



RIDGE

**RADWELL BURY FARM
BATTERY ENERGY STORAGE
SYSTEM FACILITY**

BALANCE POWER

**FLOOD RISK ASSESSMENT AND
SURFACE WATER DRAINAGE
STRATEGY**

15th November 2024

RADWELL BURY FARM BATTERY ENERGY STORAGE SYSTEM FACILITY

BALANCE POWER

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EXECUTIVE SUMMARY

Ridge and Partners LLP have been commissioned by Balance Power to prepare a Flood Risk Assessment and Surface Water Drainage Strategy in support of a planning application for the construction of a Battery Energy Storage System (BESS) facility at Radwell Bury Farm, Baldock, Hertfordshire.

The proposed site lies within Flood Zone 1, and is therefore at 'Very Low' risk of fluvial and tidal flooding (less than 1 in 1000 probability of flooding in any given year). Parts of the site are at 'Low' risk of surface water flooding, which is a probability of flooding between 1 in 100 and 1 in 1000 in any given year. Some limited extents of 'Medium' surface water flood risk (between 1 in 30 and 1 in 100 probability in any given year) have been identified in the northern confines of the site. No flood risk sources are considered to pose an unmanageable risk to the development, and therefore the proposed BESS facility is considered suitable in this location.

The proposed surface water drainage system incorporates open SuDS in the form of two attenuation basins, (with a restricted outfall limited to QBAR runoff rate into the existing watercourse), filter drains, filter strip, and cut-off ditch (utilised to intercept any overland runoff from the fields). As the site is located within a principal aquifer (chalk bedrock), all drainage features will be lined with impermeable membranes (including below the granular compound areas) to prevent used/ contaminated firewater infiltrating to ground and potentially contaminating groundwater sources. Notwithstanding this, infiltration testing has also been undertaken across the site which has confirmed that existing ground conditions are practically impervious (only a single soakage test completed with a poor infiltration rate, whilst all other soakage tests could not calculate an infiltration rate due to insufficient head loss). As such, infiltration is not a viable means of surface water disposal regardless of the risk to groundwater from contamination.

A firewater supply tank is currently proposed, which will be utilised as a firefighting water supply at the site. A new mains water supply and hydrant connection is also being explored for the site, which if viable, would mean the firewater supply tank would not be required. Penstock shutoff valves will be provided in chambers immediately downstream of the proposed attenuation basins, which can be utilised to prevent used/ contaminated firewater discharging into the downstream watercourse, and provide a contained firewater supply for reuse (if required) during a fire incident.

1. INTRODUCTION

Ridge and Partners LLP have been commissioned by Balance Power to prepare a Flood Risk Assessment (FRA) and Surface Water Drainage Strategy in support of a planning application for the construction of a Battery Energy Storage System (BESS) facility at Radwell Bury Farm, Baldock, Hertfordshire.

The existing site is greenfield, and so greenfield (pre-development) run off rates have been calculated and utilised for establishing the allowable peak post-development runoff rates from the site.

The total development area associated with this planning application covers an approximate area of 3.58 ha, of which approximately 1.08 ha is new hard landscaped area (access roads, granular compounds, concrete bases etc). The remaining area will remain as soft landscaping.

The NPPF and Environment Agency (EA) provide guidance for where a site-specific FRA is required, which applies to the following:

- For sites of 1 hectare or greater in Flood Zone 1;
- All new development (including minor development and change of use to a more vulnerable class e.g. commercial to residential) in Flood Zones 2 and 3;
- For sites within Flood Zone 1 which have critical drainage problems (as notified by the Environment Agency); and
- Where proposed development (including change of use to a more vulnerable class e.g. commercial to residential) may be subject to other sources of flooding.

Furthermore, all planning applications which are classified as 'Major Development' must be submitted with a Surface Water Management Strategy. 'Major Development' is considered either:

- 10 or more dwellings, or a site of 0.5 hectares or more for residential applications; or
- Floorspace of 1000m² or more, or a site of 1 hectare or more.

As the proposed BESS facility site is larger than 1 hectare, a Flood Risk Assessment and Surface Water Management Strategy is required.

This FRA and Drainage Strategy assesses the existing flood risk associated with the proposed site (including managing any potential increase in flood risk as a result of the new development), whilst setting out the surface water drainage design for the development to manage flood risk (both on and off the site) in the post-development scenario. The report considers the risk of flooding from all sources, including fluvial (watercourse), pluvial (surface water), groundwater, reservoir, sewer flooding and flooding from artificial sources.

2. SITE DESCRIPTION

2.1. Site Location

Site Name: Radwell Bury Farm

Site Address: Radwell, Baldock, Hertfordshire, SG7 5DP

Site Location: Easting: 524067, Northing: 236690

National Grid Reference: TL 24067 36690

Site Area: Approx. 3.58 ha

The site is located off Newnham Road and is currently accessed from a gravel track which joins the site from the south. The site is bounded by an existing ditch to the north-east, Newnham Road to the south and farmland to the west (beyond which is Baldock Services). Approximately 600m east is a cluster of commercial units.

132kV overhead powerlines cross the site, running north to south, with a pylon located to the north-east boundary of the site. A 30m exclusion zone from the base of this pylon has been identified for any new development, within which no construction works can be undertaken. A 30m ecological buffer zone from the existing ditch has been utilised in developing the design, ensuring that new development is located outside of this.

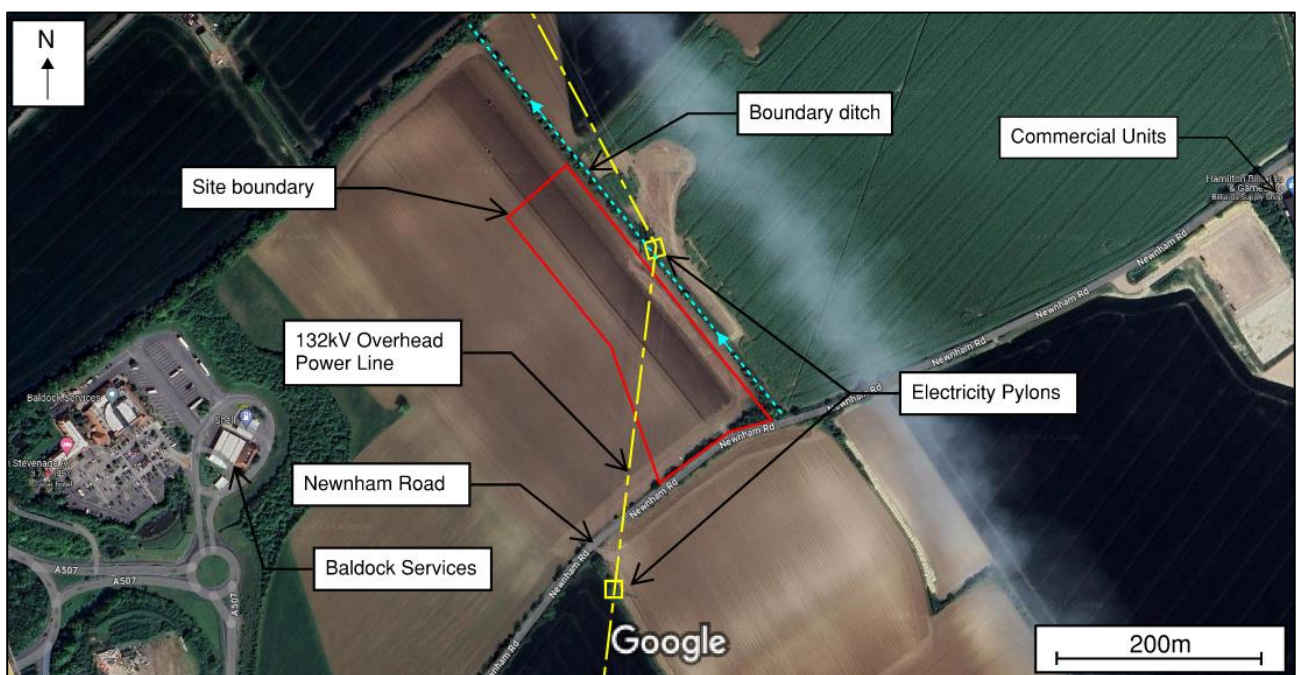


Figure 1 – Radwell Bury Farm Development Site (Google, 2024)

2.2. Land use and Topography

The site is an arable field which generally falls from south-west to north-east, with the highest point being on the south-western boundary at 60.8mAOD, and the lowest on the northern edge at 56.4mAOD. There is therefore an approximate maximum level difference of 4.4 m across the site. The existing site catchment area (3.58ha) drains towards the existing boundary ditch, following a localised depression northwards in the field (parallel to the existing ditch) before the surface water drains off the field into the ditch.

The topographical survey drawing has been provided in Appendix A – Topographic and Existing Utilities Survey.

2.3. Site Constraints and Risks

The following site constraints and risks have been identified:

- **132kV overhead power lines and pylon** – Power lines of 132kV and lower are owned by the DNO (Distribution Network Operator). For the case of Radwell Bury Farm, the DNO is UKPN (UK Power Networks). A 30m offset from the base of the existing pylon for proposed works has been utilised. Any proposed works being undertaken below the overhead lines present a risk to the workforce e.g. flashover from the cables above. A GS6 request form should be raised with UKPN to arrange a site visit and discuss safe working clearances.
- **Ecological buffer** - A 30m ecological buffer zone from the existing ditch has been utilised in developing the design, ensuring that new development is located outside of this.
- **Site access** – A new permanent site access is required to be constructed along Newnham Road. It is anticipated this will be a bellmouth access, with a Section 278 agreement required with Hertfordshire County Council Highways. As Newnham Road is a national speed limit road, the proposed access will need to be designed accordingly to ensure the new site access is safe for road users.
- **Trees** – There are several existing trees along the southern site boundary (adjacent to Newnham Road) and adjacent to the existing watercourse along the eastern side of the site boundary. The design of the new vehicular access and connection to the existing watercourse will be undertaken to avoid/limit impact on tree roots where trees are to be retained.
- **Groundwater** – The site is located within a principal aquifer, and therefore extremely sensitive to potential pollution and contamination sources. This is discussed further in Sections 2.7 and Section 6 of this report, including proposals for protecting the bedrock aquifer by preventing infiltration to ground.

2.4. Hydrology

The site falls within the Upper and Bedford Ouse Management Catchment area, and the site drains towards an ordinary watercourse on the northeast edge of the site, which in turn flows to the Cat Ditch Water Body to the north.

The FEH hydrological catchment for the site is shown below in Figure 2:

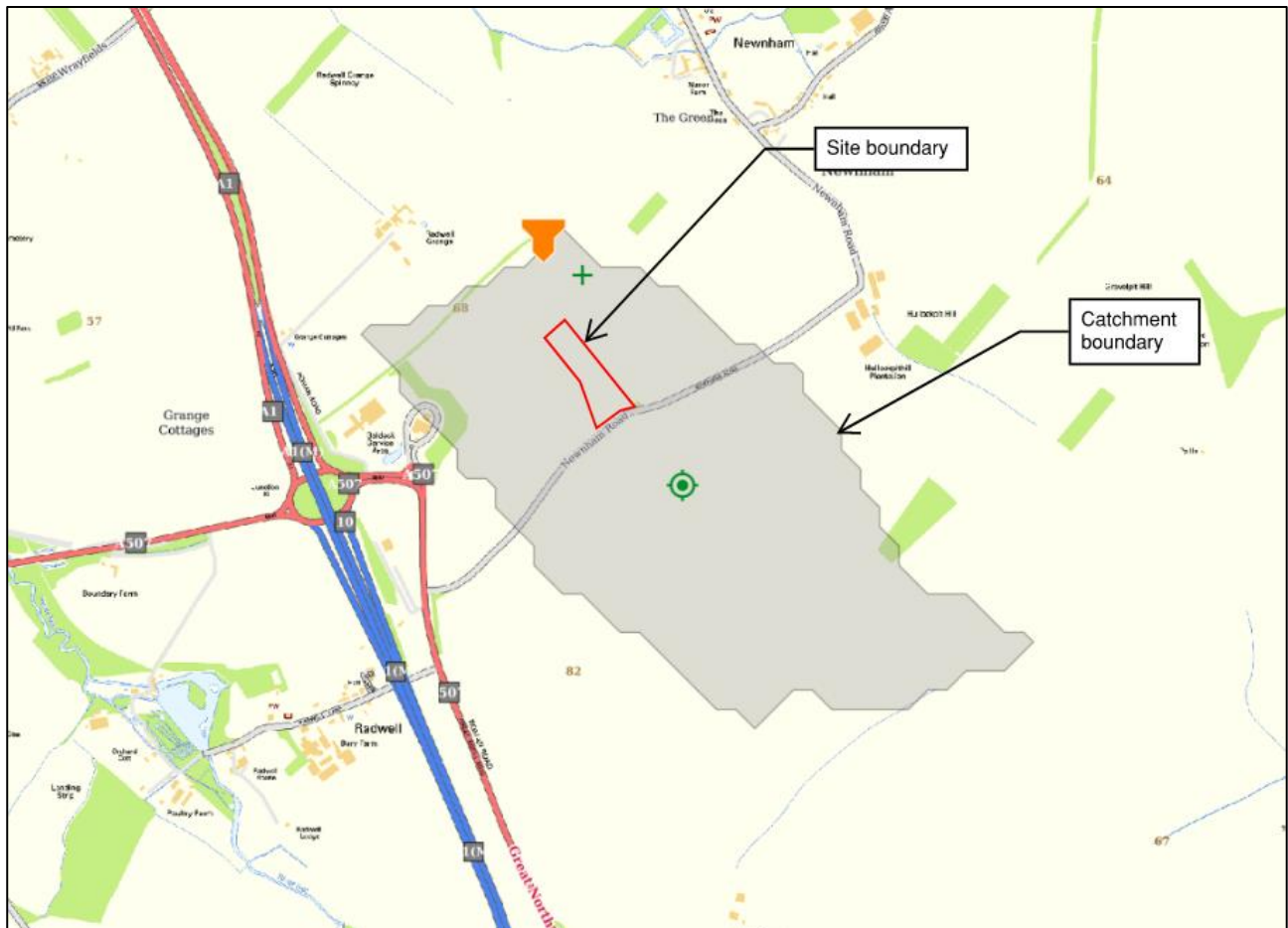


Figure 2 – Hydrological Catchment (FEH Online Web Service, 2024)

It has also been identified that the ordinary watercourse which bounds the eastern side of the development site lies within the Bedfordshire and Rivel Ivel Internal Drainage Board (IDB) Area (as illustrated in Figure 3 below). Whilst the watercourse itself is not adopted into the Boards maintenance programme, it is understood that the watercourse is still subject to the Boards' statutory and byelaw control. This includes applying for Land Drainage Consent with the Board for the new headwall outfall to be constructed in the existing watercourse.

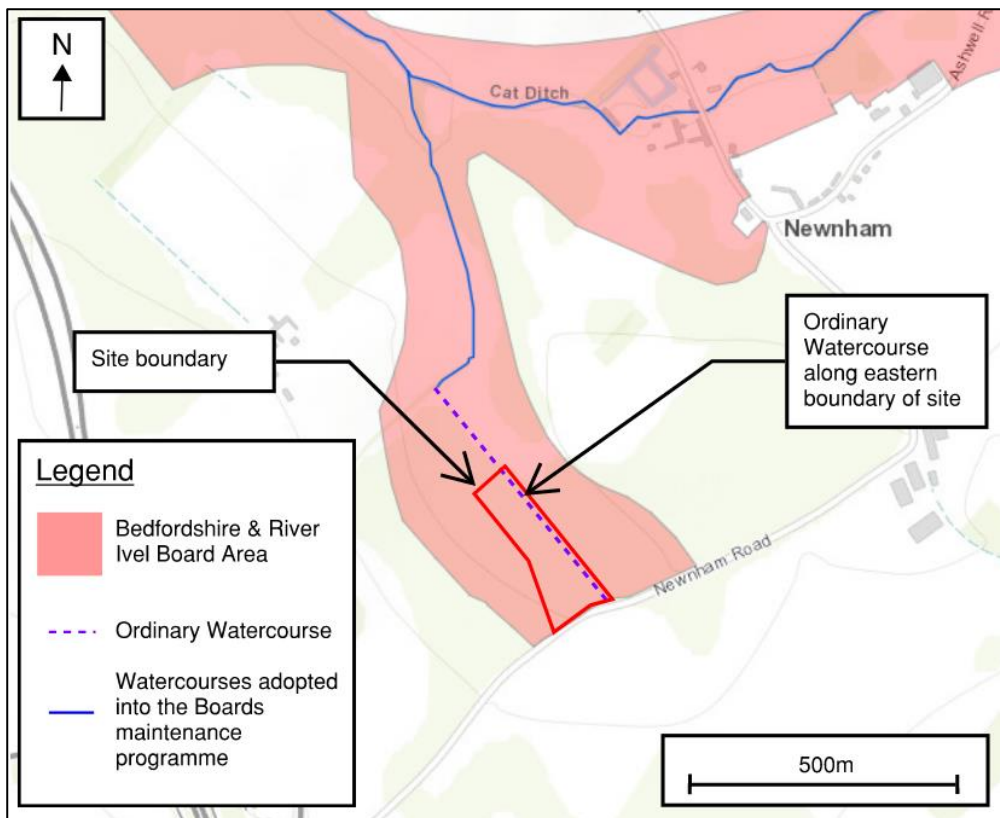


Figure 3 – Bedfordshire and River Ivel Internal Drainage Board Area (IDB Bedford Group, 2024)

2.5. Geological Records

British Geological Survey (BGS) online mapping shows the site is underlain by a bedrock of chalk, with superficial Head deposits of clay, silt, sand and gravel. The BGS geological mapping records pertaining to the site are illustrated in Figures 4 and 5 below:

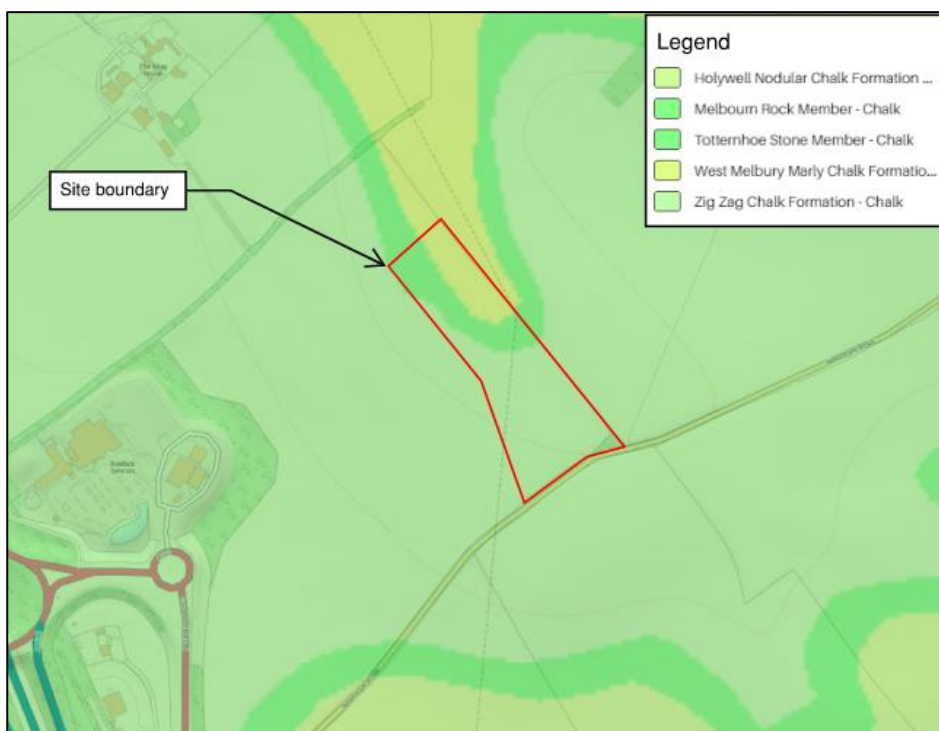


Figure 4 – Bedrock Deposits at the site (British Geological Survey, 2024)

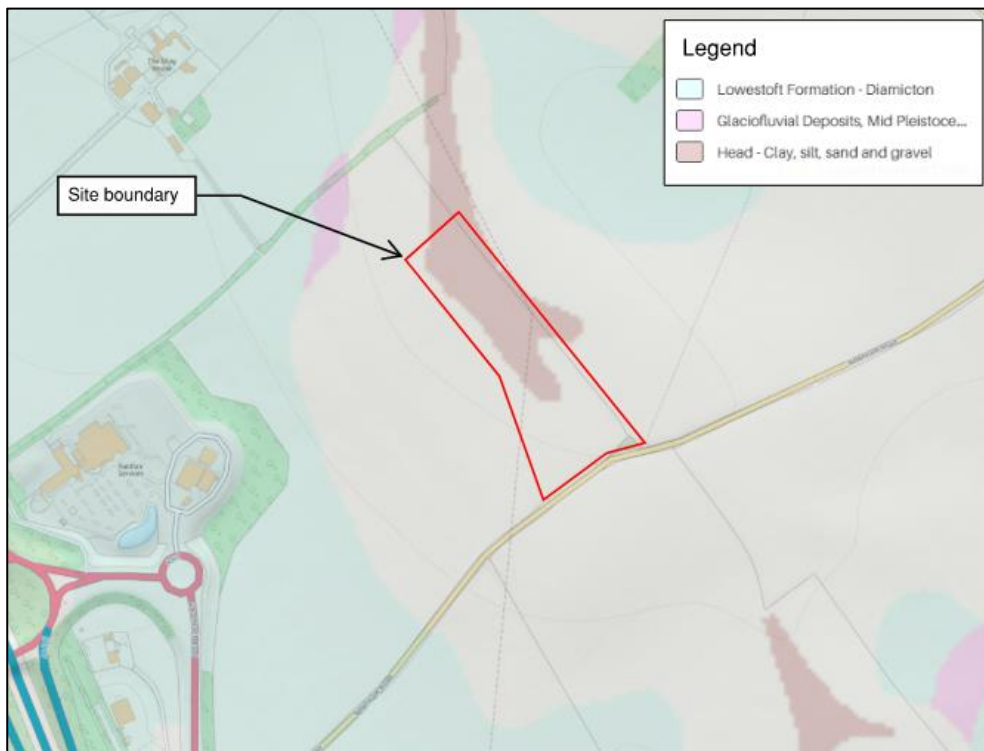


Figure 5 – Superficial deposits at the site (British Geological Survey, 2024)

No historic borehole records are available for the site, however there are a number of borehole logs in the locality, including:

- **Ref. TL23NW28** (640 m south-west of the site) – Indicates clay, sand and silty deposits above chalk.
- **Ref. TL23NW29** (750 m south-west of the site) – Indicates clay, sand and silty deposits above chalk.

Whilst it cannot be assumed the ground strata at the development site will exactly match these borehole records, the borehole records can be used to provide an indication of what is likely to be encountered on site. The borehole records accord with the BGS geology mapping which is illustrated in Figures 4 and 5 above. Historic borehole information can be viewed on the BGS borehole records website¹.

Soilscapes² mapping also indicates the soil is likely to be freely draining lime-rich loamy soils.

2.6. Hydrogeology

Approximately half the site is located in Zone III (Total Catchment) of a Source Protection Zone (SPZ), roughly 1.5 km from the edge of Zone II (Outer Protection Zone) and 2.9 km from Zone I (Inner Protection Zone).

¹ [Borehole records - British Geological Survey \(bgs.ac.uk\)](https://bgs.ac.uk/borehole-records)

² [LandIS - Land Information System - Soilscapes soil types viewer](https://landis.bgs.ac.uk/)
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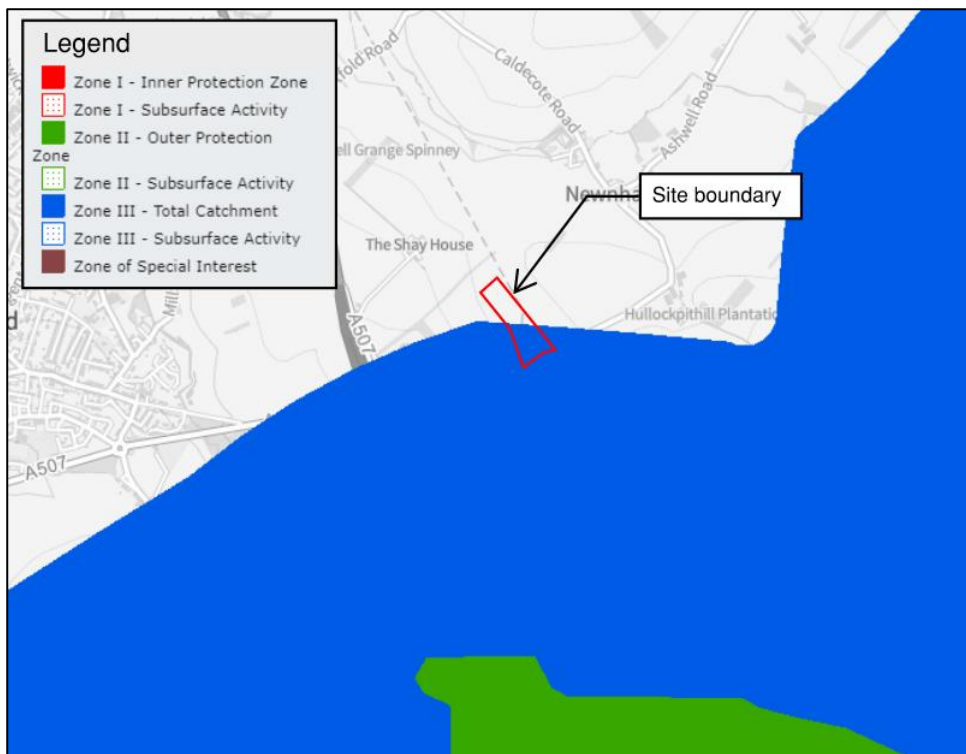


Figure 6 – Source Protection Zones (Magic Maps, 2024)

The site is located within a principal aquifer (chalk bedrock) and is partly located within a Secondary (undifferentiated) superficial aquifer. This secondary aquifer relates to the head deposits (clay, silt, sand and gravels) which are expected to be encountered within the site.

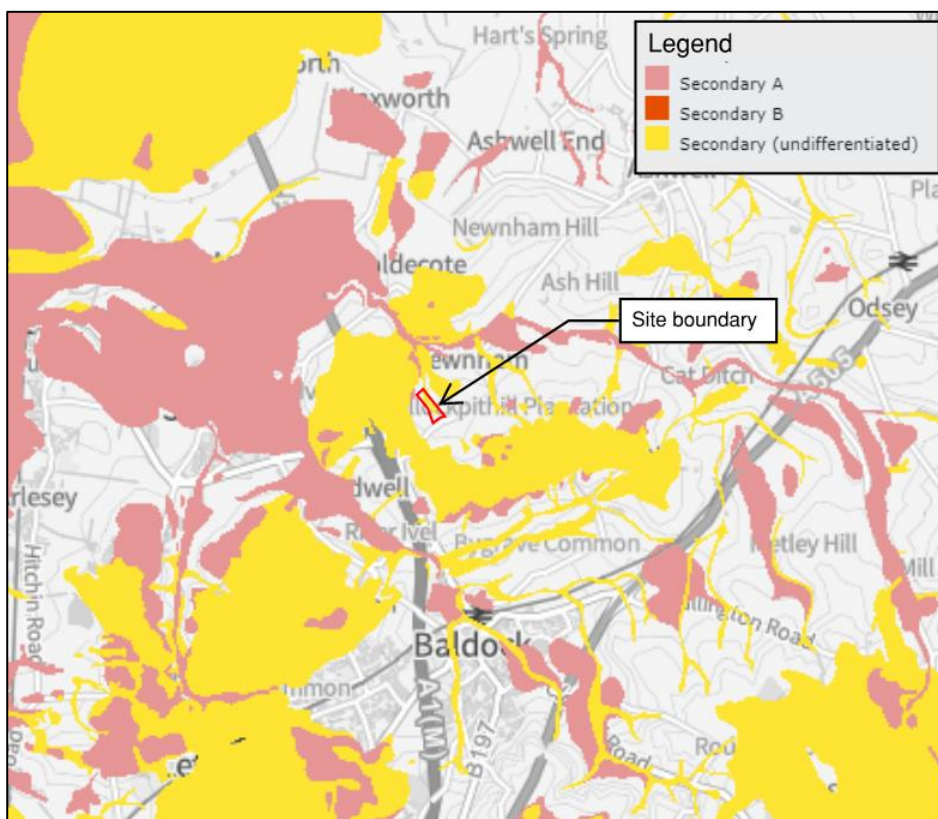


Figure 7 – Aquifer Designation Mapping (Magic Maps, 2024)

The site spans areas of medium, medium high, and high groundwater vulnerability. Higher groundwater vulnerability is associated with the presence of aquifers.

Groundwater vulnerability can be summarised as follows:

- **High:** areas that can easily transmit pollution to groundwater. They are characterised by high-leaching soils and the absence of low-permeability superficial deposits.
- **Medium:** areas that offer some groundwater protection. Intermediate between high and low vulnerability.
- **Low:** areas that provide the greatest protection to groundwater from pollution. They are likely to be characterised by low-leaching soils and/or the presence of low-permeability superficial deposits.
- **Unproductive:** areas comprised of rocks that have negligible significance for water supply or baseflow to rivers, lakes and wetlands. They consist of bedrock or superficial deposits with a low permeability that naturally offer protection to any aquifers that may be present beneath.

2.7. Desktop Study and Ground Investigation

A desktop study was undertaken by Ridge & Partners LLP in February 2024 for the proposed site. The findings of the study can be found in the report titled '5034440-RDG-XX-ST-DOC-C-00DTS01' which is included in Appendix F of this report.

Ground investigation was undertaken at the site in late October 2024. The ground investigation comprised four machine excavated trial pits (with infiltration testing to BRE 365) and three windowless sampler boreholes (with installation of groundwater monitoring wells). No groundwater was encountered in the trial holes during the site investigation. Windowless sampler boreholes were installed to depths of 4m – 5m.

For all trial hole locations, silty clay and clayey silt were encountered at shallow depths (up to a maximum depth of approx. 0.85m). Below this, chalk was recovered as silty sand.

Table 1 below provides a summary of the ground strata recorded during the ground investigation:

Table 1 – Summary of Encountered Ground Conditions (Ridge, 2024)

STRATA	UPPER LIMIT (MBGL)	LOWER LIMIT (MBGL)
Silty Clay	0.00	0.20-0.40
Sandy Clayey Silt	0.20-0.35	0.70-0.85
Chalk (Recovered as Silty Sand)	0.30-0.70	1.00-5.00

The Ground Investigation Report (prepared by Ridge) is included in Appendix I of this report.

2.8. Infiltration Testing

Infiltration testing has been undertaken across the site which has confirmed that existing ground conditions are practically impervious (only a single soakage test completed with a poor infiltration rate, whilst all other soakage tests could not calculate an infiltration rate due to insufficient head loss). As such, infiltration is not a viable means of surface water disposal regardless of the risk to groundwater from contamination. Table 2 below provides a summary of the infiltration testing undertaken across the site. Trial hole sample locations and references are illustrated on the 'Final Investigation Plan' which is included in the Ground Investigation Report in Appendix I.

Table 2 – Summary of Soil Infiltration Testing (Ridge, 2024)

HOLE ID	PIT DEPTH (M)	TIME AT 75% (MINS)	TIME AT 25% (MINS)	TOTAL TIME (MINS)	INFILTRATION RATE (M/S)	DRAINAGE CONDITION
TP01-1	1.00	90	-	300	n/a	Practically Impervious
TP01-2	1.00	-	-	300	n/a	Practically Impervious
TP02-1	2.00	900	-	1620	n/a	Practically Impervious
TP03-1	1.00	40	435*	440*	4.60E ⁻⁰⁶	Poor
TP03-2	1.00	165	-	360	n/a	Practically Impervious
TP04-1	2.00	110	-	300	n/a	Practically Impervious
TP04-2	2.00	195	-	300	n/a	Practically Impervious

Notwithstanding the above, infiltration is not proposed as a means of surface water disposal, as the site is located within a principal aquifer. Given the nature of the development and the risk to groundwater from pollutants e.g. contaminated firewater, infiltration is not considered practicable. The Environment Agency document titled 'The Environment Agency's approach to groundwater protection' has been reviewed, in addition to previous Environment Agency responses/ correspondence on similar sites (where objections have been raised on drainage systems permitting infiltration to ground where the risk to groundwaters is unacceptable). As such, the surface water drainage systems for the BESS facility at Radwell Bury Farm are required to be lined (e.g. using impermeable membranes) with control penstock/s upstream of the proposed outfall to the watercourse. The drainage strategy is discussed further in Section 6 of this report.

3. DEVELOPMENT PROPOSALS

The existing site is greenfield and is approximately 3.58ha, of which around 1.08 ha will become impermeable area post-development. The proposed development is comprised of the following:

- MOT Type 1 granular fill for construction of access roads through the site;
- MOT Type 1 (or other granular material/ gravel) for the remainder of the compound areas;
- New infrastructure associated with the new BESS facility, including 2 no. substations, control room and welfare, DNO room, transformer, storage room, battery containers and inverters;
- Concrete bases/ plinths for the new containers or buildings;
- Concrete hardstanding for the areas of proposed battery containers;
- Grasscrete or cellular ground reinforcement grids for emergency access tracks (fire tender access);
- 2 no. attenuation basins (with deeper areas for permanent water to support biodiversity and ecology);
- Filter strip;
- Surface water filter drains;
- Impermeable liners e.g. butyl are to be installed below both attenuation basins, filter drains, filter strip. and all granular areas across the compounds to prevent any pollutants e.g. contaminated firewater percolating to ground, to protect the chalk bedrock aquifer from contamination; and
- Cut-off drain along the western side of the development to intercept overland surface water flows.

A proposed site layout plan is provided in Appendix B.

4. FLOOD RISK POLICY

4.1. National Flood Risk Policy

Under Section 14 'Meeting the challenge of climate change, flooding and coastal change' of the **National Planning Policy Framework (NPPF)**³, the 'Planning and flood risk' section provides high-level guidance to local planning authorities to ensure the effective implementation of flood risk planning policy. This includes overarching statements relating to inappropriate development (in areas at risk of flooding) and flood risk vulnerability classifications, seeking advice from flood risk management authorities, a sequential based approach to siting of new development, the importance of not increasing flood risk off-site, and requirements for minor and major development (such as the incorporation of sustainable drainage systems).

The **Technical Guidance to the National Planning Policy Framework**⁴ provides supplementary information to the NPPF specific to Flood Risk and Minerals Policy. This document provides more specific information on The Sequential and Exception Tests, definition of Flood Zones 1, 2 and 3, types of development across the flood risk vulnerability classifications and flood zone compatibility, site-specific and Strategic Flood Risk Assessments (SFRAs), managing residual risk on sites, and accounting for climate change when assessing flood risk.

The NPPF and Environment Agency (EA) provide guidance for where a site-specific FRA is required to be submitted with a planning application, which applies to the following:

- For sites of 1 hectare or greater in Flood Zone 1;
- All new development (including minor development and change of use to a more vulnerable class e.g. commercial to residential) in Flood Zones 2 and 3;
- For sites within Flood Zone 1 which have critical drainage problems (as notified by the Environment Agency); and
- Where proposed development (including change of use to a more vulnerable class e.g. commercial to residential) may be subject to other sources of flooding.

Furthermore, all planning applications which are classified as 'Major Development' must be submitted with a Surface Water Management Strategy. 'Major Development' is considered either:

- 10 or more dwellings, or a site of 0.5 hectares or more for residential applications; or
- Floorspace of 1000m² or more, or a site of 1 hectare or more.

DEFRA (Department for Environment, Flood and Rural Affairs) have also produced a document titled '**Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems**'⁵. These technical standards for SuDS provide a high-level overview for managing peak flows from a new development, controlling surface water runoff volumes, managing flood risk within the development, construction of SuDS, and key maintenance considerations for SuDS.

The national guidance described in this section has been utilised to inform the development of this Flood Risk Assessment and Drainage Strategy.

³ [National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/432424/NPPF_2019.pdf)

⁴ [Technical Guidance to the National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/432424/Technical_Guidance_to_the_National_Planning_Policy_Framework.pdf)

⁵ [Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/432424/Sustainable_Drainage_Systems_Non-statutory_technical_standards_for_sustainable_drainage_systems.pdf)

4.2. Local Flood Risk and Sustainable Drainage Policies

Further to the national flood risk and drainage policies outlined above in Section 4.1, the following documents have also been produced by the Lead Local Flood Authority (Hertfordshire County Council) and Local Planning Authority (North Hertfordshire District Council).

4.2.1. Hertfordshire Local Flood Risk Management Strategy 2⁶

This document was produced by Hertfordshire County Council in 2019, as part of their role as Lead Local Flood Authority (LLFA) and was prepared to provide an overview of the strategy for the management of local sources of flood risk.

The Hertfordshire Local Flood Risk Management Strategy 2 includes the following information:

- Understanding local flood risk and relationship to national guidance
- Risk management authorities and their responsibilities
- Principles for flood risk management in Hertfordshire

This document has been used to develop an understanding of the local context for flood risk management.

4.2.2. Hertfordshire Strategic Flood Risk Assessment Level 1⁷

This document (separate to the SFRA produced by North Herts District Council), was published in July 2022, and further expands on the Local Flood Risk Management Strategy.

The following information is included:

- Flood risk policy
- Assessment of flood risk in Hertfordshire

4.2.3. North Hertfordshire District Council Strategic Flood Risk Assessment Update⁸

Produced in 2016, this document is to be read in conjunction with the wider Hertfordshire SFRA Level 1, and provides a more in depth assessment of the risk of flooding in North Hertfordshire, as well as mapping watercourses within North Hertfordshire.

- Flood zones
- Historic flooding

The SFRA indicates there are no recorded historic flooding incidents on the site area.

4.2.4. North Hertfordshire District Surface Water Management Plan⁹

The Surface Water Management Plan (SWMP) outlines the preferred strategy for surface water management within North Hertfordshire, and is undertaken in consultation with key stakeholders for surface water management and drainage. It provides suggestions for the mitigation of surface water flood risk around hotspots identified in the SFRA.

⁶ [Hertfordshire LFRMS 2](#)

⁷ [Hertfordshire SFRA Level 1](#)

⁸ [North Hertfordshire District Council SFRA Update](#)

⁹ [North Hertfordshire District Surface Water Management Plan](#)

4.2.5. Hertfordshire LLFA Summary Guidance for Developers¹⁰

This document, updated in 2021, provides technical guidance for developers with regards to the management of surface water drainage. It also sets out the technical requirements that an FRA/Surface Water Drainage Strategy must demonstrate, which are outlined below.

Runoff rates

Peak discharge rates must not increase as a result of the development, up to a 1 in 100+40% storm. As such, new development is required to limit peak post-development discharge rates to greenfield runoff rates.

Storage volumes

The site must not flood for up to and including a 1 in 30 year storm, and any flooding for an event up to the 1 in 100+40% must be contained on site and not pose a risk to the development or third parties.

SuDS

The SuDS hierarchy provided should be followed, with any obstacles justified as to why they prevent the most desirable SuDS method being implemented.

Residual risk

The residual risk of flooding can be managed and contained on site should any drainage features fail, or during an extreme storm event. This includes an overland flow routing plan.

Climate change allowances

This section outlines where the climate change allowances for Hertfordshire could be found. This is discussed further in Section 6 of this report.

4.3. Flood Risk Management Authorities

Below is a summary of flood risk management authorities pertinent to the site:

Lead Local Flood Authority (LLFA) - Hertfordshire County Council are the LLFA who are responsible for managing local flood risk (surface water, groundwater and ordinary watercourses). This includes leading on cooperation and coordination between Risk Management Authorities in the area.

Local Planning Authorities (LPAs) - The site lies within the district boundary of North Hertfordshire District Council. LPAs have a duty to cooperate and share information to reduce flood risk, and have powers to carry out flood risk management works on minor watercourses (outside IDB areas). In determining major planning applications, the District Council must consult with the County Council (LLFA) to inform of its determination of the planning application.

Environment Agency (EA) - The Environment Agency have a strategic overview of all sources of flooding and coastal erosion. In particular, the EA are responsible for regulating Main Rivers, managing flood risk and activities for those watercourses which are designated as Main Rivers. The Environment Agency also oversee the protection of groundwater and risks of groundwater pollution, and will require evidence of how proposed activities at the site will be managed to demonstrate the risks to groundwater are acceptable e.g. containment of contaminated firewater.

¹⁰ [LLFA Summary Guidance for developers](#)

Internal Drainage Boards (IDBs) - IDBs manage water levels in areas where there is a special need for drainage. The site lies within in the area of the Bedfordshire and River Ivel IDB, who are part of a Consortium of drainage boards which comprise the Bedford Group of Drainage Boards. The IDB's responsibilities include undertaking watercourse maintenance and improvement, adoption, and maintenance of Sustainable Drainage Systems (SuDS). The group also provides advice and direction to local authorities and developers, as part of the Town and Country planning procedure¹¹.

¹¹ [Home - The Bedford Group of Drainage Boards \(idbs.org.uk\)](http://idbs.org.uk)

5. SOURCES OF FLOOD RISK

An overview of flood risk sources in relation to the site is presented below in Table 3 and discussed further in Sections 5.1 - 5.6.

Table 3 - Summary of Flood Risk Sources

Flood Risk Source	Possibility at Site
Rivers or the Sea (Fluvial)	Very Low probability of fluvial flooding. The site is located in Flood Zone 1 (probability of fluvial flooding of less than 1 in 1000 years or 0.1% each year).
Surface Water (Pluvial)	Area of 'Low' surface water flooding risk (probability of flooding between 1 in 1000 years or 0.1% each year, and 1 in 100 years or 1% each year) along eastern side of the site. Some limited extents of 'Medium' surface water risk (probability of flooding between 1 in 100 years or 1% each year, and 1 in 30 years or 3.33% each year) in northern confines of the site.
Groundwater	Long Term Flood Risk Service states that flooding from groundwater is unlikely in this area. Soilsmap ¹² mapping has also indicated the ground conditions are anticipated to be freely draining.
Artificial Sources	Site is not located within predicted flood extents from reservoirs, canals, or considered at risk from other blue infrastructure.
Sewers or Drains	Considered unlikely.
Historical Flood Events	No historical flood events have been identified in the vicinity of the site.

5.1. Flooding from Rivers or the Sea (Fluvial/Tidal Flood Risk)

The Environment Agency (EA) Flood Map for Planning (extract provided below in Figure 8) indicates the site is located within Flood Zone 1 (Very Low risk of fluvial flooding). Very Low fluvial flood risk is a probability of less than 1 in 1000 year, or an annual probability of less than 0.1%. Given the fluvial flood mapping, the site is not considered to be at risk of fluvial flooding.

¹² [LandIS - Land Information System - Soilsmap soil types viewer](#)
5024440-RDG-XX-XX-RP-C-0501

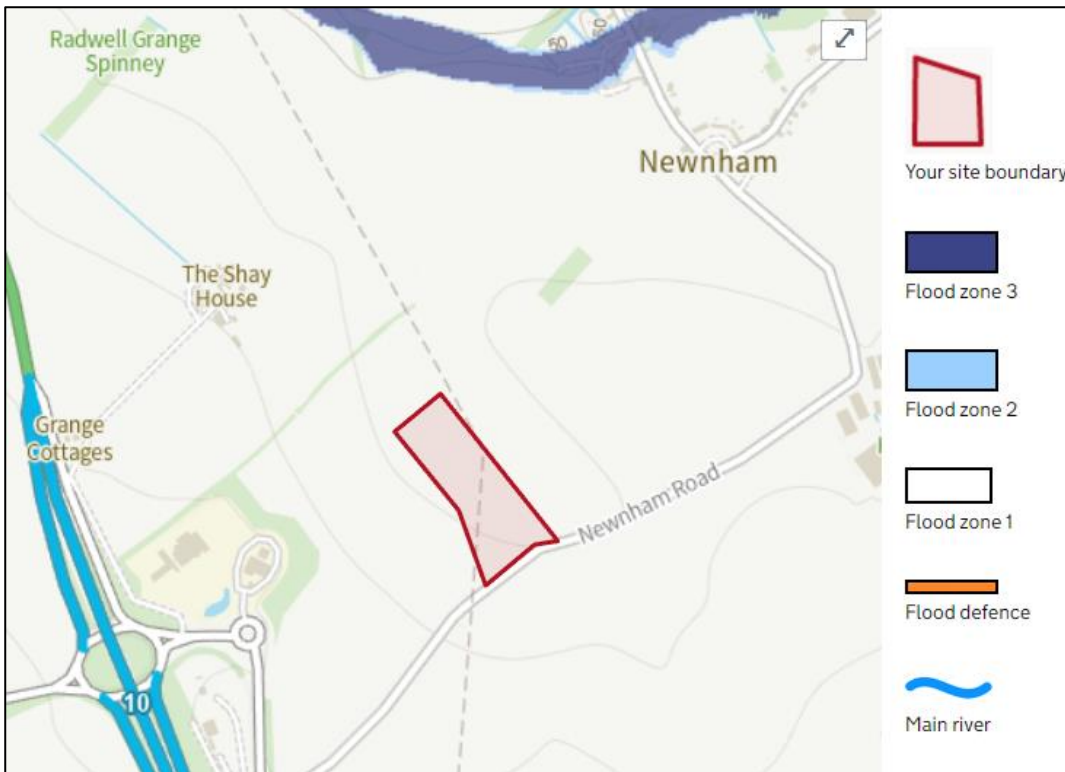


Figure 8 - Extract of Flood Map for Planning (Environment Agency, 2024)

5.2. Surface Water (Pluvial) Flood Risk

Extracts from the Environment Agency's surface water flood risk mapping are shown in Figures 9 - 13 below:

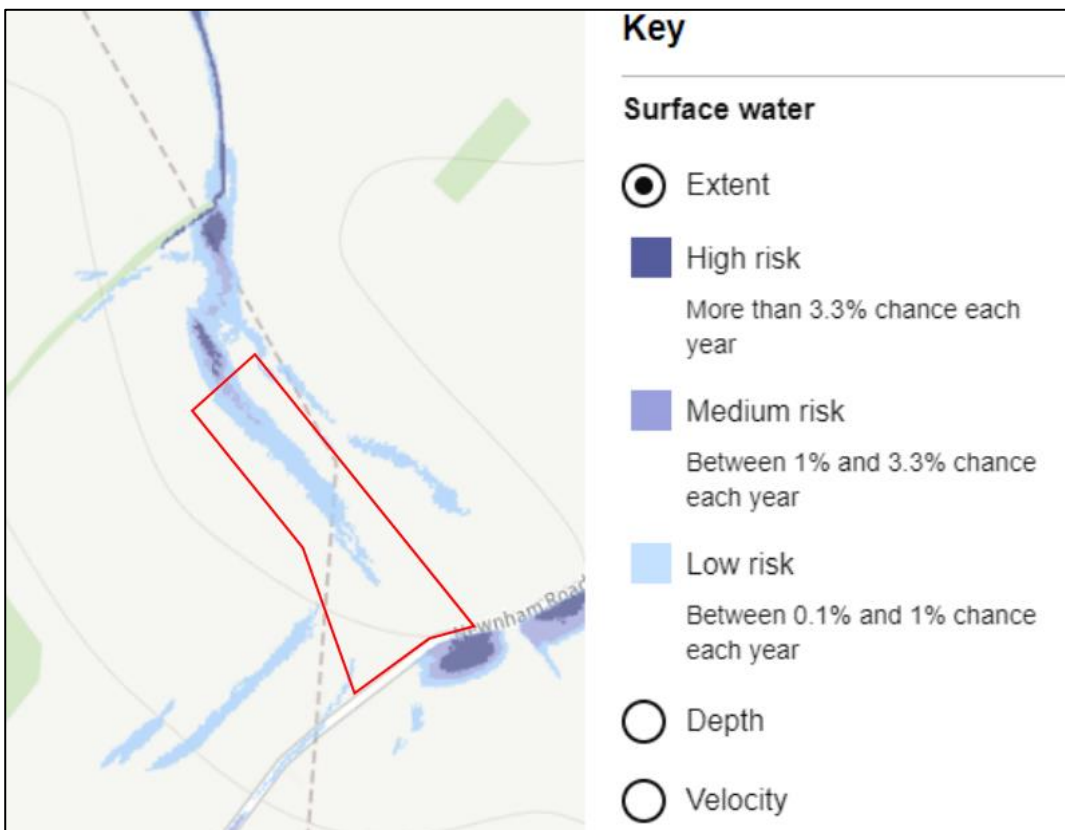


Figure 9 - Extract of Surface Water Flood Risk Mapping (Environment Agency, 2024)



Figure 10 - Extract of Medium Risk Surface Water Flood Depth Mapping (Environment Agency, 2024)

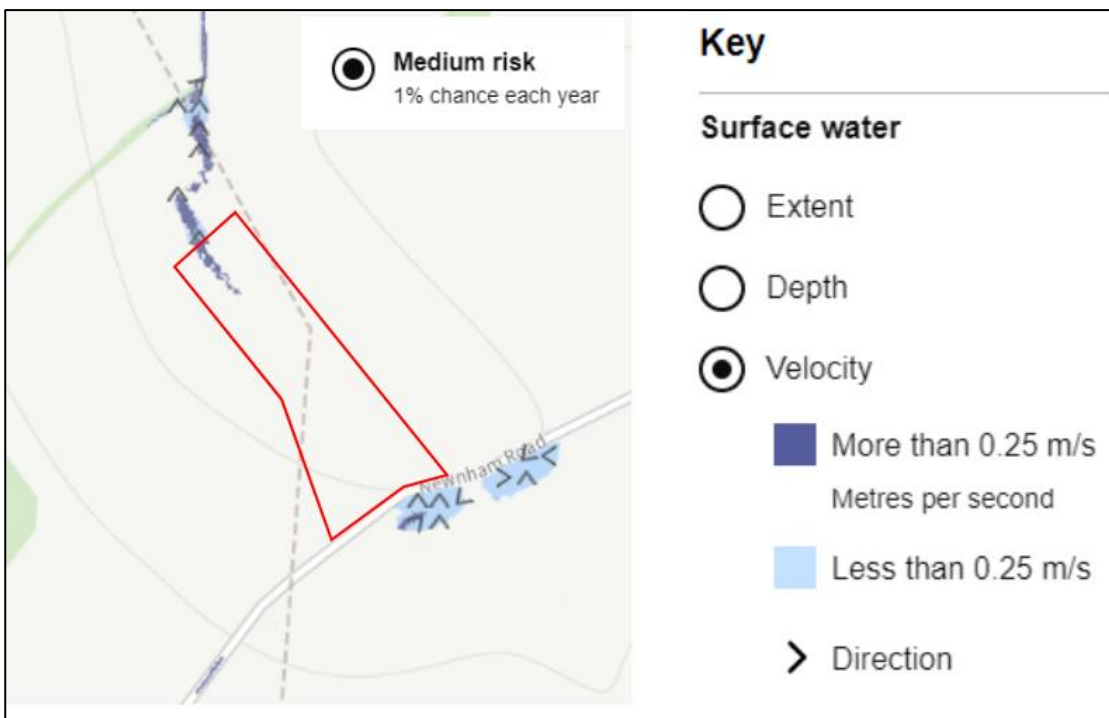


Figure 11 - Extract of Medium Risk Surface Water Flood Velocity Mapping (Environment Agency, 2024)

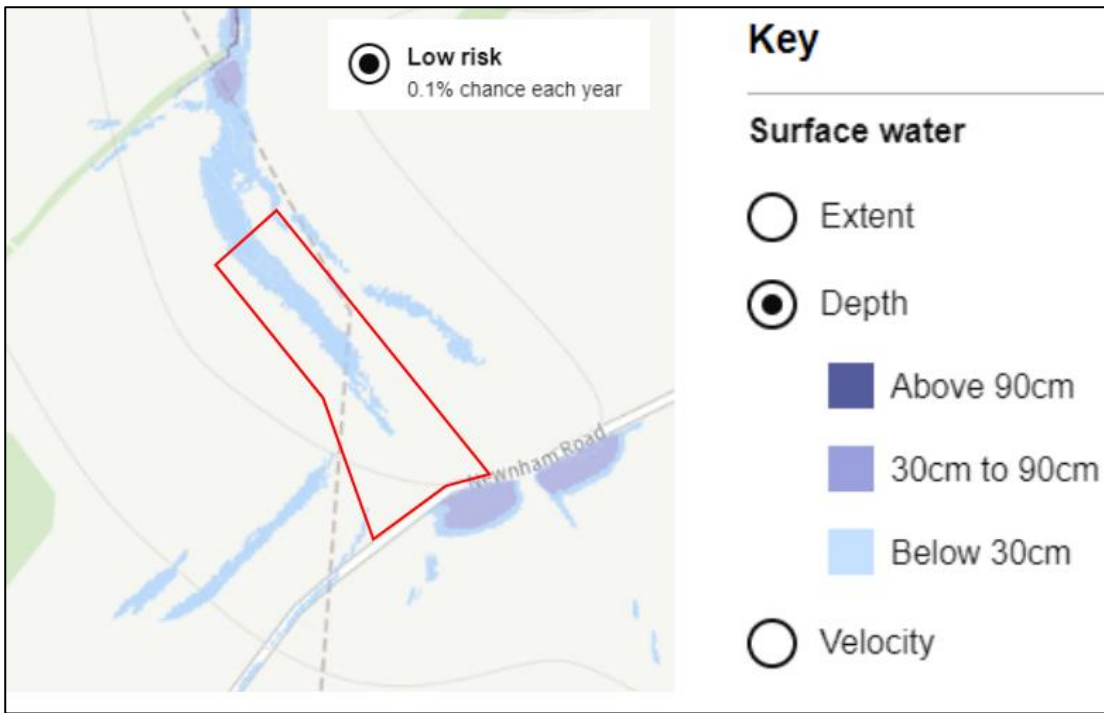


Figure 12 - Extract of Low Risk Surface Water Flood Depth Mapping (Environment Agency, 2024)

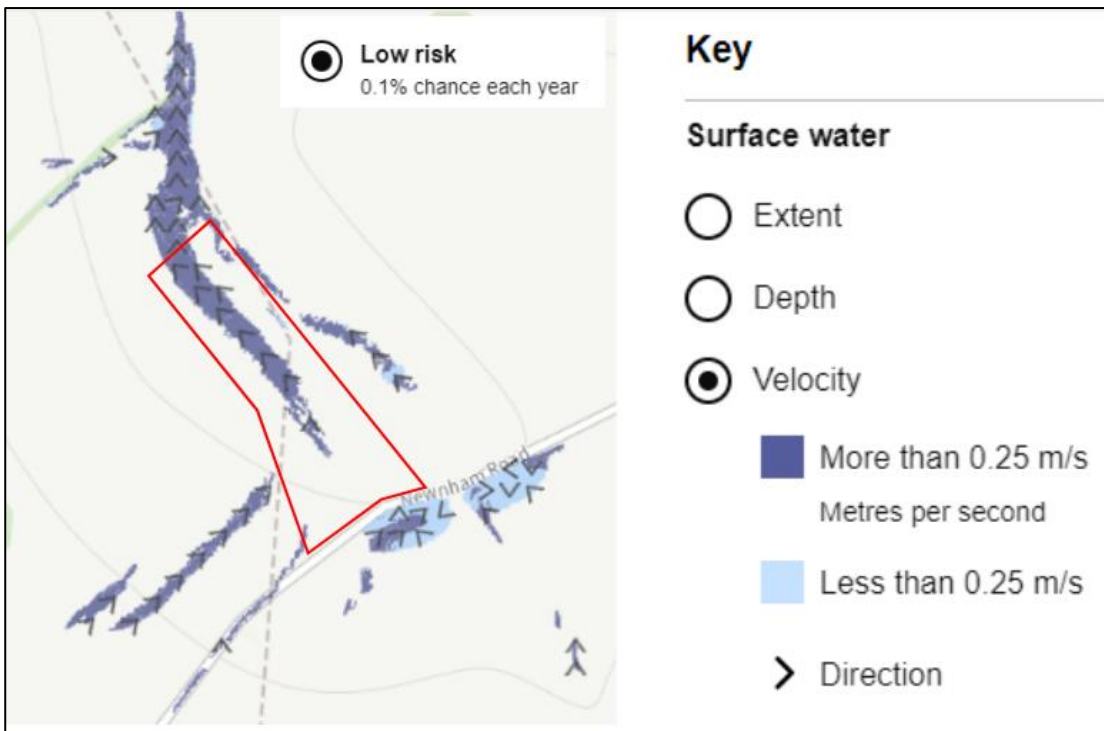


Figure 13 - Extract of Low Risk Surface Water Flood Velocity Mapping (Environment Agency, 2024)

The extracts above indicate the greatest predicted surface water flood depth across the site is less than 300mm, even for the 'Low' surface water flood risk events (risk of flooding between 1% and 0.1% each year). For the 'Low' risk surface water flood mapping, there is a predicted overland surface water flow route (following a northerly direction), where there is a shallow dip in the site topography which runs parallel to the existing ditch, before the surface water drains off the field into the existing watercourse. The site levels will be reprofiled as part of the works, and will include a cut-off ditch along the western side of the site to ensure overland flows are intercepted and routed northwards to re-join the existing overland flow route at the northern

side of the site. There is opportunity to construct attenuation features within the cut-off ditch (such check dams) which will slow the rate of flow from this arable catchment before it enters the existing watercourse.

5.3. Flooding from Groundwater

The Long-Term Flood Risk Service¹³ states that flooding from groundwater is unlikely in this area. In addition, Soilscales¹⁴ mapping has indicated the ground conditions are anticipated to be freely draining, lime-rich, loamy soils. This however is non-depth specific, and the infiltration testing undertaken at the site (up to depths of 2.0m) has indicated that ground strata is relatively impervious.

An extract from Soilscales mapping is presented in Figure 14 below:

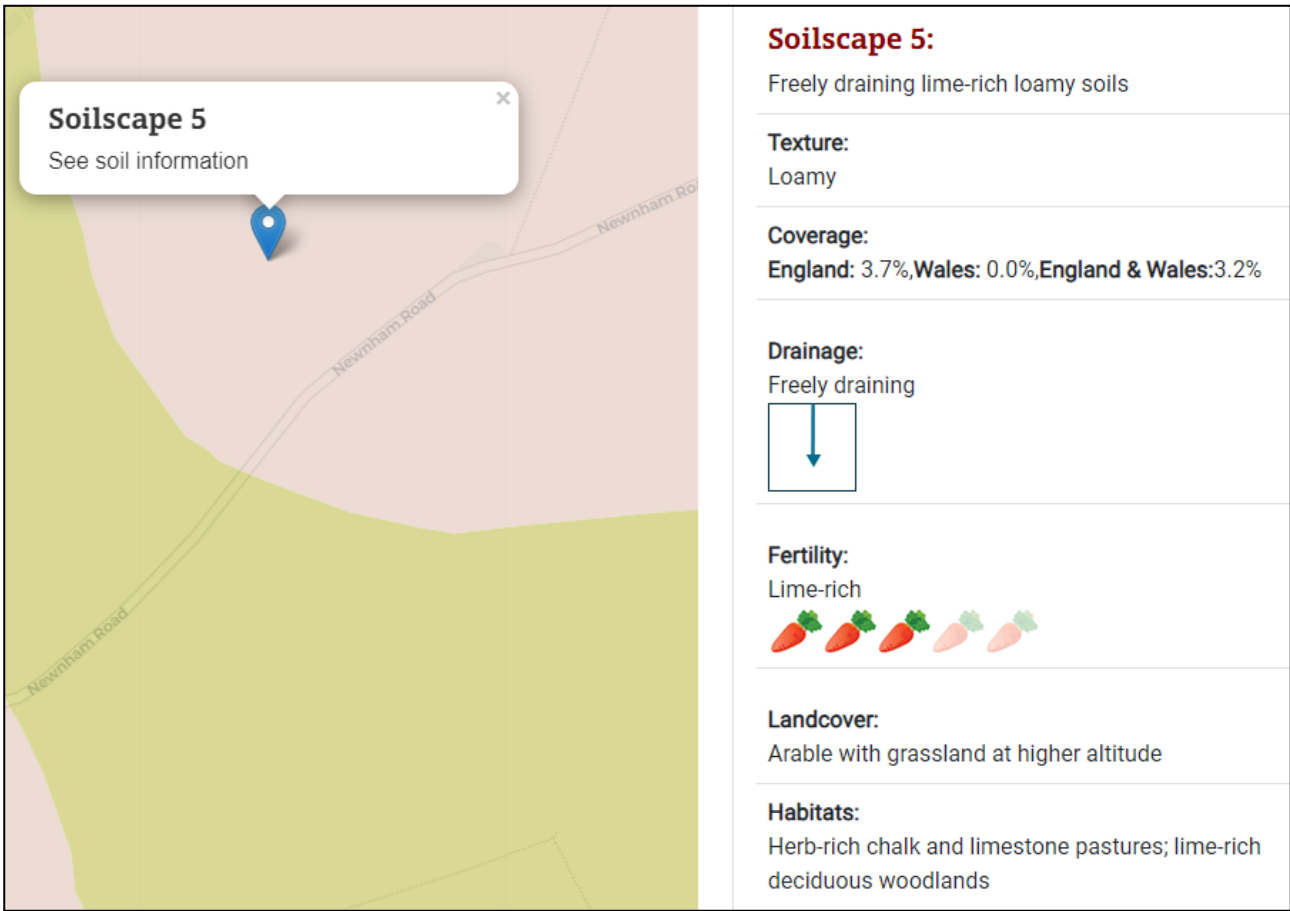


Figure 14 - Soilscales Mapping Extract (Soilscales, 2024)

5.4. Flooding from Artificial Sources

The Environment Agency Flood Risk from Reservoirs mapping indicates that the site is not located within an area of predicted reservoir flood extents. There are no canals or other blue infrastructure that poses a flood risk in the vicinity of the site.

5.5. Flooding from Sewers or Drains

Whilst it has not yet been established whether any sewers or drains are located within, or in the vicinity of the site, it is considered unlikely that the site has been previously affected by flooding from sewers or drains.

¹³ <https://check-long-term-flood-risk.service.gov.uk/>

¹⁴ [LandIS - Land Information System - Soilscales soil types viewer](#)
5024440-RDG-XX-XX-RP-C-0501

5.6. Historical Flood Events

Based on a review of the SFRA, no historic flood events have been identified in the vicinity of the site.

5.7. Sequential Test

Paragraph 167 of the National Planning Policy Framework (NPPF)¹⁵ requires all proposed development to apply a sequential, risk-based approach to the location of the development, taking into account all sources of flood risk, and the current and future impacts of climate change. Essentially, the purpose of the sequential test is to steer new development to areas with the lowest risk of flooding from any source, before higher risk locations are considered.

The National Flood Risk Standing Advice for Local Planning Authorities states a sequential test is required if any part of a proposed development will be:

- In flood zone 2 or 3
- In flood zone 1 and the local SFRA shows it will be at increased risk of flooding during its lifetime
- Subject to sources of flooding other than rivers or the sea

If it is not possible for development to be located in areas with a lower risk of flooding, the exception test may have to be applied. To pass the exception test, it should be demonstrated that:

- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

As part of the Radwell Bury development site falls within an area of low/ medium risk of surface water flooding, a sequential test is required. The location has been selected as a viable BESS site based on the proximity to an available point of connection (POC) which is Letchworth Bulk Supply Point, by which any facility must lie within a 4km radius of this point. When considering the availability of alternative sites, including considerations such as size to support a BESS development, greenbelt or other environmental considerations (e.g. nature reserves, conservation areas) and available brownfield sites, it was concluded that Radwell Bury is the only viable site for a new BESS facility.

The proposed site layout has also been arranged to move development away from the northern area of the site (location of medium surface water flood risk) so that development is located within the areas of lowest risk of surface water flooding. Other surface water mitigation measures are also proposed, such as the boundary cut-off ditch.

Table 2 of the NPPF classifies the 'Flood risk vulnerability classification' of proposed development. As the proposed development is to be used for electrical energy storage, it shall be classed as **Essential Infrastructure**. The extract from Annex 3: Flood Risk Vulnerability Classification of the NPPF is shown in Figure 15 below.

¹⁵ [National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/432424/NPPF_2019.pdf)
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Essential infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood.
- Wind turbines.
- Solar farms.

Figure 15 - Flood Risk Vulnerability Classification (Extract from Annex 3, NPPF)

Whilst the Radwell Bury site is not located within floodplain, the vulnerability classification can be checked against Table 3 of the NPPF 'Flood risk vulnerability and flood zone compatibility' to confirm whether the development is appropriate, and whether an exception test is required. As the site lies in Flood Zone 1, there is no requirement to apply the exception test.

Table 4 - Flood Risk Vulnerability and Flood Zone Compatibility (Table 3, NPPF Practice Guide)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *
Key:					
✓ Exception test is not required					
X Development should not be permitted					

6. SURFACE WATER DRAINAGE PROPOSALS

6.1. Overview

The proposed surface water drainage strategy for the site comprises the following:

- 2 no. attenuation basins (with deeper areas for permanent water to support biodiversity and ecology);
- Filter strip;
- Filter drains;
- Impermeable liners e.g. butyl to be installed below both attenuation basins, filter drains, filter strip, and granular areas e.g. access tracks within the battery container compound to prevent any pollutants e.g. contaminated surface water percolating to ground (to protect the principal aquifer);
- Cut-off drain along the western side of the development to intercept overland surface water flows; and
- 2 no. vortex flow controls (downstream of attenuation basins).

The system shall discharge to the existing watercourse (which bounds the eastern side of the site) at a maximum restricted rate of 0.5 l/s, which matches the QBAR greenfield runoff rate (calculated based on the proposed impermeable area).

6.2. Greenfield Runoff Estimates

The greenfield runoff rates were calculated using FEH and FSR data using the latest InfoDrainage design software (released by Innovyze) which has superseded MicroDrainage.

The greenfield runoff rates have been summarised in Table 5 below and an extract from InfoDrainage has been included in Figure 16 below.

Table 5 - Greenfield Runoff Rate Summary (InfoDrainage, 2024)

CATCHMENT AREA (HA)	GREENFIELD RUNOFF RATE, Q_{BAR} (L/S)
1.08	0.5

Method
☒ ICP SUDS
☐ IH 124

Area (ha)

SAAR (mm)
Map

Soil

Region
...

Additional Options

Urban

Return Period (years)

Growth Curve

Calculate

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 5	0.5	0.5	0.4	1.2	1.8

Figure 16 - Greenfield Runoff Rate (InfoDrainage, 2024)

6.3. Proposed SuDS Strategy

For the proposed surface water drainage strategy, the SuDS hierarchy provided in Herts LLFA ‘Summary Guidance for Developers’ has been followed, with the hierarchy set out in order of most to least sustainable:

- Living roofs and walls;
- Basins and ponds;
- Filter strips and swales;
- Infiltration devices;
- Permeable surfaces and filter drains; and
- Tanked and piped systems.

Living walls and roofs have not been considered, as there is no practicable way to incorporate them into the proposed development, due to its nature as an electrical substation and energy storage area. The majority of attenuation storage is provided within the two attenuation basins, satisfying the requirement to use the most sustainable option available that is practicable. Furthermore, as discussed in Section 6.1 of this report, a filter strip and filter drains are also proposed. However, infiltration is not considered suitable given the presence of the principal bedrock aquifer, poor infiltration potential, and the risk of groundwater pollution from the site.

The proposed surface water drainage strategy includes an attenuated gravity discharge (with a new outfall to the existing watercourse) limited to the QBAR greenfield runoff rate of 0.5l/s. This will provide a benefit for the higher return period storm events e.g. 30 year, 100 year, as the 0.5l/s post-development runoff rate is lower than the greenfield runoff rates for these higher intensity rainfall events.

The four pillars of SuDS (water quality, water quantity, amenity and biodiversity) are considered to have been achieved by the following means:

- **Water quality** – Surface SuDS features have been proposed, with an assessment of the pollution hazard indices, mitigation indices, and treatment trains to ensure a suitable level of treatment is provided. This is discussed in Section 6.5 of this report. The site is located within a principal aquifer, so impermeable membranes are proposed to prevent infiltration of surface water to ground.

- **Water quantity** – 2 no. attenuation basins have been proposed, with a vortex flow control chamber prior to the outfall to the existing watercourse to restrict post-development runoff to the existing QBAR runoff rate.
- **Amenity** – Although the surface SuDS features will not be utilised by the general public, the attenuation basins will provide pleasant, landscaped areas for users of the site, and facilitate maintenance of the surface water systems.
- **Biodiversity** – The new basins have been designed to support and enhance local biodiversity, by incorporating permanent water features.

6.4. Design of Surface Water Drainage and InfoDrainage Modelling

The proposed surface water drainage system has been modelled using InfoDrainage. The output results include all the data that is typically presented in MicroDrainage outputs, plus greater visibility of proposed SuDS features and graphical representation. Innovyze has worked extensively with approving authorities to ensure the output from InfoDrainage facilitates a more streamlined review. InfoDrainage design software has been utilised to design the surface water drainage system; results are provided in Appendix D of this report.

The site lies within the Upper and Bedford Ouse Management Catchment. See Table 6 below for the latest peak rainfall climate change allowances for the Upper and Bedford Ouse Management Catchment:

Table 6 - Ouse Upper and Bedford Management Catchment Peak Rainfall Allowances (Environment Agency, 2024)

1% annual exceedance rainfall event		
Epoch		
	Central allowance	Upper end allowance
2050s	20%	40%
2070s	25%	40%
*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.		

The upper end climate change allowance for the 2070s epoch (to be utilised for development with a lifetime between 2061 and 2125) is 40%. As such, a 40% uplift to the design rainfall has been utilised for the design of the surface water drainage in the InfoDrainage software.

The surface water drainage system has been designed to attenuate up to the 1 in 100+ 40% climate change storm event.

Table 7 – Design Summary for Attenuation Basins

SUDS FEATURE	DEPTH (M)	AREA (M ²)	VOLUME (M ³)	OUTFLOW CONTROL
Upstream attenuation basin	1.1	1935	1335	Free discharge to vortex flow control chamber MH8
Downstream attenuation basin	1.3	1000	846	Free discharge to vortex flow control chamber MH12

Prior to the connection with the existing watercourse, a vortex flow control in chamber MH12 is utilised to restrict the outflow. The peak discharge rate from the downstream attenuation basin has been limited to greenfield runoff rates (QBAR) of 0.5 l/s.

The proposed peak discharge rates for the 1in1, 1in30, 1in30+35%, 1in100 and 1in100+45% climate change storm events are summarised in Table 8 below:

Table 8 – Post-Development Peak Discharge Rates

CRITICAL STORM BY RETURN PERIOD	MH12 PEAK DISCHARGE RATE (l/s)
QBAR	0.4
1in30	0.4
1in30+35%	0.4
1in100	0.4
1in100+40%	0.5

6.5. Water Quality

In accordance with Table 4.3 in Chapter 4 of the SuDS manual (C753) a water quality assessment has been undertaken using the Simple Index Approach. This approach is set out in Section 26.7.1 of the SuDS Manual.

For the purposes of the water quality assessment for the BESS facility at Radwell Bury Farm, the land-use has been classified as 'Commercial Yard and Delivery Areas' in accordance with Table 26.2 of the SuDS Manual. The pollution hazard indices are noted as follows in Table 9:

Table 9 - Pollution Hazard Indices

LAND USE	POLLUTION HAZARD LEVEL	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
Commercial yards and delivery areas	Medium	0.7	0.6	0.7

To provide sufficient treatment, the selected SuDS components should have a total mitigation index that equals or exceeds the pollution hazard index.

Total SuDS Mitigation $\geq$ Pollution Hazard Index

Where multiple SuDS components are proposed, the following calculation shall be applied:

Total SuDS Mitigation Index of the primary SuDS component + 0.5 * Mitigation indices of secondary SuDS components

The site utilises a treatment train of filter strips, filter drains and detention basins to mitigate the pollution hazard.

The indicative SuDS mitigation indices for filter strips, filter drains, and detention basins are as follows:

Table 10 - Pollution Mitigation Indices

	MITIGATION INDICES		
TYPE OF SUDS COMPONENT	TSS	METALS	HYDROCARBONS
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Detention basin	0.5	0.5	0.6

The total mitigation indices of the treatment trains have been calculated as follows:

Table 11 - Treatment Trains

TREATMENT TRAIN		MITIGATION INDICIES			
TREATMENT REFERENCE	TRAIN	SUDS COMPONENTS	TSS	METALS	HYDROCARBONS
Treatment Train 1 (Access road)		Filter Drain > Basin > Basin	0.90	0.90	1.00

Treatment Train 2 (South compound)	Filter Drain > Basin > Basin	0.90	0.90	1.00
Treatment Train 3 (North compound)	Filter Strip > Filter Drain > Basin	0.85	0.85	1.00

As highlighted in Table 11, all three treatment trains provide sufficient pollution mitigation for TSS, Metals and Hydrocarbons.

The scenario provided above is for the site operating as normal. For management of contaminated fire water runoff in the event of a fire, please refer to Section 8 of this report.

6.6. Management of Surface Water Runoff during Construction

Before the permanent surface water drainage system is operational, the contractor will ensure that surface water runoff from the site is managed using some/ all of the following measures to control the quality of surface water runoff from the site:

- Constructing the proposed surface water drainage system from downstream to upstream, to facilitate the provision of suitable settlement/ control points e.g. downstream basin, outfall chamber before discharging runoff to the existing surface water ditch;
- Catchpits across the site (either temporary or permanent locations) to facilitate the capture of silt at the sump locations;
- Silt barrier/s to capture and control the runoff of any sediment from the site;
- Silt sock/s or settlement tank/s to be provided as temporary means of capturing fine sediment and silt before it is discharged to surface water systems; and
- Spill kits to provide a means of containing and mopping up spills of hazardous substances, to protect downstream surface water drainage networks and watercourses.

The contractor's methodology for dewatering of excavations shall ensure that dewatering operations e.g. overpumping does not draw fine material from the ground, to minimise potential ground movement and limit the volume of entrained material which is discharged from excavations.

6.7. Flood Resistance and Resilience Measures

Whilst the site is not located in fluvial floodplain, it is recommended that the proposed BESS equipment and buildings are raised by a minimum of 150mm from external ground levels to protect against the potential ingress of surface water. This will be coordinated at detailed design with other parties e.g. structural designers, Distribution Network Operator.

7. FOUL WATER DRAINAGE

No proposed foul drainage systems are required to be installed at the site, such as a new connection to a foul public sewer or sewage treatment plant/ septic tank. The control room and welfare unit will be provided with a toilet, however this will be a contained system which will be emptied periodically and taken away from site for disposal.

8. CONTAMINATED WATER DRAINAGE STRATEGY

In the unlikely event of a battery fire at the site, adequate provision needs to be in place both for firewater supply, and containment of contaminated surface water runoff from firefighting activities.

A large below-ground firewater supply tank (228,000 litre capacity) is currently proposed to be installed along the western side of the site. This will be an on-site firewater storage facility, which will provide a water supply for the fire service. A new mains water supply and hydrant connection is also being explored for the site, which if viable, would mean the firewater supply tank would not be required. For BESS sites, the National Fire Chiefs Council recommends a minimum flow rate of no less than 1,900 litres per minute for at least 2 hours, or 31.7 litres/sec.

On this basis, the 228,000-litre tank would provide around 2 hours (120 minutes) of firewater (at a delivery rate of 31.7 litres/sec) until the supply was exhausted. However, in the event of a battery fire (or other fire at the site), penstock shutoff valves would be activated in either/ both chambers MH12 and MH8. This would prevent potentially contaminated firewater being released into the downstream surface water systems and contain used firewater within the proposed drainage network on site. Firewater would build up in the network, backing up into access chambers which could be utilised as pumping points for firewater reuse (if required) by the fire service.

Following any fire incident, the firewater would be tested for contaminants and tankered away as necessary from the site, including any cleaning required of the attenuation basins or wider surface water network. The surface water drainage layout provided in Appendix C illustrates the location of the proposed firewater supply tank.

The fire mitigation strategy and viability of a new mains water supply and hydrant connection to serve the site is presently being reviewed in conjunction with the fire service.

9. MAINTENANCE PLAN

The construction, operation, and maintenance requirements of all SuDS components has been considered as part of the proposed drainage strategy. It is important for the performance of the surface water systems that they are maintained on a regular basis.

The Balance Power site management/ facilities team will be responsible for the operation and maintenance of the proposed surface water drainage systems, and will therefore become the maintaining body for the drainage systems in perpetuity.

A summary of the recommended management and maintenance requirements is provided below:

Pipes

It is recommended that all drainage runs are inspected a minimum of once per year. High-pressure jet washing/ rodding of surface water pipes shall be undertaken if necessary to remove detritus and reduce the likelihood of blockages obstructing flow through the pipes. A full CCTV condition survey of the surface water network is recommended once per ten years as a minimum.

Manholes/Catchpits

All manholes and catchpits shall be inspected regularly (minimum once per 3 months recommended initially for the first 12 months) and cleared as necessary e.g., using high-pressure jetting. A visual inspection shall be undertaken by lifting the catchpit/ manhole cover, to check the chamber is free flowing and for any evidence of blockage. The frequency of inspection can be reduced after the first 12 months to either annual or half yearly inspections if appropriate.

Vortex Flow Control

Flow control chambers shall be inspected on a regular basis (minimum once per 3 months recommended) to check for potential blockages, accumulations of silt, etc. and cleared as required. This is particularly important in advance of forecasted storm events since the available attenuation capacity is dependent on the downstream vortex flow control being free from obstructions and operating efficiently.

Attenuation Basins

The basins should be inspected on a regular basis (typically monthly or quarterly as a minimum) and any build-up of litter (including leaf litter in the autumn), debris and litter should be removed as required. Routine maintenance, including cutting/ mowing of grass and any aquatic vegetation will also be required on a regular basis particularly during the growing season. This includes maintenance routes, embankments/ side slopes, areas around headwalls (to reduce the risk of blockages/ obstruction and to facilitate visual inspections) and across the main storage area. Slope areas that have become bare should be re-vegetated, and any eroded areas should be regraded before replanting. Silt removal should be undertaken, as required, to ensure the effective operation of the pond and to maintain aesthetic appearance of the site. Invasive silt and vegetation removal should only be carried out to limited areas at a time (25% of the basin on one occasion each year) to minimise the impact on biodiversity.

An excerpt from Table 23.1 from the CIRIA SuDS Manual has been included below:

TABLE 23.1 Operation and maintenance requirements for ponds and wetlands			
	Maintenance schedule	Required action	Typical frequency
Regular maintenance		Remove litter and debris	Monthly (or as required)
		Cut the grass – public areas	Monthly (during growing season)
		Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
		Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
		Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
		Inspect water body for signs of poor water quality	Monthly (May – October)
		Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
		Check any mechanical devices, eg penstocks	Half yearly
		Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
		Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
		Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
		Remove sediment from any forebay.	Every 1–5 years, or as required
		Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
	Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
	Remedial actions	Repair erosion or other damage	As required
		Replant, where necessary	As required
		Aerate pond when signs of eutrophication are detected	As required
		Realign rip-rap or repair other damage	As required
		Repair / rehabilitate inlets, outlets and overflows.	As required

Figure 17 - Recommended Pond/ Basin Maintenance Activities and Frequency (CIRIA SuDS Manual, 2015)

Filter Drains

The treatment performance of filter drains is dependent on maintenance, and it is important that adequate access is provided for inspection. Filter drains are sometimes used in conjunction with filter strips, which help limit the volume of silt draining into the filter drain. Routine maintenance typically involves removing debris and litter from the surface and cutting back vegetation, whereas more extensive works may involve cleaning or replacing the surface gravel periodically.

An excerpt from Table 16.1 from the CIRIA SuDS Manual has been included below:

TABLE 16.1 Operation and maintenance requirements for filter drains			
	Maintenance schedule	Required action	Typical frequency
	Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
		Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
		Remove sediment from pre-treatment devices	Six monthly, or as required
	Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
		Clear perforated pipework of blockages	As required

Figure 18 - Recommended Filter Drain Maintenance Activities and Frequency (CIRIA SuDS Manual, 2015)

Filter Strips

The most significant maintenance requirement for filter strips is mowing. Access for mowers should always be available. Grass lengths at the site should ideally be kept between 75-150mm, which assists in filtering pollutants and sediment retention. Litter and debris removal should also be undertaken regularly.

An excerpt from Table 15.1 from the CIRIA SuDS Manual has been included below:

TABLE 15.1 Operation and maintenance requirements for filter strips			
	Maintenance schedule	Required action	Typical frequency
	Regular maintenance	Remove litter and debris	Monthly (or as required)
		Cut the grass – to retain grass height within specified design range	Monthly (during growing season), or as required
		Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
		Inspect filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (eg oils)	Monthly (at start, then half yearly)
		Check flow spreader and filter strip surface for even gradients	Monthly (at start, then half yearly)
		Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start, then half yearly)
		Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then half yearly)
	Occasional maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area.
	Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
		Relevel uneven surfaces and reinstate design levels	As required
		Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
		Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
		Remove and dispose of oils or petrol residues using safe standard practices	As required

Figure 19 - Recommended Filter Strip Maintenance Activities and Frequency (CIRIA SuDS Manual, 2015)

10. CONCLUSION

Ridge and Partners LLP have been commissioned by Balance Power to prepare a Flood Risk Assessment and Surface Water Drainage Strategy in support of a planning application for the construction of a Battery Energy Storage System (BESS) facility at Radwell Bury Farm, Baldock, Hertfordshire.

The proposed site lies within Flood Zone 1, and is therefore at 'Very Low' risk of fluvial and tidal flooding (less than 1 in 1000 probability of flooding in any given year). Parts of the site are at 'Low' risk of surface water flooding, which is a probability of flooding between 1 in 100 and 1 in 1000 in any given year. Some limited extents of 'Medium' surface water flood risk (between 1 in 30 and 1 in 100 probability in any given year) have been identified in the northern confines of the site. No flood risk sources are considered to pose an unmanageable risk to the development, and therefore the proposed BESS facility is considered suitable in this location.

The proposed surface water drainage system incorporates open SuDS in the form of two attenuation basins, (with a restricted outfall limited to QBAR runoff rate into the existing watercourse), filter drains, filter strip, and cut-off ditch (utilised to intercept any overland runoff from the fields). As the site is located within a principal aquifer (chalk bedrock), all drainage features will be lined with impermeable membranes (including below the granular compound areas) to prevent used/ contaminated firewater infiltrating to ground and potentially contaminating groundwater sources. Notwithstanding this, infiltration testing has also been undertaken across the site which has confirmed that existing ground conditions are practically impervious (only a single soakage test completed with a poor infiltration rate, whilst all other soakage tests could not calculate an infiltration rate due to insufficient head loss). As such, infiltration is not a viable means of surface water disposal regardless of the risk to groundwater from contamination.

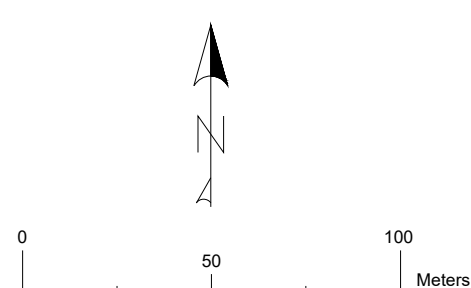
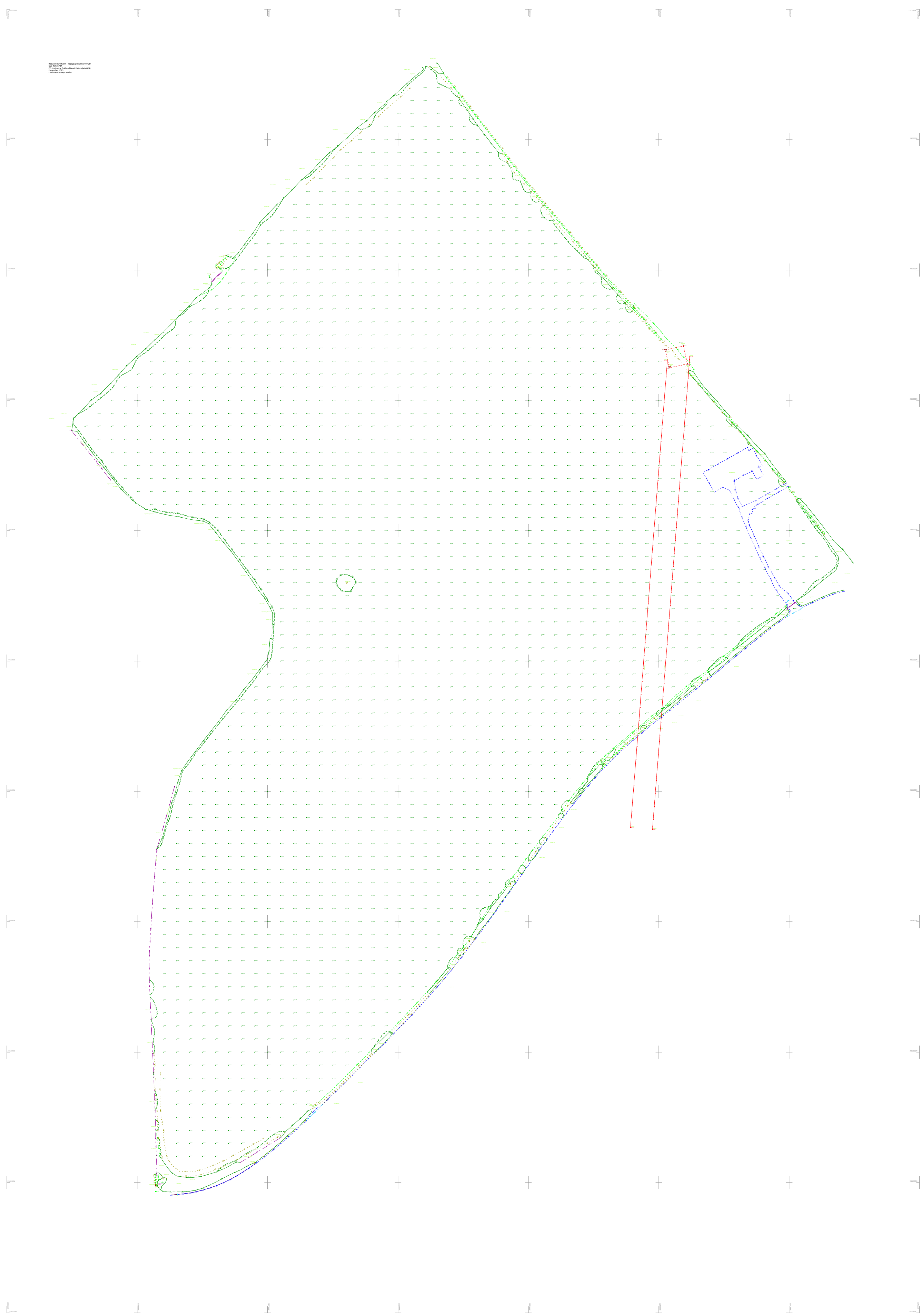
A firewater supply tank is currently proposed, which will be utilised as a firefighting water supply at the site. A new mains water supply and hydrant connection is also being explored for the site, which if viable, would mean the firewater supply tank would not be required. Penstock shutoff valves will be provided in chambers immediately downstream of the proposed attenuation basins, which can be utilised to prevent used/ contaminated firewater discharging into the downstream watercourse, and provide a contained firewater supply for reuse (if required) during a fire incident.

10.1. Recommendations

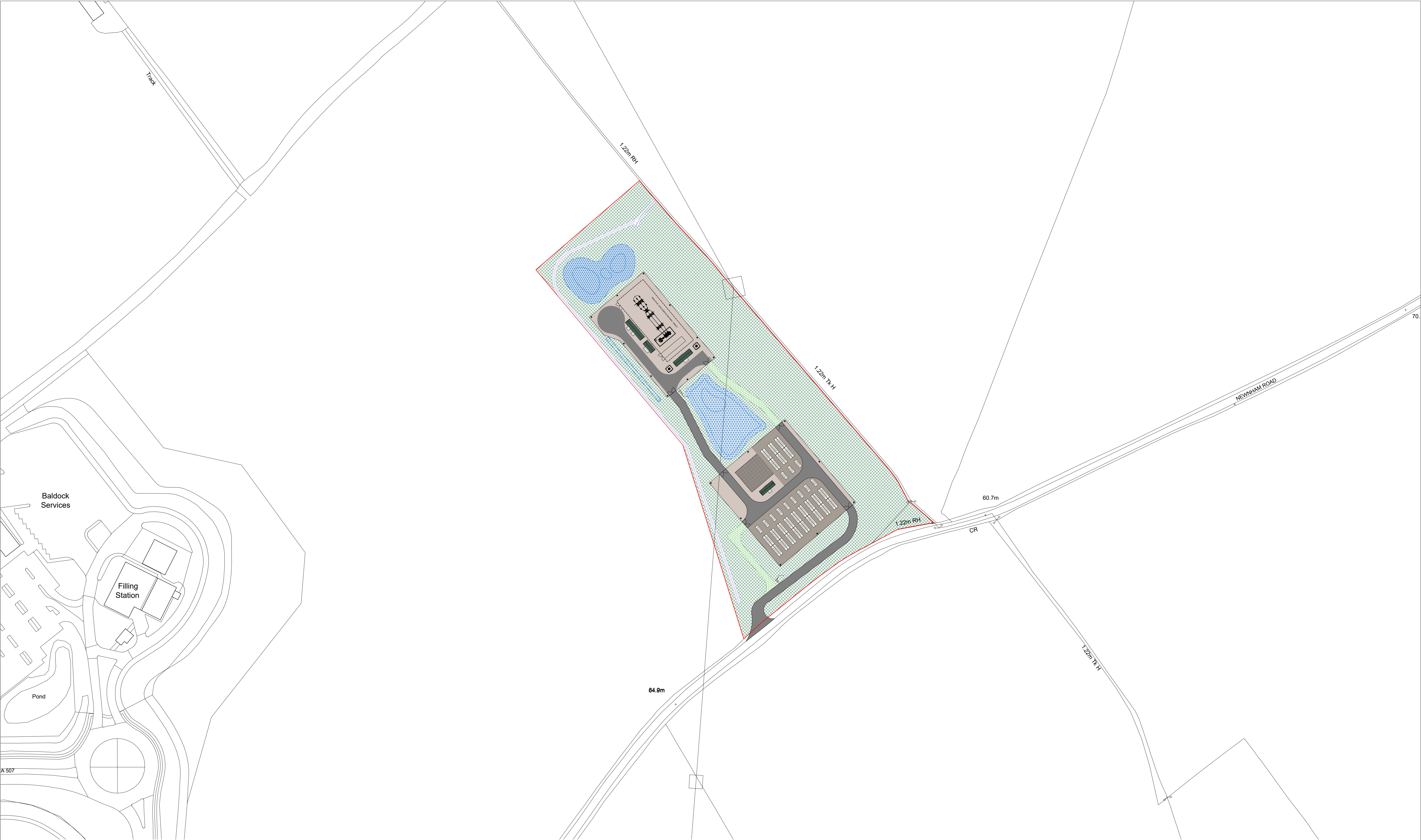
The following recommendations are provided for further works:

- Undertake ground investigation to support detailed design;
- Prepare and submit application for Land Drainage Consent with the Bedfordshire and Rivel Ivel IDB;
- Engage with UKPN regarding the proposed works in proximity to/ below the existing overhead power lines to discuss how works can be safely undertaken;
- Confirm viability of new mains water supply and hydrant to serve the site;
- Review the fire mitigation strategy and holding tank capacity with the fire service; and
- Undertake discussions/ engagement with both the LLFA and IDB.

APPENDIX A - TOPOGRAPHICAL SURVEY



APPENDIX B - PROPOSED SITE LAYOUT PLAN



GENERAL

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NOTES

(1) N/A

EQUIPMENT LIST

BATTERY CONTAINERS
INVERTER & TRANSFORMER MODULES
DNO ROOM
TRANSFORMER
PRIVATE SUBSTATION
WELFARE & CONTROL ROOM
STORAGE ROOM

DRAWING NUMBER

PR853_101

PROJECT TITLE

RADWELL BURY FARM

PROJECT ADDRESS

RADWELL BURY FARM_SG7 5ES

DATE

14/11/24

PROJECT TYPE

ENERGY DEVELOPMENT

DRAWING TYPE

PROPOSED PLAN

DESIGNER

L.GALE

CHECKED BY & APPROVED BY

C.VICK

SCALE

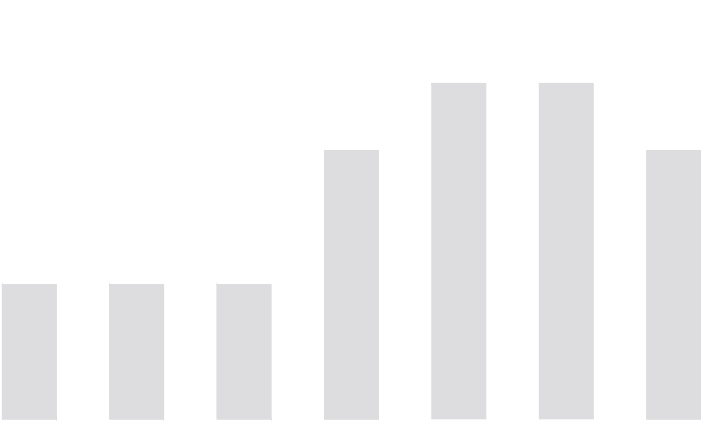
1:1250

REVISION

REV H

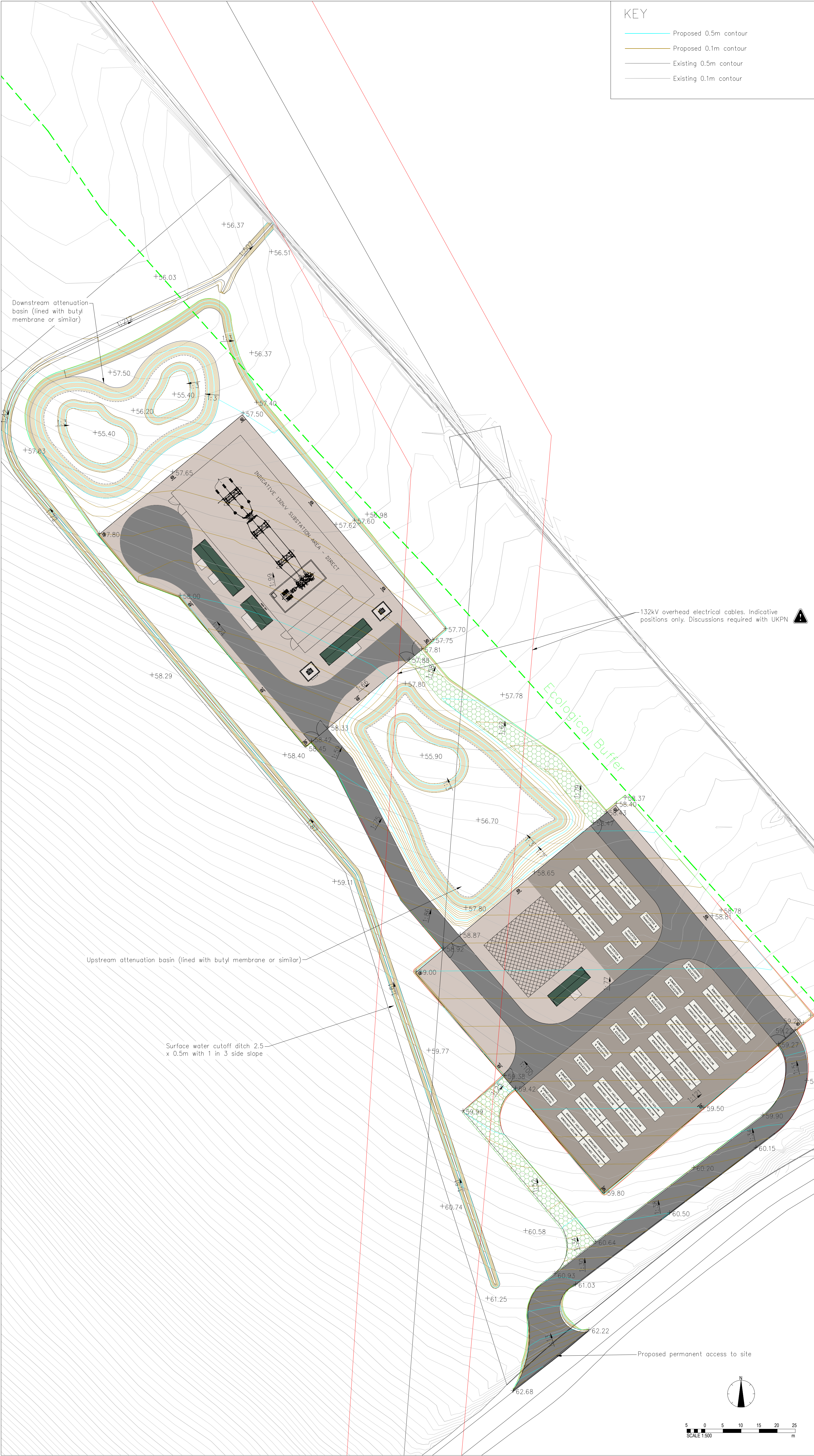
PAPER SIZE

A1



DRAWING PURPOSE
PLANNING

APPENDIX C – PROPOSED SURFACE WATER DRAINAGE LAYOUT



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CDM REGULATIONS 2015

Significant or non-obvious risks and risks which are difficult to manage are identified on this drawing using the following symbol identified to the right with brief accompanying text. For further details of the risks identified by designers, reference should be made to CDM hazard register.

P03	Updated to show new site layout	15/11/2024	JB	SC
P02	Updated to suit new site layout	22/08/2024	AO/B	SC
P01	First Issue	29/04/2024	JB	SW
REV	DESCRIPTION	DATE	BY	CHKD

ORIGINATOR: www.ridge.co.uk



PROJECT NUMBER: 5024440

CLIENT:



IN ASSOCIATION WITH:

PROJECT:
Radwell bury Farm

TITLE:
Proposed Levels

DRAWN BY: AO/B CHECKED BY: SC APPROVED BY: SW

SCALE @ A1: 1:500 DATE OF REVIEW: 22/08/2024

ISO 19650 STATUS:
S3 - Issued for Comment

DRAWING No: 5024440-RDG-XX-XX-D-C-0601_P03 Proposed Levels.dwg

PROJECT: ORG: FUNCTION: SPATIAL: FORM: DISCIPLINE: NUMBER: REV:
5024440 RDG XX XX D C 0601 P03

APPENDIX D - INFODRAINAGE RESULTS AND OUTPUTS

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.276
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.221
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.055
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (4)

Type : Catchment Area

Area (ha)	0.068
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Catchment Area (12)

Type : Catchment Area

Area (ha)	0.135
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (9)

Type : Catchment Area

Area (ha)	0.193
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (13)

Type : Catchment Area

Area (ha)	0.139
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (14)

Type : Catchment Area

Area (ha)	0.249
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Catchment Area (5)

Type : Catchment Area

Area (ha)	0.011
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (6)

Type : Catchment Area

Area (ha)	0.01
-----------	------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (7)

Type : Catchment Area

Area (ha)	0.016
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area

Type : Catchment Area

Area (ha)	0.034
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Catchment Area (11)

Type : Catchment Area

Area (ha)	0.004
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (15)

Type : Catchment Area

Area (ha)	0.001
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (8)

Type : Catchment Area

Area (ha)	0.003
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (10)

Type : Catchment Area

Area (ha)	0.002
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024		
Designed by: AO'B		Checked by: EP	Approved By: SC	
Report Details: Type: Junctions Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
MH12	Manhole	523939.715	236870.232	57.500	1.380	56.120	Circular	1.500
MH9	Manhole	524003.367	236785.582	57.720	1.120	56.600	Circular	0.450
MH11	Manhole	523952.371	236846.551	57.470	1.070	56.400	Circular	0.450
MH10	Manhole	523979.096	236814.603	57.720	1.220	56.500	Circular	0.450
MH8	Manhole	523994.380	236772.746	57.870	1.078	56.792	Circular	1.500
MH7	Manhole	524054.653	236738.337	58.370	1.070	57.300	Circular	0.450
MH5	Manhole	524105.986	236678.058	59.170	1.670	57.500	Circular	0.450
MH6	Manhole	524081.221	236707.139	58.780	1.380	57.400	Circular	0.450
MH4	Manhole	524096.788	236667.361	59.520	0.920	58.600	Circular	0.450
MH3	Manhole	524047.418	236618.548	60.540	1.040	59.500	Circular	0.450
MH2	Manhole	524034.183	236608.409	60.850	0.850	60.000	Circular	0.450
MH1	Manhole	524025.295	236587.359	61.570	1.070	60.500	Circular	0.450

Name	Lock
MH12	None
MH9	None
MH11	None
MH10	None
MH8	None
MH7	None
MH5	Levels
MH6	None
MH4	None
MH3	Levels
MH2	None
MH1	None

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



DS Basin

Type : Pond

Dimensions

Exceedance Level (m)	57.500
Depth (m)	1.300
Base Level (m)	56.200
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	1057.856

Depth (m)	Area (m²)	Volume (m³)
0.000	889.82	0.000
1.300	1350.00	1445.527

Advanced

Perimeter	Circular
Length (m)	54.548
Friction Scheme	Manning's n
n	0.03



US Basin

Type : Pond

Dimensions

Exceedance Level (m)	58.000
Depth (m)	1.100
Base Level (m)	56.900
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	1199.622

Depth (m)	Area (m²)	Volume (m³)
0.000	1337.90	0.000
1.100	1800.00	1719.573

Advanced

Perimeter	Circular
Length (m)	64.295
Friction Scheme	Manning's n
n	0.03

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (2)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	59.560
Depth (m)	0.960
Base Level (m)	58.600
Freeboard (mm)	0
Porosity (%)	30
Length (m)	68.662
Long. Slope (1:X)	76.00
Width (m)	0.600
Total Volume (m³)	12.695

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (5)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	57.720
Depth (m)	1.220
Base Level (m)	56.500
Freeboard (mm)	0
Porosity (%)	30
Length (m)	37.000
Long. Slope (1:X)	380.00
Width (m)	0.600
Total Volume (m³)	9.956

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (6)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	57.500
Depth (m)	1.100
Base Level (m)	56.400
Freeboard (mm)	0
Porosity (%)	30
Length (m)	41.000
Long. Slope (1:X)	380.00
Width (m)	0.675
Total Volume (m³)	12.303

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	375
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (1)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	60.850
Depth (m)	0.850
Base Level (m)	60.000
Freeboard (mm)	0
Porosity (%)	30
Length (m)	20.000
Long. Slope (1:X)	40.00
Width (m)	0.600
Total Volume (m³)	3.307

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (4)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	58.650
Depth (m)	1.350
Base Level (m)	57.300
Freeboard (mm)	0
Porosity (%)	30
Length (m)	40.000
Long. Slope (1:X)	400.00
Width (m)	0.600
Total Volume (m³)	11.699

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



Filter Drain (3)

Type : Infiltration Trench

Dimensions

Exceedance Level (m)	58.900
Depth (m)	1.500
Base Level (m)	57.400
Freeboard (mm)	0
Porosity (%)	30
Length (m)	37.000
Long. Slope (1:X)	370.00
Width (m)	0.600
Total Volume (m³)	11.821

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Advanced

Conductivity (m/hr)	300.0
---------------------	-------

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

Flow Options	
Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options	
Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options	
Apply Offset	☐
An error has occurred while processing TextBox 'txtSynchroniseManholeInvertLevelsHeader': The expression contains object 'SynchroniseManholeInvertLevelsTitle' that is not defined in the current context.	

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH12	FEH: 2 years: +0 %: 10080 mins: Winter	57.500	56.120	56.502	0.382	0.3	0.675	0.000	0.3	296.895	OK
MH9	FEH: 2 years: +0 %: 60 mins: Summer	57.720	56.600	56.677	0.077	0.3	0.012	0.000	0.4	1.244	OK
MH11	FEH: 2 years: +0 %: 15 mins: Summer	57.470	56.400	56.550	0.150	63.3	0.024	0.000	62.6	31.398	OK
MH10	FEH: 2 years: +0 %: 15 mins: Summer	57.720	56.500	56.722	0.222	22.3	0.035	0.000	21.7	11.420	OK
MH8	FEH: 2 years: +0 %: 10080 mins: Winter	57.870	56.792	57.145	0.353	0.3	0.624	0.000	0.3	289.747	Surcharged
MH7	FEH: 2 years: +0 %: 15 mins: Summer	58.370	57.300	57.439	0.139	52.5	0.022	0.000	51.8	28.715	OK
MH5	FEH: 2 years: +0 %: 15 mins: Summer	59.170	57.500	57.661	0.161	11.4	0.026	0.000	10.5	5.938	OK
MH6	FEH: 2 years: +0 %: 15 mins: Summer	58.780	57.400	57.625	0.225	17.8	0.036	0.000	17.0	11.217	OK
MH4	FEH: 2 years: +0 %: 15 mins: Summer	59.520	58.600	58.684	0.084	12.1	0.013	0.000	11.4	5.952	OK
MH3	FEH: 2 years: +0 %: 15 mins: Summer	60.540	59.500	59.581	0.081	3.7	0.013	0.000	3.5	1.730	OK
MH2	FEH: 2 years: +0 %: 15 mins: Summer	60.850	60.000	60.033	0.033	2.1	0.005	0.000	2.0	0.973	OK
MH1	FEH: 2 years: +0 %: 15 mins: Summer	61.570	60.500	60.500	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH12	FEH: 30 years: +0 %: 10080 mins: Winter	57.500	56.120	56.665	0.545	0.4	0.964	0.000	0.4	369.825	OK
MH9	FEH: 30 years: +0 %: 60 mins: Summer	57.720	56.600	56.770	0.170	0.3	0.027	0.000	0.4	1.612	OK
MH11	FEH: 30 years: +0 %: 10080 mins: Winter	57.470	56.400	56.667	0.267	9.4	0.042	0.000	1.8	667.139	OK
MH10	FEH: 30 years: +0 %: 15 mins: Summer	57.720	56.500	56.931	0.431	44.4	0.068	0.000	43.0	24.500	OK
MH8	FEH: 30 years: +0 %: 10080 mins: Winter	57.870	56.792	57.342	0.551	0.4	0.973	0.000	0.4	387.785	Surcharged
MH7	FEH: 30 years: +0 %: 15 mins: Summer	58.370	57.300	57.498	0.198	97.3	0.032	0.000	96.4	62.051	OK
MH5	FEH: 30 years: +0 %: 15 mins: Summer	59.170	57.500	57.962	0.462	19.4	0.073	0.000	22.0	12.800	OK
MH6	FEH: 30 years: +0 %: 15 mins: Summer	58.780	57.400	57.917	0.517	42.7	0.082	0.000	45.1	24.280	OK
MH4	FEH: 30 years: +0 %: 15 mins: Summer	59.520	58.600	58.713	0.113	19.7	0.018	0.000	19.4	12.816	OK
MH3	FEH: 30 years: +0 %: 15 mins: Summer	60.540	59.500	59.626	0.126	7.7	0.020	0.000	7.1	3.626	OK
MH2	FEH: 30 years: +0 %: 15 mins: Summer	60.850	60.000	60.048	0.048	4.4	0.008	0.000	3.9	1.990	OK
MH1	FEH: 30 years: +0 %: 15 mins: Summer	61.570	60.500	60.500	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH12	FEH: 30 years: +35 %: 10080 mins: Summer	57.500	56.120	56.754	0.634	0.5	1.120	0.000	0.4	401.590	OK
MH9	FEH: 30 years: +35 %: 120 mins: Summer	57.720	56.600	56.815	0.215	0.3	0.034	0.000	0.4	3.951	OK
MH11	FEH: 30 years: +35 %: 10080 mins: Summer	57.470	56.400	56.758	0.358	15.5	0.057	0.000	3.4	737.286	OK
MH10	FEH: 30 years: +35 %: 15 mins: Summer	57.720	56.500	57.136	0.636	53.9	0.101	0.000	50.7	33.042	OK
MH8	FEH: 30 years: +35 %: 10080 mins: Summer	57.870	56.792	57.465	0.673	0.4	1.189	0.000	0.4	437.020	Surcharged
MH7	FEH: 30 years: +35 %: 15 mins: Summer	58.370	57.300	57.530	0.230	121.0	0.037	0.000	119.8	84.030	OK
MH5	FEH: 30 years: +35 %: 15 mins: Summer	59.170	57.500	58.232	0.732	24.1	0.116	0.000	27.3	17.460	OK
MH6	FEH: 30 years: +35 %: 15 mins: Summer	58.780	57.400	58.158	0.758	54.0	0.121	0.000	57.2	32.995	OK
MH4	FEH: 30 years: +35 %: 15 mins: Summer	59.520	58.600	58.728	0.128	23.9	0.020	0.000	24.1	17.476	OK
MH3	FEH: 30 years: +35 %: 15 mins: Summer	60.540	59.500	59.663	0.163	11.1	0.026	0.000	10.4	5.034	OK
MH2	FEH: 30 years: +35 %: 15 mins: Summer	60.850	60.000	60.059	0.059	6.2	0.009	0.000	5.9	2.820	OK
MH1	FEH: 30 years: +35 %: 15 mins: Summer	61.570	60.500	60.500	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH12	FEH: 100 years: +0 %: 10080 mins: Summer	57.500	56.120	56.700	0.580	0.4	1.025	0.000	0.4	385.210	OK
MH9	FEH: 100 years: +0 %: 60 mins: Winter	57.720	56.600	56.806	0.206	0.3	0.033	0.000	0.7	1.780	OK
MH11	FEH: 100 years: +0 %: 10080 mins: Summer	57.470	56.400	56.703	0.303	10.2	0.048	0.000	3.0	679.894	OK
MH10	FEH: 100 years: +0 %: 15 mins: Summer	57.720	56.500	57.101	0.601	52.5	0.096	0.000	49.5	31.724	OK
MH8	FEH: 100 years: +0 %: 10080 mins: Winter	57.870	56.792	57.401	0.609	0.4	1.076	0.000	0.4	411.250	Surcharged
MH7	FEH: 100 years: +0 %: 15 mins: Summer	58.370	57.300	57.525	0.225	117.4	0.036	0.000	116.3	80.630	OK
MH5	FEH: 100 years: +0 %: 30 mins: Summer	59.170	57.500	58.185	0.685	22.5	0.109	0.000	21.9	21.611	OK
MH6	FEH: 100 years: +0 %: 15 mins: Summer	58.780	57.400	58.120	0.720	52.4	0.114	0.000	55.5	31.643	OK
MH4	FEH: 100 years: +0 %: 15 mins: Summer	59.520	58.600	58.727	0.127	23.4	0.020	0.000	23.6	16.746	OK
MH3	FEH: 100 years: +0 %: 15 mins: Summer	60.540	59.500	59.656	0.156	10.6	0.025	0.000	10.1	4.812	OK
MH2	FEH: 100 years: +0 %: 15 mins: Summer	60.850	60.000	60.058	0.058	5.9	0.009	0.000	5.7	2.691	OK
MH1	FEH: 100 years: +0 %: 15 mins: Summer	61.570	60.500	60.500	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH12	FEH: 100 years: +40 %: 10080 mins: Winter	57.500	56.120	56.794	0.674	0.5	1.190	0.000	0.4	412.859	OK
MH9	FEH: 100 years: +40 %: 120 mins: Summer	57.720	56.600	56.856	0.256	0.8	0.041	0.000	1.2	4.480	OK
MH11	FEH: 100 years: +40 %: 10080 mins: Winter	57.470	56.400	56.797	0.397	18.4	0.063	0.000	4.0	742.350	Surcharged
MH10	FEH: 100 years: +40 %: 15 mins: Summer	57.720	56.500	57.465	0.965	66.7	0.153	0.000	66.5	44.372	Flood Risk
MH8	FEH: 100 years: +40 %: 10080 mins: Summer	57.870	56.792	57.571	0.779	0.5	1.376	0.000	0.5	470.396	Flood Risk
MH7	FEH: 100 years: +40 %: 15 mins: Summer	58.370	57.300	57.579	0.279	149.8	0.044	0.000	147.6	113.036	OK
MH5	FEH: 100 years: +40 %: 15 mins: Summer	59.170	57.500	58.735	1.235	32.2	0.196	0.000	35.7	23.513	OK
MH6	FEH: 100 years: +40 %: 30 mins: Summer	58.780	57.400	58.538	1.138	57.5	0.181	0.000	60.8	57.392	Flood Risk
MH4	FEH: 100 years: +40 %: 15 mins: Summer	59.520	58.600	58.810	0.210	29.5	0.033	0.000	32.2	23.541	OK
MH3	FEH: 100 years: +40 %: 15 mins: Summer	60.540	59.500	59.928	0.428	14.9	0.068	0.000	11.6	6.739	OK
MH2	FEH: 100 years: +40 %: 15 mins: Summer	60.850	60.000	60.071	0.071	8.4	0.011	0.000	8.0	3.755	OK
MH1	FEH: 100 years: +40 %: 15 mins: Summer	61.570	60.500	60.500	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
DS Basin	FEH: 2 years: +0 %: 10080 mins: Winter	56.502	56.502	0.302	0.302	1.5	283.550	0.000	0.000	0.3	298.027	73.196	OK
US Basin	FEH: 2 years: +0 %: 10080 mins: Winter	57.145	57.145	0.245	0.245	2.1	339.637	0.000	0.000	0.3	290.226	71.688	OK
Filter Drain (2)	FEH: 2 years: +0 %: 15 mins: Summer	59.559	58.750	0.056	0.150	13.5	1.025	0.000	0.000	12.1	5.963	91.930	OK
Filter Drain (5)	FEH: 2 years: +0 %: 15 mins: Summer	56.750	56.740	0.152	0.240	26.1	1.308	0.000	0.000	22.4	11.444	86.859	OK
Filter Drain (6)	FEH: 2 years: +0 %: 15 mins: Summer	56.710	56.671	0.202	0.271	67.8	1.963	0.000	0.000	63.5	31.387	84.045	OK
Filter Drain (1)	FEH: 2 years: +0 %: 15 mins: Summer	60.518	60.053	0.018	0.053	2.3	0.114	0.000	0.000	2.1	0.976	96.568	OK
Filter Drain (4)	FEH: 2 years: +0 %: 15 mins: Summer	57.614	57.572	0.214	0.272	57.5	1.760	0.000	0.000	52.7	28.704	84.954	OK
Filter Drain (3)	FEH: 2 years: +0 %: 15 mins: Summer	57.653	57.635	0.153	0.235	22.8	1.284	0.000	0.000	17.9	11.237	89.141	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
DS Basin	FEH: 30 years: +0 %: 10080 mins: Winter	56.665	56.665	0.465	0.465	2.4	449.299	0.000	0.000	0.4	385.883	57.527	OK
US Basin	FEH: 30 years: +0 %: 10080 mins: Winter	57.343	57.343	0.443	0.443	3.5	631.135	0.000	0.000	0.4	389.077	47.389	OK
Filter Drain (2)	FEH: 30 years: +0 %: 15 mins: Summer	59.587	58.890	0.084	0.290	28.4	2.063	0.000	0.000	19.8	12.828	83.746	OK
Filter Drain (5)	FEH: 30 years: +0 %: 15 mins: Summer	57.005	56.987	0.407	0.487	56.1	3.003	0.000	0.000	44.5	24.523	69.841	OK
Filter Drain (6)	FEH: 30 years: +0 %: 15 mins: Summer	56.909	56.822	0.401	0.422	142.3	3.488	0.000	0.000	130.9	67.549	71.647	OK
Filter Drain (1)	FEH: 30 years: +0 %: 15 mins: Summer	60.527	60.085	0.027	0.085	4.9	0.174	0.000	0.000	4.4	2.043	94.734	OK
Filter Drain (4)	FEH: 30 years: +0 %: 15 mins: Summer	57.900	57.768	0.500	0.468	111.5	3.586	0.000	0.000	97.5	62.020	69.352	OK
Filter Drain (3)	FEH: 30 years: +0 %: 15 mins: Summer	57.955	57.937	0.455	0.537	43.0	3.306	0.000	0.000	42.7	24.300	72.032	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
DS Basin	FEH: 30 years: +35 %: 10080 mins: Summer	56.754	56.754	0.554	0.554	4.6	543.166	0.000	0.000	0.5	443.904	48.654	OK
US Basin	FEH: 30 years: +35 %: 10080 mins: Summer	57.465	57.465	0.565	0.565	7.3	819.703	0.000	0.000	0.4	443.661	31.670	OK
Filter Drain (2)	FEH: 30 years: +35 %: 15 mins: Summer	59.614	58.986	0.111	0.386	39.3	3.570	0.000	0.000	23.9	17.487	71.877	OK
Filter Drain (5)	FEH: 30 years: +35 %: 15 mins: Summer	57.248	57.218	0.651	0.718	75.7	4.590	0.000	0.000	54.1	33.068	53.897	OK
Filter Drain (6)	FEH: 30 years: +35 %: 15 mins: Summer	57.106	56.973	0.598	0.573	184.8	4.967	0.000	0.000	165.2	91.198	59.624	OK
Filter Drain (1)	FEH: 30 years: +35 %: 15 mins: Summer	60.531	60.106	0.031	0.106	6.6	0.212	0.000	0.000	6.2	2.832	93.603	OK
Filter Drain (4)	FEH: 30 years: +35 %: 15 mins: Summer	58.139	57.947	0.739	0.647	143.5	5.154	0.000	0.000	121.4	83.987	55.947	OK
Filter Drain (3)	FEH: 30 years: +35 %: 30 mins: Summer	58.214	58.182	0.714	0.782	45.5	4.990	0.000	0.000	43.8	42.475	57.788	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
DS Basin	FEH: 100 years: +0 %: 10080 mins: Summer	56.700	56.700	0.500	0.500	4.1	485.863	0.000	0.000	0.4	411.088	54.071	OK
US Basin	FEH: 100 years: +0 %: 10080 mins: Winter	57.401	57.401	0.501	0.501	4.1	720.386	0.000	0.000	0.4	413.860	39.949	OK
Filter Drain (2)	FEH: 100 years: +0 %: 15 mins: Summer	59.610	58.974	0.106	0.374	37.8	3.211	0.000	0.000	23.4	16.758	74.709	OK
Filter Drain (5)	FEH: 100 years: +0 %: 15 mins: Summer	57.208	57.179	0.610	0.679	72.6	4.323	0.000	0.000	52.6	31.750	56.576	OK
Filter Drain (6)	FEH: 100 years: +0 %: 15 mins: Summer	57.073	56.949	0.565	0.549	178.2	4.720	0.000	0.000	160.0	87.552	61.637	OK
Filter Drain (1)	FEH: 100 years: +0 %: 15 mins: Summer	60.530	60.103	0.030	0.103	6.3	0.206	0.000	0.000	5.9	2.707	93.762	OK
Filter Drain (4)	FEH: 100 years: +0 %: 15 mins: Summer	58.101	57.918	0.701	0.618	138.6	4.901	0.000	0.000	117.7	80.587	58.110	OK
Filter Drain (3)	FEH: 100 years: +0 %: 30 mins: Summer	58.172	58.141	0.672	0.741	44.2	4.711	0.000	0.000	42.0	40.921	60.146	OK

Project: 5024440 - Radwell Bury Farm		Date: 22/07/2024			
		Designed by: AO'B	Checked by: EP		Approved By: SC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
DS Basin	FEH: 100 years: +40 %: 10080 mins: Winter	56.794	56.794	0.594	0.594	4.9	586.140	0.000	0.000	0.5	464.637	44.592	OK
US Basin	FEH: 100 years: +40 %: 10080 mins: Summer	57.571	57.571	0.671	0.671	8.8	988.220	0.000	0.000	0.5	491.204	17.622	OK
Filter Drain (2)	FEH: 100 years: +40 %: 15 mins: Summer	59.912	59.207	0.408	0.607	50.4	7.184	0.000	0.000	29.6	23.504	43.409	OK
Filter Drain (5)	FEH: 100 years: +40 %: 15 mins: Summer	57.634	57.767	1.036	1.267	101.7	7.128	0.314	0.000	66.8	44.399	28.406	Flood
Filter Drain (6)	FEH: 100 years: +40 %: 15 mins: Summer	57.421	57.213	0.913	0.813	241.7	7.334	0.000	0.000	209.8	122.569	40.385	OK
Filter Drain (1)	FEH: 100 years: +40 %: 15 mins: Summer	60.536	60.129	0.036	0.129	8.8	0.253	0.000	0.000	8.4	3.815	92.357	OK
Filter Drain (4)	FEH: 100 years: +40 %: 15 mins: Summer	58.486	58.219	1.086	0.919	184.1	7.462	0.000	0.000	150.2	113.009	36.221	OK
Filter Drain (3)	FEH: 100 years: +40 %: 15 mins: Summer	58.699	58.619	1.199	1.219	67.6	8.083	0.000	0.000	67.4	44.453	31.624	OK

Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

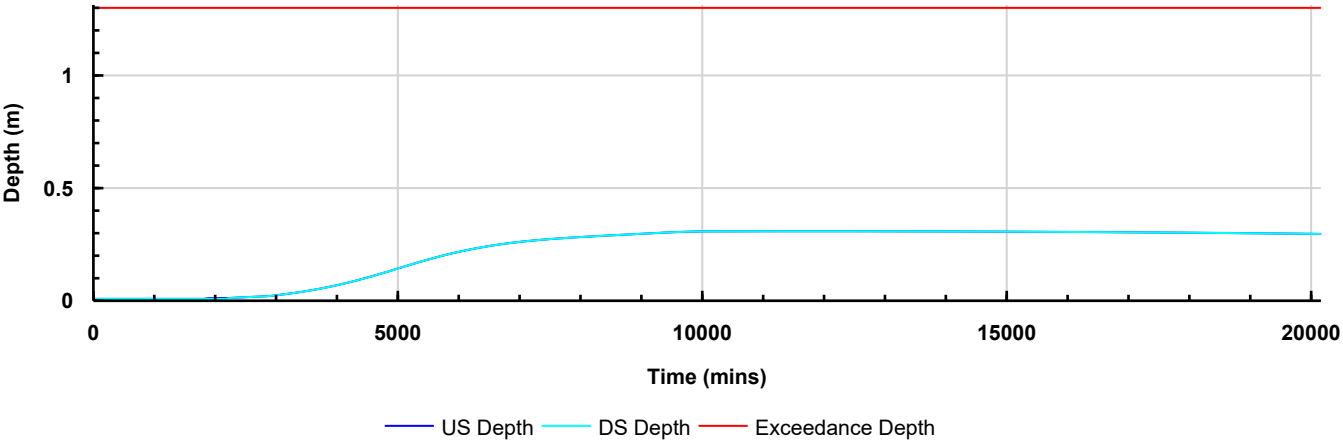


DS Basin
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

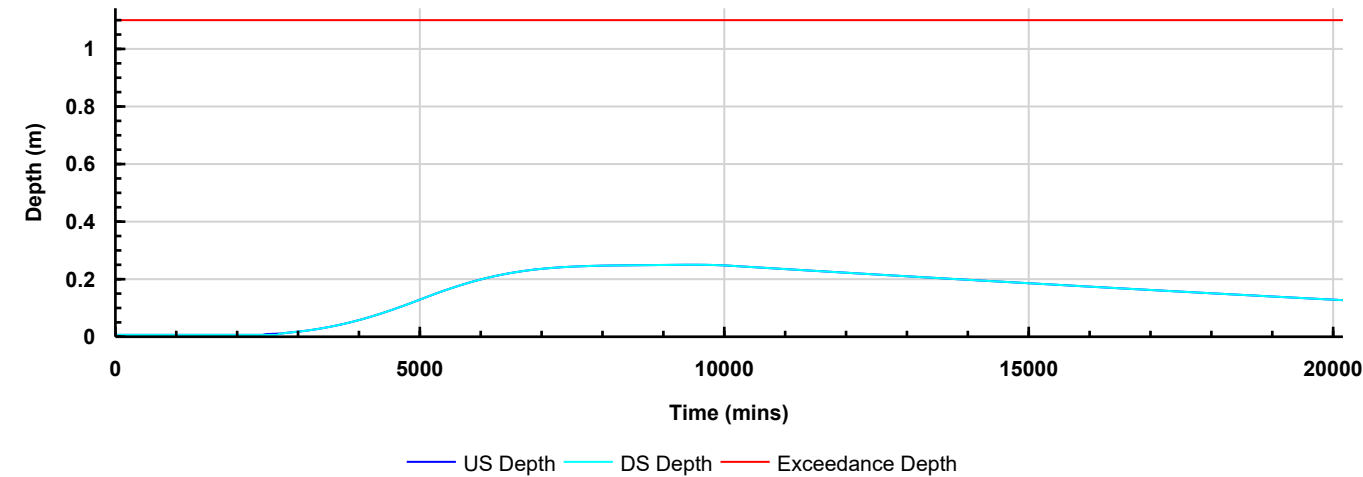


US Basin
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



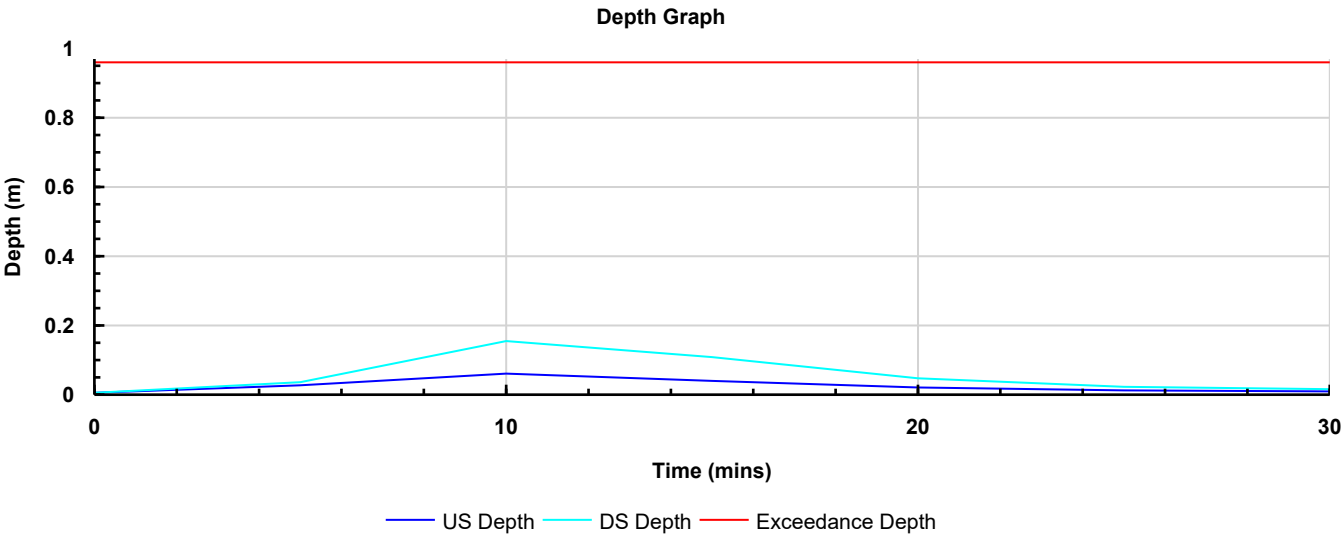
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (2)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



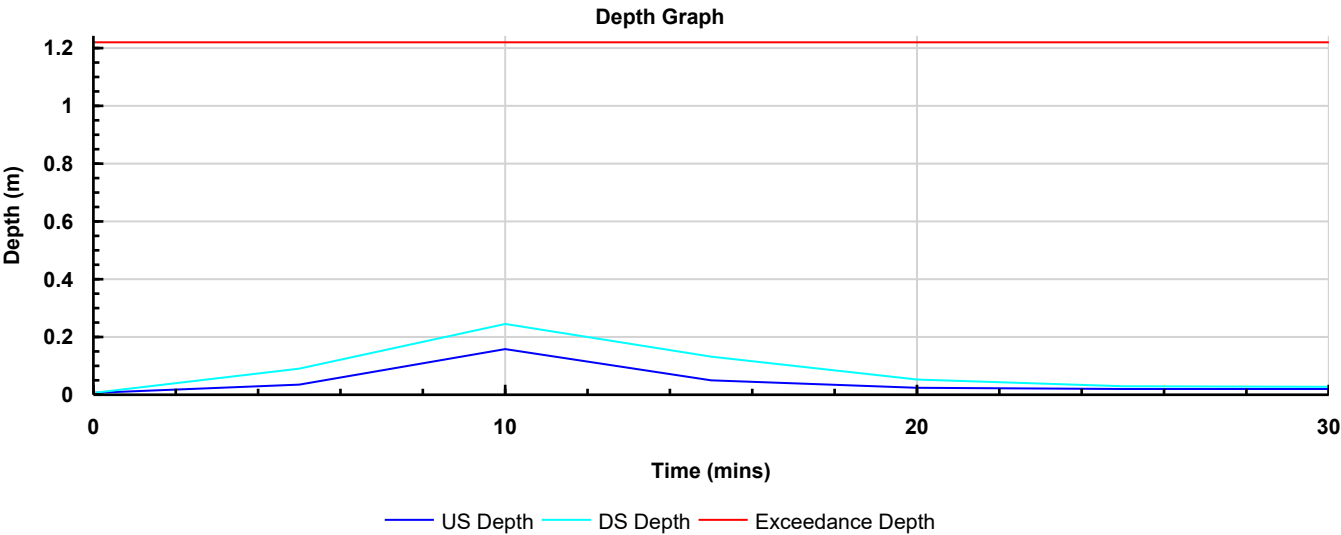
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (5)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

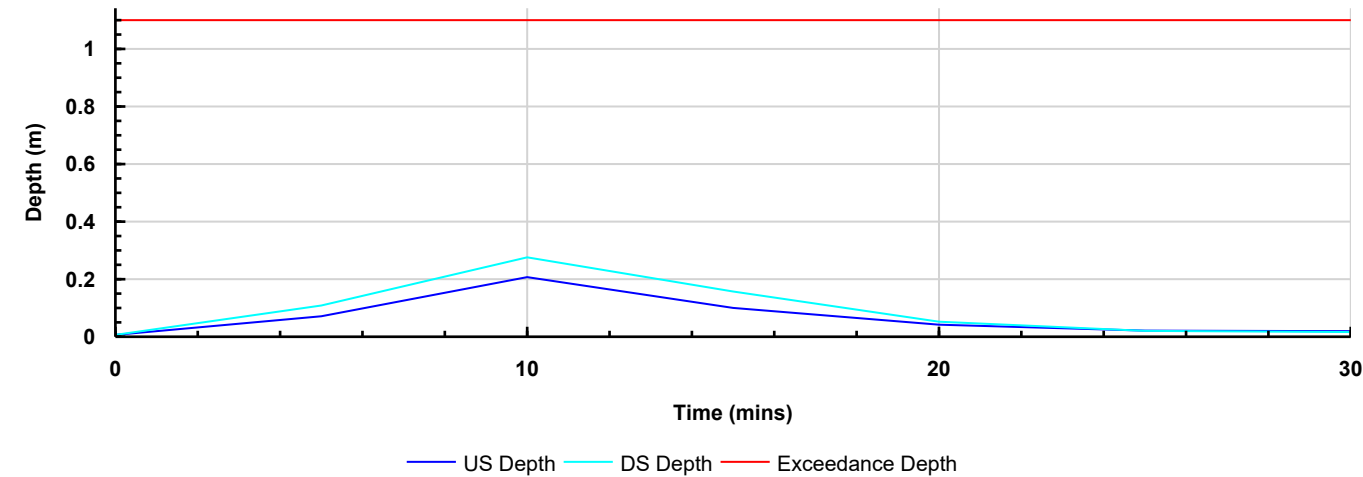


Filter Drain (6)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



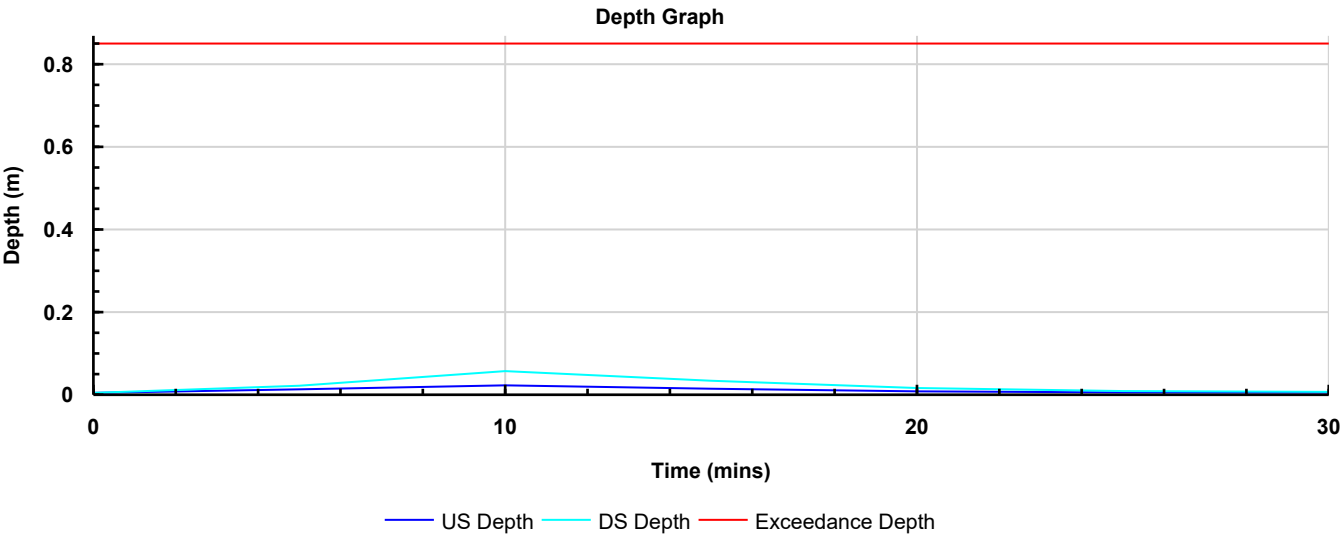
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (1)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

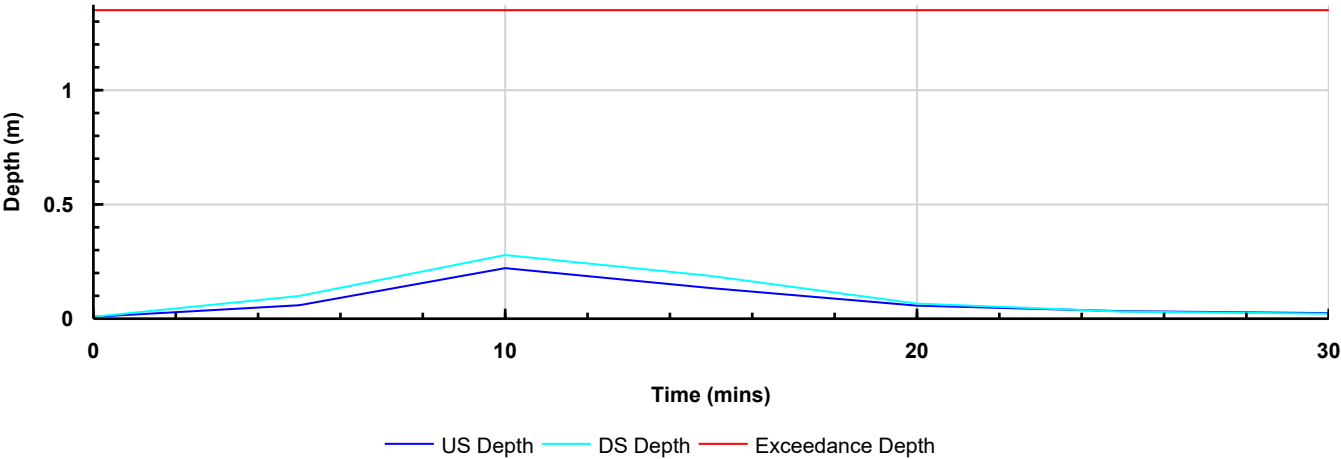


Filter Drain (4)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



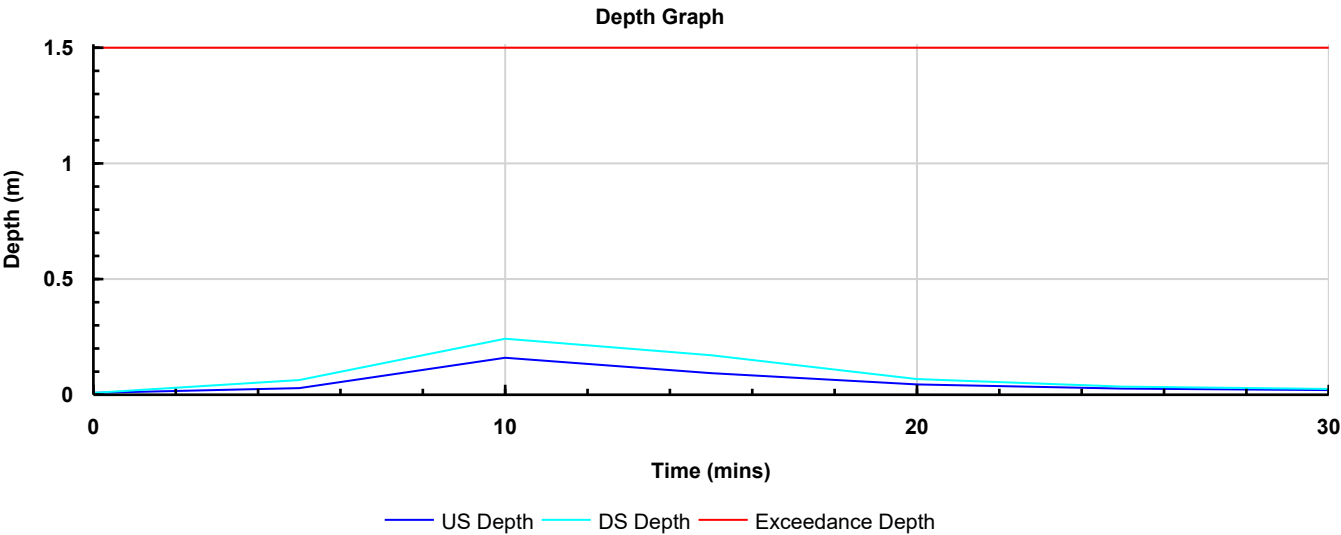
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (3)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

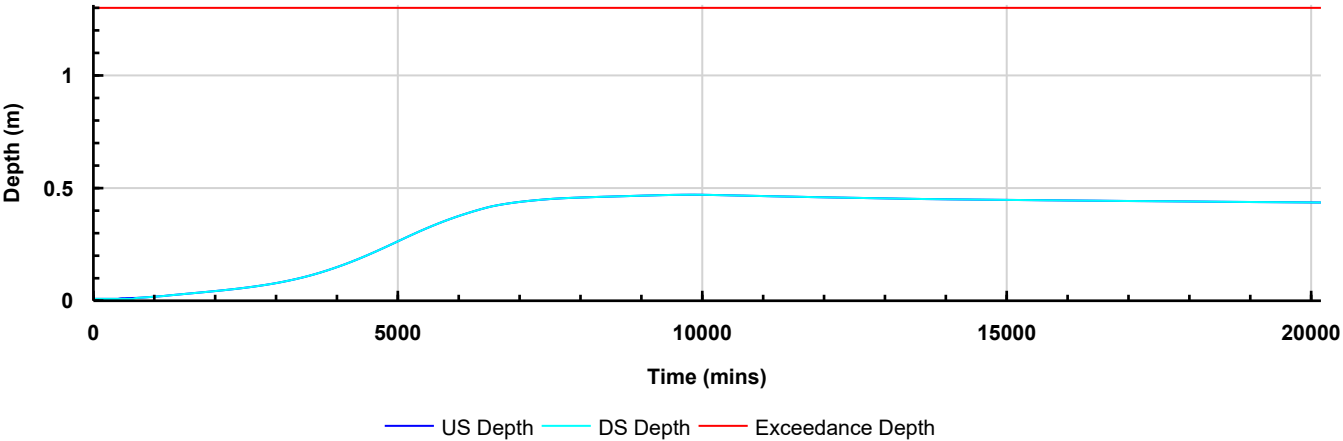


DS Basin
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

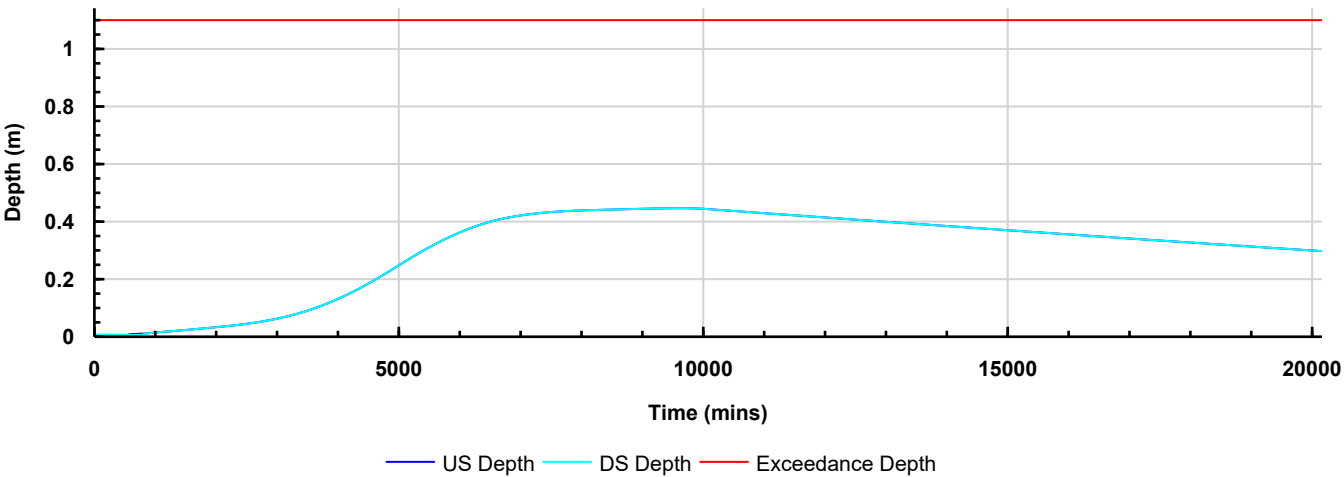


US Basin
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

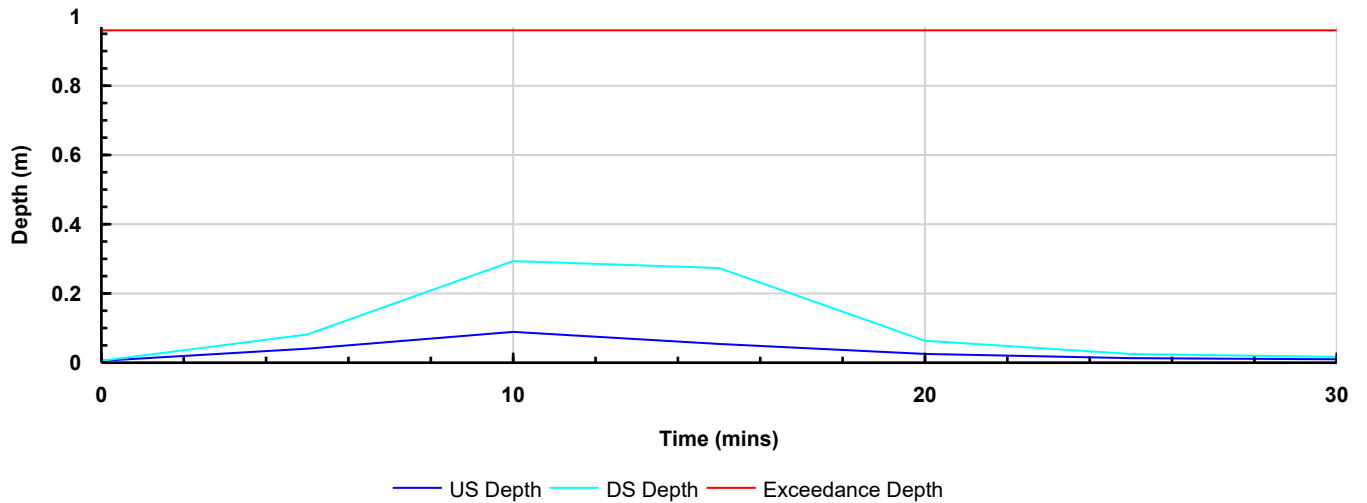


Filter Drain (2)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



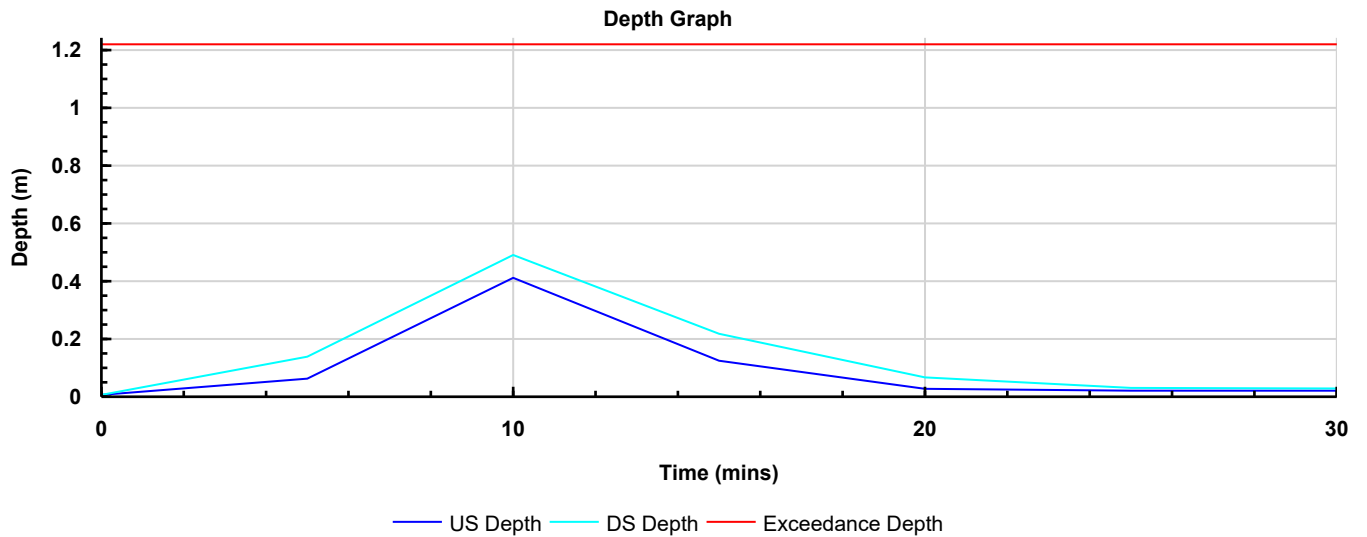
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	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (5)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

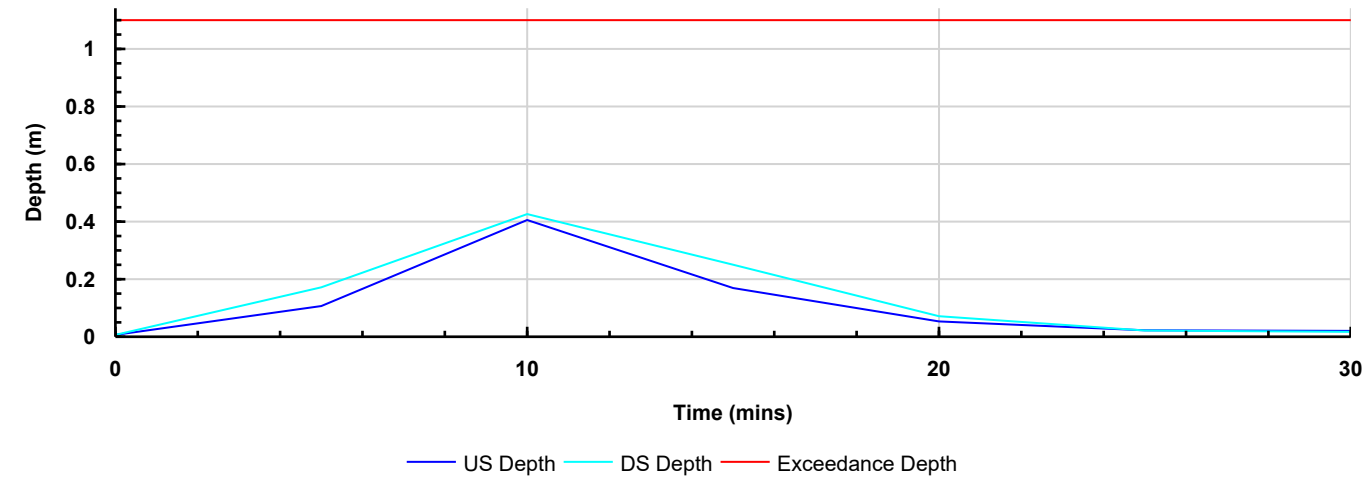


Filter Drain (6)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



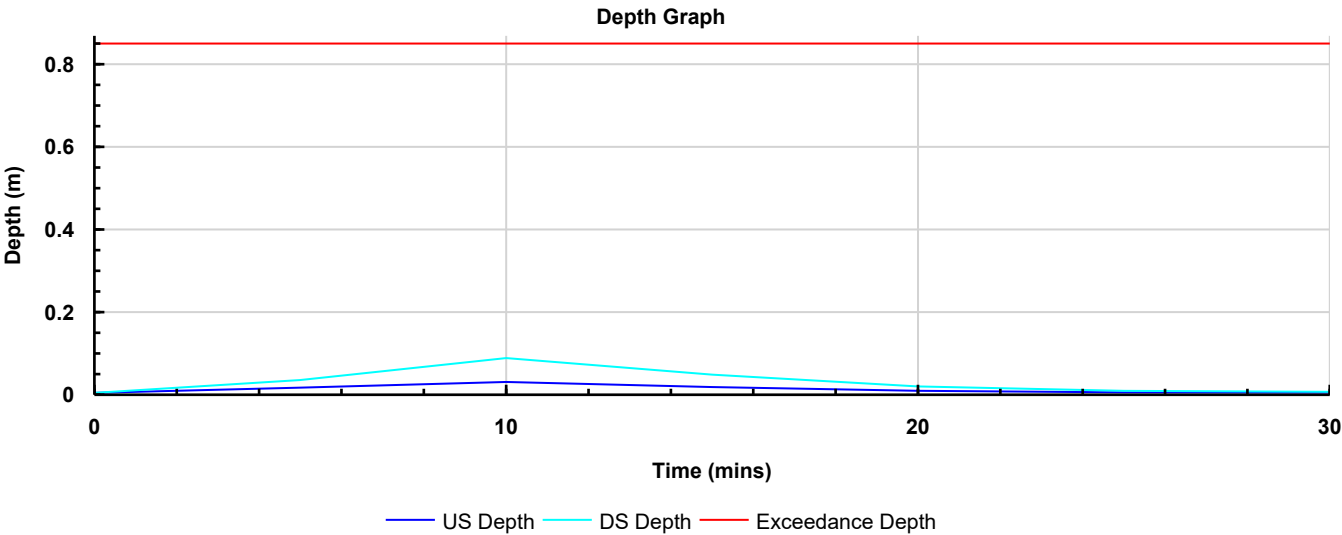
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (1)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

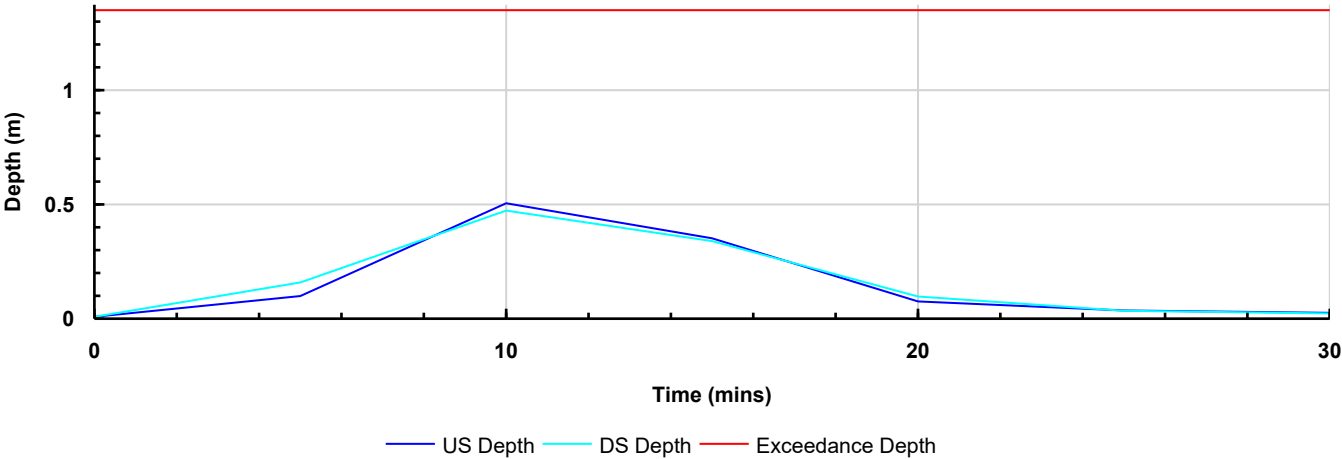


Filter Drain (4)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



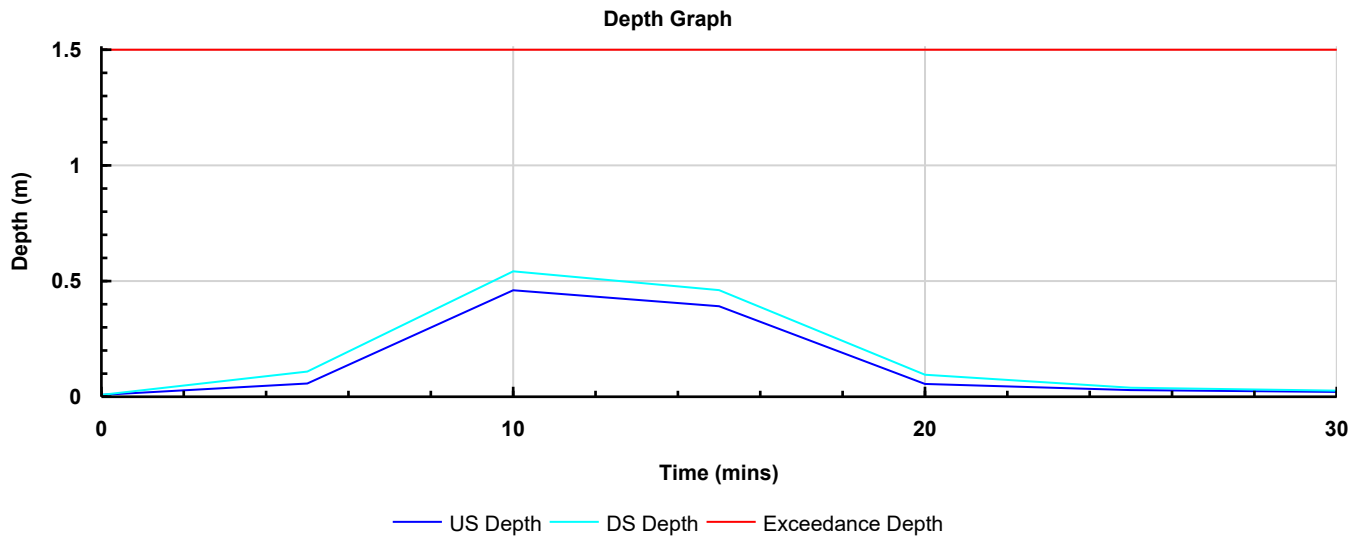
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (3)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

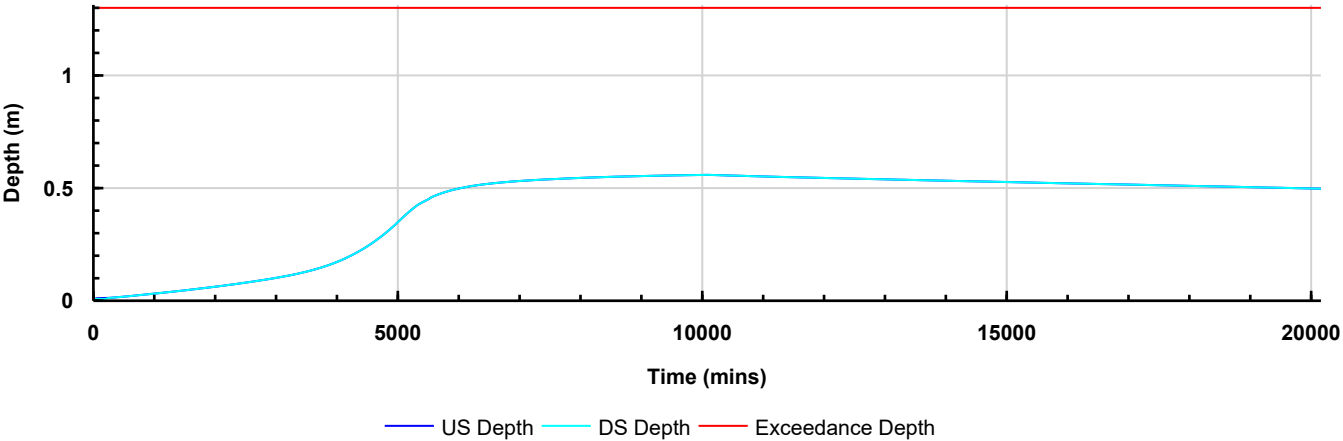


DS Basin
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 10080 mins: Summer

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

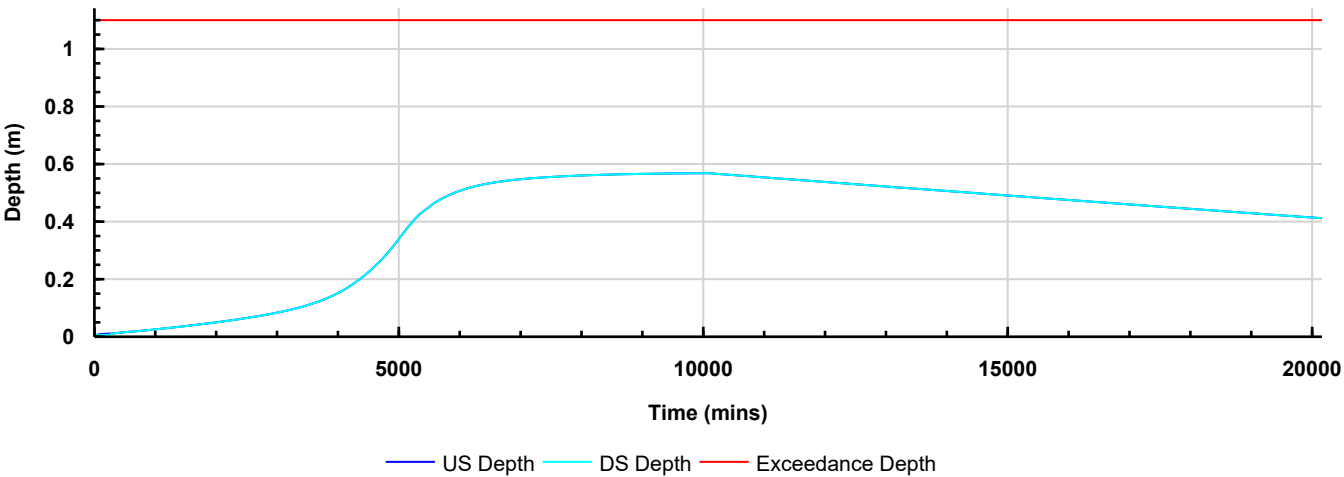


US Basin
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 10080 mins: Summer

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



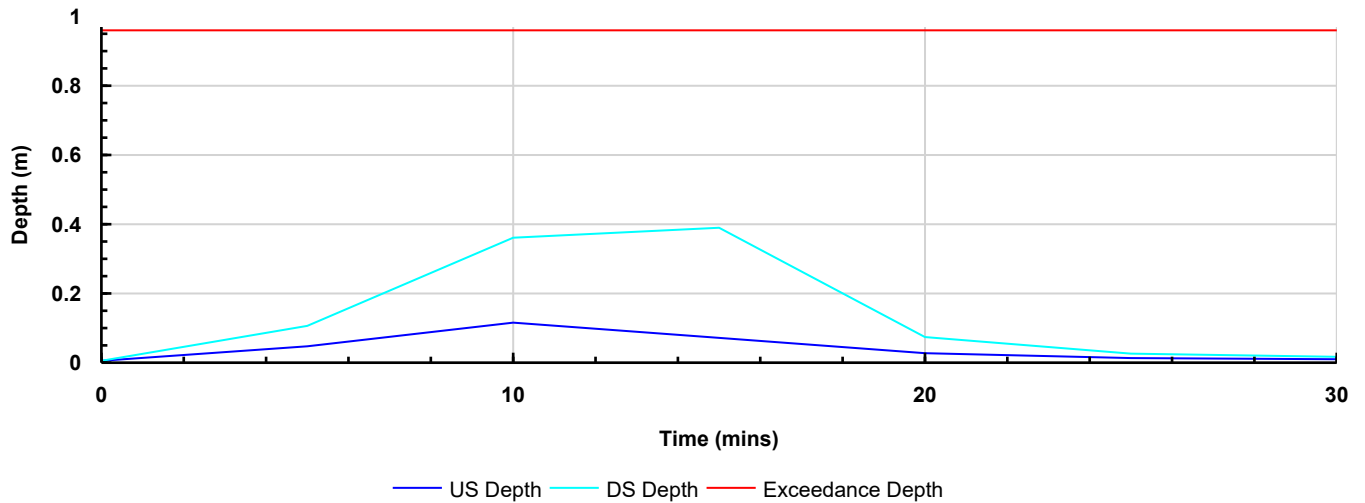
Filter Drain (2)

Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

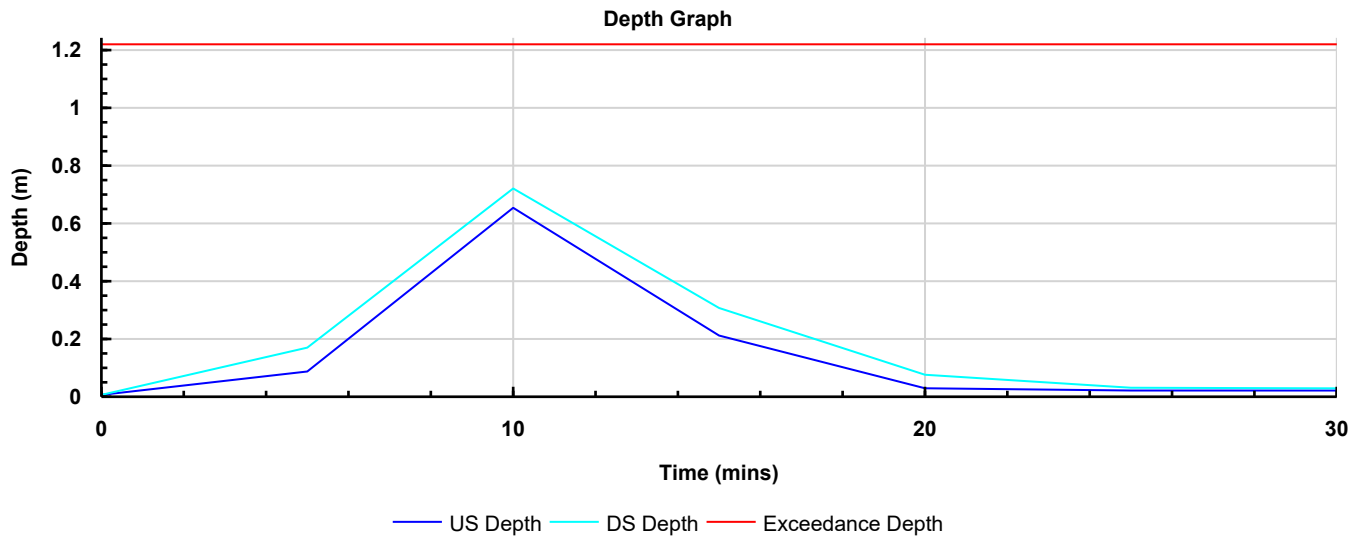


Filter Drain (5)

Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



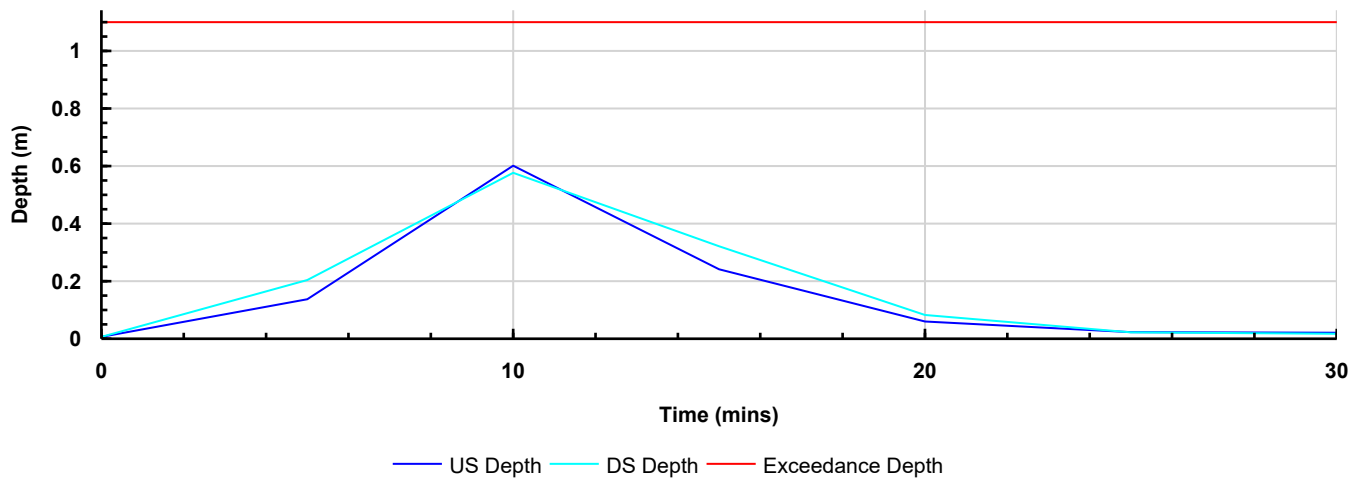
Filter Drain (6)

Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



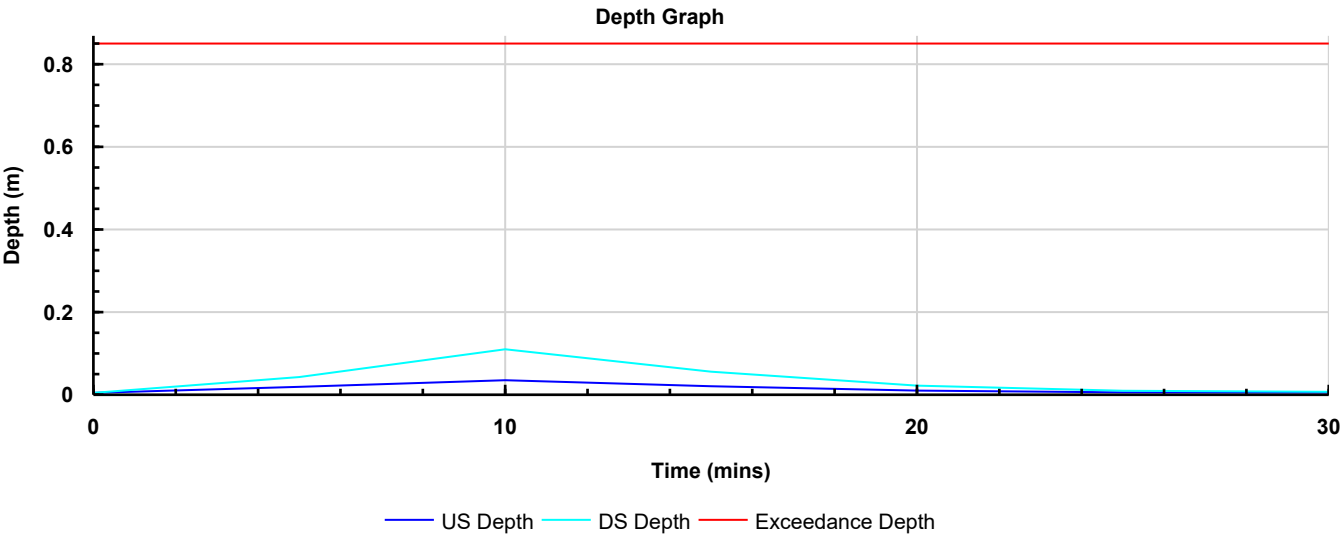
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (1)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

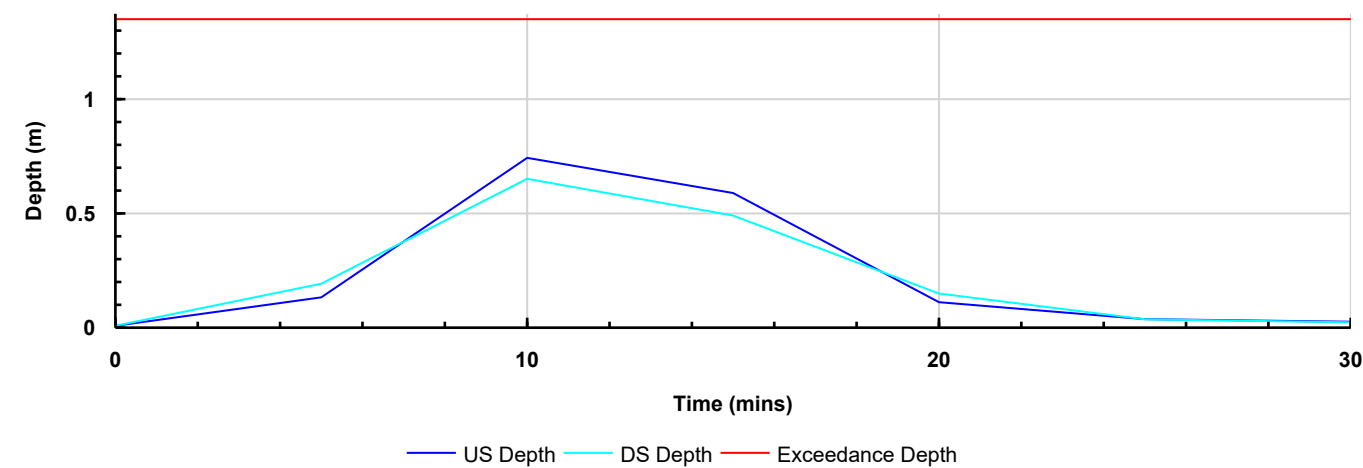


Filter Drain (4)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



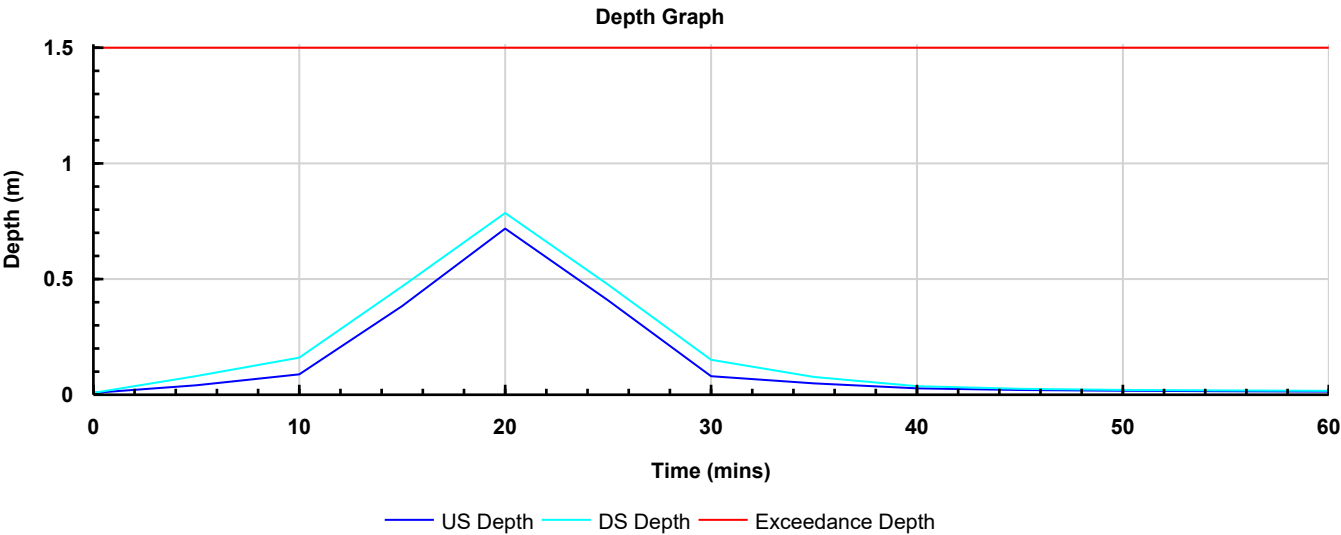
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (3)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 30 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

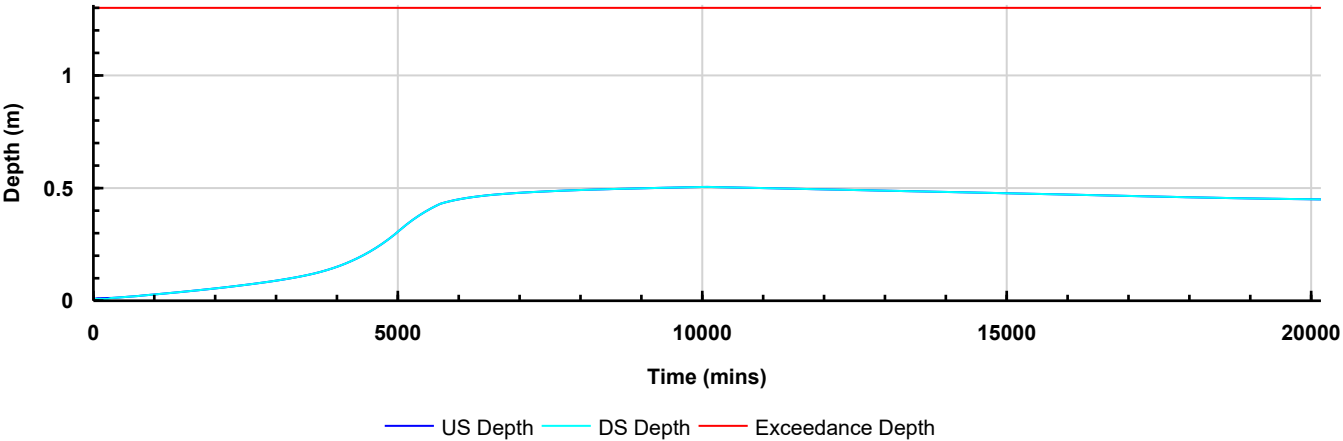


DS Basin
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 10080 mins: Summer

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

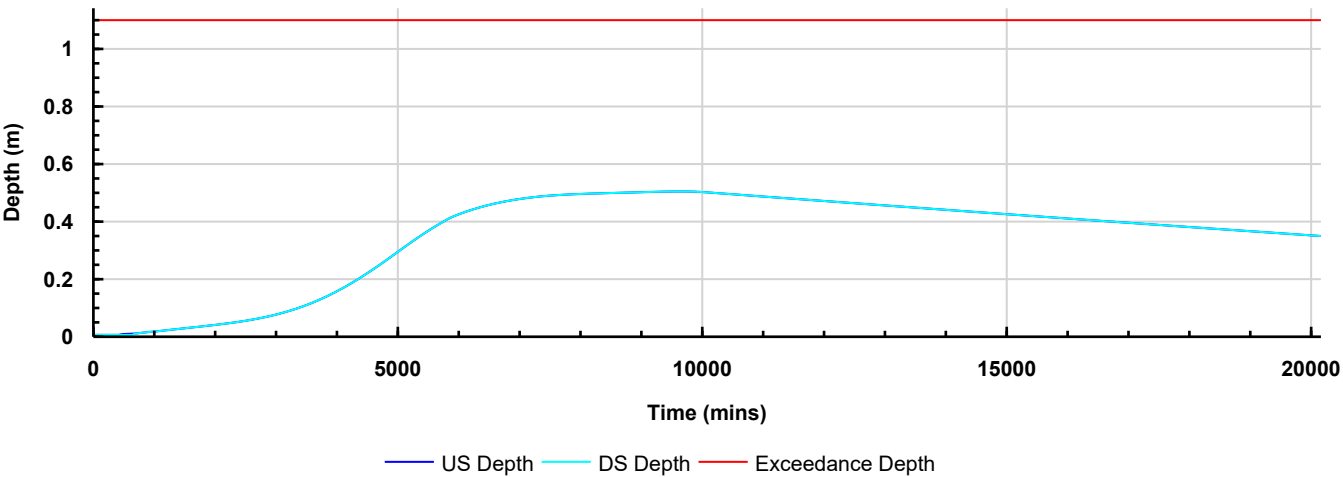


US Basin
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



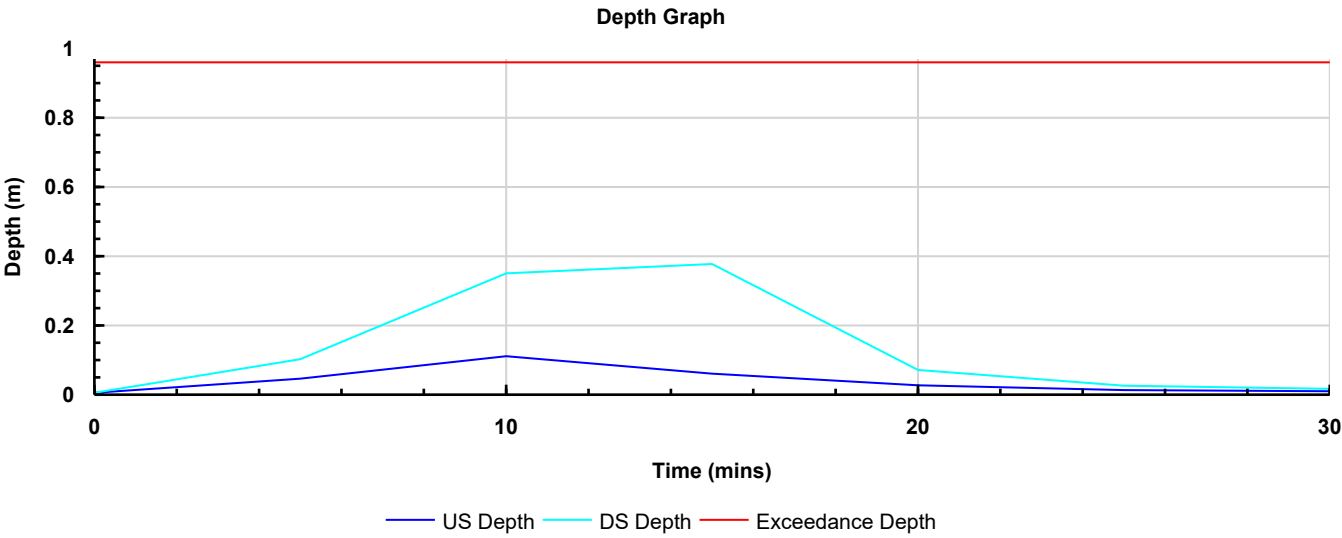
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (2)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

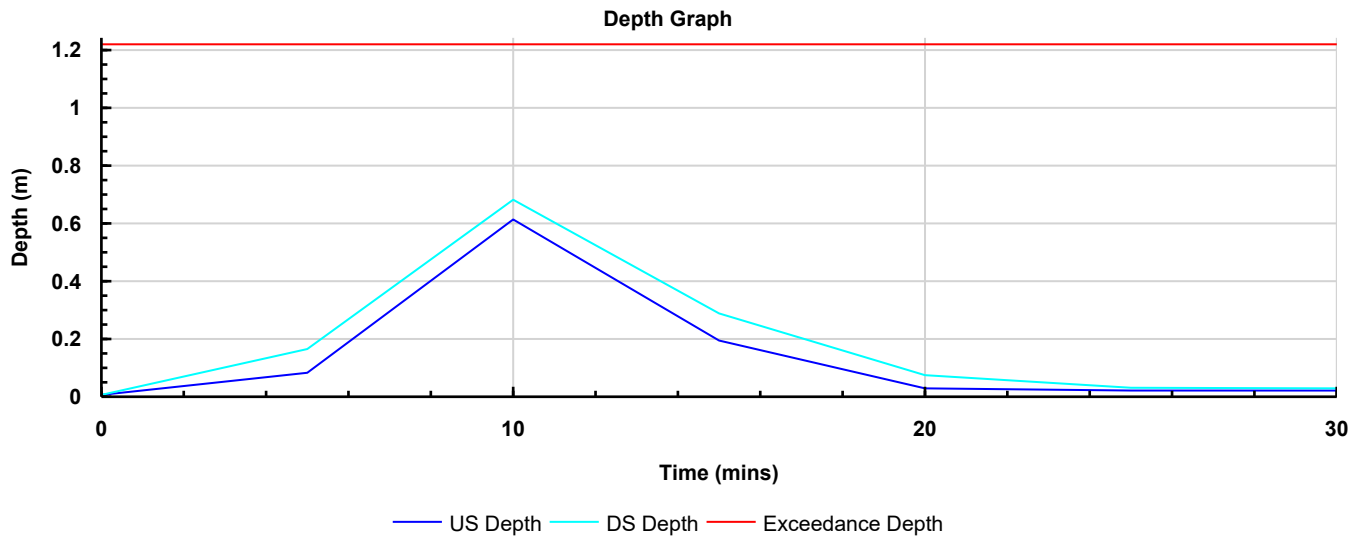


Filter Drain (5)

Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



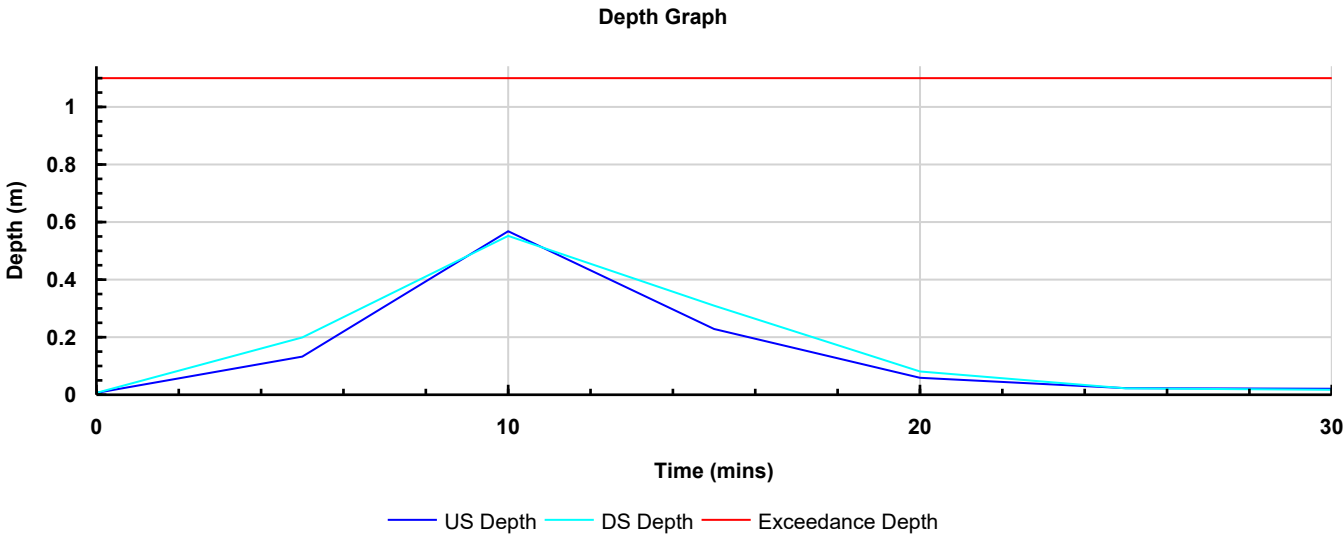
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (6)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



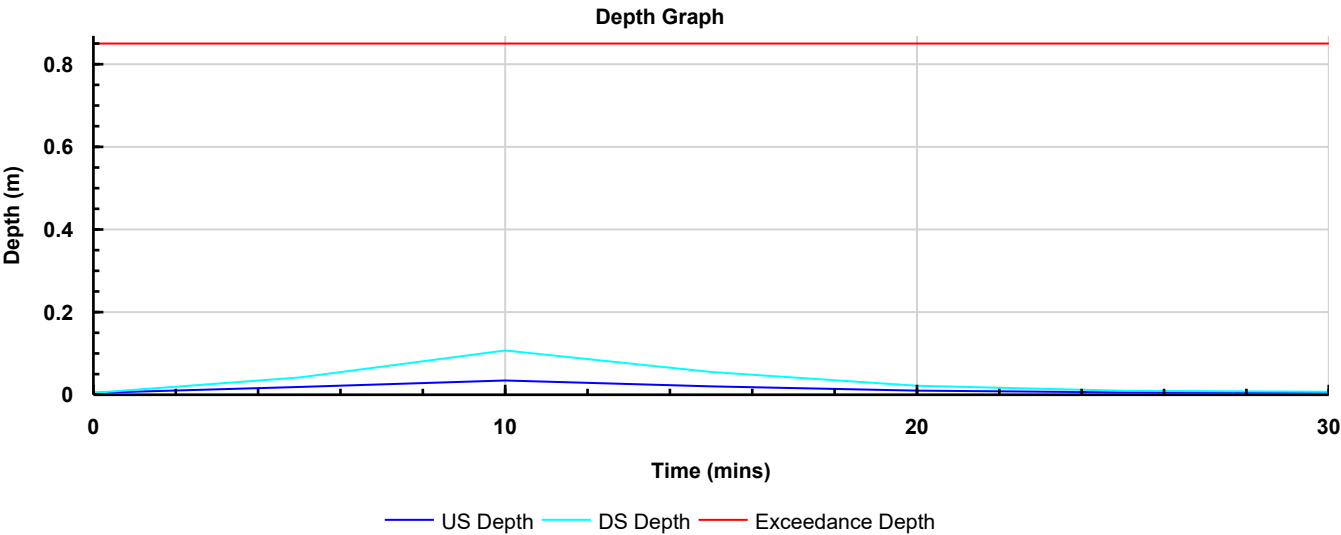
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (1)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

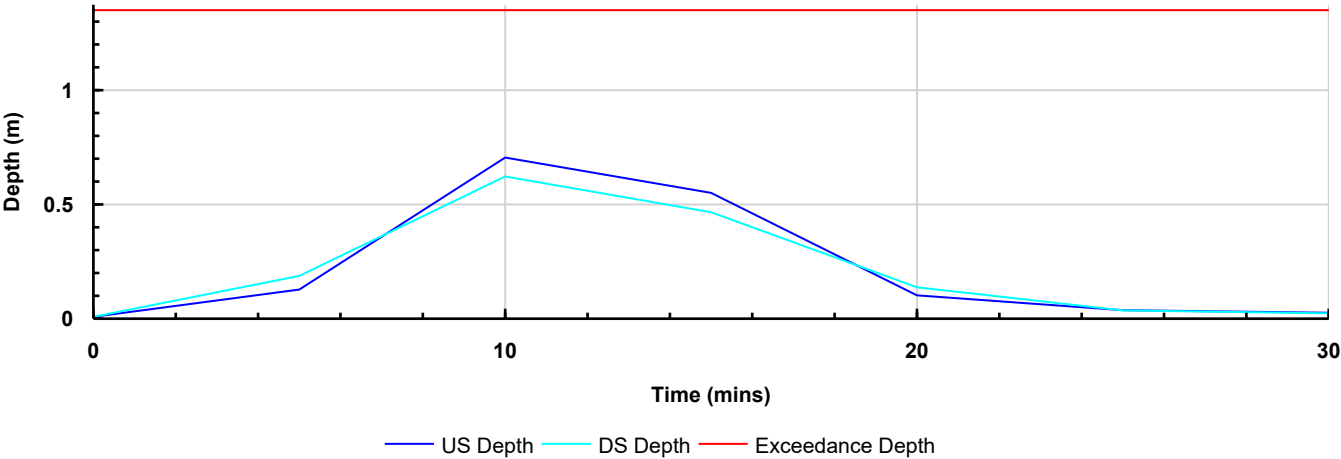


Filter Drain (4)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



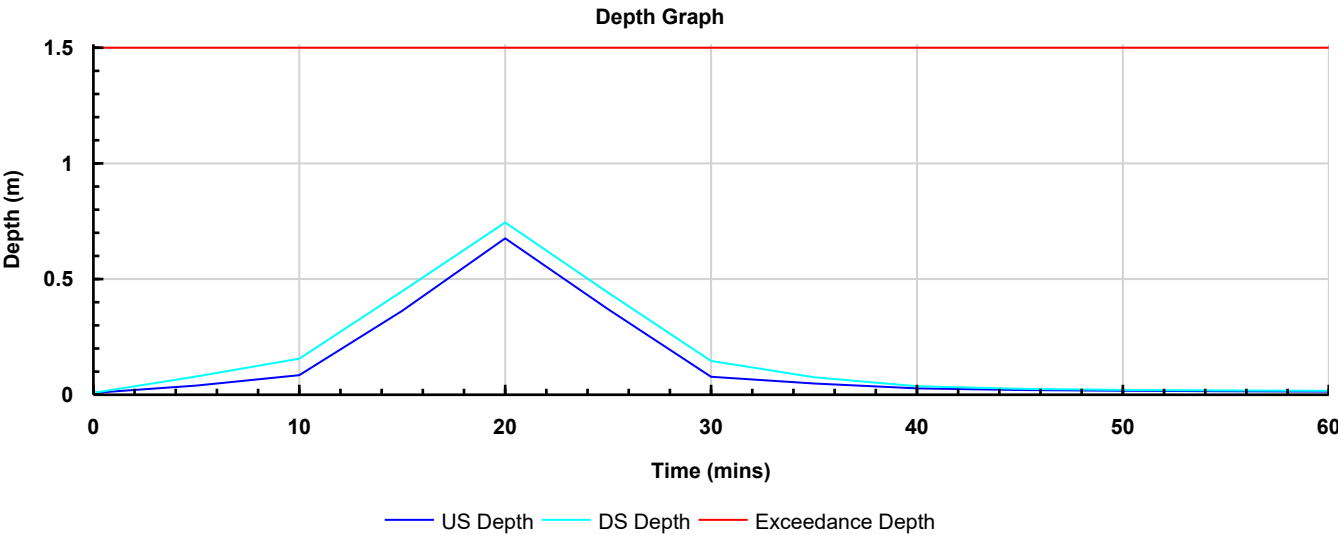
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (3)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +0: 30 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

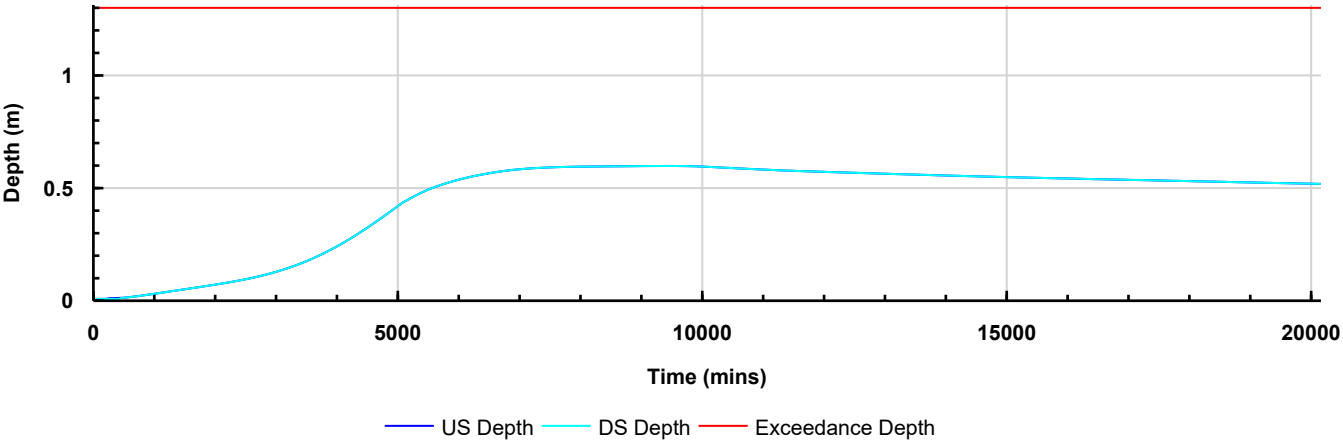


DS Basin
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 10080 mins: Winter

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024		
	Designed by: AO'B	Checked by: EP	Approved By: SC
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR		

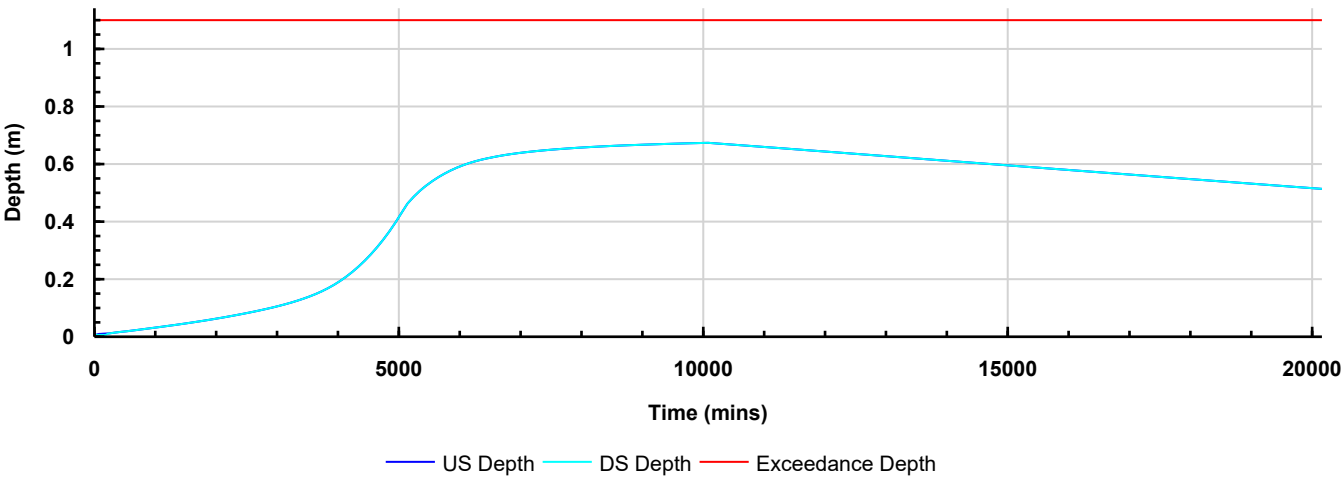


US Basin
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 10080 mins: Summer

Type : Pond

Graphs

Depth Graph



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

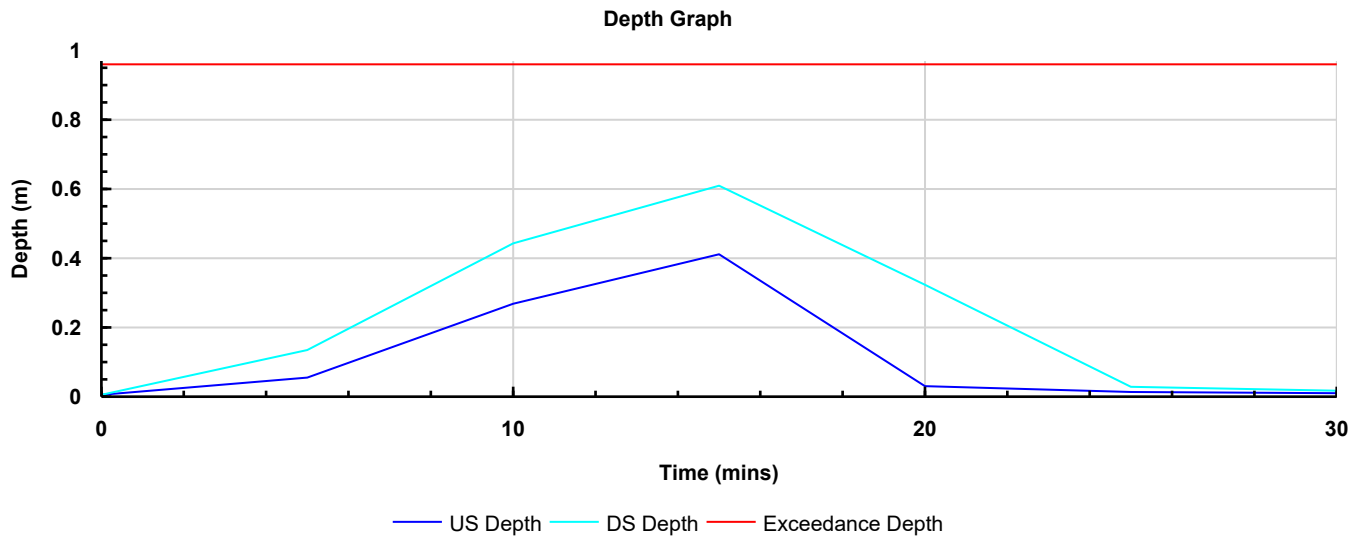


Filter Drain (2)

Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			

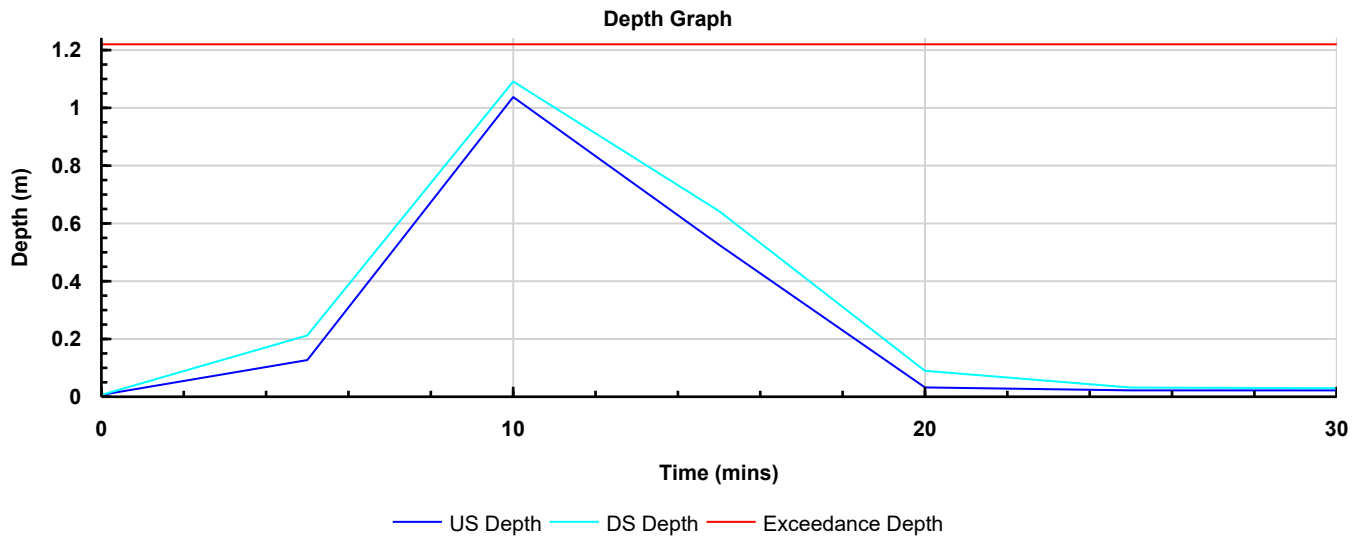


Filter Drain (5)

Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs



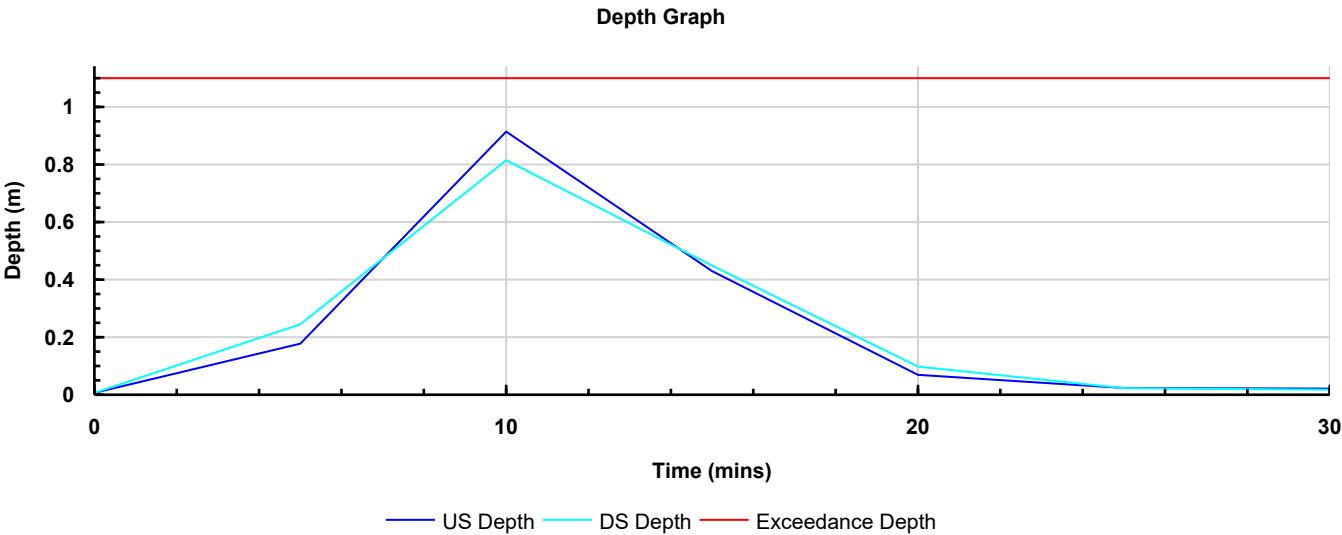
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (6)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs



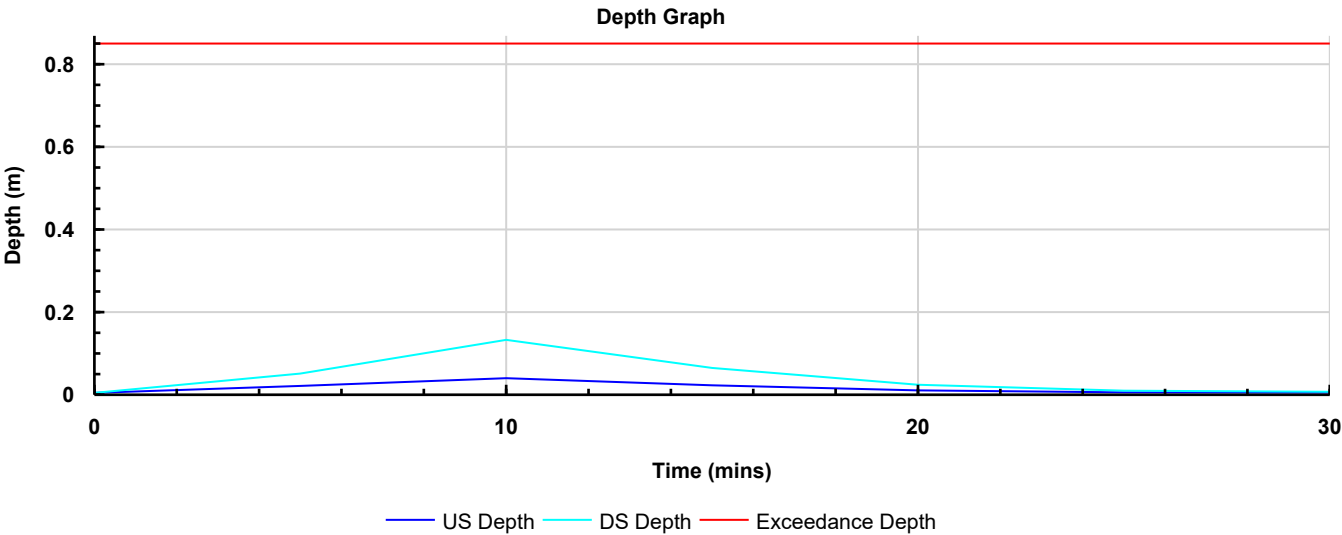
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
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Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



Filter Drain (1)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs



Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
	Designed by: AO'B	Checked by: EP	Approved By: SC	
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Ridge & Partners LLP The Cowyards, Blenheim Park Oxford Road, Woodstock OX20 1QR			



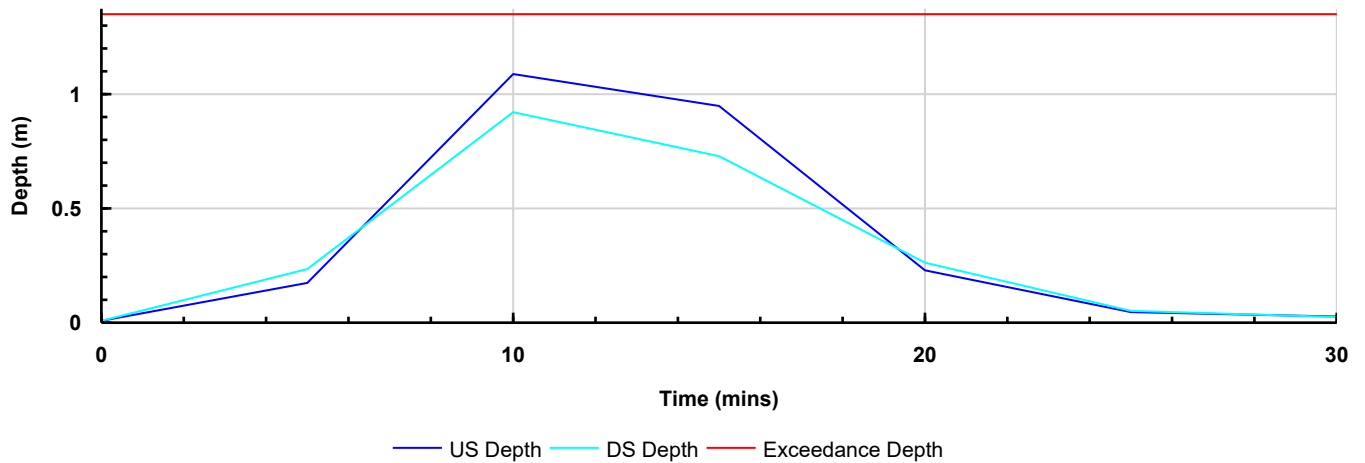
Filter Drain (4)

Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs

Depth Graph



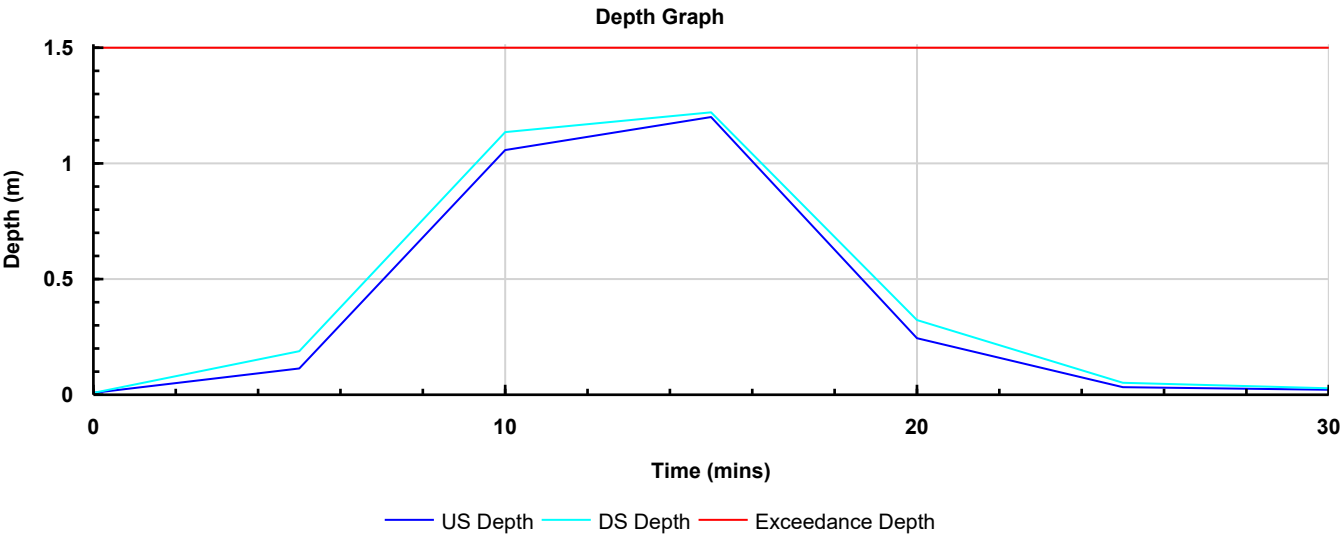
Project: 5024440 - Radwell Bury Farm	Date: 22/07/2024			
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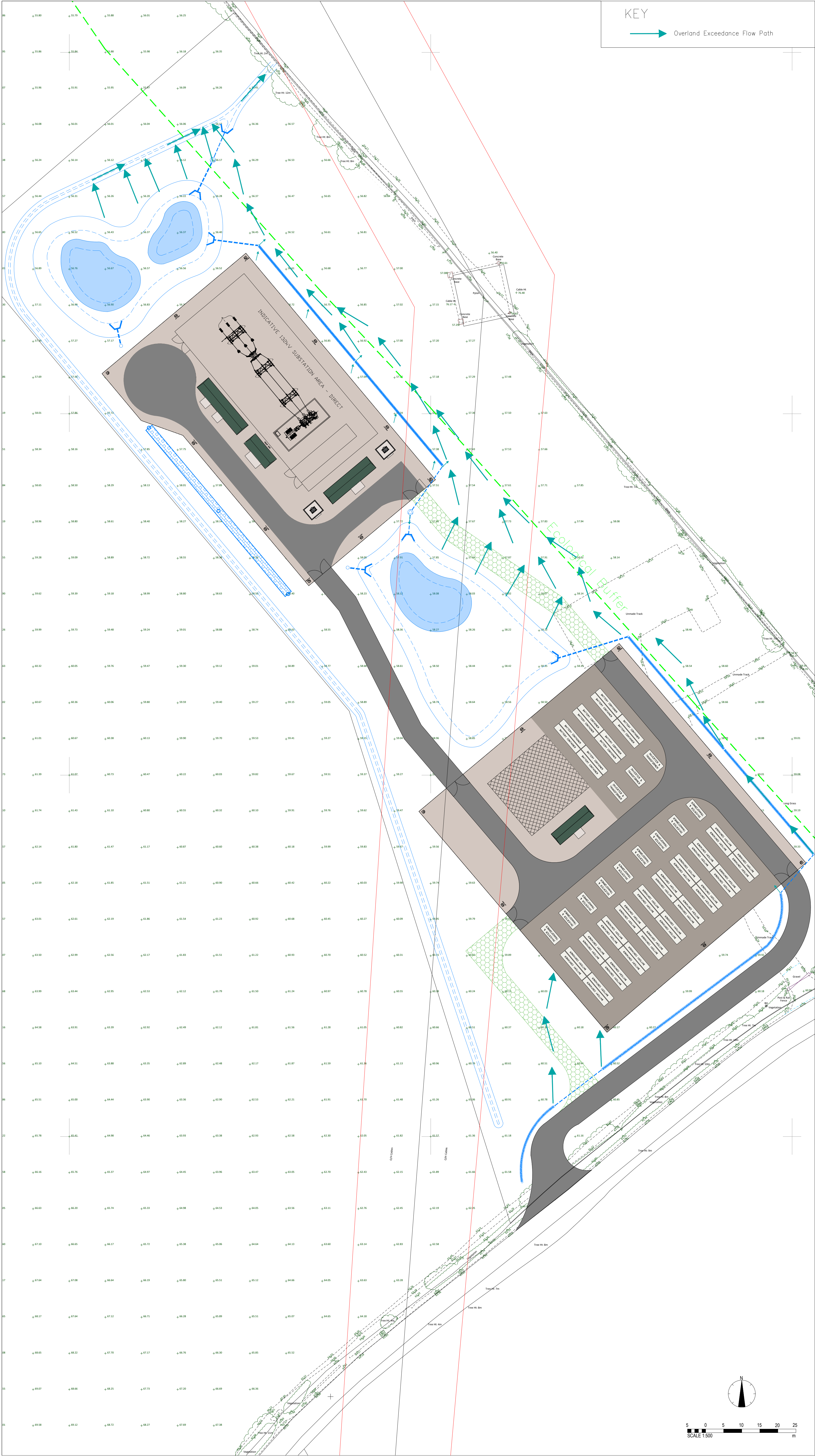
Filter Drain (3)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Infiltration Trench

Graphs



APPENDIX E - OVERLAND FLOW ROUTING PLAN



KEY

Overland Exceedance Flow Path

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CDM REGULATIONS 2015

Significant or non-obvious risks and risks which are difficult to manage are identified on this drawing using the following symbol identified to the right with brief accompanying text. For further details of the risks identified by designers, reference should be made to CDM hazard register.



P02	Updated to show new site layout	15/11/2024	JB	SC
P01	First Issue	22/08/2024	AOB	SC
REV	DESCRIPTION	DATE	BY	CHKD

ORIGINATOR: www.ridge.co.uk

RIDGE

PROJECT NUMBER: 5024440

CLIENT:



IN ASSOCIATION WITH:

PROJECT:
Radwell Bury Farm

TITLE:
Overland Exceedance Flows

DRAWN BY: AOB CHECKED BY: SC APPROVED BY: SW

SCALE @ A1: 1:500 DATE OF REVIEW: 22/08/2024

ISO 19650 STATUS:

S3 - Suitable for Review and Comment

DRAWING No: 5024440-RDG-XX-XX-D-C-0510_P02 Overland Exceedance Flows.dwg
PROJECT: 5024440 ORG: RDG FUNCTION: XX SPATIAL: XX D C DISCIPLINE: 0510 NUMBER: P02

APPENDIX F – GROUND INVESTIGATION DESKTOP STUDY



RIDGE

DESK TOP STUDY

RADWELL BURY FARM

BALANCE POWER

February 2024



DESK TOP STUDY

RADWELL BURY FARM

BALANCE POWER

February 2024

Prepared for

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VERSION CONTROL

VERSION	DATE	DESCRIPTION	REPORT REFERENCE	CREATED	REVIEWED
01	16/02/24	DTS – First Issue	5024440-RDG-XX-ST-DOC-C-00DTS01	OS	MS

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1. INTRODUCTION

1.1. Brief

Ridge and Partners LLP (Ridge) have been commissioned by Balance Power (the Client) to undertake a Desk Top Study for land at Radwell Bury Farm, SG7 5TR (hereafter referred to as 'the site'). A site location plan is included as Figure 1.

Ridge were briefed to use information provided by the client to obtain an environmental database search relating to the site and carry out a walkover survey to assess and report on the findings with respect to potential ground contamination and potential associated future liabilities in accordance with guidance outlined in Land Contamination Risk Management (LCRM 2023), published by the Environment Agency.

This report is prepared in line with the agreed brief and is subject to report conditions shown in Appendix 1.

1.2. Proposals

Proposals are yet to be fully defined but are likely to comprise of a battery storage facility with an access road from Newnham Road to the south of the site. The development is also likely to include storage rooms, a control room, and a welfare room.

1.3. Legal Context and Methodology

Part IIA of the Environmental Protection Act provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment, but the regime does not take into account future uses. New developments are therefore controlled by the planning regime, with reference to the National Planning Policy Framework (NPPF, 2023), rather than directly by Part IIA of the Environmental Protection Act.

This report has been prepared in accordance with published Environment Agency guidance – Land Contamination Risk Management (LCRM, 2020), which supersedes CLR 11. CLR 11 adopted and refined the well-recognised methodology and terminology that has been used in contaminated land risk assessment for a number of years.

LCRM advocates a tiered approach to risk assessment, as necessary. This document constitutes a **Preliminary Risk Assessment** under that guidance.

Further details regarding Legal Context and Methodology are included as Appendix 2.

1.4. End Use Classification

For the Preliminary Risk Assessment the end use classification of 'commercial/industrial' will be applied.

A change in the site use from the one currently proposed may result in the need for re-assessment of risk criteria, as such the conclusions and recommendations resulting from the risk assessment could change significantly.

1.5. Report Scope and Limitation

This report is based upon a review of historical and current information, a site walkover survey, geological and hydrogeological mapping and information from an environmental database search. The assessment is based on the proposed end use outlined in Section 1.2. The outcomes of this assessment could change if the end uses change.

The information contained in this report is intended for the use of **Balance Power**. Ridge can take no responsibility for the use of this information by any other party or for uses other than that described in this report.

2. SITE CONDITIONS

An engineer from Ridge visited on 2 February 2024 to conduct a walkover survey of the site and the surrounding areas for the purpose of identifying any potential contamination or evidence of previous contaminative processes. The descriptions below relate to site conditions at the time of the inspection only.

A photographic log is included as Appendix 3.

2.1. Site Location

The site is centred on easting 524071 and northing 236682 to the north of Baldock. The centre of the site is situated at approximately 59m AOD (Above Ordnance Datum).

The site is a rough rectangular shape with the longest axis north-west to south-east of approximately 300m, and with a smaller rectangle extending to the south-west along Newnham Road. The site has an area of approximately 4ha.

2.2. Current Site Use

The site is currently an open field showing evidence of ongoing agricultural use, such as ploughing. A large electricity pylon is seen in the eastern area of the site. No buildings are present on site.

2.3. Access

A double gate on Newnham Road provides access to the south-east of the site. There are also other entrances to adjacent fields to the north-west and east.

2.4. Structures

Apart from the large electricity pylon, no structures are present on site.

2.5. Boundaries

Newnham Road comprises the southern site boundary, whilst mixed trees and shrubs form the eastern border. No physical boundaries are present to the west.

2.6. Topography

A topographic survey revealed a general decrease in elevation towards the eastern and northern areas of the site, with the east sitting at around 58-59mAOD and the north being even lower at 55-56mAOD. The south-western area of site ranges from around 64-65mAOD, and the central areas of the site tend to range from 57 to 59mAOD.

2.7. Surroundings

At the time of the walkover, dry ditches run along the northern and eastern boundaries, and beyond which are similar agricultural fields. Baldock Services are seen further to the west, which include a Shell petrol station.

2.8. Trees & Vegetation

Mixed deciduous trees and hedges run along the southern and eastern edges of the site, whilst the fields are predominantly filled with grass (at the time of the walkover).

2.9. Utilities

Power cables run north-east to south-west over the centre of the site. No manhole covers were noted during the site walkover.

2.10. Miscellaneous

A gravel into unmade track is present in the sites eastern corner.

2.11. Potential Sources of Contamination – Walkover Survey

Shell petrol station at Baldock Services, although due to the considerable distance from the site this is unlikely to be a significant source.

3. SITE HISTORY AND HISTORICAL CONTAMINATIVE SOURCES

3.1. Review of Historical Maps

Ordnance Survey Maps provided within a Groundsure Report package have been obtained to provide details of the history of the site and surrounding areas. A chronological description of the maps is shown in the table below. The descriptions focus on potentially contaminative land uses within 50-100m and potentially infilled features within 250m of the development site boundary. Note, potential contaminative sources and features outside these distances from the site have been discussed only where they are considered to be relevant. Copies of the maps are included as Appendix 4.

MAPPING (SCALE)	OBSERVATIONS	
	ON-SITE	OFF-SITE
1877 (1:2,500)	The site is shown as an open field bordered by trees to its south and similar fields elsewhere.	The area surrounding the site consists of similar open fields. A track or road is seen adjacent to the site's south.
1882-1884 (1:10,560)	No changes visible.	Radwell Grange is seen 444m north-west. Newnham is seen 700m north-east, whilst Radwell is seen 820m south-west.
1899-1959 (1:10,560)	No changes visible.	No significant changes visible.
1967 (1:2,500)	A large electricity pylon has appeared on top of the sites eastern border. The electricity wire extends north to south over the centre of the site. The site appears to be congruent with the present day layout.	The electricity wires above the site extend to the south towards another pylon 49m south.
1968 (1:2,500 & 1:10,560)	No changes visible.	The Roman Road 363m west has expanded significantly, and is now labelled A1.
1969 (1:2,500 & 1:10,560)	No changes visible.	The small road adjacent to the site's south has been marked as Newnham Road.
1982-2001 (1:2,500 & 1:10,000)	No changes visible.	No significant changes visible.
2010 (1:10,000)	No changes visible.	Baldock Service Area is marked 329m west of site.
2024 (1:10,000)	No changes visible.	Radwell Grange is renamed to The Shay House.

Table 3.1: Historical Map Review

3.2. Review of Satellite Images

A review of publicly available satellite images has been carried out to provide information in relation to the site.

- The earliest image available for review (1999) shows the site to be an open agricultural field with a small road bordering it to the south. Electricity pylons run north-east to south-west of the centre of the site. The surrounding fields seem to be of similar land use.
- Except for agricultural changes in the field, no significant changes are noted in the following images from 2009, 2015, 2017, and 2020.

3.3. Internet Search

Historical maps between 1830 to 1880 from the National Library of Scotland show no history of land use on the site or immediate surrounding area. The town of Radwell is seen to the south-west, whilst Newnham is seen to the north-east.

3.4. Potential Sources of Contamination – Historical Map Review

No potential sources have been identified during the historical map review.

Potential contamination sources not considered to represent a significant risk to the site are detailed in the table below. The features will not be considered further.

POTENTIAL SOURCES NOT CONSIDERED FURTHER	
FEATURE	JUSTIFICATION
Electricity pylon, on site, 1967-present	Low contamination potential
Baldock Service Area, 329m W, 2010-present	Significant distance from site.
Radwell Grange, 444m NW, 1882-present	Significant distance from site.

Table 3.2: Potential Sources not considered further.

4. PHYSICAL SETTING

4.1. Geology and Hydrogeology

The following observations are taken from the British Geological Survey (BGS) GeoIndex (2023) and the Geo Insight Groundsure Report (Appendix 5).

The site is underlain by three different bedrock geologies which are all variations of chalk. Superficial geology is seen in the north of the site, being head deposits of clay, silt, sand and gravel. The map below shows how each of these lithologies underlie the sites area.



Image 4.1: Combined geological map of the area, showing bedrock geologies of the Zig Zag Chalk Formation (light green), Totterhoe Stone Member (green), West Melbury Marly Chalk Formation (yellow), and superfical head deposits (pink).

Tables 4.1 & 4.2 below identify the expected composition of the published strata and aquifer classification.

SUPERFICIAL GEOLOGY [1]	
Unit Name	Head – clay, silt, sand, and gravel
Geology Description	Head is poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes.
Aquifer	Secondary Undifferentiated
Aquifer Description	Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and nonaquifer.

Table 4.1: Superficial Geology

BEDROCK GEOLOGY [2]

Unit Name	Zig Zag Chalk Formation
Geology Description	Mostly firm, pale grey to off-white blocky chalk with a lower part characterised by rhythmic alternations of marls and marly chinks with firm white chalk. Thin silty chalk beds act as markers in the sequence. Parent unit of the Totternhoe Stone Member.
Aquifer	Principal
Aquifer Description	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.

BEDROCK GEOLOGY [3]

Unit Name	Totternhoe Stone Member
Geology Description	A distinctly harder unit in the Grey Chalk Subgroup ("Lower Chalk"). Typically brownish-grey, fine-grained calcarenite. Has been described as "sandy" because of coarse fossil fragments - not because of quartz sand grains. Thin to thickly bedded. Fossiliferous.
Aquifer	Principal
Aquifer Description	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.

BEDROCK GEOLOGY [4]

Unit Name	West Melbury Marly Chalk Formation
Geology Description	Buff, grey and off-white, soft, marly chalk and hard grey limestone arranged in couplets.
Aquifer	Principal
Aquifer Description	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.

*Table 4.2: Bedrock Geology***4.1.1. Groundwater Vulnerability**

Both superficial and bedrock geologies are believed to be of high vulnerability, along with a high leaching class. There are also records of significant soluble rocks – problems unlikely except with considerable surface or subsurface water flow.

4.1.2. Artificial Ground, Landslips and Faults

There are no records within 250m of the site.

4.1.3. Radon

The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No Radon Protective Measures are considered necessary for new properties or extensions to existing ones.

4.1.4. Ground Workings and Mining

There are no records of artificial or made ground within 500m of the site, however it is highlighted that chalk mining has occurred in geology similar to that on site. It is also stated that underground mine workings are uncommon. This does not necessarily mean that chalk mining has occurred on site, as supported by the lack of any land use following historical map review or any other mining records on site.

4.1.5. BGS Borehole Records

No records within 250m of the site.

4.1.6. Natural Ground Subsidence

The BGS has provided the following information as summarised in Table 4.3 below.

PROCESS	RISK LEVEL	DETAILS
Ground Dissolution of Soluble Rocks	Very Low	Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.
Collapsible Deposits	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.
Landslides	Very Low	Slope instability problems are unlikely to be present. No special actions
Running Sands	Very Low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.
Shrink Swell Clay	Very Low	Ground conditions predominantly low plasticity.
Compressible Deposits	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits.

Table 4.3: Ground Subsidence Records

4.1.7. BGS Estimated Background Soil Chemistry

Estimated background concentrations on site are as follows: arsenic 15mg/kg; cadmium 1.8mg/kg; chromium 40-60mg/kg; nickel 15-30mg/kg, lead 100mg/kg.

4.2. Hydrology

4.2.1. Surface Water Features

There are no surface water features recorded within 250m of the site boundary. The site is however in a river catchment, known as the Cat Ditch.

4.2.2. Flooding

There are no Environment Agency floodplain zones present within 50m of the site boundary. The site is therefore in Flood Zone 1, indicating a less than 0.1% annual probability of flooding.

There is a low risk of surface water flooding in the sites northern section where there is a topographical depression. Outside the site, parts of the field to the north-east have a greater risk of surface water flooding, being a 1 in 30 year return period. This follows an off site overland flood route.

The northern section of the site also has a moderate risk of groundwater flooding, whereas the rest of the site has a low risk.

4.3. Controlled Waters

4.3.1. Abstraction Licenses

There are no abstractions within 500m of the site, inclusive of potable abstractions.

4.3.2. Source Protection Zones

The southern half of the site is in a Type 3 SPZ. This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source. This SPZ3 is related to the inner SPZ1 to the south and east of site.

4.4. Designated Environmentally Sensitive Sites

Other than the London Green Belt (9m SE), there are no designated features within 1000m of the site.

4.5. Agricultural Designations

The site is listed as Grade 2 agricultural land. This is very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting.

4.6. Nitrate Vulnerable Zones

The site is classified as two Nitrate Vulnerable Zones (NVZ), known as the Great Ouse NVZ (surface water) and the Anglian Chalk NVZ (groundwater).

Nitrate vulnerable zones are areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC).

5. ENVIRONMENTAL RECORDS REVIEW

The following information has been obtained from public archive via the data supplier Groundsure or by direct application. The full Enviro Insight Groundsure Report is included as Appendix 5. The subsequent review focusses on records within 50m of the outlined development site for above ground features or within 250m for potentially infilled features, or those which are considered relevant to the proposed development. Ridge have not included data from Groundsure's own review of historical maps.

5.1. Groundsure Record Search

The following observations are taken from the Enviro Insight Report (Appendix 5).

5.1.1. Historical Industrial Land Uses

There are no records relating to historical industrial land uses within 350m of the site.

5.1.2. Historical Petrol Stations and Garages

There are no records of petrol stations or garages within 500m of the site.

5.1.3. Historical Tank Database

There are no records of historical tanks within 500m of the site boundary.

5.1.4. Historical Energy Features

There are no records of historical energy features within 500m of the site boundary.

5.1.5. Waste and Landfill

No historical or current records of landfills or waste sites within 500m of the site.

There is however a storing of waste exemption 281m north-west.

5.1.6. Environmental Permits, Incidents, Registers and Consents

No pertinent records within 350m of the site.

5.1.7. Current Industrial Land Uses

Two pylons are noted to be within 250m of the site, being 1m north and 57m south.

There is also a Shell petrol station 375m west.

5.2. Local Authority Consultation

5.2.1. Planning History – Hertfordshire Building Control

Hertfordshire Building Control were contacted for pertinent information relating to the site and immediate surroundings on 6 February 2024, however were unable to provide any relevant information.

5.2.2. Contaminated Land Officer – Hertfordshire Council

The council were contacted for pertinent information relating to the site and immediate surroundings on 6 February 2024. A response had not been approved at the time of writing this report – if prudent information is supplied it will be submitted within a report addendum.

5.3. Potential Sources of Contamination – Records Review

No potential sources have been identified within the records review.

Potential contamination sources not considered to represent a significant risk to the site are detailed below. These features will not be considered further within the risk assessment.

POTENTIAL SOURCES NOT CONSIDERED FURTHER	
FEATURE	JUSTIFICATION
Electricity pylon, 1m N & 57m S	Low contamination potential
Storing of waste exemption, 281m NW	Significant distance from site.
Shell petrol station, 375m W	Significant distance from site.

Table 5.1: Potential Sources not considered further.

6. PRELIMINARY CONCEPTUAL SITE MODEL

The preliminary conceptual site model represents an assessment of the current status of the site and the likelihood of a pollutant linkage for each identified potential combination of contaminant, pathway and receptor.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance¹) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

6.1. Potential Sources

No on site sources of contamination have been identified. No off site sources of contamination have been identified that are considered feasible to impact the site.

It should be noted that sources of contamination may become apparent during any future investigation and development of the site.

6.2. Pollutant Linkages

With no credible sources identified there cannot be plausible contaminant linkages as these require a source, pathway and receptor.

At this stage, no potential on or off site contamination sources have been identified, and therefore the development proposal is unlikely to impact identified receptors. If an on site contamination source is identified following groundworks or further investigation the conceptual model and risk assessment should be revisited.

¹ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land". London HMSO.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Contamination

With no credible sources identified there cannot be plausible contaminant linkages as these require a source, pathway and receptor.

7.1.1. Further Investigation

A specific contamination investigation is not required due to the lack of contamination sources, however a contamination screening is advised during any geotechnical investigations or groundworks.

A contamination screening should comprise the collection of three or four soil samples for analysis of a generic contamination suite to verify the low risk levels assessed within this preliminary risk assessment.

7.1.2. Watching Brief

A Watching Brief should be carried out by the Site Supervisor during construction and groundworks in case any areas of contamination are identified.

Ridge should be contacted in the first instance if any suspected contaminated soils are identified.

7.2. Geotechnical

A review of key geotechnical aspects is provided below.

7.2.1. Expected Ground Conditions

The desk-based information reviewed within this report indicates that a veneer of topsoil is likely to be present over superficial head deposits comprising of clay, silt, sand, and gravel in the sites northern area. The predominant bedrock geology is of a firm, marly chalk, however in the northern area two slight variations of this chalk are seen.

7.2.2. Foundations

With reference to the published geology and the proposed development, it is considered likely that shallow foundations can be utilised for the proposed development. The solution may need to be deepened where soft or loose ground is encountered.

Any solution in the northern part of site may need to account for differences in underlying geology, both superficial and bedrock, although all three bedrock geologies seen on site are variations of chalk.

7.2.3. Drainage

Based on the expected geology traditional soakaways are likely to be viable. Soakage testing in line with BRE365 should be carried out to confirm this.

7.2.4. Other Considerations

The site is bordered by trees and bushes to its east and south. If soils are shrinkable, foundations may need to be deepened adjacent to existing or proposed trees.

7.2.5. Earthworks / Site Levels

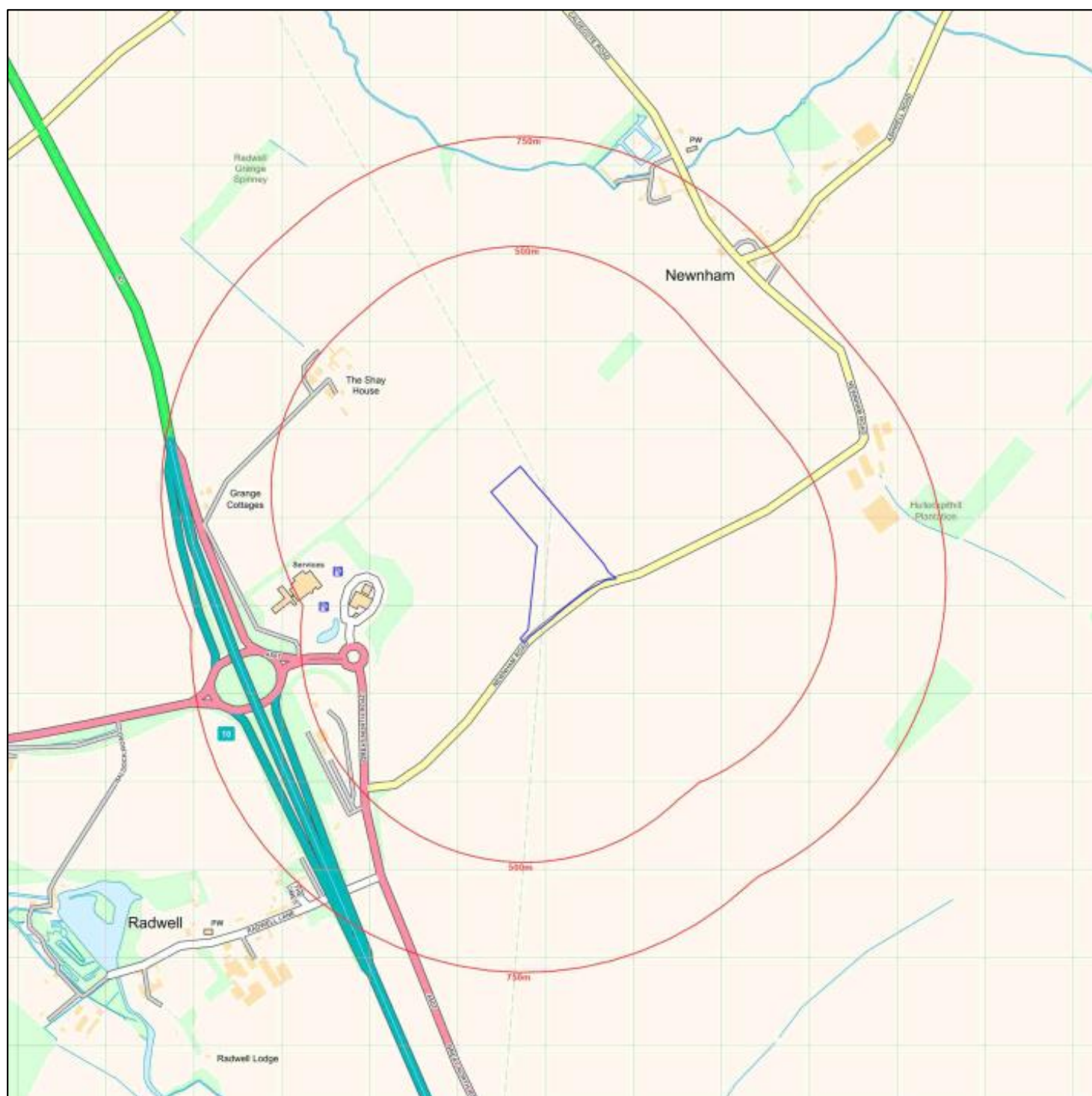
A general decrease in elevation is seen towards the eastern and northern areas of the site, with the east sitting at around 58-59mAOD and the north being even lower at 55-56mAOD. The south-western area of site ranges from around 64-65mAOD.

Care should be taken to ensure that excessive earthworks are not required nor retaining situations created.

7.3. Unexploded Ordnance

The site is not considered to be in an area at risk from UXO.

FIGURE 1 – SITE LOCATION PLAN



Project	Radwell Bury Farm			Title	Site Location Plan
Job Number	5024440	Client	Balance Power	 1 Royal Court Kings Worthy Winchester SO23 7TW	
Drawing	5024440-Fig1	Revision	-		
Drawn	OS	Date	February 2024		
Checked by	MS	Scale	NTS		
				Ridge and Partners LLP www.ridge.co.uk	
				TEL: 01962 834400	

APPENDIX 1 – REPORT CONDITIONS

Report Conditions

This report is produced solely for the benefit of **Balance Power** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is based on a visual Site inspection, study of readily accessible referenced historical records, information supplied by those parties noted in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground contamination is suspected but no physical Site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the Site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, not revealed by this research cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question, as such bodies may have unpublished, often more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Ridge and Partners LLP. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the Site and adjacent Sites. The report concentrates on the Site as defined in the report and provides an opinion on surrounding Sites. If migrating pollution or contamination (past or present) exists, this can only practically be better assessed following extensive on and off Site intrusive investigations and monitoring.

APPENDIX 2 – LEGAL CONTEXT AND METHODOLOGY

Legal Context

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from land contamination. In accordance with the Act and the statutory guidance document 'The Contaminated Land (England) Regulations 2000', the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only "contaminated land" where it appears to the Regulatory Authority, by reason of substances within or under the land, that:

"Significant harm is being caused, or there is a significant possibility of such harm being caused; or Pollution of controlled waters is being, or is likely to be, caused."

Inherent in this definition is the requirement for contamination risk assessment to be undertaken on a site-specific basis, as the potential for harm is determined by the Site's end use and its specific environmental setting. The guidance defines "risk" as the combination of:

- The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and
- The magnitude (including the seriousness) of the consequences.

While Part IIA of the Environmental Protection Act provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment, the regime does not take into account future uses. New developments are therefore controlled by the planning regime, with reference to the National Planning Policy Framework (NPPF, 2023), rather than directly by Part IIA of the Environmental Protection Act.

The NPPF is based on the principal that the site should be suitable for its new use, taking account of ground conditions, including from natural hazards or former activities and states that "Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner". The NPPF also links the planning and Part IIA regimes by stating that "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990". Key components of the Part IIA regime, such as the definition of Contaminated Land and the associated risk-based assessment approach, are therefore considered to also be applicable to the planning regime.

Methodology

This report has been prepared in accordance with published Environment Agency guidance – Land Contamination Risk Management (LCRM, 2020), which supersedes CLR 11. CLR 11 adopted and refined the well-recognised methodology and terminology that has been used in contaminated land risk assessment for a number of years.

In the context of land contamination, there are three essential elements to any risk:

A **contaminant source** – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.

A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage.

An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).

APPENDIX 3 – PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

RIDGE

SITE: RADWELL BURY FARM
PROJECT NUMBER: 5024440

Photo No.	Date	
1	02/02/24	
Photo Title Overview of the site looking towards the south-east		

Photo No.	Date	
2	02/02/24	
Photo Title View along the eastern boundary of site.		

PHOTOGRAPHIC LOG

SITE: RADWELL BURY FARM
PROJECT NUMBER: 5024440



Photo No.	Date	
3	02/02/24	
Photo Title View of site facing west.		

Photo No.	Date	
4	02/02/24	
Photo Title View of site looking towards the southern boundary of site.		

PHOTOGRAPHIC LOG

SITE: RADWELL BURY FARM
PROJECT NUMBER: 5024440

RIDGE

Photo No.	Date	
5	02/02/24	
Photo Title View facing east showing the pylon on the eastern boundary of site.		

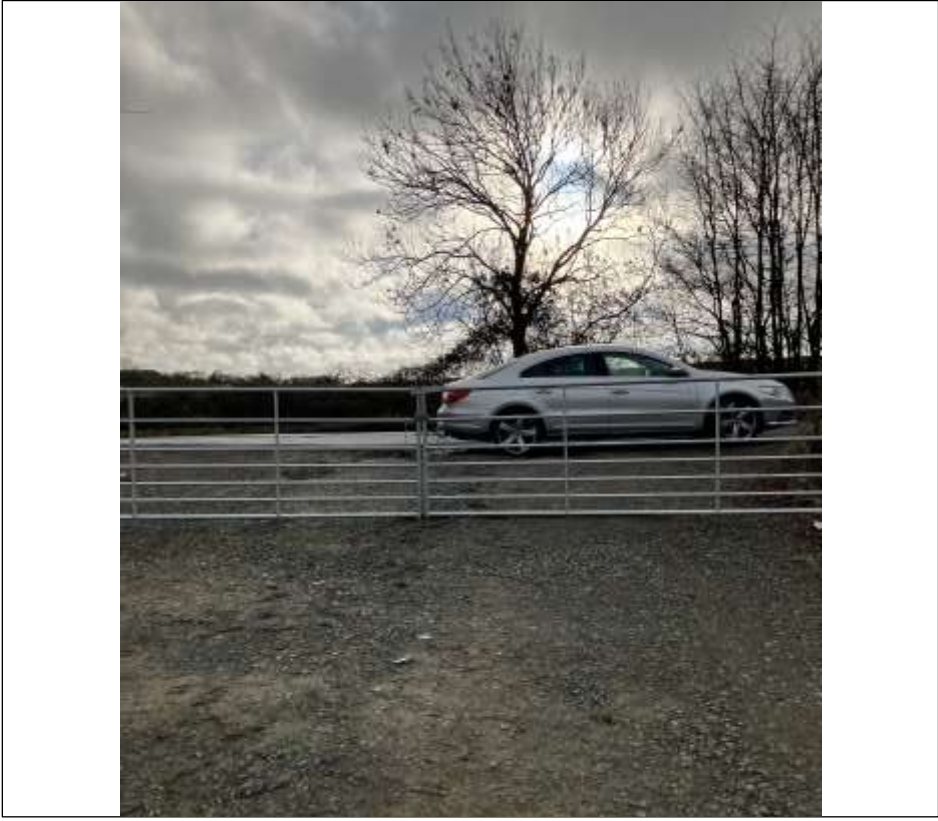
Photo No.	Date	
6	02/02/24	
Photo Title View of southern boundary of site.		

PHOTOGRAPHIC LOG

SITE: RADWELL BURY FARM
PROJECT NUMBER: 5024440



Photo No.	Date	
7	02/02/24	
Photo Title View of gate on northern boundary of site.		

Photo No.	Date	
8	02/02/24	
Photo Title View of gate on southern boundary of site.		

PHOTOGRAPHIC LOG



SITE: RADWELL BURY FARM
PROJECT NUMBER: 5024440

Photo No.	Date	
9	02/02/24	
Photo Title View of the hedgerows on northern boundary of site.		

Photo No.	Date	
10	02/02/24	
Photo Title View of south-eastern corner of site.		

APPENDIX 4 – HISTORICAL MAPS

Site Details:

Radwell Bury Farm (524000,
236716), SG7 5TR

Client Ref: Radwell_Bury_Farm_S23-3569
Report Ref: GS-3D2-J4K-KL4-XYD
Grid Ref: 524018, 236716

Map Name: County Series

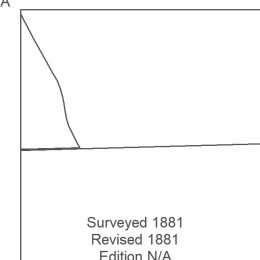
Map date: 1881

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

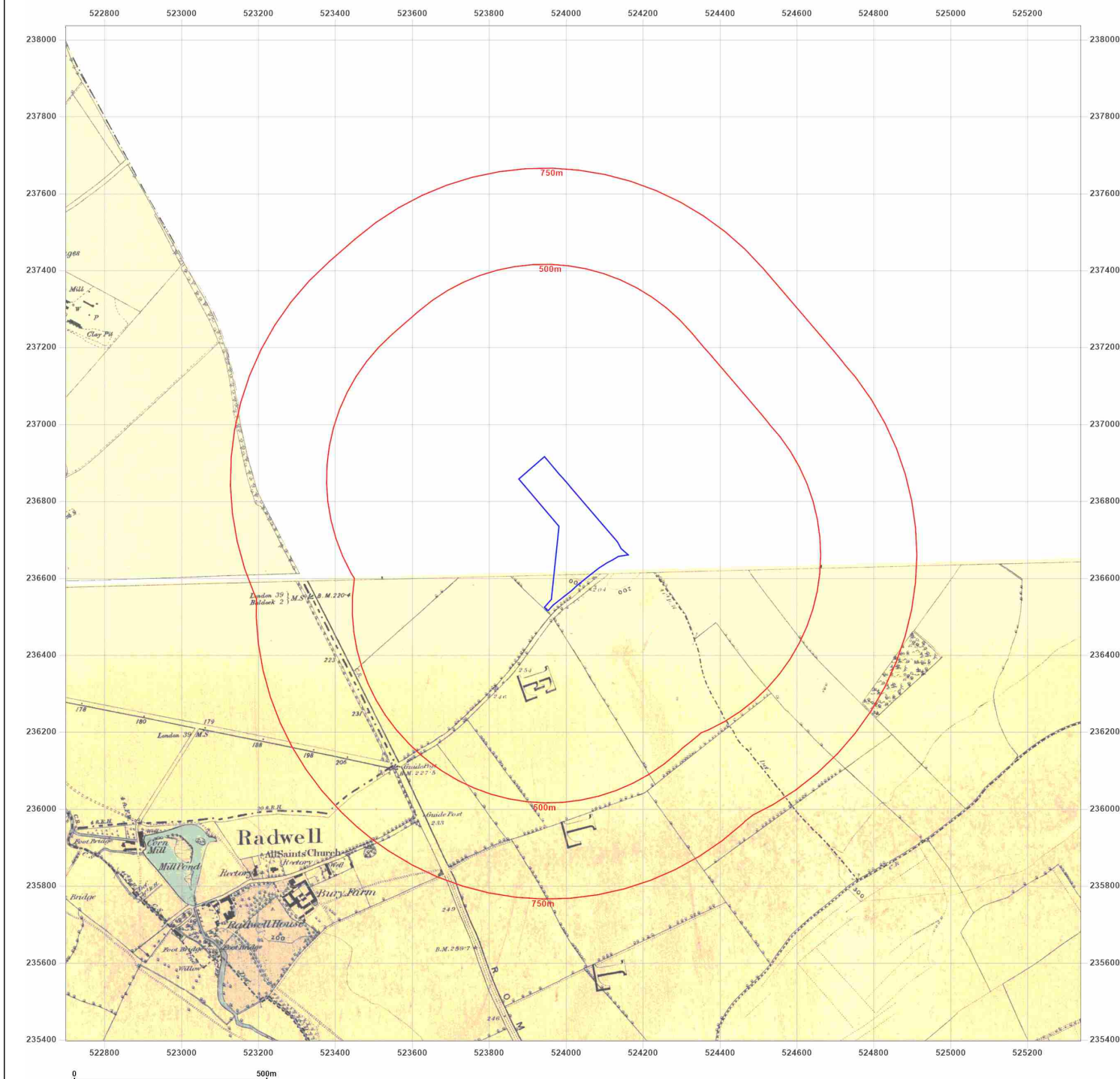


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Production date: 30 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

Radwell Bury Farm (524000,
236716), SG7 5TR

Client Ref: Radwell_Bury_Farm_S23-3569
Report Ref: GS-3D2-J4K-KL4-XYD
Grid Ref: 524018, 236716

Map Name: County Series

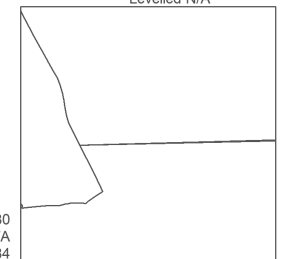
Map date: 1882-1884

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1877
Edition 1882
Copyright N/A
Levelled N/A



Surveyed 1880
Revised N/A
Edition 1884
Copyright N/A
Levelled N/A

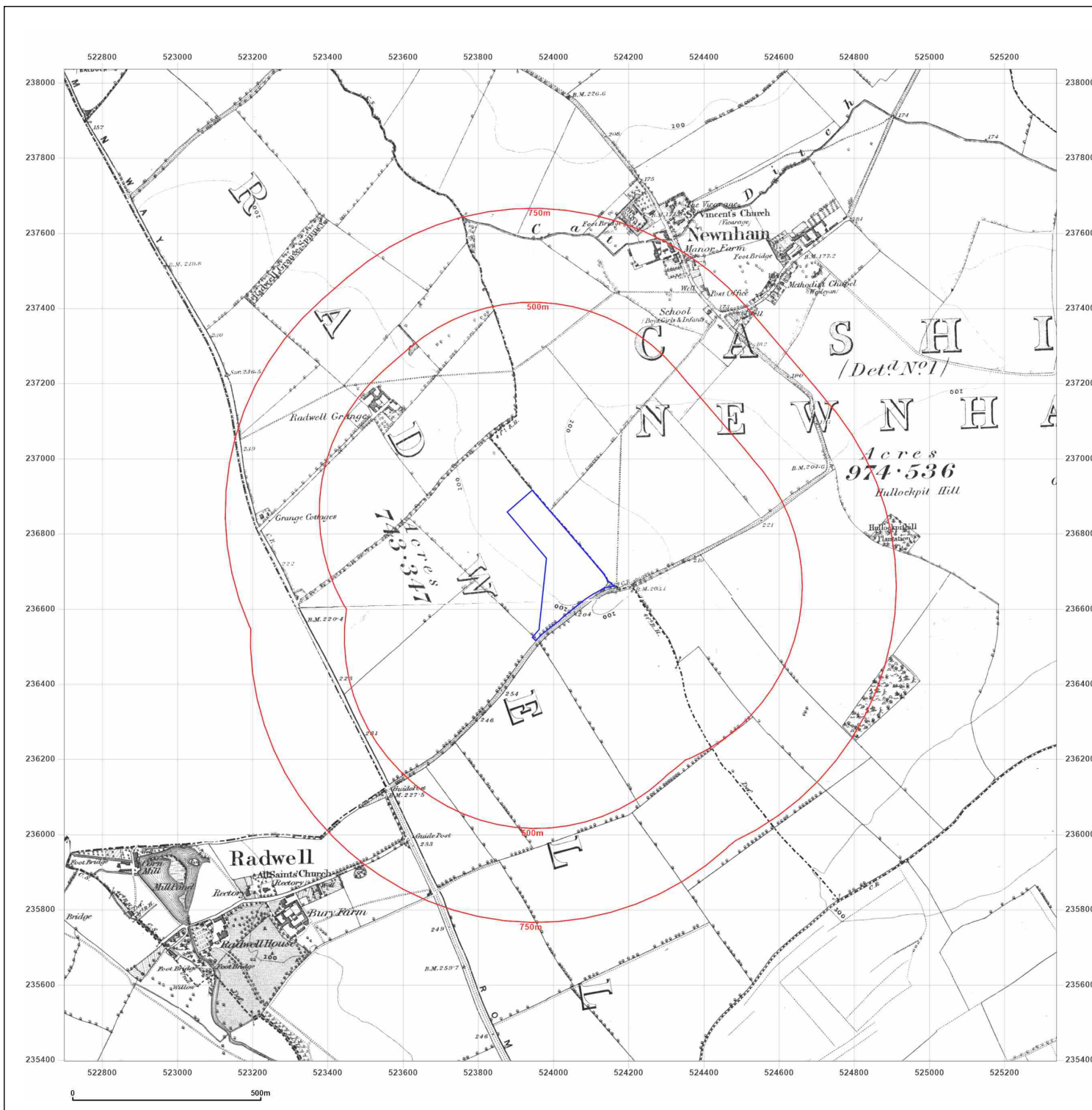


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Production date: 30 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

Radwell Bury Farm (524000,
236716), SG7 5TR

Client Ref: Radwell_Bury_Farm_S23-3569
Report Ref: GS-3D2-J4K-KL4-XYD
Grid Ref: 524018, 236716

Map Name: County Series

Map date: 1899

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1879
Revised 1899
Edition N/A
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