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ENVIRONMENT

Richborough Estates Limited
Brascote Lane, Newbold Verdon
Leicestershire
Sustainable Drainage Statement

www.bwbconsulting.com

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Richborough Estates Limited
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Sustainable Drainage Statement

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Cambridge
14-16 High Street, Histon, Cambridge
CB24 9JD
T: 01223 235 173

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street, Manchester, M1 3HU
0161 233 4260

Market Harborough
12a Woodcock House, Compass Point Market Harborough, Leicestershire, LE16 9HW
T: 01858 455020

Nottingham
Waterfront House, Station Street, Nottingham NG2 3DQ
T: 0115 924 1100

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1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Richborough Estates Limited in respect of a site located off Brascote Lane, Newbold Verdon. The report is intended to support an outline planning application for a proposed development predominantly comprised of residential development. Proposed plans are included as **Appendix 1**.

1.3 A Flood Risk Assessment (FRA) has been produced for the site (reference: BLN-BWB-ZZ-XX-RP-YE-0002_FRA) and this SDS accompanies this overarching document.

1.4 The site is currently comprised of an agricultural field and is therefore considered to be greenfield land. The site is located off Brascote Lane, immediately south of the residential setting of Newbold Verdon. Leicester city centre is located approximately 1.5km east of the site and the village of Newbold Verdon. Brascote Lane forms the western and southern boundaries of the site. The northern site boundary is bordered by the Thurlaston Brook which flows from east to west. The east of the site is surrounded by farmland.

1.5 Key site details are provided in **Table 1.1**, with the site location illustrated within **Figure 1.1**.

Table 1.1: Site Details

Site Name	Land off Brascote Lane
Location	Newbold Verdon
NGR (approx.)	SK 4468 0320
Application Site Area (ha)	14.2 (approx.)
Development Area (ha)	7.8 (approx.)
Development Type	Residential
Lead Local Flood Authority	Leicestershire County Council
Local Planning Authority	Hinckley and Bosworth Borough Council
Environment Agency Area	East Midlands
Sewerage Undertaker	Severn Trent Water

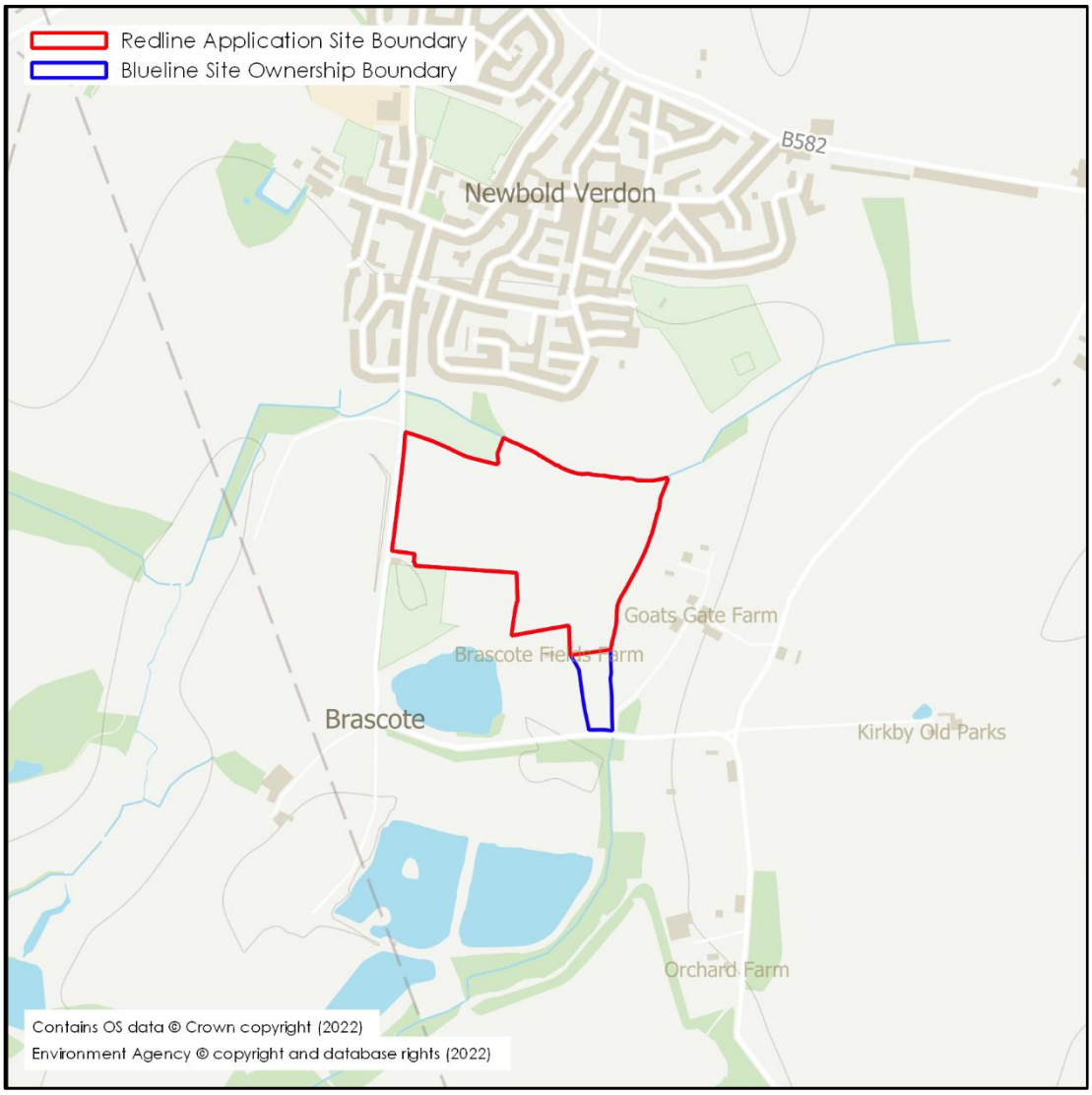


Figure 1.1: Site Location

Sustainable Drainage Guidance

1.6 Sustainable Drainage Systems (SuDS) aim to reduce the impact of development by replicating the natural runoff regime in a sustainable, cost effective manner whilst protecting water quality and reducing pollution. The four key objectives of SuDS design are to achieve improvements in water quantity, water quality, amenity provision and biodiversity.

1.7 Leicestershire County Council, in their role as the Lead Local Flood Authority (LLFA), have published an 'Interim LLFA Guidance Note: Planning and Development in Leicestershire' which serves an interim LLFA surface water and flood risk guidance prior to completion of more comprehensive guidance.

1.8 The guidance notes that calculations for attenuation requirements should allow for up to the 1 in 100 year return period plus the appropriate allowance for climate change.

1.9 Table 2 from the 'Flood risk assessments: climate change allowances'[1], included as **Table 1.2**, shows anticipated changes in extreme rainfall intensity in small and urban catchments. Therefore a 40% climate change allowance should be adopted.

Table 1.2: Peak Rainfall Intensity Allowance in Small and Urban Catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

1.10 The local guidance also notes that where applicable, the impacts of 'urban creep' should be included and a 10% increase in the impermeable area should be included within the storage calculations.

1.11 In addition to the LLFA guidance, the Non-Statutory Technical Standards for Sustainable Drainage Systems[2] as published by DEFRA and The SuDS Manual[3] have been utilised to inform the strategy.

[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[2] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems
[3] The SuDS Manual (CIRIA, 2015)

2. EXISTING CONDITIONS

2.1 A topographical survey of the site has been undertaken and is included as **Appendix 2**. Ground levels generally fall from south to north. Levels across the southern perimeter of the site boundary range between 128m Above Ordnance Datum (AOD) and 130mAOD. The levels then fall towards the Thurlaston Brook which forms the northern perimeter of the site boundary. Levels along the northern boundary generally range between 123mAOD and 125mAOD. In the wider area, levels to the north are also seen to drain towards the Thurlaston Brook.

2.2 Severn Trent Water (STW) sewer records, included as **Appendix 3**, show the nearest public assets to be located within Brascote Lane, to the north west of the site. A 375mm and 300mm public foul water sewer flow in a southerly and then westerly direction towards a sewerage treatment works (Newbold Verdon STW).

2.3 The accompanying FRA shows that the site is at a low risk of flooding from fluvial and pluvial sources. The site is located entirely within Flood Zone 1, however the Thurlaston Brook, which is located adjacent to the northern site boundary, has not been represented on the EA's Flood Map for Planning and therefore a hydraulic modelling study has been completed by BWB Consulting to provide a detailed understanding of fluvial flooding at the site. The proposed plots are shown to remain wholly unaffected during all modelled events.

2.4 A pluvial flow route is shown to be present along the northern site boundary, associated with the Thurlaston Brook. There are also two small areas of localised ponding within the site with depths in these areas predicated to remain below 300mm. No development is proposed in these locations and all residential plots are shown to remain unaffected for all surface water events.

2.5 British Geological Survey (BGS) mapping shows the site to be underlain by Gunthorpe Member (Mudstone), which is designated by the EA as a Secondary B Aquifer. Secondary B Aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

2.6 Superficial Deposits of Glaciofluvial deposits (Sand and Gravel), Oadby Member deposits (Diamicton) and Alluvium deposits (Clay, Silt, Sand and Gravel) have been recorded across the site. The superficial deposits are designated as Secondary A Aquifers and Secondary (undifferentiated) Aquifers. Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers and Secondary (undifferentiated) Aquifers are assigned in cases where it has not been possible to attribute either category A or B to a rock type.

2.7 The Hinckley and Bosworth Borough Council Strategic Flood Risk Assessment[4] (SFRA) includes mapping of Areas Susceptible to Groundwater Flooding. The site is located

[4] Level 1 Strategic Flood Risk Assessment (JBA Consulting, July 2019)

within an area considered to be at a 50-75% susceptibility to groundwater flooding. The FRA identifies that risk of flooding at the site, posed by groundwater is moderate.

2.8 Given the greenfield nature of the site, it is likely that the existing drainage regime initially consists of infiltration into the ground, followed by rapid surface water runoff which will follow the existing topography and flow towards the Thurlaston Brook when infiltration potential is exceeded.

Existing Runoff Rates

2.9 An assessment of the existing surface water runoff rates from the approximate developable area (7.8ha) has been undertaken and is summarised within **Table 2.1**. Calculations are included within **Appendix 4**.

2.10 The runoff rates have been estimated using the IH124 method, with appropriate prorated adjustments for a site of less than 50ha, as recommended in Interim Code of Practice for Sustainable Drainage[5]. This was undertaken within Micro Drainage, which makes the necessary adjustments for small sites automatically.

Table 2.1: Existing Runoff Rate from the Site

Return Period (Yrs.)	Runoff Rate (l/s)
1	28.4
Mean Annual Flow Rate (QBAR)	34.3
30	67.1
100	88.1

Existing Runoff Volume

2.11 An assessment of the existing surface water runoff rates from the development area has been made for a 1 in 100-year, 6 hour storm.

2.12 As the existing site is permeable, the runoff volume has been calculated using the Source Control module within Micro Drainage to be 2054m^3, results are included within **Appendix 4**.

[5] The National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage

3. SURFACE WATER DRAINAGE STRATEGY

3.1 The site has an approximate total area of 14.2ha. The proposed approximate development area of 7.8ha has been measured from the masterplan, included as **Appendix 1**. A conservative 65% of the measured development area is assumed to be impermeable (5.0ha) and a 10% increase to the proposed impermeable area will be applied to account for urban creep (5.5ha).

3.2 The site has been divided into two catchments based upon topography and development aspirations. Details of the catchments are presented in **Table 3.1**.

Table 3.1: Catchment Details

Catchment	Developable Area (ha)	Impermeable Area (ha)	Impermeable Area + 10% Urban Creep (ha)
1	5.3	3.4	3.7
2	2.5	1.6	1.8
Total	**7.8**	**5.0**	**5.5**

Drainage Hierarchy

3.3 The Planning Policy Guidance[6] and the SuDS Manual identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);
ii. to a surface water body;
iii. to a surface water sewer, highway drain, or another drainage system;
iv. to a combined sewer.

3.4 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

3.5 It is assumed, based on the underlying mudstone bedrock, that infiltration is unlikely to be feasible for the majority of the site. A Phase 1 Desk Study Report carried out by PJS Geotechnical Engineers in October 2021 (reference: PJSG21-47-RT-01) notes that the underlying geology would suggest that the site is likely to be unsuitable for soakaway drainage if mudstone bedrock is encountered at shallow depth.

[6] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.

3.6 Due to the close proximity of the Thurlaston Brook, it is proposed to discharge surface water from the site to this watercourse. Given the existing topography, a gravity connection to the watercourse is considered to be viable, mimicking the pre-development conditions.

3.7 As the scheme progresses, it is recommended that infiltration testing is undertaken within the site in accordance with BRE365 Digest Guidance. If infiltration is found to be a suitable method of discharging surface water from the development, this strategy should be revised in accordance with the above hierarchy.

Peak Flow Control

3.8 In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[7], runoff from greenfield developments should not exceed the equivalent greenfield rates for the 1 and 100-year return period events.

3.9 To comply with the peak flow control criterion, it is proposed to restrict the 1 in 1-year discharge rate from the development to the receiving watercourse at the equivalent greenfield 1 in 1-year rate. All other rainfall events will be restricted to the equivalent greenfield QBAR rate up to the 1 in 100-year plus climate change event. This is summarised within **Table 3.2**.

Table 3.2: Existing & Proposed Runoff Rates

Return Period (Yr.)	Existing Runoff Rate (l/s)	Proposed Discharge Rate (l/s)
1	28.4	28.4
QBAR	34.3	34.3
30	67.1	
100	88.1	
100 + 40%	-	

3.10 The proposed discharge rate has been pro-rated between the two catchments and is detailed within **Table 3.3**.

Table 3.3: Proposed Runoff Rates per Catchment

Catchment	QBAR Greenfield Discharge Rate (l/s)
1	23.3
2	11.0
Total	**34.3**

[7] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Attenuated Storage

3.11 As the development proposals require a restricted runoff rate, it will be necessary to provide attenuated storage to balance the excess volume in a safe manner within the site.

3.12 The surface water storage should be located within the site in a position where it can receive runoff from the development and discharge from the site by gravity, and also in a position where it is hydraulically isolated from any fluvial floodplain or external surface water floodplain/overland flow route that may be present in the site.

3.13 Sufficient storage for events up to the 1 in 100-year storm with a 40% allowance for climate change should be provided, and a 10% allowance should be applied to the current proposed development area to allow for urban creep over the lifetime of the development, in line with Leicestershire County Council's local guidance.

3.14 After considering the site constraints and development aspirations it is suggested that the necessary surface water storage volumes are found within a series of detention basins located at the lowest elevations of the site.

3.15 For the purpose of this outline assessment, it has been assumed that the basins will accommodate all of the necessary storage, but it may be possible to redistribute a portion of the storage within other drainage components during the detailed design of the development (e.g.: in the pipe network, swales, filter drains, etc).

3.16 A simulation has been run using Micro Drainage 'Source Control' to identify the necessary storage provision. Using a restriction, as detailed within **Table 3.3,** the volume of attenuated storage required for the development has been calculated for storm events up to the 100-year + 40% storm. The results are summarised in **Table 3.4** and calculations are included as **Appendix 5**.

Table 3.4: Outline Attenuated Storage Requirements

Rainfall Method	Critical Storm	Maximum Volume (m^3)
Catchment 1		
FSR	600 min Winter	2,449.0
FEH	720 min Winter	2,715.5
Catchment 2		
FSR	600 min Winter	1192.1
FEH	720 min Winter	1,314.8

3.17 Based on the above calculations, it is estimated that a minimum of 4,030.3m^3 of attenuation is required within the development. It is envisaged that the final required attenuated storage volume will be determined during the detailed design stage, once the development layout and drainage areas are fixed.

Runoff Volume Control

3.18 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[8] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6 hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

i. The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2l/s/ha or less. Or,

ii. All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,

iii. All the runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

3.19 An estimate of the post-development runoff volume from the 1 in 100-year 6 hour storm can be derived from the Micro Drainage calculations, included as **Appendix 5**. The existing and post-development runoff volumes are compared within **Table 3.5**.

Table 3.5: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3)
2,054	2,573	+519

3.20 The 1 in 100-year 6 hour storm runoff volume from the site has been shown to increase as a result of the proposed development. However, as the runoff volume from the development will be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions, the volume control criteria will be met.

Long Term Storage

3.21 It is proposed to discharge the runoff from the development at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions. Therefore, provision for long term storage is not required.

[8] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Sustainable Drainage Systems

3.22 Surface water runoff will be stored within a series of detention basins located within the centre of the site and to the north of the site. The basins have been designed to be 1m deep with a 300mm freeboard in the 1 in 100-year + 40% event. The ultimate outfall for the basins is Thurlaston Brook located along the northern boundary of the site. Water will discharge at a controlled rate via a vortex flow control.

3.23 Tree pits and a green corridor featuring a swale has been incorporated into the drainage design. This will improve the amenity and ecological value of the development, also providing treatment prior to discharge.

3.24 The detention basins should be appropriately planted to provide a primary level of treatment through filtration. Further levels of treatment could also be provided in the form of rain gardens, permeable paving or similar. It is envisaged that the treatment stages will be determined during the detailed design stage once the development layout and drainage areas are fixed.

3.25 Where possible, the swales and detention basins should be unlined to allow for any residual infiltration. The viability of having unlined swales and detention basins will be confirmed following seasonal groundwater monitoring within the proposed development site.

3.26 The interception volume (defined as the first 5mm of most of the majority of all rainfall events) of 275m^3 shall be contained within the storage provided to prevent contamination from high level pollutant concentrations.

3.27 An Illustrative Drainage Strategy is included as **Appendix 6** (reference: BLN-BWB-ZZ-XX-DR-CD-0001) and demonstrates how the required storage volume can be achieved within the site boundary.

Residual Risk and Designing for Exceedance

3.28 It is recommended that the final layout uses the proposed road infrastructure to provide drainage exceedance (overland flood flow) routes through the development and towards the basins for events in excess of the capacity of the drainage system.

3.29 If the capacity of the attenuated storage is exceeded, ground levels should be profiled to direct overland flows towards the north towards Thurlaston Brook.

3.30 In addition to the volume of storage provided within the main attenuation, there will be capacity within upstream pipes, manholes and additional SuDS features which has not been accounted for at this stage and a further level of redundancy to the network will therefore be provided.

3.31 A 300mm freeboard has been provided in the 1 in 100 year plus 40% climate change scenario.

4. FOUL WATER DRAINAGE

4.1 It is proposed to drain used water from the development separately to surface water. As the site is currently undeveloped, a new connection will be required. It is therefore proposed that foul water from the development will outfall to the existing STW public sewer network at the closest connection point available.

4.2 The nearest adopted gravity foul sewer is a 375mm asset located within a grass verge near Brascote Lane at manhole reference 4309. A Pre-Development Enquiry was submitted to STW and is included as **Appendix 7**. STW have confirmed that it will be necessary to undertake a hydraulic assessment of the site to understand the impact on the receiving Sewerage Treatment Works.

4.3 A review of existing ground levels suggests that a gravity connection to this sewer for the whole site is not possible. Therefore, to connect into this sewer, a foul pumping station will be required. A foul pumping station should be in the lowest developable area of the site to achieve a gravity connection from the site to the pumping station.

4.4 Based on the size of the development, it is anticipated that the pumping station will be a 'Type 3' pumping station, as outlined within the DCG. Type 3 pumping stations have typical compound dimensions of 8m x 12m and require to be accessed by an adoptable highway. Type 3 pumping stations require a 15m easement between the compound's wet well and the nearest habitable building.

4.5 The suggested pumping station location and connection point is shown on the Illustrative Drainage Strategy included as **Appendix 6.**

4.6 A S106 (Water Industry Act 1991) application should be made to STW for approval prior to a connection being made.

5. MAINTENANCE

5.1 The proposed drainage system should be designed in accordance with the Design and Construction Guidance (DCG) and be offered up for adoption to STW. If any parts of the drainage network remain unadopted, or until the point that they are, an appropriate maintenance company should be appointed. Any drainage features within private curtilage will be the responsibility of the homeowner.

5.2 Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site and should be undertaken by the site management. Any specialist or proprietary products that are specified at detailed design should have a manufacturer specific maintenance regime which should be included within the document.

5.3 It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below.

i. All drainage features should be located in open areas which are readily accessible.
ii. Gullies should be inspected and de-silted at least once a year, where necessary.
iii. Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
iv. If permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
v. The surface water attenuation areas will be predominantly dry and the base will be seeded with a wildflower grass seed mix that can tolerate wet ground conditions.
vi. Regular inspections of the attenuation basin should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary. Inlet and outlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.
vii. Vegetation/grass with the attenuation basin should be maintained appropriately to allow establishment and promote habitat formation, without impeding the operation of the inlet and outlet structure.
viii. Flow controls should be inspected every 6 months, litter/debris and silt build up should be removed as necessary.

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2 This SDS is intended to support an outline planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Table 6.1: Sustainable Drainage Statement Summary

		Existing Site	Proposed Development
Site Area (ha)		14.2	
Impermeable Area (ha)		-	5.5
Outfall Location		Infiltration/Watercourse	Watercourse
Peak Runoff Rate (l/s)	**QBAR**	34.3	34.3
	1 in 30-Year	67.1	
	1 in 100-Year	88.1	
	1 in 100-Year + CC	-	
Runoff Volume (100yr RP 6 hour Storm)		2,054m^3	2,573 m^3
Volume Control		-	Discharge rate limited to QBAR
Proposed Storage Volume		-	4030.3m^3
Interception Volume		-	275m^3
Flow Control Type		-	Vortex
SuDS Features		-	Detention Basin Swales Tree Pits
Maintenance Responsibility		-	Management Company/Sewerage Company

6.3 It is envisaged that the final drainage strategy will be determined during the detailed design stage, as the development layout is finalised.

APPENDICES

Appendix 1: Proposed Masterplan

Key

- Application site boundary
- Other land under control of applicant
- Existing (retained) trees & hedgerow
- Proposed tree/hedge removal
- Indicative proposed planting
- Potential for fruit-tree planting
- Areas of new publicly-accessible open space
- Potential for equipped area of children's play (with min 20m development offset shown)
- Potential for children's play ar and/or event along a trim-trai (with min 5m development offset shown)
- Indicative marginal wildflower and grassland planting
- Indicative surface water attenuation basin
- Existing Public Right of Way
- Proposed pedestrian/cycle routes
- Proposed vehicular access from Brascote Lane
- Visual link with the spire of The Church of St. James
- Potential for improvements at Windmill pub
- Indicative dwellings (and associated garages)

Richborough Estates

nineteen47
CHARTERED TOWN PLANNERS & URBAN DESIGNERS

Project
Brascote Lane, Newbold Verdon

Drawing Title
Illustrative Layout

Project Code	Drawing Nr	Rev
n1741	006	A

Date	Drawing Scale
16.02.2022	1:1,250 @ A1

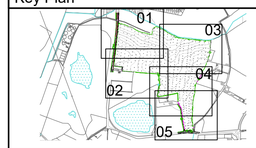
Appendix 2: Topographical Survey

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	444426.770	303328.244	122.988
BWB02	444421.393	303216.789	127.180
BWB03	444415.262	303163.558	128.736

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
0.25 / 1 — Flow direction and pipe diameter
Station and Name
BH 1 — Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 — Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
		Gas	Gas	TL	Traffic Light
DK	Drop Kerb	GV	Gas Valve	TP	Telegraph Post
DP	Down Pipe	GY	Gully	TS	Traffic Signal
Elec	Electric	Ht	Height	UTS	Unable to Survey
EP	Electricity Post	IC	Inspection Chamber	WL	Water Level
ER	Earth Rod	IFL	Internal Floor Level	WM	Water Meter
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev
P2	08.07.21	First Issue	SDS	Ds

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Client
Richborough Estates Ltd

Project Title
Brascote Lane
Newbold Verdon

Drawing Title
Existing Site 2D Plan
Sheet 1 of 5

Drawn:	S.D.Shreeves	Reviewed:	D.Smith
BWB Ref:	BMW3175	Date: 08.07.21	Scale@A1: 1:500

Drawing Status
PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
BLN-BWB-00-01-DR-G-001	S2	P1

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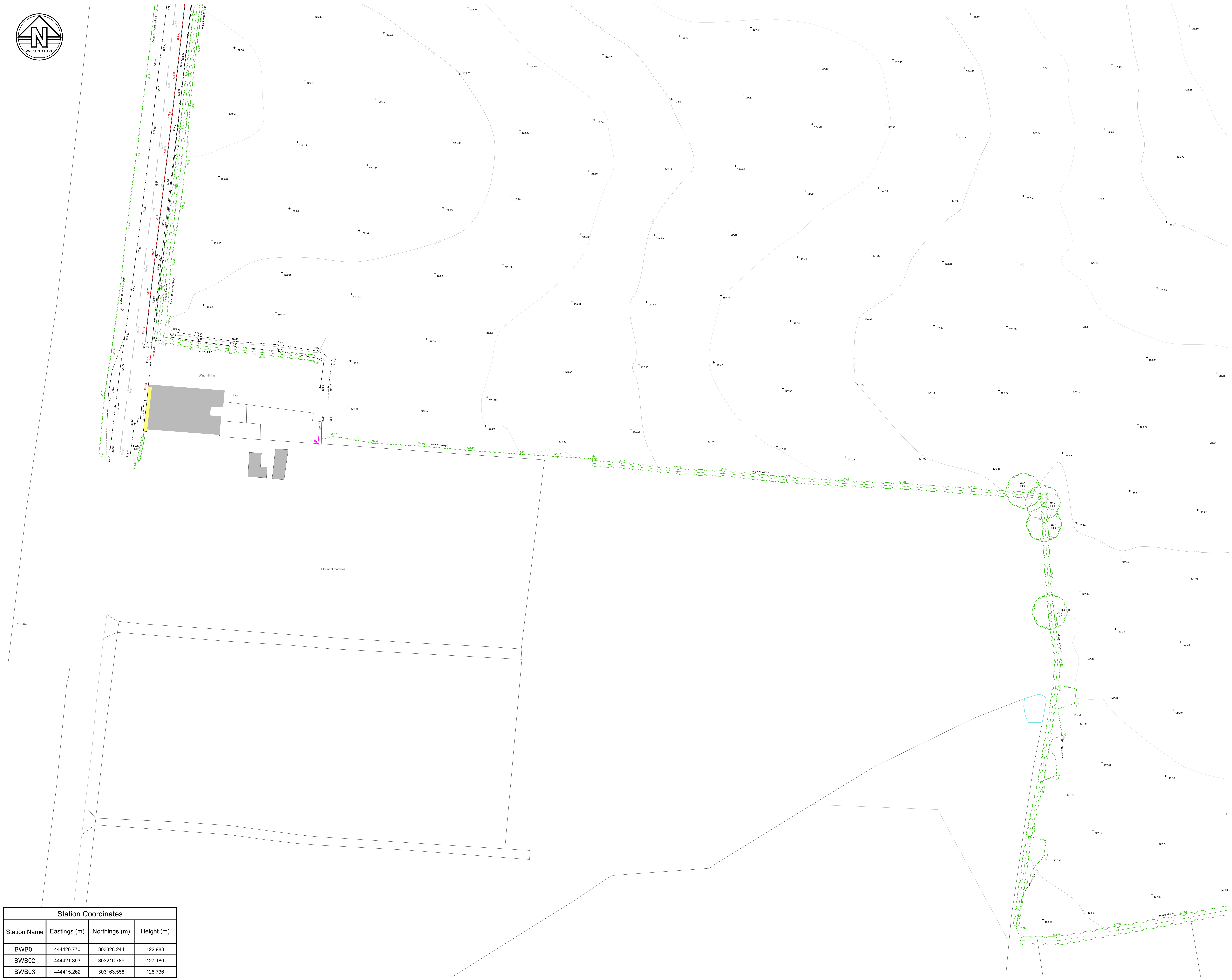

Station Coordinates

Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	444426.770	303328.244	122.988
BWB02	444421.393	303216.789	127.180
BWB03	444415.262	303163.558	128.736

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Notes

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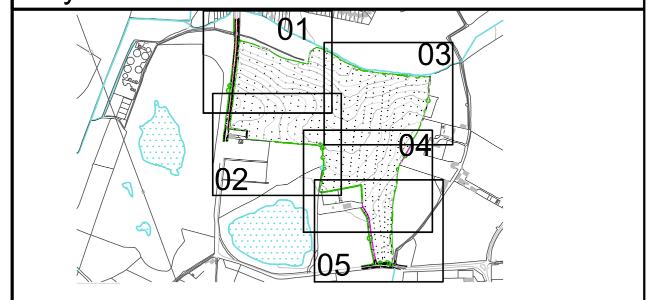
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
1 Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
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		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
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Elec	Electric	Ht	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	08.07.21	First Issue	SDS	Ds

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Client
Richborough Estates Ltd

Project Title
Brascote Lane Newbold Verdon

Drawing Title
Existing Site 2D Plan Sheet 2 of 5

Drawn:	S.D.Shreeves	Reviewed:	D.Smith
BWB Ref:	BMW3175	Date:	08.07.21
Scale@A1:	1:500		

Drawing Status
PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
BLN-BWB-00-02-DR-G-001	S2	P1

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	444426.770	303328.244	122.988
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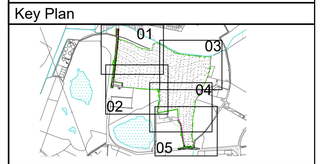

Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
0.25 / 1 — Flow direction and pipe diameter
Station and Name
BH 1 — Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 — Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
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Rev	Date	Details of issue / revision	Drw	Rev
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Project Title

Brascote Lane
Newbold Verdon

Drawing Title

Existing Site 2D Plan
Sheet 3 of 5

Drawn:	S.D.Shreeves		Reviewed:	D.Smith	
BWB Ref:	BMW3175	Date:	08.07.21	Scale@A1:	1:500

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
BLN-BWB-00-03-DR-G-001	**S2**	**P1**

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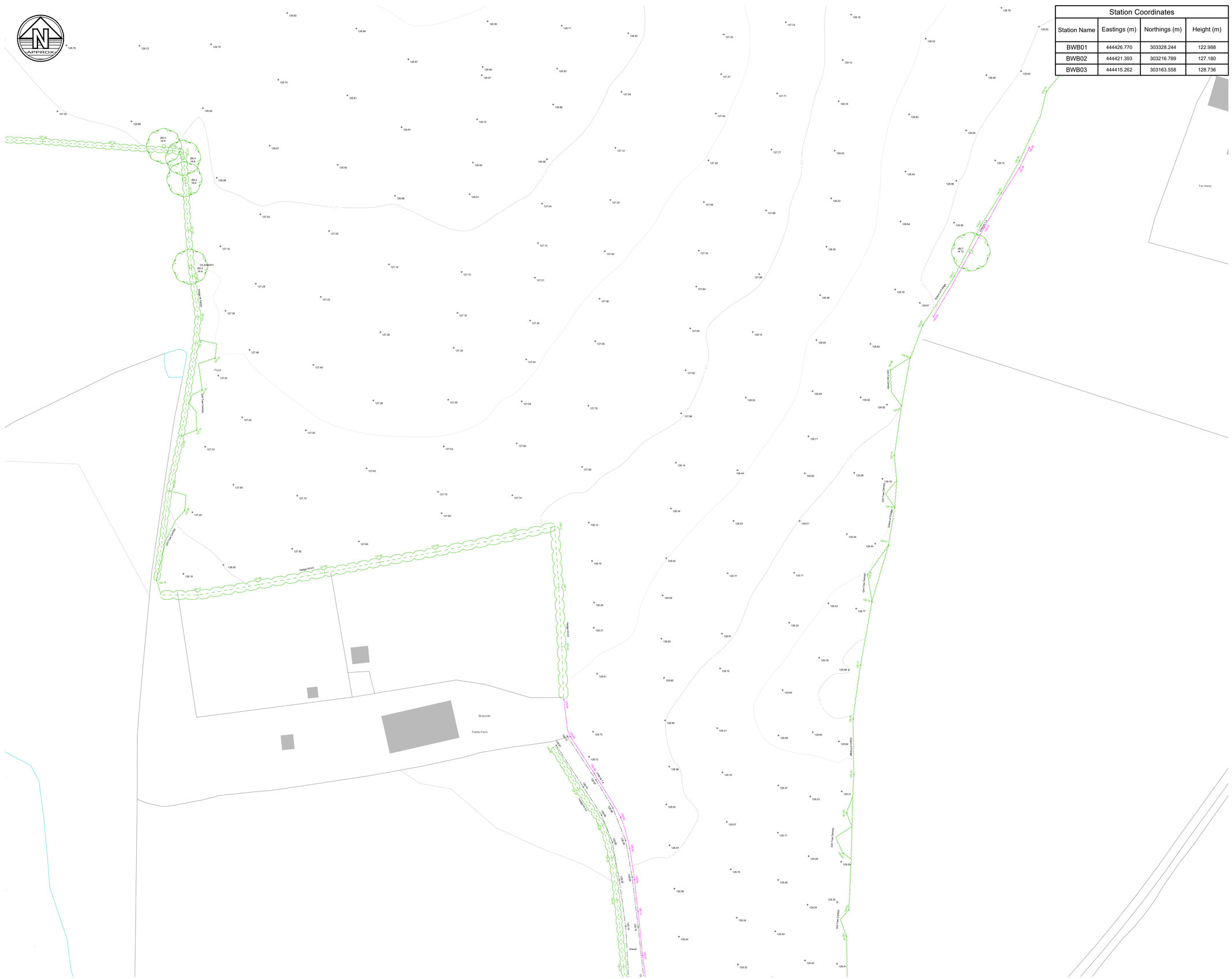

Station Coordinates

Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	444426.770	303328.244	122.988
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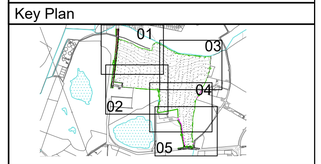

Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
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0.25 / 1 — Flow direction and pipe diameter
Station and Name
BH 1 — Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
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Assumed Surface Water Drainage Line
Surface Water Drainage Line

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Rev	Date	Details of issue / revision	Drw	Rev
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Client

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Project Title

Brascote Lane
Newbold Verdon

Drawing Title

Existing Site 2D Plan
Sheet 4 of 5

Drawn:	S.D.Shreeves	Reviewed:	D.Smith		
BWB Ref:	BMW3175	Date:	08.07.21	Scale@A1:	1:500

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
BLN-BWB-00-04-DR-G-001	**S2**	**P1**

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Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
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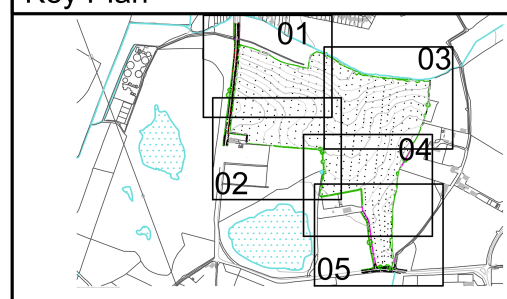

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
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- Flow direction and pipe diameter (0.25)
- Station and Name (1)
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- Tree / Bush / Sapling
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- Spot Level (50.00)
- Assumed Surface Water Drainage Line
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Client
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Project Title
Brascote Lane Newbold Verdon

Drawing Title
Existing Site 2D Plan Sheet 5 of 5

Drawn:	S.D.Shreeves	Reviewed:	D.Smith		
BWB Ref:	BMW3175	Date:	08.07.21	Scale@A1:	1:500

Drawing Status
PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
BLN-BWB-00-05-DR-G-001	S2	P1

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Appendix 3: Severn Trent Water Sewer Records

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Date: 10/05/21

Scale: 1:1250

Map Centre: 444474,303030

Data updated: 14/04/21

Our Ref: 554856 - 3

Wastewater Plan A0

Do not scale off this Map. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011. Transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. Some of these assets may not be shown on our records. Information about these assets may be available from the previous owner or the current owner or ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not ostensis complete records of these assets. These assets may not be displayed on the map. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

Newbold Verdon

SEVERN TRENT

SEVERN
TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0401	F		0	0
2201	F		0	0
3201	F		0	0
3302	F		0	0
3303	F		0	0
3404	F		0	0
3405	F		0	0
3501	F		0	0
4300	F		0	0
4301	F		0	0
4302	F		0	0
4303	F		0	0
4307	F		0	0
4309	F		0	0
4310	F		0	0
4400	F		0	0
4401	F	129.12	127.1	2.02
4402	F	129.1	127.94	1.1
3201	F	122.23	121.37	0.86
3302	F	123.33	0	0
3303	F	122.52	121.51	1.01
3404	F		0	0
3405	F	123.45	122.66	0.79
3501	F	125.97	124.98	1.19
4300	F	124.36	122.65	1.71
4301	F	123.28	121.92	1.36
4302	F	122.83	122.09	0.74
4303	F	123.05	121.96	1.09
4307	F	123.56	121.54	2.02
4309	F	122.87	121.76	1.11
4310	F	122.85	121.76	1.09
4400	F		0	0
4401	F	126.01	124.19	1.82
4402	F	123.88	122.23	1.65
4502	F	128.1	125.81	2.29
5303	F	124.36	123.26	1.1
5305	F	123.96	123.12	0.84
5306	F	124.28	122.92	1.36
5400	F		0	0
5403	F		0	0
5404	F		0	0
5405	F		0	0
5406	F	125.1	122.76	2.34
6300	F	124.53	123.06	1.47
6302	F		0	0
6303	F		0	0
6404	F	124.77	123.56	1.21
7301	F		0	0
7302	F	127.19	125.6	1.59
7305	F	126.8	124.84	1.96
7401	F	129.57	128.31	1.26
7403	F	128.79	125.39	3.39
7404	F	129.51	127.26	2.25
7501	F	129.55	127.8	1.75
7507	F	129.74	128.27	1.47
8301	F	128.72	125.94	2.78
9301	F	129.77	126.64	3.13
7201	S	129.13	127.93	1.2
3401	S	125.78	123.98	1.8
3402	S	124.76	122.86	1.9
3403	S	123.85	122.26	1.59
3504	S	126.64	124.87	1.77
4304	S	123.49	121.59	1.9
4305	S	0	0	0
4403	S	124.48	123.89	0.59
4405	S	127.29	126.01	1.28
5301	S	124.46	122.58	1.88
5401	S	128.83	127.87	0.96
5402	S	126.81	125.08	1.73
6301	S	125.32	123.11	2.21
6401	S	126.28	123.65	2.63
6402	S		0	0
6403	S	126.03	123.54	2.49
6405	S	127.38	0	0
6406	S	127.56	0	0
6407	S	127.54	124.28	3.26
6500	S	127.29	0	0
6505	S	127.54	125.85	1.69
7303	S	127.09	125.58	1.51
7304	S	126.83	124.59	2.24
7402	S	129.6	127.91	1.69
7405	S	128.49	126.76	1.43
7504	S	129.85	127.81	2.04
8401	S	130.03	128.44	1.59
8402	S	128.93	126.34	2.59

Appendix 4: Existing Runoff Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	7.800	Urban	0.000
SAAR (mm)	700	Region Number	Region 4

Results	**l/s**
QBAR Rural	34.3
QBAR Urban	34.3
Q1 year	28.4
Q1 year	28.4
Q30 years	67.1
Q100 years	88.1

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Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	1999
Site Location	GB 443900 302500 SK 43900 02500
C (1km)	-0.028
D1 (1km)	0.361
D2 (1km)	0.333
D3 (1km)	0.293
E (1km)	0.309
F (1km)	2.371
Areal Reduction Factor	1.00
Area (ha)	7.800
SAAR (mm)	650
CWI	96.000
SPR Host	40.150
URBEXT (1990)	0.0848

Results

Percentage Runoff (%)	39.15
Greenfield Runoff Volume (m^3)	2053.629

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Appendix 5: Proposed Storage Volumes

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.329	0.329	23.3	1224.8	O K
30 min Summer	99.382	0.382	23.3	1429.3	O K
60 min Summer	99.440	0.440	23.3	1657.0	O K
120 min Summer	99.501	0.501	23.3	1898.9	O K
180 min Summer	99.536	0.536	23.3	2039.1	O K
240 min Summer	99.559	0.559	23.3	2132.4	O K
360 min Summer	99.587	0.587	23.3	2246.4	O K
480 min Summer	99.601	0.601	23.3	2306.3	O K
600 min Summer	99.608	0.608	23.3	2334.4	O K
720 min Summer	99.610	0.610	23.3	2341.2	O K
960 min Summer	99.600	0.600	23.3	2300.5	O K
1440 min Summer	99.578	0.578	23.3	2212.8	O K
2160 min Summer	99.543	0.543	23.3	2069.5	O K
2880 min Summer	99.506	0.506	23.3	1921.0	O K
4320 min Summer	99.424	0.424	23.3	1594.9	O K
5760 min Summer	99.354	0.354	23.3	1320.8	O K
7200 min Summer	99.296	0.296	23.3	1096.3	O K
8640 min Summer	99.249	0.249	23.1	918.0	O K
10080 min Summer	99.213	0.213	22.9	779.5	O K
15 min Winter	99.368	0.368	23.3	1374.3	O K
30 min Winter	99.427	0.427	23.3	1604.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	180.066	0.0	1198.2	26
30 min Summer	105.754	0.0	1380.8	41
60 min Summer	62.111	0.0	1721.8	70
120 min Summer	36.478	0.0	2022.7	130
180 min Summer	26.720	0.0	2222.6	188
240 min Summer	21.424	0.0	2376.4	248
360 min Summer	15.693	0.0	2611.1	366
480 min Summer	12.583	0.0	2773.6	484
600 min Summer	10.601	0.0	2899.3	602
720 min Summer	9.217	0.0	3001.8	720
960 min Summer	7.331	0.0	3136.2	838
1440 min Summer	5.309	0.0	3271.7	1080
2160 min Summer	3.845	0.0	3838.9	1472
2880 min Summer	3.058	0.0	4071.5	1876
4320 min Summer	2.179	0.0	4352.0	2648
5760 min Summer	1.713	0.0	4562.3	3408
7200 min Summer	1.422	0.0	4732.5	4112
8640 min Summer	1.221	0.0	4877.0	4840
10080 min Summer	1.073	0.0	5002.0	5456
15 min Winter	180.066	0.0	1325.6	26
30 min Winter	105.754	0.0	1521.2	41

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.492	0.492	23.3	1862.9	O K
120 min Winter	99.561	0.561	23.3	2140.4	O K
180 min Winter	99.601	0.601	23.3	2304.4	O K
240 min Winter	99.628	0.628	23.3	2416.4	O K
360 min Winter	99.662	0.662	23.3	2559.4	O K
480 min Winter	99.682	0.682	23.3	2642.5	O K
600 min Winter	99.694	0.694	23.3	2690.6	O K
720 min Winter	99.700	0.700	23.3	2715.5	O K
960 min Winter	99.693	0.693	23.3	2688.8	O K
1440 min Winter	99.660	0.660	23.3	2550.5	O K
2160 min Winter	99.611	0.611	23.3	2346.6	O K
2880 min Winter	99.556	0.556	23.3	2123.8	O K
4320 min Winter	99.435	0.435	23.3	1636.5	O K
5760 min Winter	99.331	0.331	23.3	1232.4	O K
7200 min Winter	99.251	0.251	23.1	924.1	O K
8640 min Winter	99.194	0.194	22.7	708.2	O K
10080 min Winter	99.161	0.161	21.7	587.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	62.111	0.0	1928.6	70
120 min Winter	36.478	0.0	2265.5	128
180 min Winter	26.720	0.0	2489.7	184
240 min Winter	21.424	0.0	2661.7	242
360 min Winter	15.693	0.0	2895.5	360
480 min Winter	12.583	0.0	3063.2	474
600 min Winter	10.601	0.0	3191.0	590
720 min Winter	9.217	0.0	3289.3	702
960 min Winter	7.331	0.0	3400.7	922
1440 min Winter	5.309	0.0	3426.5	1182
2160 min Winter	3.845	0.0	4300.1	1608
2880 min Winter	3.058	0.0	4560.5	2052
4320 min Winter	2.179	0.0	4874.4	2860
5760 min Winter	1.713	0.0	5112.4	3624
7200 min Winter	1.422	0.0	5300.6	4264
8640 min Winter	1.221	0.0	5462.0	4920
10080 min Winter	1.073	0.0	5602.7	5448

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 443900 302500 SK 43900 02500
C (1km)	-0.028
D1 (1km)	0.361
D2 (1km)	0.333
D3 (1km)	0.293
E (1km)	0.309
F (1km)	2.371
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 3.700

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	1.233	4	8	1.233	8	12	1.233

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3575.7	1.000	4473.9

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0212-2330-1050-2330
Design Head (m)	1.050
Design Flow (l/s)	23.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	212
Invert Level (m)	98.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	23.3
Flush-Flo™	0.361	23.3
Kick-Flo®	0.757	19.9
Mean Flow over Head Range	-	19.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.2	1.200	24.8	3.000	38.5	7.000	58.1
0.200	20.5	1.400	26.7	3.500	41.5	7.500	60.1
0.300	23.1	1.600	28.5	4.000	44.3	8.000	62.0
0.400	23.2	1.800	30.2	4.500	46.9	8.500	63.8
0.500	22.9	2.000	31.7	5.000	49.3	9.000	65.6
0.600	22.3	2.200	33.2	5.500	51.7	9.500	67.4
0.800	20.5	2.400	34.6	6.000	53.9		
1.000	22.8	2.600	36.0	6.500	56.0		

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.283	0.283	23.2	945.6	O K
30 min Summer	99.366	0.366	23.3	1234.3	O K
60 min Summer	99.447	0.447	23.3	1523.4	O K
120 min Summer	99.522	0.522	23.3	1792.4	O K
180 min Summer	99.558	0.558	23.3	1925.9	O K
240 min Summer	99.578	0.578	23.3	2000.5	O K
360 min Summer	99.600	0.600	23.3	2082.2	O K
480 min Summer	99.609	0.609	23.3	2114.7	O K
600 min Summer	99.610	0.610	23.3	2117.7	O K
720 min Summer	99.605	0.605	23.3	2101.6	O K
960 min Summer	99.594	0.594	23.3	2058.2	O K
1440 min Summer	99.568	0.568	23.3	1961.8	O K
2160 min Summer	99.525	0.525	23.3	1805.4	O K
2880 min Summer	99.482	0.482	23.3	1648.8	O K
4320 min Summer	99.401	0.401	23.3	1359.4	O K
5760 min Summer	99.332	0.332	23.3	1114.7	O K
7200 min Summer	99.275	0.275	23.2	917.0	O K
8640 min Summer	99.231	0.231	23.0	764.6	O K
10080 min Summer	99.196	0.196	22.7	648.1	O K
15 min Winter	99.317	0.317	23.3	1061.4	O K
30 min Winter	99.409	0.409	23.3	1386.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.667	0.0	962.8	26
30 min Summer	91.679	0.0	1231.9	41
60 min Summer	57.296	0.0	1588.3	70
120 min Summer	34.570	0.0	1917.1	128
180 min Summer	25.370	0.0	2110.5	188
240 min Summer	20.243	0.0	2245.4	246
360 min Summer	14.710	0.0	2447.5	364
480 min Summer	11.721	0.0	2600.4	484
600 min Summer	9.820	0.0	2719.3	602
720 min Summer	8.495	0.0	2808.0	706
960 min Summer	6.752	0.0	2944.8	806
1440 min Summer	4.878	0.0	3108.8	1044
2160 min Summer	3.518	0.0	3512.8	1448
2880 min Summer	2.787	0.0	3711.0	1848
4320 min Summer	2.005	0.0	4003.6	2636
5760 min Summer	1.585	0.0	4221.2	3352
7200 min Summer	1.320	0.0	4395.7	4048
8640 min Summer	1.137	0.0	4541.3	4760
10080 min Summer	1.002	0.0	4668.1	5448
15 min Winter	139.667	0.0	1067.7	26
30 min Winter	91.679	0.0	1362.6	40

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.500	0.500	23.3	1713.1	O K
120 min Winter	99.584	0.584	23.3	2021.5	O K
180 min Winter	99.626	0.626	23.3	2178.3	O K
240 min Winter	99.650	0.650	23.3	2269.6	O K
360 min Winter	99.678	0.678	23.3	2376.7	O K
480 min Winter	99.692	0.692	23.3	2429.3	O K
600 min Winter	99.697	0.697	23.3	2449.0	O K
720 min Winter	99.697	0.697	23.3	2447.2	O K
960 min Winter	99.685	0.685	23.3	2402.7	O K
1440 min Winter	99.646	0.646	23.3	2254.4	O K
2160 min Winter	99.586	0.586	23.3	2030.2	O K
2880 min Winter	99.522	0.522	23.3	1794.6	O K
4320 min Winter	99.400	0.400	23.3	1356.0	O K
5760 min Winter	99.299	0.299	23.3	999.0	O K
7200 min Winter	99.223	0.223	23.0	738.2	O K
8640 min Winter	99.173	0.173	22.4	570.0	O K
10080 min Winter	99.150	0.150	20.6	493.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	57.296	0.0	1779.1	70
120 min Winter	34.570	0.0	2147.1	126
180 min Winter	25.370	0.0	2363.8	184
240 min Winter	20.243	0.0	2514.9	242
360 min Winter	14.710	0.0	2741.6	358
480 min Winter	11.721	0.0	2891.7	474
600 min Winter	9.820	0.0	3006.7	588
720 min Winter	8.495	0.0	3098.3	700
960 min Winter	6.752	0.0	3232.1	916
1440 min Winter	4.878	0.0	3354.8	1140
2160 min Winter	3.518	0.0	3935.0	1584
2880 min Winter	2.787	0.0	4156.7	2020
4320 min Winter	2.005	0.0	4484.5	2816
5760 min Winter	1.585	0.0	4727.5	3528
7200 min Winter	1.320	0.0	4923.5	4184
8640 min Winter	1.137	0.0	5086.3	4760
10080 min Winter	1.002	0.0	5227.9	5440

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.200	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 3.700

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	1.233	4	8	1.233	8	12	1.233

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3222.3	1.000	4077.5

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0212-2330-1050-2330
Design Head (m)	1.050
Design Flow (l/s)	23.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	212
Invert Level (m)	98.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	23.3
Flush-Flo™	0.361	23.3
Kick-Flo®	0.757	19.9
Mean Flow over Head Range	-	19.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.2	1.200	24.8	3.000	38.5	7.000	58.1
0.200	20.5	1.400	26.7	3.500	41.5	7.500	60.1
0.300	23.1	1.600	28.5	4.000	44.3	8.000	62.0
0.400	23.2	1.800	30.2	4.500	46.9	8.500	63.8
0.500	22.9	2.000	31.7	5.000	49.3	9.000	65.6
0.600	22.3	2.200	33.2	5.500	51.7	9.500	67.4
0.800	20.5	2.400	34.6	6.000	53.9		
1.000	22.8	2.600	36.0	6.500	56.0		

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.334	0.334	11.0	595.0	O K
30 min Summer	99.386	0.386	11.0	694.3	O K
60 min Summer	99.443	0.443	11.0	804.2	O K
120 min Summer	99.502	0.502	11.0	920.4	O K
180 min Summer	99.535	0.535	11.0	987.2	O K
240 min Summer	99.557	0.557	11.0	1031.5	O K
360 min Summer	99.584	0.584	11.0	1085.3	O K
480 min Summer	99.597	0.597	11.0	1113.2	O K
600 min Summer	99.604	0.604	11.0	1126.0	O K
720 min Summer	99.605	0.605	11.0	1128.7	O K
960 min Summer	99.592	0.592	11.0	1103.2	O K
1440 min Summer	99.566	0.566	11.0	1049.7	O K
2160 min Summer	99.528	0.528	11.0	971.8	O K
2880 min Summer	99.490	0.490	11.0	896.0	O K
4320 min Summer	99.407	0.407	11.0	734.8	O K
5760 min Summer	99.336	0.336	11.0	598.6	O K
7200 min Summer	99.276	0.276	11.0	486.3	O K
8640 min Summer	99.227	0.227	11.0	396.5	O K
10080 min Summer	99.187	0.187	10.8	325.9	O K
15 min Winter	99.372	0.372	11.0	667.9	O K
30 min Winter	99.430	0.430	11.0	779.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	180.066	0.0	606.9	26
30 min Summer	105.754	0.0	706.5	41
60 min Summer	62.111	0.0	837.7	70
120 min Summer	36.478	0.0	984.1	130
180 min Summer	26.720	0.0	1081.3	188
240 min Summer	21.424	0.0	1156.1	248
360 min Summer	15.693	0.0	1270.3	366
480 min Summer	12.583	0.0	1358.1	484
600 min Summer	10.601	0.0	1430.3	602
720 min Summer	9.217	0.0	1492.2	722
960 min Summer	7.331	0.0	1558.8	884
1440 min Summer	5.309	0.0	1616.9	1108
2160 min Summer	3.845	0.0	1867.6	1488
2880 min Summer	3.058	0.0	1980.8	1884
4320 min Summer	2.179	0.0	2117.2	2684
5760 min Summer	1.713	0.0	2219.6	3416
7200 min Summer	1.422	0.0	2303.6	4176
8640 min Summer	1.221	0.0	2372.5	4848
10080 min Summer	1.073	0.0	2433.4	5544
15 min Winter	180.066	0.0	679.2	26
30 min Winter	105.754	0.0	774.6	41

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.494	0.494	11.0	904.7	O K
120 min Winter	99.561	0.561	11.0	1038.7	O K
180 min Winter	99.600	0.600	11.0	1117.8	O K
240 min Winter	99.626	0.626	11.0	1172.0	O K
360 min Winter	99.659	0.659	11.0	1241.6	O K
480 min Winter	99.678	0.678	11.0	1281.5	O K
600 min Winter	99.689	0.689	11.0	1303.9	O K
720 min Winter	99.694	0.694	11.0	1314.8	O K
960 min Winter	99.688	0.688	11.0	1301.5	O K
1440 min Winter	99.656	0.656	11.0	1233.6	O K
2160 min Winter	99.600	0.600	11.0	1117.7	O K
2880 min Winter	99.543	0.543	11.0	1003.7	O K
4320 min Winter	99.421	0.421	11.0	760.8	O K
5760 min Winter	99.315	0.315	11.0	559.1	O K
7200 min Winter	99.230	0.230	11.0	403.1	O K
8640 min Winter	99.168	0.168	10.7	291.5	O K
10080 min Winter	99.127	0.127	10.4	218.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	62.111	0.0	938.2	70
120 min Winter	36.478	0.0	1102.2	128
180 min Winter	26.720	0.0	1211.1	186
240 min Winter	21.424	0.0	1294.9	244
360 min Winter	15.693	0.0	1422.8	360
480 min Winter	12.583	0.0	1518.6	476
600 min Winter	10.601	0.0	1579.7	590
720 min Winter	9.217	0.0	1624.1	704
960 min Winter	7.331	0.0	1662.3	926
1440 min Winter	5.309	0.0	1624.8	1342
2160 min Winter	3.845	0.0	2091.9	1632
2880 min Winter	3.058	0.0	2218.5	2076
4320 min Winter	2.179	0.0	2371.3	2900
5760 min Winter	1.713	0.0	2486.2	3640
7200 min Winter	1.422	0.0	2578.8	4328
8640 min Winter	1.221	0.0	2657.5	4936
10080 min Winter	1.073	0.0	2725.3	5544

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 443900 302500 SK 43900 02500
C (1km)	-0.028
D1 (1km)	0.361
D2 (1km)	0.333
D3 (1km)	0.293
E (1km)	0.309
F (1km)	2.371
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.800

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.600	4	8	0.600	8	12	0.600

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1683.8	1.000	2315.9

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0151-1100-1050-1100
Design Head (m)	1.050
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	98.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	11.0
Flush-Flo™	0.318	11.0
Kick-Flo®	0.706	9.1
Mean Flow over Head Range	-	9.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.5	1.200	11.7	3.000	18.1	7.000	27.2
0.200	10.6	1.400	12.6	3.500	19.5	7.500	28.1
0.300	11.0	1.600	13.4	4.000	20.8	8.000	29.0
0.400	10.9	1.800	14.2	4.500	22.0	8.500	29.8
0.500	10.7	2.000	14.9	5.000	23.1	9.000	30.7
0.600	10.2	2.200	15.6	5.500	24.2	9.500	31.5
0.800	9.7	2.400	16.3	6.000	25.2		
1.000	10.7	2.600	16.9	6.500	26.2		

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.290	0.290	11.0	461.6	O K
30 min Summer	99.373	0.373	11.0	602.7	O K
60 min Summer	99.454	0.454	11.0	743.1	O K
120 min Summer	99.526	0.526	11.0	873.0	O K
180 min Summer	99.561	0.561	11.0	936.8	O K
240 min Summer	99.580	0.580	11.0	972.2	O K
360 min Summer	99.601	0.601	11.0	1011.1	O K
480 min Summer	99.610	0.610	11.0	1026.1	O K
600 min Summer	99.610	0.610	11.0	1026.8	O K
720 min Summer	99.605	0.605	11.0	1018.2	O K
960 min Summer	99.590	0.590	11.0	989.7	O K
1440 min Summer	99.559	0.559	11.0	932.9	O K
2160 min Summer	99.514	0.514	11.0	850.0	O K
2880 min Summer	99.469	0.469	11.0	770.8	O K
4320 min Summer	99.388	0.388	11.0	627.6	O K
5760 min Summer	99.316	0.316	11.0	505.3	O K
7200 min Summer	99.256	0.256	11.0	405.5	O K
8640 min Summer	99.209	0.209	10.9	326.9	O K
10080 min Summer	99.171	0.171	10.8	266.9	O K
15 min Winter	99.324	0.324	11.0	518.3	O K
30 min Winter	99.416	0.416	11.0	677.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	140.425	0.0	473.1	26
30 min Summer	92.166	0.0	621.3	41
60 min Summer	57.587	0.0	776.6	70
120 min Summer	34.732	0.0	937.0	130
180 min Summer	25.480	0.0	1031.1	188
240 min Summer	20.325	0.0	1096.7	248
360 min Summer	14.772	0.0	1195.8	366
480 min Summer	11.770	0.0	1270.4	484
600 min Summer	9.861	0.0	1330.5	602
720 min Summer	8.530	0.0	1381.0	720
960 min Summer	6.780	0.0	1463.7	836
1440 min Summer	4.898	0.0	1549.0	1068
2160 min Summer	3.532	0.0	1715.7	1456
2880 min Summer	2.798	0.0	1812.5	1852
4320 min Summer	2.012	0.0	1955.1	2640
5760 min Summer	1.591	0.0	2061.1	3400
7200 min Summer	1.325	0.0	2146.7	4112
8640 min Summer	1.141	0.0	2217.6	4760
10080 min Summer	1.005	0.0	2279.1	5448
15 min Winter	140.425	0.0	530.0	26
30 min Winter	92.166	0.0	696.0	40

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.506	0.506	11.0	836.2	O K
120 min Winter	99.588	0.588	11.0	985.9	O K
180 min Winter	99.629	0.629	11.0	1062.0	O K
240 min Winter	99.652	0.652	11.0	1106.2	O K
360 min Winter	99.680	0.680	11.0	1158.7	O K
480 min Winter	99.693	0.693	11.0	1183.4	O K
600 min Winter	99.697	0.697	11.0	1192.1	O K
720 min Winter	99.697	0.697	11.0	1190.8	O K
960 min Winter	99.686	0.686	11.0	1169.9	O K
1440 min Winter	99.643	0.643	11.0	1088.8	O K
2160 min Winter	99.579	0.579	11.0	969.8	O K
2880 min Winter	99.514	0.514	11.0	850.2	O K
4320 min Winter	99.390	0.390	11.0	631.1	O K
5760 min Winter	99.284	0.284	11.0	451.1	O K
7200 min Winter	99.203	0.203	10.9	317.1	O K
8640 min Winter	99.146	0.146	10.6	226.4	O K
10080 min Winter	99.114	0.114	10.1	175.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	57.587	0.0	870.0	70
120 min Winter	34.732	0.0	1049.6	128
180 min Winter	25.480	0.0	1155.1	186
240 min Winter	20.325	0.0	1228.4	244
360 min Winter	14.772	0.0	1339.4	360
480 min Winter	11.770	0.0	1422.9	474
600 min Winter	9.861	0.0	1490.3	590
720 min Winter	8.530	0.0	1537.9	702
960 min Winter	6.780	0.0	1599.2	922
1440 min Winter	4.898	0.0	1628.1	1188
2160 min Winter	3.532	0.0	1921.9	1604
2880 min Winter	2.798	0.0	2029.9	2028
4320 min Winter	2.012	0.0	2190.1	2852
5760 min Winter	1.591	0.0	2309.1	3576
7200 min Winter	1.325	0.0	2403.7	4248
8640 min Winter	1.141	0.0	2483.6	4840
10080 min Winter	1.005	0.0	2552.7	5352

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.300	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.800

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.600	4	8	0.600	8	12	0.600

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1509.4	1.000	2110.5

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0151-1100-1050-1100
Design Head (m)	1.050
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	98.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	11.0
Flush-Flo™	0.318	11.0
Kick-Flo®	0.706	9.1
Mean Flow over Head Range	-	9.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.5	1.200	11.7	3.000	18.1	7.000	27.2
0.200	10.6	1.400	12.6	3.500	19.5	7.500	28.1
0.300	11.0	1.600	13.4	4.000	20.8	8.000	29.0
0.400	10.9	1.800	14.2	4.500	22.0	8.500	29.8
0.500	10.7	2.000	14.9	5.000	23.1	9.000	30.7
0.600	10.2	2.200	15.6	5.500	24.2	9.500	31.5
0.800	9.7	2.400	16.3	6.000	25.2		
1.000	10.7	2.600	16.9	6.500	26.2		

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