

Surface Water Drainage Strategy for Planning

August 2026

Prepared for:

Danworth Farm Ltd

Location:

Danworth Farm

Cuckfield Road

Hurstpierpoint

BN6 9GL

Our reference:

97486-Ventham-DanworthFarm



Document Issue Record

Project Details	
Project:	Surface Water Drainage Strategy for Planning
Prepared for:	Danworth Farm Ltd
Application:	New mixed use barn for agricultural equipment storage and general storage for use by existing tenants, office and warehouse
Location:	Danworth Farm, Cuckfield Road, Hurstpierpoint, BN6 9GL
Our reference:	97486-Ventham-DanworthFarm
Issue no.:	v1.0
Issue date:	24 th August 2026

Project Consultants	
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Authorisation:	Mr Antony Rousou, BSc (Hons) C.WEM MCIWEM

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1. Introduction

- 1.1. This Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Danworth Farm Ltd, in support of a planning application for the new mixed use barn for agricultural equipment storage and general storage for use by existing tenants, office and warehouse. The proposed development is being undertaken at Danworth Farm, Cuckfield Road, Hurstpierpoint, BN6 9GL. This report sets out the surface water drainage arrangements for the proposed development.
- 1.2. The proposed planning application is for the new mixed use barn for agricultural equipment storage and general storage for use by existing tenants, office and warehouse. Post development the roof area of the proposed barn will cover approximately 605m².
- 1.3. In order to mitigate flood risk posed by post development runoff, adequate control measures will be required within the site. This will ensure that surface water runoff is dealt with at source and the flood risk off site is not increased.



Figure 1: Aerial view of the site and surrounding area (Source: Google Earth)

2. Existing Site

- 2.1. The site is currently a field.
- 2.2. The surrounding area is characterised by buildings associated with Danworth Farm, and agricultural land.
- 2.3. Existing plans are provided in the report Appendix.

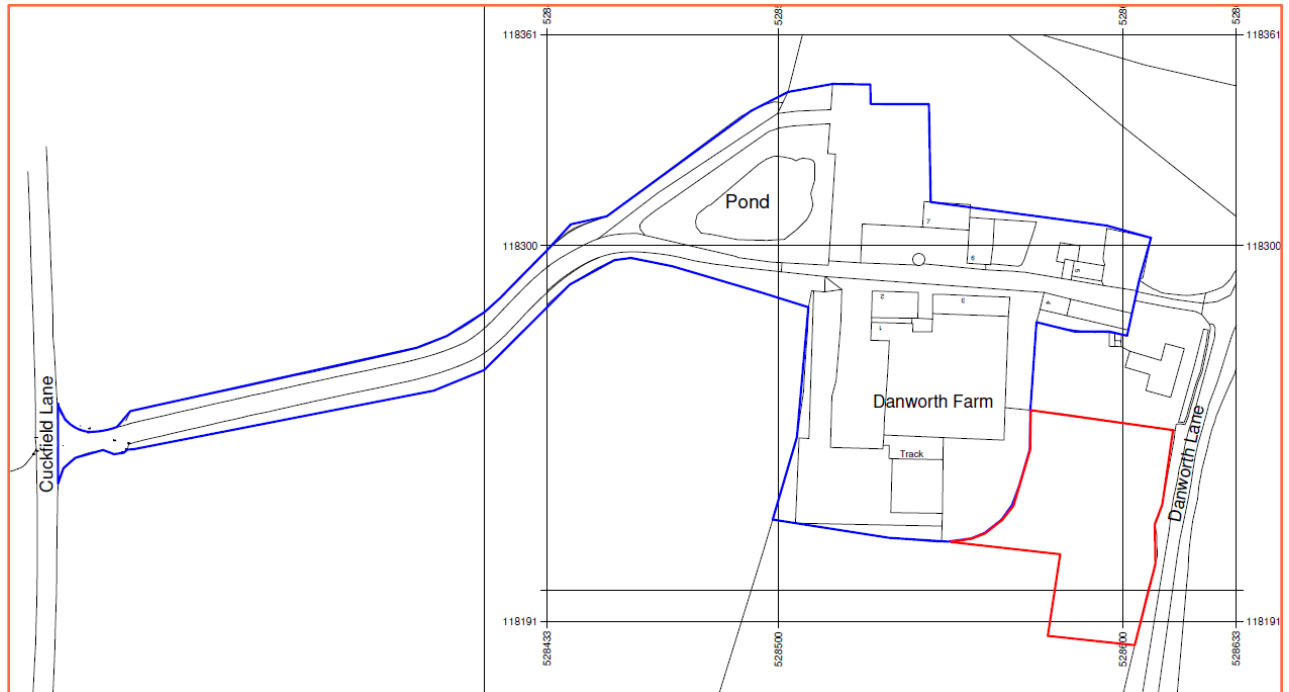


Figure 2: Site Location Plan (Source: Claire Haigh Associates Ltd)

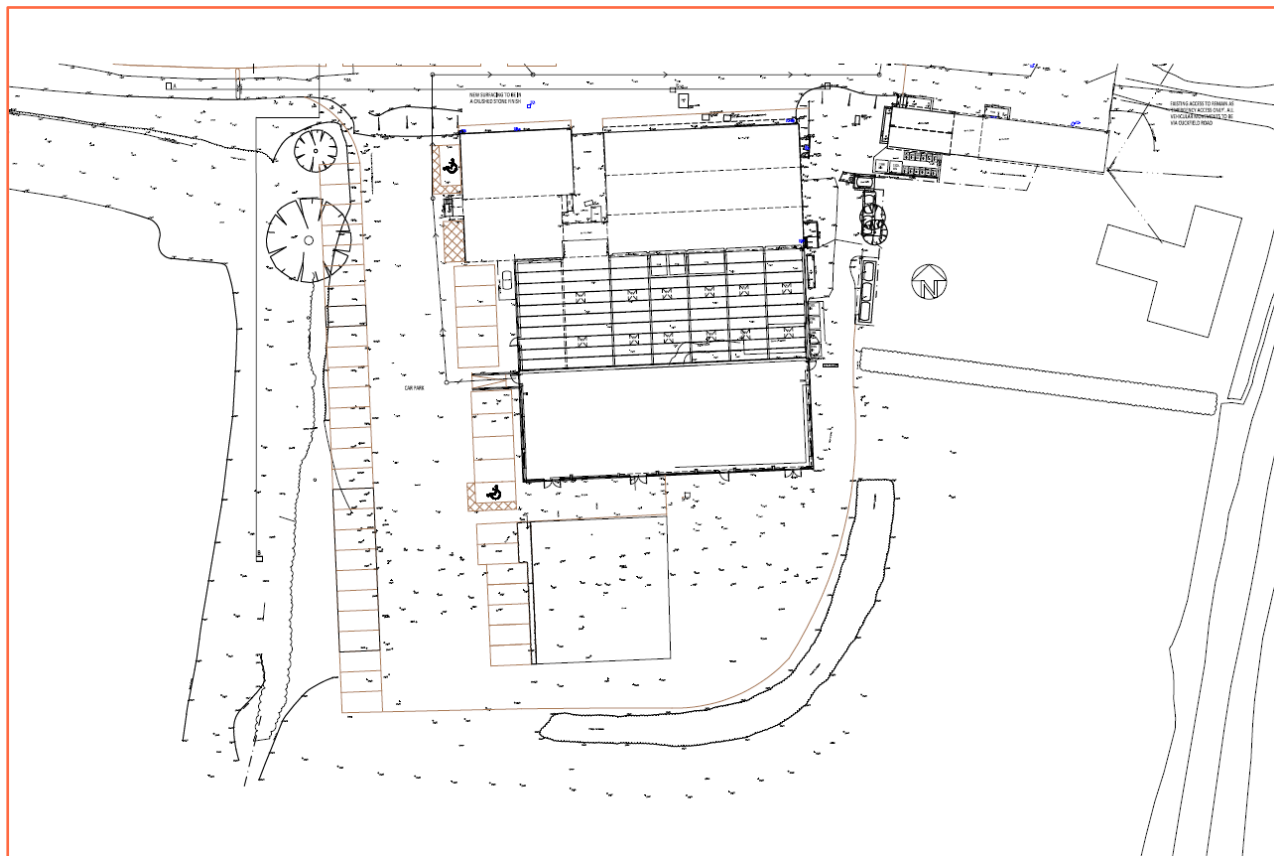


Figure 3: Existing block plan (Source: Claire Haigh Associates Ltd)

Site Topography:

- 2.4. A topographic survey of the site shows ground topography on site ranges from 27.79m AOD to 28.73m AOD.

Existing Ground Conditions:

- 2.5. The 1:50,000 BGS map shows that the bedrock underlying the site is Weald Clay Formation – Mudstone.
- 2.6. The BGS hold no records of superficial deposits underlying the site.
- 2.7. The soil type taken from the UKSO Soil Map Viewer shows the site to be located upon relatively deep soils of claystone/mudstone parent material with a soil texture of clay to clayey loam.
- 2.8. The published Environment Agency Groundwater Source Protection Zone map shows the site is not located within a Groundwater Source Protection Zone.

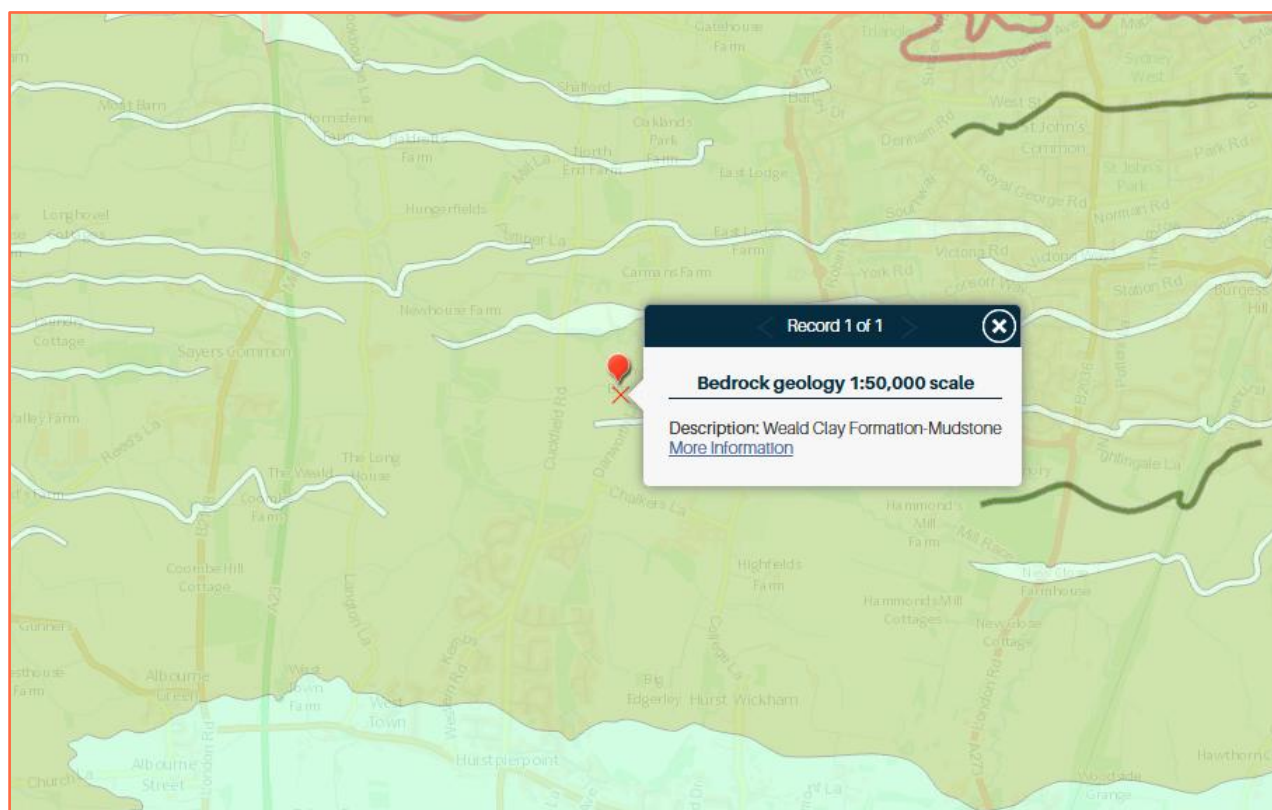


Figure 4: BGS Bedrock Geology (Source: BGS)

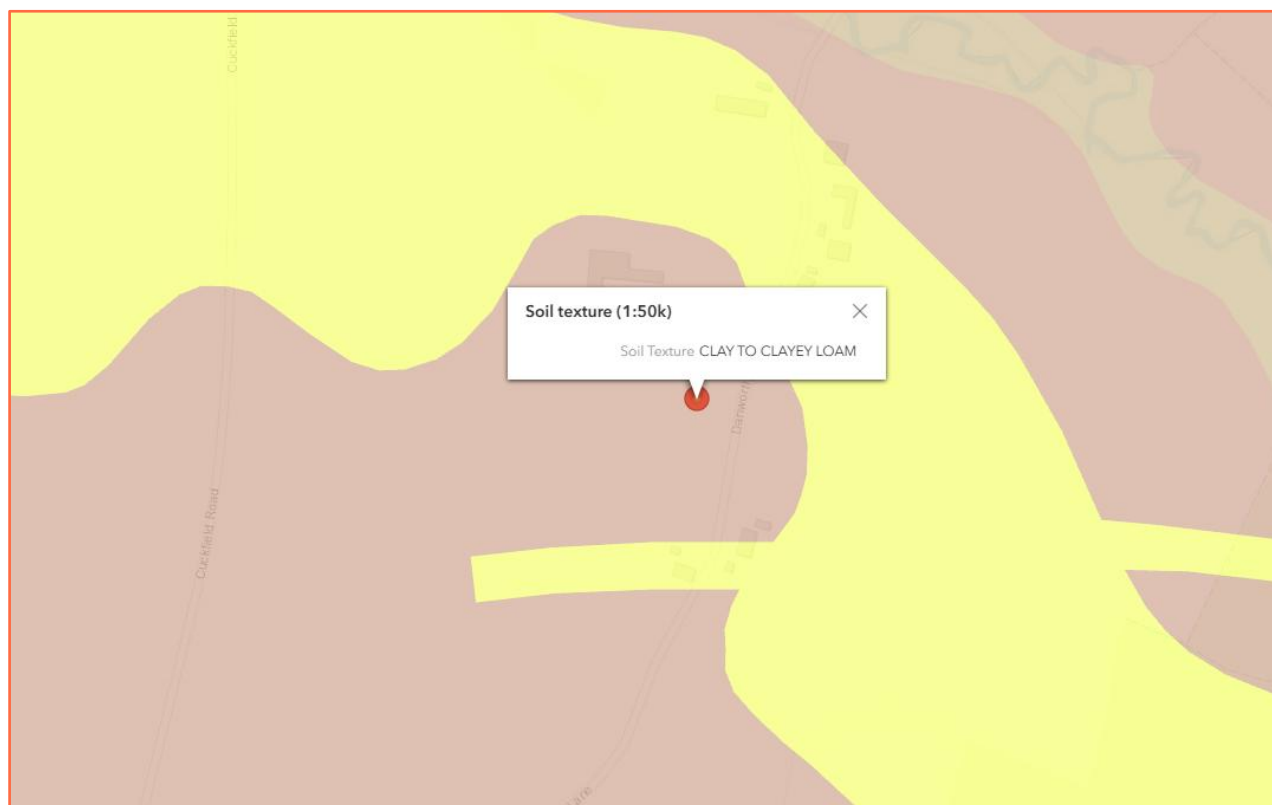


Figure 5: Soil map (Source: UK Soils, BGS)

Nearby Watercourses / Drainage Features:

- 2.9. The nearest drainage feature is a ditch adjacent to the site's eastern boundary. The ditch flows northward and is understood to be a tributary of the Herrings Stream.

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3. Development Proposal

- 3.1. The proposed planning application is for the new mixed use barn for agricultural equipment storage and general storage for use by existing tenants, office and warehouse. Post development the roof area of the barn will cover approximately 605m².
- 3.2. In light of this, SuDS storage sizing within the strategy has been based on a total area of 605m².
- 3.3. Proposed plans are provided in the report Appendix.

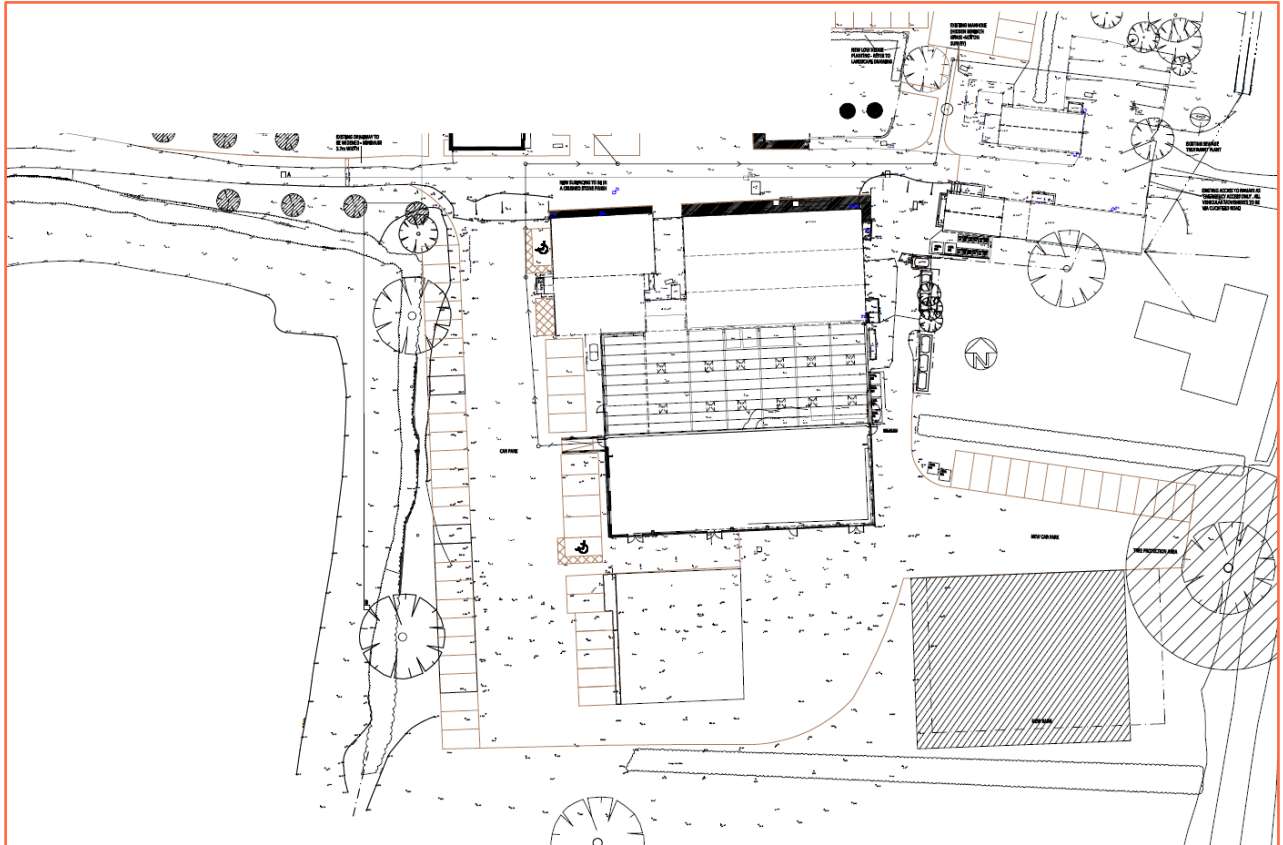


Figure 6: Proposed block plan (Source: Claire Haigh Associates Ltd)

4. Surface Water Drainage Strategy

Existing Drainage:

- 4.1. The existing site is a field, and is therefore understood to discharge its surface water via runoff and infiltration.

Drainage Hierarchy:

- 4.2. In order to mitigate flood risk posed by post development runoff, adequate control measures will need to be considered within the site. This will ensure that surface water runoff is dealt with at source and flood risk is not increased elsewhere.
- 4.3. The drainage strategy for the site has been prepared according to the drainage discharge hierarchy from CIRIA C753 The SuDS Manual, as follows:
1. Infiltration to the maximum extent that is practical;
 2. Discharge to surface waters;
 3. Discharge to surface water sewer;
 4. Discharge to combined sewer.

Infiltration Potential:

- 4.4. The 1:50,000 BGS map shows that the bedrock underlying the site is Weald Clay Formation – Mudstone. The soil type taken from the UKSO Soil Map Viewer shows the site to be located upon relatively deep soils of claystone/mudstone parent material with a soil texture of clay to clayey loam.
- 4.5. Infiltration testing was conducted on the site. Two trial pits were excavated to 1.6m below ground level (bgl) to test suitability of soakaways. One trial pit was excavated to 0.6m bgl to test suitability of permeable paving.
- 4.6. The 1.6m deep trial pits failed to drain down to the 25% marker within 24 hours. As such, soakaways are not considered suitable.
- 4.7. The 0.6m deep trial pit, located in the area of the proposed car park, returned a minimum infiltration rate of 2.35×10^{-6} m/s. As such, permeable paving can be considered suitable.
- 4.8. A fourth pit was excavated to 2.6m bgl to monitor for groundwater. Groundwater penetration was observed at approximately 2m bgl. After six hours, 100mm of water was present at the base of the pit.

Proposed Discharge Rate and Location:

- 4.9. The greenfield runoff rate for the area of the site being attenuated has been calculated as 0.3 l/s for the 1:1 annual runoff event, 0.7 l/s for the 1:30 year event and 0.9 l/s for the 1:100 year event. The QBar greenfield runoff rate for the area of the site being attenuated is 0.4 l/s. Refer to calculations in Appendix.
- 4.10. Runoff from the roof area of the barn will be directed into the cellular storage attenuation located to the southeast of the barn.
- 4.11. From the cellular storage, runoff will be gradually discharged to the ditch adjacent to the site's eastern boundary. The discharge will be limited to 0.4 l/s for all storms up to the 1:100 year + 45% climate change event via a Hydro-Brake. The Hydro-Brake will be installed in an inspection chamber within the site.
- 4.12. The ditch is understood to be within the Applicant's ownership and have onward connectivity to the Herrings Stream. Ordinary Watercourse Consent for the proposed discharge will be obtained from the LLFA.

- 4.13. The discharge rate of 0.4 l/s matches the greenfield QBar runoff rate for the area being drained, and is therefore in accordance with MSDC's Flood Risk and Drainage Team's comments dated 2nd April 2026.
- 4.14. All new ground surfaces will be of permeable construction, with permeable paving utilised for the new parking area.

Cellular Storage Attenuation:

- 4.15. The proposed area discharging into the cellular storage amounts to approximately 605m².
- 4.16. Preliminary calculations indicate that sufficient storage required to attenuate runoff from the proposed barn's roof area arising from the critical 1:100 year + 45% climate change event can be provided by cellular storage of dimensions 165m² x 0.4m deep x 0.95 (voids).
- 4.17. Preliminary calculations indicate that some 62.7m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 4.18. *Please note that the levels and locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes.*
- 4.19. All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to Appendix.

Water Quality:

- 4.20. Water quality has been assessed in line with the Simple Index approach from Chapter 26 of CIRIA C753 The SuDS Manual:

Step 1 – Allocate suitable pollution hazard indices for the proposed land use.

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.

- 4.21. The highest pollution hazard level for the proposed land use is Low (non-residential car parking with infrequent change). The pollution hazard indices for this land use are shown in the table below.

Land Uses	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Non-residential car parking with infrequent change	Low	0.5	0.4	0.4

Table 1: Pollution hazard indices for the proposed site (from Table 26.2 of CIRIA C753 The SuDS Manual)

- 4.22. All SuDS components are assessed for their effectiveness in pollutant removal prior to discharge in Table 26.3 in CIRIA C753 The SuDS Manual. The pollution mitigation indices for permeable pavements are shown in the Table below.

SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7

Table 2: Pollution mitigation hazard indices for permeable pavements

- 4.23. The Pollution Mitigation Indices for permeable pavement are greater than the Pollution Hazard Indices for non-residential car parking with infrequent change. Therefore, permeable pavements will provide sufficient water quality treatment.

- 4.24. Roof water will contain negligible contaminant concentrations and does not warrant treatment. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

Design Exceedance:

- 4.25. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

Adoption and Maintenance:

- 4.26. It is proposed that all SuDS facilities will be maintained privately by the end users.
- 4.27. A draft Maintenance Schedule is outlined below.
- 4.28. In addition, it is recommended that all drainage elements are inspected following the first storm event and monthly for the first 3 months following commissioning.

Permeable Paving:

- 4.29. Permeable surfaces should be maintained with the following actions at the specified intervals to preserve their infiltration capacity and structural integrity, or in line with the manufacturer's recommendations.

Maintenance Schedule	Action	Frequency
Routine Maintenance	- Clean of silt and other sediments using a brush and vacuum. - Remove any other debris.	Three times a year: - End of winter - Mid-summer - After autumn leaf fall Or as required.
Occasional Maintenance	- Removal of weeds manually or with weedkiller. - Stabilise adjacent landscaped areas to prevent sediment spills onto surface.	Action as required.
Remedial Actions	- Replace damaged or lost blocks. - Level depressions in the surface. - Apply pure rock salt de-icer free from additional sand or grit.	Action as required.
	Rehabilitation of upper substructure by remedial sweeping of joints and reapplication of jointing material.	Every 10 – 15 years or as required (if infiltration performance is reduced due to clogging of joints).
Monitoring	Initial inspection.	Monthly for 3 months post-installation.
	Inspect for poor infiltration performance or structural damage and take remedial action as necessary.	Every three months 48hrs after storm events.
	Visually inspect for blocked joints between pavers.	Annually.
	Monitor inspection chambers.	Annually.

Table 3: Suggested maintenance regime for permeable paving

- 4.30. Materials removed from the voids or the layers below the surface of the paving may contain hazardous substances such as heavy metals and hydrocarbons which may need to be disposed of as controlled waste.

Cellular Storage:

- 4.31. It is not envisaged that silt build up within the cellular crate systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits and inspection chambers on a regular basis. Notwithstanding this, a suitable maintenance regime is outlined in the table below.

Maintenance Schedule	Action	Frequency
Routine Maintenance	• Remove silt build-up from system.	Action as required.
	• Remove debris from catchment surface if it may cause risks to performance.	Action as required.
Remedial Actions	• Repair inlets, outlets and overflows.	Action as required.
Monitoring	• CCTV inspection of crates for silt build-up to establish silt removal frequencies.	Following first storm event and every five years thereafter.
	• Inspection of inlet, outlet and overflow pipework for silt accumulation to establish silt removal frequencies.	Monthly for first 3 months and annually thereafter.
	• Inspection of inlets, outlets and overflows to ensure they are functioning correctly.	Annually.

Table 4: Suggested maintenance regime for cellular storage

- 4.32. Inspection and maintenance access can be gained via inspection chambers and inlet pipework.
- 4.33. Jetting should be undertaken in accordance with current jetting guidelines, particularly the Sewer Jetting Code of Practice published by The Water Research Centre. Jetting at 150 bar at 300 l/min should be more than adequate in removing any build-up of material. However, unlike regular jetting which relies heavily on high pressure to remove hardened deposits on the inner bore of pipes, effective cleansing of a crate system relies more on the delivery flow rate to flush solids back through the system.
- 4.34. A standard jet head with rear facing nozzles should be used. The head should be fed to the far end of the crate tunnel via the nearest inspection chamber, activated and retracted. As the nozzle is removed, debris will be swept back into the inspection chamber where it can then be removed with the use of a standard gully sucker. This method will ensure the effective removal of gross solids (carrier bags, cans, leaf litter etc.) from the system. Whilst 100% removal cannot be guaranteed, it has been shown that this jetting method will also remove an element of finer material which would otherwise be 'lost' within the system.

Pipework, Inspection Chambers, Catchpits and Flow Controls:

- 4.35. It is not envisaged that silt build up within the pipework systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems is outlined in the table below.

Maintenance Schedule	Action	Frequency
Routine Maintenance	• Remove silt and debris from inspection chambers, catchpits and flow controls.	Annually or as required.
	• Cleaning of gutters and downpipe filters.	
	• Remove root ingress.	Action as required.
Monitoring	• Inspect for silt and debris.	Every three months.
	• CCTV survey of drainage system to identify alignment issues, cracked pipes or leaking joints.	Every 10 years.

Table 5: Suggested maintenance regime for pipework, inspection chambers, catchpits and flow controls

5. Discussion and Conclusion

- 5.1. This Surface Water Drainage Strategy has been prepared by Unda Consulting Limited on behalf of Danworth Farm Ltd, in support of a planning application for the new mixed use barn for agricultural equipment storage and general storage for use by existing tenants, office and warehouse. The proposed development is being undertaken at Danworth Farm, Cuckfield Road, Hurstpierpoint, BN6 9GL. This report sets out the surface water drainage arrangements for the proposed development.
- 5.2. The site is currently a field.
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- 5.4. The 1:50,000 BGS map shows that the bedrock underlying the site is Weald Clay Formation – Mudstone.
- 5.5. The BGS hold no records of superficial deposits underlying the site.
- 5.6. The soil type taken from the UKSO Soil Map Viewer shows the site to be located upon relatively deep soils of claystone/mudstone parent material with a soil texture of clay to clayey loam.
- 5.7. The published Environment Agency Groundwater Source Protection Zone map shows the site is not located within a Groundwater Source Protection Zone.
- 5.8. The nearest drainage feature is a ditch adjacent to the site's eastern boundary. The ditch flows northward and is understood to be a tributary of the Herrings Stream.
- 5.9. The 1:50,000 BGS map shows that the bedrock underlying the site is Weald Clay Formation – Mudstone. The soil type taken from the UKSO Soil Map Viewer shows the site to be located upon relatively deep soils of claystone/mudstone parent material with a soil texture of clay to clayey loam.
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- 5.18. The discharge rate of 0.4 l/s matches the greenfield QBar runoff rate for the area being drained, and is therefore in accordance with MSDC's Flood Risk and Drainage Team's comments dated 2nd April 2026.
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- 5.22. Preliminary calculations indicate that some 62.7m³ of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.
- 5.23. The highest pollution hazard level for the proposed land use is Low (non-residential car parking with infrequent change). The Pollution Mitigation Indices for permeable pavement are greater than the Pollution Hazard Indices for non-residential car parking with infrequent change. Therefore, permeable pavements will provide sufficient water quality treatment.
- 5.24. Roof water will contain negligible contaminant concentrations and does not warrant treatment. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.
- 5.25. It is proposed that all SuDS facilities will be maintained privately by the end users. A draft Maintenance Schedule is outlined within the report.
- 5.26. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

This drainage strategy has been undertaken in accordance with the principles set out in NPPF. We can conclude that providing the development adheres to the conditions advised above, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

**Unda Consulting Limited
August 2026**

Appendix

A – Development Plans:

- Site location, existing and proposed plans – Claire Haigh Associates Ltd.

B – Topographic Survey:

- Topographic Survey – M.J. Zara Associates.

C – Infiltration Testing:

- Infiltration Test Report – Smart Drainz.

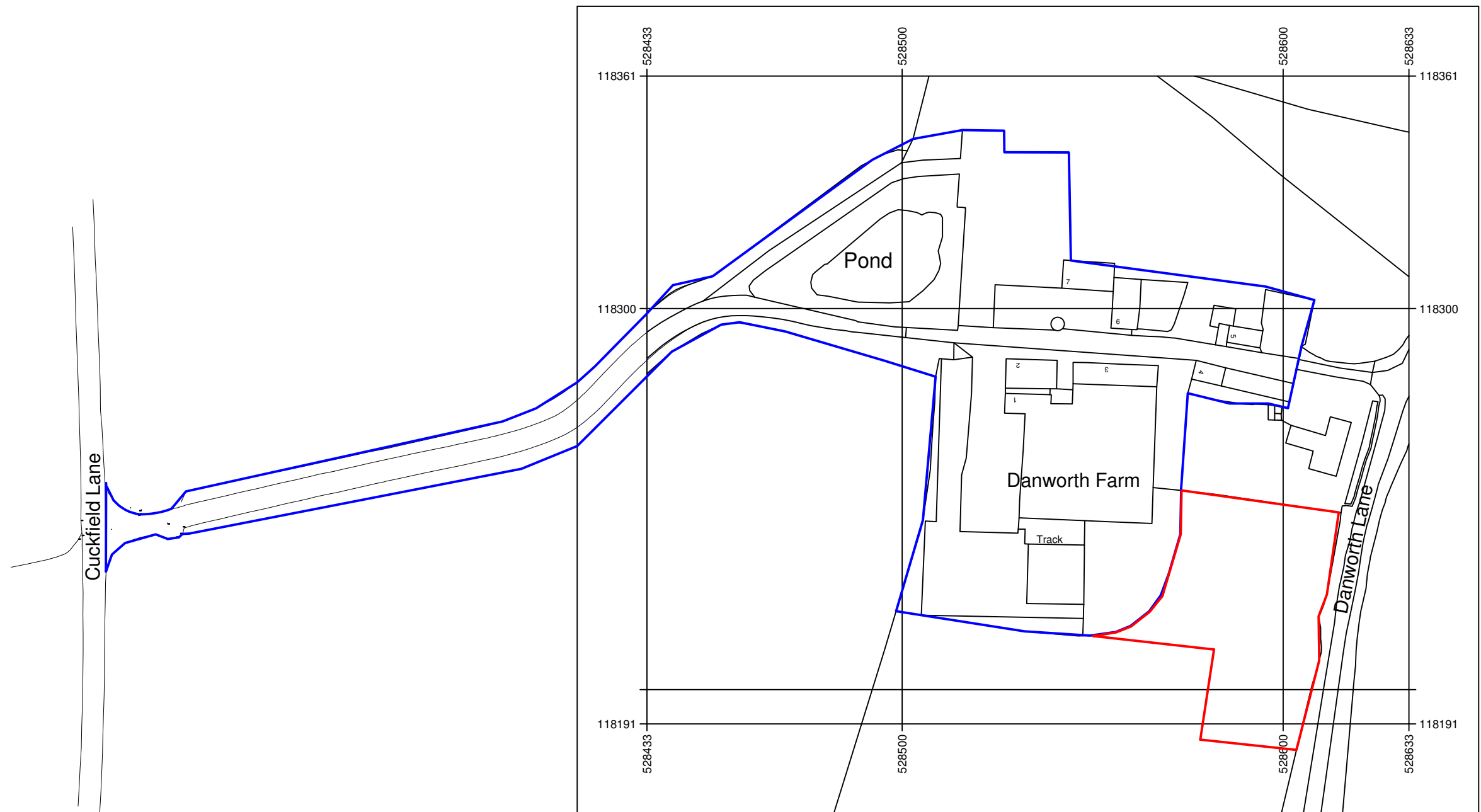
D – Causeway Calculations:

- IH124 Pre-Development Greenfield Runoff Calculations for the area of the site being attenuated;
- Cellular Storage (Depth/Area Storage Structure) Calculations.

E – Drainage Layout Plans:

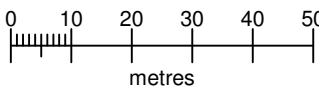
- Proposed Drainage Layout [97486-01].

Appendix A

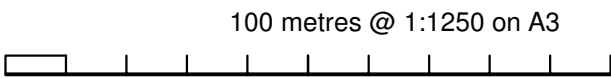


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NORTH



10 metres @ 1:1250 on A3

Proposed Location Plan 1:1250

A Location plan adjusted to
include neutral grassland Feb.26

rev.	date

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Building Control or other appropriate checking Authority
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No dimensions to be scaled from this drawing.
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Jeremy Ventham

project
Danworth Farm
Hurstpierpoint

drawing
Proposed Location Plan

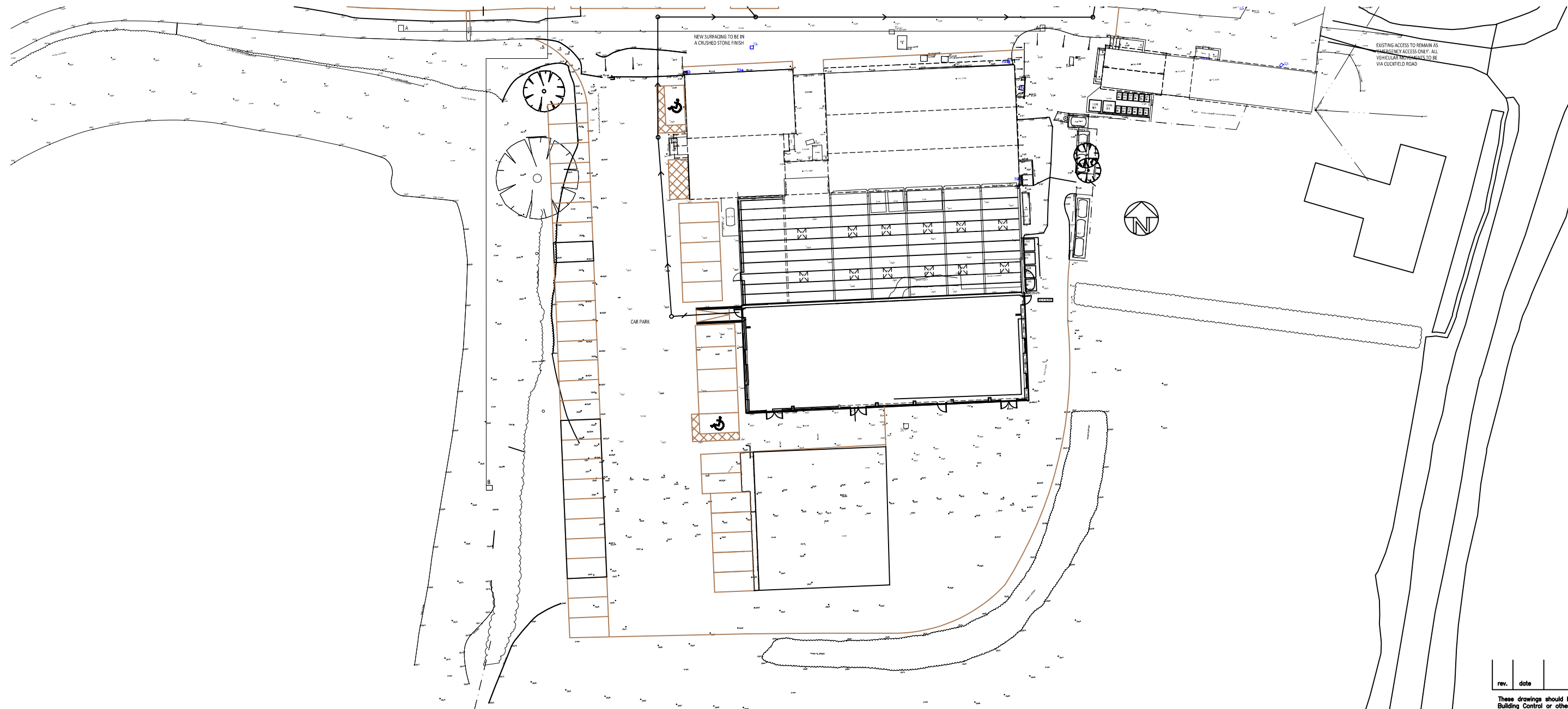
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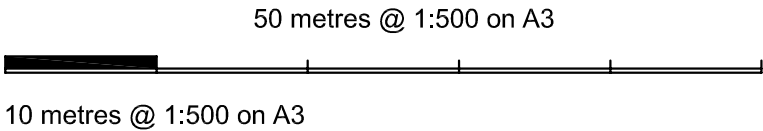
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 Claire Haigh
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CH 1312 /008 rev. B



Existing Block Plan 1:500



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drawing
Existing Block Plan
Proposed New Barn

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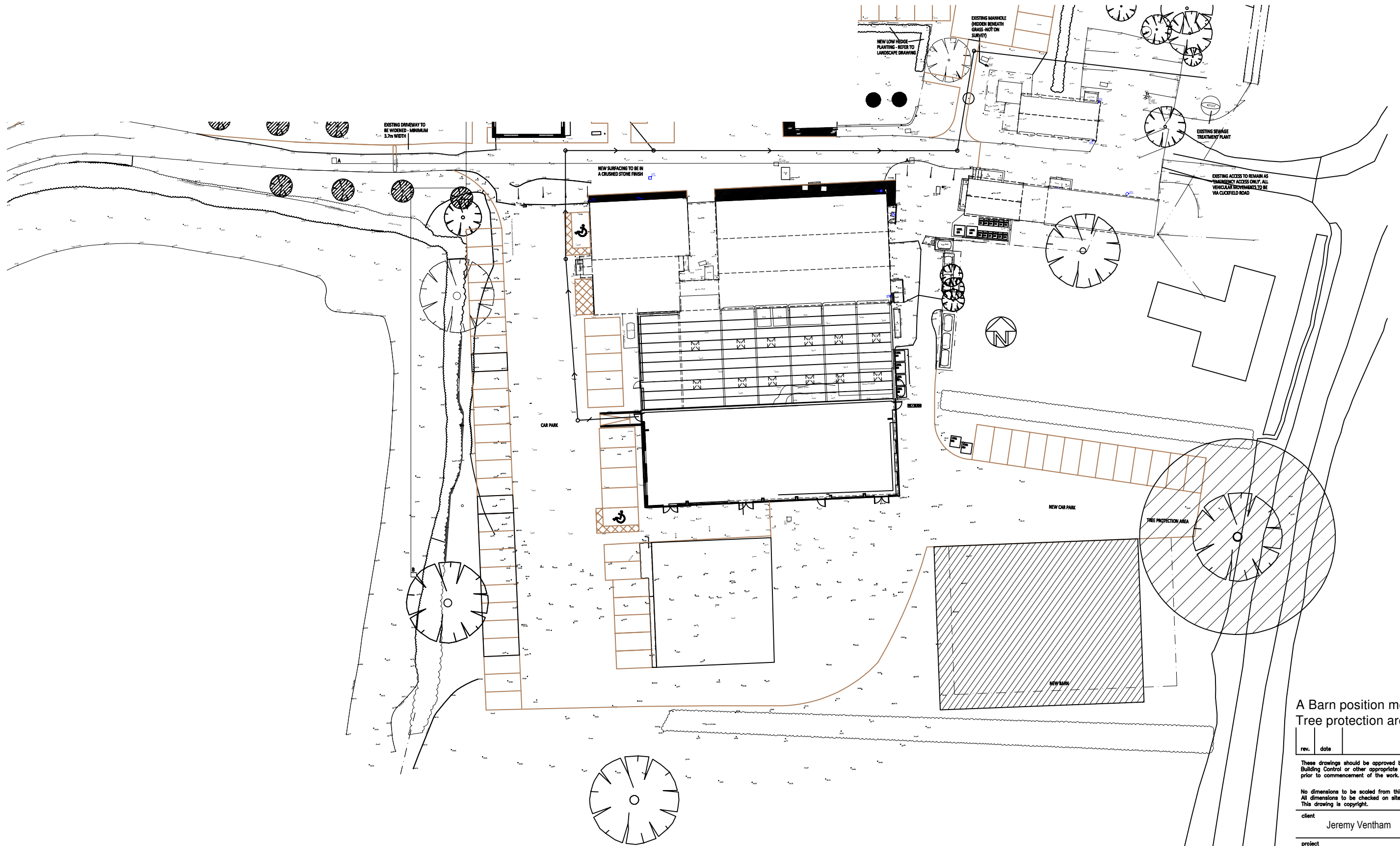
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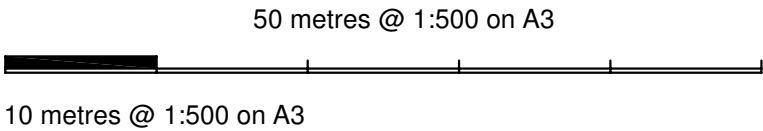
**Claire Haigh
Associates Ltd**

CH 1266 /009

rev.



Proposed Block Plan 1:500



A Barn position moved out of
Tree protection area Nov'25

rev.	date

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project
Danworth Farm
Hurstpierpoint

drawing
Proposed Block Plan
Proposed New Barn

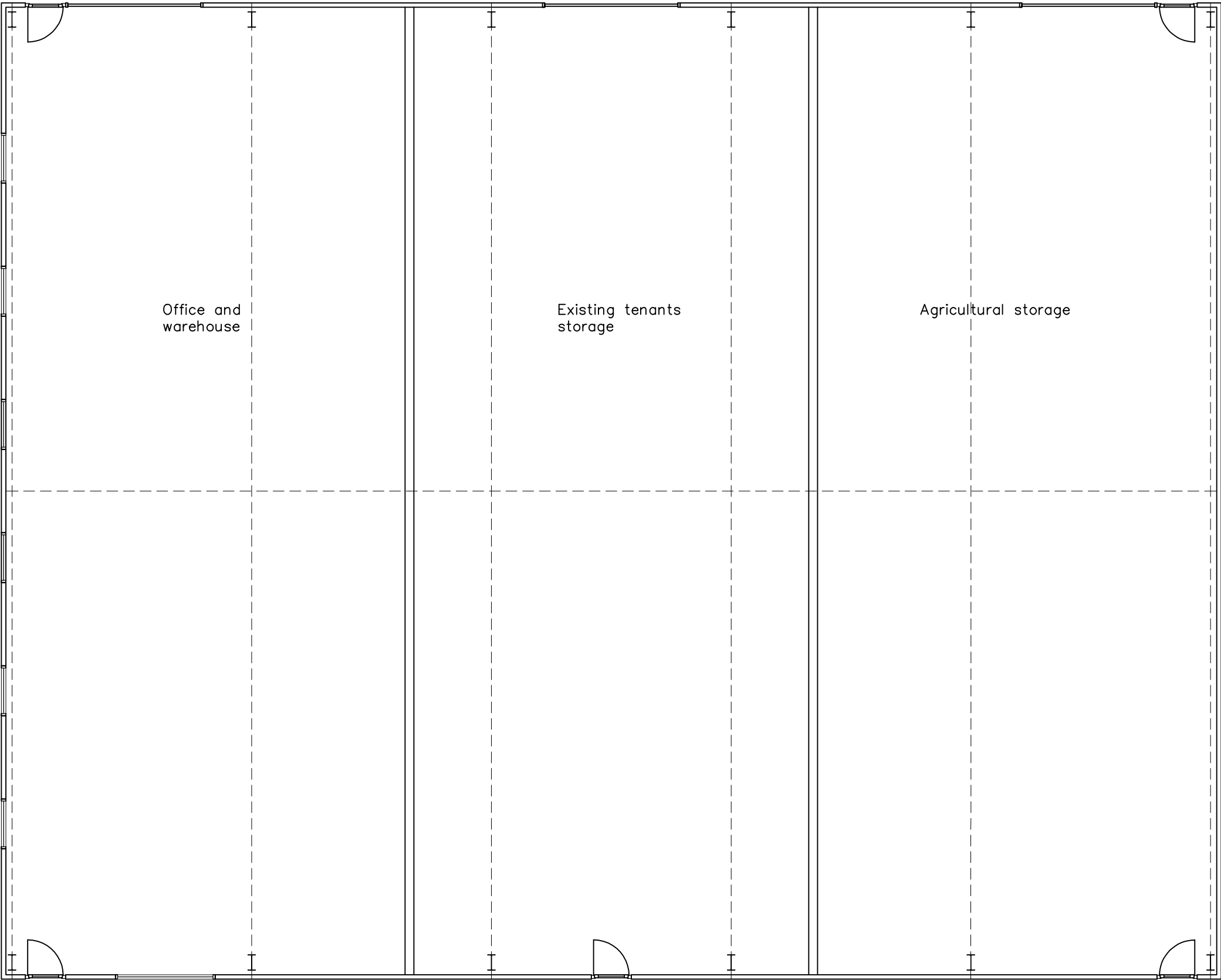
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CH 1266 /009 rev. A



10 metres @ 1:100 on A3

1 metre @ 1:100 on A3

B Barn divided into use areas
A Barn size altered and
position moved out of Tree
protection area Nov'25

rev.	date

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project
Danworth Farm
Hurstpierpoint

drawing
New Barn
Proposed Plans

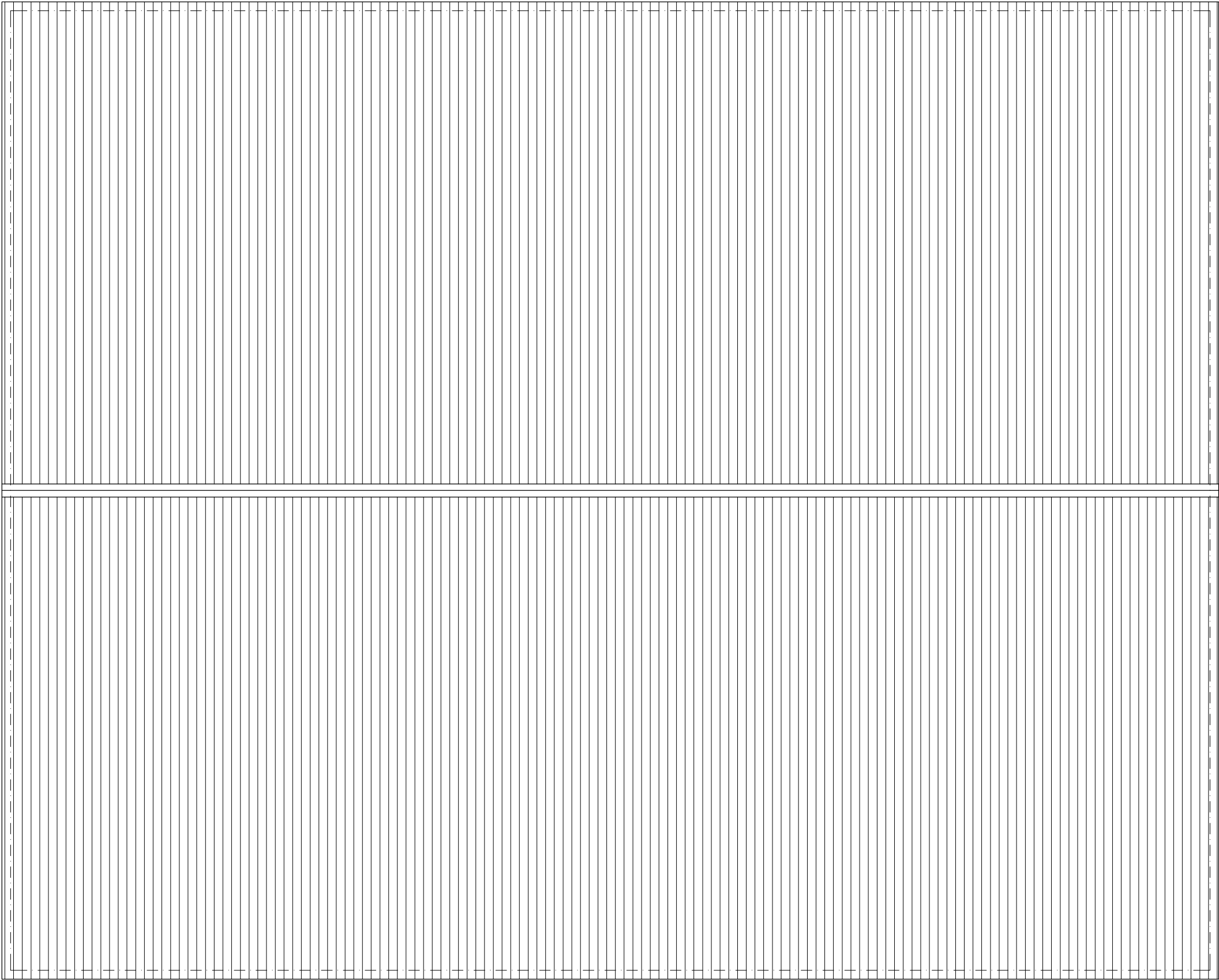
scale 1:100@A3 date 13.03.25

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A Barn size altered and
position moved out of Tree
protection area Nov'25

rev.	date

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project
Danworth Farm
Hurstpierpoint

drawing
New Barn
Proposed Roof Plan

scale 1:100@A3 date 13.03.25

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Associates Ltd

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10 metres @ 1:100 on A3

1 metre @ 1:100 on A3

Appendix B

Appendix C



Tel: 0333 202 7129

Email: info@smartdrainz.co.uk

Unit 3 Sandleheath Ind Est Fordingbridge SP6 1PA

Job Service Report

27 July 2026

Danworth Farm
Hurstpierpoint
England BN6 9GL
United Kingdom

Job Address

Hurstpierpoint
England
BN6 9GL
United Kingdom

Job Number

JB04451

BRE365 Soil Infiltration Test

The soil infiltration rate (f) is calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the test hole in contact with the water during the test monitoring period (time taken for the water level to fall between 75% and 25% of the initial test depth), and its base area. This figure is then divided by the test duration to give the soil infiltration rate in metres per second.

A soakage test hole was excavated to the same depth as anticipated in the full-size soakaway. It should have vertical sides trimmed square. A lot of water will be used to determine the soil infiltration rate so a water bowser may be needed. Fill the pit and allow it to drain three times to near empty; each time record the water level and time from filling, at intervals sufficiently close to clearly define water level versus time. The three fillings should be on the same or consecutive days. Calculate the soil infiltration rate from the time taken for the water level to fall from 75% to 25% effective storage depth in the pit, using the lowest f value of the three test results for design.

Groundwater Testing:

A fourth pit was excavated to establish if groundwater is present near to the bottom of any proposed soakage features. This pit was excavated to a depth of 2.6m bgl (i.e. 1m below the maximum trial pit depth).

Once dug, it should be monitored for groundwater ingress over the course of the day. The test hole was excavated at least 5m from the infiltration test hole to avoid any interaction.

Please see our results below.

Tasks

Staff Member	Task	Description
Ben Ford	Infiltration Test Hole 1. 300mm wide x 1.0 meter long x 600mm deep	Depth 0.6m First 400mm - dry hard sandy clay 400-600mm - moist sandy clay 75% marker at 450mm 25% marker at 150mm. Test time 8.5 hours to drop 300mm between 75% - 25% marker

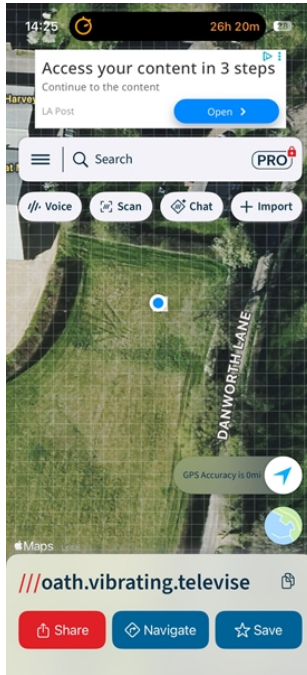
		Second test Test time 9.0 hours to drop 300mm between 75% - 25% marker
Ben Ford	Infiltration Test Hole 2. 450mm wide x 1.5 meter long x 1.6 meter deep	Depth 1.6m Similar substrate as Th1 600-1200mm - gravely sandy clay moist (10mm gravel) 1200-1600mm - blue sandy clay 75% marker at 1200mm 25% marker at 400mm After 24 hours level dropped 530mm from 75% marker Test failed to meet 25% marker over 24 hours Due to duration, no further tests were conducted
Ben Ford	Infiltration Test Hole 3 450mm wide x 1.5 meter long x 1.6 meter deep	Depth 1.6m Similar substrate to Th2 150mm sandy topsoil 150-300mm sandy clay 300-1200mm gravely clay (20-30mm stone) 1200-1600mm blue clay After 24 hours level dropped 60mm from 75% marker Test failed to meet 25% marker over 24 hours Due to duration, no further test were conducted
Ben Ford	Groundwater Test Hole 450 wide x 1.8 meter long x 2.6 meter deep	Depth 2.6m First 600mm - dry sandy clay(hard) From 900mm- wet sandy clay 1600-2200mm- gravel filled clay/sand band 2200 to 2600mm- sandy gravel with blue clay present After 6 hours there was 100mm of water in the bottom of test hole Ground water penetration observed at approximate depth of 2.0m

Notes

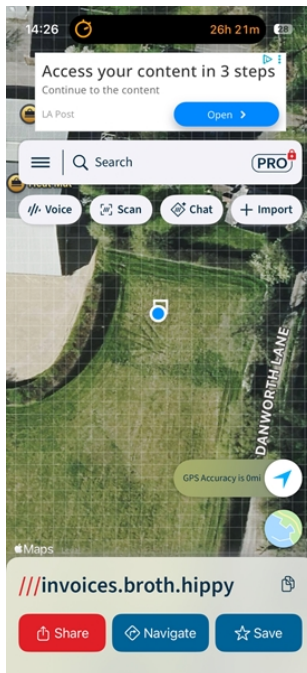
4 layers of substrate
 First 600mm - dry sandy clay(hard)
 From 900-1600mm wet sandy clay
 1600-2200mm- gravel filled clay/sand band
 2200-2600 - sandy gravel with blue clay present



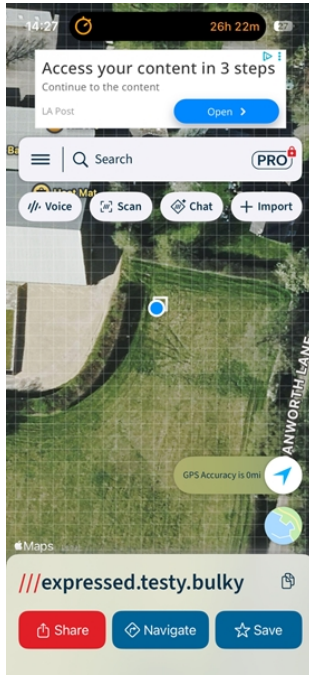
Th1



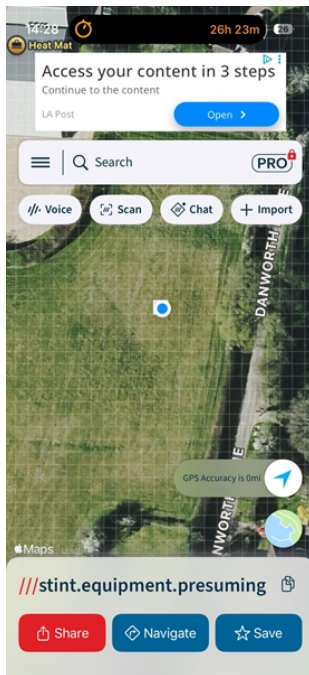
Ground water test hole location



Th2



Th3





Trial pit

Dimensions: 0.30 m (W) x 1.00 m (L), excavated depth 0.60 m bgl, effective test depth 0.45 m. $V(75-25) = 0.068 \text{ m}^3$, $a(p50) = 0.885 \text{ m}^2$ (sides to 50% depth plus base). Water per fill: 135 litres.

Test	Time to 75% (min)	Time to 25% (min)	t(75-25) (min)	Rate (mm/hr)	Rate (m/s)
Test 1	0	510	510.0	8.97	2.49×10^{-6}
Test 2 (design)	0	540	540.0	8.47	2.35×10^{-6}
Design (lowest f)				8.47	2.35×10^{-6}

DESIGN SOIL INFILTRATION RATE (LOWEST f)

$2.35 \times 10^{-6} \text{ m/s}$

(8.47 mm/hr) · governing: Test 2

Trial pit

Dimensions: 0.45 m (W) x 1.50 m (L), excavated depth 1.60 m bgl, effective test depth 1.20 m. $V(75-25) = 0.405 \text{ m}^3$, $a(p50) = 3.015 \text{ m}^2$ (sides to 50% depth plus base). Water per fill: 810 litres.

Test	Time to 75% (min)	Time to 25% (min)	t(75-25) (min)	Rate (mm/hr)	Rate (m/s)
Test 1 (design)	0	1440	1440.0	5.60	1.55×10^{-6}
Test 2	0	0	Time to 25% must exceed time to 75%		
Design (lowest f)				5.60	1.55×10^{-6}

DESIGN SOIL INFILTRATION RATE (LOWEST f)

$1.55 \times 10^{-6} \text{ m/s}$

(5.60 mm/hr) · governing: Test 1

Trial pit

Dimensions: 0.45 m (W) x 1.50 m (L), excavated depth 1.60 m bgl, effective test depth 1.20 m. $V(75-25) = 0.405 \text{ m}^3$, $a(p50) = 3.015 \text{ m}^2$ (sides to 50% depth plus base). Water per fill: 810 litres.

Test	Time to 75% (min)	Time to 25% (min)	t(75-25) (min)	Rate (mm/hr)	Rate (m/s)
Test 1 (design)	0	1440	1440.0	5.60	1.55×10^{-6}
Test 2	0	0	Time to 25% must exceed time to 75%		
Design (lowest f)				5.60	1.55×10^{-6}

DESIGN SOIL INFILTRATION RATE (LOWEST f)

$1.55 \times 10^{-6} \text{ m/s}$

(5.60 mm/hr) · governing: Test 1

Appendix D



Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.3
Rainfall Events	Singular	Drain Down Time (mins)	240	30 year (l/s)	0.7
Summer CV	1.000	Additional Storage (m³/ha)	0.0	100 year (l/s)	0.9
Winter CV	1.000	Starting Level (m)		Check Discharge Volume	x
Analysis Speed	Normal	Check Discharge Rate(s)	✓		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.47	Betterment (%)	0
Greenfield Method	IH124	Region	7	QBar	0.4
Positively Drained Area (ha)	0.061	Growth Factor 1 year	0.85	Q 1 year (l/s)	0.3
SAAR (mm)	823	Growth Factor 30 year	1.95	Q 30 year (l/s)	0.7
Soil Index	4	Growth Factor 100 year	2.48	Q 100 year (l/s)	0.9

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
MH1	0.061	5.00	10.000	100.000	100.000	0.401	9.599

Node MH1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	9.599	Product Number	CTL-SHE-0035-4000-0400-4000
Design Depth (m)	0.400	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.4	Min Node Diameter (mm)	1200

Node MH1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	9.599
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	
Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	165.0	0.0	0.400	165.0	0.0
			0.401	0.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	MH1	930	9.989	0.390	3.4	61.1378	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	MH1	Hydro-Brake®	0.4	23.4



Results for 100 year +45% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MH1	20	9.739	0.140	51.2	21.9395	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
15 minute summer	MH1	Hydro-Brake®	0.4	6.0



Results for 100 year +45% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	20	9.739	0.140	48.1	21.9444	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
15 minute winter	MH1	Hydro-Brake®	0.4	6.0

Results for 100 year +45% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	MH1	35	9.786	0.187	47.4	29.3232	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
30 minute summer	MH1	Hydro-Brake®	0.4	6.2



Results for 100 year +45% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	MH1	34	9.786	0.187	38.2	29.3605	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
30 minute winter	MH1	Hydro-Brake®	0.4	6.2



Results for 100 year +45% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	MH1	65	9.837	0.238	36.1	37.2402	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
60 minute summer	MH1	Hydro-Brake®	0.4	6.5



Results for 100 year +45% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	MH1	64	9.837	0.238	26.1	37.2415	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
60 minute winter	MH1	Hydro-Brake®	0.4	6.5



Results for 100 year +45% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute summer	MH1	126	9.881	0.282	23.3	44.2231	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
120 minute summer	MH1	Hydro-Brake®	0.4	7.0



Results for 100 year +45% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	MH1	124	9.881	0.282	16.0	44.2019	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
120 minute winter	MH1	Hydro-Brake®	0.4	7.1



Results for 100 year +45% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	MH1	188	9.908	0.309	17.3	48.4045	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute summer	MH1	Hydro-Brake®	0.4	8.1



Results for 100 year +45% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute winter	MH1	184	9.908	0.309	11.9	48.3947	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
180 minute winter	MH1	Hydro-Brake®	0.4	8.1



Results for 100 year +45% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
240 minute summer	MH1	244	9.927	0.328	14.6	51.4182	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
240 minute summer	MH1	Hydro-Brake®	0.4	9.3

Results for 100 year +45% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	MH1	240	9.927	0.328	9.7	51.4792	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	MH1	Hydro-Brake®	0.4	9.3



Results for 100 year +45% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	MH1	368	9.950	0.351	11.1	55.0027	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute summer	MH1	Hydro-Brake®	0.4	11.6



Results for 100 year +45% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	MH1	360	9.951	0.352	7.2	55.1103	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute winter	MH1	Hydro-Brake®	0.4	11.7



Results for 100 year +45% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute summer	MH1	480	9.966	0.367	8.7	57.5102	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
480 minute summer	MH1	Hydro-Brake®	0.4	14.1



Results for 100 year +45% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	MH1	472	9.966	0.367	5.8	57.4963	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
480 minute winter	MH1	Hydro-Brake®	0.4	14.1



Results for 100 year +45% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	MH1	600	9.975	0.376	7.1	58.8861	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
600 minute summer	MH1	Hydro-Brake®	0.4	16.3

Results for 100 year +45% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	MH1	585	9.976	0.377	4.9	59.1581	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
600 minute winter	MH1	Hydro-Brake®	0.4	16.4



Results for 100 year +45% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	MH1	720	9.980	0.381	6.3	59.6473	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute summer	MH1	Hydro-Brake®	0.4	18.6



Results for 100 year +45% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
720 minute winter	MH1	705	9.984	0.385	4.3	60.4186	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
720 minute winter	MH1	Hydro-Brake®	0.4	18.8



Results for 100 year +45% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	MH1	960	9.986	0.387	5.2	60.7396	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute summer	MH1	Hydro-Brake®	0.4	23.3



Results for 100 year +45% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
960 minute winter	MH1	930	9.989	0.390	3.4	61.1378	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
960 minute winter	MH1	Hydro-Brake®	0.4	23.4



Results for 100 year +45% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute summer	MH1	1350	9.983	0.384	3.7	60.1497	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
1440 minute summer	MH1	Hydro-Brake®	0.4	32.1



Results for 100 year +45% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	MH1	1380	9.983	0.384	2.5	60.2145	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	MH1	Hydro-Brake®	0.4	32.2



Results for 100 year +45% CC 2160 minute summer. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
2160 minute summer	MH1	1680	9.967	0.368	2.6	57.7189	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
2160 minute summer	MH1	Hydro-Brake®	0.4	44.0



Results for 100 year +45% CC 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	MH1	1740	9.966	0.367	1.8	57.5575	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
2160 minute winter	MH1	Hydro-Brake®	0.4	44.4



Results for 100 year +45% CC 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
2880 minute summer	MH1	2100	9.953	0.354	2.2	55.4779	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
2880 minute summer	MH1	Hydro-Brake®	0.4	55.8



Results for 100 year +45% CC 2880 minute winter. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	MH1	2160	9.948	0.349	1.5	54.7514	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
2880 minute winter	MH1	Hydro-Brake®	0.4	57.1



Results for 100 year +45% CC 4320 minute summer. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
4320 minute summer	MH1	2880	9.937	0.338	1.7	52.9101	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
4320 minute summer	MH1	Hydro-Brake®	0.4	78.4



Results for 100 year +45% CC 4320 minute winter. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute winter	MH1	3120	9.910	0.311	1.1	48.7487	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
4320 minute winter	MH1	Hydro-Brake®	0.4	80.3



Results for 100 year +45% CC 5760 minute summer. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
5760 minute summer	MH1	3720	9.908	0.309	1.4	48.4630	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
5760 minute summer	MH1	Hydro-Brake®	0.4	100.6



Results for 100 year +45% CC 5760 minute winter. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute winter	MH1	4020	9.869	0.270	0.9	42.3283	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
5760 minute winter	MH1	Hydro-Brake®	0.4	107.2



Results for 100 year +45% CC 7200 minute summer. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
7200 minute summer	MH1	4620	9.884	0.285	1.2	44.7106	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
7200 minute summer	MH1	Hydro-Brake®	0.4	121.8



Results for 100 year +45% CC 7200 minute winter. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute winter	MH1	4800	9.823	0.224	0.8	35.0920	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
7200 minute winter	MH1	Hydro-Brake®	0.4	122.9



Results for 100 year +45% CC 8640 minute summer. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
8640 minute summer	MH1	5400	9.865	0.266	1.0	41.6524	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
8640 minute summer	MH1	Hydro-Brake®	0.4	133.0

Results for 100 year +45% CC 8640 minute winter. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute winter	MH1	5640	9.792	0.193	0.7	30.2245	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
8640 minute winter	MH1	Hydro-Brake®	0.4	132.3



Results for 100 year +45% CC 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	MH1	6120	9.833	0.234	0.9	36.6931	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
10080 minute summer	MH1	Hydro-Brake®	0.4	140.3

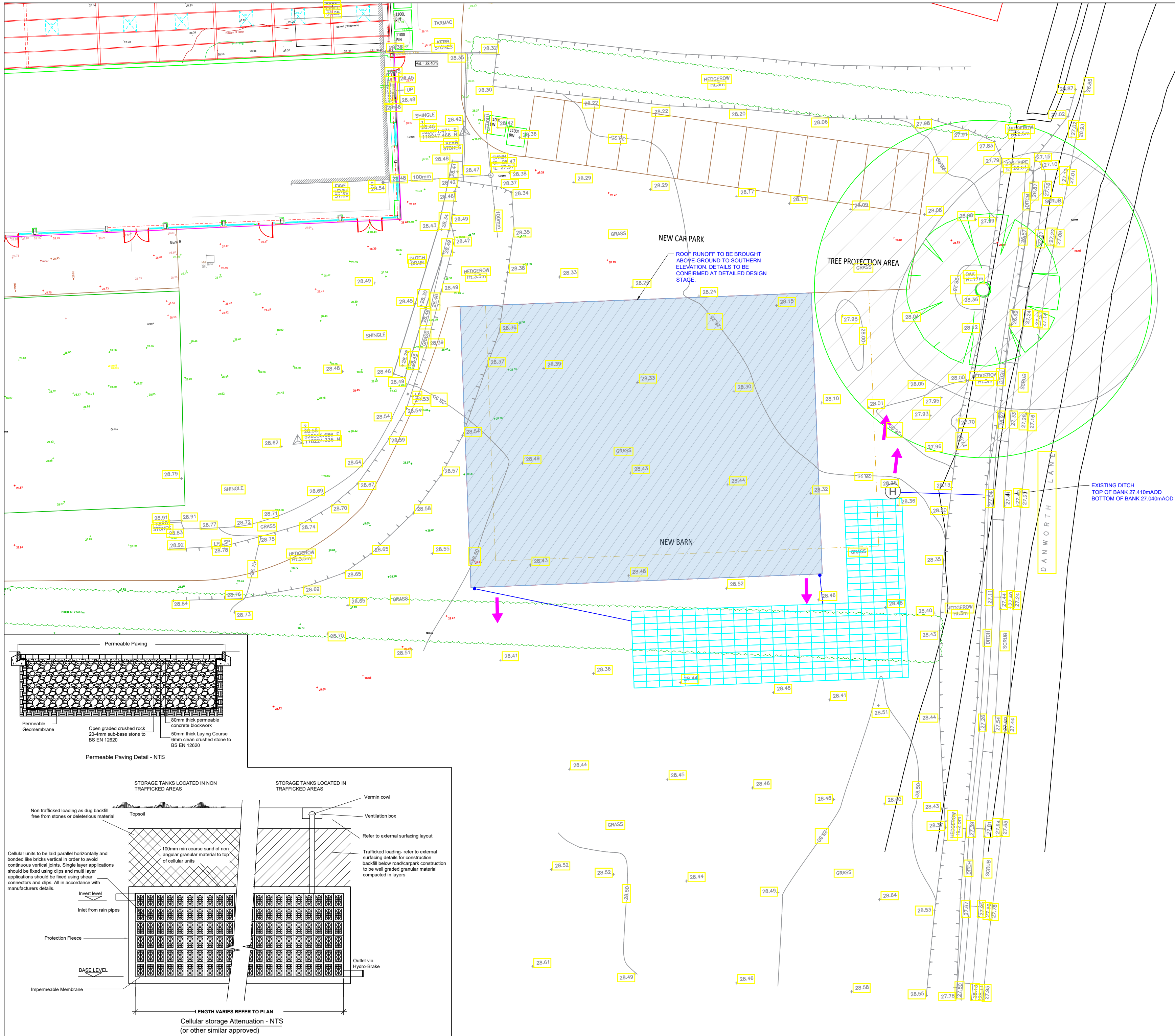


Results for 100 year +45% CC 10080 minute winter. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute winter	MH1	6420	9.761	0.162	0.6	25.3343	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
10080 minute winter	MH1	Hydro-Brake®	0.4	140.1

Appendix E



- Notes:**
1. Discharge of surface water via cellular storage attenuation. Preliminary calculations indicate that sufficient storage required to attenuate runoff arising from the proposed roof area of the barn, during the critical 1 in 100 year + 45% Climate Change event, can be provided within cellular storage of dimensions 165m² x 0.4m deep x 0.95 (voids).
 2. All new ground surfaces will be of permeable construction, with permeable paving utilised for the new parking area.
 3. All levels are in metres above ordnance datum.

- Legend**
- Proposed Cellular Storage Attenuation
 - Proposed Cellular Storage Catchment
 - Proposed Surface Water Downpipe
 - Proposed Surface Water Pipework
 - Proposed Hydro-Brake Chamber
 - Design Exceedance Route


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Job Reference: 97486-Ventham-DanworthFarm	Date: 24-Aug-26
Drawing Number: 97486-01	Revision: 1.0

Designed by: EW	Drawn by: EW	Checked by: AR
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Scale: 1:200@A2	Disclaimer: The drawings provided are for planning purposes only.
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