



Flood Risk Assessment & Drainage Strategy Report

Proposed New Housing Development Slip End Farm Ashwell

Date: April 2026

Project No.: 20149

Report Reference: 205149-SWH-ZZ-01-DR-RP-0001

Revision: 01

Prepared by:

Michael Hartley BSc (Hons), MSc C.WEM MCIWEM
Senior Engineer

Reviewed by:

Jason Daniels BEng (Hons) CEng MICE MIStructE
Technical Director

	Structural Engineering
	Civil Engineering
	CDM Consultants
	Sustainability and BREEAM
	Traffic and Transport
	Flood Risk Assessments
	Highway Engineering
	Event Engineering

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1.0 Introduction

- 1.1** Scott White and Hookins have been instructed by Peter George Town Planning to undertake a flood risk assessment (FRA) of a proposed development at Slip End Farm, Ashwell. This flood risk assessment has been produced as a supporting document for a planning application and takes the form of a desk study.
- 1.2** The proposed development comprises nine new residential properties with associated access road. The existing site is currently used as Farm Buildings/ light industrial purposes which is semi agricultural. A location plan is provided in **Appendix A**. Proposed site plans are given in **Appendix B**.
- 1.3** On the basis of the proposed development the scheme is classed as 'More Vulnerable' under table 2 of the NPPF. On this basis development is considered appropriate for flood zone 1 and 2 only. Sequential and Exception tests are required. This FRA addresses part 'b' of the exception test.

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
FZ1					
FZ2		ETR			
FZ3a	ETR		ETR		
FZ3b	ETR				

Green – Development appropriate.

Red- Development not permitted.

ETR – Exception test required to allow development.

- 1.3** This report considers the flood risk to the proposed development and the impact that the development will have in relation to flooding of adjacent areas and watercourses. It also considers any limits relating to flooding that are likely to be imposed to allow the development to be undertaken and recommends Sustainable Urban Drainage systems (SuDS) to control surface water runoff.
- 1.4** This report takes into account the requirements of NPPF and local policies and is based on information received from the Environment Agency flood mapping and Anglian Water. The report also considers the DEFRA SuDS standards for 2025 which shifts surface water management from a purely flood control function to a multifunctional approach that integrates water quality, biodiversity, amenity, and climate resilience into the design of new developments. The new standards encourage SuDS to be visible, natural landscape features rather than hidden structure, with aesthetics and recreational potential becoming key components of drainage strategies. The standards also strongly emphasize rainwater harvesting to collect water for non-potable use as part of any SuDS scheme.
- 1.5** Local planning policy is contained within the North Herts Local Plan. Flood Risk and

Sustainable Drainage elements are covered by Policies NE7 and NE8 respectively. See **Appendix K**.

- 1.6** This report is for the private and confidential use of the client and its agents and may not be copied in whole or in part without the written permission of Scott White and Hookins Ltd.

2.0 Existing Site Conditions

2.1 The site is located adjacent to A505 Royston Road SG7 6SG, centred on grid reference TL 28655 37129, and is approximately 0.57 ha in size. A location plan is given in **Appendix A**.

2.2 The site currently comprises steel portal framed farm buildings. To the east is agricultural land and a bungalow. To the south and west are existing farm buildings to be retained to serve existing Farm House; beyond these is an unclassified road. To the north is agricultural land. The agricultural land is also a site of scheduled monument. An aerial view of the site is given in **Appendix A**.

2.3 There is some existing surface water drainage within the site evidenced by gullies and rainwater pipes. An existing open soakaway was identified adjacent to the Dutch barn just outside the site boundary. An existing septic tank serving the bungalow is identified on the survey; this is located within the development boundary and will need to be considered at detailed design stage. A second likely septic tank serving the farm house was also identified on the topographic survey; this lies outside the development boundary. The presence of both the above features suggest that the site drains via infiltration to the ground. See Topographic survey in **Appendix C**.

2.4 Anglian Water asset plans in **Appendix D** show no surface water or foul sewers within the site or adjacent to the site.

2.5 The British Geological Survey records for the site indicate that the site is likely to be underlain by White Chalk Subgroup. See **Appendix E**.

A trial pit dug for infiltration testing by Ground Engineering Limited shows structureless chalk and gravel to a depth of 1.5m and structured chalk with gravel down to the bottom of the pit (2m depth). This would appear to confirm the BGS records.

2.6 The site is underlain by a principal bedrock aquifer and is in Zone 1 of a source protection zone.

2.7 A phase 1 desk study of the site indicates a low risk of contamination. See separate report by Dice Environmental May 2023.

2.8 Soakaway testing to BRE 365 was carried out by Ground Engineering Limited. Results of the testing indicate that infiltration rates are good and features such as permeable paving and soakaways could be adopted. The results are provided in **Appendix F** but are summarised below:

Location	Depth (m)	Infiltration (Lowest Value) m/s
Trial Pit TP1	2.0	8.29 x 10 ⁻⁵

3.0 Potential Flood Risk Affecting the site

3.1 Fluvial Flooding

- 3.1.1 Flood plain mapping provided by the Environment Agency (EA) indicates that the site lies in Flood Zones 1,2 and 3. Flood Zones 2 and 3 cover the existing site access to the west. See extract of flood maps in **Appendix G**.
- 3.1.2 The Flood Zones are defined in Table 1 of the Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' section as follows:
- Flood Zone 1 'Low Probability' – Land at less than 1 in 1000 (0.1%) annual probability of river or sea flooding;
 - Flood Zone 2 'Medium Probability' – Land between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of sea flooding;
 - Flood Zone 3 'High Probability' – Land at 1 in 100 (1%) or greater annual probability of river flooding, or 1 in 200 (0.5%) or greater annual probability of sea flooding.
- 3.1.3 When climate change is considered (up to 2115), there is little discernible difference in floodplain extent compared to the present day, see map in **Appendix G**.
- 3.1.4 The Flood Map for Planning often does not map fluvial flood risk from ordinary watercourses such as the Cat Ditch which lies to the west and south of the site and therefore the fluvial flood risk is thought to be an overestimate. However, the "Risk of Flooding from Surface Water" map is considered a reasonable initial indicator of fluvial flood risk ordinary watercourses, see further details below.

3.2 Surface Water Flooding

- 3.2.1 The general topography of the site slopes down from north east to south west and gradients are relatively shallow. The EA surface water flood map shows the site is mainly at very low risk of surface water flooding. There is a low risk of flooding near the site entrance where along the line of the ditch. There is a high surface water flood risk area confined to the channel of the this ditch south of the site.

3.3 Groundwater Flooding

- 3.3.1 A British geological borehole was dug to a depth of 19.2m below ground near the site (TL23NE14). It recorded groundwater over 14m below ground level. As such it is considered the risk of groundwater flooding is low.

3.4 Reservoir Flooding

- 3.4.1 EA flood maps indicate the site is not at risk of flooding in the event of a breach from reservoirs.

3.5 Sewer Flooding

- 3.5.1 Anglian Water asset plans in **Appendix D** show no surface water or foul sewers within the site or adjacent to the site. The risk of sewer flooding is negligible.

- 3.6 Our assessment of the above flood risks indicates that although the flood map for planning shows part of the site is located in Flood Zones 2 and 3, the actual risk of risk of fluvial flooding taking in consideration the presence of Cat Ditch is low.

4.0 Flood Mitigation and Outline Drainage Proposals

4.1 Flood Mitigation

- 4.1.1 The proposed works (excluding site entrance) are not considered to be at risk of flooding from fluvial sources. Due to the development of the site flood mitigation measures are required to reduce downstream flood risks.

Ground Floor Levels

- 4.1.2 Current government guidance (ref: Preparing a flood risk assessment: standing advice - GOV.UK (www.gov.uk) recommends a freeboard allowance of 600mm above the design flood level (1% AEP) plus an appropriate climate change allowance. There is no flood modelled flood data associated with adjacent Ditch, however the flood map for planning is considered conservative and the proposed houses are located outside the climate change flood extent. This guidance is not applicable as the site is at low risk from fluvial and surface water flooding.
- 4.1.3 It is recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from buildings in such a scenario.

Surface Water flooding

- 4.1.4 The Environment Agency surface water flood maps indicate that a small section of the existing access road, near the site entrance, is crossed by overland surface water flows in a low risk scenario. Long term flood mapping from the Environment Agency flood map indicate low risk flows of <200mm depth. This is likely to translate to a 'very low flood hazard' according to the EA's supplementary note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose document.
- 4.1.5 Given the location of the access road and adjacent sites it is not possible to mitigate this flood risk. Road levels will need to be set to allow these flows to continue unhindered which will therefore not change the current offsite flood risks. When surface water flooding occurs in this location, road access to the site may not be available. For overland surface water flows, flood periods would be short and therefore access and egress restrictions would be of short duration and no further mitigation in this respect is proposed. Emergency access to the site is still possible from the adjacent A505.

4.2 Surface Water Drainage

- 4.2.1 The NPPF recognises that flood risk and other environmental damage can be managed

by minimising changes in the volume and rate of surface runoff from development sites and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.

4.2.2 As the intention of SuDS is to mimic the natural drainage regime of the undeveloped site, the Defra National standards for sustainable drainage systems states the following:

- priority 1: collected for non-potable use
- priority 2: infiltrated to ground
- priority 3: discharged to an above ground surface water body
- priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- priority 5: discharged to a combined sewer

4.2.3 Based on the aforementioned drainage hierarchy, the preferred method for disposal of surface water from the new development is rainwater collected for non-potable use such as landscape irrigation and flushing toilets. Rainwater harvesting should be incorporated into the scheme unless this method is proved to be unfeasible.

4.2.4 The next preferred method for disposal of surface water is infiltration to the ground. Infiltration testing on site indicated a coefficient of permeability (k) of approximately $8.29 \times 10^{-5} \text{m/s}$ (see **Appendix F** for copy of results). Infiltration is suitable at a depth of approximately 2m in the chalk.

4.2.5 For the new site SUDS drainage measures should be introduced. Geological data for the site indicates that the soil comprises a layer of sand and gravels near the surface with chalk below. Infiltration testing has confirmed that chalk with suitable infiltration characteristics is present on the site.

4.2.6 On the basis of the above the following drainage options are considered to be appropriate for this site:

Device	Description
Permeable surfaces	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate into permeable soils or discharge to sewers.
Filter drains & perforated pipes	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration.

4.2.7 Permeable paving to intercept and store runoff from the hardstanding areas and roof drainage would be appropriate based on the current site proposals. It is proposed roof drainage discharge to the subbase of the permeable paving via diffuser units. It is calculated a subbase of 200mm would be able to accommodate the impermeable area of the site with no flooding in a 1 in 100 year storm plus 40% allowance for climate change.

An urban creep allowance of 10% has been applied to the area of the buildings (excluding garages), see drainage design calculations in **Appendix H**. It is recommended further infiltration testing is undertaken at a shallower depth in the chalk to reflect the anticipated depth of the permeable paving subbase.

4.2.8 A copy of the drainage scheme proposal is enclosed in **Appendix I**.

4.2.9 Protection of groundwater from pollution is covered in Chapter 26 of CIRIA SuDS Manual C753. Due to the limited extent of the surface water catchment from the development i.e., rainwater from roofs and residential parking areas, we can utilise the "simple qualitative method" described in this chapter (cl. 26.7.1) where we may select "**SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index**", Table 26.2 & 26.3 CIRIA refers.

Pollution Hazard (Indices method)				
Area	Pollution Hazard	TSS	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Low traffic roads and parking	Low	0.5	0.4	0.4

Note – Please see CIRIA SUDS manual for full descriptions.

Pollution Mitigation (Indices method)				
Area - Site				
Component	TSS	Metals	Hydro-carbons	
Permeable pavement	0.7	0.6	0.7	

4.2.10 The site is above an aquifer source protection zone (SPZ1). Infiltration techniques will need to include measures to protect the underlying ground water. Shallow infiltration systems are preferred. For the suggested infiltration techniques for this site the following assessment is made in line with the recommendations of the CIRIA SUDS manual and EA Standing advice.

4.2.11 Rainwater from roofs is considered have a very low risk pollution risk (Table 26.2 CIRIA). For SPZ1 the EA standing advice allows infiltration drainage for clean roof rainwater drainage (Groundwater protection section G12). On this basis these are considered acceptable.

4.2.12 Driveways and low traffic roads have a low risk of pollution. Permeable pavements offer sufficient pollution mitigation and are considered acceptable (Table 26.3 and 26.4 CIRIA).

4.3 To ensure drainage elements function correctly, maintenance of drainage should be covered by a suitable management company and subject to a regular maintenance regime. Maintenance of SuDS to be in accordance with CIRIA SuDS manual C753 where specific intervals are advised within the document as per element type. A summary of these are present in **Appendix J**.

5.0 Summary and Recommendations

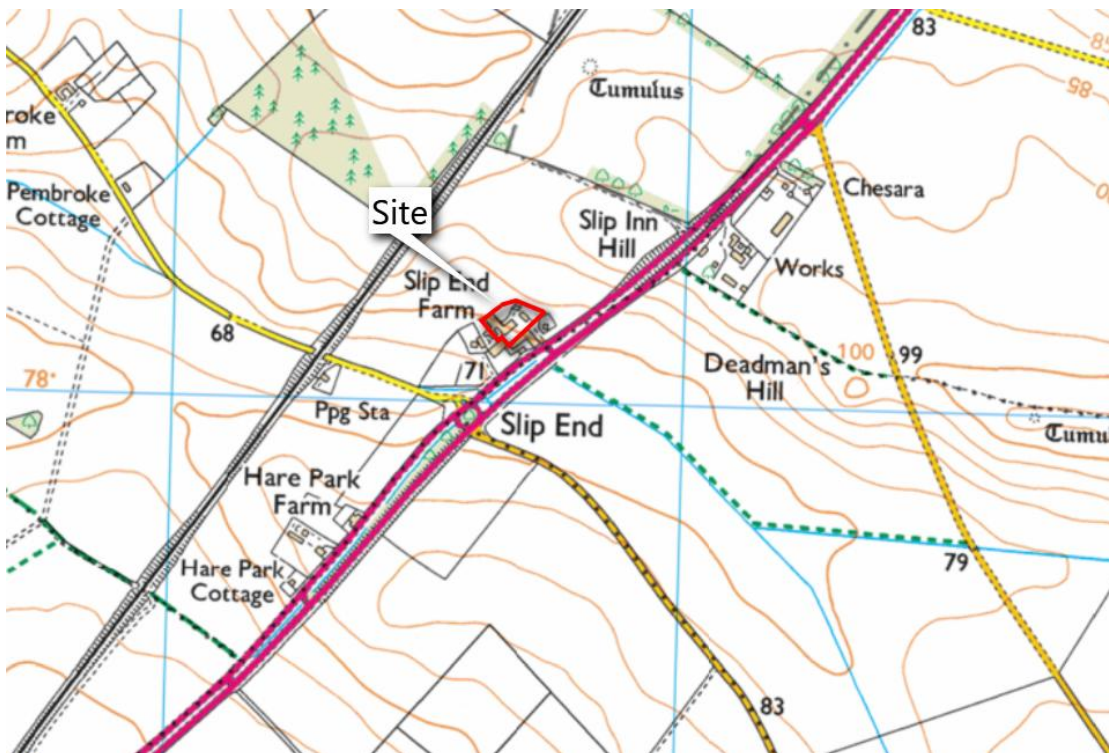
- 5.1** This Flood Risk Assessment (FRA) has been prepared by Scott White and Hookins to support a planning application for a residential scheme at Slip End Farm, Ashwell, Hertfordshire.
- 5.2** The site is in Flood Zones 1, 2 and 3, low, medium and high probability from rivers. However, it considered the flood map for planning overestimates the fluvial flood risk and the surface water flood map is a better indicator of flood risk from the nearby Cat Ditch (ordinary watercourse). The surface water flood map shows a large portion of the site is at very low risk of surface water flooding. The site is at low risk from other sources including from groundwater and sewers. It is recommended ground floor levels are set minimum 150mm above surrounding ground levels.
- 5.3** The proposed surface water drainage strategy is based on infiltration to ground. Roof drainage and runoff from hardstanding areas will discharge to the ground via permeable paving subbase. It is recommended that further infiltration testing is carried out to confirm the viability of infiltration drainage.
- 5.4** In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

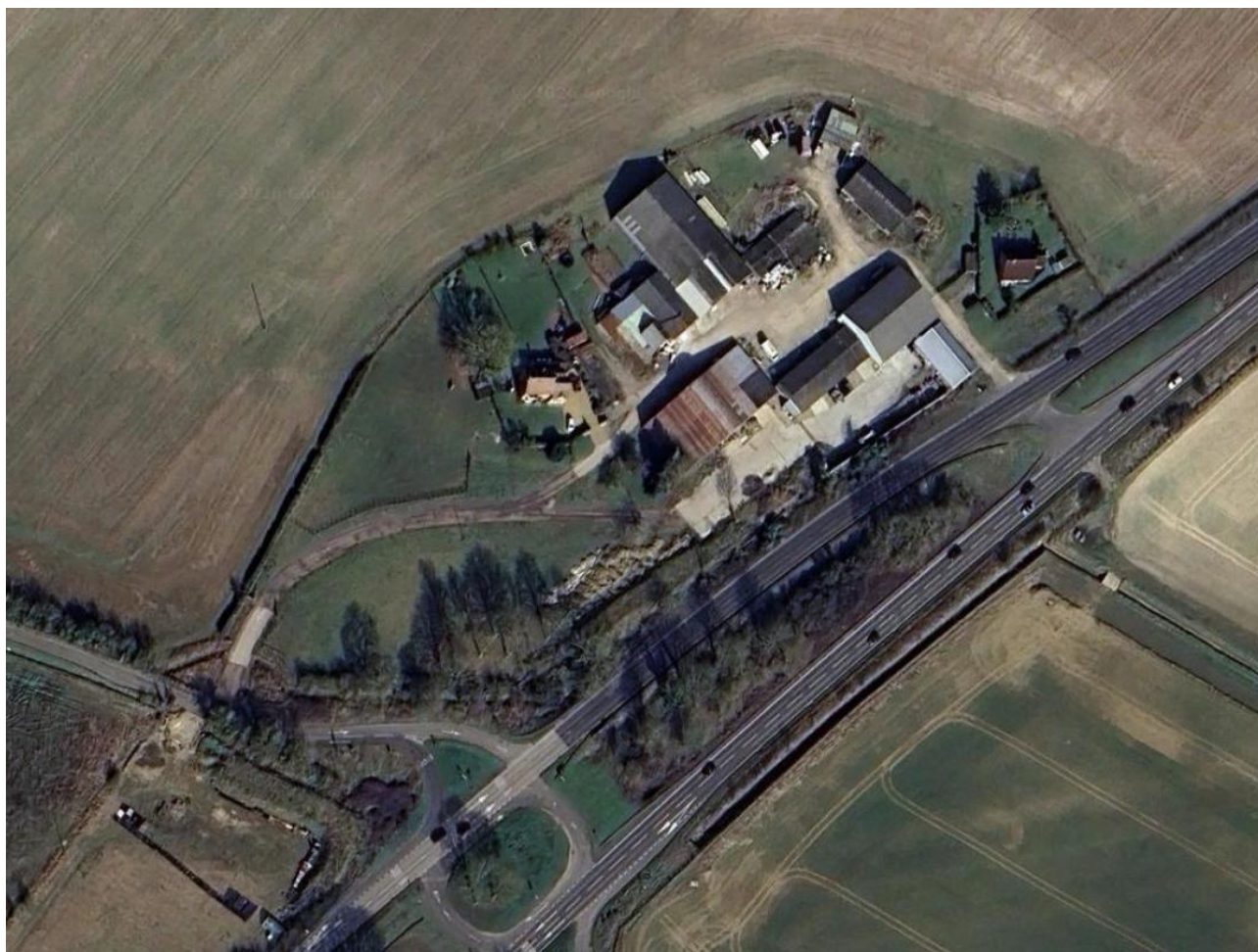
6.0 Appendices

- A. Site Location Plan**
- B. Proposed Site Plan**
- C. Existing Topographic Survey**
- D. Existing Sewer Record Drawings**
- E. British Geological Survey Records**
- F. Infiltration Testing Report and Results**
- G. Flood Map Extracts**
- H. Drainage Design Calculations**
- I. Proposed Drainage Scheme**
- J. SW Drainage Maintenance Schedule**
- K. National Planning Guidance**

Appendix A

Site Location Plan





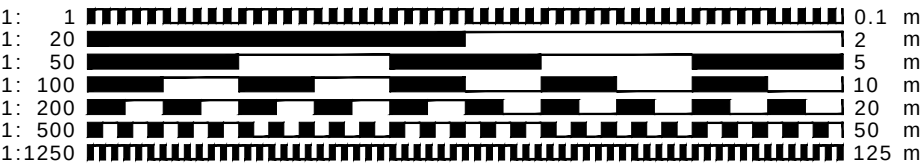
Aerial photograph of existing site

Appendix B

Proposed Site Plan



Site & Access Plan 1:1000



- CLIENT MUST SEEK SEPARATE SPECIALIST ADVICE ON PARTY WALL MATTER IN SUFFICIENT TIME TO SERVE ALL NOTICES IF REQUIRED
- ALL STRUCTURAL ELEMENTS ARE INDICATIVE ONLY AND SUBJECT TO FULL STRUCTURAL DESIGN BY STRUCTURAL ENGINEER - ALL DESIGN IS SUBJECT TO STRUCTURAL DESIGN TO BE PROVIDED BY OTHERS
- THIS DRAWING IS FOR PLANNING APPROVAL ONLY AND SUBJECT TO ALL OTHER RELEVANT STATUTORY APPROVALS

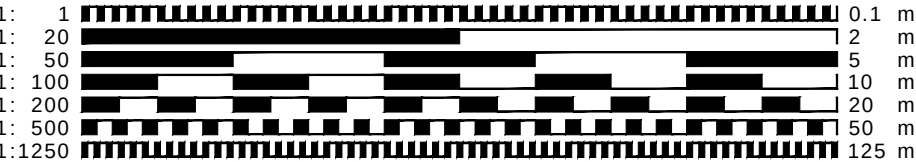


FOR APPROVAL

CONTRACT		
Proposed Residential Development, Slip End Farm, Slip End, Baldock, Hertfordshire		
DRAWING TITLE		
Site and Access Plan		
SCALE	1:1000@A3	DRAWING NUMBER
DATE	Sept 2025	PO2
DRAWN	JEI	CHECKED BY
JOB NUMBER	RSD-24-17	
redshed design 45 Hoo Road Meppershall Bedfordshire SG17 5JP		
telephone: 01462 807175, 07884008970 fax: 01462 807175 e-mail: james/karen@redsheddesign.co.uk www.redsheddesign.co.uk		



Proposed Site Plan 1:500



PLOT		GIA	PARKING	CYCLE	GARDEN
PLOT 1	3 bed semi detached dwelling	165sqm	3 parking spaces	2	377sqm
PLOT 2	3 bed semi detached dwelling	130sqm	3 parking spaces	2	220sqm
PLOT 3	3 bed semi detached dwelling	140sqm	2 parking spaces	2	212sqm
PLOT 4	4 bed semi detached dwelling	180sqm	3 parking spaces	2	262sqm
PLOT 5	4 bed semi detached dwelling	152sqm	3 parking spaces	2	155sqm
PLOT 6	4 bed detached dwelling	180sqm	3 parking spaces	2	229sqm
PLOT 7	4 bed detached dwelling	180sqm	3 parking spaces	2	228sqm
PLOT 8	4 bed semi detached dwelling	215sqm	3 parking spaces	2	175sqm
PLOT 9	4 bed semi detached dwelling	215sqm	3 parking spaces	2	177sqm

- CLIENT MUST SEEK SEPARATE SPECIALIST ADVICE ON PARTY WALL MATTER IN SUFFICIENT TIME TO SERVE ALL NOTICES IF REQUIRED
- ALL STRUCTURAL ELEMENTS ARE INDICATIVE ONLY AND SUBJECT TO FULL STRUCTURAL DESIGN BY STRUCTURAL ENGINEER - ALL DESIGN IS SUBJECT TO STRUCTURAL DESIGN TO BE PROVIDED BY OTHERS
- THIS DRAWING IS FOR PLANNING APPROVAL ONLY AND SUBJECT TO ALL OTHER RELEVANT STATUTORY APPROVALS

Existing highway access to A505 to be decommissioned and blocked up

FOR APPROVAL



CONTRACT
Proposed Residential Development,
Slip End Farm, Slip End, Baldock,
Hertfordshire

DRAWING TITLE
Proposed Site Plan

SCALE 1:500@A3 DRAWING NUMBER PO3 REVISION

DATE Sept 2025

DRAWN JEI

JOB NUMBER RSD-24-17 CHECKED BY

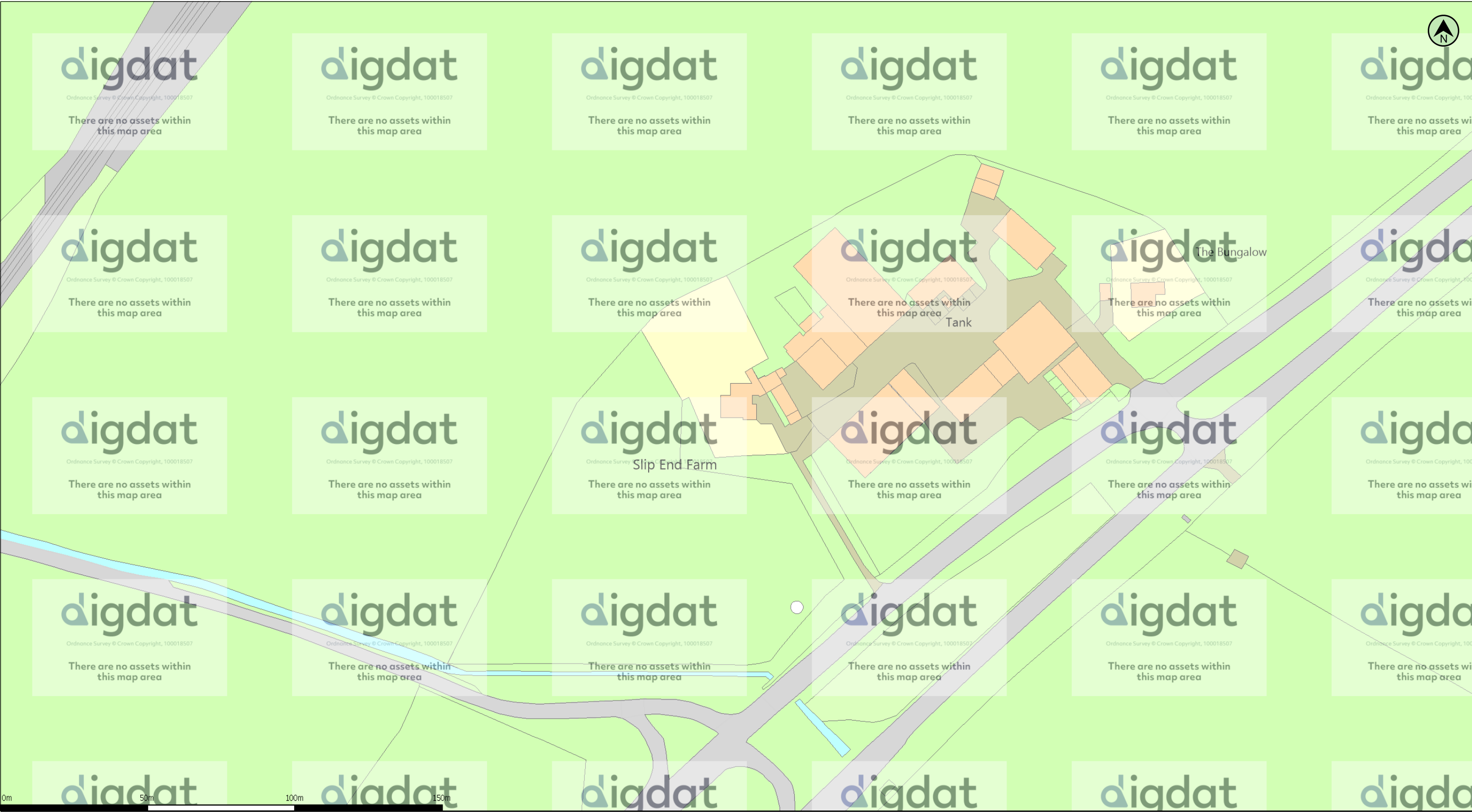
redshed design telephone: 01462 807175, 07884008970
45 Hoo Road fax: 01462 807175
Meppershall e-mail: james/karen@redsheddesign.co.uk
Bedfordshire www.redsheddesign.co.uk
sg17 5lp

Appendix C

Existing Topographic Survey

Appendix D

Existing Sewer Record Drawings



(c) Crown copyright and database rights 2023 Ordnance Survey 100022432

Date: 18/09/23

Scale: 1:1250

Map Centre: 528589,237110

Data updated: 31/08/23

Our Ref: 1274626 - 1

Wastewater Plan A3

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2023 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer					
Surface Sewer		Outfall*		Sewage Treatment Works	
Combined Sewer				Public Pumping Station	
Final Effluent		Inlet*		Decommissioned Pumping Station	
Rising Main*					
Private Sewer*		Manhole*			
Decommissioned Sewer*					

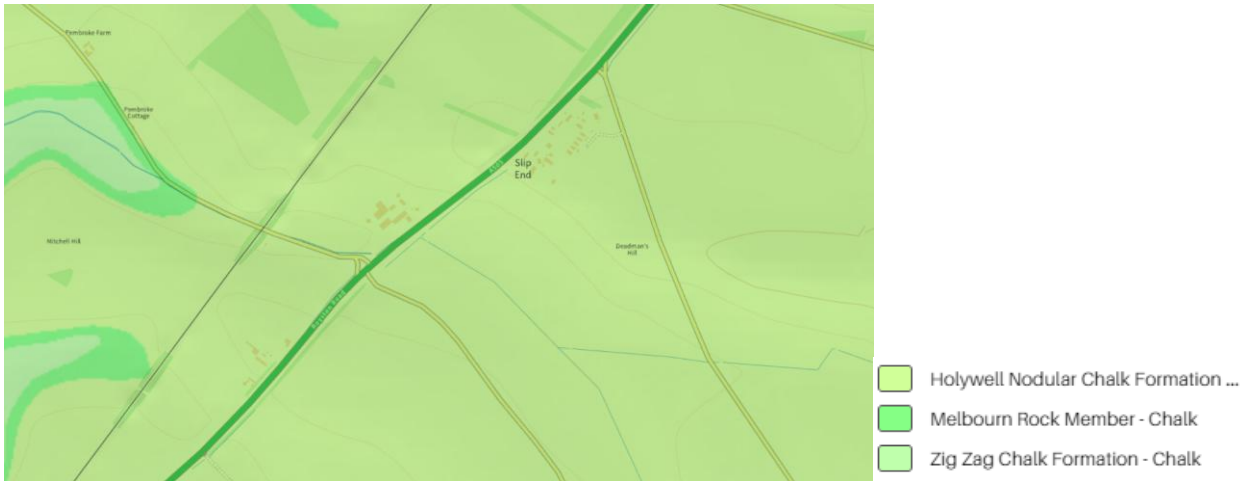
*(Colour denotes effluent type)

sjenkins@swh.co.uk
204303



Appendix E

British Geological Survey Records



Bedrock Geology (no Superficial Geology)

Extract of British Geological Survey

Appendix F

Infiltration testing Report and Results

GROUND ENGINEERING

Newark Road
Peterborough PE1 5UA



BRE 365 SOAKAWAY TESTS

SLIP END FARM

SLIP END

BALDOCK

Report Reference No. C16074

On behalf of:-

James Northern

Slip End Farm

Slip End

Baldock

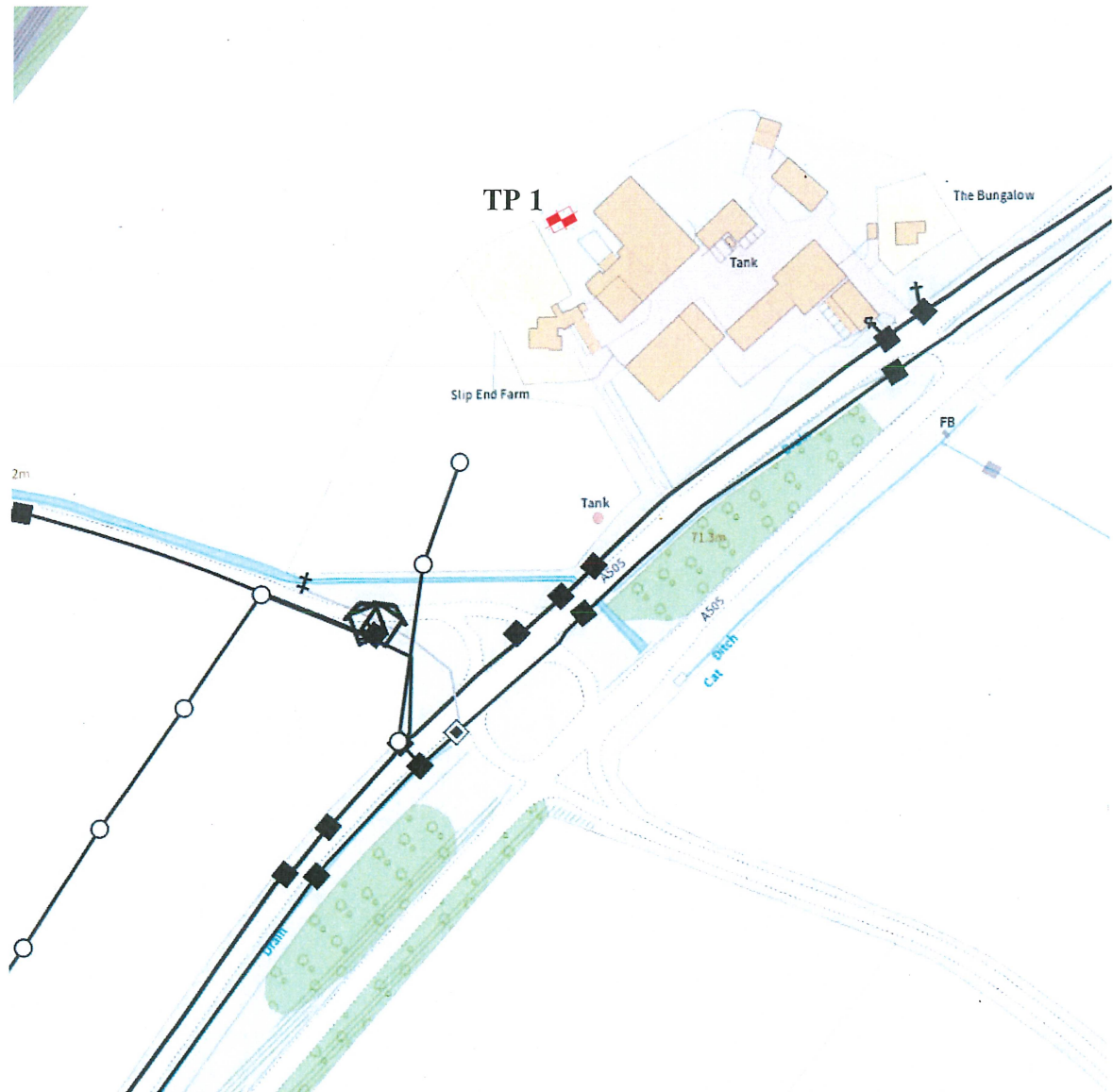
SG7 6SG

November 2023

Exploratory Hole Location Plan

Based on BT plan

© Crown Copyright (Ground Engineering Limited; Licence No. AL 100005523).



NOT TO SCALE

Key

Trial Pit



Project: Slip End Farm, Slip End, Baldock

Client: James Northern

**GROUND
ENGINEERING
LIMITED**

Peterborough

Tel : 01733 566566

Project No.

C16074

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: SLIP END FARM, BALDOCK		TRIAL PIT TP1		
			Date: 10/11/23	Pit Size: 3.30m L x 0.70m W x 2.00m D.	Ground Level:		
Samples and in-situ Tests			(Date)	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result	Water				
0.10	D1			TOPSOIL - Dark brown, slightly gravelly, sandy SILT. Gravel of angular to rounded chalk, flint and quartz.			
0.30	D2					0.40	
0.50-0.80	B1			Structureless CHALK composed of white and light brown, silty GRAVEL with pockets of light brown sand at 0.65m to 1.10m depth. Gravel of sub-angular to rounded, very weak, low density chalk clasts.			
0.60	D3					0.90	
0.70	D4			Structureless CHALK composed of white, silty GRAVEL. Gravel of sub-angular to sub-rounded, very weak, medium density chalk clasts.			
1.50-1.80	B2					1.50	
1.60	D5			Structured CHALK recovered as white, silty GRAVEL with occasional cobbles of chalk. Gravel of sub-angular to rounded, medium strong chalk clasts.			
1.80-2.00	B3					1.80	
2.00	D6			Structured CHALK recovered as white, clayey GRAVEL with many cobbles of chalk. Gravel of angular to rounded, medium strong chalk clasts.		2.00	
				Pit completed at 2.00m depth			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample ☒ Water Strike ☒ Water Rise ☒ Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Live roots observed to 1.30m depth 2. Pit dry 3. Pit sides stable	Project No 16074	
		Scale 1:25	Page 1/1

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Slip End Farm, Baldock
Client: James Northern

Project No: C16074
Sheet No: 1\3

Trial Pit: TP 1
Depth: 2.00
Length: 3.30
Width: 0.70

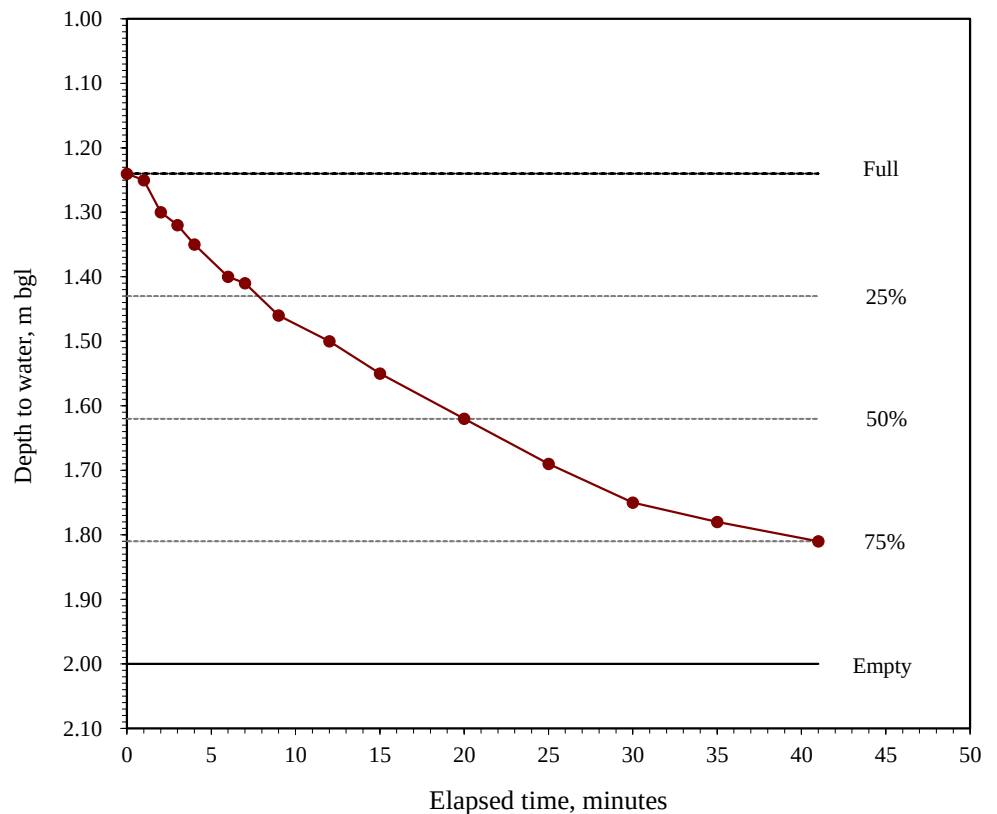
FIRST FILLING

Description of Stratum under test: CHALK

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0	1.24
1	1.25
2	1.30
3	1.32
4	1.35
6	1.40
7	1.41
9	1.46
12	1.50
15	1.55
20	1.62
25	1.69
30	1.75
35	1.78
41	1.81

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

$$f = (V_{75} - V_{25}) / A_{50}(T_{75} - T_{25})$$

$V_{75} - V_{25} = 0.878$
 $A_{50} = 5.350$
 $T_{75} - T_{25} = 33$

Soil Infiltration Rate

$f = \mathbf{8.29E-05} \text{ m/s}$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Slip End Farm, Baldock
Client: James Northern

Project No: C16074
Sheet No: 2\3

Trial Pit: TP 1
Depth: 1.95
Length: 3.30
Width: 0.70

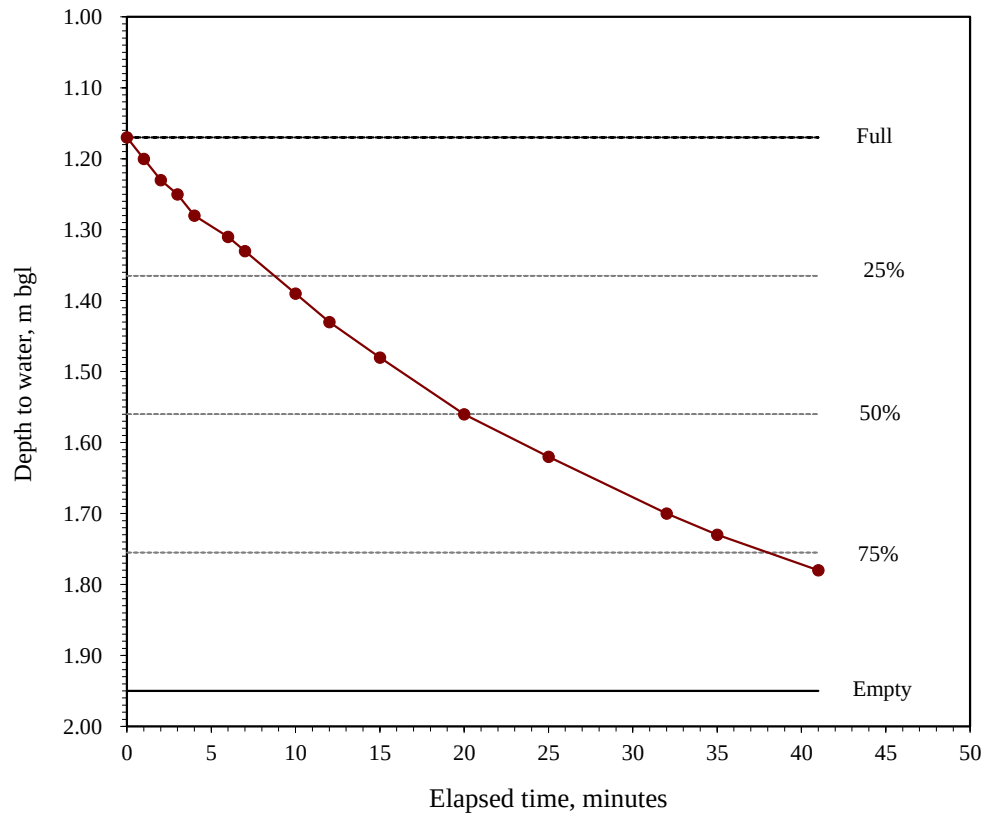
SECOND FILLING

Description of Stratum under test: CHALK

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0	1.17
1	1.20
2	1.23
3	1.25
4	1.28
6	1.31
7	1.33
10	1.39
12	1.43
15	1.48
20	1.56
25	1.62
32	1.70
35	1.73
41	1.78

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

$$f = (V_{75} - V_{25}) / A_{50}(T_{75} - T_{25})$$

$$V_{75} - V_{25} = 0.901$$

$$A_{50} = 5.430$$

$$T_{75} - T_{25} = 29$$

Soil Infiltration Rate

$$f = \underline{\underline{9.54E-05}} \text{ m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Slip End Farm, Baldock
Client: James Northern

Project No: C16074
Sheet No: 3\3

Trial Pit: TP 1
Depth: 1.95
Length: 3.30
Width: 0.70

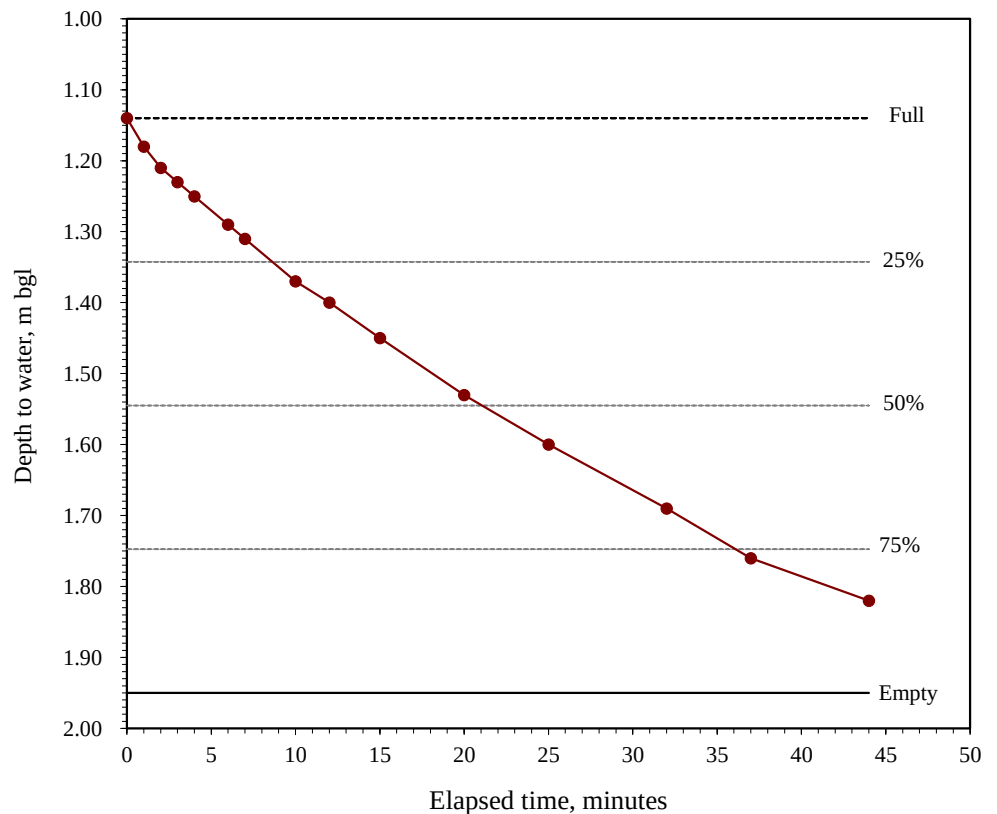
THIRD FILLING

Description of Stratum under test: CHALK

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0	1.14
1	1.18
2	1.21
3	1.23
4	1.25
6	1.29
7	1.31
10	1.37
12	1.40
15	1.45
20	1.53
25	1.60
32	1.69
37	1.76
44	1.82

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

$$f = (V_{75} - V_{25}) / A_{50}(T_{75} - T_{25})$$

V₇₅-V₂₅ = 0.936
A₅₀ = 5.550
T₇₅-T₂₅ = 28

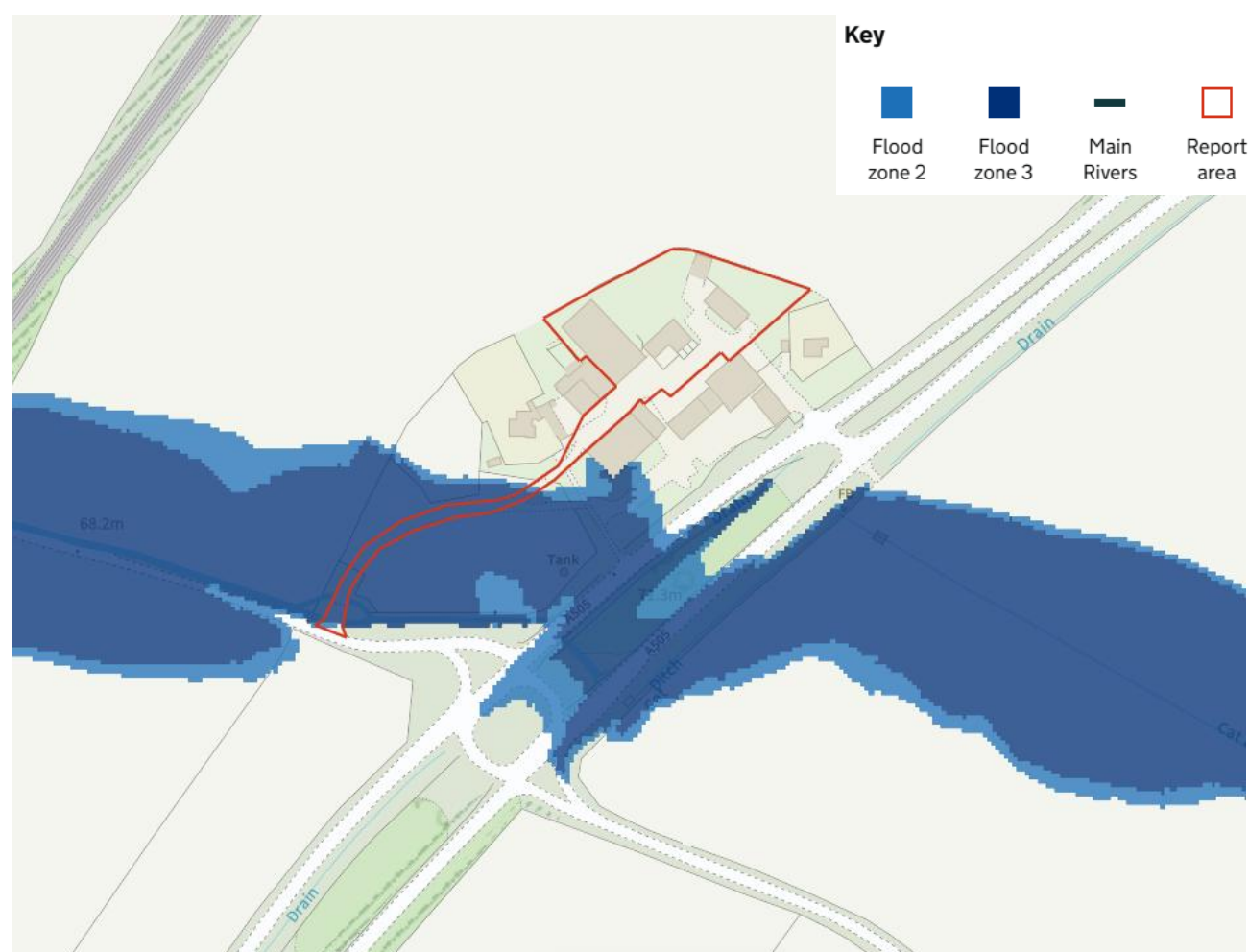
Soil Infiltration Rate

$$f = \underline{\underline{1.00E-04}} \text{ m/s}$$

Appendix G

Flood Map Extracts

River and Sea Flooding



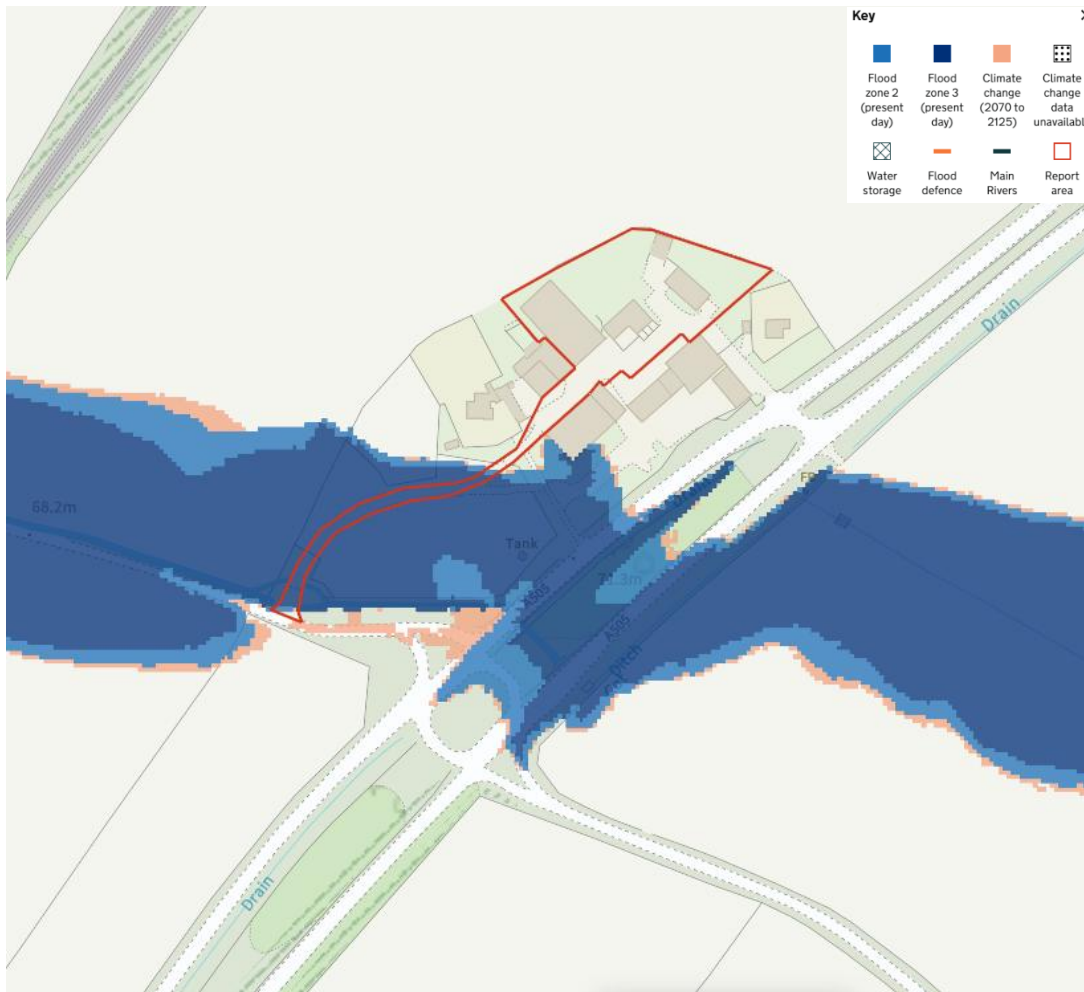
Flood Map For Planning

Flood risk from rivers or the sea

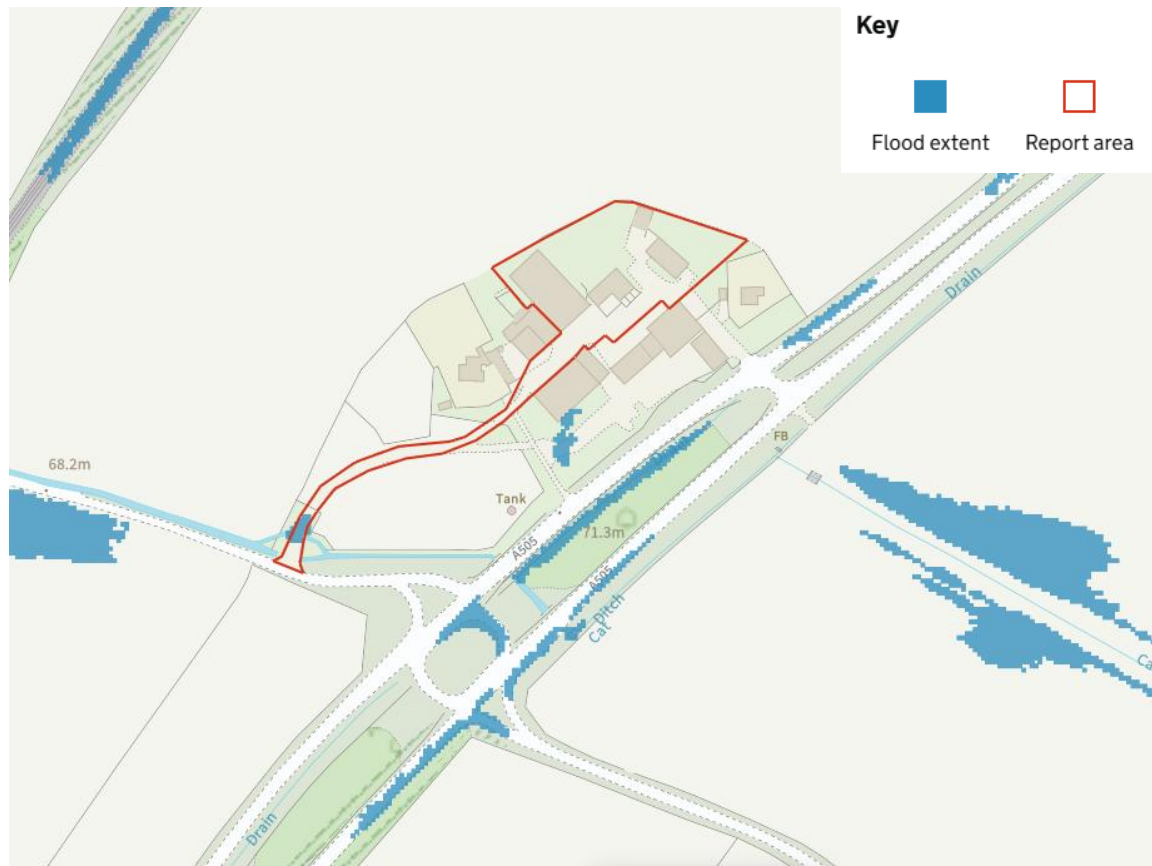
Low Probability (Flood Zone 1) means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium Probability (Flood Zone 2) means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

High Probability (Flood Zone 3) means that each year this area has a chance of flooding of greater than 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.



Surface Water Flooding



Flood Map – Surface Water – low risk scenario (between 0.1 and 1% chance of flooding each year)

Flood risk from surface water

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Appendix H

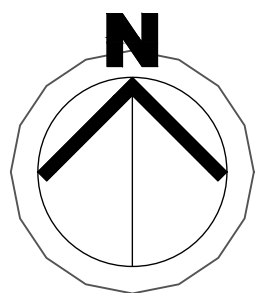
Drainage Design Calculations

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	Car Park	24	74.334	0.184	211.3	70.7249	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)					
30 minute summer	Car Park	Infiltration	54.8					

Appendix I

Proposed Drainage Scheme



Shading denotes permeable paving

Site Boundary

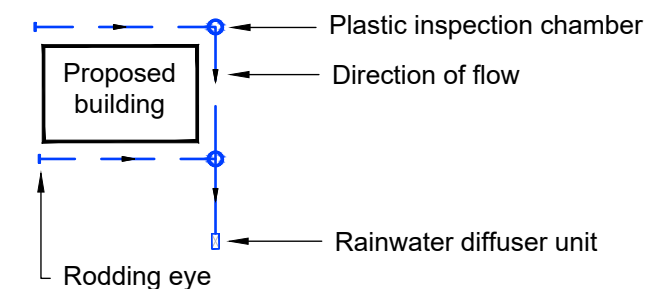
Denotes rainwater diffuser units within sub-base of permeable paving

Notes

This drawing is indicative and shows outline drainage and flood risk mitigation intent for the site.

Design to be developed for final scheme based on the principles shown on this drawing.

Key



Denotes permeable paving with 200mm sub-base depth.

Weirs within sub-base can be incorporated at detailed design stage if required.

PRELIMINARY - NOT FOR CONSTRUCTION

P02	PRELIMINARY	CW	JD	JD	02.04.2026
P01	PRELIMINARY	CW	MH	JD	17.02.2026
Rev.	Amendment	Drn.	Chkd.	Appd.	Date

FLOOD RISK ASSESSMENT
SLIP END FARM, BALDOCK

PROPOSED DRAINAGE SCHEME

Scott White and Hookins

Structural Engineering Civil Engineering Sustainability and BREEAM CDM Consultancy

Scale at A3 1: 500

DO NOT SCALE FROM THIS DRAWING

205149-SWH-ZZ-XX-D-C-0050 P02

Project | Originator | Zone | Level | Type | Role | Number | Rev.

Appendix J

SW Drainage Maintenance Schedule

This schedule sets out the inspection and maintenance requirements for long term management of the development's surface water drainage system. This work is to be undertaken by the Client.

All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The site's infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.

The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on to maintenance operatives through task specific risk assessments.

There are three types of maintenance activities associated with surface water drainage systems.

The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – *'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'*
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'*

SuDS Components Operation and Maintenance Activities

Operation and Maintenance activity	SuDS component (Components shown thus ' Wetland ' are not relevant to the project for which this schedule has been compiled.)												
	Pond	Wetland	Detention basin	Infiltration basin	Sockaway	Infiltration Trench	Filter Drain	Modular Storage	Pervious Pavement	Swale/bioretention/trees	Filter Strip	Green Roofs	Proprietary Treatment Systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

■ Will be required □ May be required

¹ Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Piped Network / Chambers

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Permeable Pavements

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 year or as required (if infiltration and

		filtration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and / or weed growth - If required, take remedial action.	Three-monthly, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements		

Water Butt

Water Butt Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris.	Annually (or following poor performance)
Occasional maintenance	Replacement of any filters.	As required.
Remedial Actions	Repair of erosion damage, or damage to tank.	As required.
Monitoring	Inspection of the tank for debris and sediment build up.	Annually (or following poor performance)
	Inspection of inlets, outlets and withdrawal devices.	Annually (or following poor performance)
	Inspection of areas receiving overflow, for evidence of erosion.	After extreme storms.
	Inspection of roof drain filters.	Annually (or following poor performance)

Appendix K

National Planning Guidance

- 2.1** The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied by Local Planning Authorities and decision-makers, both in drawing up plans and making decisions about planning applications. Section 14 of the NPPF sets out how the challenges of climate change, flooding and coastal change will be approached through planning and development.
- 2.2** The interpretation of the NPPF is supported by the Planning Practice Guidance (PPG), last updated September 2025. This is a web-based resource which sets out how the government's planning policies are expected to be applied in England. The flood risk and coastal change section of the PPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
- 2.3** Traditionally surface water runoff from developments has been conveyed by pipe systems to the nearest watercourse or sewer. This tends to increase the rate and volume of the run off often leading to flooding downstream of the new development. Latest policy promotes the use of sustainable urban drainage systems (SuDS) whereby the control of run off is to be as close to source as possible. This can be achieved by utilising techniques which mimic the natural drainage processes, the use of direct infiltration for example. The Lead Local Flood Authority will, in general, seek to restrict the allowable discharge from a new development to that previously expected from the undeveloped land.
- 2.4** In terms of what sort of sustainable drainage may be appropriate to consider, the PPG states this will depend on the proposed development and its location, as well as any planning policies and guidance that apply locally. Where possible, preference should be given to multi-functional SuDS, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:
- priority 1: collected for non-potable use
 - priority 2: infiltrated to ground
 - priority 3: discharged to an above ground surface water body
 - priority 4: discharged to a surface water sewer, or another piped surface water drainage system
 - priority 5: discharged to a combined sewer

Note 1: priority 1 is the highest priority and priority 5 is the lowest.

The hierarchy is consistent with Defra National Standards for sustainable drainage systems (SuDS).

- 2.5** The Requirements of a Flood Risk Assessment:

A Flood Risk Assessment is required in order to ascertain whether a development will exacerbate the risk of flooding elsewhere in the catchment or is at risk of flooding itself. A site specific FRA is required for developments: -

- in flood zone 2 or 3 including minor development and change of use
- more than 1 hectare (ha) in flood zone 1
- less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
- in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency

2.6 Local Policies

The North Hertfordshire Local Plan outlines the different requirements of new developments. The requirements of the Local Plan relating to flood risk and sustainable drainage states:

Policy NE7: Reducing flood risk Planning permission for development proposals will be granted provided that (as applicable):

- a) Development is located outside of medium and high-risk flood areas (flood zone 2 and 3) and other areas affected by other sources of flooding where possible;
- b) Where (a) is not possible, application of the sequential and exception tests is demonstrated where development is proposed in areas of flood risk using the Strategic Flood Risk Assessment (SFRA) and Environment Agency flood maps;
- c) A FRA has been prepared in accordance with national guidance that considers the lifetime of the development, climate change impacts and safe access and egress;
- d) It will be located, designed and laid out to ensure the risk of flooding is reduced whilst not increasing flood risk elsewhere;
- e) The impact of any residual flood risk will be minimised through flood resistant, resilient design and construction;
- f) Any flood protection and mitigation measures necessary will not cause harm to nature conservation, heritage assets, and/ or landscape and recreation and, where possible, will have a positive impact in these respects; and
- g) Overland flow routes and functional floodplain areas are protected from all development other than that which is "water compatible" and this must be designed and constructed to remain operational and safe for users during flood events, resulting in no net loss of flood plain storage and not impeding water flows or increasing flood risk elsewhere.

Policy NE8: Sustainable drainage systems Planning permission for development will be granted provided that: a) The most appropriate sustainable drainage solution is used taking into account technical, viability and design issues to reduce the risk of surface water flooding, enhance biodiversity, water quality and provide amenity benefits; b) It aims to mimic the natural drainage patterns and processes as far as possible; and c) Drainage solutions follow the SuDS hierarchy.