Flood Risk Statement and Drainage Impact Assessment

Winking Hill Battery Energy Storage System

Ref	04875-6760028

Revision History

Issue	Date	Name	Latest changes
01	16.05.24	William Miskelly	First created

Contents

1 Overview

1.1 Introduction

Winking Hill is a proposed battery-based energy storage system located on West Leake Lane, Ratcliffe on Soar, Nottinghamshire, NG110DF.

This report sets out the flood risk screening and surface water management plan for the proposed Winking Hill battery energy storage system, which will house battery enclosures along with associated infrastructure and electrical equipment.

The battery storage system comprises battery enclosures with associated power conversion systems, transformers and grid compliance equipment. All electrical equipment will be set on concrete foundations.

Drawing 04875-RES-LAY-DR-PT-001 included in Appendix A, shows the proposed project layout. The compound area within the fence measures 1.30 hectares, the total area enclosed by the red line boundary measures approximately 4.3 hectares.

Relevant Nottinghamshire County Council (LFA) guidance is included in Appendix C.

2 Relevant Guidance and Legislation Requirements

This report uses best practice and conforms with the requirements of the relevant regulatory authorities.

The key legislation and guidance adhered to are as follows:

- The EU Water Framework Directive (2000/60/EC).
- Engineering in the Water Environment, Good Practice Guide, Temporary Construction Methods, First Edition, March 2009.
- Environmental Good Practice on Site, CIRIA C692, 3rd Edition.
- Control of Water Pollution on Construction Sites, CIRIA C532.
- The SUDS Manual 2015. CIRIA C753.
- British Geological Survey (BGS) Maps.
- Soakaway Design BRE Digest 365.

3 Existing Information

3.1 Site Location

The site is located approx. 1km to the East of Ratcliffe-on-Soar Power Station, Ratcliffe-on-Soar, Nottinghamshire.

Access will be taken off West Leake Lane to the East of the site. The access track to the site will be formed through upgrading an existing access and constructing a route to the compound from this existing access.

3.2 Existing Land Use and Topography

A walkover survey of the site has been undertaken, and a topographical survey of the site extents carried out to confirm the existing land use and topography. The existing site land use is for agricultural purposes, confirmed by the landowner during a site walkover.

Ground levels on site falls from approx. 81m AOD in the East to 73m AOD in the West. Levels fall at a gradient of approximately 3%.

3.3 Ground Conditions

Superficial Deposits are not recorded as present on the site, though areas immediately east and west do show the presence of silts, sands and gravels. Investigation records associated with the A453 show the presence of stiff to very stiff sandy clay to 1m depth, underlain by slightly to moderately weathered mudstone.

3.4 Existing Hydrology / Drainage

The site drains from East to West and into a drainage channel located along the Northwestern boundary of the site which then drains away from the site. During the site visit this drainage channel was inspected and deemed to be in good condition and has sufficient capacity to support site drainage.

In discussions during a site visit, the landowner stated there are no land drains present on site as the site drains naturally to the Northwestern corner. No land drains were found in a topographic survey (including buried services) undertaken in September 2023.

4 Flood Risk Screening

4.1 Overview

The proposed battery energy storage compound is deemed not at risk from flooding as set out in this flood screening section.

There is a proposed access track located within an area at risk of surface water flooding (see figure 1 below). The construction of this access track will not result in any increased flood risk in the area, this has been detailed in section 4.3.

4.2 Flooding from Fluvial

The Environment Agency flood maps were reviewed and showed no fluvial flooding on the site for a 1 in 1000 year event (0.1%AEP), as shown in figure 1.

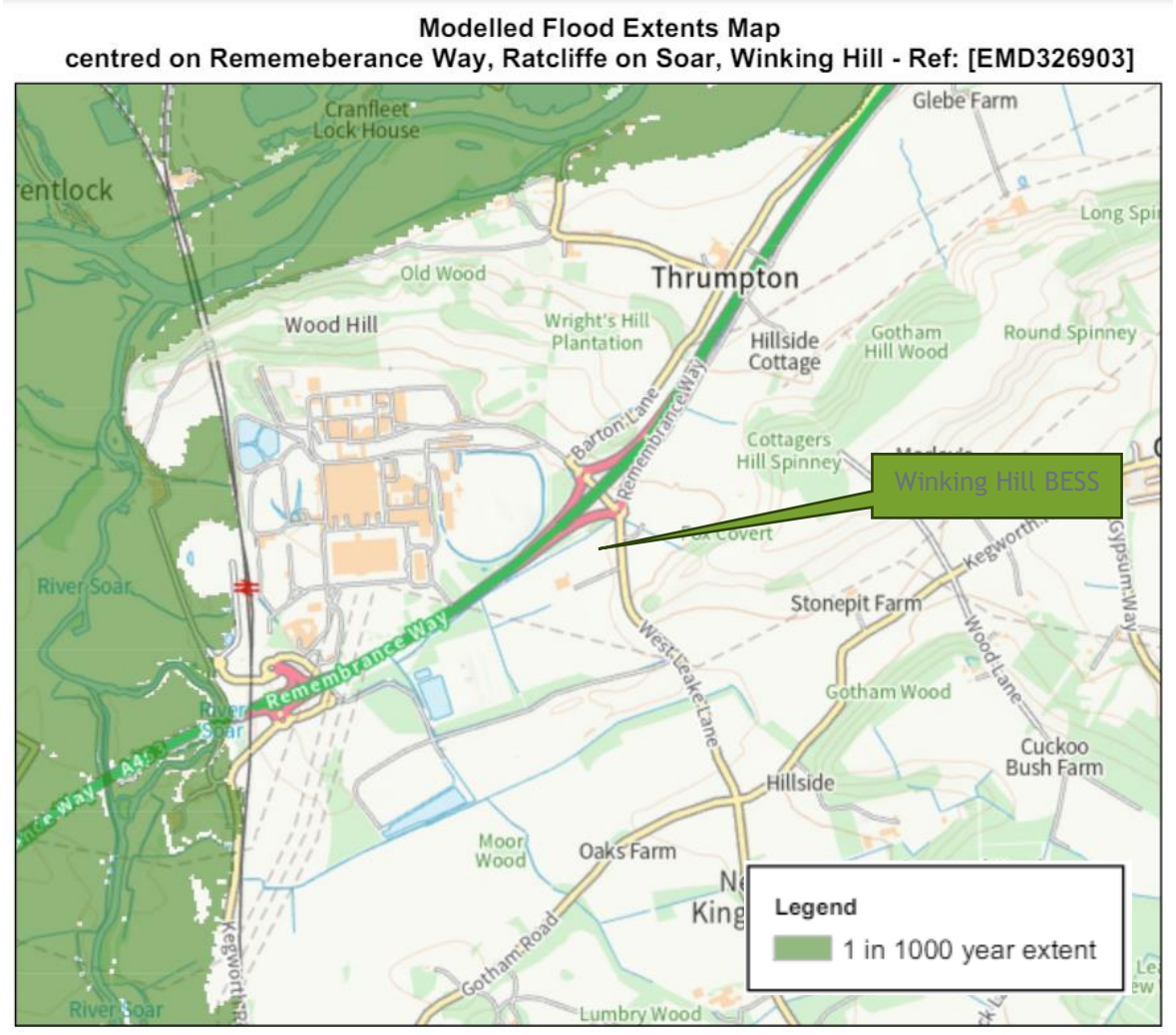


Figure 1 - Fluvial Flooding 1 in 1000 year

4.3 Flooding from Surface Water

Figure 2 below depicts the Environment agency surface water flood map, with the proposed site overlaid. As can be observed in Figure 2 the proposed battery energy storage compound does not lie in an area at risk of flooding from surface water flooding sources (blue zones).

Figure 2 shows the access track located in the floodzone. This track will be used for emergency access only, its purpose is to provide access for the emergency services in the event a prevailing wind during a fire at the compound results in the alternative (primary) access being unusable. This track will be constructed at the level of the existing topography to ensure there is no loss of flood storage area and subsequently no increased flood risk due to the development. The likelihood of an adverse prevailing wind during a fire event at the compound and a flood event with an AEP (annual exceedance percentage) of 3.33% to occur at the same time is far beyond what is reasonably practicable to design for. In the unlikely event that these occurred at the same time the flood water is less than 30cm deep during the 3.33% AEP event, therefore emergency vehicles could still access the site if no alternative was available. Subsequently, the proposed site is deemed to provide safe access/egress during flood events.

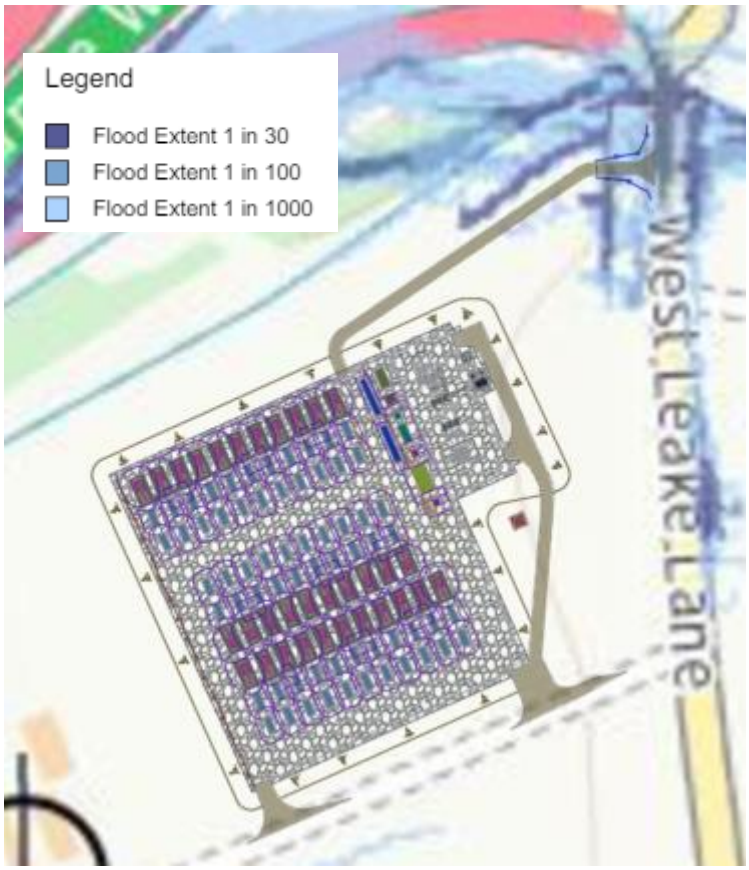


Figure 2 - Excerpt from Environment Agency product 4 map of surface water flooding map, with proposed site overlaid.

4.4 Flooding from Groundwater

There is very low risk of groundwater flooding occurring at the site.

4.5 Flooding from Tidal or Sea Flooding

The development site is located outside of any area of tidal influence based on its ground elevation above ordnance datum of >50m AOD. The proposed development is therefore not considered at risk of tidal or sea flooding.

4.6 Flooding from Overland Sheet Flow

Levels within the site area are proposed to fall to the southeast at a gradient of 1 - 2%, ensuring flooding from sheet flow will not develop on the site.

Uphill of the site is West Leake Lane, West Leake Lane slopes to the North towards highway drainage. The topographical survey showed that this drainage consisted of a 450mm stormwater pipe conveying flows into the watercourse located along the Northern boundary of the site. Any overland sheet flow will therefore bediverted away from the battery energy storage site compound and associated substation.

Given the above, the development is not considered at risk of flooding from overland sheet flow.

4.7 Flooding as a Result of the Development

The existing flow regime will remain unchanged as a result of the development as set out in Sections 5 and 6 of this report. Therefore, the development is not considered to exacerbate the flood risk of the surrounding area.

4.8 Historic Flooding

There are no known records of historic flooding to the knowledge of the Landowner.

5 Drainage Design Options

5.1 Foul Drainage

5.1.1 Overview

Permanent welfare facilities will be required, in the form of a WC.

A Foul Drainage Assessment (FDA) form has been completed in conjunction with this report. The FDA documents the foul drainage decisions taken with respect to disposal in accordance with The National Planning Practice Guidance and Building Regulations Approved Document H. The FDA form also documents that the proposed foul drainage is not located in a source protection zone.

Refer to Appendix E for the FDA form.

5.1.2 Foul Drainage Hierarchy

As described in the FDA form, the National Planning Practice Guidance and Building Regulations Approved Document H give a hierarchy of drainage options that must be considered and discounted in the following order:

1. Connection to the public sewer.
2. Package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption).
3. Septic Tank.
4. If none of the above are feasible, a cesspool.

5.1.3 Connection to a Public Sewer

As set out in Building Regulations Approved Document H, Section 2.3 “Foul drainage should be connected to a public foul or combined sewer wherever this is reasonably practicable. For small developments connection should be made to a public sewer where this is within 30m provided that the developer has the right to construct the drainage over any intervening land”.

Based on the quantity of foul drainage facilities proposed and the infrequent use over its lifetime, the site can be classified as a small development in the context of foul drainage.

As shown in drawing 04875-RES-UTI-DR-XX-002 provided in Appendix A, no public sewers have been identified within a reasonable distance to the development, therefore, it is deemed impracticable to connect to a public sewer.

5.1.4 Packaged Treatment Plant / Septic Tank / Cesspool

A packaged treatment plant has not been deemed practicable given the infrequent use and small scale of the foul drainage facilities.

Septic tank effluent discharging directly into the existing field ditch has not been deemed an option based on the residual contamination risk posed by the foul water and such, a septic tank would only be viable should the ground conditions allow infiltration.

As discussed later in Section 5.2.3, it is expected the ground conditions offer little to no infiltration, therefore, a septic tank has not been proposed. Infiltration testing will be undertaken on site prior to detail design, and should acceptable infiltration rates be found, a septic tank solution will be adopted during detail design.

Given the above assessment, the foul drainage has been assumed to be discharged into a sealed cesspool.

5.1.5 Proposed System

As set out in Section 5.1.4, a cesspool has been chosen as the most practicable foul water disposal method.

Off-site disposal from the cesspool will be by a licensed waste haulier / contractor.

Permanent facilities on site will be designed by the contractor and shall be in accordance with the General Binding Rules (GBR) created through the Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2014.

Prior to the installation of the foul drainage system, any necessary agreements or licensing from the relevant third parties will be gained.

The infrastructure layout provided in Appendix A has been designed to allow space for the permanent cesspool or septic tank (infiltration testing to be conducted during detailed design).

5.2 Surface Water Drainage Discharge Options

5.2.1 General

As per guidance from Nottinghamshire County Council provided in Appendix C the proposed development should be drained by a sustainable urban drainage system. As such, the SUDS Hierarchy as enclosed in Building Regulations Part H will be applied, and adequate infiltration testing to BRE 365 Digest will be undertaken to determine the viability of an infiltration-based drainage solution.

5.2.2 Infiltration

Based on the hierarchy identified in Section 5.2.1, the preferred method of surface water discharge is via infiltration to the ground. However, the ground on site is not anticipated to support drainage by infiltration due to the following:

- Greenfield runoff rate estimation tool created by HR Wallingford supports this assumption as it identifies the land as soil type 4 indicating relatively impermeable ground conditions and therefore lack of suitability for infiltration methods.

- Existing drainage systems in place in fields around site comprise field ditches, indicating the need to convey overland flows during storm events.

5.2.3 Attenuate Rainwater in Ponds for Gradual Release

Refer to the infrastructure layout provided in Appendix A for details of the drainage layout.

If infiltration testing shows an infiltration-based drainage solution is not possible, the next preference in the SUDS Hierarchy is to attenuate flows in an on-site basin, discharging from site at a rate that does not exceed that of pre-existing greenfield conditions. Due to the low probability of infiltration capacity on site, it is assumed for design purposes that attenuation basin is the highest option on the SUDS Hierarchy that is viable for the proposed development site.

The surface water drainage will be designed in accordance with the guidance in Section 2, and Section 5.2.1. Flows will be restricted to Qbar and the attenuation basin will be sized to contain the 1 in 100 rainfall event plus a 40% allowance for climate change (as per guidance from Nottinghamshire County Council included in Appendix C).

The preferred discharge point for the restricted flow will be to the existing drainage channel to the North of site, therefore matching existing drainage routes.

6 Development Proposal

6.1 Site Preparation

As part of site preparation, existing topsoil on site will be scraped off and set aside for re-use in the landscaping scheme. For the proposed areas of permanent hardstanding on site (inside the compound) and the proposed tracks, the preferred surfacing will comprise permeable unbound granular material.

The compound and tracks will facilitate construction traffic and allow safe installation of the electrical infrastructure.

The compound will be graded appropriately in line with existing falls, ensuring a fall within the compound does not exceed 2%.

6.2 Management of Surface Water Flows

6.2.1 Post Development Surface Water Runoff

The proposed compound on the development will result in a permanent hardstanding area of in the order of 1.30 ha. To ensure adequate allowances are made at this stage in the project, it is assumed for storage calculations that permanent hardstanding will comprise asphalt, entirely impermeable with a runoff coefficient of 1.

6.2.2 Proposed Attenuation Basin Design

It is proposed to use an attenuation basin to limit off-site surface water runoff from the permanent hardstanding areas on site. Ground levels on site fall to the Northwest. The proposed attenuation basin is located in the Northwestern corner, such that surface water in the compound area can be conveyed into the basin naturally via a filter drain and swale.

The Winking Hill Infrastructure Plan shown in Appendix A shows the proposed attenuation basin design location. The basin has been designed with a plan area and depth sufficient to accommodate storm flows generated on site during a 100-year event including an additional 40% allowance for climate change. To mitigate ground stability risk and slip / trip risk, basin slopes are limited to 1:3.

Attenuation calculations are summarised in Section 7 and shown in Appendix B. Interception losses, such as those provided by on-site topsoil / grass, hedgerows, and vegetation, are neglected from these calculations as a conservative measure.

6.2.3 Water Quality and Treatment

In line with good engineering practice, a Simple Index Approach is undertaken to ensure the proposed drainage strategy provides adequate water quality treatment, as per Section 26.7.1 of the SUDS Manual 2015 (CIRIA C753).

As a conservative approach, the proposed development is considered a medium pollution hazard level based on land use definitions provided in Table 26.2 of the SUDS Manual. The corresponding pollution hazard indices are denoted in Table 1.

Surface water within the proposed development will receive minimum three stages of treatment before being discharged into the drainage channel located on the site. The three main stages are listed below:

1. Filtration of water through filter drain stone upstream of basin; mitigation indices for filter drain: TSS = 0.4, metals = 0.4, hydrocarbons = 0.4.
2. Settlement in swale with drainage stone check dam to increase pollutant retention; mitigation indices for detention basin: TSS = 0.5, metals = 0.6, hydrocarbons = 0.6.
3. Settlement in attenuation basin; mitigation indices for detention basin: TSS = 0.5, metals = 0.5, hydrocarbons = 0.6.

Table 1 below demonstrates how the pollution hazard index for each contaminant is satisfied by the three stages of water treatment provided as part of the proposed drainage strategy.

Table 1 - Simple Index Calculation

Contaminant Type	Stage 1	Stage 2	Stage 3	Total SUDS Mitigation Index	Pollution Hazard Index	Utilisation
TSS	0.4	0.5(0.5)=0.25	0.5(0.5)=0.25	0.9	0.7	1.29
Metals	0.4	0.5(0.6)=0.3	0.5(0.5)=0.25	0.95	0.6	1.58
Hydrocarbons	0.4	0.5(0.6)=0.3	0.5(0.6)=0.3	1	0.7	1.43

During construction phase, temporary silts fences will be installed, providing an additional treatment stage of water filtration.

6.2.4 Exceedance Flow Design

In accordance with CIRIA Report 753, an exceedance route should be considered as part of the SUDS design.

The exceedance route will remain as per the existing scenario, i.e., over vegetation down towards the drainage channel in the Northwest of site.

To mitigate flood risk in the event of an exceedance, the attenuation basin will be located downslope of the energy storage facility. The resultant site levels will be such that surface water from any extreme events will flow over the banks of the attenuation basin away from the energy storage facility and then downslope overland away from the site. The edges of the attenuation basin will be vegetated to reduce the risk of scour during an extreme event.

6.2.5 SUDS Layout and Typical Details

Refer to Appendix A for indicative details and layout of the SUDS proposed across the site.

7 Hydraulic Assessment

A preliminary runoff and attenuation calculation for compound has been undertaken using a HR Wallingford online design tool available from:

https://www.uksuds.com/tools/greenfield-runoff-rate-estimation

The inputs taken have been assumed as “worst case” and as such has determined the maximum drainage component extents required for the project. This includes assuming all permanent infrastructure (other than the access track) has an asphalt surface, and that drainage by infiltration is not possible.

A detailed drainage design will be performed following the ground investigation and compound earthing design (to determine surface finishes).

All methods and inputs are taken in accordance with the relevant guidance documents provided in Section 2.

7.1 Greenfield Peak Runoff Rates from Site

Current and future greenfield runoff rates for the development have been estimated using the FEH Method. Using the mapping software within HR Wallingford Design Tool, the site-specific parameters have been established:

- Standard average annual rainfall between 1961 – 1990 (SAAR): 603mm;
- BFI Host: 0.417
- Total drained area: 1.30ha;
- M5-60 rainfall depth: 17mm;
- Ratio M5-60 / M5-2day: 0.4.

Total drained area is defined as the catchment area for the attenuation basin, which comprises the area inside the compound (1.30ha). The extents of the area is shown on the Infrastructure Layout in Appendix A.

Refer to Appendix B for the Qbar design tool calculation summary.

The peak runoff rate calculated for a Qbar (1 in 2.3) rainfall event is 3.53 l/s. It is proposed to match this discharge rate through use of a flow control device installed in a manhole positioned immediately downstream of the basin.

7.2 Attenuation Storage Required Post Development

The surface water storage volume estimation tool uses a storage assessment method developed by HR Wallingford based on correlations between storage requirements and hydrological and hydraulic characteristics of sites.

Attenuation storage will be provided to accommodate the peak runoff rate calculated up to the critical 1 in 100 storm plus a 40% allowance for climate change.

Refer to Appendix B for the storage volume calculation summary.

As per the calculation described in Section 7.1, allowable discharge from the basin is set to the calculated greenfield runoff rate of 3.53 l/s.

Due to site levels and basin positioning as described in Section 6.2.2, the catchment area for the basin is defined as the compound area, 1.30ha.

The attenuation volume calculated based on the above criteria is approximately 1000m^3. The attenuation volume should be considered a maximum volume, this assumes that all permanent infrastructure (other than the access track) has an asphalt surface and that drainage by infiltration methods is not possible.

8 Operation and Maintenance Requirements

All surface water drainage and pollution control features associated with the site will remain private and will be maintained by the site operator.

The following section outlines the proposed maintenance for the various aspects of the drainage system. If necessary, these outline maintenance proposals will be refined when the site is operational to suit specific conditions.

A maintenance record log will be maintained for all maintenance work carried out. Where problems persist on each six-monthly inspection, advice will be sought from the SUDS designer on an alternative drainage solution.

8.1 Pipes

The anticipated maintenance plan for the drainage pipes is outlined in Table 2.

Table 2 – Typical Pipe Operation and Maintenance Requirements

Pipe Maintenance Schedule	
Maintenance Action	**Minimum Frequency**
Inspect manhole / pipe. Where pipe has become clogged with silt, the pipe will be cleared out	Half yearly
Remove litter and debris	Half yearly
Inspect inlets and outlets for blockages, and clear (if required)	Half yearly

8.2 Filter Drain

The anticipated maintenance plan for the filter drains is outlined in Table 3.

Table 3 – Typical Filter Drain Maintenance Requirements

Filter Drain Maintenance Schedule	
Maintenance Action	**Minimum Frequency**
Inspect filter drain for silt contamination.	Half yearly
Replace drainage stone where necessary.	Half yearly
Remove litter and debris	Half yearly

8.3 Swale

The anticipated maintenance plan for the swale at the site is outlined in Table 4.

Table 4 – Typical Swale Maintenance Requirements

Swale Maintenance Schedule	
Maintenance Action	**Minimum Frequency**
Inspect swale for silt contamination.	Half yearly
Remove litter and debris.	Half yearly
Cut grass along swale banks.	Half yearly

8.4 Infiltration / Attenuation Basin

The anticipated maintenance plan for the basin at the site is outlined in Table 5.

Table 5 – Typical Basin Operation and Maintenance Requirements

Basin Maintenance Schedule	
Maintenance Action	**Minimum Frequency**
Remove litter and debris	Half yearly
Inspect inlets and outlets for blockages, and clear (if required).	Half yearly
Inspect inlets and outlets for noticeable effects of erosion, suitable erosion protection measures such as reno-mattress or placement of large stones (>150mm) to dissipate water energy levels will be installed at the area affected.	Half yearly
Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies	Half yearly
Reseed areas of poor vegetation growth, alter plant types to better suit conditions (if required).	As required, or if bare soil is exposed over 10% or more of the basin treatment area

9 Conclusion

A flood risk assessment has been undertaken across the site. The assessment identified surface water flooding in the Northeast of the site, however as described in section 4.3 there will be no increased flood risk as a result of the development.

An assessment of the drainage options has also been undertaken, and it has been concluded that drainage by infiltration is unlikely to be a viable option. As such, the current proposal is to drain the site via an attenuation basin, with a restricted discharge rate into the onsite drainage channel. Infiltration testing will be undertaken on site prior to detail design, and should acceptable infiltration rates be found, an infiltration solution will be adopted during detail design.

The required attenuation volume has been calculated as approximately 1000m^3. This should be considered a maximum volume, based on the assumption that all permanent infrastructure (other than the access track) has an asphalt surface and that drainage by infiltration methods is not possible.

A site investigation, 3D earthworks design, earthing design, and a further assessment of the proposed discharge will be undertaken to inform the detailed design of the site drainage.

The drainage strategy proposed will provide sufficient water quality treatment as demonstrated using the Simple Index Approach.

The permanent foul drainage will be disposed of into a sealed cesspool and will be emptied at appropriate intervals.

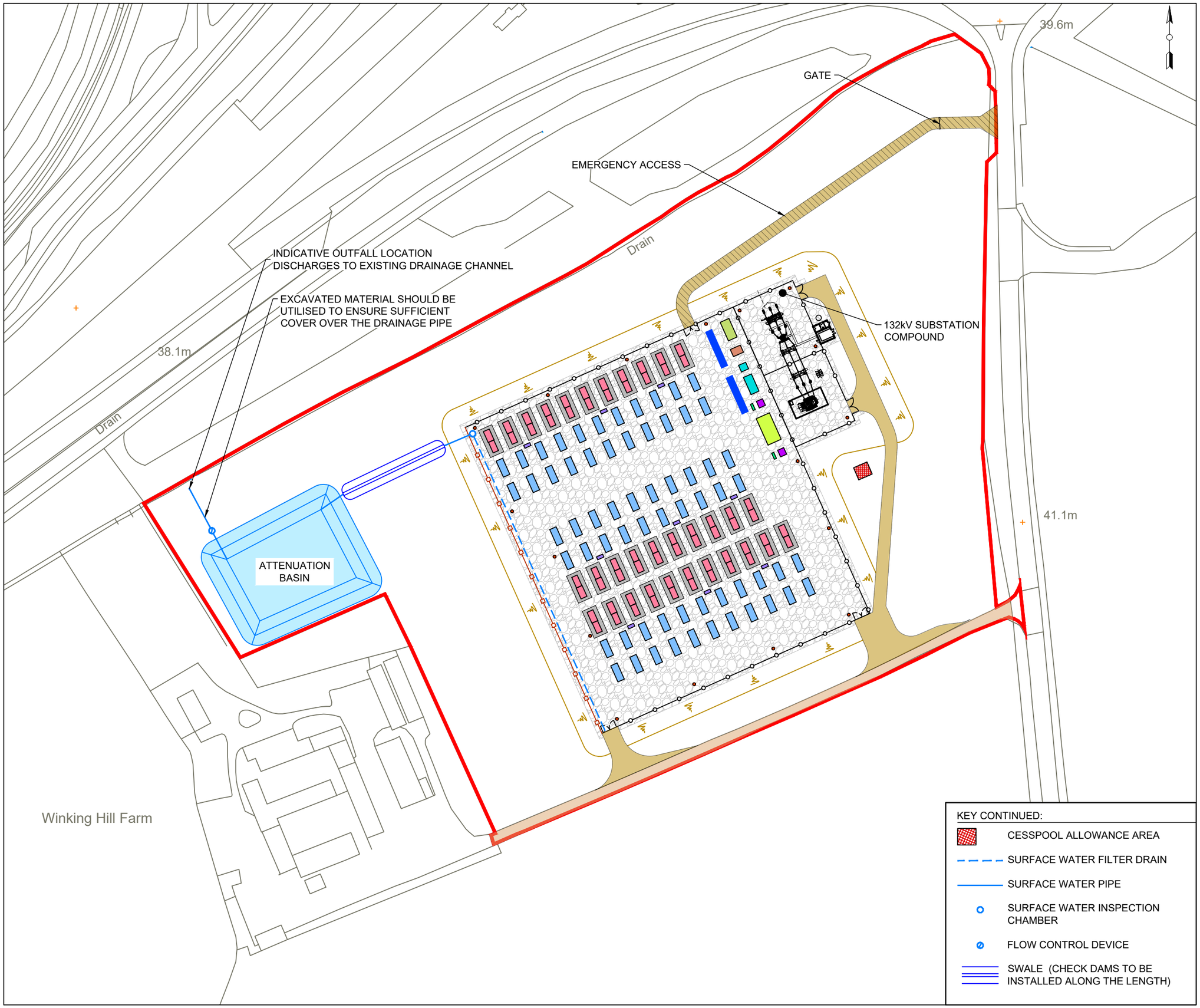
Appendix A Project Drawings

A.1 Infrastructure Layout – 04875-RES-LAY-DR-PT-001

A.2 Typical Drainage Details – 04875-RES-DRN-DR-PT-001

A.3 Foul Sewer Locations – 04875-RES-UTI-DR-XX-002

A.4 Location Plan – 04875-RES-MAP-DR-XX-001



KEY:

- DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)
- SECURITY FENCE
- ACOUSTIC FENCE
- BATTERY STORAGE ENCLOSURE (BSE)
- POWER CONVERSION SYSTEM (PCS) WITH SINGLE MV SKID AND APRON SLAB
- BESS SUBSTATION BUILDING
- AUXILIARY TRANSFORMER
- LV DISTRIBUTION EQUIPMENT
- AGGREGATION PANEL WITH LV PILLAR
- PRE-INSERTION RESISTOR
- CAPACITOR BANK
- HARMONIC FILTER AND RESISTOR
- SPARES CONTAINER
- LIGHTING / CCTV COLUMN
- SURFACE TO COMPRISE COMPACTED AGGREGATE, GRAVEL OR ASPHALT FINISH TO SUIT DETAILED EARTHING DESIGN
- ACCESS TRACK
- EMERGENCY ACCESS TRACK
- EARTHWORK AREA

CONTINUED...

KEY CONTINUED:

- CESSPOOL ALLOWANCE AREA
- SURFACE WATER FILTER DRAIN
- SURFACE WATER PIPE
- SURFACE WATER INSPECTION CHAMBER
- FLOW CONTROL DEVICE
- SWALE (CHECK DAMS TO BE INSTALLED ALONG THE LENGTH)

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
4	BM	WM	MAS	2024-12-13	UPDATED SUBSTATION COMPOUND & UPDATED PURPOSE
3	BM	VM	MAS	2024-08-16	ADDED EMERGENCY ACCESS TRACK TO KEY
2	BM	VM	MAS	2024-07-26	UPDATED DEVELOPMENT BOUNDARY
1	BM	WM	VM	2024-05-14	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: OSGB 1936
SCALE: 1:1,250 @A3	DATUM: N/A
LAYOUT DRAWING: N/A	T-LAYOUT NO: N/A

PROJECT TITLE
WINKING HILL

DRAWING TITLE
INFRASTRUCTURE LAYOUT

RES DRAWING NUMBER	REV
04875-RES-LAY-DR-PT-001	4

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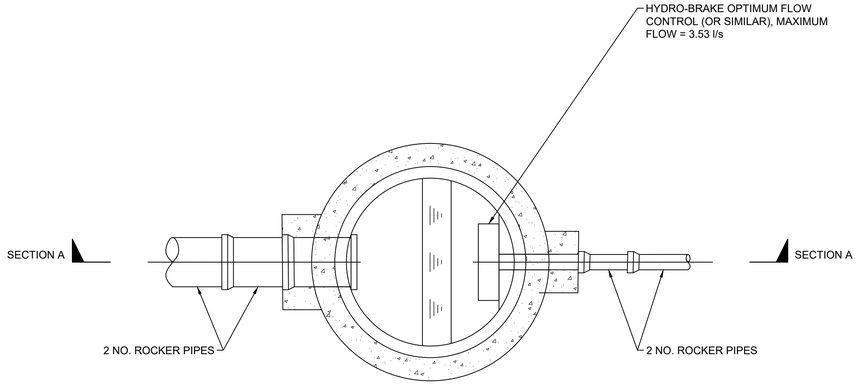
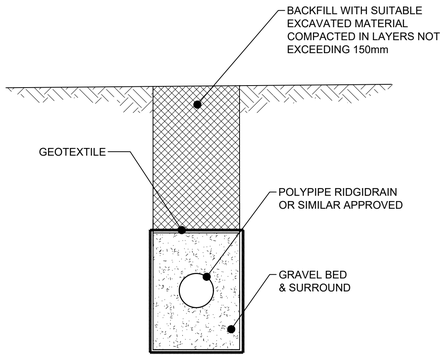
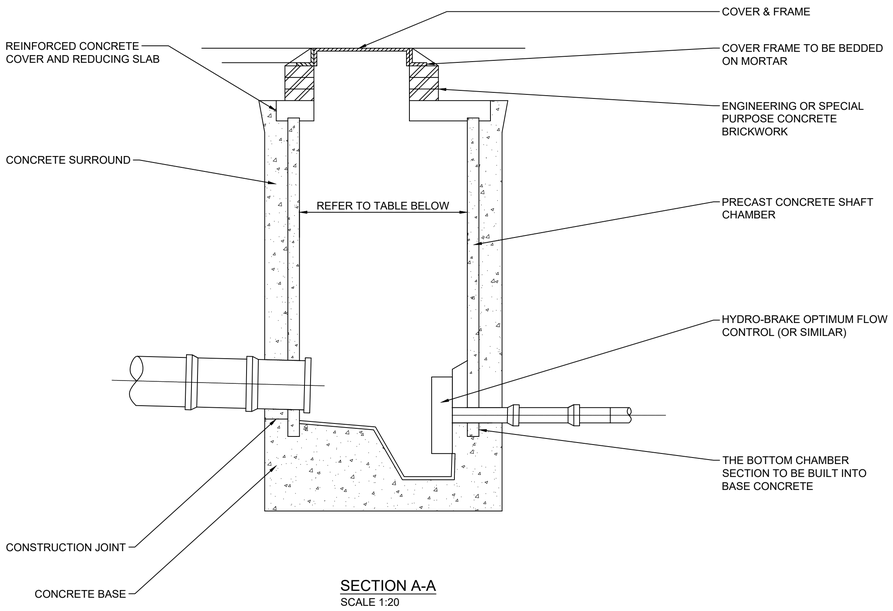


MANHOLE DETAIL WITH FLOW CONTROL DEVICE
SCALE 1:20

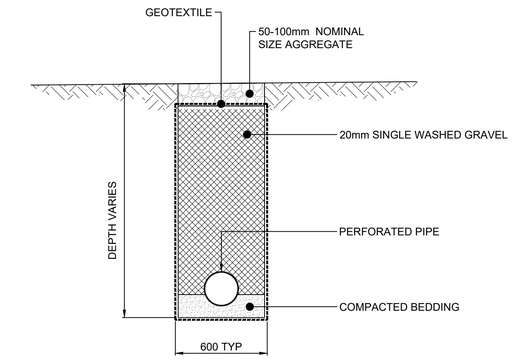


PIPE BEDDING DETAIL
SCALE 1:20

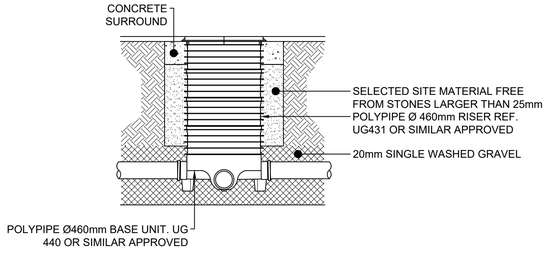
Ø OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375 - 700	1500
750 - 900	1800



SECTION A-A
SCALE 1:20



FILTER DRAIN DETAIL
SCALE 1:20



TYPICAL INSTALLATION DETAIL FOR INSPECTION PIPE CHAMBER
SCALE 1:20

NOTES:

1. DO NOT SCALE, ANY DISCREPANCIES SHALL BE HIGHLIGHTED TO THE DESIGNER FOR CONFIRMATION.
2. SUDS SYSTEMS TO BE CONSTRUCTED PRIOR TO, OR AT THE SAME TIME AS THE ACCESS TRACK AND COMPOUND. INTERIM MEASURES SUCH AS THE PLACEMENT OF SILT FENCES TO BE USED AROUND WATERCOURSES AND RETAINED IN PLACE UNTIL SUDS ARE ESTABLISHED AND PROVIDING SUFFICIENT SILT REMOVAL.
3. WHERE RESEEDING IS REQUIRED, NATIVE SPECIES SEED MIX SHALL BE USED BASED UPON THE SURROUNDING HABITAT. THE PLANTING SHALL BE CAPABLE OF RESISTING DROUGHT CONDITIONS.
4. AREAS STRIPPED OF VEGETATION SHOULD BE KEPT TO A MINIMUM.
5. SILT LEVELS AT DETENTION BASIN TO BE VISUALLY INSPECTED AS PART OF AN ONGOING MAINTENANCE PROGRAMME DURING THE CONSTRUCTION PHASE. WHERE CHECK DAMS BECOME CLOGGED WITH SILT OR VEGETATION, STONE CHECK DAM TO BE REMOVED AND DISPOSED OF APPROPRIATELY.
6. SUDS DETAILS, DIMENSIONS AND LEVELS MAY BE MODIFIED DURING DETAILED DESIGN. CHANGES WILL ADHERE TO THE REQUIREMENTS AND PHILOSOPHY IN THE SURFACE WATER MANAGEMENT PLAN AND ADDENDUM.

SHEET 1 OF 3

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
2	BM	WM	JM	2024-12-13	UPDATED PURPOSE TO PLANNING
1	BM	WM	JM	2024-06-19	FIRST ISSUE

PURPOSE: PLANNING
COORDINATES: N/A
SCALE: AS SHOWN @ A1
DATUM: N/A
LAYOUT DWG: N/A
T-LAYOUT NO.: N/A
PROJECT TITLE: WINKING HILL
DRAWING TITLE: TYPICAL DRAINAGE DETAILS
RES DRAWING NUMBER: 04875-RES-DRN-DR-PT-001
REV: 2

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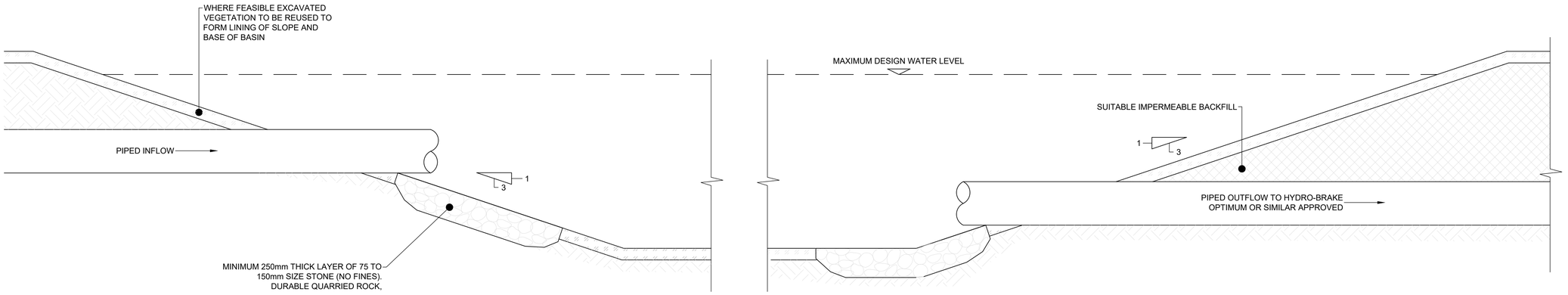
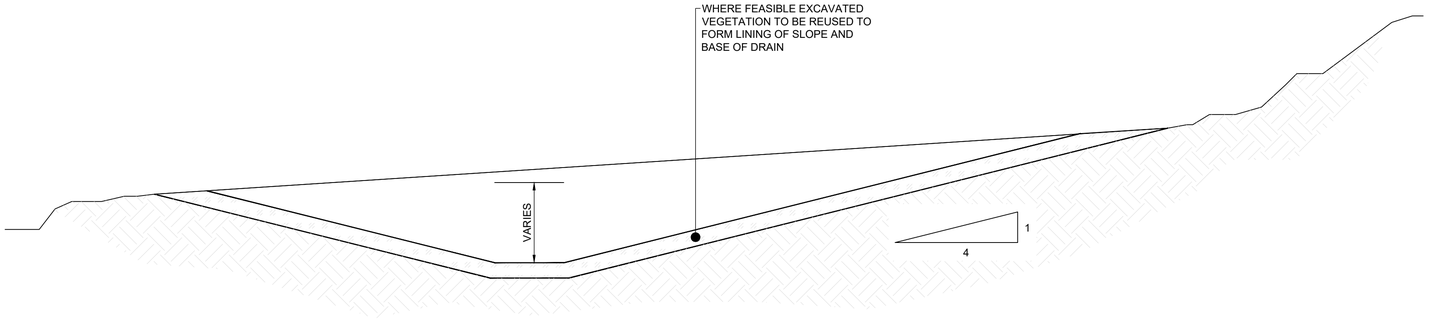


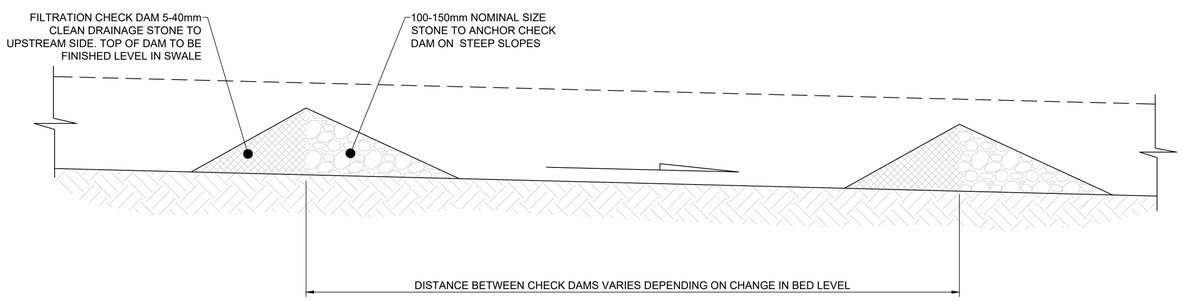
TYPICAL SECTION OF ATTENUATION BASIN

SCALE - NTS



TYPICAL SWALE DETAIL

SCALE - 1:20



TYPICAL SWALE CHECK DAM DETAIL

SCALE - 1:20

NOTES:

1. DO NOT SCALE, ANY DISCREPANCIES SHALL BE HIGHLIGHTED TO THE DESIGNER FOR CONFIRMATION.
2. SUDS SYSTEMS TO BE CONSTRUCTED PRIOR TO, OR AT THE SAME TIME AS THE ACCESS TRACK AND COMPOUND. INTERIM MEASURES SUCH AS THE PLACEMENT OF SILT FENCES TO BE USED AROUND WATERCOURSES AND RETAINED IN PLACE UNTIL SUDS ARE ESTABLISHED AND PROVIDING SUFFICIENT SILT REMOVAL.
3. WHERE RESEEDING IS REQUIRED, NATIVE SPECIES SEED MIX SHALL BE USED BASED UPON THE SURROUNDING HABITAT. THE PLANTING SHALL BE CAPABLE OF RESISTING DROUGHT CONDITIONS.
4. AREAS STRIPPED OF VEGETATION SHOULD BE KEPT TO A MINIMUM.
5. SILT LEVELS AT DETENTION BASIN TO BE VISUALLY INSPECTED AS PART OF AN ONGOING MAINTENANCE PROGRAMME DURING THE CONSTRUCTION PHASE. WHERE CHECK DAMS BECOME CLOGGED WITH SILT OR VEGETATION, STONE CHECK DAM TO BE REMOVED AND DISPOSED OF APPROPRIATELY.
6. SUDS DETAILS, DIMENSIONS AND LEVELS MAY BE MODIFIED DURING DETAILED DESIGN. CHANGES WILL ADHERE TO THE REQUIREMENTS AND PHILOSOPHY IN THE SURFACE WATER MANAGEMENT PLAN AND ADDENDUM.

SHEET 2 OF 3

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
2	BM	WM	JM	2024-12-13	UPDATED PURPOSE TO PLANNING
1	BM	WM	JM	2024-06-19	FIRST ISSUE

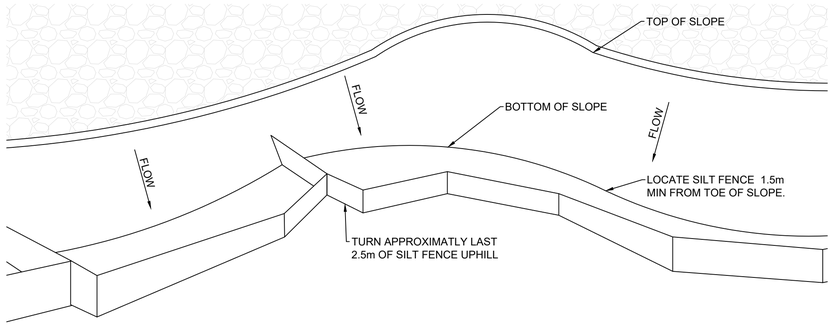
PURPOSE: PLANNING	COORDINATES: N/A
SCALE: AS SHOWN @ A1	DATUM: N/A
LAYOUT DWG: N/A	T-LAYOUT NO.: N/A

PROJECT TITLE: WINKING HILL

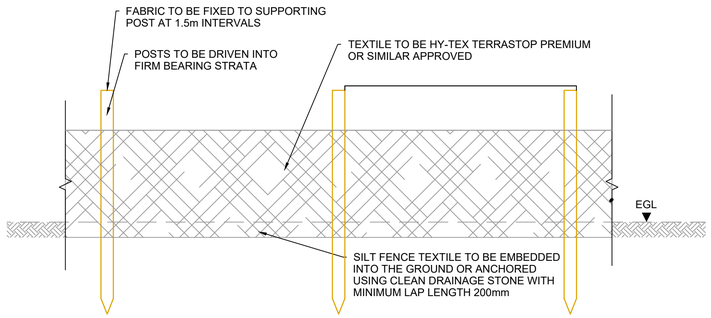
DRAWING TITLE: TYPICAL DRAINAGE DETAILS

RES DRAWING NUMBER: 04875-RES-DRN-DR-PT-001 | REV: 2

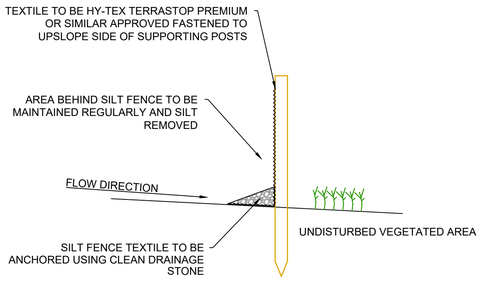
BEAUFORT COURT,
EGG FARM LANE,
KINGS LANGLEY,
HERTS WD4 8LR, UK
TEL +44 (0) 1923 296200
WWW.RES-GROUP.COM



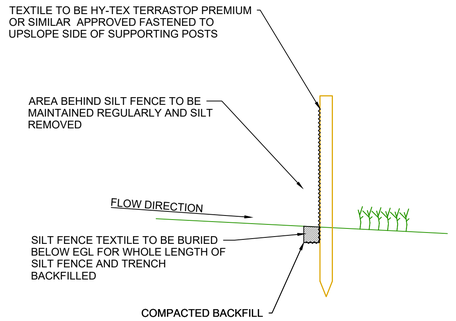
TYPICAL SILT FENCE BOTTOM OF SLOPE
SCALE - NTS



SILT FENCE TEXTILE DETAIL
SCALE 1:20



ANCHORED TYPE OPTION
SCALE 1:20



BURIED TYPE OPTION
SCALE 1:20

NOTES:

1. DO NOT SCALE, ANY DISCREPANCIES SHALL BE HIGHLIGHTED TO THE DESIGNER FOR CONFIRMATION.
2. SUDS SYSTEMS TO BE CONSTRUCTED PRIOR TO, OR AT THE SAME TIME AS THE ACCESS TRACK AND COMPOUND. INTERIM MEASURES SUCH AS THE PLACEMENT OF SILT FENCES TO BE USED AROUND WATERCOURSES AND RETAINED IN PLACE UNTIL SUDS ARE ESTABLISHED AND PROVIDING SUFFICIENT SILT REMOVAL.
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SHEET 3 OF 3

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
2	BM	WM	JM	2024-12-13	UPDATED PURPOSE TO PLANNING
1	BM	WM	JM	2024-06-19	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: N/A
SCALE: AS SHOWN @ A1	DATUM: N/A
LAYOUT DWG: N/A	T-LAYOUT NO.: N/A

PROJECT TITLE: WINKING HILL

DRAWING TITLE: TYPICAL DRAINAGE DETAILS

RES DRAWING NUMBER: 04875-RES-DRN-DR-PT-001

REV: 2

BEAUFORT COURT,
EGG FARM LANE,
KINGS LANGLEY,
HERTS WD4 8LR, UK
TEL +44 (0) 1923 299200
WWW.RES-GROUP.COM

KEY:

DEVELOPMENT BOUNDARY
(OUTSIDE OF LINE DENOTES BOUNDARY)

(FW) FOUL WATER SEWER (SEVERN TRENT RECORDS DATED 19-02-2024)

2072m

1	BM	WM	JM	2024-05-24	FIRST ISSUE
ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES

PURPOSE: OTHER	COORDINATES: OSGB 1936
SCALE: 1:5,000 @ A1	DATUM: N/A
LAYOUT DWG: N/A	T-LAYOUT NO.: N/A

PROJECT TITLE
WINKING HILL

DRAWING TITLE
FOUL SEWER LOCATIONS

RES DRAWING NUMBER	REV
04875-RES-UTI-DR-XX-002	1

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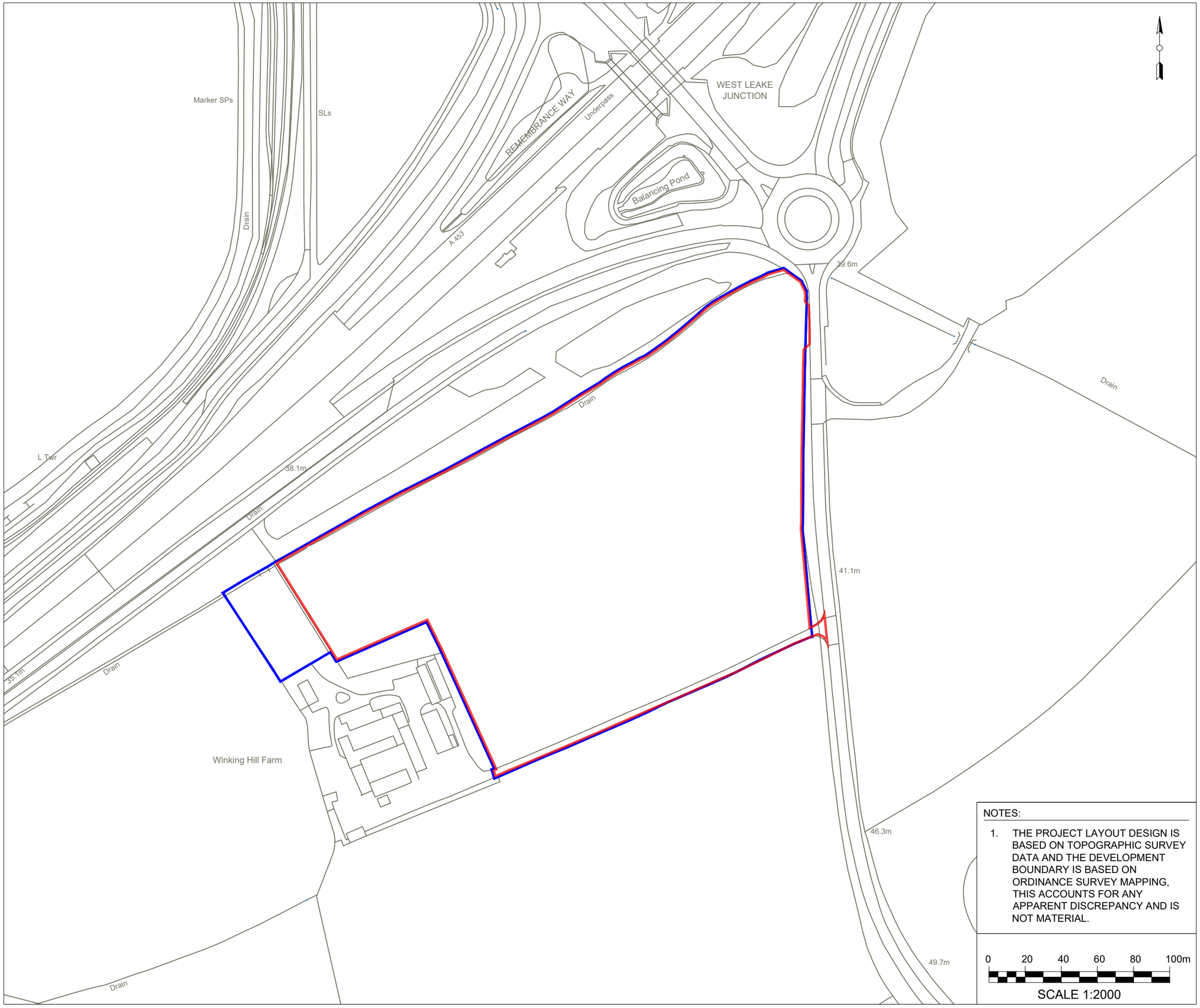
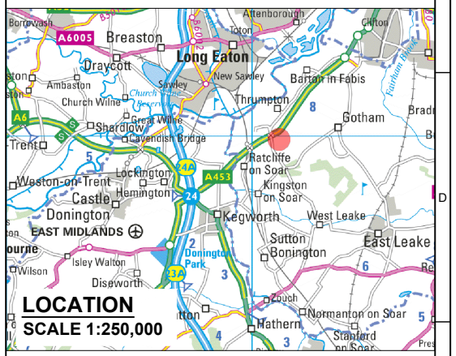


KEY:

LAND CONTROLLED BY APPLICANT (INSIDE EDGE OF LINE DENOTES BOUNDARY)

DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)

KEY PLAN - NOT TO SCALE



ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
4	BM	WM	WM	2024-12-13	UPDATED PURPOSE TO PLANNING
3	BM	VM	NC	2024-07-26	UPDATED BOUNDARIES AND ADDED NOTES
2	BM	WM	NC	2024-06-19	UPDATED DEVELOPMENT BOUNDARY AND ADDED LANDLORD'S PROPERTY
1	BM	BY APPD	MA	2023-09-12	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: OSGB 1936
SCALE: 1:2,000 @A3	DATUM: N/A
LAYOUT DRAWING: N/A	T-LAYOUT NO: N/A

PROJECT TITLE: WINKING HILL

DRAWING TITLE: LOCATION PLAN

RES DRAWING NUMBER	REV
04875-RES-MAP-DR-XX-001	4

NOTES:

1. THE PROJECT LAYOUT DESIGN IS BASED ON TOPOGRAPHIC SURVEY DATA AND THE DEVELOPMENT BOUNDARY IS BASED ON ORDINANCE SURVEY MAPPING, THIS ACCOUNTS FOR ANY APPARENT DISCREPANCY AND IS NOT MATERIAL.

0 20 40 60 80 100m

SCALE 1:2000

BEAUFORT COURT,
EGG FARM LANE,
KINGS LANGLEY,
HERTS WD4 8LR. UK
TEL +44 (0) 1923 299200
WWW.RES-GROUP.COM

Appendix B Calculations

B.1 Winking Hill Greenfield Runoff Rate Estimation - 04875-7687464

B.2 Winking Hill – UK Storage Volumes - 04875-7687256

B.3 Rainfall Data - 04875-7698593

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	William Miskelly
Site name:	Winking Hill
Site location:	

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	52.86354° N
Longitude:	1.24296° W
Reference:	2870560841
Date:	Nov 22 2023 15:52

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1.3

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	4
BFI / BFIHOST:	0.417
Q_{MED} (l/s):	3.14
Q_{BAR} / Q_{MED} factor:	1.12

Hydrological characteristics

	Default	Edited
SAAR (mm):	598	603
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):		3.53
1 in 1 year (l/s):	-	2.93
1 in 30 years (l/s):	-	7.05
1 in 100 year (l/s):	-	9.06
1 in 200 years (l/s):	-	10.72

Winking Hill - UK Storage Volumes

PROJECT:	Winking Hill
PROJECT NO:	4875
REFERENCE NO:	04875-7154519

Issue	Date	Author	Nature and Location of Change
1	19/01/2024	William Miskelly	First issue

Note: revision history should include design stage, revision of load and other relevant information.

Attenuation Storage

1. INPUT PARAMETERS AND ASSUMPTIONS

1.1 First category of inputs - Hydrological Characteristics

m5-60	17.00	mm	*Five Year - 60 Minute Rainfall Depth (UK SUDs website)*
r	0.40		*Ratio M5-60/M5-2day (UK SUDs website)*
Location	E/W		*E/W (England and Wales) or S/NI (Scotland and Northern Ireland)*
Fc	1.40		*Local flood authority guidance*

1.2 Second category of inputs - Catchment Area Characteristics

Ap	0.00	ha	*Permeable Area*
Cp	N/A		
Ai	1.30	ha	*Impermeable Area (C= 1 assumed) (ha)*
Qa	0.00353	m³/s	*Allowable Discharge*

2. CALCULATIONS

2.1 First calculation section - effective catchment area calculation

Ae	1.30	ha	*Effective area (see "Data" Tab)*

2.2 Second calculation section - calculation to dermine the m5 rainfall for various durations

D (min)	Z1	m5 - D (mm)
15.00	0.63	10.77
30.00	0.80	13.66
60.00	1.00	17.00
120.00	1.21	20.51
240.00	1.45	24.59
360.00	1.60	27.26
600.00	1.79	30.49
1440.00	2.24	38.08
2160.00	2.47	41.93

m5-D calculation

Note: z1 is calculation in the "Att Data" Tab

2.3 Third calculation section - attenuation volume calculations for various durations and return periods

D (min)	Z2	MT-10 (mm)	Inflow Vol m^3	Outflow vol (m^3)	Att Volume
15.00	0.61	9	120	3	117
30.00	0.62	12	153	6	147
60.00	0.63	15	194	13	182
120.00	0.64	18	240	25	214
240.00	0.66	23	295	51	244
360.00	0.67	26	332	76	256
600.00	0.68	29	378	127	251
1440.00	0.70	37	482	305	177
2160.00	0.70	41	537	457	80

1 year return period calculation

Note: z2 is calculation in the "Att Data" Tab

D (min)	Z2	MT-10 (mm)	Inflow Vol m^3	Outflow vol (m^3)	Att Volume
15.00	1.03	16	202	3	199
30.00	1.03	20	256	6	250
60.00	1.03	25	319	13	306
120.00	1.03	30	385	25	359
240.00	1.03	35	461	51	410
360.00	1.03	39	511	76	435
600.00	1.03	44	571	127	444
1440.00	1.02	54	708	305	403
2160.00	1.02	60	778	457	321

5 year return period calculation

Note: z2 is calculation in the "Att Data" Tab

D (min)	Z2	MT-10 (mm)	Inflow Vol m^3	Outflow vol (m^3)	Att Volume
15.00	1.22	18	240	3	236
30.00	1.23	24	307	6	301
60.00	1.24	30	384	13	371
120.00	1.24	36	463	25	438
240.00	1.24	43	555	51	504
360.00	1.23	47	611	76	534
600.00	1.22	52	676	127	549
1440.00	1.20	64	829	305	524
2160.00	1.19	70	905	457	448

10 year return period calculation

Note: z2 is calculation in the "Att Data" Tab

D (min)	Z2	MT-10 (mm)	Inflow Vol m^3	Outflow vol (m^3)	Att Volume
15.00	1.50	23	293	3	290
30.00	1.52	29	377	6	371
60.00	1.53	36	474	13	462
120.00	1.54	44	576	25	550
240.00	1.53	53	687	51	636
360.00	1.52	58	756	76	680
600.00	1.51	64	838	127	711
1440.00	1.48	79	1023	305	718
2160.00	1.46	86	1112	457	655

30 year return period calculation

Note: z2 is calculation in the "Att Data" Tab

D (min)	Z2	MT-10 (mm)	Inflow Vol m^3	Outflow vol (m^3)	Att Volume
15.00	1.92	29	377	3	373
30.00	1.97	38	489	6	483
60.00	2.01	48	621	13	608
120.00	2.03	58	757	25	732
240.00	2.01	69	900	51	850
360.00	1.99	76	988	76	912
600.00	1.97	84	1091	127	964
1440.00	1.91	102	1321	305	1016
2160.00	1.87	110	1431	457	973

100 year return period calculation

Note: z2 is calculation in the "Att Data" Tab

3. RESULTS

Att 1	256	m^3	*Attenuation volume required in a 1 in 1 year event*
Att 5	444	m^3	*Attenuation volume required in a 1 in 5 year event*
Att 10	549	m^3	*Attenuation volume required in a 1 in 10 year event*
Att 30	718	m^3	*Attenuation volume required in a 1 in 30 year event*
Att 100	1016	m^3	*Attenuation volume required in a 1 in 100 year event*

Point data at 451078,329837

Point: 451078,329837

Tag: Winking Hill

Rainfall Export

Descriptor	Value
NGR	SK 51078 29837
BFIHOST	0.431
BFIHOST19	0.417
PROPWET	0.35
SAAR6190	603 mm

Appendix C Correspondence with Nottinghamshire County Council

C.1 RE Winking Hill Flood Risk Assessment and Drainage Impact Assessment Guidance – 04875-6988201

C.2 LLFA – 04875-7676037

Outlook

RE: Winking Hill Flood Risk Assessment and Drainage Impact Assessment Guidance

From Callum Smith <Callum.Smith@nottscc.gov.uk>
Date Mon 02/10/2023 2:57 PM
To William Miskelly <William.Miskelly@res-group.com>

Good Afteroon William,

Please see below for our general ask for developments as a minimum:

- Demonstrate that the development will use SuDS throughout the site as a primary means of surface water management and that design is in accordance with CIRIA C753 and NPPF Paragraph 169.
- Limit the discharge generated by all rainfall events up to the 100 year plus 40% (climate change) critical rain storm to QBar rates for the developable area.
- Provide detailed design (plans, network details, calculations and supporting summary documentation) in support of any surface water drainage scheme, including details on any attenuation system, the outfall arrangements and any private drainage assets.

  Calculations should demonstrate the performance of the designed system for a range of return periods and storm durations inclusive of the 1 in 1 year, 1 in 30 year and 1 in 100 year plus climate change return periods.
  - No surcharge shown in a 1 in 1 year.
  - No flooding shown in a 1 in 30 year.
  - For all exceedance to be contained within the site boundary without flooding properties in a 100 year plus 40% storm.
- Evidence to demonstrate the viability (e.g Condition, Capacity and positive onward connection) of any receiving watercourse to accept and convey all surface water from the site.
- Details of STW approval for connections to existing network and any adoption of site drainage infrastructure.
- Evidence of approval for drainage infrastructure crossing third party land where applicable.
- Provide a surface water management plan demonstrating how surface water flows will be managed during construction to ensure no increase in flood risk off site.
- Evidence of how the on-site surface water drainage systems shall be maintained and managed after completion and for the lifetime of the development to ensure long term effectiveness.

Many thanks,

Callum Smith

Callum Smith
Principal Officer - Flood Risk Management
Single Point of Contact for Drones
LEVI Project Officer
Highways and Transport

Nottinghamshire County Council

Tel: 0115 9773100

callum.smith@nottscc.gov.uk I flood.team@nottscc.gov.uk I www.nottinghamshire.gov.uk

Flood Risk Management Team, Nottinghamshire County Council,
County Hall, Loughborough Road, West Bridgford, Nottingham, NG2 7QP

From: William Miskelly <William.Miskelly@res-group.com>
Sent: 26 September 2023 11:11
To: Flood Team <flood.team@nottscc.gov.uk>
Subject: RE: Winking Hill Flood Risk Assessment and Drainage Impact Assessment Guidance

Hi Amy,

Please find the site shown by the red boundary on the map and the coordinates are shown below.

Thanks,

William Miskelly
Civil Engineer

M +44 7795 236 408
william.miskelly@res-group.com | www.res-group.com

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---

From: Amy Perry <Amy.Perry@nottscc.gov.uk> **On Behalf Of** Flood Team
Sent: Tuesday, September 26, 2023 10:52 AM
To: William Miskelly <William.Miskelly@res-group.com>
Subject: RE: Winking Hill Flood Risk Assessment and Drainage Impact Assessment Guidance

Good morning,

Could you please provide me with a more precise location? This way I will be able to pass you on to the appropriate officer to respond.

Kind regards,

Amy Perry
Amy Perry
Flood Risk Management Trainee
Highways and Transport

Nottinghamshire County Council

Tel: 0115 804 2163

amy.perry@nottscc.gov.uk I flood.team@nottscc.gov.uk I www.nottinghamshire.gov.uk
Supporting Gary Wood Head of Highways and Transport - Tel: 0115 9774270 ; Email: gary.wood@nottscc.gov.uk
Flood Risk Management Team, Nottinghamshire County Council,
County Hall, Loughborough Road, West Bridgford, Nottingham, NG2 7QP

From: William Miskelly <William.Miskelly@res-group.com>
Sent: 26 September 2023 10:10
To: Flood Team <flood.team@nottscc.gov.uk>
Subject: Winking Hill Flood Risk Assessment and Drainage Impact Assessment Guidance

Hello,

I am a developer planning to submit a planning application at Winking Hill for a battery energy storage project. I am trying to obtain guidance regarding flood risk assessments or drainage strategy preferences so I can produce the design in line with the Nottinghamshire County council's guidance and subsequently satisfy the Nottinghamshire county council planners.

Can you help?

Regards,

William Miskelly
Civil Engineer

M +44 7795 236 408
william.miskelly@res-group.com | www.res-group.com

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This matter is being dealt with by:
Callum Smith
T 0115 9773100
E callum.smith@nottscc.gov.uk

Nottinghamshire County Council

Planning ref:
23/01867/ADVICE
Consultation received:
30/10/23

Ms Helen Knott
Service Manager – Planning
Rushcliffe Borough Council
Rushcliffe Arena
Rugby Road
West Bridgford
NG2 7YG

20 December 2024

Dear Ms Knott

PROPOSAL: Proposal for Battery Energy Storage System (BESS) and associated works.

LOCATION: West Leake Lane, Ratcliffe On Soar

Nottinghamshire County Council as the Lead Local Flood Authority (LLFA) has reviewed the pre-app advice application which was received on the 30 Oct 2023.

Given the proposed scale of the development to satisfy the National Planning Policy Framework (NPPF) further details would need to be submitted to support this application. Paragraph 163 fn.50 of the NPPF requires that applications in Flood Zone 2, 3 and in Flood Zone 1 over 1 hectare should be accompanied by a site-specific flood risk assessment, reviewing the potential flood risks to the development from all sources. An FRA is vital if the local planning authority is to make an informed planning decision.

As LLFA we also require details of the proposed surface water drainage strategy for the development. Paragraph 165 of the NPPF states that major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The LLFA expect that any proposed drainage strategy is in accordance with CIRIA C753 and current best practice guidance. Any FRA or drainage strategy should include following information:

- An assessment of the nature of SuDS proposed to be used and demonstration that design is in accordance with CIRIA C753 and NPPF Paragraph 169.
- Details of a proven outfall from site in accordance with the drainage hierarchy. The following options should be considered in order of preference:
    - Infiltration
    - Discharge to watercourse
    - Discharge to surface water sewer
    - Discharge to combined sewer
- Justification for the use or not of infiltration, including the results of soakaway testing, in accordance with BRE 365.
- Evidence the maximum discharge is set to the QBar Greenfield run-off rate for the positively drained area of development.

- Demonstrate the site drainage system should cater for all rainfall events up to and including the 1 in 100-year event including a 40% allowance for climate change.
- Provide details for exceedance flows; surface water should be contained within the site boundary without flooding any properties in a 1 in 100 year plus 40% climate change storm.
- Evidence to demonstrate the viability (e.g Condition, Capacity and positive onward connection) of any receiving watercourse to accept and convey all surface water from the site.
- Details of STW approval for connections to existing network and any adoption of site drainage infrastructure.
- Evidence of approval for drainage infrastructure crossing third party land where applicable.
- A surface water management plan demonstrating how surface water flows will be managed during construction to ensure no increase in flood risk off site.
- Evidence of how the on-site surface water drainage systems shall be maintained and managed after completion and for the lifetime of the development to ensure long term effectiveness, and the party responsible for this.

This is only a brief outline of the minimum information we would be expecting to see and not an exhaustive list.

Informative

1. SuDS involve a range of techniques and SuDS methods can be implements on all sites. SuDS are a requirement for all major development as set out within paragraph 165 of the NPPF.

2. The LLFA does not consider oversized pipes or box culverts as sustainable drainage. Should infiltration not be feasible at the site, alternative sustainable drainage should be used, with a preference for above ground solutions.

3. Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. Sustainable Drainage Systems (SuDS) are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on-site as opposed to traditional drainage approaches which involve piping water off-site as quickly as possible.

Yours sincerely

Callum Smith

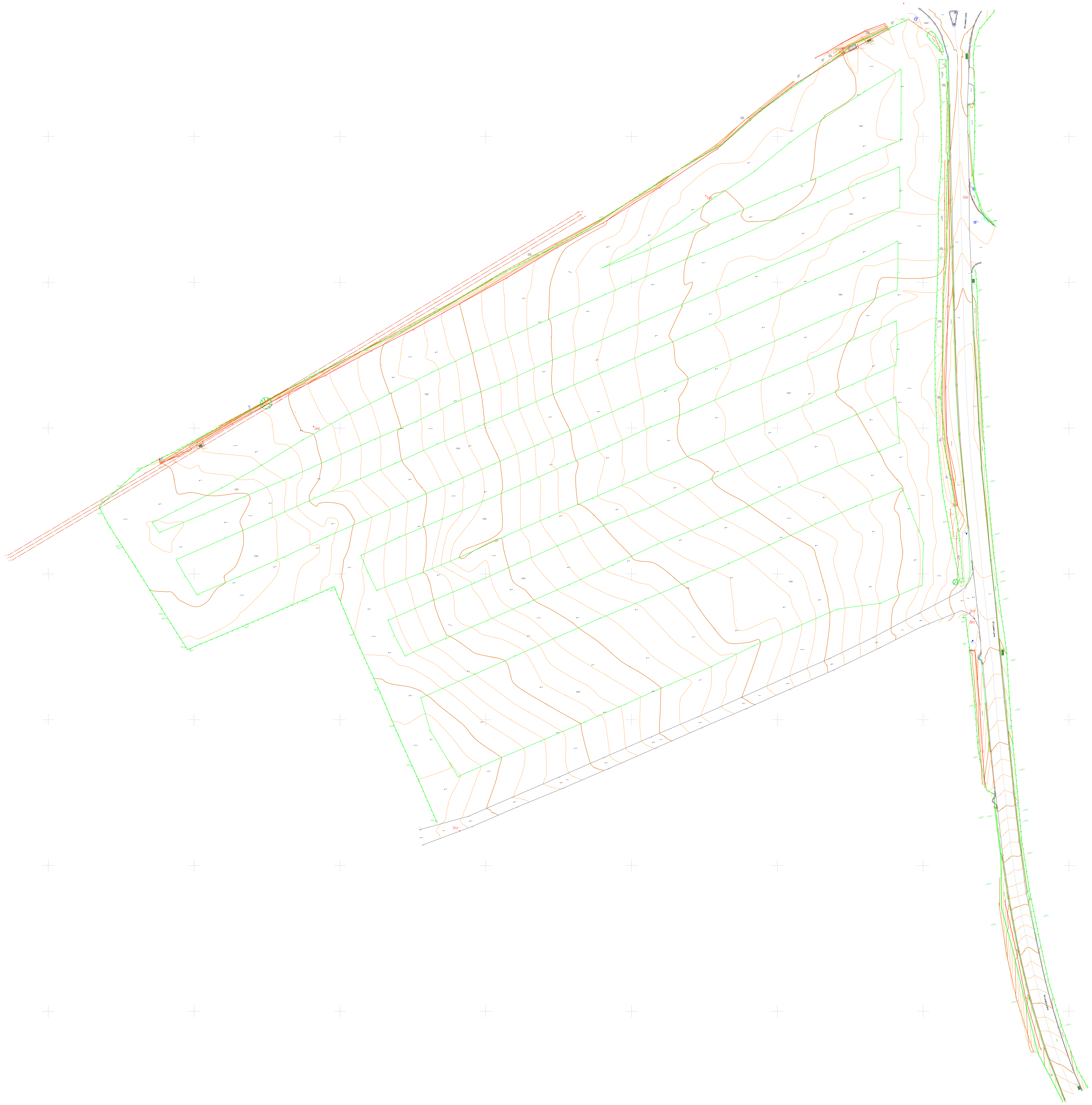
Callum Smith

Principal Flood Risk Management Officer
Nottinghamshire County Council

Please ensure any consultations are sent to flood.team@nottscc.gov.uk

Appendix D Surveys

D.1 Topographic Survey 2D – 4222-360-00-WHF-TS-001-00



Legend

Topographical Linetypes:

- Road
- Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

Underground Utility Linetypes

E	Electric
GAS	Gas
W	Water
CATV	Cable TV
CATVTFR	Cable TV TFR
CCTV	Closed Circuit TV
BT	British Telecom
BTTFR	British Telecom TFR
EMPTY	Empty Ducting
UNK	Unknown Metallic Utility
GPR	GPR Anomaly Possible Utility
COM	Communications
	Foul Water Drainage Route
	Surface Water Drainage Route
	Combined Service Drainage Route
	Unknown Drainage Route
Field Drain	Field Drain
Aco Drain	Aco Drain
E-TFR	Electric - Taken from Records
E AR	Assumed Electric
O/H E	Electric Overhead
O/H BT	BT Overhead
MSR	Multi Service Route
MULTI SERVICE TRENCH	Multi Service Trench
W-TFR	Water - Taken from Records
W AR	Assumed Water
GAS AR	Assumed Gas
GAS-TFR	Gas - Taken from Records
	Survey Extents
EOS	End of Signal
UTR	Unable to Raise
UTT	Unable to Trace
NVO	No Visible Outlet
UTMOCA	Unable to Make Out Chamber Attributes

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Underground utility detection, verification and location – Specification

Disclaimer
Three60 Mapping Ltd cannot offer a 100% guarantee that all utilities will be located within a given area, especially those of non-metallic nature due to equipment limitations.
Due diligence must be carried out by any party prior to attempting any excavation work.
This survey is to be used as a 'guide' only and should form only part of a wider safe digging policy in line with HSG47.
Three60 Mapping Ltd cannot and will not be held liable for 'strikes' to services during the excavation process.

Symbols

Symbol	Description	Symbol	Description
TP	Telegraph Pole		Gate
LP	Lamp Post	MH1 CL 100.000 IL 98.000	Manhole
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Water Level 73.172	Water Level	CATV CL 100.000	Cable TV Chamber
FL	Floodlight	BT CL 100.000	BT Chamber
CTV	Cable TV IC	RG 100.000	Road Gully
SC	Stop Cock	SV CL 100.000	Stop Valve
GV	Gas Valve	WM CL 100.000	Water Meter
BOL	Bollard	AV CL 100.000	Air Valve
2.345	Spot Level	WO CL 100.000	Wash Out
Post	Post	FH CL 100.000	Fire Hydrant
GUL	Gully	GV CL 100.000	Gas Valve
Sign Height 81.956	Sign Height	Cabinet 100.000	Cabinet
GR	Gas Riser	Fence Height 81.278	Fence Height Level
RWP	Rain Water Pipe	MH2 CL 100.000 IL 97.500	Circular Manhole
RS	Road Sign	MH3 CL 100.000 IL 97.500	Triangular Manhole
SVP	Soil Vent Pipe		Tree
S1 E=436676.617 N=546728.511 Level=25.558	Station Control Details		
Veg' Height 80.578	Vegetation Height		

EOS End of Signal/Unable to Trace Further

Approximate National Grid North
and datum based upon the Trimble OSTN15 system. Scale Factor 1.000m

N

THREE SIXTY GROUP
UNIT 3, MANDALE PARK, NORTH SHIELDS, TYNE & WEAR, NE29 7FN
0191 594 7672
ADMIN@360HQ.CO.UK
WWW.360HQ.CO.UK

res

Winking Hill Farm
Ratcliffe-on-Soar

Topographical Survey 2D

1:500 @ A0	04.10.23	OS SF1
RJ/MW	RJ/MW	RJ
4222-360-00-WHF-TS-001-00	Overview	

PO2	ADDITIONAL INFORMATION ADDED	RJ	RJ
PO1	INITIAL RELEASE	RJ	RJ

Legend

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Underground utility detection, verification and location – Specification

PAS 128 QUALITY LEVELS & EXPECTED ACCURACIES	
B1	2 Detection Methods ±15% of depth or 0.15 m (whichever is greatest)
B2	1 Detection Method ±25% of depth or 0.25 m (whichever is greatest)
B3	Detection successful but no depth,horizontal ±0.50m
B4	Detection unsuccessful assumed route
D	Detection unsuccessful route from records 'TFR'

Note: (P) Post fix indicates GPR post processing

WARNING

For all excavations, assume that underground utilities are present and act accordingly. To avoid buried services effectively it is necessary to positively identify and locate the services that are present by means of 'trial pits'. Attention is drawn to laws, rules and regulations applicable to vacuum excavating or hand digging near or atop dangerous utilities such as electric, gas, fuel or petroleum. Attention is drawn to HSE's publication, Avoiding danger from underground services (HSG47) [1].

Please ensure this survey drawing is read in conjunction with all available statutory service records

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RS	Road Sign	MH3 CL 100.000 IL 97.500	Triangular Manhole
SVP	Soil Vent Pipe		Tree
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Veg' Height 80.578	Vegetation Height		

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and datum based upon the Trimble OSTN15 system. Scale Factor 1.000m

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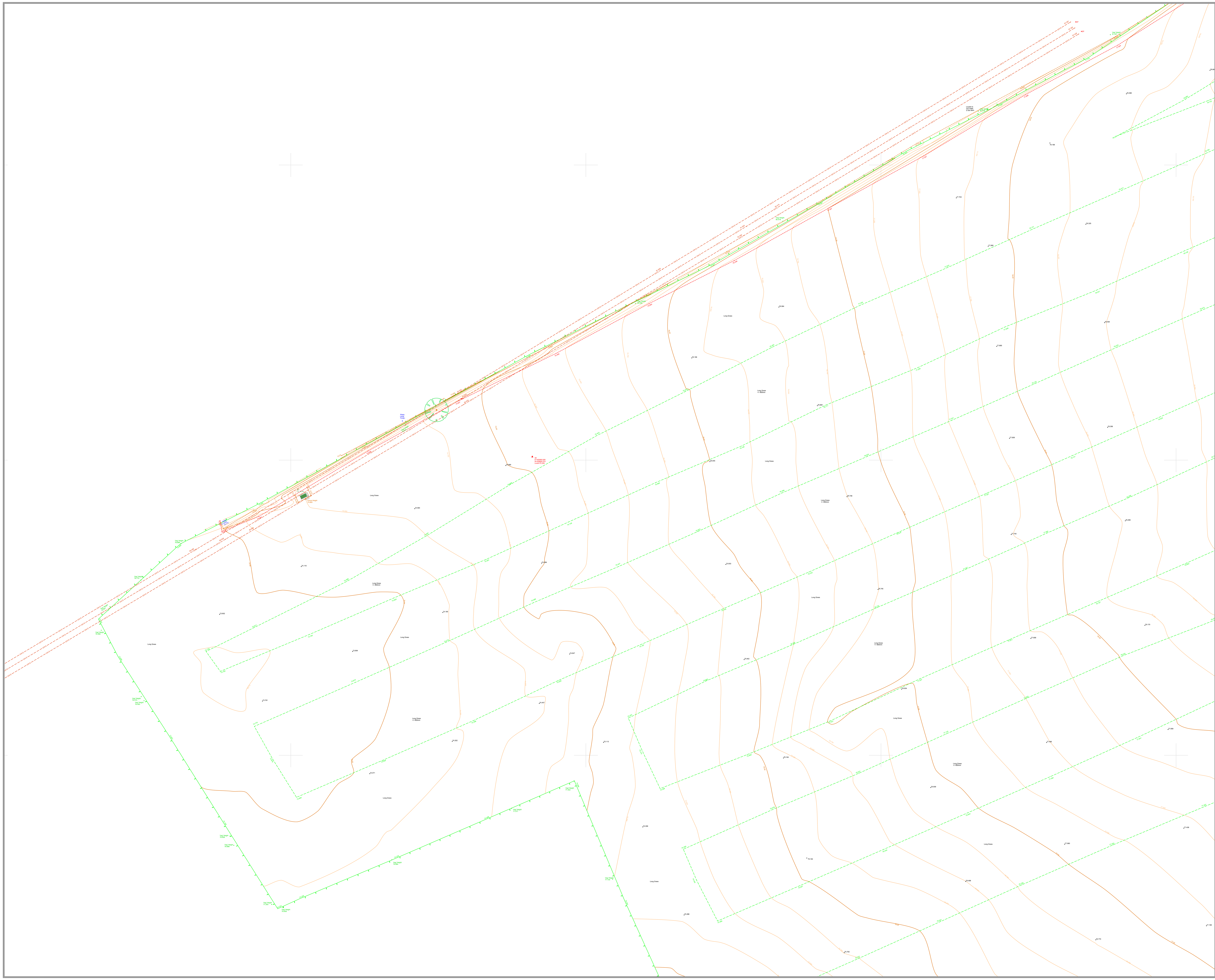
res

Winking Hill Farm
Ratcliffe-on-Soar

Topographical Survey 2D

1:200 @ A0	04.10.23	OS SF1
RJ/MW	RJ/MW	RJ
4222-360-00-WHF-TS-001-00	Sheet 1	

PO2	ADDITIONAL INFORMATION ADDED	RJ	RJ
PO1	INITIAL RELEASE	RJ	RJ



Legend

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Underground utility detection, verification and location – Specification

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Winking Hill Farm
Ratcliffe-on-Soar

Topographical Survey 2D

1:200 @ A0	04.10.23	OS SF1
RJ/MW	RJ/MW	RJ
4222-360-00-WHF-TS-001-00	Sheet 2	

Legend

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- CCTV — Closed Circuit TV
- BT — British Telecom
- BTTFR — British Telecom TFR
- EMPTY — Empty Ducting
- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route
- Unknown Drainage Route
- Field Drain — Field Drain
- Aco Drain — Aco Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water
- GAS AR — Assumed Gas
- GAS-TFR — Gas - Taken from Records
- Survey Extents

EOS	End of Signal
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Underground utility detection, verification and location – Specification

Table 1 – Utility detection grades

A	Detection likelihood ≥95% at depth ≤ 0.5 × (1 + tallyMark) (general)
B	Detection likelihood ≥95% at depth ≤ 0.25 m (tallyMark) (general)
C	Detection successful but not reliably estimated at depth
D	Detection unsuccessful (assumed) over
E	Detection unsuccessful (route from scarce 1m)

Notes

1 Where required, the user may determine a depth of investigation with an appropriate confidence level (see Annex F).

Disclaimer

Viewpoint Mapping can cannot offer or verify guarantees that all utilities will be located within a given area, especially those of non-metallic nature due to equipment limitations.
Our data is provided in good faith and is based on the information supplied to us by third parties.
The customer must carry out a desktop survey and trial trench prior to any excavation work.
Viewpoint Mapping will not be liable for any loss, damage, cost or expense arising from any inaccuracy.

Symbols

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WL	Water Level		
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RWP	Rain Water Pipe	Fence Height 81.278	Fence Height Level
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SVP	Soil Vent Pipe	MH3 CL 100.000 IL 97.500	Triangular Manhole
BI E=436676.611 N=540726.511 Level=25.558	Station Control Details		
Veg Height 80.578	Vegetation Height		Tree

EOS — End of Signal/Unable to Trace Further

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Topographical Survey 2D

1:200 @ A0	04.10.23	OS SF1
RJ/MW	RJ/MW	RJ
4222-360-00-WHF-TS-001-00	Sheet 3	

Appendix E Foul Drainage Assessment Form

E.1 Winking Hill Foul Drainage Assessment Form (FDA) – 04875-7684056

Foul Drainage Assessment Form (FDA)

Please note: You should only use this form for planning related queries. You cannot use it to apply for an Environmental Permit but you may submit a copy of the information you have provided for planning purposes in support of your Environmental Permit application. Further information on how to apply for an environmental permit and general binding rules applicable to small discharges of domestic sewage effluent is available on the gov.uk website.

APPLICANT DETAILS
Name: William Miskelly
Address: Beaufort Court
Telephone No: 07795236408
e-mail: william.miskelly@res-group.com

We will use the information you provide on this form to establish whether non-mains drainage, either a new system or connection to an existing system, would be acceptable. It is important that you provide full and accurate information. Failure to do this will delay the processing of your application.

You must provide evidence that a connection to the public sewer is not feasible.

Other than in very exceptional circumstances, we will not allow the use of non-mains drainage as part of your Planning or Building Regulation application unless you can prove that a connection to the public sewer is not feasible. We do not consider non-mains drainage systems to be environmentally acceptable in locations where it is feasible to connect to a public sewer. Please note that a lack of capacity in, or other operating problems with, the public sewer are not valid reasons to use a non-mains drainage system where it is otherwise feasible to connect to a public sewer.

Where connection to the public sewer is feasible, you may need to get the agreement of either the owners of any land through which the drainage will run or, if you intend to connect via an existing private drain, the owner of that private drain.

The National Planning Practice Guidance and Building Regulations Approved Document H give a hierarchy of drainage options that must be considered and discounted in the following order:

1 Connection to the public sewer
2 Package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption)
3 Septic Tank
4 If none of the above are feasible a cesspool

You must respond to all the following questions. If you wish to submit additional information please do so, marked clearly “Additional Information”. **In some cases you will be required to provide further information in order to demonstrate that any non-mains foul drainage system proposed is acceptable.**

Feasibility of mains foul sewer connection	YES	NO
Have you provided a written explanation of why it is not feasible to connect to the public foul sewer with this form? *This must include a scaled map showing the nearest public foul sewer connection point - check with your local sewerage undertaker.*	x	
Is the distance from your site to the closest connection point to the public foul sewer less than the number of properties to be built on the site multiplied by 30m? *(see Guidance Note 2)*		x
Does your proposal form part of a phased development or planned development of a wider area? *If YES, please provide further details including references of any planning permissions already granted.*		x

Non-mains connection

Please provide a plan with dimensions that clearly shows the location of the whole system in relation to the proposed development and the position of the key elements e.g. septic tank, drainage fields and points of discharge.

1. Existing system	YES	NO
Do you intend to use an existing non-mains foul drainage system?		x
If YES, does the system already have an Environmental Permit issued by the Environment Agency? *(In the case of a cesspool write N/A)* If YES, please provide Environmental Permit reference number……	N/A	

2. Discharge	YES	NO
Do you propose to use a package treatment plant?		x
Do you propose to use a septic tank?		x
Do you propose to use a cesspool? *If YES go to Q4*	x	
Have you considered having your system adopted by the sewerage undertaker? *(see Guidance Note 7).*	N/A	N/A
Will all, or any part of, the discharge go to a drainage field or soakaway*? (see Guidance Note 3)* - this includes systems that combine a drainage field with a high level overflow to watercourse *If YES go to Q3.*	N/A	N/A
Do you intend to use a system that discharges solely to watercourse? *(see Guidance Note 3) If YES go to Q9.*	N/A	N/A

3. Water abstraction	YES	NO
Do you receive your water from the public mains supply?	N/A	N/A
If not, where do you get your water supply from?	N/A	

4. Cesspools *(For methods other than cesspools write N/A)*	YES	NO
Have you provided written justification for the use of a cesspool in preference to more sustainable methods of foul drainage disposal? *(see Guidance Note 4).*	x	

See section 5 of flood risk screening and drainage management plan.

5. **Drainage field design** *(For cesspools write N/A)*	YES	NO
Will the system discharge to a drainage field designed and constructed in accordance with British Standard BS6297:2007? If not, why not?	N/A	
Will the discharge from the system be located in a Source Protection Zone 1 (SPZ1)?		x

6. **Ground Conditions** *(For cesspools write N/A)*	YES	NO
6a. Have you submitted a copy of the percolation test results with this form *(see Guidance Note 6)?*	N/A	
6c. Is any part of the system in land which is marshy, water logged or subject to flooding?	N/A	
6d. Will the soakaway be located on artificially raised, made-up ground or ground likely to be contaminated? *If YES please provide details as additional information.*	N/A	
6e. Have you submitted the results of a trial hole at the site to establish that the proposed drainage field will be above any standing groundwater *(see Guidance Note 6)?*	N/A	

7. **Available Land**	YES	NO
Is the application site plus any available area for a soakaway less than 0.025 hectares ($250m^2$)?	N/A	

8. **Siting of drainage field/soakaway discharge from a septic tank or package treatment plant or other secondary treatment.** *You may need to make local enquiries to get a full answer to these questions*.	YES	NO
Will it be at least **10m** from a watercourse, permeable drain or land drain?	N/A	
Will it be at least **50m** from any point of abstraction from the ground for a drinking water supply (e.g. well, borehole or spring)? *This includes your own or a neighbour's supply.*	N/A	
Will the discharge be within a groundwater Source Protection Zone 1? *If yes, you will need to apply for an environmental permit*	N/A	
Are there any drainage fields/soakaways within **50m**? *This includes any foul drainage discharge system (other than the subject of this application) or surface water soakaway on either your own or a neighbour's property.*	N/A	
Will it be at least **15m** from any building?	N/A	
Will there be any water supply pipes or underground services within the disposal system, other than those required by the system? *(For cesspools write N/A)*	N/A	
Will there be any access roads, driveways or paved areas within the disposal area? *(For cesspools write N/A)*	N/A	

9. **Siting of treatment plant, septic tank or cesspool**	YES	NO
Is it at least **7m** from the habitable part of a building?	x	
Will there be vehicular access for emptying within **30m?**	x	
Can the plant, tank or cesspool be maintained or emptied without the contents being taken through a dwelling or place of work?	x	

10.Expected flow

Please estimate the total flow in litres per day *(see Guidance Note 5).*	0 l/d most days. 90l/d for routine maintenance. as per flows and loads – 4, full time day staff.

11. General Binding Rules for Small Sewage Discharges	YES	NO
Does the system meet the requirements of the General Binding Rules for small sewage discharges?	x	

12. Maintenance

6 monthly inspections to determine when maintenance actions are required.

Maintenance requirements will vary subject to the extent of operation works required across the site.

13. Declaration

I declare that the above information is factually correct.

Name	Signature	Date
William Miskelly		16/04/2024

GUIDANCE NOTES:

1) This form is for use with *the National Planning Practice Guidance, British Standard BS6297:2007 and Building Regulations Approved Document H*. It is intended to help Local Planning Authorities establish basic information about your non-mains drainage system and decide whether you need to submit a more detailed site assessment. If a detailed site assessment is requested but not submitted, your planning application might be refused.

2) Where the distance from a site to the closest point of connection to the foul sewer is less than the number of properties that are proposed to be built on that site multiplied by 30m an Environmental Permit will be required and an applicant will need to demonstrate as part of any application for such a permit why connection to the public foul sewer is not feasible.

Number of domestic properties served by the sewage treatment system [1] x 30 metres = Answer [30] metres

3) In addition to Planning Permission and Building Regulation approval **you may also require an Environmental Permit from the Environment Agency (EA). Please note that the granting of Planning Permission or Building Regulation approval does not guarantee the granting of an Environmental Permit. Upon receipt of a correctly filled in application form the EA will carry out an assessment. It can take up to 4 months before the Agency is in a position to decide whether to grant a permit or not**.

4) The use of cesspools is an option of last resort as set out in the non-mains drainage hierarchy of preference in Building Regulations Approved Document H. In principle, a properly constructed and maintained cesspool, being essentially a holding tank with no discharges, should not lead to environmental, amenity or public health problems. However, in practice, it is known that such problems occur as a result of frequent overflows due to poor maintenance, irregular emptying, lack of suitable vehicular access for emptying and even through inadequate capacity. In addition to this the requirement for frequent emptying is usually carried out by a contractor involving road transport with associated environmental costs. For these reasons, the use of cesspools will not normally be considered to be a long-term foul

sewage disposal solution. In view of the environmental risks associated with their use, any proposal to use cesspools must be fully justified to the Local Planning Authority

5) Package treatment plants and septic tanks should be designed and sized according to the advice given in the current edition of Flows and Loads, published by British Water. Volumes for larger systems should be calculated based on expected flows arising from the development.

6) You should refer to Building Regulations Approved Document H2 with regard to the general requirements for construction of non mains sewerage systems. **Sections 1.33 to 1.38** deal with the test requirements for trial holes and percolation tests and for convenience the text of these sections is repeated below:

1.33 A trial hole should be dug to determine the position of the standing groundwater table. The trial hole should be a minimum of 1m^2 in area and 2m deep, or a minimum of 1.5m below the invert of the proposed drainage field pipework. The ground water table should not rise to within 1m of the invert level of the proposed effluent distribution pipes. If the test is carried out in summer, the likely winter groundwater levels should be considered. A percolation test should then be carried out to assess the further suitability of the proposed area.

1.34 Percolation test method – A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe. Where deep drains are necessary the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out. Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris.

1.35 Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.

1.36 Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (i.e. a depth of 150mm). Divide this time by 150mm. The answer gives the average time in seconds (Vp) required for the water to drop 1mm.

1.37 The test should be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.

1.38 Drainage field disposal should only be used when percolation tests indicate average values of V_p of between 12 and 100 and the preliminary site assessment report and trial hole tests have been favourable. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where V_p is outside these limits effective treatment is unlikely to take place in a drainage field. However, provided that an alternative form of secondary treatment is provided to treat the effluent from the septic tanks, it may still be possible to discharge the treated effluent to a soakaway.

N.B. When determining whether a discharge may be made under statutory General Binding Rules one of the requirements is that any drainage field must be designed and constructed in accordance with BS6297:2007. This specifies that the minimum percolation rate under that standard is 15s/mm and any discharge made to ground where the percolation rate is less than 15s/mm is subject to the granting of an Environmental Permit.

7) Developers may requisition a sewer from the Sewerage Undertaker to connect their development to the public sewer. Should this not be feasible on the grounds of cost and practicability, on site treatment in the form of package plants and their associated sewers (if constructed to an acceptable standard) can be offered to the sewerage undertaker for adoption. This approach is in support of advice from the Government contained in the National Planning Practice Guidance Developers are urged to discuss their requirements with the Sewerage Undertaker at the earliest possible opportunity.

8) Glossary

Package treatment plant
A package treatment plant is a system which offers varying degrees of biological sewage treatment and involves the production of an effluent which can be disposed of to ground via a drainage field or direct to a watercourse. There are many varieties of package treatment plant but all involve settling the solids before and/or after a biological treatment stage and almost all use electricity. Package treatment plants usually treat sewage to a higher standard than septic tanks but are vulnerable in the event of power failures and require more regular servicing and maintenance to ensure that they work effectively. The type of system chosen should be appropriate to the type of development proposed and take account of variations in flow and periods of inactivity, for example where the system will serve holiday accommodation where occupation and maintenance may be more irregular.

Septic tank
A septic tank is a two or three chamber system, which retains sewage from a property for sufficient time to allow the solids to form into sludge at the base of the tank, where it is partially broken down. The remaining liquid in the tank then drains from the tank by means of an outlet pipe.

Effluent from a septic tank is normally disposed of to ground via a drainage field and receives further treatment in the soils surrounding that drainage field, so that it does not generate a pollution risk to surface waters or groundwater resources (underground water). The most commonly used form of drainage field is a subsurface irrigation area, comprising a herringbone pattern of interconnecting dispersal pipes laid in shallow, shingle filled trenches. The dispersal pipes within the drainage field should be located at as shallow a depth as possible, usually within 1 metre of the ground surface. A septic tank typically needs to be desludged at least once a year in order to ensure that it continues to work effectively.

Cesspool
A cesspool is a covered watertight tank used for receiving and storing sewage and has no outlet. It relies on road transport for the removal of raw sewage and is therefore the least sustainable option for sewage disposal. It is essential that a cesspool is, and remains, impervious to the ingress of groundwater or surface water.