 12hr + 40%CC	836.4m ³	475mm

The above results shall vary slightly based on site geographical area. However, the result shows the bund has more than sufficient capacity. The bund is typically designed for 110% of the largest tank i.e., 8,489m³

Refer to Appendix VI for the full bund calculations.

6.0 Contaminated Silage Clamp Runoff

The runoff from the silage clamps will be contaminated with leachate from the crop. As the runoff has leachate within it, it has value to be reused within the process. Therefore, the site will use contaminated runoff as a main source of water.

Runoff will be collected through channel drains running along the front of the clamps where it will be brought to the south of the clamps and discharged into an underground holding tank of 50m³.

This will then be pumped into 3nr 400m³ holding tanks within the bund where it will be used within the process at a rate of 2l/s/. This provides a total storage capacity of 1,250m³.

All the storage capacity will be modelled as a single tank with a pumped discharge of 2l/s.

An extract of the storage structure and pump structure is shown below.

Tank or Pond Structure

Cover Level (m) 74.450 Storage is Online

Dividing Weir Level (m) 0.000

Invert Level (m) 72.450

Depth (m)	Area (m ²)
0.000	625.0
2.000	625.0

Scale Factor (%) 0

0.1m 0.2m 0.4m Clear Repeat

Enter Area between 0.0 and 999999.9 Depth (m): 2.000 Volume Available (m³): 1250.0

MicroDrainage 'Source Control' Tank Structure

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Outflow (l/s)
0.100	2.0000
0.200	2.0000
0.300	2.0000
0.400	2.0000
0.500	2.0000
0.600	2.0000
0.700	2.0000
0.800	2.0000
0.900	2.0000
1.000	2.0000
1.100	2.0000
1.200	2.0000

0.1m 0.2m Default Repeat Clear

Enter Invert Level between -9999.999 and 9999.999

MicroDrainage 'Source Control' Pump Overflow

The model has been run over a variety of storm events with the resultant volumes and depths detailed below. During extreme storm events, the discharge into the process will be increased to prevent above ground flooding.

As the site for a maximum period of 12hrs, the peak and 12hr event will be analysed.

Storm Event	Volume	Discharge Rate
1:1 Yr 12hr + 40%CC	492.7m ³	2.0l/s
1:1 Yr 36hr + 40%CC	546.5m ³	2.0l/s
1:2 Yr 12hr + 40%CC	605.9m ³	2.0l/s
1:2 Yr 36hr + 40%CC	678.1m ³	2.0l/s
1:10 Yr 12hr + 40%CC	880.9m ³	2.0l/s
1:10 Yr 48hr + 40%CC	1,011.4m ³	2.0l/s
1:30 Yr 12hr + 40%CC	1,124.4m ³	2.0l/s
1:30 Yr 48hr + 40%CC	1,305.6m ³	2.0l/s Flood
1:100 Yr 12hr + 40%CC	1,464.2m ³	2.0l/s Flood
1:100 Yr 48hr + 40%CC	1,712.9m ³	2.0l/s Flood

Refer to Appendix IX for silage clamp 2l/s calculations.

As shown within the above calculations, the contaminated drainage system floods within the peak 1:30 event and both 1:100 events.

In these extreme storm events, it is proposed to increase the discharge rate into the process. The calculations have been remodelled with higher discharge rates to determine what rates are required to prevent flooding.

Storm Event	Volume	Discharge Rate
1:30 Yr 36hr + 40%CC	1,231.2m ³	2.5l/s
1:100 Yr 12hr + 40%CC	1,247.8m ³	7.6l/s
1:100 Yr 12hr (Peak) + 40%CC	1,247.8m ³	7.6l/s

Refer to Appendix X for amended pump rate calculations.

As shown above, during the peak 1:30 event, the process must increase the discharge to 2.5l/s and increase the 1:100 to 7.6l/s/ to prevent above ground flooding. It should also be noted that additional storage tank are likely to be available to hold further water.

10.0 Plant Water Demand Against Average Annual Rainfall

The site has been designed to contain all flows up to and including the 1:100 year +40% CC below ground.

An assessment has been undertaken to compare the average annual rainfall (AAR) against the process' water demand to determine if the process demand is greater than the harvested water.

From reviewing the process, it is expected the process has a yearly operation demand of 62,000m³, equating to a continuous flow of 2l/s.

AAR = 0.667

Area (Total Catchment) = 46,347m²

CC = 40%

Total annual rainfall (including climate change) = 43,278.8m³

The rainfall generated within the contaminated catchment provides 43,278.8m³ of water each year, 70% of the yearly demand.

As shown above, the plant has a greater demand than the yearly rainfall within the site with the addition of climate change. The attenuation capacity has been solely provided to satisfy local and national policy.

Therefore, the collected runoff is recycled within the process, satisfying sustainability and drainage hierarchy requirements.

APPENDIX I

Bund Calculations

GGP Consult			Page 1																																																																																																																																																																																														
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Innovyze		Source Control 2019.1																																																																																																																																																																																															
<u>Summary of Results for 1 year Return Period (+40%)</u> Outflow is too low. Design is unsatisfactory. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>72.718</td><td>0.218</td><td>80.1</td><td>O K</td></tr><tr><td>30 min Summer</td><td>72.738</td><td>0.238</td><td>104.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>72.757</td><td>0.257</td><td>132.4</td><td>O K</td></tr><tr><td>120 min Summer</td><td>72.776</td><td>0.276</td><td>164.3</td><td>O K</td></tr><tr><td>180 min Summer</td><td>72.788</td><td>0.288</td><td>185.5</td><td>O K</td></tr><tr><td>240 min Summer</td><td>72.796</td><td>0.296</td><td>202.0</td><td>O K</td></tr><tr><td>360 min Summer</td><td>72.808</td><td>0.308</td><td>226.3</td><td>O K</td></tr><tr><td>480 min Summer</td><td>72.816</td><td>0.316</td><td>244.6</td><td>O K</td></tr><tr><td>600 min Summer</td><td>72.822</td><td>0.322</td><td>259.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>72.827</td><td>0.327</td><td>272.9</td><td>O K</td></tr><tr><td>960 min Summer</td><td>72.836</td><td>0.336</td><td>294.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>72.848</td><td>0.348</td><td>329.2</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>72.862</td><td>0.362</td><td>367.7</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>72.871</td><td>0.371</td><td>397.3</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>72.885</td><td>0.385</td><td>443.2</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>72.895</td><td>0.395</td><td>479.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>72.903</td><td>0.403</td><td>509.3</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>72.910</td><td>0.410</td><td>535.4</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>72.916</td><td>0.416</td><td>558.6</td><td>O K</td></tr><tr><td>15 min Winter</td><td>72.726</td><td>0.226</td><td>89.7</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>43.387</td><td>0.0</td><td>23</td></tr><tr><td>30 min Summer</td><td>28.301</td><td>0.0</td><td>38</td></tr><tr><td>60 min Summer</td><td>17.920</td><td>0.0</td><td>68</td></tr><tr><td>120 min Summer</td><td>11.119</td><td>0.0</td><td>128</td></tr><tr><td>180 min Summer</td><td>8.370</td><td>0.0</td><td>188</td></tr><tr><td>240 min Summer</td><td>6.835</td><td>0.0</td><td>248</td></tr><tr><td>360 min Summer</td><td>5.105</td><td>0.0</td><td>368</td></tr><tr><td>480 min Summer</td><td>4.138</td><td>0.0</td><td>488</td></tr><tr><td>600 min Summer</td><td>3.516</td><td>0.0</td><td>608</td></tr><tr><td>720 min Summer</td><td>3.078</td><td>0.0</td><td>728</td></tr><tr><td>960 min Summer</td><td>2.495</td><td>0.0</td><td>968</td></tr><tr><td>1440 min Summer</td><td>1.857</td><td>0.0</td><td>1448</td></tr><tr><td>2160 min Summer</td><td>1.383</td><td>0.0</td><td>2168</td></tr><tr><td>2880 min Summer</td><td>1.120</td><td>0.0</td><td>2888</td></tr><tr><td>4320 min Summer</td><td>0.833</td><td>0.0</td><td>4328</td></tr><tr><td>5760 min Summer</td><td>0.676</td><td>0.0</td><td>5768</td></tr><tr><td>7200 min Summer</td><td>0.574</td><td>0.0</td><td>7208</td></tr><tr><td>8640 min Summer</td><td>0.503</td><td>0.0</td><td>8648</td></tr><tr><td>10080 min Summer</td><td>0.450</td><td>0.0</td><td>10088</td></tr><tr><td>15 min Winter</td><td>43.387</td><td>0.0</td><td>23</td></tr></tbody></table>					Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status	15 min Summer	72.718	0.218	80.1	O K	30 min Summer	72.738	0.238	104.5	O K	60 min Summer	72.757	0.257	132.4	O K	120 min Summer	72.776	0.276	164.3	O K	180 min Summer	72.788	0.288	185.5	O K	240 min Summer	72.796	0.296	202.0	O K	360 min Summer	72.808	0.308	226.3	O K	480 min Summer	72.816	0.316	244.6	O K	600 min Summer	72.822	0.322	259.8	O K	720 min Summer	72.827	0.327	272.9	O K	960 min Summer	72.836	0.336	294.9	O K	1440 min Summer	72.848	0.348	329.2	O K	2160 min Summer	72.862	0.362	367.7	O K	2880 min Summer	72.871	0.371	397.3	O K	4320 min Summer	72.885	0.385	443.2	O K	5760 min Summer	72.895	0.395	479.2	O K	7200 min Summer	72.903	0.403	509.3	O K	8640 min Summer	72.910	0.410	535.4	O K	10080 min Summer	72.916	0.416	558.6	O K	15 min Winter	72.726	0.226	89.7	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	43.387	0.0	23	30 min Summer	28.301	0.0	38	60 min Summer	17.920	0.0	68	120 min Summer	11.119	0.0	128	180 min Summer	8.370	0.0	188	240 min Summer	6.835	0.0	248	360 min Summer	5.105	0.0	368	480 min Summer	4.138	0.0	488	600 min Summer	3.516	0.0	608	720 min Summer	3.078	0.0	728	960 min Summer	2.495	0.0	968	1440 min Summer	1.857	0.0	1448	2160 min Summer	1.383	0.0	2168	2880 min Summer	1.120	0.0	2888	4320 min Summer	0.833	0.0	4328	5760 min Summer	0.676	0.0	5768	7200 min Summer	0.574	0.0	7208	8640 min Summer	0.503	0.0	8648	10080 min Summer	0.450	0.0	10088	15 min Winter	43.387	0.0	23
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Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																														
15 min Summer	43.387	0.0	23																																																																																																																																																																																														
30 min Summer	28.301	0.0	38																																																																																																																																																																																														
60 min Summer	17.920	0.0	68																																																																																																																																																																																														
120 min Summer	11.119	0.0	128																																																																																																																																																																																														
180 min Summer	8.370	0.0	188																																																																																																																																																																																														
240 min Summer	6.835	0.0	248																																																																																																																																																																																														
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600 min Summer	3.516	0.0	608																																																																																																																																																																																														
720 min Summer	3.078	0.0	728																																																																																																																																																																																														
960 min Summer	2.495	0.0	968																																																																																																																																																																																														
1440 min Summer	1.857	0.0	1448																																																																																																																																																																																														
2160 min Summer	1.383	0.0	2168																																																																																																																																																																																														
2880 min Summer	1.120	0.0	2888																																																																																																																																																																																														
4320 min Summer	0.833	0.0	4328																																																																																																																																																																																														
5760 min Summer	0.676	0.0	5768																																																																																																																																																																																														
7200 min Summer	0.574	0.0	7208																																																																																																																																																																																														
8640 min Summer	0.503	0.0	8648																																																																																																																																																																																														
10080 min Summer	0.450	0.0	10088																																																																																																																																																																																														
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GGP Consult		Page 2		
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant			
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC			
Innovyze	Source Control 2019.1			
<u>Summary of Results for 1 year Return Period (+40%)</u>				
Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	72.747	0.247	117.1	O K
60 min Winter	72.767	0.267	148.3	O K
120 min Winter	72.787	0.287	184.0	O K
180 min Winter	72.799	0.299	207.8	O K
240 min Winter	72.807	0.307	226.2	O K
360 min Winter	72.819	0.319	253.4	O K
480 min Winter	72.828	0.328	273.9	O K
600 min Winter	72.834	0.334	290.9	O K
720 min Winter	72.840	0.340	305.6	O K
960 min Winter	72.849	0.349	330.3	O K
1440 min Winter	72.862	0.362	368.7	O K
2160 min Winter	72.875	0.375	411.9	O K
2880 min Winter	72.885	0.385	445.0	O K
4320 min Winter	72.900	0.400	496.4	O K
5760 min Winter	72.910	0.410	536.7	O K
7200 min Winter	72.919	0.419	570.4	O K
8640 min Winter	72.926	0.426	599.7	O K
10080 min Winter	72.932	0.432	625.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
30 min Winter	28.301	0.0	38	
60 min Winter	17.920	0.0	68	
120 min Winter	11.119	0.0	128	
180 min Winter	8.370	0.0	188	
240 min Winter	6.835	0.0	248	
360 min Winter	5.105	0.0	368	
480 min Winter	4.138	0.0	488	
600 min Winter	3.516	0.0	608	
720 min Winter	3.078	0.0	728	
960 min Winter	2.495	0.0	968	
1440 min Winter	1.857	0.0	1448	
2160 min Winter	1.383	0.0	2168	
2880 min Winter	1.120	0.0	2888	
4320 min Winter	0.833	0.0	4328	
5760 min Winter	0.676	0.0	5768	
7200 min Winter	0.574	0.0	7208	
8640 min Winter	0.503	0.0	8648	
10080 min Winter	0.450	0.0	10088	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant	
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.985

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.492	4	8	0.493

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

GGP Consult		Page 4												
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant													
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC													
Innovyze		Source Control 2019.1												
Model Details Storage is Online Cover Level (m) 75.000 Tank or Pond Structure Invert Level (m) 72.500 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>0.0</td><td>0.500</td><td>5836.0</td><td>2.500</td><td>5836.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	0.0	0.500	5836.0	2.500	5836.0
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)									
0.000	0.0	0.500	5836.0	2.500	5836.0									
©1982-2019 Innovyze														

GGP Consult		Page 1																																																																																																																																																																																													
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<u>Summary of Results for 2 year Return Period (+40%)</u> Outflow is too low. Design is unsatisfactory. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>72.737</td><td>0.237</td><td>103.6</td><td>O K</td></tr><tr><td>30 min Summer</td><td>72.758</td><td>0.258</td><td>134.3</td><td>O K</td></tr><tr><td>60 min Summer</td><td>72.778</td><td>0.278</td><td>167.5</td><td>O K</td></tr><tr><td>120 min Summer</td><td>72.797</td><td>0.297</td><td>204.7</td><td>O K</td></tr><tr><td>180 min Summer</td><td>72.809</td><td>0.309</td><td>228.9</td><td>O K</td></tr><tr><td>240 min Summer</td><td>72.817</td><td>0.317</td><td>247.5</td><td>O K</td></tr><tr><td>360 min Summer</td><td>72.828</td><td>0.328</td><td>275.2</td><td>O K</td></tr><tr><td>480 min Summer</td><td>72.836</td><td>0.336</td><td>296.3</td><td>O K</td></tr><tr><td>600 min Summer</td><td>72.843</td><td>0.343</td><td>313.7</td><td>O K</td></tr><tr><td>720 min Summer</td><td>72.848</td><td>0.348</td><td>328.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>72.857</td><td>0.357</td><td>353.5</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>72.869</td><td>0.369</td><td>391.9</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>72.882</td><td>0.382</td><td>434.5</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>72.892</td><td>0.392</td><td>467.2</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>72.905</td><td>0.405</td><td>517.7</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>72.915</td><td>0.415</td><td>556.8</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>72.923</td><td>0.423</td><td>589.3</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>72.930</td><td>0.430</td><td>617.3</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>72.935</td><td>0.435</td><td>642.1</td><td>O K</td></tr><tr><td>15 min Winter</td><td>72.746</td><td>0.246</td><td>116.0</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>56.082</td><td>0.0</td><td>23</td></tr><tr><td>30 min Summer</td><td>36.348</td><td>0.0</td><td>38</td></tr><tr><td>60 min Summer</td><td>22.680</td><td>0.0</td><td>68</td></tr><tr><td>120 min Summer</td><td>13.855</td><td>0.0</td><td>128</td></tr><tr><td>180 min Summer</td><td>10.330</td><td>0.0</td><td>188</td></tr><tr><td>240 min Summer</td><td>8.375</td><td>0.0</td><td>248</td></tr><tr><td>360 min Summer</td><td>6.209</td><td>0.0</td><td>368</td></tr><tr><td>480 min Summer</td><td>5.013</td><td>0.0</td><td>488</td></tr><tr><td>600 min Summer</td><td>4.246</td><td>0.0</td><td>608</td></tr><tr><td>720 min Summer</td><td>3.706</td><td>0.0</td><td>728</td></tr><tr><td>960 min Summer</td><td>2.991</td><td>0.0</td><td>968</td></tr><tr><td>1440 min Summer</td><td>2.210</td><td>0.0</td><td>1448</td></tr><tr><td>2160 min Summer</td><td>1.634</td><td>0.0</td><td>2168</td></tr><tr><td>2880 min Summer</td><td>1.318</td><td>0.0</td><td>2888</td></tr><tr><td>4320 min Summer</td><td>0.973</td><td>0.0</td><td>4328</td></tr><tr><td>5760 min Summer</td><td>0.785</td><td>0.0</td><td>5768</td></tr><tr><td>7200 min Summer</td><td>0.665</td><td>0.0</td><td>7208</td></tr><tr><td>8640 min Summer</td><td>0.580</td><td>0.0</td><td>8648</td></tr><tr><td>10080 min Summer</td><td>0.517</td><td>0.0</td><td>10088</td></tr><tr><td>15 min Winter</td><td>56.082</td><td>0.0</td><td>23</td></tr></tbody></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status	15 min Summer	72.737	0.237	103.6	O K	30 min Summer	72.758	0.258	134.3	O K	60 min Summer	72.778	0.278	167.5	O K	120 min Summer	72.797	0.297	204.7	O K	180 min Summer	72.809	0.309	228.9	O K	240 min Summer	72.817	0.317	247.5	O K	360 min Summer	72.828	0.328	275.2	O K	480 min Summer	72.836	0.336	296.3	O K	600 min Summer	72.843	0.343	313.7	O K	720 min Summer	72.848	0.348	328.6	O K	960 min Summer	72.857	0.357	353.5	O K	1440 min Summer	72.869	0.369	391.9	O K	2160 min Summer	72.882	0.382	434.5	O K	2880 min Summer	72.892	0.392	467.2	O K	4320 min Summer	72.905	0.405	517.7	O K	5760 min Summer	72.915	0.415	556.8	O K	7200 min Summer	72.923	0.423	589.3	O K	8640 min Summer	72.930	0.430	617.3	O K	10080 min Summer	72.935	0.435	642.1	O K	15 min Winter	72.746	0.246	116.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	56.082	0.0	23	30 min Summer	36.348	0.0	38	60 min Summer	22.680	0.0	68	120 min Summer	13.855	0.0	128	180 min Summer	10.330	0.0	188	240 min Summer	8.375	0.0	248	360 min Summer	6.209	0.0	368	480 min Summer	5.013	0.0	488	600 min Summer	4.246	0.0	608	720 min Summer	3.706	0.0	728	960 min Summer	2.991	0.0	968	1440 min Summer	2.210	0.0	1448	2160 min Summer	1.634	0.0	2168	2880 min Summer	1.318	0.0	2888	4320 min Summer	0.973	0.0	4328	5760 min Summer	0.785	0.0	5768	7200 min Summer	0.665	0.0	7208	8640 min Summer	0.580	0.0	8648	10080 min Summer	0.517	0.0	10088	15 min Winter	56.082	0.0	23
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Innovyze	Source Control 2019.1			
<u>Summary of Results for 2 year Return Period (+40%)</u>				
Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	72.768	0.268	150.4	O K
60 min Winter	72.789	0.289	187.7	O K
120 min Winter	72.809	0.309	229.3	O K
180 min Winter	72.821	0.321	256.4	O K
240 min Winter	72.829	0.329	277.2	O K
360 min Winter	72.841	0.341	308.2	O K
480 min Winter	72.849	0.349	331.8	O K
600 min Winter	72.856	0.356	351.3	O K
720 min Winter	72.862	0.362	368.0	O K
960 min Winter	72.871	0.371	395.9	O K
1440 min Winter	72.884	0.384	438.9	O K
2160 min Winter	72.897	0.397	486.6	O K
2880 min Winter	72.907	0.407	523.3	O K
4320 min Winter	72.921	0.421	579.8	O K
5760 min Winter	72.931	0.431	623.6	O K
7200 min Winter	72.939	0.439	660.0	O K
8640 min Winter	72.946	0.446	691.4	O K
10080 min Winter	72.952	0.452	719.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
30 min Winter	36.348	0.0	38	
60 min Winter	22.680	0.0	68	
120 min Winter	13.855	0.0	128	
180 min Winter	10.330	0.0	188	
240 min Winter	8.375	0.0	248	
360 min Winter	6.209	0.0	368	
480 min Winter	5.013	0.0	488	
600 min Winter	4.246	0.0	608	
720 min Winter	3.706	0.0	728	
960 min Winter	2.991	0.0	968	
1440 min Winter	2.210	0.0	1448	
2160 min Winter	1.634	0.0	2168	
2880 min Winter	1.318	0.0	2888	
4320 min Winter	0.973	0.0	4328	
5760 min Winter	0.785	0.0	5768	
7200 min Winter	0.665	0.0	7208	
8640 min Winter	0.580	0.0	8648	
10080 min Winter	0.517	0.0	10088	
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GGP Consult		Page 3
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Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.985

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.492	4	8	0.493

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

GGP Consult		Page 4												
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant													
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<u>Summary of Results for 10 year Return Period (+40%)</u>				
Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	72.807	0.307	224.2	O K
60 min Winter	72.829	0.329	278.0	O K
120 min Winter	72.851	0.351	336.1	O K
180 min Winter	72.863	0.363	372.6	O K
240 min Winter	72.872	0.372	399.7	O K
360 min Winter	72.884	0.384	440.5	O K
480 min Winter	72.893	0.393	471.7	O K
600 min Winter	72.900	0.400	497.1	O K
720 min Winter	72.905	0.405	518.8	O K
960 min Winter	72.915	0.415	554.6	O K
1440 min Winter	72.928	0.428	609.0	O K
2160 min Winter	72.941	0.441	668.3	O K
2880 min Winter	72.951	0.451	713.5	O K
4320 min Winter	72.965	0.465	782.2	O K
5760 min Winter	72.975	0.475	834.6	O K
7200 min Winter	72.983	0.483	877.5	O K
8640 min Winter	72.990	0.490	914.2	O K
10080 min Winter	72.995	0.495	946.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
30 min Winter	54.206	0.0	38	
60 min Winter	33.604	0.0	68	
120 min Winter	20.311	0.0	128	
180 min Winter	15.011	0.0	188	
240 min Winter	12.078	0.0	248	
360 min Winter	8.874	0.0	368	
480 min Winter	7.126	0.0	488	
600 min Winter	6.008	0.0	608	
720 min Winter	5.225	0.0	728	
960 min Winter	4.190	0.0	968	
1440 min Winter	3.067	0.0	1448	
2160 min Winter	2.244	0.0	2168	
2880 min Winter	1.797	0.0	2888	
4320 min Winter	1.313	0.0	4328	
5760 min Winter	1.051	0.0	5768	
7200 min Winter	0.884	0.0	7208	
8640 min Winter	0.767	0.0	8648	
10080 min Winter	0.681	0.0	10088	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.985

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.492	4	8	0.493

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

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Innovyze	Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+40%)</u>				
Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	72.833	0.333	286.7	O K
60 min Winter	72.858	0.358	356.9	O K
120 min Winter	72.881	0.381	431.3	O K
180 min Winter	72.894	0.394	476.6	O K
240 min Winter	72.903	0.403	509.4	O K
360 min Winter	72.916	0.416	558.4	O K
480 min Winter	72.925	0.425	595.7	O K
600 min Winter	72.932	0.432	625.9	O K
720 min Winter	72.937	0.437	651.6	O K
960 min Winter	72.947	0.447	693.7	O K
1440 min Winter	72.960	0.460	757.1	O K
2160 min Winter	72.973	0.473	825.2	O K
2880 min Winter	72.983	0.483	876.6	O K
4320 min Winter	72.997	0.497	953.7	O K
5760 min Winter	73.007	0.507	1011.8	O K
7200 min Winter	73.015	0.515	1059.0	O K
8640 min Winter	73.022	0.522	1098.9	O K
10080 min Winter	73.028	0.528	1133.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
30 min Winter	69.298	0.0	38	
60 min Winter	43.136	0.0	68	
120 min Winter	26.061	0.0	128	
180 min Winter	19.202	0.0	188	
240 min Winter	15.393	0.0	248	
360 min Winter	11.248	0.0	368	
480 min Winter	8.999	0.0	488	
600 min Winter	7.565	0.0	608	
720 min Winter	6.562	0.0	728	
960 min Winter	5.240	0.0	968	
1440 min Winter	3.812	0.0	1448	
2160 min Winter	2.770	0.0	2168	
2880 min Winter	2.207	0.0	2888	
4320 min Winter	1.601	0.0	4328	
5760 min Winter	1.274	0.0	5768	
7200 min Winter	1.067	0.0	7208	
8640 min Winter	0.922	0.0	8648	
10080 min Winter	0.816	0.0	10088	
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GGP Consult		Page 3
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Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.985

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.492	4	8	0.493

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

GGP Consult		Page 4												
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant													
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC													
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Model Details Storage is Online Cover Level (m) 75.000 Tank or Pond Structure Invert Level (m) 72.500 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>0.0</td><td>0.500</td><td>5836.0</td><td>2.500</td><td>5836.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	0.0	0.500	5836.0	2.500	5836.0
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Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>138.153</td><td>0.0</td><td>23</td></tr><tr><td>30 min Summer</td><td>90.705</td><td>0.0</td><td>38</td></tr><tr><td>60 min Summer</td><td>56.713</td><td>0.0</td><td>68</td></tr><tr><td>120 min Summer</td><td>34.246</td><td>0.0</td><td>128</td></tr><tr><td>180 min Summer</td><td>25.149</td><td>0.0</td><td>188</td></tr><tr><td>240 min Summer</td><td>20.078</td><td>0.0</td><td>248</td></tr><tr><td>360 min Summer</td><td>14.585</td><td>0.0</td><td>368</td></tr><tr><td>480 min Summer</td><td>11.622</td><td>0.0</td><td>488</td></tr><tr><td>600 min Summer</td><td>9.738</td><td>0.0</td><td>608</td></tr><tr><td>720 min Summer</td><td>8.424</td><td>0.0</td><td>728</td></tr><tr><td>960 min Summer</td><td>6.697</td><td>0.0</td><td>968</td></tr><tr><td>1440 min Summer</td><td>4.839</td><td>0.0</td><td>1448</td></tr><tr><td>2160 min Summer</td><td>3.490</td><td>0.0</td><td>2168</td></tr><tr><td>2880 min Summer</td><td>2.766</td><td>0.0</td><td>2888</td></tr><tr><td>4320 min Summer</td><td>1.989</td><td>0.0</td><td>4328</td></tr><tr><td>5760 min Summer</td><td>1.573</td><td>0.0</td><td>5768</td></tr><tr><td>7200 min Summer</td><td>1.311</td><td>0.0</td><td>7208</td></tr><tr><td>8640 min Summer</td><td>1.129</td><td>0.0</td><td>8648</td></tr><tr><td>10080 min Summer</td><td>0.994</td><td>0.0</td><td>10088</td></tr><tr><td>15 min Winter</td><td>138.153</td><td>0.0</td><td>23</td></tr></tbody></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status	15 min Summer	72.820	0.320	255.2	O K	30 min Summer	72.850	0.350	335.0	O K	60 min Summer	72.878	0.378	419.0	O K	120 min Summer	72.902	0.402	506.0	O K	180 min Summer	72.915	0.415	557.4	O K	240 min Summer	72.924	0.424	593.3	O K	360 min Summer	72.936	0.436	646.5	O K	480 min Summer	72.945	0.445	686.9	O K	600 min Summer	72.952	0.452	719.4	O K	720 min Summer	72.958	0.458	746.8	O K	960 min Summer	72.967	0.467	791.6	O K	1440 min Summer	72.980	0.480	857.9	O K	2160 min Summer	72.992	0.492	928.3	O K	2880 min Summer	73.001	0.501	980.7	O K	4320 min Summer	73.015	0.515	1058.1	O K	5760 min Summer	73.025	0.525	1115.7	O K	7200 min Summer	73.032	0.532	1161.8	O K	8640 min Summer	73.039	0.539	1200.5	O K	10080 min Summer	73.045	0.545	1233.9	O K	15 min Winter	72.832	0.332	285.8	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	138.153	0.0	23	30 min Summer	90.705	0.0	38	60 min Summer	56.713	0.0	68	120 min Summer	34.246	0.0	128	180 min Summer	25.149	0.0	188	240 min Summer	20.078	0.0	248	360 min Summer	14.585	0.0	368	480 min Summer	11.622	0.0	488	600 min Summer	9.738	0.0	608	720 min Summer	8.424	0.0	728	960 min Summer	6.697	0.0	968	1440 min Summer	4.839	0.0	1448	2160 min Summer	3.490	0.0	2168	2880 min Summer	2.766	0.0	2888	4320 min Summer	1.989	0.0	4328	5760 min Summer	1.573	0.0	5768	7200 min Summer	1.311	0.0	7208	8640 min Summer	1.129	0.0	8648	10080 min Summer	0.994	0.0	10088	15 min Winter	138.153	0.0	23
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GGP Consult		Page 2		
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant			
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC			
Innovyze	Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>				
Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	72.864	0.364	375.2	O K
60 min Winter	72.892	0.392	469.2	O K
120 min Winter	72.918	0.418	566.7	O K
180 min Winter	72.931	0.431	624.2	O K
240 min Winter	72.940	0.440	664.5	O K
360 min Winter	72.953	0.453	724.1	O K
480 min Winter	72.962	0.462	769.3	O K
600 min Winter	72.970	0.470	805.8	O K
720 min Winter	72.975	0.475	836.4	O K
960 min Winter	72.985	0.485	886.6	O K
1440 min Winter	72.998	0.498	960.9	O K
2160 min Winter	73.011	0.511	1039.7	O K
2880 min Winter	73.022	0.522	1098.4	O K
4320 min Winter	73.036	0.536	1185.1	O K
5760 min Winter	73.047	0.547	1249.6	O K
7200 min Winter	73.056	0.556	1301.3	O K
8640 min Winter	73.064	0.564	1344.6	O K
10080 min Winter	73.070	0.570	1382.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
30 min Winter	90.705	0.0	38	
60 min Winter	56.713	0.0	68	
120 min Winter	34.246	0.0	128	
180 min Winter	25.149	0.0	188	
240 min Winter	20.078	0.0	248	
360 min Winter	14.585	0.0	368	
480 min Winter	11.622	0.0	488	
600 min Winter	9.738	0.0	608	
720 min Winter	8.424	0.0	728	
960 min Winter	6.697	0.0	968	
1440 min Winter	4.839	0.0	1448	
2160 min Winter	3.490	0.0	2168	
2880 min Winter	2.766	0.0	2888	
4320 min Winter	1.989	0.0	4328	
5760 min Winter	1.573	0.0	5768	
7200 min Winter	1.311	0.0	7208	
8640 min Winter	1.129	0.0	8648	
10080 min Winter	0.994	0.0	10088	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant	
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.985

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.492	4	8	0.493

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

GGP Consult		Page 4												
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Bund Calcs AD Plant													
Date 01/05/2022 File Bund Calcs No Outfall.SRCX	Designed by DJC Checked by JHC													
Innovyze		Source Control 2019.1												
Model Details Storage is Online Cover Level (m) 75.000 Tank or Pond Structure Invert Level (m) 72.500 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>0.0</td><td>0.500</td><td>5836.0</td><td>2.500</td><td>5836.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	0.0	0.500	5836.0	2.500	5836.0
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)									
0.000	0.0	0.500	5836.0	2.500	5836.0									
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APPENDIX II

Silage Clamp 2l/s Calculations

GGP Consult				Page 1	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 1 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	72.683	0.233	2.0	145.8	O K
30 min Summer	72.753	0.303	2.0	189.6	O K
60 min Summer	72.831	0.381	2.0	238.3	O K
120 min Summer	72.917	0.467	2.0	291.6	O K
180 min Summer	72.970	0.520	2.0	325.0	O K
240 min Summer	73.009	0.559	2.0	349.5	O K
360 min Summer	73.062	0.612	2.0	382.4	O K
480 min Summer	73.097	0.647	2.0	404.3	O K
600 min Summer	73.122	0.672	2.0	420.3	O K
720 min Summer	73.142	0.692	2.0	432.4	O K
960 min Summer	73.168	0.718	2.0	449.0	O K
1440 min Summer	73.193	0.743	2.0	464.2	O K
2160 min Summer	73.197	0.747	2.0	466.6	O K
2880 min Summer	73.191	0.741	2.0	463.0	O K
4320 min Summer	73.170	0.720	2.0	449.7	O K
5760 min Summer	73.143	0.693	2.0	433.1	O K
7200 min Summer	73.114	0.664	2.0	415.0	O K
8640 min Summer	73.084	0.634	2.0	396.4	O K
10080 min Summer	73.054	0.604	2.0	377.5	O K
15 min Winter	72.712	0.262	2.0	163.5	O K
30 min Winter	72.790	0.340	2.0	212.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	43.387	0.0	132.2	27	
30 min Summer	28.301	0.0	160.4	41	
60 min Summer	17.920	0.0	239.6	70	
120 min Summer	11.119	0.0	290.8	130	
180 min Summer	8.370	0.0	318.6	190	
240 min Summer	6.835	0.0	333.3	250	
360 min Summer	5.105	0.0	336.5	368	
480 min Summer	4.138	0.0	334.1	488	
600 min Summer	3.516	0.0	331.7	606	
720 min Summer	3.078	0.0	329.4	726	
960 min Summer	2.495	0.0	324.8	964	
1440 min Summer	1.857	0.0	315.5	1442	
2160 min Summer	1.383	0.0	640.0	1888	
2880 min Summer	1.120	0.0	629.4	2280	
4320 min Summer	0.833	0.0	590.5	3068	
5760 min Summer	0.676	0.0	884.1	3880	
7200 min Summer	0.574	0.0	939.5	4696	
8640 min Summer	0.503	0.0	986.0	5536	
10080 min Summer	0.450	0.0	1020.3	6360	
15 min Winter	43.387	0.0	144.8	26	
30 min Winter	28.301	0.0	169.0	41	
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GGP Consult				Page 2	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 1 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	72.878	0.428	2.0	267.5	O K
120 min Winter	72.975	0.525	2.0	327.8	O K
180 min Winter	73.035	0.585	2.0	365.9	O K
240 min Winter	73.081	0.631	2.0	394.1	O K
360 min Winter	73.142	0.692	2.0	432.4	O K
480 min Winter	73.183	0.733	2.0	458.3	O K
600 min Winter	73.214	0.764	2.0	477.7	O K
720 min Winter	73.238	0.788	2.0	492.7	O K
960 min Winter	73.273	0.823	2.0	514.2	O K
1440 min Winter	73.310	0.860	2.0	537.3	O K
2160 min Winter	73.324	0.874	2.0	546.5	O K
2880 min Winter	73.314	0.864	2.0	539.9	O K
4320 min Winter	73.282	0.832	2.0	520.2	O K
5760 min Winter	73.241	0.791	2.0	494.3	O K
7200 min Winter	73.194	0.744	2.0	465.0	O K
8640 min Winter	73.145	0.695	2.0	434.3	O K
10080 min Winter	73.095	0.645	2.0	403.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	17.920	0.0	266.1	70	
120 min Winter	11.119	0.0	317.4	128	
180 min Winter	8.370	0.0	337.8	186	
240 min Winter	6.835	0.0	339.4	246	
360 min Winter	5.105	0.0	337.2	362	
480 min Winter	4.138	0.0	334.9	480	
600 min Winter	3.516	0.0	332.8	596	
720 min Winter	3.078	0.0	330.7	714	
960 min Winter	2.495	0.0	326.5	944	
1440 min Winter	1.857	0.0	318.1	1400	
2160 min Winter	1.383	0.0	650.7	2060	
2880 min Winter	1.120	0.0	636.7	2656	
4320 min Winter	0.833	0.0	604.8	3324	
5760 min Winter	0.676	0.0	990.2	4224	
7200 min Winter	0.574	0.0	1051.1	5128	
8640 min Winter	0.503	0.0	1098.9	6048	
10080 min Winter	0.450	0.0	1118.7	6864	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)			
0 4 0.606	4 8 0.606	8 12 0.606			

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

GGP Consult		Page 4
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

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GGP Consult					Page 1	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY			Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....			Designed by DJC Checked by JHC			
Innovyze			Source Control 2019.1			
<u>Summary of Results for 2 year Return Period (+40%)</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		72.752	0.302	2.0	188.9	O K
30 min Summer		72.841	0.391	2.0	244.3	O K
60 min Summer		72.935	0.485	2.0	302.9	O K
120 min Summer		73.035	0.585	2.0	365.7	O K
180 min Summer		73.097	0.647	2.0	404.4	O K
240 min Summer		73.142	0.692	2.0	432.6	O K
360 min Summer		73.204	0.754	2.0	471.5	O K
480 min Summer		73.247	0.797	2.0	498.1	O K
600 min Summer		73.278	0.828	2.0	517.8	O K
720 min Summer		73.303	0.853	2.0	532.9	O K
960 min Summer		73.337	0.887	2.0	554.1	O K
1440 min Summer		73.371	0.921	2.0	575.4	O K
2160 min Summer		73.379	0.929	2.0	580.5	O K
2880 min Summer		73.369	0.919	2.0	574.3	O K
4320 min Summer		73.342	0.892	2.0	557.3	O K
5760 min Summer		73.311	0.861	2.0	538.1	O K
7200 min Summer		73.278	0.828	2.0	517.8	O K
8640 min Summer		73.245	0.795	2.0	496.9	O K
10080 min Summer		73.212	0.762	2.0	476.0	O K
15 min Winter		72.789	0.339	2.0	211.8	O K
30 min Winter		72.888	0.438	2.0	274.0	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		56.082	0.0	159.8	27	
30 min Summer		36.348	0.0	171.3	41	
60 min Summer		22.680	0.0	295.9	72	
120 min Summer		13.855	0.0	337.1	130	
180 min Summer		10.330	0.0	340.9	190	
240 min Summer		8.375	0.0	339.8	250	
360 min Summer		6.209	0.0	337.7	368	
480 min Summer		5.013	0.0	335.7	488	
600 min Summer		4.246	0.0	333.7	608	
720 min Summer		3.706	0.0	331.7	726	
960 min Summer		2.991	0.0	327.8	966	
1440 min Summer		2.210	0.0	319.9	1444	
2160 min Summer		1.634	0.0	653.0	2148	
2880 min Summer		1.318	0.0	638.7	2460	
4320 min Summer		0.973	0.0	604.7	3208	
5760 min Summer		0.785	0.0	1027.1	4032	
7200 min Summer		0.665	0.0	1084.4	4832	
8640 min Summer		0.580	0.0	1122.5	5696	
10080 min Summer		0.517	0.0	1105.7	6464	
15 min Winter		56.082	0.0	168.9	27	
30 min Winter		36.348	0.0	171.4	41	
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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 2 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	72.994	0.544	2.0	340.0	O K
120 min Winter	73.108	0.658	2.0	411.0	O K
180 min Winter	73.178	0.728	2.0	455.1	O K
240 min Winter	73.230	0.780	2.0	487.4	O K
360 min Winter	73.302	0.852	2.0	532.5	O K
480 min Winter	73.352	0.902	2.0	563.8	O K
600 min Winter	73.390	0.940	2.0	587.4	O K
720 min Winter	73.419	0.969	2.0	605.9	O K
960 min Winter	73.462	1.012	2.0	632.7	O K
1440 min Winter	73.510	1.060	2.0	662.8	O K
2160 min Winter	73.535	1.085	2.0	678.1	O K
2880 min Winter	73.530	1.080	2.0	674.9	O K
4320 min Winter	73.489	1.039	2.0	649.5	O K
5760 min Winter	73.446	0.996	2.0	622.5	O K
7200 min Winter	73.396	0.946	2.0	591.5	O K
8640 min Winter	73.344	0.894	2.0	558.6	O K
10080 min Winter	73.290	0.840	2.0	525.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	22.680	0.0	322.3	70	
120 min Winter	13.855	0.0	342.3	128	
180 min Winter	10.330	0.0	341.2	188	
240 min Winter	8.375	0.0	340.2	246	
360 min Winter	6.209	0.0	338.2	364	
480 min Winter	5.013	0.0	336.3	480	
600 min Winter	4.246	0.0	334.4	598	
720 min Winter	3.706	0.0	332.6	716	
960 min Winter	2.991	0.0	328.9	948	
1440 min Winter	2.210	0.0	321.7	1408	
2160 min Winter	1.634	0.0	656.2	2080	
2880 min Winter	1.318	0.0	644.1	2736	
4320 min Winter	0.973	0.0	616.3	3460	
5760 min Winter	0.785	0.0	1147.9	4376	
7200 min Winter	0.665	0.0	1201.3	5264	
8640 min Winter	0.580	0.0	1196.1	6216	
10080 min Winter	0.517	0.0	1151.8	7064	
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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.606		4 8 0.606		8 12 0.606	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 10 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	72.904	0.454	2.0	283.7	O K
30 min Summer	73.035	0.585	2.0	365.8	O K
60 min Summer	73.172	0.722	2.0	451.5	O K
120 min Summer	73.316	0.866	2.0	540.9	O K
180 min Summer	73.402	0.952	2.0	594.8	O K
240 min Summer	73.463	1.013	2.0	633.1	O K
360 min Summer	73.550	1.100	2.0	687.6	O K
480 min Summer	73.612	1.162	2.0	726.0	O K
600 min Summer	73.658	1.208	2.0	754.9	O K
720 min Summer	73.694	1.244	2.0	777.7	O K
960 min Summer	73.747	1.297	2.0	810.8	O K
1440 min Summer	73.808	1.358	2.0	848.5	O K
2160 min Summer	73.840	1.390	2.0	868.7	O K
2880 min Summer	73.837	1.387	2.0	866.7	O K
4320 min Summer	73.793	1.343	2.0	839.2	O K
5760 min Summer	73.747	1.297	2.0	810.8	O K
7200 min Summer	73.704	1.254	2.0	783.9	O K
8640 min Summer	73.663	1.213	2.0	757.8	O K
10080 min Summer	73.621	1.171	2.0	732.2	O K
15 min Winter	72.959	0.509	2.0	318.0	O K
30 min Winter	73.106	0.656	2.0	410.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	83.912	0.0	172.0	27	
30 min Summer	54.206	0.0	171.5	42	
60 min Summer	33.604	0.0	343.8	72	
120 min Summer	20.311	0.0	342.8	132	
180 min Summer	15.011	0.0	342.0	190	
240 min Summer	12.078	0.0	341.2	250	
360 min Summer	8.874	0.0	339.6	370	
480 min Summer	7.126	0.0	338.2	490	
600 min Summer	6.008	0.0	336.7	608	
720 min Summer	5.225	0.0	335.3	728	
960 min Summer	4.190	0.0	332.5	968	
1440 min Summer	3.067	0.0	327.0	1446	
2160 min Summer	2.244	0.0	663.9	2164	
2880 min Summer	1.797	0.0	654.2	2880	
4320 min Summer	1.313	0.0	630.7	3680	
5760 min Summer	1.051	0.0	1291.3	4440	
7200 min Summer	0.884	0.0	1253.6	5192	
8640 min Summer	0.767	0.0	1210.6	5976	
10080 min Summer	0.681	0.0	1163.6	6856	
15 min Winter	83.912	0.0	172.0	27	
30 min Winter	54.206	0.0	171.6	41	
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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 10 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	73.260	0.810	2.0	506.4	O K
120 min Winter	73.422	0.972	2.0	607.5	O K
180 min Winter	73.520	1.070	2.0	668.6	O K
240 min Winter	73.590	1.140	2.0	712.3	O K
360 min Winter	73.690	1.240	2.0	775.0	O K
480 min Winter	73.761	1.311	2.0	819.7	O K
600 min Winter	73.816	1.366	2.0	853.8	O K
720 min Winter	73.859	1.409	2.0	880.9	O K
960 min Winter	73.924	1.474	2.0	921.4	O K
1440 min Winter	74.003	1.553	2.0	970.5	O K
2160 min Winter	74.055	1.605	2.0	1003.4	O K
2880 min Winter	74.068	1.618	2.0	1011.4	O K
4320 min Winter	74.036	1.586	2.0	991.4	O K
5760 min Winter	73.971	1.521	2.0	950.8	O K
7200 min Winter	73.915	1.465	2.0	915.8	O K
8640 min Winter	73.857	1.407	2.0	879.2	O K
10080 min Winter	73.796	1.346	2.0	841.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	33.604	0.0	343.9	70	
120 min Winter	20.311	0.0	343.0	130	
180 min Winter	15.011	0.0	342.1	188	
240 min Winter	12.078	0.0	341.3	246	
360 min Winter	8.874	0.0	339.8	364	
480 min Winter	7.126	0.0	338.3	482	
600 min Winter	6.008	0.0	336.9	600	
720 min Winter	5.225	0.0	335.5	718	
960 min Winter	4.190	0.0	332.8	952	
1440 min Winter	3.067	0.0	327.3	1420	
2160 min Winter	2.244	0.0	664.8	2108	
2880 min Winter	1.797	0.0	656.1	2796	
4320 min Winter	1.313	0.0	636.6	4104	
5760 min Winter	1.051	0.0	1303.8	4792	
7200 min Winter	0.884	0.0	1274.4	5616	
8640 min Winter	0.767	0.0	1240.4	6488	
10080 min Winter	0.681	0.0	1202.5	7456	
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Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC				
Innovyze		Source Control 2019.1				
<u>Summary of Results for 30 year Return Period (+40%)</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		73.027	0.577	2.0	360.4	O K
30 min Summer		73.200	0.750	2.0	468.6	O K
60 min Summer		73.380	0.930	2.0	581.2	O K
120 min Summer		73.566	1.116	2.0	697.3	O K
180 min Summer		73.675	1.225	2.0	765.6	O K
240 min Summer		73.751	1.301	2.0	813.1	O K
360 min Summer		73.859	1.409	2.0	880.7	O K
480 min Summer		73.936	1.486	2.0	928.9	O K
600 min Summer		73.995	1.545	2.0	965.6	O K
720 min Summer		74.041	1.591	2.0	994.5	O K
960 min Summer		74.110	1.660	2.0	1037.5	O K
1440 min Summer		74.192	1.742	2.0	1088.7	O K
2160 min Summer		74.244	1.794	2.0	1121.5	O K
2880 min Summer		74.254	1.804	2.0	1127.3	O K
4320 min Summer		74.209	1.759	2.0	1099.3	O K
5760 min Summer		74.145	1.695	2.0	1059.4	O K
7200 min Summer		74.086	1.636	2.0	1022.8	O K
8640 min Summer		74.033	1.583	2.0	989.4	O K
10080 min Summer		73.983	1.533	2.0	958.2	O K
15 min Winter		73.096	0.646	2.0	403.9	O K
30 min Winter		73.290	0.840	2.0	525.3	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		106.449	0.0	172.0	27	
30 min Summer		69.298	0.0	171.7	42	
60 min Summer		43.136	0.0	344.0	72	
120 min Summer		26.061	0.0	343.3	132	
180 min Summer		19.202	0.0	342.6	190	
240 min Summer		15.393	0.0	341.9	250	
360 min Summer		11.248	0.0	340.7	370	
480 min Summer		8.999	0.0	339.5	490	
600 min Summer		7.565	0.0	338.4	610	
720 min Summer		6.562	0.0	337.2	728	
960 min Summer		5.240	0.0	335.0	968	
1440 min Summer		3.812	0.0	330.6	1446	
2160 min Summer		2.770	0.0	669.5	2164	
2880 min Summer		2.207	0.0	662.2	2884	
4320 min Summer		1.601	0.0	644.8	4276	
5760 min Summer		1.274	0.0	1313.2	4848	
7200 min Summer		1.067	0.0	1283.0	5552	
8640 min Summer		0.922	0.0	1246.1	6312	
10080 min Summer		0.816	0.0	1204.1	7064	
15 min Winter		106.449	0.0	172.1	27	
30 min Winter		69.298	0.0	171.7	41	
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GGP Consult				Page 2	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	73.493	1.043	2.0	651.7	O K
120 min Winter	73.702	1.252	2.0	782.7	O K
180 min Winter	73.826	1.376	2.0	860.0	O K
240 min Winter	73.913	1.463	2.0	914.1	O K
360 min Winter	74.037	1.587	2.0	991.6	O K
480 min Winter	74.126	1.676	2.0	1047.4	O K
600 min Winter	74.194	1.744	2.0	1090.1	O K
720 min Winter	74.249	1.799	2.0	1124.4	O K
960 min Winter	74.332	1.882	2.0	1176.1	Flood Risk
1440 min Winter	74.435	1.985	2.0	1240.6	Flood Risk
2160 min Winter	74.511	2.061	2.0	1288.2	FLOOD
2880 min Winter	74.539	2.089	2.0	1305.6	FLOOD
4320 min Winter	74.523	2.073	2.0	1295.4	FLOOD
5760 min Winter	74.458	2.008	2.0	1255.0	FLOOD
7200 min Winter	74.375	1.925	2.0	1202.9	Flood Risk
8640 min Winter	74.306	1.856	2.0	1160.0	Flood Risk
10080 min Winter	74.239	1.789	2.0	1117.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	43.136	0.0	344.1	72	
120 min Winter	26.061	0.0	343.3	130	
180 min Winter	19.202	0.0	342.6	188	
240 min Winter	15.393	0.0	341.9	248	
360 min Winter	11.248	0.0	340.7	366	
480 min Winter	8.999	0.0	339.4	484	
600 min Winter	7.565	0.0	338.2	602	
720 min Winter	6.562	0.0	337.0	720	
960 min Winter	5.240	0.0	334.7	956	
1440 min Winter	3.812	0.0	330.1	1426	
2160 min Winter	2.770	38.2	668.9	2124	
2880 min Winter	2.207	55.6	661.9	2804	
4320 min Winter	1.601	45.4	646.6	4152	
5760 min Winter	1.274	5.0	1320.1	5424	
7200 min Winter	1.067	0.0	1297.5	6480	
8640 min Winter	0.922	0.0	1269.3	6752	
10080 min Winter	0.816	0.0	1236.4	7672	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.606	4	8	0.606
			8	12	0.606

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

GGP Consult		Page 4
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

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GGP Consult				Page 1	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	73.200	0.750	2.0	468.5	O K
30 min Summer	73.433	0.983	2.0	614.4	O K
60 min Summer	73.676	1.226	2.0	766.1	O K
120 min Summer	73.922	1.472	2.0	920.1	O K
180 min Summer	74.063	1.613	2.0	1008.3	O K
240 min Summer	74.159	1.709	2.0	1068.0	O K
360 min Summer	74.294	1.844	2.0	1152.7	O K
480 min Summer	74.392	1.942	2.0	1213.9	Flood Risk
600 min Summer	74.467	2.017	2.0	1260.4	FLOOD
720 min Summer	74.526	2.076	2.0	1297.5	FLOOD
960 min Summer	74.615	2.165	2.0	1353.0	FLOOD
1440 min Summer	74.724	2.274	2.0	1421.4	FLOOD
2160 min Summer	74.802	2.352	2.0	1470.1	FLOOD
2880 min Summer	74.828	2.378	2.0	1486.0	FLOOD
4320 min Summer	74.800	2.350	2.0	1468.7	FLOOD
5760 min Summer	74.720	2.270	2.0	1418.4	FLOOD
7200 min Summer	74.635	2.185	2.0	1365.6	FLOOD
8640 min Summer	74.560	2.110	2.0	1318.5	FLOOD
10080 min Summer	74.492	2.042	2.0	1276.0	FLOOD
15 min Winter	73.290	0.840	2.0	524.9	O K
30 min Winter	73.552	1.102	2.0	688.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	138.153	0.0	172.1	27	
30 min Summer	90.705	0.0	171.8	42	
60 min Summer	56.713	0.0	344.3	72	
120 min Summer	34.246	0.0	343.7	132	
180 min Summer	25.149	0.0	343.1	192	
240 min Summer	20.078	0.0	342.6	252	
360 min Summer	14.585	0.0	341.6	370	
480 min Summer	11.622	0.0	340.7	490	
600 min Summer	9.738	10.4	339.8	610	
720 min Summer	8.424	47.5	338.9	730	
960 min Summer	6.697	103.0	337.2	970	
1440 min Summer	4.839	171.4	333.8	1448	
2160 min Summer	3.490	220.1	674.3	2168	
2880 min Summer	2.766	236.0	668.9	2884	
4320 min Summer	1.989	218.7	656.5	4324	
5760 min Summer	1.573	168.4	1332.2	5592	
7200 min Summer	1.311	115.6	1311.3	6128	
8640 min Summer	1.129	68.5	1283.5	6832	
10080 min Summer	0.994	26.0	1249.0	7568	
15 min Winter	138.153	0.0	172.1	27	
30 min Winter	90.705	0.0	171.8	42	
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GGP Consult				Page 2	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs No Outfall....		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	73.824	1.374	2.0	858.9	O K
120 min Winter	74.102	1.652	2.0	1032.3	O K
180 min Winter	74.261	1.811	2.0	1132.0	O K
240 min Winter	74.370	1.920	2.0	1199.8	Flood Risk
360 min Winter	74.524	2.074	2.0	1296.5	FLOOD
480 min Winter	74.637	2.187	2.0	1366.8	FLOOD
600 min Winter	74.723	2.273	2.0	1420.8	FLOOD
720 min Winter	74.793	2.343	2.0	1464.2	FLOOD
960 min Winter	74.898	2.448	2.0	1530.1	FLOOD
1440 min Winter	75.033	2.583	2.0	1614.2	FLOOD
2160 min Winter	75.138	2.688	2.0	1680.1	FLOOD
2880 min Winter	75.185	2.735	2.0	1709.4	FLOOD
4320 min Winter	75.191	2.741	2.0	1712.9	FLOOD
5760 min Winter	75.135	2.685	2.0	1677.9	FLOOD
7200 min Winter	75.047	2.597	2.0	1623.1	FLOOD
8640 min Winter	74.945	2.495	2.0	1559.2	FLOOD
10080 min Winter	74.852	2.402	2.0	1501.3	FLOOD
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	56.713	0.0	344.3	72	
120 min Winter	34.246	0.0	343.6	130	
180 min Winter	25.149	0.0	343.0	190	
240 min Winter	20.078	0.0	342.5	248	
360 min Winter	14.585	46.5	341.4	366	
480 min Winter	11.622	116.8	340.4	484	
600 min Winter	9.738	170.8	339.3	604	
720 min Winter	8.424	214.2	338.3	722	
960 min Winter	6.697	280.1	336.4	958	
1440 min Winter	4.839	364.2	332.5	1430	
2160 min Winter	3.490	430.1	672.4	2128	
2880 min Winter	2.766	459.4	666.5	2828	
4320 min Winter	1.989	462.9	654.2	4196	
5760 min Winter	1.573	427.9	1332.1	5536	
7200 min Winter	1.311	373.1	1316.8	6840	
8640 min Winter	1.129	309.2	1297.7	7960	
10080 min Winter	0.994	251.3	1272.5	8080	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps Hornage Farm, AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.606	4	8	0.606
				8	12
					0.606

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

GGP Consult		Page 4
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs No Outfall....	Designed by DJC Checked by JHC	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

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APPENDIX III

Silage Clamp Amended Discharge Rate Calculations

GGP Consult				Page 1	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs Adjusted Ou...		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	73.026	0.576	2.5	359.8	O K
30 min Summer	73.198	0.748	2.5	467.6	O K
60 min Summer	73.377	0.927	2.5	579.5	O K
120 min Summer	73.560	1.110	2.5	694.0	O K
180 min Summer	73.667	1.217	2.5	760.7	O K
240 min Summer	73.741	1.291	2.5	806.6	O K
360 min Summer	73.843	1.393	2.5	870.9	O K
480 min Summer	73.915	1.465	2.5	915.9	O K
600 min Summer	73.969	1.519	2.5	949.3	O K
720 min Summer	74.010	1.560	2.5	975.0	O K
960 min Summer	74.068	1.618	2.5	1011.5	O K
1440 min Summer	74.130	1.680	2.5	1049.8	O K
2160 min Summer	74.152	1.702	2.5	1063.7	O K
2880 min Summer	74.132	1.682	2.5	1051.5	O K
4320 min Summer	74.055	1.605	2.5	1003.4	O K
5760 min Summer	73.985	1.535	2.5	959.1	O K
7200 min Summer	73.921	1.471	2.5	919.4	O K
8640 min Summer	73.861	1.411	2.5	881.9	O K
10080 min Summer	73.803	1.353	2.5	845.7	O K
15 min Winter	73.095	0.645	2.5	403.3	O K
30 min Winter	73.289	0.839	2.5	524.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	106.449	0.0	215.0	27	
30 min Summer	69.298	0.0	214.6	42	
60 min Summer	43.136	0.0	430.0	72	
120 min Summer	26.061	0.0	429.1	132	
180 min Summer	19.202	0.0	428.2	190	
240 min Summer	15.393	0.0	427.4	250	
360 min Summer	11.248	0.0	425.8	370	
480 min Summer	8.999	0.0	424.3	490	
600 min Summer	7.565	0.0	422.8	608	
720 min Summer	6.562	0.0	421.4	728	
960 min Summer	5.240	0.0	418.5	968	
1440 min Summer	3.812	0.0	412.6	1446	
2160 min Summer	2.770	0.0	835.2	2164	
2880 min Summer	2.207	0.0	824.4	2880	
4320 min Summer	1.601	0.0	796.5	3640	
5760 min Summer	1.274	0.0	1619.5	4376	
7200 min Summer	1.067	0.0	1572.4	5120	
8640 min Summer	0.922	0.0	1516.3	5960	
10080 min Summer	0.816	0.0	1455.2	6760	
15 min Winter	106.449	0.0	215.1	27	
30 min Winter	69.298	0.0	214.6	41	
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GGP Consult				Page 2	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs Adjusted Ou...		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	73.490	1.040	2.5	650.0	O K
120 min Winter	73.697	1.247	2.5	779.4	O K
180 min Winter	73.818	1.368	2.5	855.2	O K
240 min Winter	73.902	1.452	2.5	907.7	O K
360 min Winter	74.021	1.571	2.5	981.9	O K
480 min Winter	74.105	1.655	2.5	1034.5	O K
600 min Winter	74.169	1.719	2.5	1074.1	O K
720 min Winter	74.218	1.768	2.5	1105.1	O K
960 min Winter	74.291	1.841	2.5	1150.4	O K
1440 min Winter	74.374	1.924	2.5	1202.3	Flood Risk
2160 min Winter	74.420	1.970	2.5	1231.2	Flood Risk
2880 min Winter	74.419	1.969	2.5	1230.7	Flood Risk
4320 min Winter	74.351	1.901	2.5	1187.9	Flood Risk
5760 min Winter	74.252	1.802	2.5	1126.3	O K
7200 min Winter	74.169	1.719	2.5	1074.4	O K
8640 min Winter	74.085	1.635	2.5	1021.8	O K
10080 min Winter	74.000	1.550	2.5	968.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	43.136	0.0	430.1	70	
120 min Winter	26.061	0.0	429.1	130	
180 min Winter	19.202	0.0	428.2	188	
240 min Winter	15.393	0.0	427.4	248	
360 min Winter	11.248	0.0	425.8	364	
480 min Winter	8.999	0.0	424.2	482	
600 min Winter	7.565	0.0	422.7	600	
720 min Winter	6.562	0.0	421.2	718	
960 min Winter	5.240	0.0	418.2	952	
1440 min Winter	3.812	0.0	412.2	1420	
2160 min Winter	2.770	0.0	835.3	2108	
2880 min Winter	2.207	0.0	825.6	2792	
4320 min Winter	1.601	0.0	803.2	4072	
5760 min Winter	1.274	0.0	1637.7	4680	
7200 min Winter	1.067	0.0	1599.6	5552	
8640 min Winter	0.922	0.0	1555.0	6480	
10080 min Winter	0.816	0.0	1505.7	7368	
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GGP Consult		Page 3
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps Hornage Farm, AD Plant	
Date 01/05/2022 File Clamp Calcs Adjusted Ou...	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.606		4 8 0.606		8 12 0.606	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

GGP Consult		Page 4
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs Adjusted Ou...	Designed by DJC Checked by JHC	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

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GGP Consult				Page 1	
2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps Hornage Farm, AD Plant			
Date 01/05/2022 File Clamp Calcs Adjusted Ou...		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	73.188	0.738	7.6	461.6	O K
30 min Summer	73.416	0.966	7.6	603.5	O K
60 min Summer	73.644	1.194	7.6	746.3	O K
120 min Summer	73.862	1.412	7.6	882.3	O K
180 min Summer	73.973	1.523	7.6	952.1	O K
240 min Summer	74.040	1.590	7.6	993.5	O K
360 min Summer	74.117	1.667	7.6	1041.6	O K
480 min Summer	74.156	1.706	7.6	1066.3	O K
600 min Summer	74.172	1.722	7.6	1076.5	O K
720 min Summer	74.174	1.724	7.6	1077.5	O K
960 min Summer	74.149	1.699	7.6	1062.2	O K
1440 min Summer	74.063	1.613	7.6	1008.1	O K
2160 min Summer	73.949	1.499	7.6	936.9	O K
2880 min Summer	73.850	1.400	7.6	874.8	O K
4320 min Summer	73.666	1.216	7.6	760.3	O K
5760 min Summer	73.497	1.047	7.6	654.3	O K
7200 min Summer	73.340	0.890	7.6	556.5	O K
8640 min Summer	73.198	0.748	7.6	467.6	O K
10080 min Summer	73.070	0.620	7.6	387.6	O K
15 min Winter	73.279	0.829	7.6	518.0	O K
30 min Winter	73.534	1.084	7.6	677.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	138.153	0.0	469.7	26	
30 min Summer	90.705	0.0	605.1	41	
60 min Summer	56.713	0.0	773.3	70	
120 min Summer	34.246	0.0	933.8	130	
180 min Summer	25.149	0.0	1028.4	190	
240 min Summer	20.078	0.0	1094.2	248	
360 min Summer	14.585	0.0	1188.8	366	
480 min Summer	11.622	0.0	1252.3	486	
600 min Summer	9.738	0.0	1284.2	604	
720 min Summer	8.424	0.0	1282.8	724	
960 min Summer	6.697	0.0	1271.9	960	
1440 min Summer	4.839	0.0	1243.2	1216	
2160 min Summer	3.490	0.0	1713.3	1580	
2880 min Summer	2.766	0.0	1810.1	1972	
4320 min Summer	1.989	0.0	1952.6	2776	
5760 min Summer	1.573	0.0	2058.9	3584	
7200 min Summer	1.311	0.0	2144.1	4336	
8640 min Summer	1.129	0.0	2215.5	5104	
10080 min Summer	0.994	0.0	2277.1	5848	
15 min Winter	138.153	0.0	524.4	26	
30 min Winter	90.705	0.0	649.2	41	
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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY		Silage Clamps AD Plant			
Date 01/05/2022 File Clamp Calcs Adjusted Ou...		Designed by DJC Checked by JHC			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	73.793	1.343	7.6	839.4	O K
120 min Winter	74.042	1.592	7.6	995.1	O K
180 min Winter	74.173	1.723	7.6	1076.8	O K
240 min Winter	74.253	1.803	7.6	1126.6	O K
360 min Winter	74.350	1.900	7.6	1187.4	Flood Risk
480 min Winter	74.405	1.955	7.6	1221.7	Flood Risk
600 min Winter	74.434	1.984	7.6	1240.0	Flood Risk
720 min Winter	74.446	1.996	7.6	1247.8	Flood Risk
960 min Winter	74.440	1.990	7.6	1243.6	Flood Risk
1440 min Winter	74.360	1.910	7.6	1193.5	Flood Risk
2160 min Winter	74.207	1.757	7.6	1097.8	O K
2880 min Winter	74.070	1.620	7.6	1012.4	O K
4320 min Winter	73.799	1.349	7.6	842.9	O K
5760 min Winter	73.541	1.091	7.6	681.8	O K
7200 min Winter	73.305	0.855	7.6	534.2	O K
8640 min Winter	73.094	0.644	7.6	402.4	O K
10080 min Winter	72.912	0.462	7.6	288.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	56.713	0.0	866.1	70	
120 min Winter	34.246	0.0	1045.6	128	
180 min Winter	25.149	0.0	1150.1	186	
240 min Winter	20.078	0.0	1219.5	244	
360 min Winter	14.585	0.0	1292.9	360	
480 min Winter	11.622	0.0	1292.0	476	
600 min Winter	9.738	0.0	1287.4	592	
720 min Winter	8.424	0.0	1282.8	708	
960 min Winter	6.697	0.0	1273.0	932	
1440 min Winter	4.839	0.0	1250.2	1362	
2160 min Winter	3.490	0.0	1918.9	1696	
2880 min Winter	2.766	0.0	2027.3	2160	
4320 min Winter	1.989	0.0	2182.5	3032	
5760 min Winter	1.573	0.0	2306.3	3872	
7200 min Winter	1.311	0.0	2401.4	4680	
8640 min Winter	1.129	0.0	2481.7	5376	
10080 min Winter	0.994	0.0	2550.7	6056	
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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
Date 01/05/2022 File Clamp Calcs Adjusted Ou...	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.818

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.606	4	8	0.606
			8	12	0.606

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

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2 Hallam Road, Priory Park East Hull, Humberside HU4 7DY	Silage Clamps AD Plant	
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Model Details

Storage is Online Cover Level (m) 74.450

Tank or Pond Structure

Invert Level (m) 72.450

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	625.0	2.000	625.0

Pump Outflow Control

Invert Level (m) 72.450

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.6000	1.200	7.6000	3.000	7.6000	7.000	7.6000
0.200	7.6000	1.400	7.6000	3.500	7.6000	7.500	7.6000
0.300	7.6000	1.600	7.6000	4.000	7.6000	8.000	7.6000
0.400	7.6000	1.800	7.6000	4.500	7.6000	8.500	7.6000
0.500	7.6000	2.000	7.6000	5.000	7.6000	9.000	7.6000
0.600	7.6000	2.200	7.6000	5.500	7.6000	9.500	7.6000
0.800	7.6000	2.400	7.6000	6.000	7.6000		
1.000	7.6000	2.600	7.6000	6.500	7.6000		

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