

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

THE FOAL BARN, WINEHAM LANE, WINEHAM, HENFIELD, MID SUSSEX BN5 9AN

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1.0 Introduction and Site Context

1.1 AAH Consultants have been commissioned to undertake a Flood Risk Assessment and Drainage Strategy to support an equine development at The Foal Barn, Wineham Lane, Wineham, Henfield, BN5 9AN (the 'Site').

1.2 The information presented is as follows:

- A background to the Site
- An assessment of existing flood risk
- Development proposals
- Surface water management

The Site

1.3 The site is situated within the hamlet of Wineham, approximately 7 miles west of Burgess Hill town centre. The site is bounded by the River Adur at the north, an agricultural premise and land is present to the east, open grassland borders the site at the south, and residential dwellings are situated at the west. Currently, the site exists as an agricultural premise with various agricultural buildings/structures.

1.4 The site lies within the administrative area of Mid Sussex District Council as Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA), and Southern Water as Water and Sewerage Company (WaSC). The site does not exist within an Internal Drainage Board area.

Topography

1.5 The site topography is generally level with external ground levels varying from approximately 14.20mAoD to 7.70mAoD (no elevation data is available for the land within 61.5m of the river Adur, with this land also comprising part of the Site, however, the ground levels are expected to be further reduced in this area). There is an overall fall on the site from south to north, towards the River Adur, situated at the Sites northern boundary. A copy of the topographic survey is included in Appendix A.

Geology

1.6 According to British Geological Society (BGS) 1:50,000 scale mapping, the site is entirely underlain by bedrock geology of WEALD CLAY FORMATION - MUDSTONE. There is no information regarding the superficial geology directly at the Site, however, nearby deposits indicate the overlaying presence of silt, sand and gravel.

Hydrogeology

- 1.7 According to BGS 1:625,000 scale mapping, the site is underlain by the rock unit 'WEALDEN GROUP', characterised as 'rocks with essentially no groundwater'. The site lies outside of all groundwater source protection zones.

Hydrology

- 1.8 A ditch is present within the applicant's land ownership, at the north east of the Site, which communicates with the River Adur further to the north. A private surface water outfall to the ditch currently serves the existing site and is also under the applicants ownership. A dye test to confirm the aforementioned connection was undertaken in 2021 to advise on a previous drainage strategy undertaken at the Site. The evidence of this is attached as Appendix B.

2.0 Existing Flood Risk

- 2.1 The National Planning Policy Framework (NPPF) sets strict tests to protect people and property from flood risk, which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed.
- 2.2 For the purposes of applying the National Planning Policy Framework, "flood risk" is a combination of the probability and the potential consequences of flooding from all sources – including from rivers and the sea (fluvial flooding), directly from rainfall on the ground surface (surface water or pluvial flooding) and rising groundwater (groundwater flooding), overwhelmed sewers and drainage systems (sewer flooding), and from reservoirs, canals and lakes and other artificial sources (artificial flooding).
- 2.3 The following assesses the potential for flood risk from all sources to determine the overall flood risk to the Site.

Tidal and Fluvial Flood Risk

- 2.4 According to the Environment Agency's (EA) Flood Map for Planning service (**Figure 1**), the site lies within Flood Zones 1, 2 and 3. In undertaking an FRA for a site with multiple flood zones, the more onerous flood zone should be used to form the findings of the assessment. Flood Zone 3 is an area with a high probability of flooding.

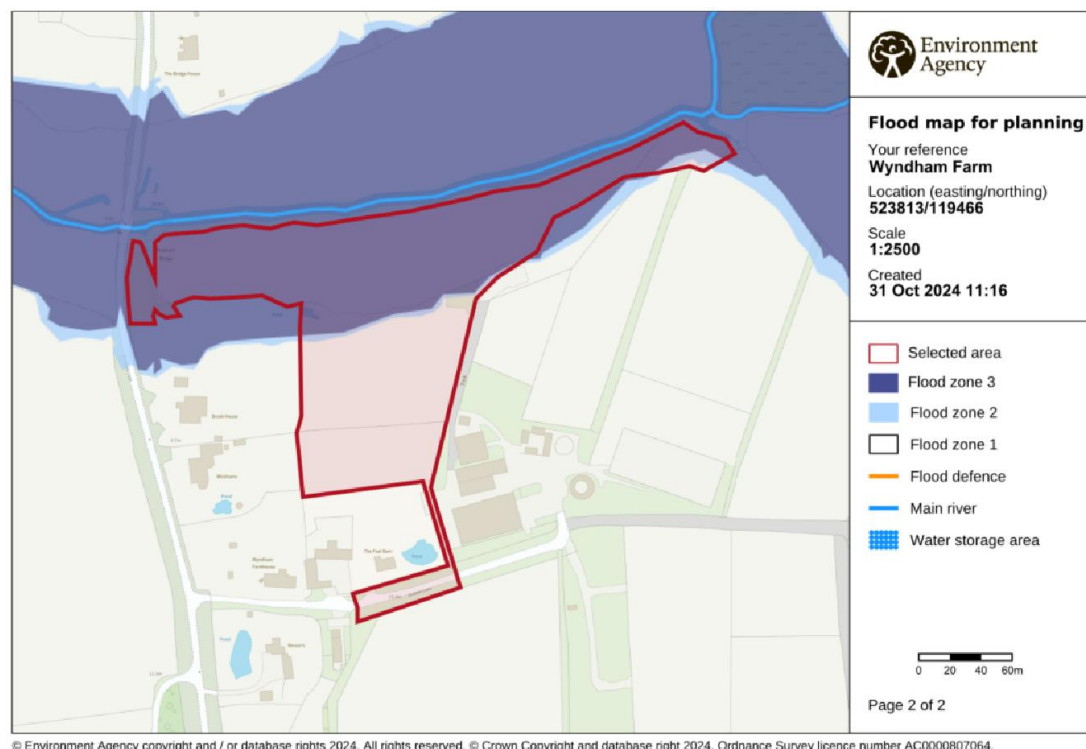


Figure 1: Environment Agency Flood Map for Planning (Site indicated in red)

- 2.5 Flood Zone 3 is further classified into 3a and 3b. Flood zone 3b is the functional floodplain, and only water compatible or essential infrastructure development proposals are appropriate in principle, although essential infrastructure is subject to further tests. Flood Zone 3a is suitable, in principle, for all development except for highly vulnerable areas, although further tests are required for essential infrastructure and more vulnerable development. The LPA are responsible for determining the threshold between flood zones 3a and 3b.
- 2.6 Within the Mid Sussex District Council (MSDC) Strategic Flood Risk Assessment (SFRA) July 2024, the LPA define Flood Zone 3b as land where water from rivers or sea has to flow or be stored in times of flood. A functional floodplain typically comprises:
- Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
 - Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).
- 2.7 In conjunction with the Environment Agency, the MSDC have produced virtual maps to support the SFRA. An area adjacent to the River Adur, within the confines of the Site, is evidenced as being Flood Zone 3B (**Figure 2**). The afore withstanding, the majority of the Site, where built development and access is proposed, is located within Flood Zone 1. An area classified as having less than a 0.1% annual probability of river or sea flooding.

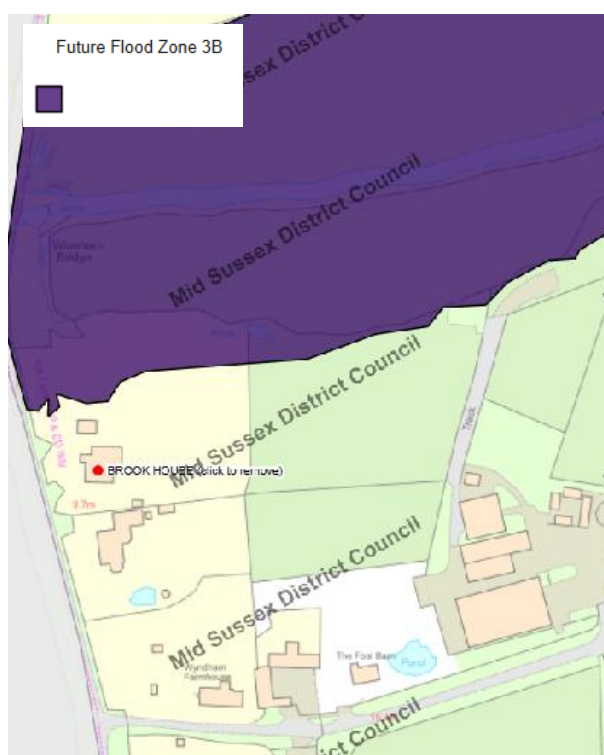


Figure 2: Mid Sussex District Council SFRA Flood Zone 3B Map

- 2.8 Under the guidance provided in the National Planning Policy Framework (NPPF), the Sequential Test is designed to steer new development to areas with the lowest risk of flooding (Flood Zone 1). The proposals are for an equine development, and a sequential approach, in line with the aforementioned NPPF guidance, has been adopted by confining the built elements and all accesses to areas with a low risk of flooding (Flood Zone 1). Consequently, a formal Sequential Test is not expected to be required. Additionally, an Exception Test is not required for water-compatible developments under the NPPF.
- 2.9 Site specific detailed flood risk information has been provided by the EA, in response to a Freedom of Information request, to inform this FRA (as contained in Appendix C). The site is not considered to be at risk from coastal flooding, but is at risk from fluvial flooding.
- 2.10 The aforementioned data has been obtained from the 'Adur Eastern Branch Update, 2011' model and the 'Adur Eastern Branch Climate Change Allowances Update (2016)' model. The models include 2D level information for the site for a range of [undefended] return periods, and with an uplift in flow to accommodate the effects of climate change.
- 2.11 The area does not benefit from any formal flood defences.
- 2.12 NPPF guidance states that for a 'water compatible' development within Flood Zone 3, the central allowance for peak river flow climate change allowance should be used. The Adur and Ouse Management Catchment Peak Rainfall Allowance (DEFRA) has been reviewed and illustrates a central allowance of 37%. As such, the most appropriate (and conservative) flood level information for the Site, as per the EA data appended to this report, is the 1% AEP with a 45% increase in flow [undefended].
- 2.13 The hydraulic data for 'Node Ref 9' modelled from the 1% AEP flood event (representative of Flood Zone 3) plus 45%, where the flood extents are nearest to the proposed development, indicates a water surface level of 8.05mAoD, with the corresponding depth of water stated to be 0.15m at that location also.
- 2.14 The site rises in elevation as the distance from the River Adur (at the north) increases. At the location where the built elements are proposed, at the location in closest proximity to the River Adur, the elevation is approximately 8.42mAoD. Finished Floor Levels for the horse stable has been set to 9.500mAoD. This provides a freeboard of 1.45m between the development proposals and the nearest point of flooding. As such, the areas consisting of the development proposals are not expected to flood under any of the assessed storm events,

including the 1% Annual Exceedance Probability (AEP) + 35% Climate Change (CC), 1% AEP + 45% CC, or 1% AEP + 105% CC scenarios.

- 2.15 The MSDC SFRA 2024 states, “for most uses, a 300mm freeboard is considered adequate, while sleeping accommodation necessitates a 600mm buffer”. Despite this guidance, the Product 4 data received from the EA provides confirmation that the existing site levels are sufficiently raised so that the proposed development will not be affected by any of the assessed storm events. Additionally, the development, the provision of equine facilities for outdoor recreation, is considered water compatible, and it is expected that the ground profile should not be altered, 'unless where necessary to accommodate level platforms for the proposed development (i.e. stables)', as a result of this, so that the existing flood risk of the wider area is retained.

Pluvial and Sewer Flood Risk

- 2.16 Intense rainfall can create run-off, which temporarily overwhelms the capacity of the local drainage systems. Under these conditions, localised 'flash' flooding can occur. In addition, surface water can flood into the sewer networks and overload both the surface water and combined sewer networks. This type of flooding is especially problematic when these systems become overloaded simultaneously.
- 2.17 The EA flood map for surface water (FMfSW) divides England and Wales into areas with a very low, low, medium and high risk of pluvial flooding. 'Very low' means that each year this area has a chance of flooding of less than 1 in 1000 (0.1%). 'Low' means that each year this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%), 'Medium' means that each year this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) and 'High' means that each year this area has a chance of flooding of greater than 1 in 30 (3.3%).

- 2.18 According to the Environment Agency's Long Term Flood Risk mapping (**Figure 3**), the site contains areas of high to low risk of pluvial flooding towards the northern boundary, the extents of which coincide with the presence of the river Adur at this location.

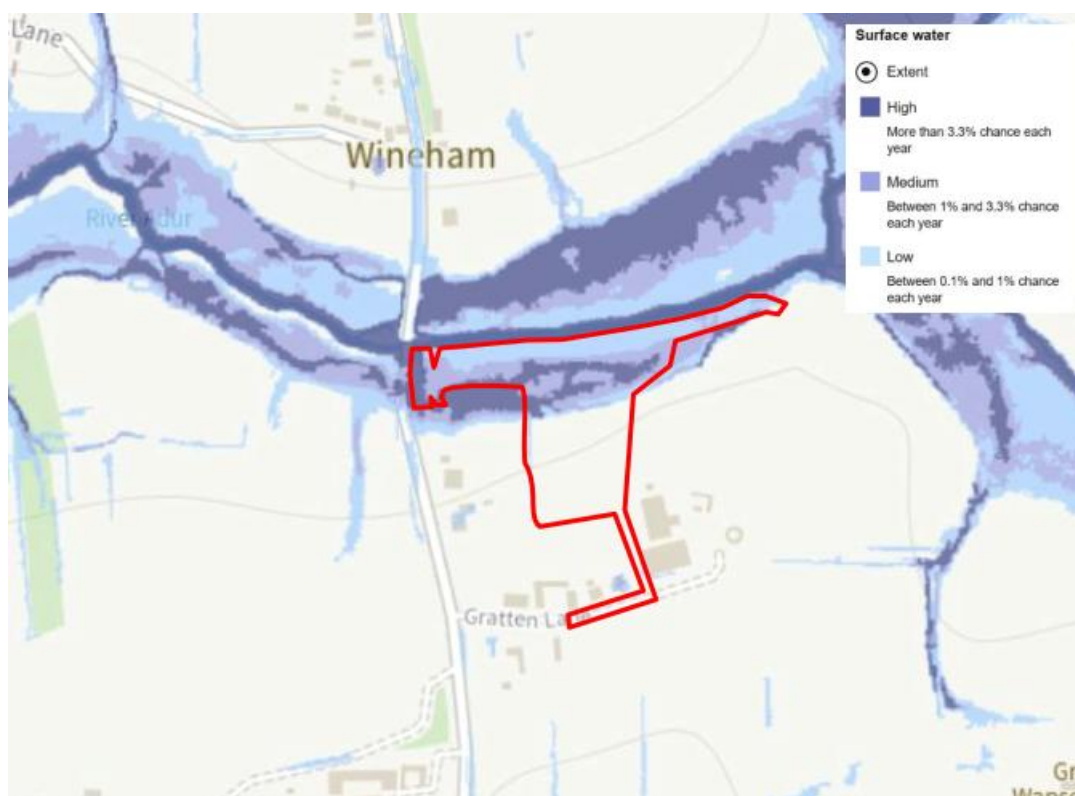


Figure 3: EA Flood Risk Map for Surface Water (Site indicated in red)

- 2.19 The development proposals illustrate the built development being situated away from the areas at higher risk of surface water flooding, and located within a central area where the risk of flooding is very low.
- 2.20 Additionally, there are no public sewers present within the vicinity of the Site, and thus the site is not expected to be at risk from this source.
- 2.21 The risk of surface water flooding to the proposed development is deemed to be low and acceptable.

Groundwater Flood Risk

- 2.22 Groundwater flooding is most commonly caused by rainfall, which causes the groundwater table beneath a site to rise and eventually exceed ground level. Groundwater flooding can also occur where the water table is sufficiently close to the site surface that it inundates subterranean development. Like other sources of flooding, groundwater flooding will be affected by increased rainfall attributable to climate change.

- 2.23 The West Sussex Local Flood Risk Management Strategy (2021-2026) includes mapping which illustrates areas at risk of groundwater flooding within the county. This source concludes that the majority of the Mid Sussex area is considered to have low potential for groundwater flooding as a result of its underlying geology.
- 2.24 The site soils consist of superficial permeable deposits (sand, silt and gravel) atop more impermeable deposits (clay). As such, if groundwater is present, it will likely be in the form of a perched water table. The MSDC SFRA states that low lying areas are likely to be more susceptible to groundwater flooding because the water table is at a much shallower depth and groundwater paths tend to travel from high to low ground. This indicates that if groundwater flooding were to occur at the Site, it would be isolated to areas at the northern boundary where the river Adur is located and topographically, the elevation is much lower.
- 2.25 The built development is to be situated away from the aforementioned areas, and thus the risk of groundwater flooding is deemed to be low and acceptable.

Artificial Flood Risk

- 2.26 The EA Risk of Flooding from Reservoirs' map indicates areas where peoples' lives would be in danger as a result of an uncontrolled release of water from a reservoir or static body of water. In terms of the probability of occurrence, the EA acknowledges in their flood map annotations that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925, with all large reservoirs inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensures that reservoirs are inspected regularly, and essential safety work is carried out.
- 2.27 The EA Risk of flooding from Reservoirs map (**Figure 4**) indicates that the site is at risk from this source when river levels are normal, and is also at risk when there is flooding from rivers.

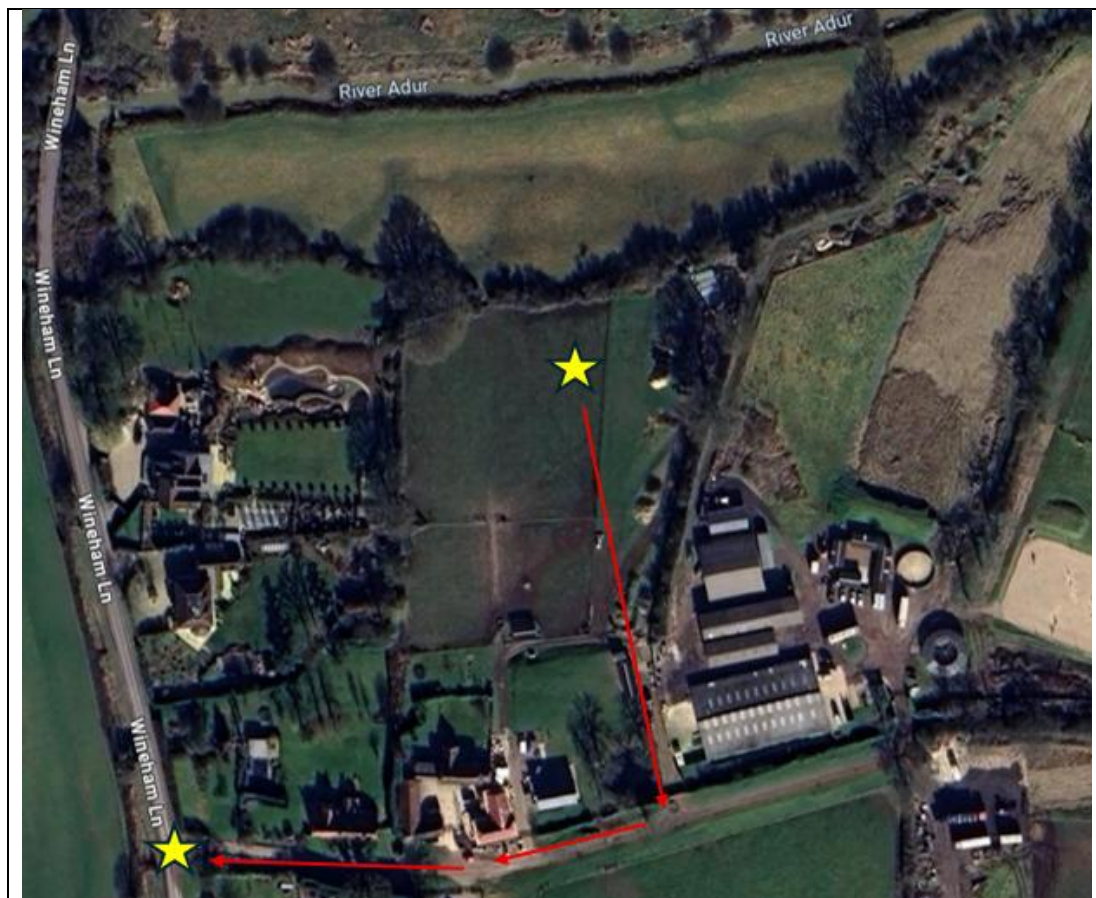


Figure 4: EA Flood Risk Map for Reservoirs (Site indicated in red)

- 2.28 Flooding from the River Adur is expected to only occur during an extreme flood event and not under the design conditions. The likelihood of a breach event is low, as is the likelihood of a reservoir failure. The likelihood of both occurring at the same time is even lower and sufficiently low enough as to not warrant any specific design consideration for such an event.

3.0 Development Proposals

- 3.1 The development proposes to enact a change of use of land from agricultural use to equestrian use, the erection of a stable building, and the construction of an all-weather outdoor riding area, with associated hard and soft landscaping. The development proposals are included as Appendix D.
- 3.2 According to the NPPF flood risk vulnerability classification, the site is categorised as a 'Water Compatible' development intended for 'outdoor recreation'.
- 3.3 Despite the outlined mitigation measures included within Section 2.0 of this report, in the event of a design flood or a more severe flooding event, safe egress from the development and access to an area of lower flood risk is required.
- 3.4 An outline flood evacuation route is provided below and can be refined through client and stakeholder engagement, if required. In general, in a flood emergency event, occupants of the proposed development should seek refuge towards the Sites southern boundary or along Wineham Lane as indicated below.



1. Users of the development are to route in a southerly direction towards Gratten Lane (private road leading to the Sites access) or the nearby Wineham Lane to the west.

3.5 The Environment Agency provide three tiers of flood warning, as below in **Figure 5**. In the event of a flood warning or severe flood warning, the flood evacuation plan should be enacted.

Would you know what to do in a flood? 

	FLOOD ALERT	PREPARE	• Prepare a bag that includes medicines and insurance documents • Visit www.gov.uk/check-flooding
	FLOOD WARNING	ACT	• Turn off gas, water and electricity • Move things upstairs or to safety • Move family, pets and car to safety
	SEVERE FLOOD WARNING	SURVIVE	• Call 999 if in immediate danger • Follow advice from emergency services • Keep yourself and your family safe

Visit check-for-flooding.service.gov.uk/plan-ahead-for-flooding **#PrepareActSurvive**

Figure 5: Environment Agency Flood Warnings

3.6 To further reduce the risk of flooding as a result of rainfall, a Sustainable Drainage System (SuDS) has been proposed. This system aims to mimic natural catchment and conveyance processes as far as possible on developed land in order to reduce the rate of flow and volume of water leaving the Site, remove contaminants from surface water run-off and provide amenity and biodiversity benefits. In general, SuDS require less long-term maintenance and capital investment when compared to traditional surface water management techniques.

4.0 Surface Water Management

Existing Drainage

- 4.1 Currently, the site is undeveloped, and there is no evidence to suggest it has ever been developed. As such, the site is not expected to be served by any drainage infrastructure.
- 4.2 The above withstanding, an existing surface water outfall routes through the site (from south west to north east) carrying flows from the adjacent residential development at the south. The existing surface water outfall ultimately discharges flows to the River Adur, via the ditch.

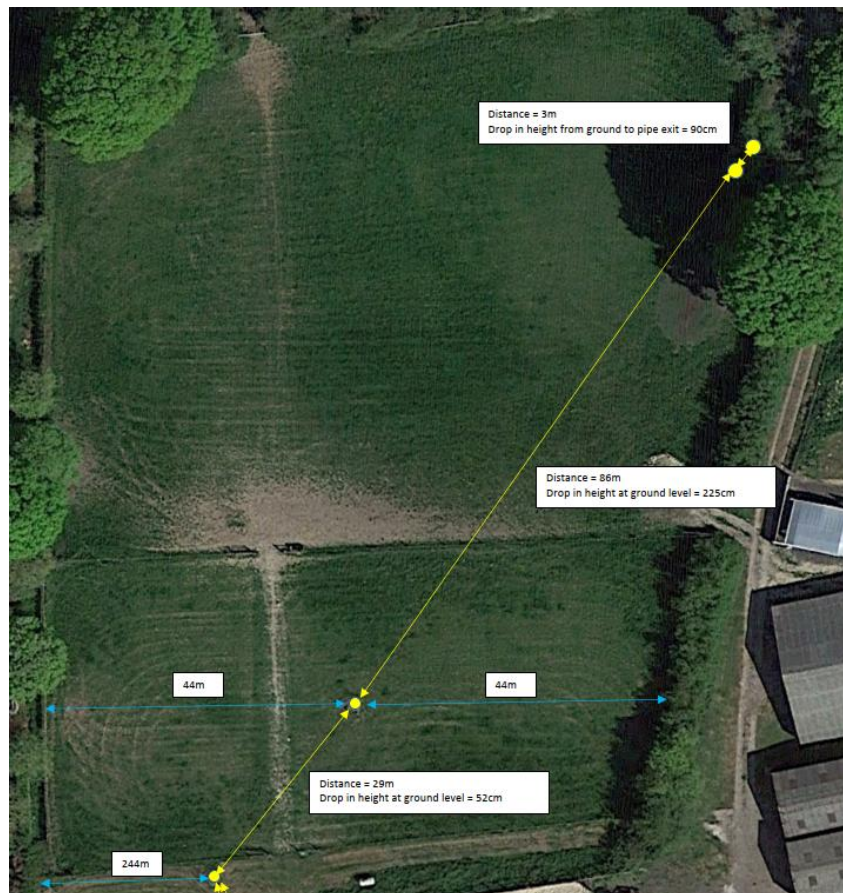


Figure 6: Extract of Existing Drainage Sketch Received from Applicant (2021)

Surface Water Disposal

- 4.3 In accordance with Building Regulations Approved Document H and DEFRA's Non-Statutory Technical Standards for SuDS (Sustainable Drainage Systems), disposal of curtilage surface water run-off should be directed to the following, in order of preference:
- Infiltration to ground;
 - Disposal to a watercourse;

- Disposal to a surface water sewer;
- Disposal to a combined sewer.

Infiltration

- 4.4 A review of British Geological Society (BGS) 1:50,000 scale mapping for the site illustrates WEALD CLAY FORMATION – MUDSTONE bedrock and no superficial deposits. The lack of any superficial deposit records suggests that the bedrock extends to the surface level and that weathered mudstone is present at shallow depths. Weathered mudstone exhibits low porosity and high cohesive properties, which renders it unsuitable for use as an infiltration medium to support a sustainable drainage system.
- 4.5 The BGS publish historic borehole records that are freely available in the public domain. Whilst it is rare that a borehole record will be available within the development site area, nearby records can be used as a high-level assessment of the characteristics of the underlying soil within the Site. Borehole records from approximately 500m northwest of the site (BGS reference TQ21NW12) demonstrate very soft to firm silty clay from surface level to a depth of up to 9.5m below ground level. The borehole record is within the same BGS 1:50,000 scale mapping bedrock classification as the site (WEALD CLAY FORMATION – MUDSTONE) and thus is assumed to be representative of the site soil conditions.
- 4.6 Additionally, the applicant has resided at the site and has worked on the land for nearly 20 years. Anecdotally, the applicant has attested to the “heavy clay” nature of the fields that have been encountered during the working of the land and the construction of past developments.
- 4.7 Taking account of the evidence gained from a desk study and conversations with the applicant, it is deemed that the site soil conditions will not support the use of infiltration structures as a means of sustainable surface water disposal. Therefore, infiltration has been discounted as a method of surface water disposal.

Disposal to Ordinary Watercourse

- 4.8 The next most preferable method of surface water disposal is discharge to a watercourse. The location of the ditch at the sites northern boundary provides a suitable means of surface water disposal.
- 4.9 A dye test, details of which are documented in Appendix B, of the sites wider surface water drainage system, demonstrates positive connectivity of the existing surface water pipe outfall to the ditch.

- 4.10 A new connection to the ordinary watercourse is proposed. Consent to connect to the ordinary watercourse will be sought from the Lead Local Flood Authority (LLFA) under Section 23 of the Land Drainage Act 1991. Thus, surface water generated as a result of the development proposals is proposed to be discharged to the existing ditch at a pumped rate no higher than 2.0l/s for all design storm events up to and including 1 in 100-year return period +40% climate change allowance (CCA). This rate (2.0l/s) is representative of the lowest greenfield rate practicable to achieve with a pump.

SuDS Management Train

- 4.11 The Non-Statutory Technical Standards for SuDS (March 2015), the SuDS Manual C753 (2015) and Policy DP41 of the District Plan (2014 – 2031) emphasise the multiple benefits that SuDS can provide, including amenity and biodiversity. One of the requirements of SuDS is for developers to deliver systems that are appropriate to the local area and its hydrology.
- 4.12 New development roofs are proposed to be drained using traditional rainwater gutters and downpipes that connect to the wider SuDS network. The pitch of the roof means that blue/green roofs have not been chosen for this development.
- 4.13 The sand school area is proposed to be constructed of a permeable surface and sub-base to enable efficient collection and attenuation of surface water run-off at source.
- 4.14 A flow control device (a pump) will serve the development to restrict surface water discharge to a combined rate of 2.0l/s for all design storm events.
- 4.15 The proposed design meets the above requirements by providing a SuDS system incorporating sustainable near-surface features that closely mimic the existing drainage/hydrology.

Hydraulic Design

- 4.16 Hydraulic calculations have been undertaken using Causeway Flow+ software. The hydraulic calculations have been based on an impermeable area contributing to the surface water drainage system of 1675m²: 175m² roof area and 1500m² hardstanding area. The surface water drainage system has been simulated against storm return period events from 1 in 1 year to 1 in 100 year + 45% CCA. Due to the elevation difference between the proposed drainage system and the outfall to the existing ditch, a pump and rising main are required to discharge flows at the required invert level.
- 4.17 The results demonstrate no flooding within any design storm return period.

- 4.18 Storage volume is provided by the permeable hardstanding and underlying sub-base, as well as a surface water attenuation basin. 166m³ of storage volume is required for the surface water drainage system to function as designed during the design storm events.
- 4.19 A drainage strategy meeting the above criteria is presented in Appendix E, with supporting hydraulic calculations in Appendix F.
- 4.20 In the event of a drainage system blockage or a storm in excess of the design parameters, there may not be sufficient capacity within the drainage system to accommodate collected surface water run-off below ground level or within the Site. Under these circumstances, minor flooding may be expected onsite, which may lead to overland flows being directed off of the Site. Finished ground levels should be designed to allow overland flows to be directed away from building thresholds and to follow the natural, pre-development, flow paths for surface water.

Water Quality

- 4.21 The development proposals have been assessed for likely contaminants within surface water run-off and the effectiveness of removal of contamination by SuDS features and proprietary treatment systems. The Simple Index Approach, as outlined in CIRIA C753 The SuDS Manual, has been used to assess the potential contamination from the development proposals and the removal of contamination in the surface water drainage system. As **Table 1** below indicates, it is evident that permeable paving provides suitable pollution mitigation.

Table 1: Minimum water quality management requirements for discharges to receiving surface waters and groundwater (SuDS Manual, 2015, Table 4.3)

Minimum water quality management requirements for discharges to receiving surface waters and groundwater (SuDS Manual, 2015, Table 4.3)				
Land use	Pollution hazard level		Requirement for discharge to surface waters and groundwater	
Residential roofs (used as a proxy for development roofs)	Very low		Removal of gross solids and sediments only	
Individual property driveways, residential car parks, low traffic roads (e.g., cul de sacs, home zones, general access roads)	Low		Simple index approach	
Pollution hazard indices for different land use classifications (SuDS Manual, 2015, Table 4.3)				
Land use	Pollution hazard level	Total suspended solids TSS	Metals	Hydrocarbons
Residential roofs (used as a proxy for development roofs)	Very low	0.2	0.2	0.05

Individual property driveways, residential car parks, low traffic roads (e.g., cul de sacs, home zones, general access roads)	Low	0.5	0.4	0.4
<i>Indicative SuDS mitigation indices for discharges to surface waters (SuDS Manual, 2015, Table 26.3)</i>				
SuDS components	TSS	Metals	Hydrocarbons	
Permeable paving	0.7	0.6	0.7	
Attenuation Basin	0.7	0.7	0.5	

Maintenance

- 4.22 Maintenance of SuDS is critical to achieve efficient functionality, long lasting performance, and reduced contamination risk to the site and downstream. Regular inspections and checks can be undertaken by the Applicant; however, corrective maintenance and repairs may need to be undertaken by a competent professional. Maintenance responsibility should be placed with the Applicant.
- 4.23 The useful life and effective operation of SuDS components is related to the frequency of maintenance and the risk of sediment being introduced into the system.
- 4.24 Maintenance will usually be carried out manually, although suction tankers can be used for sediment and debris removal from large systems. If maintenance is not undertaken for extended periods of time, deposits may become hard-packed and more difficult to remove.
- 4.25 In exceptional circumstances where maintenance is not undertaken regularly, replacement of the entire SuDS may be required at significant cost and disruption and, ultimately, will lead to higher flood risk to the Development and the wider catchment.
- 4.26 An outline maintenance strategy and schedule for the proposed SuDS feature is provided in **Table 2** below.

Table 2: Permeable Pavement Maintenance Requirements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – particular attention to be paid to areas where water runs directly onto pervious surface from adjacent impermeable areas, as this is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow the contributing and adjacent areas	As required

	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping that, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10-15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3: Attenuation Basin Maintenance Requirements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public area	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first three years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in the main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Hand cut submerged and emergent aquatic plants (at a minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before the start of the growing season	Annually

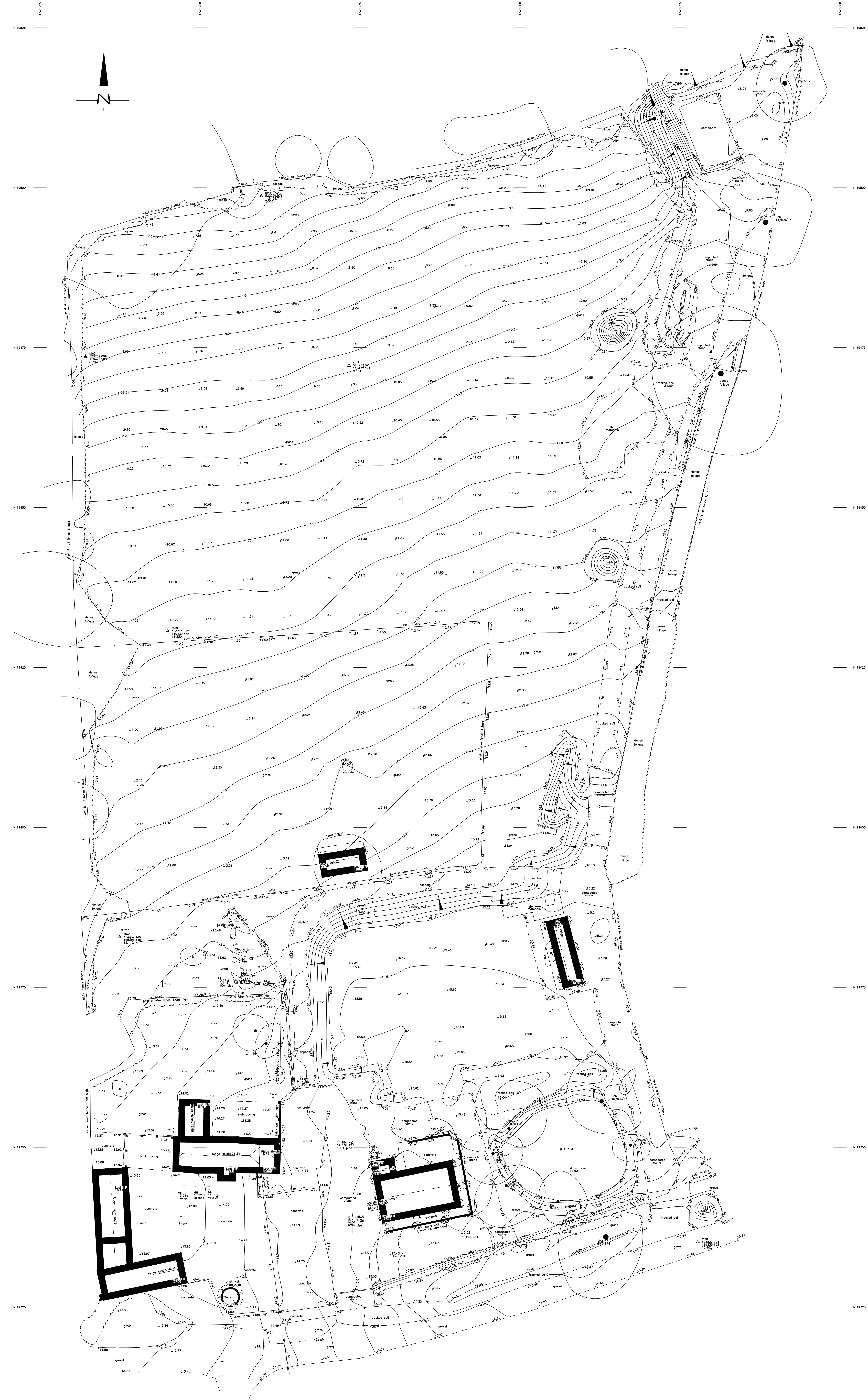
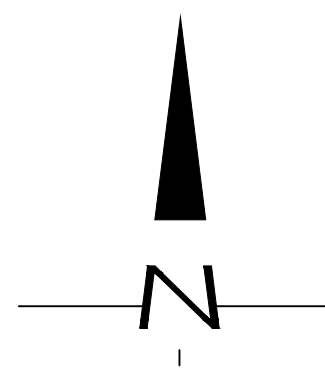
	(Note: tree maintenance is usually part of the overall landscape management contract)	
	Remove all sediment from any forebay	Every 1 – 5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25 – 50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate the pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows	As required

- 4.27 For the flow control device, which will be located within a surface water manhole, it is recommended that one month after construction, the device should be inspected, preferably after a period of rainfall. This will involve checking that the pump activates and operates as intended, that water is being effectively transferred. A visual check should be carried out on the debris guard or trash screen, with any debris removed. Thereafter, inspections should be carried out monthly for three months and then annually, with cleaning if required.

5.0 Conclusion

- 5.1 A Flood Risk Assessment and Drainage Strategy has been produced to support a planning application for an equine development at The Foal Barn, Wineham, Henfield. The FRA has concluded that the site contains areas at risk of flooding from all sources, namely fluvial, surface water, groundwater and from reservoirs.
- 5.2 Notwithstanding the above, the areas of flood risk are confined to the Sites southern boundary, with built development to be situated entirely within an area categorised as Flood Zone 1. This area is not at risk from any sources of flooding and is significantly elevated compared to the northern topography. Consequently, the risk to the site is deemed to be low and acceptable.
- 5.3 An outline flood evacuation plan has been provided to enable sufficient warning, preparation, and evacuation to a low flood risk area in the event of a design flood or worse.
- 5.4 Surface water disposal should be ultimately discharged, at a restricted rate, to the River Adur via a ditch. The proposed surface water drainage strategy intends to discharge directly to the existing ditch. Consent from the Lead Local Flood Authority (LLFA) will be required to permit this under the Land Drainage Act.
- 5.5 A combined attenuation and flow control system has been proposed in the form of an attenuation basin, permeable paving and a pump. This provides the storage volume required and enables multi-functional benefits that enhance the site and reduce maintenance burdens.
- 5.6 This FRA concludes that the development will be safe for its lifetime, taking account of the vulnerability of its users without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

APPENDIX A
TOPOGRAPHIC SURVEY



Trees/Tree Abbreviations

ASH	Ash	LP	London Plane
BAY	Bay	MAR	Marble
BEE	Beech	OAK	Oak
CB	Copper Beech	POPL	Poplar
CED	Cedar	RM	Red Maple
CH	Cherry	RSH	Roseholme
CON	Conifer	SB	Silver Birch
EUC	Eucalyptus	SE	Scots Pine
FR	Fraxinus	SF	Scots Pine
HAW	Hawthorn	SVC	Sycamore
HOL	Holly	WAL	Walnut
LAU	Laurel	WIL	Willow
LI	Lime	WY	Weymouth
		WY	Weymouth
		WY	Weymouth

Tree Dimensions (average)
Ground/Floor/Diagonal

Trees denoted with 'approx' have been surveyed by remote methods and therefore their positions & dimensions cannot be guaranteed

Abbreviations

AV	Air Valve	LP	Lamp Post
BL	Bollard	M	Marker
BM	Bench Mark	MA	Manhole Cover
BP	Boundary Point	MK	Marker
BT	BT Cover	MS	Manhole
CATV	Cable Television	RG	Ridge Level
CAB	Cabinet	RS	Road Sign
CL	Cover Level	RW	Rain Water Pipe
EP	Electric Power Pole	SC	Stop Cock
EV	Electric Valve	SH	Shower
FL	Floor Level	SV	Stop Valve
FP	Fence Post	SW	Sub Water Pipe
GP	Gas Post	TH	Threshold Level
G	Gully	TL	Traffic Light
IP	Insulation	TP	Telephone
GV	Gas Valve	UTL	Unlikely To Lift
IC	Inspection Chamber	VP	Valve Pipe
IL	Iron Level	WM	Water Meter
KO	Kerb Outlet	WO	Wash Out

Linetypes

Bank (excavated)	-----
Building	=====
Drain	-----
Electric	-----
Fence	-----
Foliage	-----
FWS (excavated)	-----
Hedge	-----
Kerb	-----
Plot	-----
CL (excavated)	-----
Topography	-----
Tree/Foliage	-----
Tree Canopy	-----
Verge	-----
Water	-----
Wall	-----

▲	Spot Height	-----	Drain Gully
■	Spot Height	-----	Drain Gully
▲	Spot Height	-----	Drain Gully
▲	Spot Height	-----	Drain Gully

SWS
SouthWestSurveys
Tel: 01454 501003
Mobile: 07504044665
www.southwestsurveys.co.uk
info@southwestsurveys.co.uk

Drawing Title:
Topographics survey

Project Name:
Wyndham Farm
Wincham Lane, Henfield, West Sussex, BNS 9AN

Client:
Sarah Platt
Agent:
Fowler Architecture & Planning

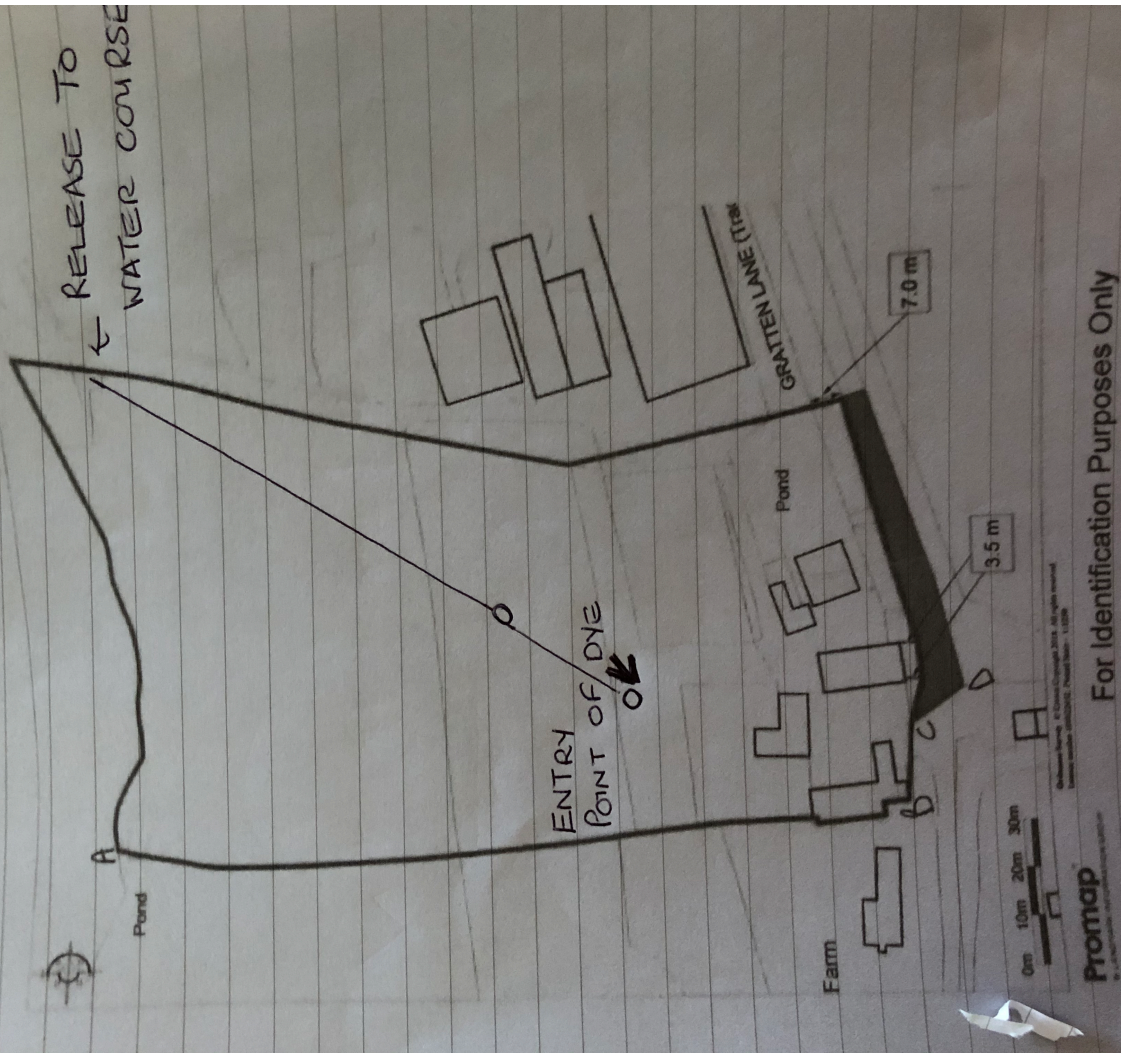
Site Level Datum:
OSN 100

Date: 17th April 2024
Scale: 1:250 (A3)

Surveyed by: RP
Drawn By: RP
Sheet ID: 100
Rev: 100

APPENDIX B

WATERCOURSE CONNECTIVITY [DYE] TEST (2021)



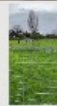
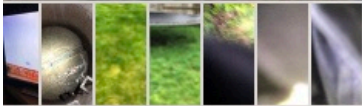
For Identification Purposes Only

Note: The boundaries marked A-B-C-D are intended to watch the boundaries.



Henfield
Today 13:09

All Photos



Edit



APPENDIX C

ENVIRONMENT AGENCY DETAILED FLOOD RISK INFORMATION

Flood risk assessment data

Location of site: Land North of Gratten Lane, Wineham, Henfield, BN5 9AN

Document created on: 7 November 2024

This information was previously known as a product 4.

Customer reference number: SSD382980

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- past floods
- flood defences and attributes

We do not have past flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to flooding from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is West Sussex County.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Adur Eastern Branch Update, 2011
Scenario(s): Undefined fluvial
Date: 2011

Model name: Adur Eastern Branch Climate Change Allowances Update
Scenario(s): Undefined climate change fluvial
Date: 2016

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.



Flood map for planning

Location (easting/northing)
523784/119501

Scale
1:10,000

Created
7 Nov 2024

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods

Climate change

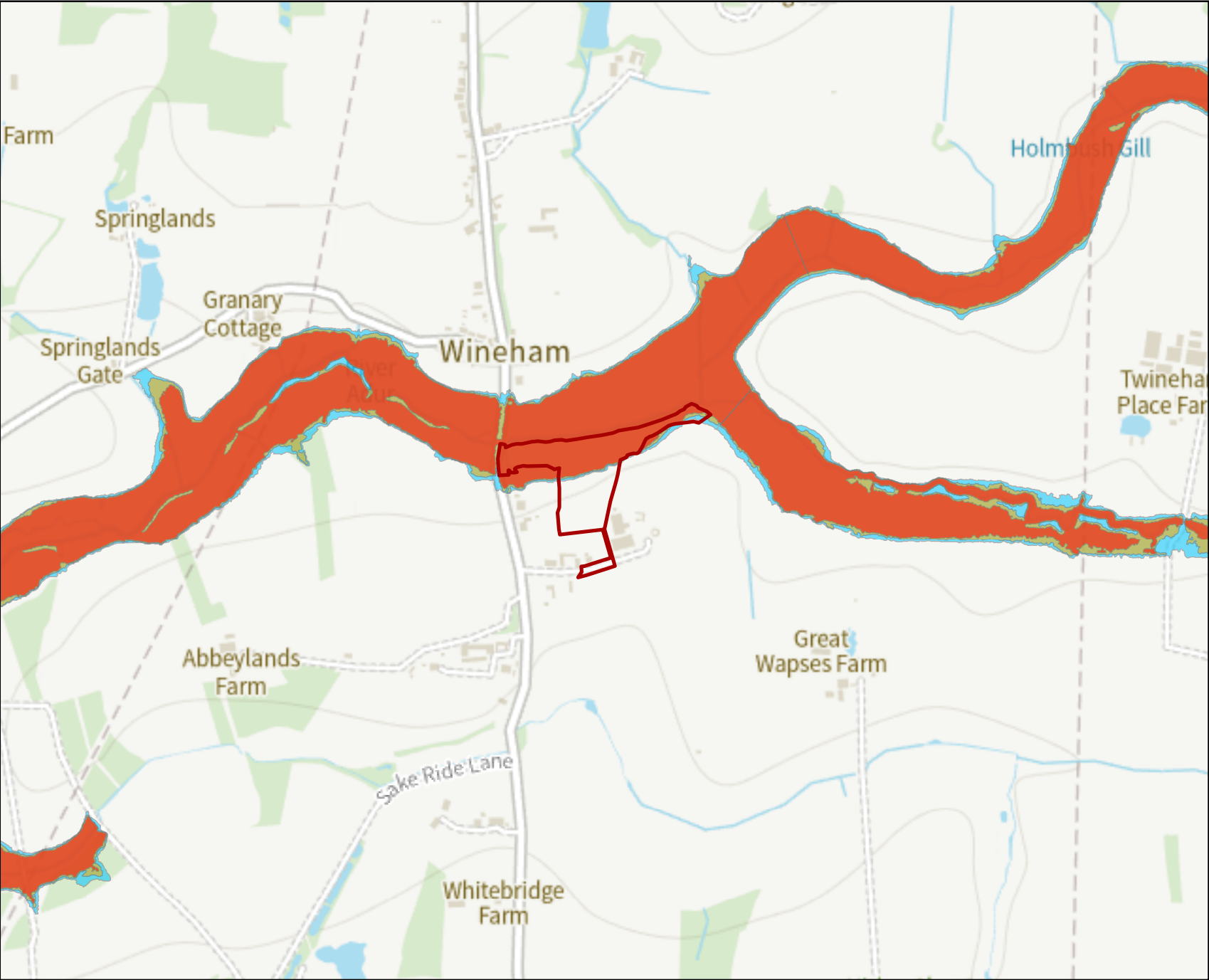
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences
- No defences exist climate change modelled fluvial: risk of flooding from rivers where there are no flood defences, including estimated impact of climate change





Environment
Agency

N
▲

Legend

Site Boundary

5% AEP (Undefended Fluvial)

1% AEP (Undefended Fluvial)

0.1% AEP (Undefended Fluvial)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

00.2250.45

Kilometers

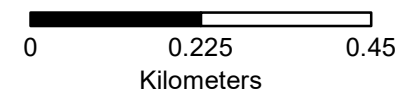


Legend

-  Site Boundary
-  1% AEP +CC 35% Undefended Fluvial
-  1% AEP +CC 45% Undefended Fluvial
-  1% AEP +CC 105% Undefended Fluvial

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000







Environment
Agency

N
▲

Legend

●

Site Nodes

□

Site Boundary

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:2,750

00.050.1

Kilometers

Product 4 Flood Risk Data Requested by: Emma Luckman

Site: Land North of Gratten Lane, Wineham, Henfield, BN5 9AN

Table 1: Water Levels: Fluvial Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD					
	Eastings	Northings	Undefended Annual Exceedance Probability					
			5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	523622	119556	7.45	7.67	7.73	7.78	8.05	7.94
2	523638	119559	7.51	7.72	7.90	7.95	8.21	7.98
3	523880	119589	7.59	7.80	7.99	8.04	8.32	8.08
4	523972	119631	7.61	7.82	8.02	8.07	8.36	8.10
5	523639	119516	-	-	7.86	7.90	8.17	-
6	523755	119552	-	-	8.03	8.08	8.34	-
7	523869	119546	-	-	7.99	8.04	8.14	-
8	523987	119609	-	-	8.02	8.07	8.36	-
9	523802	119500	-	-	8.00	8.05	8.32	-
10	523738	119425	-	-	-	-	-	-
11	523819	119331	-	-	-	-	-	-

Table 2: Water Depths: Fluvial Undefended

Node Ref	NGR		Modelled Flood Depths in Metres					
	Eastings	Northings	Undefended Annual Exceedance Probability					
			5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	523622	119556	-	-	2.56	2.61	2.88	-
2	523638	119559	-	-	1.79	1.84	2.10	-
3	523880	119589	-	-	1.26	1.31	1.60	-
4	523972	119631	-	-	1.56	1.62	1.91	-
5	523639	119516	-	-	1.22	1.27	1.53	-
6	523755	119552	-	-	1.33	1.38	1.64	-
7	523869	119546	-	-	1.24	1.29	1.57	-
8	523987	119609	-	-	0.72	0.78	1.07	-
9	523802	119500	-	-	0.10	0.15	0.42	-
10	523738	119425	-	-	-	-	-	-
11	523819	119331	-	-	-	-	-	-

All levels taken from: Upper Adur Eastern Branch Modelling (In-channel Levels Only) (2011), by Hyder Consulting, with updated climate change allowances (2016) by JBA Consulting.

Produced on: 07/11/2024

*** The flood risk data provided is based on existing EA hydraulic models with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 27 July 2021.**

You should refer to ['Flood risk assessments: climate change allowances'](#) for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is West Sussex County.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Solent and South Downs Environment Agency team at ssdenquiries@environment-agency.gov.uk for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

APPENDIX D
DEVELOPMENT PROPOSALS



FOWLER
ARCHITECTURE & PLANNING

39 High Street
Pewsey
Wiltshire
SN9 5AF

tel (01672) 569444
enquiries@faap.co.uk



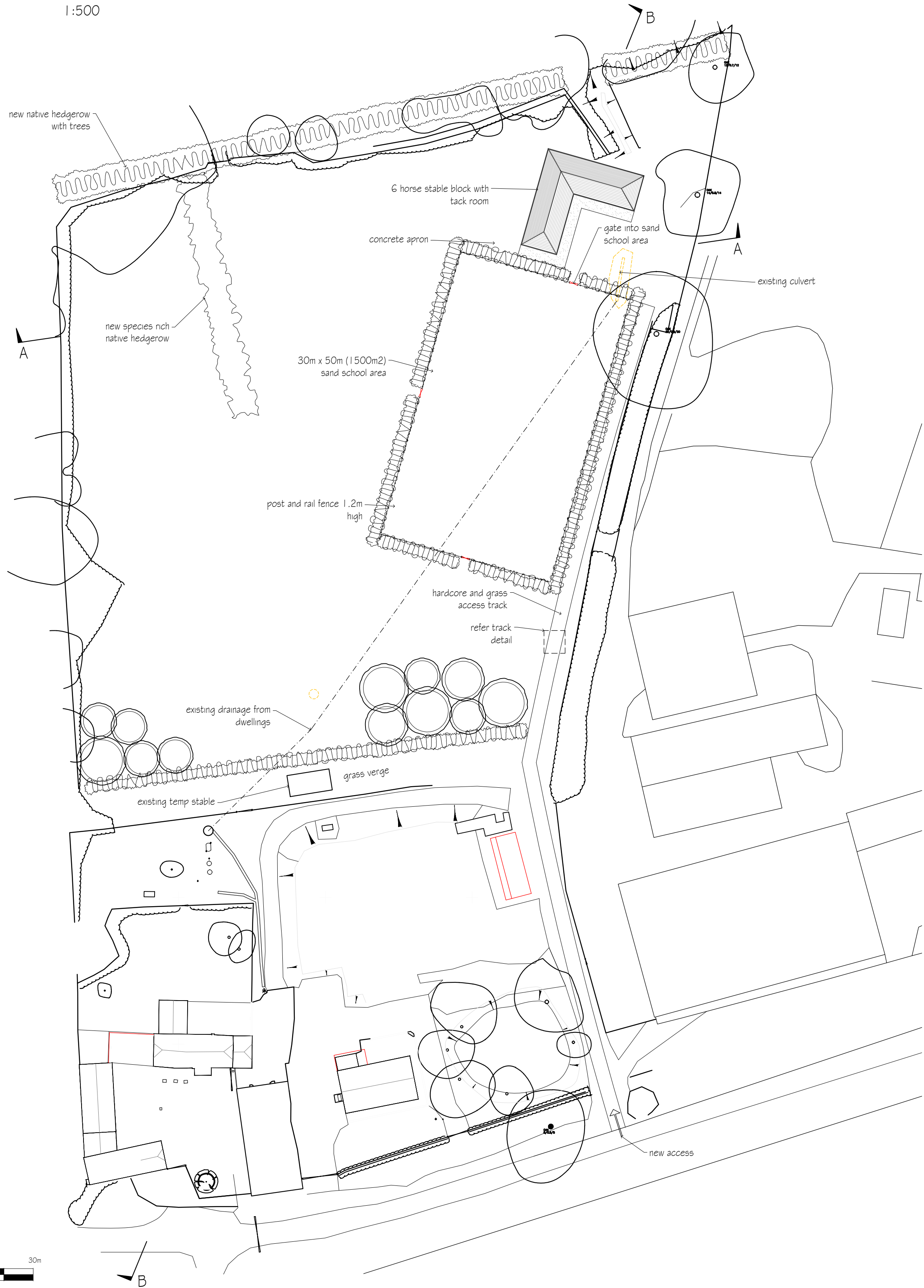
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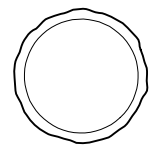
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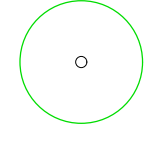


SITE PLAN

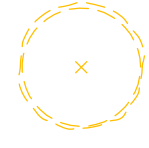
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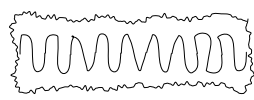
New tree



Existing tree



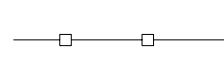
Tree to be removed



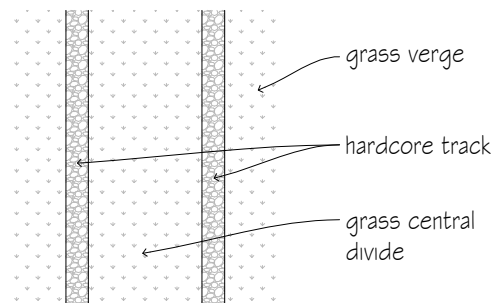
New hedgerow with trees



New species rich native hedgerow



Post and rail fence 1.2m high



TRACK DETAIL

1:100

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revisions		initial	date

Contractors, Sub Contractors and Suppliers are to check all relevant dimensions and levels of site and buildings before commencing any shop drawings or building work.

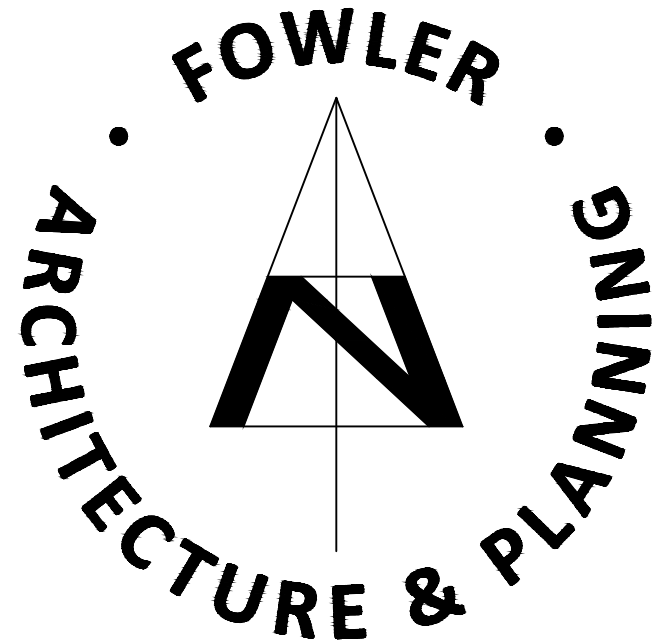
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project
THE FOAL BARN

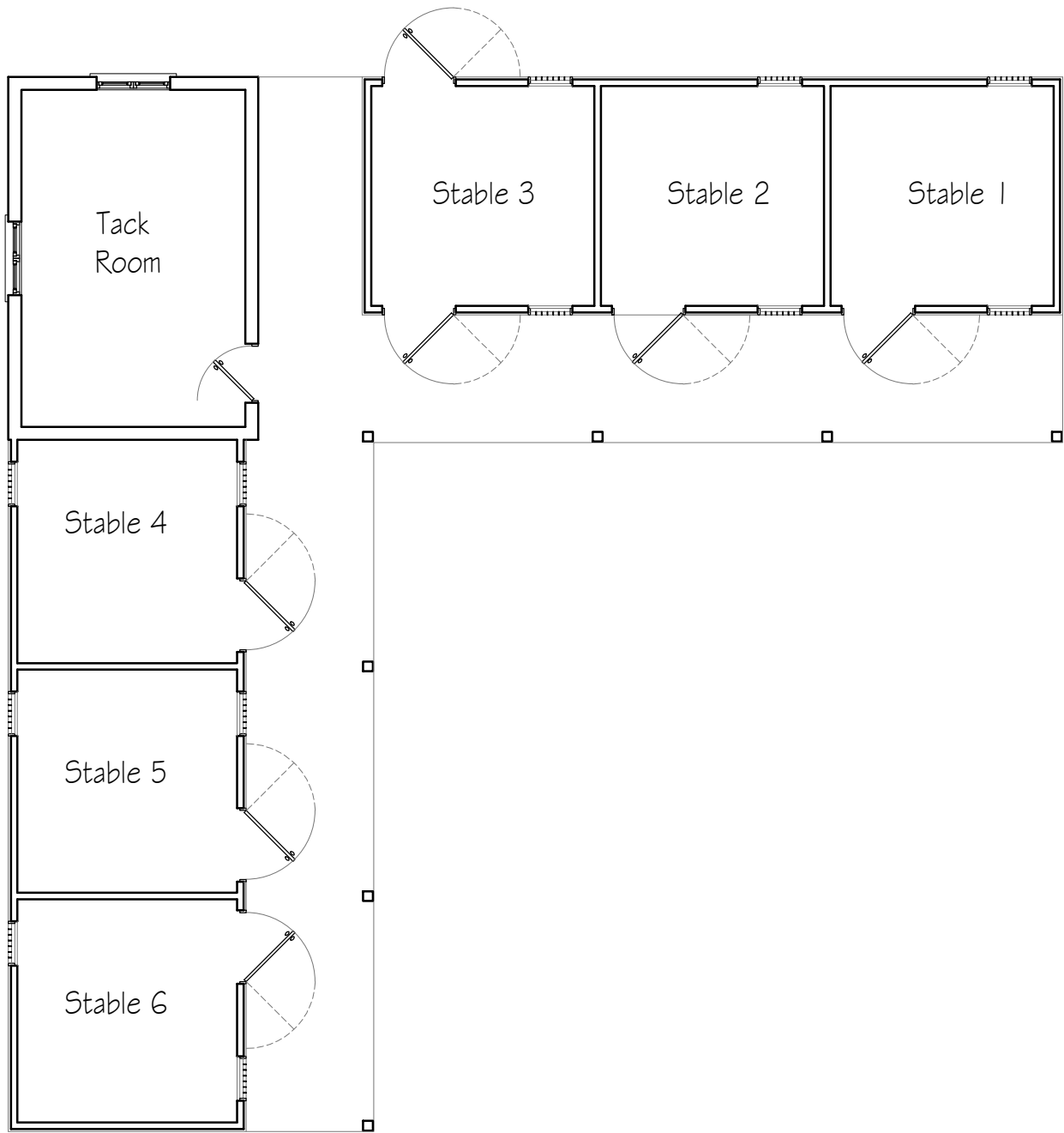
drawing
Site Plan

scale	drawn by	date
1:500 @A1	db	Sept '25

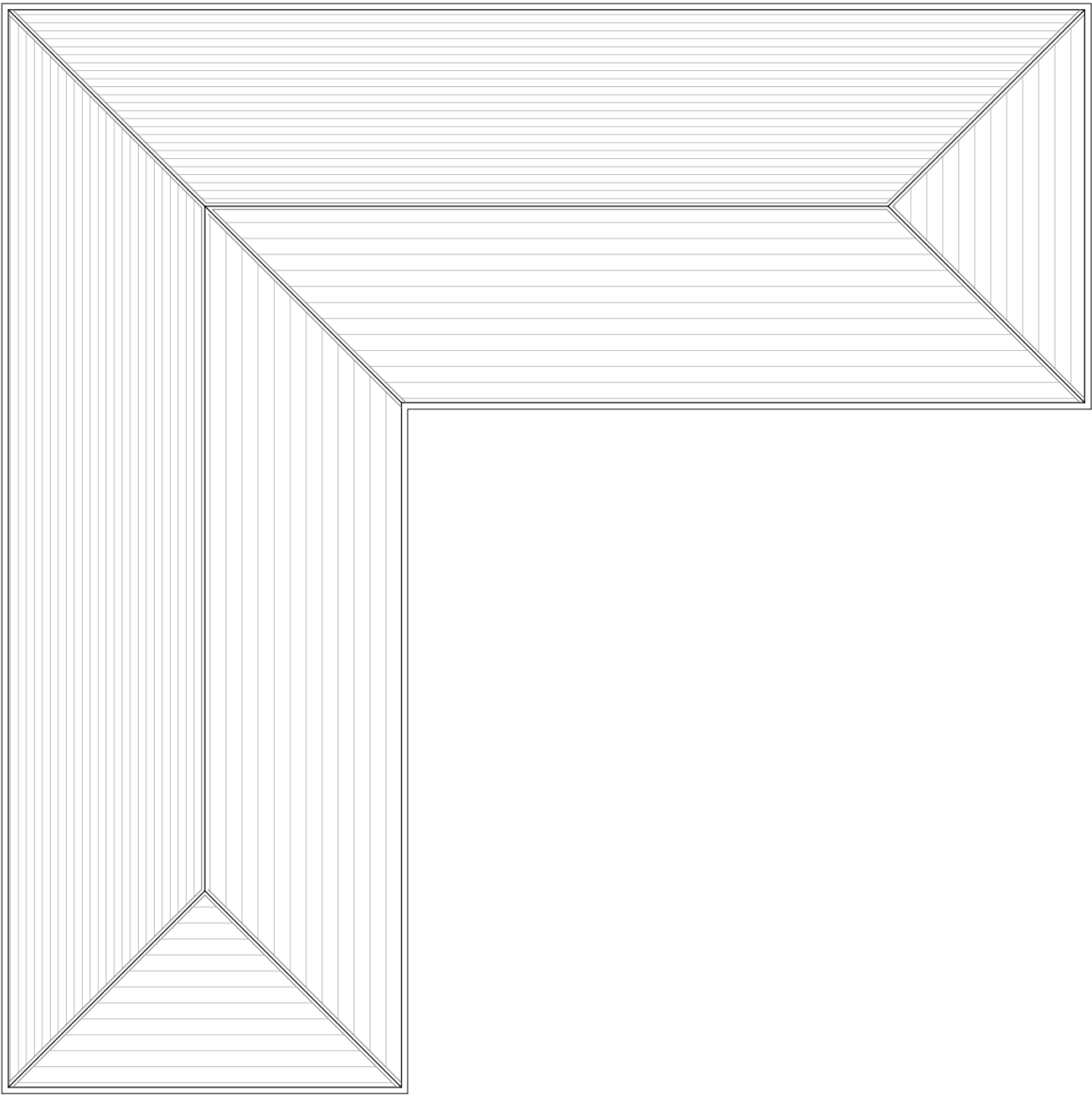
180506-500	A
drawing no	rev



39 High Street
Pewsey
Wiltshire
SN9 5AF
tel (01672) 569444
fax (01672) 569488
enquiries@faap.co.uk



Plan
1:100



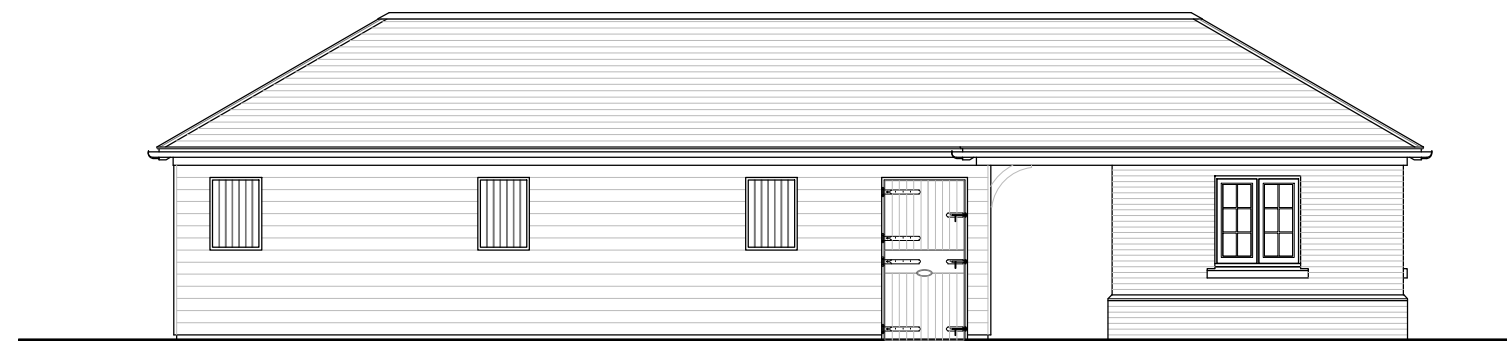
Roof Plan
1:100



South Elevation
1:100



West Elevation
1:100



North Elevation
1:100



East Elevation
1:100

C	Title revised	DB	05.01.26
B	redesign	DB	21.03.25
A	redesign	DB	22.01.25
revisions		initial	date

Contractors, Sub Contractors and Suppliers are to check all relevant dimensions and levels of site and buildings before commencing any shop drawings or building work.

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project
THE FOAL BARN

drawing
Stable Design

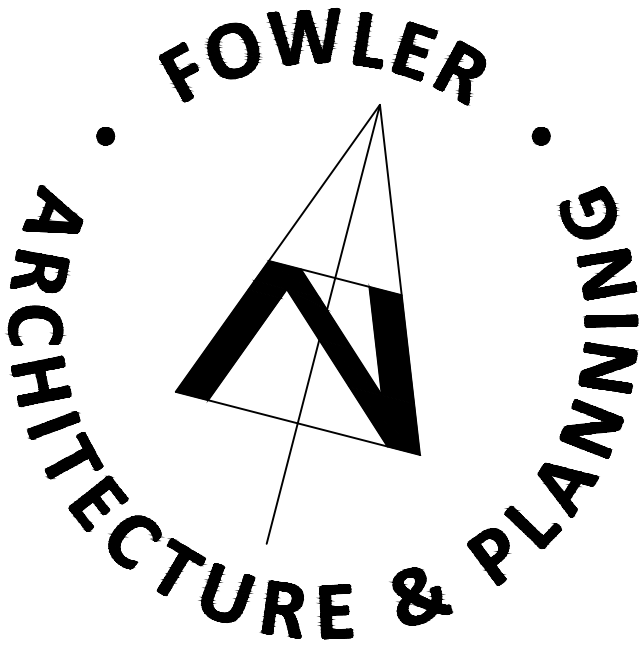
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drawn by
db

date
April '24

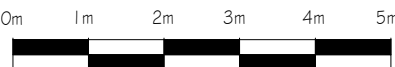
180506-501
drawing no

C
rev



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APPENDIX E
PROPOSED DRAINAGE LAYOUT

APPENDIX F
SURFACE WATER HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	3.000
CV	1.000	Preferred Cover Depth (m)	0.750
Time of Entry (mins)	5.00	Include Intermediate Ground	x
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)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.075	5.00	12.400	1200	523798.556	119431.728	3.814
2	0.004	5.00	9.500	450	523828.195	119499.259	0.850
3	0.004	5.00	9.500	450	523812.248	119503.769	1.066
Pond		5.00	9.041		523802.217	119486.642	1.000
4	0.002	5.00	9.500	450	523807.063	119485.434	1.533
5	0.002	5.00	9.500	450	523830.043	119496.756	1.400
6	0.003	5.00	9.500	450	523828.290	119490.558	1.443
7	0.003	5.00	9.500	450	523818.008	119493.466	1.514
8			9.500	1200	523815.094	119483.163	1.664
9			9.500	1200	523819.723	119481.917	1.692
9_OUT			10.660		523825.163	119480.479	2.885

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	8	54.028	0.600	8.586	7.836	0.750	72.0	300	5.49	50.0
2.000	2	3	16.572	0.600	8.650	8.484	0.166	100.0	100	5.36	50.0
2.001	3	4	19.054	0.600	8.434	7.967	0.467	40.8	150	5.56	50.0
3.000	Pond	4	11.100	0.600	8.041	7.967	0.074	150.0	150	5.23	50.0
2.002	4	8	8.346	0.600	7.967	7.911	0.056	150.0	150	5.73	50.0
4.000	5	6	6.441	0.600	8.100	8.057	0.043	150.0	150	5.13	50.0
4.001	6	7	10.685	0.600	8.057	7.986	0.071	150.0	150	5.35	50.0
4.002	7	8	10.707	0.600	7.986	7.911	0.075	142.8	150	5.56	50.0
1.001	8	9	4.794	0.600	7.836	7.808	0.028	171.2	225	5.81	49.8
1.002	9	9_OUT	5.613	0.600	7.808	7.775	0.033	170.1	225	5.90	49.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.854	131.1	27.1	3.514	1.364	0.150	0.0	92	1.473
2.000	0.769	6.0	0.7	0.750	0.916	0.004	0.0	23	0.511
2.001	1.580	27.9	1.4	0.916	1.383	0.008	0.0	23	0.832
3.000	0.818	14.5	0.0	0.850	1.383	0.000	0.0	0	0.000
2.002	0.818	14.5	1.8	1.383	1.439	0.010	0.0	36	0.561
4.000	0.818	14.5	0.4	1.250	1.293	0.002	0.0	17	0.347
4.001	0.818	14.5	0.9	1.293	1.364	0.005	0.0	25	0.455
4.002	0.839	14.8	1.4	1.364	1.439	0.008	0.0	31	0.530
1.001	0.996	39.6	30.2	1.439	1.467	0.168	0.0	147	1.093
1.002	0.999	39.7	29.8	1.467	2.660	0.168	0.0	145	1.094

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	40	0	0
100	45	0	0

Node 8 Online Pump Control

Flap Valve	x	Invert Level (m)	7.836	Switch off depth (m)	0.300
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.000	0.300	2.000	0.500	2.000	0.700	2.000	0.900	2.000
0.200	2.000	0.400	2.000	0.600	2.000	0.800	2.000	1.000	2.000

Node 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	9.100	Slope (1:X)	80.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	16	Depth (m)	0.400
Safety Factor	2.0	Width (m)	30.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Safety Factor	2.0	Invert Level (m)	8.041
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	160.0	160.0	1.000	322.8	331.6

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	8.650	0.064	13.5	0.0727	0.0000	OK
15 minute summer	1.000:50%	13	8.405	0.194	26.9	0.0000	0.0000	OK
15 minute summer	2	11	8.673	0.023	0.7	0.0037	0.0000	OK
15 minute summer	3	11	8.457	0.023	1.4	0.0036	0.0000	OK
1440 minute summer	Pond	1470	8.323	0.282	2.9	51.5413	0.0000	SURCHARGED
1440 minute summer	4	1470	8.323	0.356	2.9	0.0566	0.0000	SURCHARGED
15 minute summer	5	12	8.415	0.315	4.0	0.0500	0.0000	SURCHARGED
15 minute summer	6	12	8.413	0.356	6.6	0.0566	0.0000	SURCHARGED
15 minute summer	7	12	8.407	0.421	7.7	0.0669	0.0000	SURCHARGED
15 minute summer	8	13	8.400	0.564	24.2	0.6379	0.0000	SURCHARGED
15 minute winter	9	12	7.843	0.035	2.0	0.0395	0.0000	OK
15 minute winter	9_OUT	12	7.809	0.034	2.0	0.0000	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	1.000:50%	13.4	0.920	0.102	0.7539	
15 minute summer	1	1.000	8	24.2	0.668	0.184	1.6026	
15 minute summer	2	2.000	3	0.7	0.511	0.115	0.0226	
15 minute summer	3	2.001	4	1.4	0.467	0.050	0.1838	
1440 minute summer	Pond	3.000	4	-2.9	-0.163	-0.199	0.1954	
1440 minute summer	Pond	Infiltration		0.1				
1440 minute summer	4	2.002	8	-2.7	-0.153	-0.187	0.1469	
15 minute summer	5	4.000	6	-3.7	-0.242	-0.253	0.1134	
15 minute summer	6	4.001	7	-6.1	-0.347	-0.422	0.1881	
15 minute summer	7	4.002	8	-7.2	-0.410	-0.486	0.1885	
15 minute summer	8	Pump	9	2.0				
15 minute summer	8	Infiltration		0.0				
15 minute winter	9	1.002	9_OUT	2.0	0.521	0.050	0.0216	1.0

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	9.519	0.933	48.4	1.0554	0.0000	SURCHARGED
15 minute summer	1.000:50%	11	9.467	1.256	95.0	0.0000	0.0000	SURCHARGED
15 minute summer	2	12	8.897	0.247	3.9	0.0393	0.0000	SURCHARGED
15 minute summer	3	12	8.872	0.438	9.4	0.0696	0.0000	SURCHARGED
600 minute summer	Pond	450	8.538	0.497	12.5	99.6419	0.0000	SURCHARGED
15 minute summer	4	12	8.857	0.890	41.3	0.1416	0.0000	SURCHARGED
30 minute summer	5	22	9.323	1.223	6.6	0.1945	0.0000	FLOOD RISK
30 minute summer	6	22	9.323	1.266	12.0	0.2013	0.0000	FLOOD RISK
30 minute summer	7	22	9.322	1.336	16.8	0.2125	0.0000	FLOOD RISK
30 minute summer	8	22	9.321	1.485	89.5	12.9191	0.0000	FLOOD RISK
180 minute winter	9	76	7.843	0.035	2.0	0.0395	0.0000	OK
15 minute summer	9_OUT	8	7.809	0.034	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	1.000:50%	46.6	0.952	0.356	1.9023	
15 minute summer	1	1.000	8	93.7	1.331	0.715	1.9023	
15 minute summer	2	2.000	3	2.4	0.636	0.392	0.1297	
15 minute summer	3	2.001	4	5.4	0.583	0.195	0.3354	
600 minute summer	Pond	3.000	4	-12.5	-0.710	-0.865	0.1954	
600 minute summer	Pond	Infiltration		0.1				
15 minute summer	4	2.002	8	-39.0	-2.215	-2.697	0.1469	
30 minute summer	5	4.000	6	-5.5	-0.313	-0.381	0.1134	
30 minute summer	6	4.001	7	-10.4	-0.592	-0.721	0.1881	
30 minute summer	7	4.002	8	-15.2	-0.866	-1.028	0.1885	
30 minute summer	8	Pump	9	2.0				
30 minute summer	8	Infiltration		0.3				
180 minute winter	9	1.002	9_OUT	2.0	0.521	0.050	0.0216	41.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	9.779	1.193	63.0	1.3496	0.0000	SURCHARGED
15 minute summer	1.000:50%	11	9.690	1.479	123.7	0.0000	0.0000	SURCHARGED
15 minute summer	2	12	8.977	0.327	4.4	0.0520	0.0000	SURCHARGED
15 minute summer	3	11	8.934	0.500	6.1	0.0795	0.0000	SURCHARGED
960 minute summer	Pond	705	8.688	0.647	11.6	137.5313	0.0000	SURCHARGED
60 minute summer	4	40	8.914	0.947	40.0	0.1506	0.0000	SURCHARGED
30 minute summer	5	23	9.415	1.315	6.6	0.2091	0.0000	FLOOD RISK
30 minute summer	6	23	9.415	1.358	12.3	0.2160	0.0000	FLOOD RISK
30 minute summer	7	23	9.415	1.429	17.2	0.2272	0.0000	FLOOD RISK
30 minute summer	8	23	9.413	1.577	117.9	24.4009	0.0000	FLOOD RISK
15 minute winter	9	7	7.843	0.035	2.0	0.0395	0.0000	OK
15 minute winter	9_OUT	7	7.809	0.034	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	1.000:50%	60.7	0.996	0.463	1.9023	
15 minute summer	1	1.000	8	121.9	1.731	0.930	1.9023	
15 minute summer	2	2.000	3	2.9	0.685	0.484	0.1297	
15 minute summer	3	2.001	4	5.8	0.579	0.209	0.3354	
960 minute summer	Pond	3.000	4	-11.6	-0.661	-0.805	0.1954	
960 minute summer	Pond	Infiltration		0.1				
60 minute summer	4	2.002	8	-36.9	-2.093	-2.549	0.1469	
30 minute summer	5	4.000	6	-5.5	-0.315	-0.383	0.1134	
30 minute summer	6	4.001	7	-10.6	-0.600	-0.731	0.1881	
30 minute summer	7	4.002	8	-15.5	-0.882	-1.047	0.1885	
30 minute summer	8	Pump	9	2.0				
30 minute summer	8	Infiltration		0.4				
15 minute winter	9	1.002	9_OUT	2.0	0.521	0.050	0.0216	29.9