



CHRIS PIKE ASSOCIATES

BUILDING CONSERVATION & ENVIRONMENTAL SERVICES



Property Address

**Oast House Farm,
Brockhampton Estate, nr. Bromyard,
Herefordshire, WR6 5SH**

Title

**Surface Water & Foul Water Drainage
Strategy Report**

Prepared for

The National Trust

March 2021

Job No: 2019/1104/03-04/201-203

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Author: **ROBERT PIKE** MSc BSc(Hons) MCIWEM



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Checked & Approved: *Eur Ing* **CHRISTOPHER I PIKE** MA BSc(Hons) CEng MIStructE

Revision	Amendments	Prepared By	Date

1. INTRODUCTION

- 1.1. Chris Pike Associates Ltd (CPA) were instructed by the National Trust to prepare a surface water and foul water drainage strategy for the proposed conversion of a number of barns at Oast House Farm.
- 1.2. The proposals comprise conversion of the brick barns, oast houses and adjoining structures into three holiday cottages.
- 1.3. This report sets out the surface water and foul water drainage strategy for the proposed development.
- 1.4. This report should be read in conjunction with the following documents:
 - Flood Risk Statement and Indicative Drainage Proposals report (report reference *LP546/009*), prepared by Telford & Wrekin Council, dated November 2018.
 - Site Investigation Report (report reference *2019/1104/03-04/301*), prepared by Chris Pike Associates Ltd, dated May 2020.

2. SITE LOCATION

- 2.1. The barns are located at Oast House Farm, approximately 4.0km north-east of Bromyard, Herefordshire. The nearest postcode is WR6 5SH and the National Grid Reference (NGR) is 368934(E), 256781(N). A site layout plan is provided in **Appendix A**.
- 2.2. The site comprises:
 - Cart Shed – An historic cart house and adjoining stable located at the western end of the site and oriented east-west.
 - Hop Kiln Barn – Two former oast houses with adjoining barns and pig sties located at the eastern end of the site and oriented north-south.
- 2.3. A farmhouse is located between the two barns. The farmhouse has previously been converted for use as a holiday cottage.
- 2.4. The barns are situated in a rural location within the National Trust's Brockhampton estate.
- 2.5. The barns are currently disused.

3. TOPOGRAPHY

3.1. Topographical survey of the site was completed by ARM Surveys Ltd in April 2020. A copy of the survey is provided in **Appendix B**.

3.2. The survey shows:

- Ground levels generally fall in a northerly direction across the site.
- At the driveway entrance at the south-east corner of the site ground levels are approximately 95.21m above Ordnance Datum (aOD).
- Along the western elevation of the Hop Kiln barn ground levels fall from 95.10m aOD at the southern corner, to 94.59m aOD at the northern corner adjacent to the farmhouse.
- Along the rear eastern elevation ground levels fall from 94.88m aOD at the southern corner to 93.81m aOD at the northern corner.
- Ground levels continue to fall at the north-west of the barns to a water level of approximately 91.00m aOD at the southern extent of a small pond at the north-west of the site.
- Along the southern elevation of the cart shed ground levels rise slightly in a westerly direction from 95.08m aOD at the eastern corner to 95.20m aOD at the western corner.
- Ground levels at the rear northern elevation of the cart shed are lower, ranging from 93.97m aOD at the eastern corner to 94.14m aOD at the western end.
- Ground levels continue to fall in a northerly direction to the north of the cart shed, to a level of 91.03m aOD along the northern fence line of the site.

4. HYDROLOGICAL CONTEXT & FLOOD RISK

4.1. There are a number of watercourses within the vicinity of the site:

- The Linceter Brook, a minor watercourse, flows in an easterly direction approximately 360m north of the site.
- The head of a minor watercourse flows from a small wooded area approximately 250m east of the site, and flows in a north-easterly direction, ultimately confluent with the Linceter Brook.
- The Linceter Brook ultimately confluent with the Sapey Brook, a tributary of the River Teme.

- There is a small pond located immediately north of the barns and farmhouse. The existing drainage from roof and hardstanding areas drain to this pond. There is no known formal outfall channel from the pond. There is another small pond located downslope approximately 120m north of the site.
- 4.2. Data from the Flood Estimation Handbook (FEH) website indicates the contributing catchment area upstream of the site is less than 0.25km².
 - 4.3. The Environment Agency (EA) Flood Map for Planning, indicates the site is located wholly in Flood Zone 1 – Land assessed as having a less than 1 in 1,000 annual probability of fluvial flooding. A copy of the map is provided in **Appendix C**.
 - 4.4. The online EA Map for Flood Risk for Surface Water indicates the site is located in an area of very low surface water flood risk.
 - 4.5. The online EA Map for Flood Risk from Reservoirs indicates the site is not within an area at risk of flooding as a result of a reservoir breach or failure.
 - 4.6. The Herefordshire Level 1 Strategic Flood Risk Assessment (SFRA) (WSP, published April 2019) states that records of groundwater flooding within Herefordshire are limited. The SFRA does not identify any locations close to the site with historic records of groundwater flooding. The SFRA also lists the most prominent locations with potential for groundwater flooding due to the presence of sand and gravel deposits. No such deposits are found at or within the immediate vicinity of the site and flood risk from groundwater is therefore considered to be low.
 - 4.7. Given there are no stormwater sewers located at or within the vicinity of the site, the risk of flooding from sewer flooding at the site is considered to be negligible.
 - 4.8. The site is not located within, or in the vicinity of, any EA flood warning or flood alert area.
 - 4.9. In summary, the site is considered to be at low risk of flooding from all sources and there is no requirement to incorporate flood mitigation or flood resilience measures within the development proposals.

5. GEOLOGICAL CONTEXT

- 5.1. The British Geological Survey (BGS) Geology of Britain Online Viewer indicates:
 - There are no superficial deposits found at the site.
 - The bedrock underlying the site is the *Raglan Mudstone Formation – Siltstone and Mudstone*.
- 5.2. The Cranfield University online 'Soilscapes Map' indicates the site is underlain by *Slightly acid loamy and clayey soils with impeded drainage* that drain to the stream network. These soils are indicated to have slightly impeded drainage.

- 5.3. Mapping from the online UK Soil Observatory (UKSO) map viewer indicates the soils comprise of *Clayey Loam to Silty Loam*.
- 5.4. The soil association survey map of England and Wales shows the site is predominantly underlain by *Well drained reddish fine silty soils over shale and siltstone. Some similar soils with slowly permeable subsoils and slight seasonal waterlogging. Some well drained coarse loamy soils over sandstone. Risk of water erosion.*
- 5.5. The solid bedrock geology is classified as a Secondary A Aquifer.
- 5.6. The site is not located in a Groundwater Source Protection Zone (SPZ).
- 5.7. Site observations of the underlying ground were made within trial holes dug for the purpose of a Site Investigation during February 2020. Further details of the ground conditions at the site are provided in the Site Investigation Report (CPA Report 2019/1104/03-04/301, dated May 2020).

6. EXISTING SURFACE WATER DRAINAGE

- 6.1. Rainwater from the existing roof areas drains both directly and indirectly to the pond at the north of the site. The roof areas served by gutters and downpipes drain into a piped system that outfalls into the pond. Run-off from roof areas that drain directly onto the adjacent ground is conveyed overland to the pond, following the natural topography of the site.

7. DEVELOPMENT PROPOSALS

- 7.1. The development proposals comprise conversion of the brick barns into holiday cottages:
 - It is proposed to convert the Cart Shed Barn into a 3-bedroom holiday cottage with disabled access.
 - It is proposed to convert the Hop Kiln Barn into a 2no. 1-bedroom holiday cottages.
- 7.2. There will be no increase in the footprint of the buildings as a result of the proposals. There will be a minor increase in hardstanding / surfacing as a result of reconfigured parking and driveway areas.
- 7.3. The development proposals are presented on the drawings prepared by Tim Ratcliffe Associates in **Appendix D**.

8. SURFACE WATER DRAINAGE STRATEGY

Policy Requirements

- 8.1. Spatial planning and development control recommendations relating to flood risk and drainage are set out in the Herefordshire Level 1 SFRA (April 2019). When considering site run-off the SFRA states:
- *Development should result in no increase in the rate or volume of run-off when compared to the existing situation. Where possible, betterment should be provided.*
 - *Run-off should be infiltrated to ground where site conditions permit. If this is not possible, consideration should first be given to discharging to a watercourse before consideration is given to discharging to the sewerage network.*
 - *SuDS features should be used where feasible to promote water quality, amenity and biodiversity benefits.*
 - *Proposed adoption and maintenance arrangements for all proposed drainage systems must be clarified.*
- 8.2. Herefordshire County Council (HCC) in their role as Lead Local Flood Authority (LLFA) published a Sustainable Drainage Systems (SuDS) Handbook in June 2018. The document states:
- *For non-major development we encourage evidence that sustainable drainage (SuDS) has been considered. SuDS need to be applied to any development and demonstration of compliance with the SuDS hierarchy will always be required. It is however recognised that implementing effective SuDS on small sites can prove difficult.*
- 8.3. The HCC SuDS Handbook includes a checklist setting out the information that is required within a surface water management strategy submitted as part of a planning application. The information provided in this report provides the necessary detail to assess surface water management strategy as part of a full planning application for a non-major development.

Drainage Areas

- 8.4. The existing site layout is shown on Tim Ratcliffe Associates drawing no. *BROH-TRA-XX-XX-DR-A-Ex01* in **Appendix A**.
- 8.5. The proposed site layout is shown on Tim Ratcliffe Associates drawings *BROH-TRA-XX-XX-DR-A-Pr01* and *BROH-TRA-XX-XX-DR-A-Pr02* in **Appendix D**. The plans confirm the footprint of the barns will remain unchanged. Existing hardstanding areas will be reconfigured to provide a new driveway entrance and increased car parking provision.

8.6. The impermeable area of the proposed development has been measured as follows:

Element	Existing Area (m ²)	Proposed Area (m ²)
Farmhouse	98	98
Hop Kiln Barn	211	211
Cart Shed Barn	144	144
Driveway, parking and paved areas	413	636
Garage / store	41	26
External seating areas	0	18
TOTAL	907	1133

8.7. The development represents an increase in impermeable area of approximately 226m² across the site. The increase in hardstanding relates solely to areas of driveway and parking which will drain onto adjacent landscaped area. The surface water run-off rate and volumes from roof areas draining to the pond will remain unchanged.

Proposed Strategy

8.8. The National Planning Policy Framework (NPPF) Planning Practice Guidance (PPG) for Flood Risk and Coastal Change sets out a drainage hierarchy for surface water runoff. The guidance states:

Generally, the aim should be to discharge surface run-off as high up the following hierarchy of drainage options as reasonably practicable:

- 1. Into the ground (infiltration);*
- 2. To a surface water body;*
- 3. To a surface water sewer, highway drain, or another drainage system;*
- 4. To a combined sewer.*

8.9. Percolation testing for the purposes of the foul drainage design (Section 8) has found that ground conditions are not suitable for infiltration drainage at the site. This corresponds with the findings of the Site Investigation which confirms the site is underlain by predominantly clayey impermeable soils and rock.

8.10. It is proposed to maintain the existing surface water drainage arrangements by discharging run-off from the roof areas into the pond at the north of the site. Where required new rainwater downpipes will be provided from roof areas.

8.11. Surface water run-off from driveway, parking and paved areas will discharge into adjacent areas of soft landscaping and vegetation.

8.12. The surface water drainage design proposals are set out on drawing 1104/03-04/201 in **Appendix E**.

8.13. The run-off rate from the site to the pond has been calculated using the Modified Rational Method. Summary calculations are provided in **Appendix F**, and the associated areas and rates summarised in the table below:

Element	Area (m ²)	Storm Event			
		1 in 1 year	QBAR (1 in 2 year)	1 in 30 year	1 in 100 year
Roof areas	453	3.9 l/s	5.1 l/s	9.7 l/s	12.6 l/s

- 8.14. There are no known existing capacity concerns relating to the pond. The pond is therefore expected to manage run-off from the roof areas of the site as per the existing drainage regime.

Exceedance Design

- 8.15. A consideration of extreme rainfall events should be developed into the proposals in order to mitigate the effects of climate change.
- 8.16. If the drainage systems were to fail, or the pond to exceed capacity, surcharged flows would follow the natural lie of the land into open fields at the north of the site. There is considered to be negligible risk to people or property in such an event given there are no receptors in the immediate vicinity downstream of the site. Given the nature, location and scale of the development no further assessment of exceedance flows is considered necessary.

Maintenance

- 8.17. It is recommended that drainage systems associated with the barns (gutters, downpipes and gulley's) are cleared and maintained as part of the National Trust's annual schedule of works.
- 8.18. Inspection chambers and manhole covers should be lifted at least once annually to check and confirm that the drainage system remains in good condition.

9. FOUL WATER DRAINAGE STRATEGY

Existing Foul Drainage

- 9.1. The farmhouse currently drains to a septic tank located in the area immediately north of the barns, and to the west of the pond.
- 9.2. The micro-brewery located within the converted barn immediately west of the site drains into a separate drainage system to the north of barns. Details of this system can be found on the HCC planning portal (application reference *DCN073017/F*).
- 9.3. The single office toilet from the micro-brewery also discharges into the septic tank serving the farmhouse.
- 9.4. Anecdotal information indicates there are regular problems with blockages in the existing foul drainage system from the farmhouse. Given the assumed location of the existing foul drains it is possible that the current pipe gradients are inadequate.
- 9.5. There are no public sewers located in the vicinity of the site.

Proposed Foul Drainage Design

- 9.6. Percolation testing has been completed at the site.
- 9.7. A trial hole was dug in the area at the north of the site, between the barns and the existing Septic Tank. Photographs of the trial hole are provided in **Appendix G**.
- 9.8. The testing found that the infiltration rate was extremely poor and inadequate for the purposes of a drainage field. The ground in this area has a high clay content and there was no observable drop in the water level over the period of testing.
- 9.9. The development proposals will result in an increase in the potential maximum occupancy of the site and therefore the existing foul drainage system must be upgraded to manage the greater foul flows.
- 9.10. A new small Package Sewage Treatment Plant will be installed to manage foul effluent from the development. This Package Sewage Treatment Plant will also manage flows from the farmhouse. The existing system serving the farmhouse will be decommissioned.
- 9.11. Given that percolation testing has found infiltration rates at the site to be unfavourable it is proposed to discharge treated flows from the Package Treatment Plant into the existing pond at the north of the site.

- 9.12. The barn conversion will provide 3 dwellings (1no. 3-bedroom and 2no. 1-bedroom) with a total maximum occupancy of 9 persons. The farmhouse accommodates up to 10 persons. For the purposes of the assessment it is also assumed that the single toilet within the adjacent micro-brewery will also connect into the new foul drainage system. The total maximum occupancy at the site is therefore 20. Assessment of flows using the daily discharge calculator (<https://www.gov.uk/permits-you-need-for-septic-tanks/general-binding-rules>) estimates a total daily discharge of 3.00m³.
- 9.13. The estimated daily discharge volume assumes the holiday cottages are at maximum occupancy. The discharge volumes are considered to have no significant impact on water levels on the pond. Given the nature of the development as holiday properties, peak discharges are likely to occur during the summer months when occupancy will be greater. Water levels within the pond are expected to be lower during the summer months and therefore have greater residual capacity for increased inflows.
- 9.14. The farmhouse, converted barns and brewery toilet will all drain to a single package sewage treatment plant, located in the retained landscaping area at the north of the site. Potential systems that could be used include the following:
- Graf Klaro E Professional
 - Kingspan Klargest BioFicient 5
 - Marsh Ensign:Ultra / Ensign:Standard 20PE
 - Premier Tech Aqua – Conder ASP 20
 - Tricel Novo UK24
 - WPL Diamond DMS
 - WTE Ltd – Vortex 21
- 9.15. The existing Septic Tank serving the site will be decommissioned.
- 9.16. The treated effluent will be discharged into the neighbouring pond.
- 9.17. The proposed location of the treatment plant and drainage channel is shown on Drawing 1104/03-04/203 in **Appendix H**.
- 9.18. The treatment plant will require a power supply.
- 9.19. A permit is not typically required for discharge of treated effluent to a surface water body where the total discharge is less than 5m³ per day.
- 9.20. The extent of the existing foul drainage system is not currently known and it may be necessary to relay part or all of the existing system to allow new connections from the barn conversions to be provided. Relaying the existing system may also help remediate existing issues experienced with blockages.

Maintenance

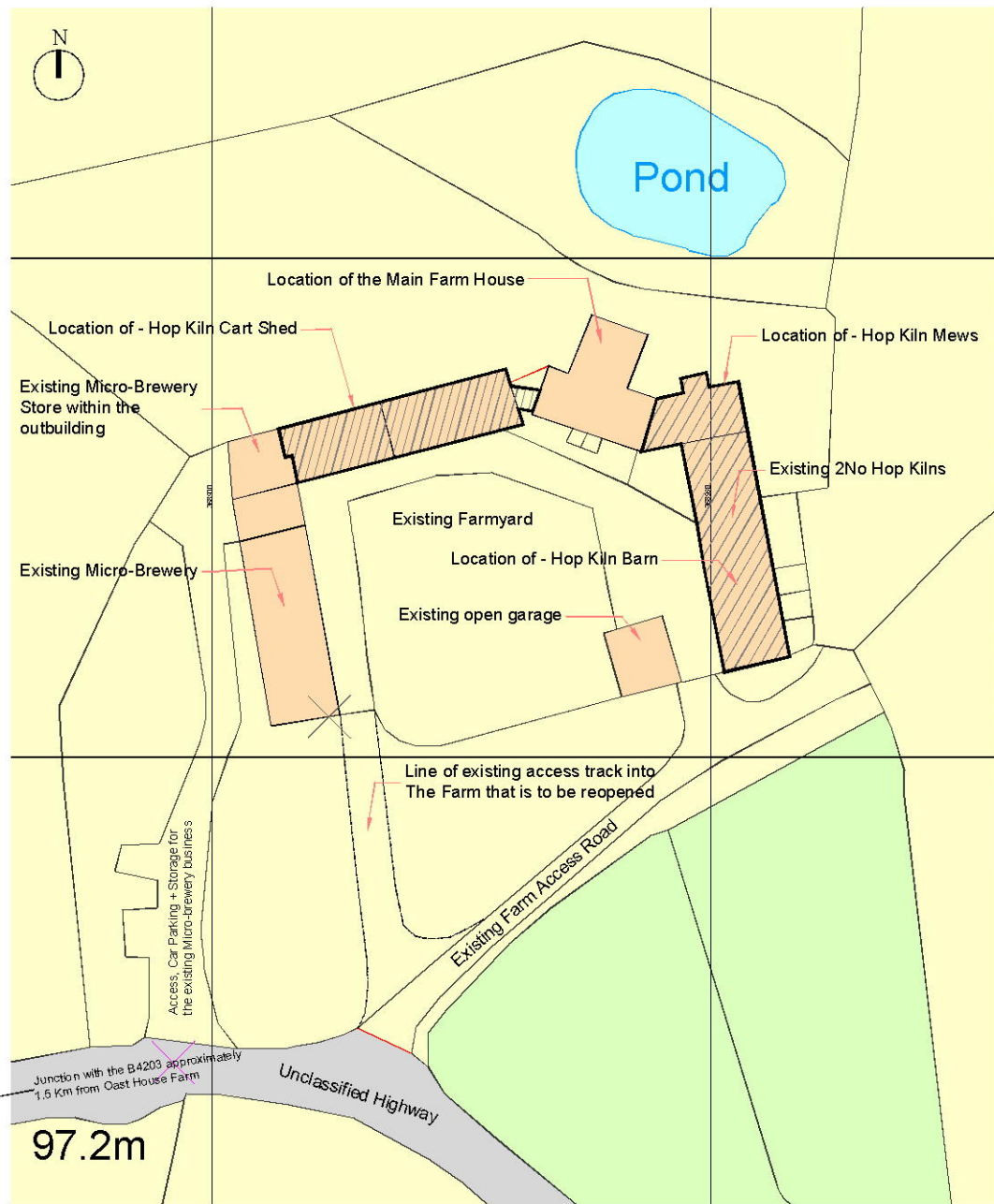
- 9.21. Regular maintenance and emptying of the treatment plant will be undertaken as required by the manufacturers recommendations.
- 9.22. Vehicular access must be maintained to the area at the rear of the Farmhouse and Cart Shed Barn so that the Package Sewage Treatment Plant can be accessed for maintenance purposes.

10. CONCLUSIONS

- 10.1. Existing surface water run-off from roof areas at the site drain to a small pond located immediately north of the site.
- 10.2. Percolation tests undertaken at the site confirm that soakaways and/or drainage fields will not be suitable to provide surface water drainage and foul water drainage for the proposed residential development.
- 10.3. It is proposed to maintain the existing site arrangement by discharging surface water run-off from roof areas of the development into the pond. Surface water run-off from all other hardstanding will run-off into adjacent landscaped or garden areas.
- 10.4. Foul effluent is proposed to be treated using a small package sewage treatment plant and to discharge only treated flows into the pond. The existing septic tank would be decommissioned.

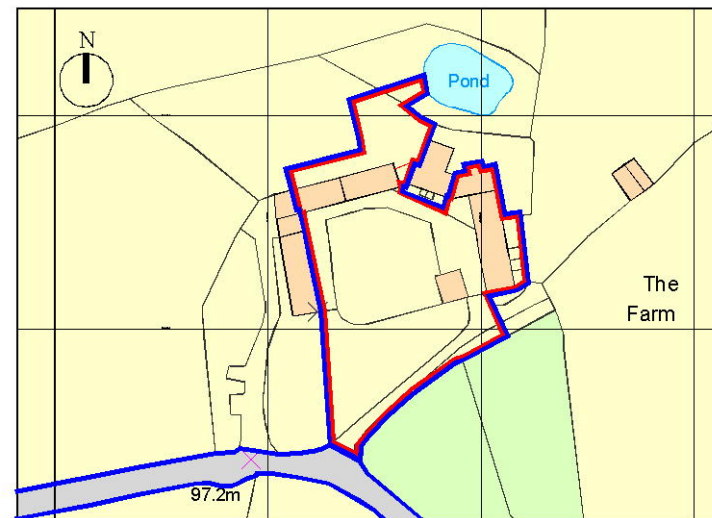


Appendix A
Site Location Plan



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Block Plan of The Farm - 1:500 scale: Existing



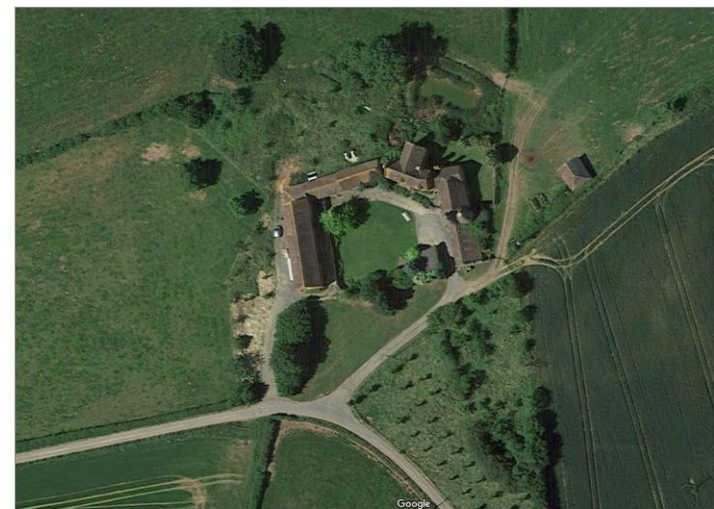
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Site Location and Ownership Plan - Scale 1:1250

Key

Application Area

Other Land in the Applicants Ownership



Google Imagery ©2021 CNES/Airbus, Getmapping plc

Aerial View of The Farm, Brockhampton (not to scale)

XXXX	XXXXXX	XXX	XXXXXXXX	XXXXXXXX
Rev	Date	Description	Checked	

PLANNING/LBC

Client:
THE NATIONAL TRUST
Brockhampton Estate, Herefordshire

Project:
Redevelopment of Existing Farm Buildings
The Farm, Whitbourne,
Herefordshire, WR6 5SH.

Drawing Title:
Existing Site Location Plan (Ownership)
Existing Block Plan

Proj. No.
BROH - TRA - XX - XX - DR - A - Ex01

Scale: 1:1250 + 1:500 @ A3	Drawn: JGR	Rev. No. P 01
Date: 17.01.21	Check: TJR	

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Cambrian House, Nantmawr, Oswestry, SY10 9HL.
T: 01691 829240 E: office@timratcliffe.co.uk



Appendix B

Topographical Survey



Legend			
BT	British Telecom Cover	OHCL	Overhead Cable Level
CL	Ceiling Level	O.S.B.M	OS Bench Mark
DK	Dropped Kerb	RLP	Road Lamp Post
EP	Electric Pole	RS	Road Sign
FL	Floor Level	TCSL	Tree Clear Stem Level
G	Gully	TP	Telegraph Pole
GSV	Gas Stop Valve	TTL	Top Tree Level
HTL	Hedge Top Level	TWL	Top Wall Level
IC	Inspection Cover	UTL	Unable To Lift
IL	Invert Level	UTM	Unable To Measure
LP	Lamp Post	WSV	Water Stop Valve
Fence types			
A/B	Armco Barrier	P/R	Post & Rail
CL	Chain Link	P/W	Post & Wire
E/F	Estate Fencing	S/S	Steel Security
I/R	Iron Railing	V/C	Vertical Closeboard
P/F	Timber panel		
	Borehole		Survey station
	Water		Wall
	Gas		Building
	Telecom		Bottom of bank
	Electric		Top of bank
	Unknown		Contour major
	Fence		Contour minor
	Hedge		Surface edge
	Foliage		Tree canopy
			Gate

Notes.
 Copyright of this plan is held by A.R.M. Surveys Limited. No responsibility is taken for amendments by others. Do not scale from copies or PDFs.
 The origin and orientation of the survey grid is based on national grid co-ordinates via GNSS with active os network OSGB36 (15) centred around station SN2 with the data presented on a plane grid.
 Levels are Ordnance datum via GNSS.
 This survey was carried out to an agreed specification. Detail and features not included in the original specification will not be shown.
 The drawing scale indicates the accuracy of the digital data.
 Trees with a trunk diameter of 0.2m and larger included in the survey and shown with the average canopy spread.

Hedge widths are indicative, text notes show widths.
 Stock boundary fences may not be shown where they occur adjacent to other boundary features.
 Areas of the site obscured by overgrowth or spoil may have detail omitted from the survey.

A.R.M. Surveys Ltd Suite 9 Sabrina Court Shrewsbury SY3 7BF Tel 01743 248265			
Client The National Trust	Project Oast House, Brockhampton Estate, Bromyard, WR6 5SH.		
Job 1236-0320-T	Scale 1:200		
Grid 25m	Contours 0.25m	Date 20.04.20	Dwg no 01/01
		Surveyor MM	Checked MM

Existing Topographical Survey Information has been prepared by A.R.M. Surveys Ltd. Measured Building Survey Information has been prepared by BiT - Borough of Telford & Wrekin Council

XXXXX	XXXXXX	XXX	XXXXXX
Drawn	Checkd	Description	Checked

PLANNING/LBC

Client THE NATIONAL TRUST Brockhampton Estate, Herefordshire	Project Redevelopment of Existing Farm Buildings The Farm, Whitbourne, Herefordshire, WR6 5SH.
Drawing Title Existing Topographical Survey	

Drawn BROH - TRA - XX - XX - DR - A - Ex02

Scale 1:500	@ A3	Drawn JGR	Drawn P 01
Date 17.01.21		Checkd TJR	

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 Cambrian House, Nantmawr, Oswestry, SY10 9HL.
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Appendix C

Flood Maps

Flood map for planning

Your reference
1104/03-04

Location (easting/northing)
368934/256781

Created
5 May 2020 12:21

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

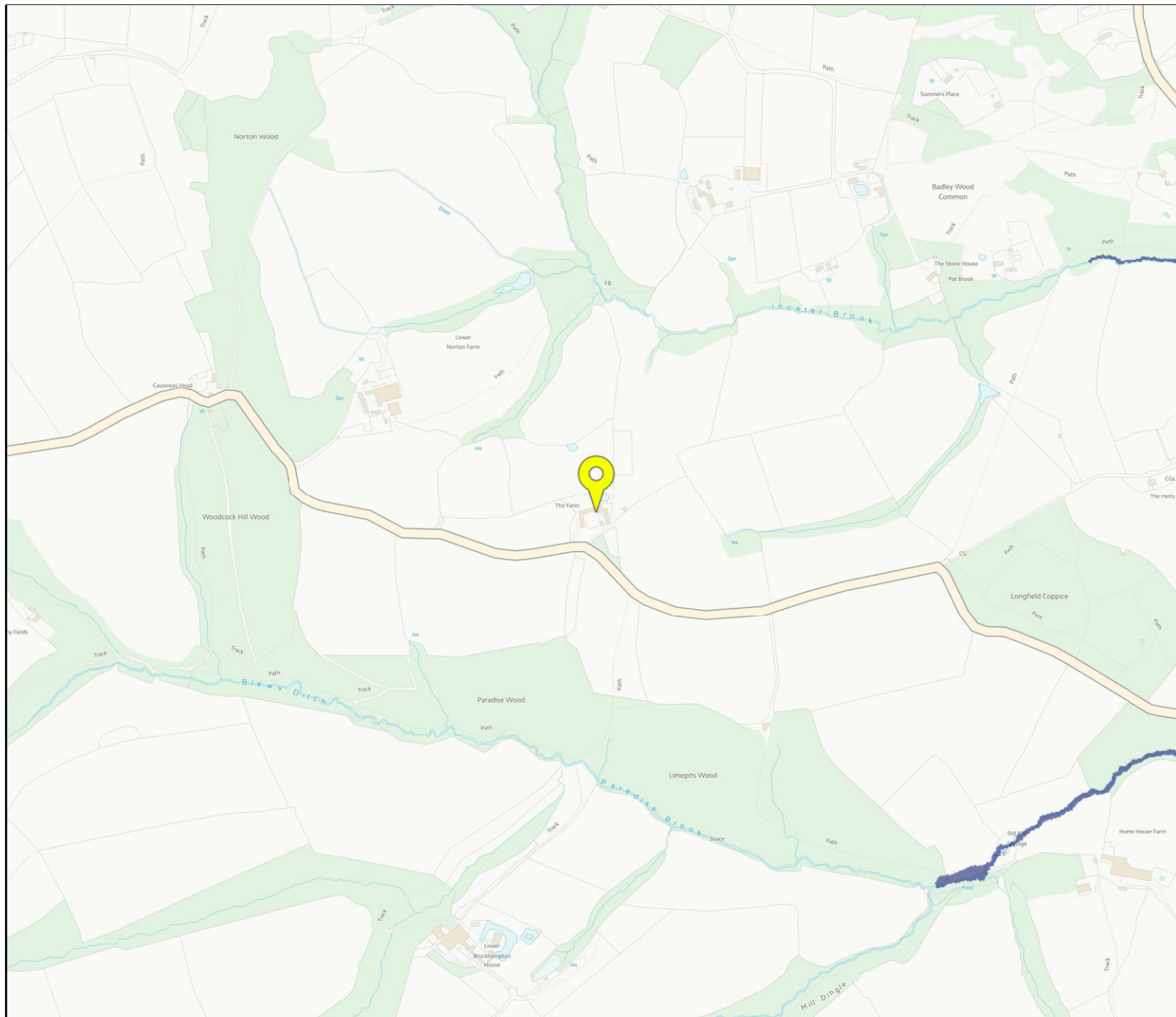
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

Your reference

1104/03-04

Location (easting/northing)

368934/256781

Scale

1:10000

Created

5 May 2020 12:21



Selected point



Flood zone 3



Flood zone 3: areas
benefitting from flood
defences



Flood zone 2



Flood zone 1



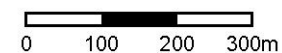
Flood defence



Main river



Flood storage area





Appendix D
Proposed Site Layout



Existing Topographical Survey Information has been prepared by A.R.M. Surveys Ltd. Measured Building Survey Information has been prepared by B&T - Borough of Telford & Wrekin Council.



Location of proposed 18 person Package Treatment Plant to replace the existing Septic Tank in the same location.

Existing Hop Kilns. Cows to the 2 No Kilns to be reinstated to a Herefordshire design, with accompanying ironwork, fixtures and fittings

Surfacing to the new Car Parking Area to be clean stone with a bound aggregate hoggin. Parking bays will be indicated by timber or metal studs only along their back edge

Existing Hop Kilns. Cows to the 2 No Kilns to be reinstated to a Herefordshire design, with accompanying ironwork, fixtures and fittings

New Timber framed and timber clad storage provision for Bins, Linen, Logs and Cycle s to be constructed beneath the existing roof canopy of the open-sided shed that abuts the perimeter stone wall to the farmyard. The Linen Store will provide an enclosed space, whilst the bin store and log store will be screened

Existing historical drive alignment into the Farm yard to be reopened and surfaced with a dressing of clean stone and/or hoggin

Access to the existing unclassified highway remains unchanged

XXXXX	XXXXXX	XXX		XXXXXX
Rev.	Desc.	Rev.	Description	Checked

PLANNING/LBC

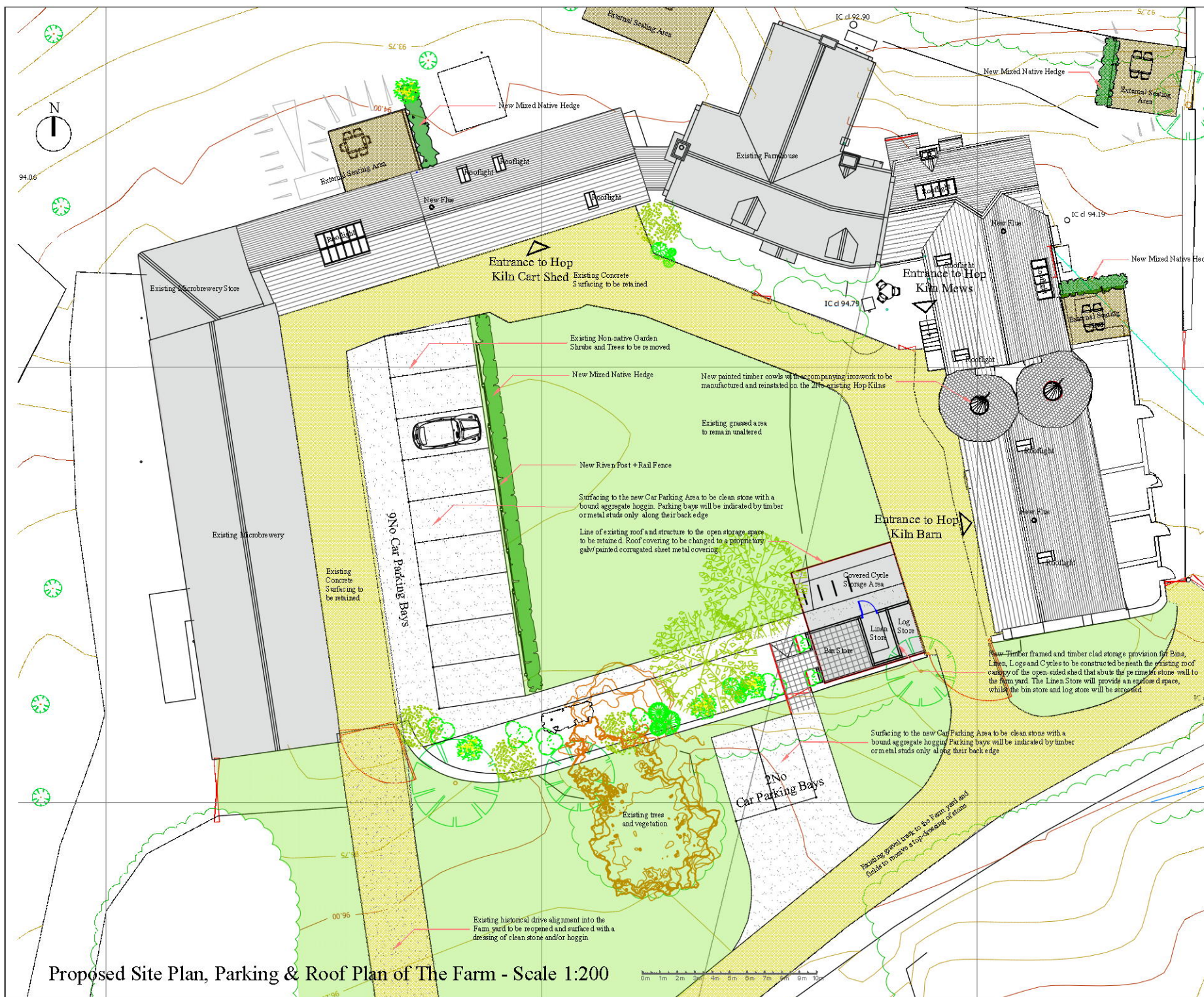
Client:	THE NATIONAL TRUST Brockhampton Estate, Herefordshire
Project:	Redevelopment of Existing Farm Buildings The Farm, Whitbourne, Herefordshire, HR7 4PL
Drawing Title:	Proposed Site Layout, Parking + Roof Plan of the Key Buildings

Draw No.	BROH - TRA - XX - XX - DR - A - Pr01
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Scale:	1:500 @ A3	Drawn:	JGR	Drawn:	JGR
Date:	17.01.21	Checked:	TJR	Drawn:	P01

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Proposed Site Plan, Parking & Roof Plan of The Farm - Scale 1:500



Existing Topographical Survey Information has been prepared by A R M Surveys Ltd. Measured Building Survey Information has been prepared by BiT - Borough of Telford & Wrekin Council.

XXXX	XXXXXX	XXX	XXXXXX
Drawn	Drawn	Drawn	Checked

PLANNING/LBC

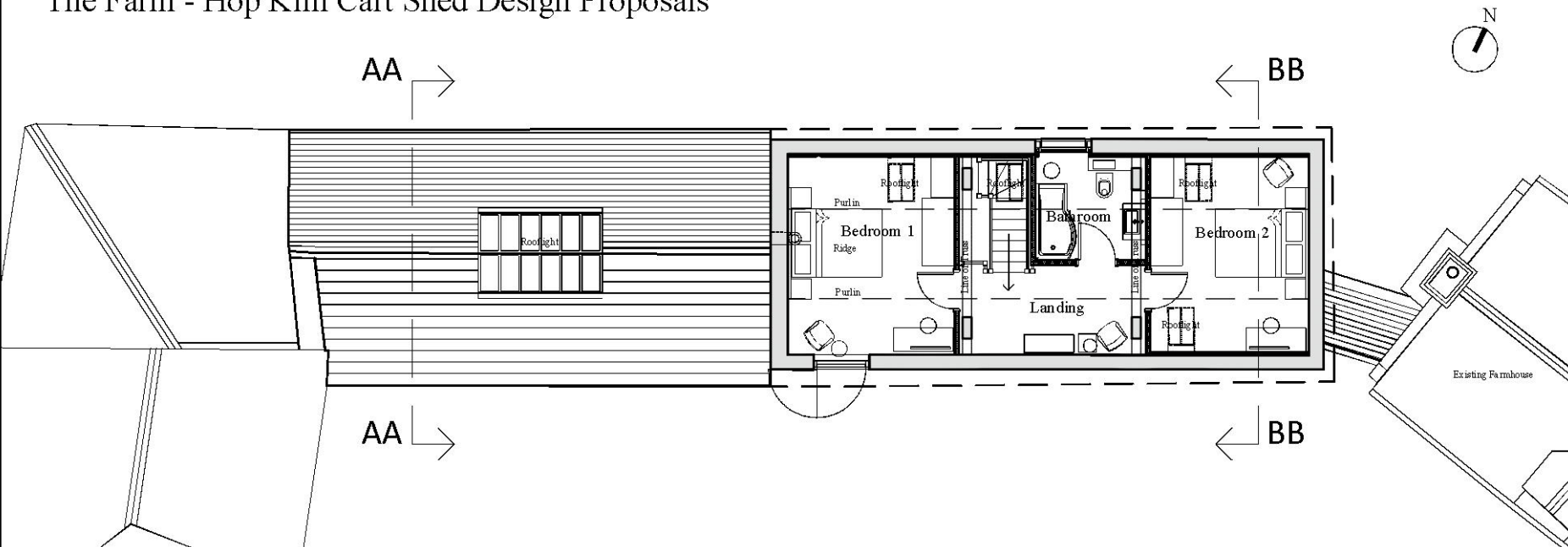
Client:	THE NATIONAL TRUST Brockhampton Estate, Herefordshire
Project:	Redevelopment of Existing Farm Buildings The Farm, Whitbourne, Herefordshire, HR7 4PL
Drawing Title:	Proposed Site Layout, Parking + Roof Plan of the Key Buildings

Drawn By:	BROH - TRA - XX - XX - DR - A - Pr02
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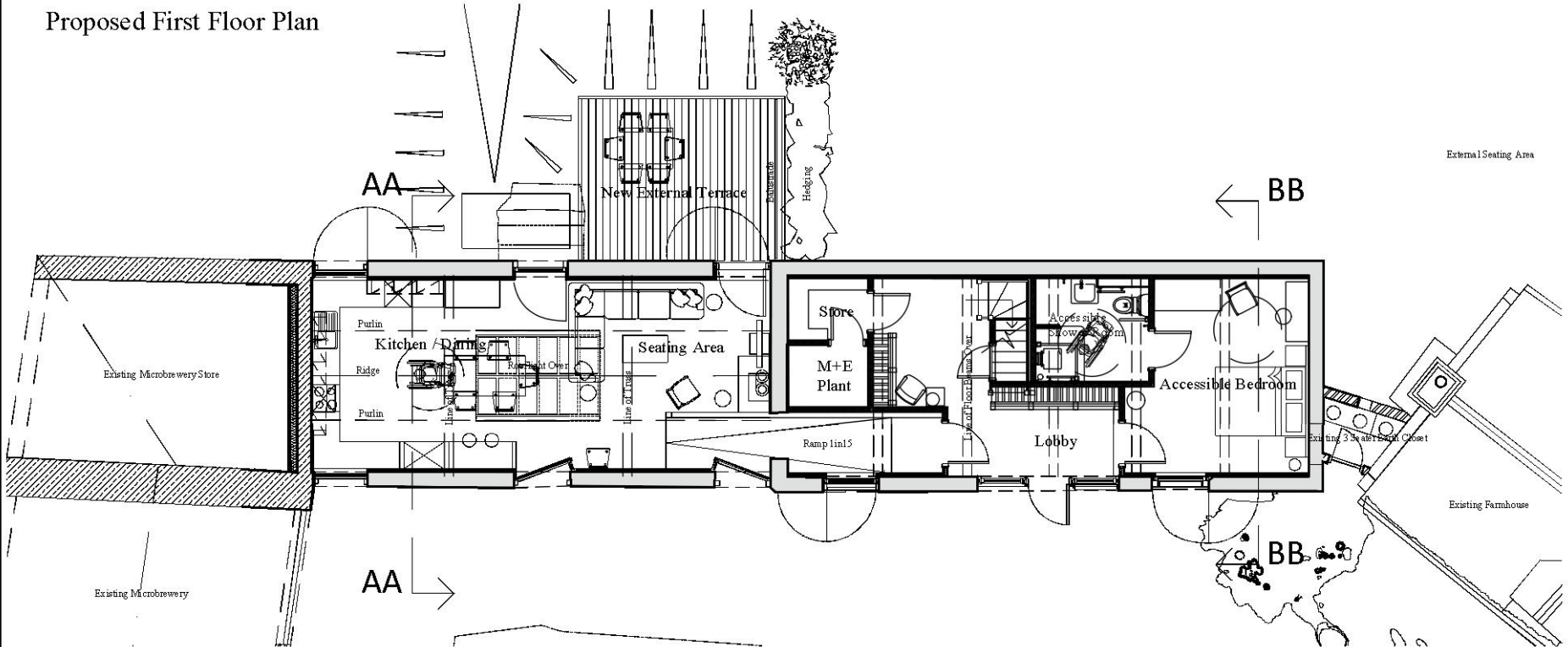
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Date:	17.01.21	Checked:	TJR		

TIM RATCLIFFE ASSOCIATES
HISTORIC BUILDING AND TRACK MATERIALS CONSULTANTS
Cambrian House, Nantmawr, Oswestry, SY10 9HL
T: 01691 829240 E: office@timratcliffe.co.uk

The Farm - Hop Kiln Cart Shed Design Proposals



Proposed First Floor Plan



Proposed Ground Floor Plan - Scale 1:100

Rev.	Date	Description	Checked

PLANNING/LBC

Client:
THE NATIONAL TRUST
Brockhampton Estate, Herefordshire

Project:
Redevelopment of Existing Farm Buildings
The Farm, Whitbourne,
Herefordshire, WR6 5SH.

Drawing Title:
The Hop Kiln Cart Shed Buildings
Proposed Floor Plans

Drawn By:
BROH - TRA - XX - XX - DR - A - Pr04

Scale:
1:100 @ A3

Date:
17.01.21

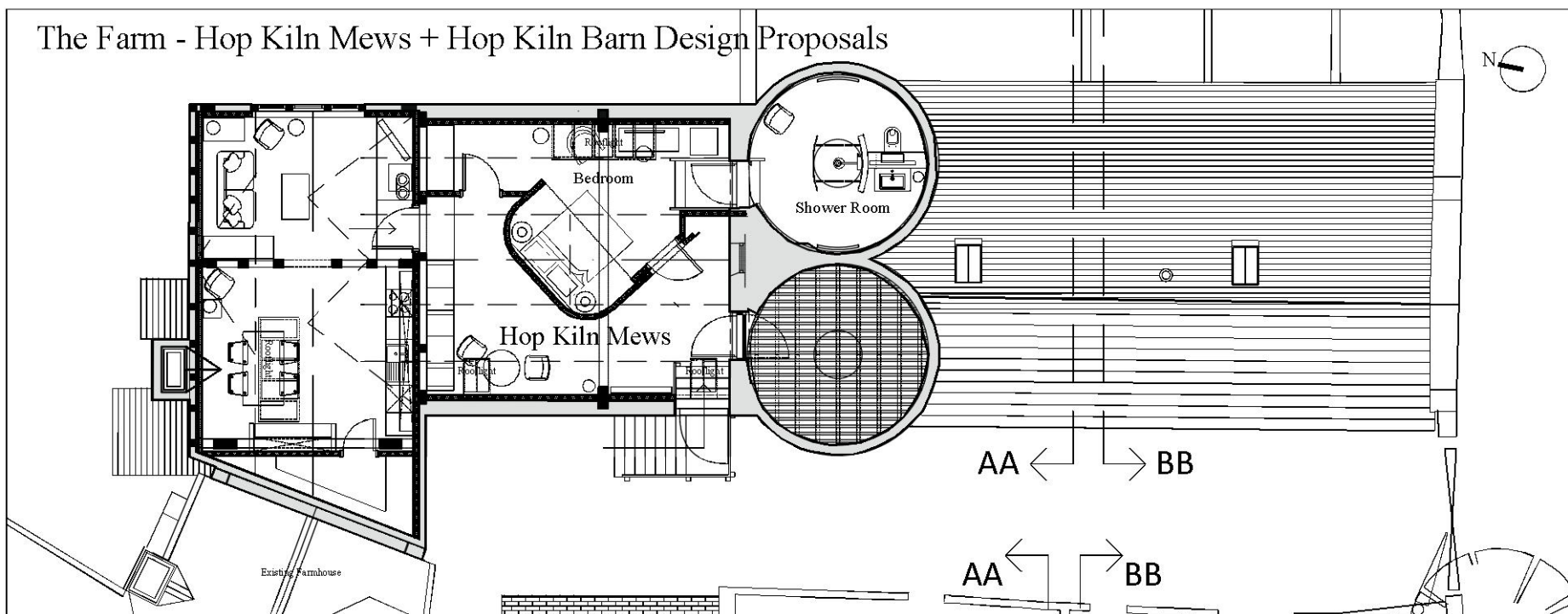
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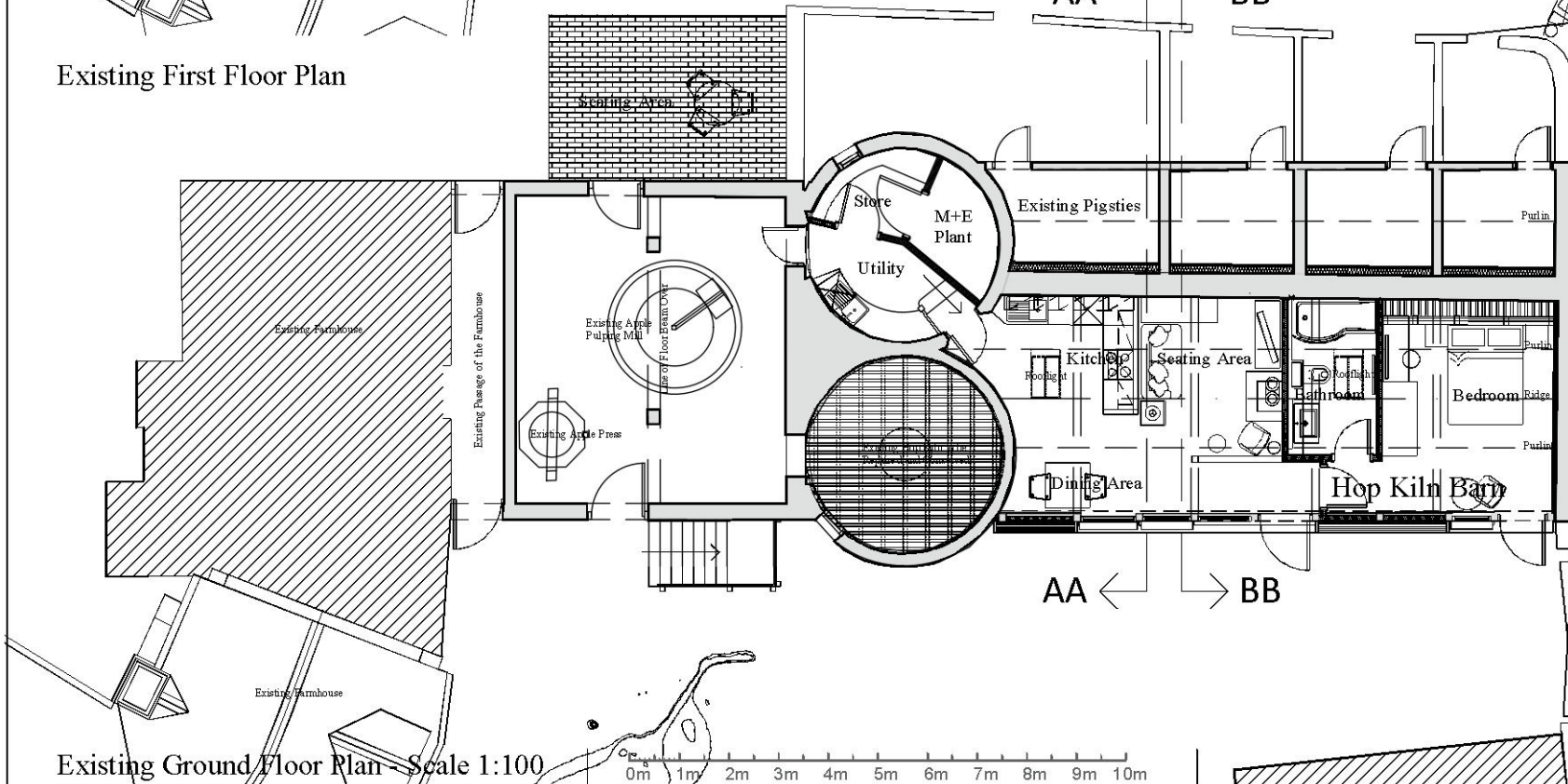
Rev. Ref:
P 01

TIM RATCLIFFE ASSOCIATES
HISTORIC BUILDING AND TRACED MATERIALS CONSULTANTS
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The Farm - Hop Kiln Mews + Hop Kiln Barn Design Proposals



Existing First Floor Plan



Existing Ground Floor Plan - Scale 1:100

XXXX	XXXXXX	XXX		XXXXXX
Rev.	Date	Description	Checked	
PLANNING/LBC				
Client: THE NATIONAL TRUST Brockhampton Estate, Herefordshire				
Project: Redevelopment of Existing Farm Buildings The Farm, Whitbourne, Herefordshire, HR7 4PL.				
Drawing Title: Hop Kiln Mews + Hop Kiln Barn Proposed Floor Plans				
Proj. No. BROH - TRA - XX - XX - DR - A - Pr10				
Scale:	1:100	@ A3	Drawn: JGR	Rev. Ref. P 01
Date:	17.01.21		Check Ref. TJR	
TIM RATCLIFFE ASSOCIATES				
HISTORIC BUILDING AND TRADITIONAL MATERIALS CONSULTANTS Cambrian House, Nantmawr, Oswestry, SY10 9HL. T: 01691 829240 E: office@timratcliffe.co.uk				



Appendix E

Proposed Surface Water Drainage Strategy

CHRIS PIKE ASSOCIATES BUILDING CONSERVATION & ENVIRONMENTAL SERVICES www.cpaconservation.co.uk 13 Claremont Hill, Shrewsbury, Shropshire, SY1 1RD Tel. 01952 581751 Email. admin@cpaconservation.co.uk			
Project:	1104/03-04 – Oast House Farm Barns	Date:	16/03/2021
Client:	The National Trust	Drg No:	1104/03-04/201
Drawing Title:	1104/03-04 – Surface Water Drainage Design	Drawn By	RP
		Approved By	

14. WHERE THE HEAD OF THE EXISTING DRAINAGE RUNS ARE TOO SHALLOW TO BE ABLE TO MAKE A NEW CONNECTION, IT MAY BE NECESSARY TO RELAY SECTIONS OF THE EXISTING DRAINAGE AT GREATER DEPTH. ALTERNATIVELY, NEW CONNECTIONS INTO THE EXISTING DRAINAGE COULD BE MADE VIA CONVEYANCE FEATURES AT SURFACE LEVEL, SUCH AS MODULAR TRENCH DRAINS (“ACO” OR SIMILAR).
15. INSPECTION CHAMBERS MUST BE PROVIDED AT ALL JUNCTIONS AND CHANGES OF DIRECTION. INSPECTION CHAMBERS SHOULD BE INSTALLED WITHIN THE EXISTING SYSTEM WHERE NOT CURRENTLY PROVIDED.
16. THE LOCATIONS AND ALIGNMENTS OF EXISTING DRAINS SHOWN ON THE PLAN BELOW ARE ASSUMED AND INDICATIVE ONLY. EXACT LOCATIONS ARE TO BE CONFIRMED BY EXPOSING SECTIONS OF THE DRAINS DURING THE SITE WORKS.
17. EXISTING RAINWATER GOODS SERVING THE FARMHOUSE AND ADJOINING STRUCTURES APPEAR IN GOOD CONDITION AND CAN CONTINUE TO BE USED AS EXISTING.

GENERAL NOTES AND CONDITIONS

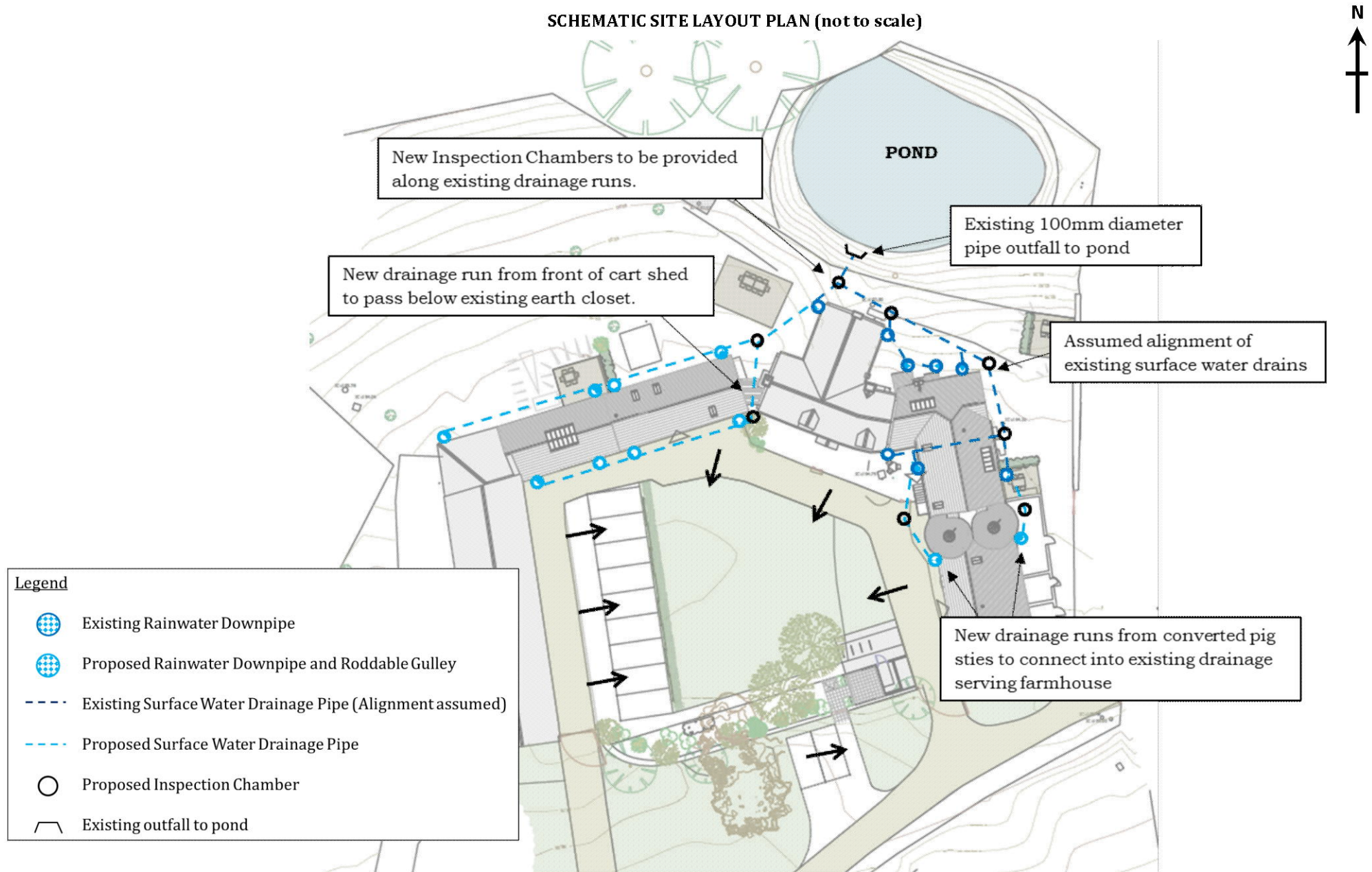
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME DRAWINGS, SCHEDULE OF WORKS AND THE CONTRACT DOCUMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE. **DO NOT SCALE FROM THIS DRAWING.**
3. ALL NEW DRAINAGE WORKS TO BE TO STANDARD SPECIFICATIONS FOR THE WATER INDUSTRY, BS EN 1295-1:1997 (AS AMENDED) AND APPROVED DOCUMENT PART H.
4. DRAINAGE RUNS TO HAVE TYPE S BED AND SURROUND FOR PLASTIC PIPES AND TYPE B BED AND SURROUND FOR RIGID (CONCRETE/CLAY) PIPES UNLESS INDICATED OTHERWISE.

PROPOSED DRAINAGE WORKS

5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL CPA PROJECT DRAWINGS AND DETAILS ISSUED BY THE ARCHITECT AND OTHER SPECIALISTS.
6. REFER TO TYPICAL DETAILS FOR MANHOLES, INSPECTION CHAMBERS AND PIPE BEDDINGS.
7. ALL DRAINS PASSING THROUGH OR BENEATH WALL FOUNDATIONS TO HAVE ROCKER PIPE SECTIONS.
8. ALL EXTERNAL RWP GULLIES TO BE BACK INLET RODDABLE TYPE. DOWNPIPE TO BE SET BELOW GRATING LEVEL BUT ABOVE TRAP.
9. ACCESS COVERS TO BE SET FLUSH WITH FINISHED SURFACE LEVEL.
10. ALL NEW DRAINAGE PIPE RUNS TO HAVE CONCRETE BED AND SURROUND TYPE A2 WHERE SET BELOW ROADWAYS AND LESS THAN 400mm COVER. ELSEWHERE TYPE S BED AND SURROUND MAY BE USED.
11. PIPES TO HAVE MINIMUM 300mm COVER UNDER HARDSTANDING AREAS.
12. THERE IS NO REQUIREMENT TO PROVIDE OIL INTERCEPTORS OR SILT TRAPS AS THE DRAINAGE SYSTEM WILL ONLY MANAGE UNCONTAMINATED RAINFALL RUN-OFF FROM ROOF AREAS.
13. THE HEAD OF THE EXISTING SURFACE WATER DRAINAGE RUNS SHOULD BE LOCATED PRIOR TO WORKS COMMENCING TO ENSURE NEW UPSTREAM CONNECTIONS CAN BE MADE WHILST MEETING THE EXISTING INVERT LEVELS AND REQUIRED COVER LEVELS.

PROPOSED SURFACE WATER DRAINAGE LAYOUT

SCHEMATIC SITE LAYOUT PLAN (not to scale)



The above plan is based on an extract of Tim Ratcliffe Associates drawing no. *BROH-TRA-XX-XX-DR-A-Pr01*, dated January 2021.

SPECIFICATION FOR PRIVATE DRAINAGE SYSTEMS

1.0 GENERAL

- 1.1 THIS SPECIFICATION IS TO BE READ IN CONJUNCTION WITH THE PRELIMINARIES AND GENERAL CONTRACT CONDITIONS AND RELATES TO THE MATERIALS, DETAILING, CONSTRUCTION AND WORKMANSHIP OF FOUL AND STORMWATER DRAINAGE SYSTEMS.
- 1.2 DRAINAGE WORK, MATERIALS DESIGN AND CONSTRUCTION SHALL MEET ALL REQUIREMENTS OF APPROVED DOCUMENT H, UNLESS OTHERWISE STATED
- 1.3 WORK OR MATERIALS NOT FULLY IN ACCORDANCE WITH THE DRAWINGS, SCHEDULE OR WORK OR THIS SPECIFICATION SHALL BE CLASSIFIED AS DEFECTIVE. ANY WORK SO CLASSIFIED AS DEFECTIVE SHALL BE IMMEDIATELY REMOVED AND REPLACED TO THE SATISFACTION OF THE ENGINEER / ARCHITECT AT THE CONTRACTORS EXPENSE SO AS NOT TO CAUSE DELAY TO THE BUILD PROGRAMME. THE BUILDING CONTRACTOR SHALL ALLOW FOR TESTING OF ALL COMPLETED DRAINAGE RUNS.

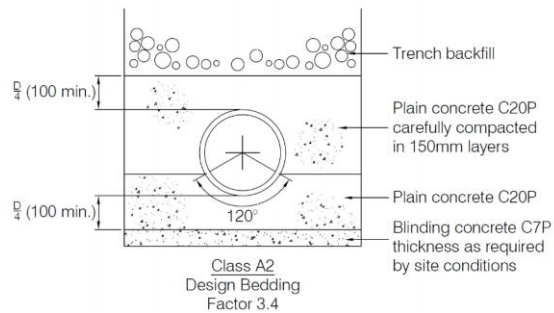
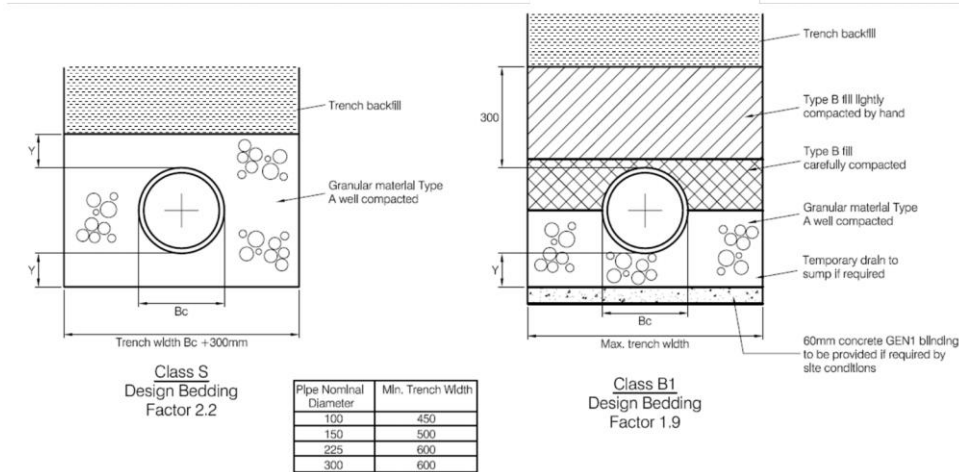
2.0 WORKMANSHIP AND OTHER DETAILS

BURIED EXTERNAL DRAINAGE SYSTEMS

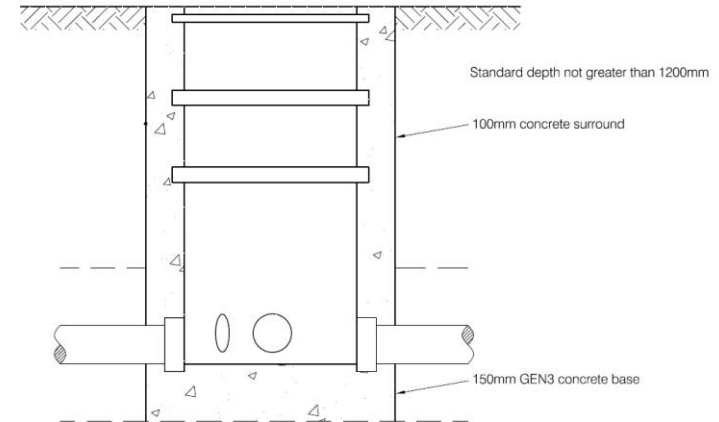
- 2.1 DRAINAGE SYSTEMS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS AND LOCAL BYELAWS, AND BE IN ACCORDANCE WITH THE SCHEDULE AND DETAILS SHOWN ON THE DRAWINGS.
- 2.2 DRAINAGE PIPE MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS FOR USE SHALL BE FULLY ADHERED TO AT ALL TIMES. EITHER FLEXIBLE SOCKETTED STONEWARE LAID IN EITHER IN GRAVEL OR CONCRETE SURROUND SHALL BE USED OR UNPLASTICISED PVC MATERIAL MAY BE USED IN AREAS NOT SUBJECT TO GROUND MOVEMENT OR VEHICLE TRAFFIC.
- 2.3 THE CONTRACTOR SHALL FIRST CHECK THAT AGREED DRAIN ROUTES DO NOT CONFLICT WITH BURIED SERVICES PRIOR TO STARTING EXCAVATION. TRENCHES FOR LAYING DRAINS TO BE SUFFICIENTLY WIDE TO ALLOW FOR EASE OF LAYING. ALL OPEN EXCAVATIONS SHALL BE SUPPORTED AS NECESSARY, PARTICULARLY WHERE SET CLOSE TO ADJACENT TRAFFICKED AREAS OR EXISTING BUILDING FOUNDATIONS.
- 2.4 BURIED DRAINS SHALL NOT BE LESS THAN 100mm MINIMUM INTERNAL DIAMETER LAID ON STRAIGHT AND EVEN FALLS BETWEEN INVERT LEVELS SHOWN ON THE DRAWINGS. PIPES TO BE LAID ON 100mm REGULATING LAYER OF GRANULAR MATERIAL PLACED BY HAND.
- 2.5 MANHOLE ACCESS SHALL BE PROVIDED AT ALL JUNCTIONS AND CHANGES OF DIRECTION UNLESS OTHERWISE INSTRUCTED.
- 2.6 WHERE DRAINAGE IS SET AT SHALLOW DEPTH OR WITHIN 300mm OF THE UNDERSIDE OF GROUND BEARING SLABS OR SURFACING, PIPEWORK SHALL BE SURROUNDED IN 150mm CONCRETE AND HAVE FULLY FLEXIBLE JOINTS AT MAXIMUM 3.0M CENTRES.
- 2.7 WHERE DRAINS PASS UNDERNEATH OR THROUGH SUBSTRUCTURE WALLS, THE DRAIN SHALL BE PROTECTED AND BRIDGED OVER USING PRECAST CONCRETE LINTELS OR OTHER MEANS TO PROVIDE A MINIMUM HALF PIPE DIAMETER CLEARANCE. FLEXIBLE PIPE COUPLERS SHALL BE PROVIDED EITHER SIDE OF THE WALL STRUCTURE.
- 2.8 DRAIN RUNS LAID STEEPER THAN 1:40 SHALL HAVE SLOW RADIUS BENDS AT THE LOWEST POINT PRIOR TO JUNCTIONS TO REDUCE THE VELOCITY OF FLOW.
- 2.9 ALL MANHOLE COVERS TO BE SET FLUSH AND LEVEL WITH SURROUND GROUND. INTERNAL MANHOLES TO HAVE DOUBLE SEAL SCREW DOWN AND AIR TIGHT COVERS.

- 2.10 GULLIES TO WASTE OUTLETS TO BE S.G. BACK INLET TYPE WITH 150mm GRATINGS AND 100mm DIAMETER OUTLETS (RODDABLE) SET IN LEAN MIX CONCRETE SURROUND. ALL EXTERNAL WASTE AND RAINWATER PIPES TO DISCHARGE TO GULLIES ABOVE THE WATERLINE AND BELOW THE LEVEL OF THE GRATING.
- 2.11 CONCRETE PIPES SHOULD COMPLY WITH THE REQUIREMENTS OF BS EN 1916 AND BS 5911-1.
- 2.12 VITRIFIED CLAY PIPES SHOULD COMPLY WITH REQUIREMENTS BS EN 295 FOR FOUL PIPES AND BS 65 FOR SURFACE WATER PIPES.
- 2.13 THERMOPLASTIC STRUCTURAL WALLED PIPES MUST COMPLY WITH WATER INDUSTRY STANDARD 4-35-01 AND ACHIEVE CLASS 8K/NM² NOMINAL SHORT TERM RING STIFFNESS. PVC PIPES SHOULD BE STORED ON SURFACES THAT PREVENT DISTORTION OF BOTH THE PIPE CIRCUMFERENCE AND LINEAR PROFILE.
- 2.14 PIPES MUST BE KITEMARKED OR HAVE A SIMILAR E.U. CERTIFICATION MARK.
- 2.15 PIPES SHOULD BE LAID IN 3.0 METRE MAXIMUM LENGTHS WITH THE JOINTS 'PUSHED HOME' INTO SOCKETS. FURTHERMORE, CARE MUST BE TAKEN TO ENSURE THE PIPE JOINTING SEALS ARE FREE FROM GRIT, SILT ETC. WHICH WILL LIKELY CAUSE THE PIPE LENGTH TO FAIL LATER AIR TESTING.
- 2.16 PIPES SHOULD BE CLEANLY CUT, BE FREE FROM DEFECTS AND LAID WITHOUT BACK FALL AND DIPS. MINIMUM EVEN FALL / GRADIENT ON RUNS BETWEEN MANHOLES AND GULLIES OF PIPE DIAMETER LESS THAN 350mm TO BE NOT SHALLOWER THAN 1:80.
- 2.17 PIPE TRENCHES SHOULD BE BACKFILLED AND COMPACTED IN 150 mm LAYERS TO 300 mm ABOVE THE PIPE CROWN. CARE SHOULD BE TAKEN DURING COMPACTION SO THAT THE SEWER REMAINS IN GOOD LINE AND LEVEL, IN PARTICULAR ADJACENT TO MANHOLE CHAMBERS TO PREVENT ROCKER PIPES BEING PUSHED DOWN FROM STUB PIPES.
- 2.18 SEWERS UP TO 750mm DIAMETER MUST BE AVAILABLE FOR TESTING EITHER BY AIR OR WATER.

PIPE BEDDING DETAILS (NOT TO SCALE)



450mm DIAMETER PLASTIC INSPECTION CHAMBER (NOT TO SCALE)



DRAINAGE CONSTRUCTION DETAILS NOTES

- B_c = EXTERNAL PIPE DIAMETER
 D = INTERNAL PIPE DIAMETER
- $Y = 0.25B_c$ WITH 500mm MIN. UNDER SOCKETS IN ROCK OR MIXED SOILS CONTAINING ROCK BANDS, BOULDERS, LARGE FLINTS OF STONE OR OTHER THICK, IRREGULAR HARD SPOTS THAT RESULT IN AN UNEVEN TRENCH BOTTOM.
- $Y = 0.16B_c$ OR 100mm WHICHEVER IS GREATER, BUT NOT LESS THAN 50mm UNDER SOCKETS IN SOILS THAT PERMIT AN EVEN TRENCH BOTTOM TO BE EXCAVATED.
- GRANULAR MATERIAL - FOR RIGID PIPES TYPE A BEDDING MATERIAL SHOULD CONFORM TO BS EN 1610 ANNEX B TABLE B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAXIMUM SIZE OF 10mm FOR 100mm PIPES, 14mm FOR 150mm PIPES, 20mm FOR PIPES FROM 150mm UP TO 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.
- SELECTED BACKFILL MATERIAL - FROM ARISINGS (NOT TO BE USED IN TRAFFICKED AREAS) TO BE FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL OR VEGETABLE MATTER.
- TYPE B FILL SHALL BE MOT TYPE 3 GRANULAR MATERIAL, OR EQUIVALENT.
- ALL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 225mm THICK.
- DESIGNATED CONCRETED MIX (GEN1, GEN3) TO BE IN ACCORDANCE WITH BS8500-2:2002.



Appendix F

Surface Water Run-Off Rates

CHRIS PIKE ASSOCIATES

13 Claremont Hill, Shrewsbury, Shropshire, SY1 1RD
 Tel: 01952 581751 E-mail: admin@cpaconservation.co.uk
www.cpaconservation.co.uk



Project No:	2019/1104/03-04	Date:	11/03/2021
Project:	Oast House Farm Barns	Initials:	RP
Element:	Proposed Surface Water Runoff Rates	Checked:	

Calculation based on HR Wallingford 'Modified Rational Method'

$$Q = 2.78CiA$$

Where:

- Q** peak discharge rate (l/s)
- C** dimensionless coefficient (mm/hr)
- i** average rainfall intensity during specified storm (mm/hr)
- A** contributing catchment area (ha)

M5-60min	20 mm
r	0.40
Impermeable Area	453.0 m ² 0.05 ha

Storm Event	Duration (D) min	Z1	M5-Dmin mm	Z2	M1-Dmin mm	i mm/hr	Impermeable Run-off	
							l/s	l/s/ha
1 in 1 year	15	0.63	12.60	0.62	7.81	31.2	3.9	86.9
1 in 2 year				0.80	10.08	40.3	5.1	112.1
1 in 30 year				1.53	19.24	77.0	9.7	214.0
1 in 100 year				1.99	25.07	100.3	12.6	278.8

Duration (D)	Z1	M5	Z2			
			1 year	2 year	30 year	100 year
5	0.38	5	0.620	0.790	1.427	1.790
10	0.54	10	0.610	0.790	1.490	1.910
15	0.63	15	0.620	0.800	1.527	1.990



Appendix G

Percolation Tests



Percolation Test undertaken in open area at the north of the site



Percolation Test undertaken in open at the north of the site



Appendix H

Proposed Foul Water Drainage Strategy

CHRIS PIKE ASSOCIATES BUILDING CONSERVATION & ENVIRONMENTAL SERVICES www.cpaconservation.co.uk 13 Claremont Hill, Shrewsbury, Shropshire, SY1 1RD Tel. 01952 581751 Email. admin@cpaconservation.co.uk			
Project:	1104/03-04 - Oast House Farm Barns	Date:	16/03/2021
Client:	The National Trust	Drg No:	1104/03-04/203
Drawing Title:	1104/03-04 - Foul Drainage Design	Drawn By	RP
		Approved By	

GENERAL NOTES AND CONDITIONS

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME DRAWINGS, SCHEDULE OF WORKS AND THE CONTRACT DOCUMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE. **DO NOT SCALE FROM THIS DRAWING.**
3. ALL NEW DRAINAGE WORKS TO BE TO STANDARD SPECIFICATIONS FOR THE WATER INDUSTRY, BS EN 1295-1:1997 (AS AMENDED), BS EN 6297:2007, AND APPROVED DOCUMENT PART H.
4. DRAINAGE RUNS TO HAVE TYPE S BED AND SURROUND FOR PLASTIC PIPES AND TYPE B BED AND SURROUND FOR RIGID (CONCRETE/CLAY) PIPES UNLESS INDICATED OTHERWISE.

PROPOSED DRAINAGE WORKS

5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL CPA PROJECT DRAWINGS, REPORTS AND DETAILS ISSUED BY THE ARCHITECT AND OTHER SPECIALISTS.
6. REFER TO TYPICAL DETAILS FOR MANHOLES, INSPECTION CHAMBERS AND PIPE BEDDINGS.
7. ALL DRAINS PASSING THROUGH OR BENEATH WALL FOUNDATIONS TO HAVE ROCKER PIPE SECTIONS.
8. ACCESS COVERS TO BE SET FLUSH WITH FINISHED SURFACE LEVEL.
9. ALL NEW DRAINAGE PIPE RUNS TO HAVE CONCRETE BED AND SURROUND TYPE A2 WHERE SET BELOW ROADWAYS / TRAFFICKED AREAS AND LESS THAN 400mm COVER. ELSEWHERE TYPE S BED AND SURROUND MAY BE USED.
10. THE EXISTING FOUL WATER DRAINAGE RUNS SHOULD BE LOCATED AND EXPOSED PRIOR TO WORKS COMMENCING TO ENSURE THAT I) NEW UPSTREAM CONNECTIONS CAN BE MADE WHILST MEETING THE EXISTING INVERT LEVELS AND REQUIRED COVER LEVELS, AND II) THE EXISTING DRAINAGE RUN TO THE SEPTIC TANK CAN BE UTILISED WHILST MEETING THE REQUIRED INVERT LEVEL OF THE INLET OF THE REPLACEMENT PACKAGE SEWAGE TREATMENT PLANT. WHERE THESE CONDITIONS CANNOT BE MET IT MAY BE NECESSARY TO REPLACE / RELAY SOME / ALL EXISTING EXTERNAL FOUL DRAINAGE RUNS TO ENSURE A SUFFICIENT GRADIENT CAN BE PROVIDED THROUGHOUT THE WHOLE SYSTEM. THE BELOW PLAN INDICATES THE POTENTIAL ACHIEVABLE INVERT LEVELS WHERE THE EXISTING DRAINAGE SYSTEM IS TO BE EXTENDED.

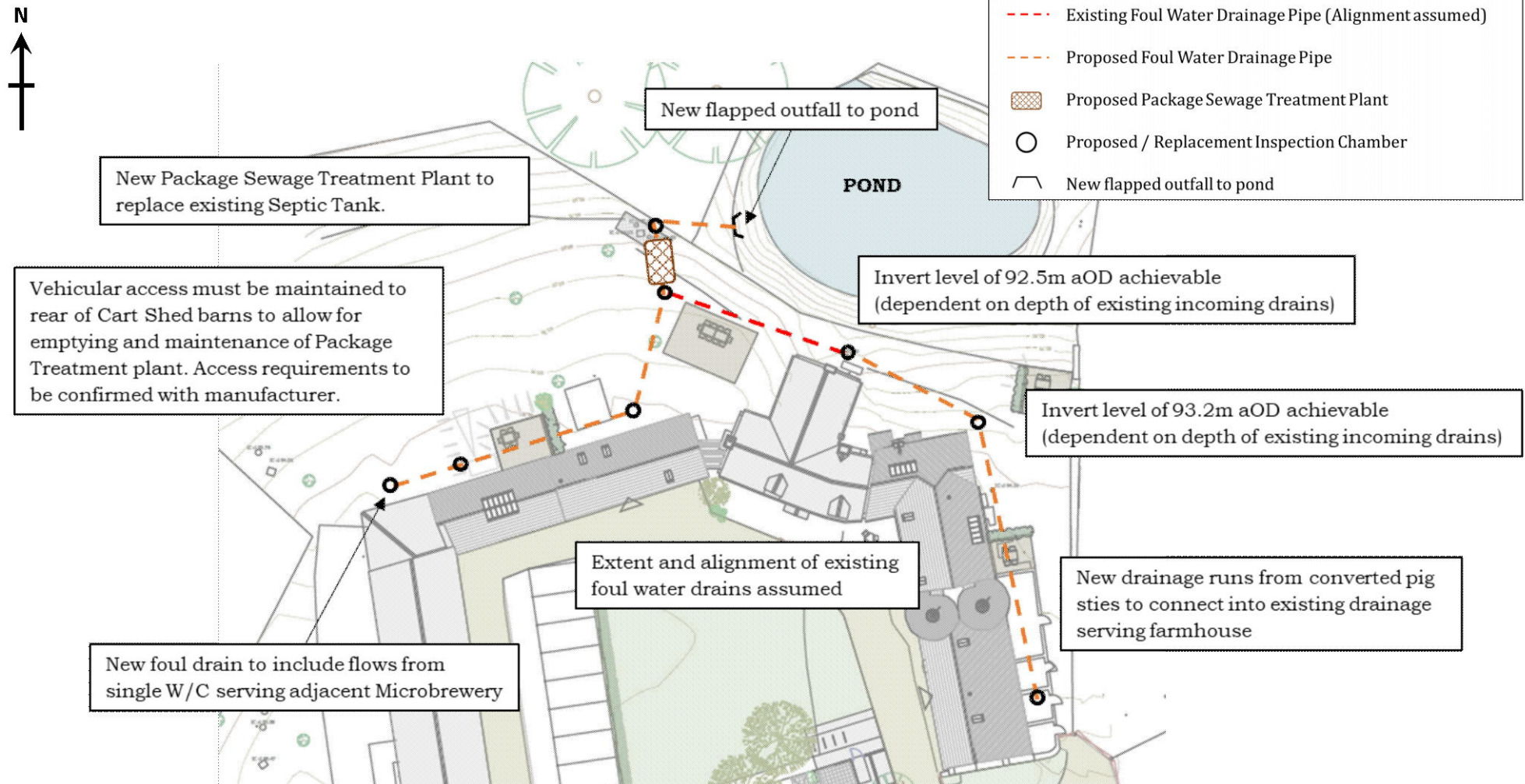
11. A NEW OUTFALL TO THE POND SHOULD BE PROVIDED FROM THE OUTLET OF THE PACKAGE TREATMENT PLANT. IT IS RECOMMENDED A FLAPPED OUTFALL IS PROVIDED AT THE OUTLET PIPE TO PREVENT BACKFLOWS DURING PERIODS WHEN THE POND MAY BE EXPERIENCING HIGH WATER LEVELS.
12. THE EXISTING SEPTIC TANK MUST BE EMPTIED AND DECOMMISSIONED.
13. REDUNDANT DRAINAGE RUNS WHICH ARE LESS THAN 1.5m DEEP SHOULD IDEALLY BE REMOVED. ANY OTHER PIPEWORK SHOULD BE SEALED AT ALL OPENINGS AND GROUT FILLED.
14. EXCAVATIONS ARE TO BE BACKFILLED WITH CLEAN GRADED MATERIAL AND ALL DISTURBED GROUND MADE GOOD.

PACKAGE SEWAGE TREATMENT PLANT

15. THE TOTAL MAXIMUM OCCUPANCY THAT THE FOUL DRAINAGE SYSTEM IS REQUIRED TO SERVE IS 20 PERSONS.
16. A SUITABLE PACKAGE TREATMENT PLANT MUST BE PROVIDED TO MANAGE FOUL FLOWS ARISING FROM THE POTENTIAL MAXIMUM OCCUPANCY OF THE SITE.
17. AT A MINIMUM THE PACKAGE TREATMENT PLANT MUST CONFORM TO BRITISH STANDARD EN 12566-3:2005 WITH CERTIFICATION OF PRODUCING MAXIMUM EFFLUENT DISCHARGE CONCENTRATIONS OF 20mg/l BIOCHEMICAL OXYGEN DEMAND (BOD), 30mg/l SUSPENDED SOLIDS (ss), AND 20mg/l AMMONICAL NITROGEN (NH₄-N).
18. THE PACKAGE SEWAGE TREATMENT PLANT IS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND GUIDANCE.
19. A POWER SUPPLY TO THE PACKAGE SEWAGE TREATMENT PLANT WILL BE REQUIRED.
20. AN INSPECTION CHAMBER SHOULD BE PROVIDED AT THE OUTLET OF THE PACKAGE SEWAGE TREATMENT PLANT TO SERVE AS A SAMPLING POINT.
21. THE PACKAGE SEWAGE TREATMENT PLANT WILL DISCHARGE TO THE EXISTING POND.
22. VEHICULAR ACCESS MUST BE AVAILABLE TO THE PACKAGE TREATMENT PLANT, OR NEARBY AREA, TO ALLOW FOR EMPTYING AND MAINTENANCE
23. THE SITE IS NOT LOCATED WITHIN A GROUNDWATER SOURCE PROTECTION ZONE.

PROPOSED FOUL DRAINAGE LAYOUT

SCHEMATIC SITE LAYOUT PLAN (not to scale)



The above plan is based on an extract of Tim Ratcliffe Associates drawing no. *BROH-TRA-XX-XX-DR-A-Pr01*, dated January 2021.

SPECIFICATION FOR PRIVATE DRAINAGE SYSTEMS

1.0 GENERAL

- 1.1 THIS SPECIFICATION IS TO BE READ IN CONJUNCTION WITH THE PRELIMINARIES AND GENERAL CONTRACT CONDITIONS AND RELATES TO THE MATERIALS, DETAILING, CONSTRUCTION AND WORKMANSHIP OF FOUL AND STORMWATER DRAINAGE SYSTEMS.
- 1.2 DRAINAGE WORK, MATERIALS DESIGN AND CONSTRUCTION SHALL MEET ALL REQUIREMENTS OF APPROVED DOCUMENT H, UNLESS OTHERWISE STATED
- 1.3 WORK OR MATERIALS NOT FULLY IN ACCORDANCE WITH THE DRAWINGS, SCHEDULE OR WORK OR THIS SPECIFICATION SHALL BE CLASSIFIED AS DEFECTIVE. ANY WORK SO CLASSIFIED AS DEFECTIVE SHALL BE IMMEDIATELY REMOVED AND REPLACED TO THE SATISFACTION OF THE ENGINEER / ARCHITECT AT THE CONTRACTORS EXPENSE SO AS NOT TO CAUSE DELAY TO THE BUILD PROGRAMME. THE BUILDING CONTRACTOR SHALL ALLOW FOR TESTING OF ALL COMPLETED DRAINAGE RUNS.

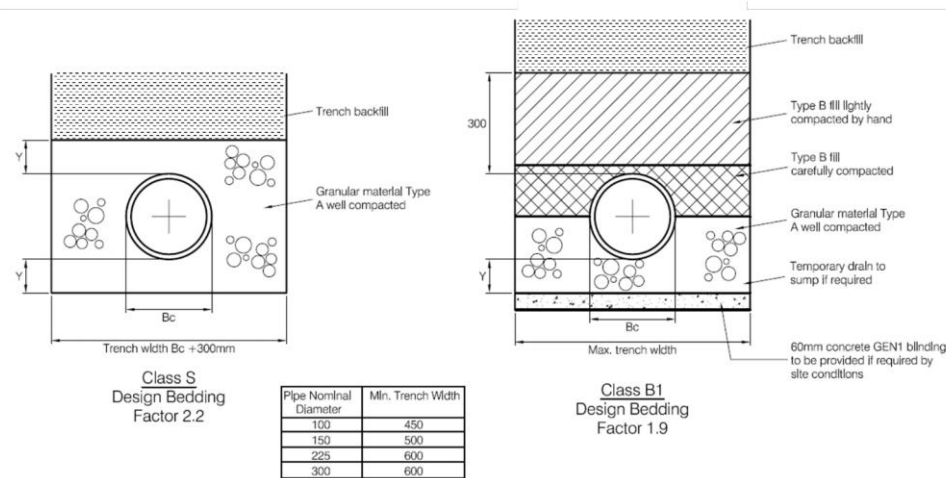
2.0 WORKMANSHIP AND OTHER DETAILS

BURIED EXTERNAL DRAINAGE SYSTEMS

- 2.1 DRAINAGE SYSTEMS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS AND LOCAL BYELAWS, AND BE IN ACCORDANCE WITH THE SCHEDULE AND DETAILS SHOWN ON THE DRAWINGS.
- 2.2 DRAINAGE PIPE MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS FOR USE SHALL BE FULLY ADHERED TO AT ALL TIMES. EITHER FLEXIBLE SOCKETTED STONEWARE LAID IN EITHER IN GRAVEL OR CONCRETE SURROUND SHALL BE USED OR UNPLASTICISED PVC MATERIAL MAY BE USED IN AREAS NOT SUBJECT TO GROUND MOVEMENT OR VEHICLE TRAFFIC.
- 2.3 THE CONTRACTOR SHALL FIRST CHECK THAT AGREED DRAIN ROUTES DO NOT CONFLICT WITH BURIED SERVICES PRIOR TO STARTING EXCAVATION. TRENCHES FOR LAYING DRAINS TO BE SUFFICIENTLY WIDE TO ALLOW FOR EASE OF LAYING. ALL OPEN EXCAVATIONS SHALL BE SUPPORTED AS NECESSARY, PARTICULARLY WHERE SET CLOSE TO ADJACENT TRAFFICKED AREAS OR EXISTING BUILDING FOUNDATIONS.
- 2.4 BURIED DRAINS SHALL NOT BE LESS THAN 100mm MINIMUM INTERNAL DIAMETER LAID ON STRAIGHT AND EVEN FALLS BETWEEN INVERT LEVELS SHOWN ON THE DRAWINGS. PIPES TO BE LAID ON 100mm REGULATING LAYER OF GRANULAR MATERIAL PLACED BY HAND.
- 2.5 MANHOLE ACCESS SHALL BE PROVIDED AT ALL JUNCTIONS AND CHANGES OF DIRECTION UNLESS OTHERWISE INSTRUCTED.
- 2.6 WHERE DRAINAGE IS SET AT SHALLOW DEPTH OR WITHIN 300mm OF THE UNDERSIDE OF GROUND BEARING SLABS OR SURFACING, PIPEWORK SHALL BE SURROUNDED IN 150mm CONCRETE AND HAVE FULLY FLEXIBLE JOINTS AT MAXIMUM 3.0M CENTRES.
- 2.7 WHERE DRAINS PASS UNDERNEATH OR THROUGH SUBSTRUCTURE WALLS, THE DRAIN SHALL BE PROTECTED AND BRIDGED OVER USING PRECAST CONCRETE LINTELS OR OTHER MEANS TO PROVIDE A MINIMUM HALF PIPE DIAMETER CLEARANCE. FLEXIBLE PIPE COUPLERS SHALL BE PROVIDED EITHER SIDE OF THE WALL STRUCTURE.
- 2.8 SOIL WASTE PIPES SHALL BE CONNECTED TO DRAINS VIA A 450mm DIAMETER SLOW RADIUS BEND SWEEP IN THE DIRECTION OF FLOW.
- 2.9 DRAIN RUNS LAID STEEPER THAN 1:40 SHALL HAVE SLOW RADIUS BENDS AT THE LOWEST POINT PRIOR TO JUNCTIONS TO REDUCE THE VELOCITY OF FLOW.

- 2.10 ALL MANHOLE COVERS TO BE SET FLUSH AND LEVEL WITH SURROUND GROUND. INTERNAL MANHOLES TO HAVE DOUBLE SEAL SCREW DOWN AND AIR TIGHT COVERS.
- 2.11 GULLIES TO WASTE OUTLETS TO BE S.G. BACK INLET TYPE WITH 150mm GRATINGS AND 100mm DIAMETER OUTLETS (RODDABLE) SET IN LEAN MIX CONCRETE SURROUND. ALL EXTERNAL WASTE AND RAINWATER PIPES TO DISCHARGE TO GULLIES ABOVE THE WATERLINE AND BELOW THE LEVEL OF THE GRATING.
- 2.12 CONCRETE PIPES SHOULD COMPLY WITH THE REQUIREMENTS OF BS EN 1916 AND BS 5911-1.
- 2.13 VITRIFIED CLAY PIPES SHOULD COMPLY WITH REQUIREMENTS BS EN 295 FOR FOUL PIPES AND BS 65 FOR SURFACE WATER PIPES.
- 2.14 THERMOPLASTIC STRUCTURAL WALLED PIPES MUST COMPLY WITH WATER INDUSTRY STANDARD 4-35-01 AND ACHIEVE CLASS 8K/NM2 NOMINAL SHORT TERM RING STIFFNESS. PVC PIPES SHOULD BE STORED ON SURFACES THAT PREVENT DISTORTION OF BOTH THE PIPE CIRCUMFERENCE AND LINEAR PROFILE.
- 2.15 PIPES MUST BE KITEMARKED OR HAVE A SIMILAR E.U. CERTIFICATION MARK.
- 2.16 PIPES SHOULD BE LAID IN 3.0METRE MAXIMUM LENGTHS WITH THE JOINTS 'PUSHED HOME' INTO SOCKETS. FURTHERMORE, CARE MUST BE TAKEN TO ENSURE THE PIPE JOINTING SEALS ARE FREE FROM GRIT, SILT ETC. WHICH WILL LIKELY CAUSE THE PIPE LENGTH TO FAIL LATER AIR TESTING.
- 2.17 PIPES SHOULD BE CLEANLY CUT, BE FREE FROM DEFECTS AND LAID WITHOUT BACK FALL AND DIPS. MINIMUM EVEN FALL / GRADIENT ON RUNS BETWEEN MANHOLES AND GULLIES OF PIPE DIAMETER LESS THAN 350mm TO BE NOT SHALLOWER THAN 1:80.
- 2.18 PIPE TRENCHES SHOULD BE BACKFILLED AND COMPACTED IN 150 mm LAYERS TO 300 mm ABOVE THE PIPE CROWN. CARE SHOULD BE TAKEN DURING COMPACTION SO THAT THE SEWER REMAINS IN GOOD LINE AND LEVEL, IN PARTICULAR ADJACENT TO MANHOLE CHAMBERS TO PREVENT ROCKER PIPES BEING PUSHED DOWN FROM STUB PIPES.
- 2.19 SEWERS UP TO 750mm DIAMETER MUST BE AVAILABLE FOR TESTING EITHER BY AIR OR WATER.

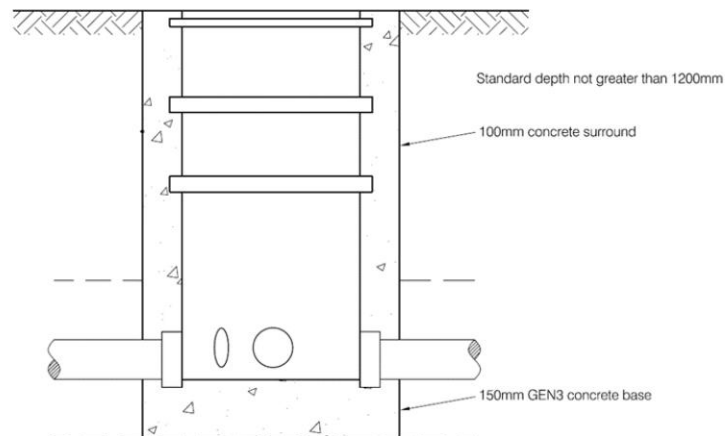
PIPE BEDDING DETAILS (NOT TO SCALE)



DRAINAGE CONSTRUCTION DETAILS NOTES

1. B_c = EXTERNAL PIPE DIAMETER
 D = INTERNAL PIPE DIAMETER
2. $Y = 0.25B_c$ WITH 500mm MIN. UNDER SOCKETS IN ROCK OR MIXED SOILS CONTAINING ROCK BANDS, BOULDERS, LARGE FLINTS OF STONE OR OTHER THICK, IRREGULAR HARD SPOTS THAT RESULT IN AN UNEVEN TRENCH BOTTOM.
3. $Y = 0.16B_c$ OR 100mm WHICHEVER IS GREATER, BUT NOT LESS THAN 50mm UNDER SOCKETS IN SOILS THAT PERMIT AN EVEN TRENCH BOTTOM TO BE EXCAVATED.
4. GRANULAR MATERIAL - FOR RIGID PIPES TYPE A BEDDING MATERIAL SHOULD CONFORM TO BS EN 1610 ANNEX B TABLE B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAXIMUM SIZE OF 10mm FOR 100mm PIPES, 14mm FOR 150mm PIPES, 20mm FOR PIPES FROM 150mm UP TO 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.
5. SELECTED BACKFILL MATERIAL - FROM ARISINGS (NOT TO BE USED IN TRAFFICKED AREAS) TO BE FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL OR VEGETABLE MATTER.
6. TYPE B FILL SHALL BE MOT TYPE 3 GRANULAR MATERIAL, OR EQUIVALENT.
7. ALL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 225mm THICK.
8. DESIGNATED CONCRETED MIX (GEN1, GEN3) TO BE IN ACCORDANCE WITH BS8500-2:2002.

450mm DIAMETER PLASTIC INSPECTION CHAMBER (NOT TO SCALE)



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Project No:	2019/1104/03-04	Date:	11/03/2021
Project:	Oast House Farm Barns	Initials:	RP
Element:	Foul Drainage Rates	Sheet:	1

Estimation of Foul Drainage Discharge Rates using British Water - Flows and Loads 4.

Proposed Occupancy

Property Type	Number	P	Total P
1-bed	2	2	4
3-bed	1	5	5
6-bed	1	10	10
Micro-Brewery	1	1	1
			20

Daily Flow

150 l/day per person

3000 l/day
3 m³/day

BOD

60 g/day per person

1200 g/day
1.2 kg/day