Lower Perrylands Farm
Dial Post, West Sussex

Flood Risk Assessment and Drainage Strategy

For

Church Barn Group

motion

Document Control Sheet

Lower Perrylands Farm

Dial Post, West Sussex

Church Barn Group

This document has been issued and amended as follows:

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4th August 2025	Final A	Phil Allen MCIWEM C.WEM	Neil Jaques
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1.0 Introduction

1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been produced by Motion on behalf of their client, Church Barn Group. It supports the planning application for three detached dwellings, plus access, parking and landscaping, on the site of Lower Perrylands Farm, Dial Post, West Sussex. This application is pursuant to the consented and extant Prior Approval Class Q application on the site for the change of use from agricultural to five residential dwellings (DC/24/1087).

1.2 A site location plan of Lower Perrylands Farm can be seen in Appendix A and details of the proposed three-unit residential development can be seen in Appendix B.

1.3 A small watercourse runs through Lower Perrylands Farm and the Environment Agency's (EA's) Flood Map for Planning shows that the site is within Flood Zone 1. However, the Risk of Flooding from Surface Water (RoFSW) mapping shows that areas of Lower Perrylands Farm are subject to surface water flood risk. As such, an FRA is required to understand whether and how the areas of surface water flood risk will affect the proposed development.

1.4 The proposed development is minor in planning terms, but with regards to flood risk and drainage it is considered to be 'non-major', which means that a drainage strategy is also required to demonstrate how the development will manage and discharge surface water generated in all rainfall events up to and including the 1 in 100-year + 45% storm.

1.5 Therefore, this FRA and drainage strategy has been produced to discuss the flood risks to the proposed development, from all sources. This FRA and drainage strategy will also define how the development will manage its surface water and foul sewage so that the development does not increase flood risk in the area or to neighbouring properties/land.

1.6 This FRA and drainage strategy follows the guidance set out in:

- West Sussex LLFA Policy for the Management of Surface Water (November 2018)
- National Planning Policy Framework (NPPF)
- Planning Practice Guidance (PPG) to the National Planning Policy Framework
- CIRIA SuDS Manual 2015 (C753)
- Environment Agency Rainfall Runoff Management for Developments
- Non-Statutory Technical Standards for SuDS (NSTSfS)

1.7 The proposed development falls within the administrative boundary of Horsham District Council (HDC) and West Sussex County Council (WSCC).

1.8 This FRA and drainage strategy report pertains only to the drainage strategy for the development. It does not provide details of how the site will be drained during the construction phase. This report is also not a drainage verification report, which can only be produced post-construction.

1.9 Similarly, this report does not provide information on how the drainage infrastructure will be protected during the construction phase of the project. The provision of this information is the responsibility of the appointed contractor.

2.0 Site Description

Table 2.1 – Site Summary

Site Name	Lower Perrylands Farm
Location	Dial Post, Horsham, West Sussex, RH13 8NT
Grid Reference	TQ144188 (approximate centre of site)
Site Area	Red Line Boundary: 0.935 ha (including access to A24)
Application Type	A planning application for three detached dwellings, plus access, parking and landscaping.
Flood Zone	Flood Zone 1
Surface Water Flood Risk	Areas of High, Medium and Low surface water flood risk within the site
Local Water Authority	Southern Water
Local Planning Authority	Horsham District Council (HDC)
Lead Local Flood Authority	West Sussex County Council (WSCC)

Site Location and Description

2.1 Lower Perrylands Farm lies to the west of the A24 Dual Carriageway, from which it is accessed, and is south of the village of Dial Post. It is a rural area and Lower Perrylands Farm is surrounded by open fields used as arable land and grazing.

2.2 The area of the site that is outlined for redevelopment and the three new residential dwellings is currently occupied by farm buildings and large sheds that are in a poor state of repair.

2.3 There are approximately seven main sheds and other smaller buildings. The sheds are surrounded by concrete hardstanding to the front (north) and back onto open ground (to the south) as the land rises.

2.4 The existing site layout can be seen in the plan in Appendix C and site photos that capture the overall site characteristics and the state of repair of the sheds can be seen in Appendix D. The location and orientation of the photos are included for reference.

Topography

2.5 A topographic survey of the site has not yet been carried out, but LiDAR data was processed to show the overall topography of the site. The outputs of the LiDAR data can be seen in Appendix E.

2.6 The site is generally flat, but with a shallow gradient falling from the southeast to the northwest. In the southeast of the area of the sheds, topographic levels are between 21.50 and 21.75 metres Above Ordnance Datum (mAOD).

2.7 Levels on the western side of the sheds are between 20.50 to 20.75 mAOD.

2.8 It can be seen from the LiDAR and contour data in Appendix E that the channel of the watercourse the runs through the site has been picked up, although the LiDAR has not fully captured the continuity of the channel (presumably due to the amount of vegetation present) and because there are culverted sections within the vicinity of the sheds.

Geology

2.9 The 1:50,000 British Geological Survey (BGS) online Geoindex Mapping has been reviewed, and the superficial and solid geologies present can be seen in Appendix F.

2.10 The information in Appendix F shows that the site is underlain by a superficial geology of Head, which is a mixture of clays, silts, sands and gravels. Depending on the location, any one of these geologies may be present.

2.11 The solid geology below Lower Perrylands Farm is listed as Weald Clay.

2.12 To investigate the local geology further, the nearest BGS borehole to the site was reviewed. Borehole TQ11NW7 is approximately 500m east of Lower Perrylands Farm and is also shown in an area of Head superficial geology and Weald Clay solid geology. The log for borehole TQ11NW7 can be seen in Appendix G.

2.13 Borehole log TQ11NW7 shows clay from the surface down to 107 feet (33.35 metres) below ground level (BGL). Below this, shallow, interbedded layers of sandstone and clay repeat to the bottom of the borehole at 175 feet (54.55m) BGL.

2.14 Therefore, it is expected that Lower Perrylands Farm is also underlain by clay geology to depth, which would prevent infiltration and the on-site discharge of surface water by soakaways or surface level SuDS features.

Hydrology

2.15 It was mentioned in the introduction to this report that a small ordinary watercourse passes through the developable area of the site. This watercourse flows east-west through the site and towards the Lancing Brook to the west, which is a tributary of the River Adur.

2.16 The watercourse is predominantly open channel but has culverted sections along its course where access is provided from north to south across the watercourse. The path of the watercourse through the site and the locations of the open channels/culverted sections is shown in Appendix H.

2.17 Photos of the watercourse can be seen in Appendix I, along with a plan of the location/orientation of the photos. The watercourse is generally in poor condition and would benefit from having the channel chased through and desilted where necessary.

2.18 The upstream culvert, which can be seen in photos 6 through 8, is formed of a concrete plinth over the watercourse. However, as photos 7 and 8 show, there appears to be a large amount of brickwork and concrete possibly from an older culvert structure still in the channel that was bridged by the new concrete plinth without being removed. This would create capacity and conveyance issues for the watercourse while in high flow conditions. Therefore, this structure would benefit from remedial works and the removal of the former culvert structure from the channel.

2.19 The downstream culvert is formed of 2no. 500mm to 600mm diameter pipes that are laid relatively shallow to the level of the access across (see Photo 4). These twin culvert pipes would also benefit from improvements, which would include being set slightly deeper to match the improved and desilted channel invert level.

2.20 In summary, the existing watercourse and the onsite structures are generally in poor condition. The proposed development would look to improve the condition of the watercourse through desilting and enhanced naturalisation of the open channel. The culverted sections would also have the existing debris removed and levels set to work with the natural hydrology of the river. This would reduce local flood risk.

Hydrogeology and Groundwater

2.21 Groundwater Source Protection Zones (SPZ's) are defined around groundwater abstraction sources such as wells, boreholes and springs that are used for public drinking water supply.

2.22 SPZ's show the risk of contamination to groundwater from any activities that might cause pollution in the area. The closer the activity to the source of abstraction, the greater the risk. The maps show three main zones; inner – Zone 1; outer – Zone 2 and; total catchment – Zone 3.

2.23 Defra's Magic Map was reviewed, and the site is not within in any SPZ's.

2.24 The superficial and drift geologies below the site are not listed as aquifers.

2.25 Borehole log TQ11NW7 in Appendix G shows that groundwater was struck at 72 feet (22.44 metres) BGL, which rested at 34.5 feet (10.75 metres) BGL once the material had been removed from the borehole and the Pore Water Pressure had been relieved.

Infiltration Potential

2.26 No site-specific BRE365 soakage tests have been conducted on site.

2.27 Head can be conducive to infiltration if gravels are present due to the open structure of the granular material. However, as has been shown in borehole log TQ11NW7 in Appendix G, the component of Head that is present below the site is clay, which is present to depth, and is underlain by Weald Clay.

2.28 Thick clay soils do not support infiltration and literature values for infiltration will be referred to in support of this position. BS 7533-13:2009 states that clay soils have infiltration rates in the order of 1×10^{-8} to 1×10^{-10}. Table 25.1 of CIRIA C753 supports this by suggesting infiltration rates of less than 3×10^{-8} can be expected.

2.29 Infiltration rates lower than 1.0×10^{-6} m/s are not generally conducive to infiltration. If infiltration rates are indeed as low as (or lower than) 1×10^{-8}, then infiltration would not be possible at Lower Perrylands Farm.

Existing Drainage Regime

2.30 The existing sheds that are present on Lower Perrylands Farm currently discharge rainwater to the surface of the ground surrounding them, much of which is made up of concrete hardstanding and compacted earth.

2.31 Therefore, surface water will currently rapidly shed off the site to the watercourse that runs through the site and to ascertain the impact that this would have on the local hydraulic regime, the existing runoff rates for the existing site have been determined.

2.32 There is no existing foul sewerage serving the site.

Brownfield Runoff Rate

2.33 The existing site has extensive impermeable areas consisting of the farm sheds and the surrounding concrete hardstanding. Because of this, it is important to investigate the brownfield runoff rates for the existing site to understand the impact that it is currently having on the local hydraulic regime. It will also show the extent that the proposed development can significantly improve the existing situation.

2.34 The current site has 1,891m^2 (0.189 ha) of impermeable areas. This includes the existing sheds and the surrounding hardstanding. Areas of hardstanding that form parts of the wider access have not been included as these will remain unchanged.

2.35 The brownfield runoff rates have been calculated using the Modified Rational Method with rainfall intensities for different return periods extracted from Table 1(a) of the Transport and Road Research Laboratory Report – Estimated Rainfall for Drainage Calculations in the United Kingdom (TRRL Report LR 595) by C. P. Young.

2.36 The Modified Rational Method Equation is:

$$Q_n = 2.78CiA$$

Where:

C = Runoff Coefficient (which is assumed to be '1' in this case to represent impermeable areas)

i_n = Rainfall intensity for a n return period (mm/hr) as prescribed by Table 1(a) of TRRL LR 595

A = Impermeable Area

Q_n = Runoff for n return period

The rainfall intensities for different return periods extracted from Table 1(a) of TRRL Report LR 595 are:

i_1 = 50.8 mm/hr

i_{30} = 113.02 mm/hr

i_{100} = 143.9 mm/hr

2.37 Using the above calculation and inputs, the brownfield runoff rates for the existing impermeable areas on site of 0.189 ha are as follows in Table 2.2.

Table 2.2 – Brownfield Runoff Rate From Existing Impermeable Areas

Return Period	1 in 1	1 in 30	1 in 100
Discharge Rate (l/s)	26.71 l/s	59.41 l/s	75.65 l/s

2.38 These brownfield runoff rates are substantial. Even the existing 1 in 1-year runoff rate from the site is 26.71 l/s. As mentioned above, surface water will shed from the impermeable surfaces quickly and this means that the above brownfield runoff rates will be entering into the watercourse unattenuated.

3.0 Flood Risk Legislative and Policy Framework

3.1 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. WSCC is the LLFA for the Dial Post area.

3.2 LLFA's have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from local sources, such as surface water run-off, groundwater and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers'.

The Environment Agency Flood Map for Planning

3.3 The updated Environment Agency's Flood Map for Planning was released on 25th March 2025. This updated and new National Flood Risk Assessment (NaFRA) uses both existing detailed local information and improved national data, includes the potential impact of climate change on flood risk, based on UK Climate Projections (UKCP18) and shows potential flood depths. This allows the Flood Map for Planning to provide much higher resolution maps that make it easier to see where there is risk

3.4 The New NaFRA Flood Map for Planning remains split into 'Flood Zones', which demarcate the extent of flooding from rivers or the sea for different return periods.

3.5 Table 3.1, below, lists the flood zone categories and explains the flood risk probabilities they represent.

Table 3.1 – Flood Zone Categories

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of tidal flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of tidal flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water must flow or be stored in times of flood, which is typically the 1 in 30-year flood event or greater. Local planning authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map, but may be distinguished in Product 4 information, for example)

The National Planning Policy Framework

3.6 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The Planning Practice Guidance (PPG) to the NPPF provides further information on the policies set out in the NPPF. It encourages development to take place in areas of lower flood risk wherever possible and stresses the importance of preventing increases in flood risk off-site to the wider catchment area. This includes ensuring that flood risk is considered at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.

3.7 The process of directing development away from those areas where risks are highest is the Sequential Test. It covers all forms of flooding, and this is covered in Paragraphs 23 and 24 of the NPPF. Following the December 2024 update to the NPPF, Paragraph 175 was added that states that development can be

appropriate on sites with flood risk "*in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would not be at risk of flooding from any source, now and in the future*". This essentially means that if a sequential approach is applied within the site boundary, and areas of flood risk now and in the future are avoided, that flood risk should not prevent the development coming forward and that the Sequential Test is not required.

3.8 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 that has critical drainage problems (as notified to the local planning authority by the EA). There are areas of surface water flood risk on the Lower Perrylands Farm site, so flood risk from all sources will be reviewed for the completeness of the application.

3.9 An FRA should identify and assess the risks of all forms of flooding and demonstrate how these flood risks will be managed so that a development stays safe throughout its lifetime, taking climate change into account.

3.10 Within each Flood Zone, a key factor in determining planning applications for development is the flood risk vulnerability of a development. Table 2 of the PPG to the NPPF categorises different development types according to their vulnerability to flooding. These categories are:

- Essential infrastructure;
- Highly vulnerable development;
- More vulnerable development;
- Less vulnerable development, and;
- Water-compatible development.

3.11 Within the different Flood Zones each of the above development categories are considered appropriate or not permissible. The Technical Guidance to the NPPF lists these as:

Flood Zone 1:

- All the development categories listed above are appropriate.

Flood Zone 2:

- Water-compatible, less vulnerable development, more vulnerable development and essential infrastructure is appropriate in this zone.

Flood Zone 3a:

- Water-compatible and less vulnerable development is appropriate in this zone. Highly vulnerable development should not be permitted in this zone.

Flood Zone 3b:

- Only water-compatible development and essential infrastructure that must be there should be permitted in this zone.

3.12 The above information sets out the basis by which developments must be assessed in terms of flood risk.

3.13 The development will be reviewed against the Flood Zone in which it is located, and an assessment will be made of the appropriateness of the proposed development, as per the advice within the PPG to the NPPF, and taking account of the proposed development layout shown in Appendix B.

4.0 Current Flood Risk

4.1 Flooding can arise from a variety or combination of sources. These may be natural or artificial and may be affected by climate change. These are discussed, below, in the following two sections and summarised in Table 6.1. The probability of any likely impacts is also assessed, where necessary.

Flooding from Rivers and the Sea

4.2 There is an ordinary watercourse that intersects the site, the nature and condition of which was discussed in Section 2 of this report.

4.3 The EA's Flood Map for Planning (Appendix J) shows that the proposed development is entirely within Flood Zone 1. Therefore, the site is at 'Very Low' risk of flooding from rivers.

4.4 With regards to the EA's Flood Map for Planning, only catchments above a threshold area have been modelled for fluvial flood risk. Therefore, while the EA's Flood Map for Planning indicates that the site is within Flood Zone 1, the small catchment area of the watercourse that passes through Lower Perrylands Farm suggests that it has never been modelled and this is the primary reason for the absence of mapped fluvial flood risk on site.

4.5 As stated in Paragraph 2.20 of this report, existing watercourse and the onsite structures are generally in poor condition and the proposed development would look to improve the condition of the watercourse and culverted sections. Acknowledging that fluvial flood risk is already 'Very Low', works to improve the watercourse would further reduce any fluvial flood risk from the site, as well as improve the health of the watercourse through desilting and enhanced naturalisation of the open channel. The culverted sections would also have the existing debris removed and levels set to work with the natural hydrology of the river.

4.6 Consequently, not only would the development be at 'Very Low' risk of fluvial flooding, but it would also stand to increase watercourse health and biodiversity improvements on this site.

Fluvial Flood Risk and the Appropriateness of the Development in this Location

4.7 Residential development is 'more vulnerable' according to the classifications in the NPPF.

4.8 Table 3 of the PPG to the NPPF (see below) states that 'more vulnerable' development is appropriate in Flood Zone 1, thus the proposed development is appropriate in this location and with the current and future level of flood risk (notwithstanding the local level of surface water flood risk, discussed below).

Table 3 of the NPPF - Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

JBA Fluvial Flood Modelling

4.9 To obtain a broader picture of fluvial flood risk, a Flood Screening Report was obtained from Envirocheck, which contains JBA's Comprehensive Flood Map (CFM). The JBA CFM, which has been developed using a separate dataset from the EA's Flood Map for Planning, can be seen in Appendix K. It shows predicted fluvial flood extents for the 1 in 75-year, 1 in 100-year, 1 in 200-year and 1 in 1,000-year return periods.

4.10 The JBA CFM in Appendix K supports the information in the EA's Flood Map for Planning and shows no fluvial flooding within the site in return periods up to and including the 1 in 1,000-year flood event. However, surface water flood risk is shown, which is discussed below.

Surface Water Flooding

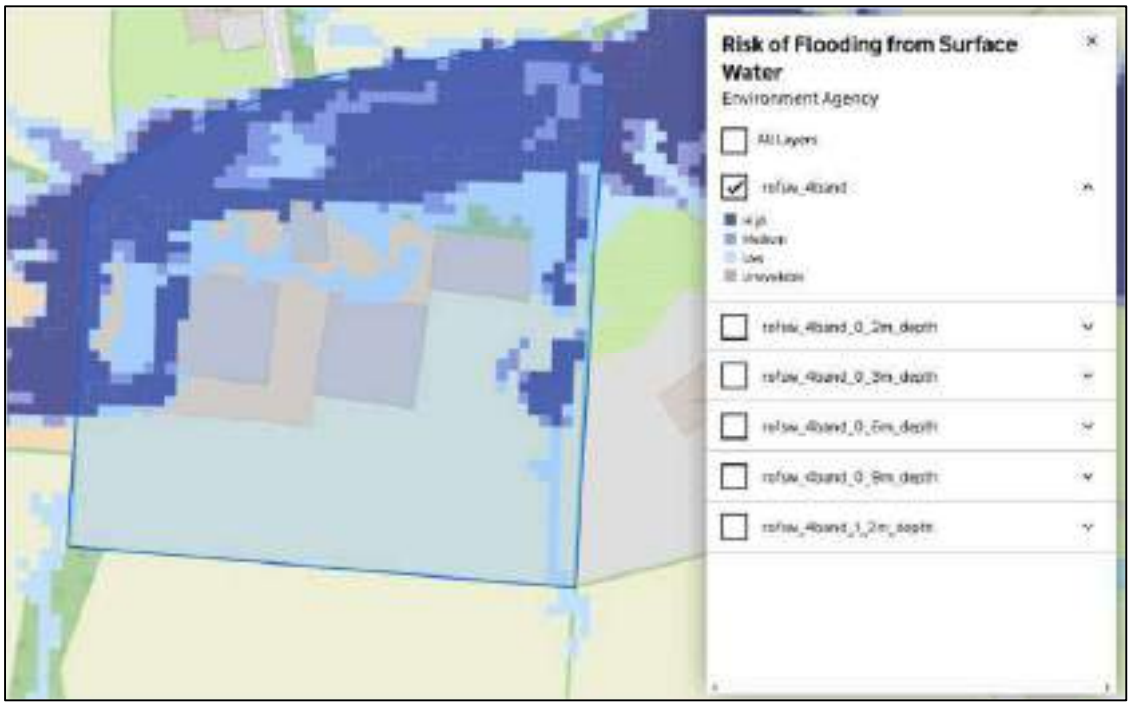
4.11 The EA's Risk of Flooding from Surface Water (RoFSW) map was updated and refined in January 2025. The map uses improvements in data, technology and modelling and includes information and input from LLFAs, where this is available. This New National Model (NNM) for surface water represents a significant improvement over the previous national-scale models with more targeted risk areas that tie in better with local land features and overall topography.

4.12 The new NAFRA Flood Map for Planning includes the RoFSW map and surface water flood outlines for the 1 in 30-year (High), 1 in 100-year (Medium) and 1 in 1,000-year (Low) risk flood events.

4.13 The 2025 RoFSW map for the site can be seen in Figure 4.1, on the next page. It shows that large parts of the site, its boundaries, and its access will be affected by surface water flood risk, with the most extensive areas occurring in the 1 in 1000-year (Low Risk) surface water flooding event.

4.14 Because of this, and the advice within Paragraph 175 of the NPPF, the distribution of surface water flood risk has been used to position the dwellings and the layout of the development. The three dwellings have been sensibly and deliberately located outside of all areas at risk of surface water flooding.

Figure 4.1 – NaFRA2 RoFSW Outline



4.15 The RoFSW surface water flood extents (all return periods) have been overlaid with the site layout, and this spatial comparison can be seen in Appendix L. It shows the distribution of the development and how the location of the residential dwellings have been purposely steered to the lowest risk areas of the site, as described above.

4.16 It is only the car ports that have been located within areas of 'Low' (1 in 1,000-year) surface water flood risk. As car ports, they are open structures that will not remove volume from the flooded areas and will not alter any flow paths or hydraulic regimes. Low vulnerability land uses are appropriate in areas at 'Low' risk of flooding, as per Table 3 of the NPPF, which is shown on the previous page.

4.17 This approach has ensured that the proposed development has minimised risk as far as is practicable and, in accordance with Paragraph 175 of the NPPF, all the vulnerable elements of the development have been directed to parts of the site that are not at risk of surface water flooding. This safeguards the dwellings and means that there is no formal need to incorporate resistance and reliance measures or make provision for evacuation plans.

4.18 All thresholds will be raised to 150mm above ground levels and safe access and egress is achievable to the south of the dwellings into the open land, which leads back to the access road without having to cross the watercourse or the areas of surface water flood risk.

4.19 With regards to the access road, it is acknowledged by this report that formal vehicular access to the site would require users to cross surface water flood risk areas. When considering the lowest risk scenario for site users and residents, it is important to refer to the consented and extant Class Q Prior Approval application (DC/24/1087), which allows for the conversion of five agricultural units into five residential dwellings. The current three-unit proposal represents a reduction in the number of dwellings, anticipated population, and associated vehicle movements when compared to the consented Class Q scheme. On this basis, refusal of the current application on flood risk grounds would result in the fallback position being the delivery of the extant five-dwelling scheme, which would, in practice, lead to a higher number of people and vehicle trips using the access.

4.20 Furthermore, in terms of overall risk to users of the access, WSCC commented during the consultation process of DC/24/1087 that the five-dwelling scheme would likely have a reduction in vehicle movements when considered against the agricultural site use. This means that the three-unit scheme will result in the lowest number of vehicle movements and the overall lowest risk to users of the access when compared with the existing agricultural use, or the consented Class Q application. The current proposals are the lowest risk scenario of all those that could be allowed to continue.

4.21 As a final note on surface water flood risk, while the updated NaFRA2 RoFSW model is a significant improvement over the former edition, some areas still require localised flood modelling for better accuracy. It has been discussed that the watercourse and catchment that runs through Lower Perrylands Farm is very small and has not been formally modelled. Because of this, the accuracy of the NaFRA2 RoFSW mapping will be relatively low in this rural area, and it will only be based on LiDAR data and broad-scale assumptions regarding the hydraulic and hydrogeological regime. This means that the presence of the culverts and their role in the watercourse's conveyance will not be represented in the model, and the pattern of flooding exhibited in the RoFSW mapping will assume that the watercourse is coming out of bank to bypass the culverted sections, which LiDAR will see as a dam. While this FRA has not provided modelling to support this position, this is known to be a common issue in areas where subsurface conveyance structures (pipes, culverts, etc.) are present but cannot be picked up in the topographical ground model drawn from LiDAR data.

4.22 As such, this FRA suggests that the actual pattern of surface water at Lower Perrylands farm will be much reduced over that displayed in the RoFSW mapping and the surface water flood extents therein. Nevertheless, the distribution of the dwellings has used the RoFSW outlines to steer development to the areas of lowest risk, which can be seen as employing the precautionary principle.

4.23 Because the residential dwellings are in areas of 'Very Low' risk (outside the 1 in 1,000-year return period risk areas), and only low vulnerability structures are in the areas of 'Low' risk (the 1 in 1,000-year return period), the development as presented is appropriate in this location, and surface water flood risk does not need to be considered further.

Groundwater Susceptibility

4.24 There are no flood risk maps for groundwater, as stated by the Environment Agency in their 2011 guidance note 'flooding from groundwater'. Mapping products currently available only show areas where the geological and hydrogeological conditions *may* combine to cause groundwater flooding, but they should not be considered as groundwater flood risk maps. They only show *susceptibility* to groundwater flooding.

4.25 There are several mapping products that depict areas that may be susceptible to groundwater flooding, but they are not comparable in detail to the risk maps developed for fluvial, tidal and surface water, such as those used by practitioners and risk management authorities to support planning decisions. The mapping does not show the likelihood of groundwater flooding occurring and can only be considered as a hazard, but not a risk-based dataset.

4.26 As such, the mapping products can be viewed as indicative at best and should only be used as a prompt to review site-based information to determine whether groundwater is a risk factor that should be considered. Indeed, the Environment Agency state that:

"*The susceptibility data should not be used on its own to make planning decisions at any scale and, in particular, should not be used to inform planning decisions at the site scale. The susceptibility data cannot be used on its own to indicate risk of groundwater flooding*."

4.27 To investigate groundwater flooding susceptibility this FRA will review the groundwater flooding susceptibility mapping made available in the Envirocheck Flood Screening Report, which can be seen in Appendix M. There are three different forms of groundwater susceptibility mapping, which are discussed in turn, below.

BGS Geological Indicators of Flooding

4.28 The BGS Geological Indicators of Flooding map shows that the site is not within an area considered to have any geological indicators of groundwater flooding.

BGS Groundwater Flooding Susceptibility

4.29 The BGS Groundwater Flooding Susceptibility map shows that the site is not in an area susceptible to groundwater flooding.

Geosmart Information Groundwater Flood Map

4.30 The Geosmart Information Groundwater Flood Map places the site in an area of 'negligible' risk.

Groundwater Flooding Susceptibility Summary

4.31 The available groundwater flooding susceptibility mapping clearly places in the site in an area where there is very low risk of groundwater flooding. Therefore, the development is not susceptible to groundwater flooding.

4.32 This is supported by the local geology, which is clay to depth and is hydraulically unproductive, and the fact that groundwater strikes were observed in a local borehole at more than 33m BGL, so relatively deep below surface.

Flooding from Infrastructure Failure

4.33 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or because of a reduction in capacity due to collapse, siltation, blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

4.34 Typically, sewer systems are constructed to accommodate rainstorms with a 30-year return period or less, depending on their age. Consequently, rainstorm events greater than 1 in 30-years would be expected to result in surcharging of some parts of the sewer system. In fact, due to most gullies being poorly maintained and often partially blocked with silt, leaves and other debris, their capacity is often estimated to be closer to the 1 in 10-year storm.

4.35 The site is currently undeveloped in terms of drainage infrastructure, thus there is no existing risk of flooding due to the failure of infrastructure. With regards to the proposed development's drainage system and risk of failure, it will be designed to attenuate the 1 in 100-year + 45% rainfall event. A drainage management and maintenance plan will also be provided, which will prescribe how the onsite drainage infrastructure should be looked after so that it works at optimum capacity. This will ensure that residual flood risks to the site from its internal drainage systems will be minimised.

Flooding from Artificial sources

4.36 The EA provides a map showing the maximum potential flood extent should all reservoirs with a capacity of greater than 25,000 cubic metres fail and release the water they hold.

4.37 The map shows that Lower Perrylands Farm would not experience flooding in this scenario.

4.38 There are no canals in the local area to create flood risk.

Historic Flooding

4.39 The Envirocheck Flood Screening Report includes the EA's Historic Flood Map, and this is presented in Appendix N. It shows that there are no records of historic flooding, from any source, on site or within the local area.

5.0 Future Flood Risk & Climate Change

5.1 The NPPF and the supporting Planning Practice Guidance document sets out how flood risk should be considered over the lifetime of a development. This requires an increase in flood risk due to climate change to be taken into account. Both peak river flows and rainfall intensity should be assessed.

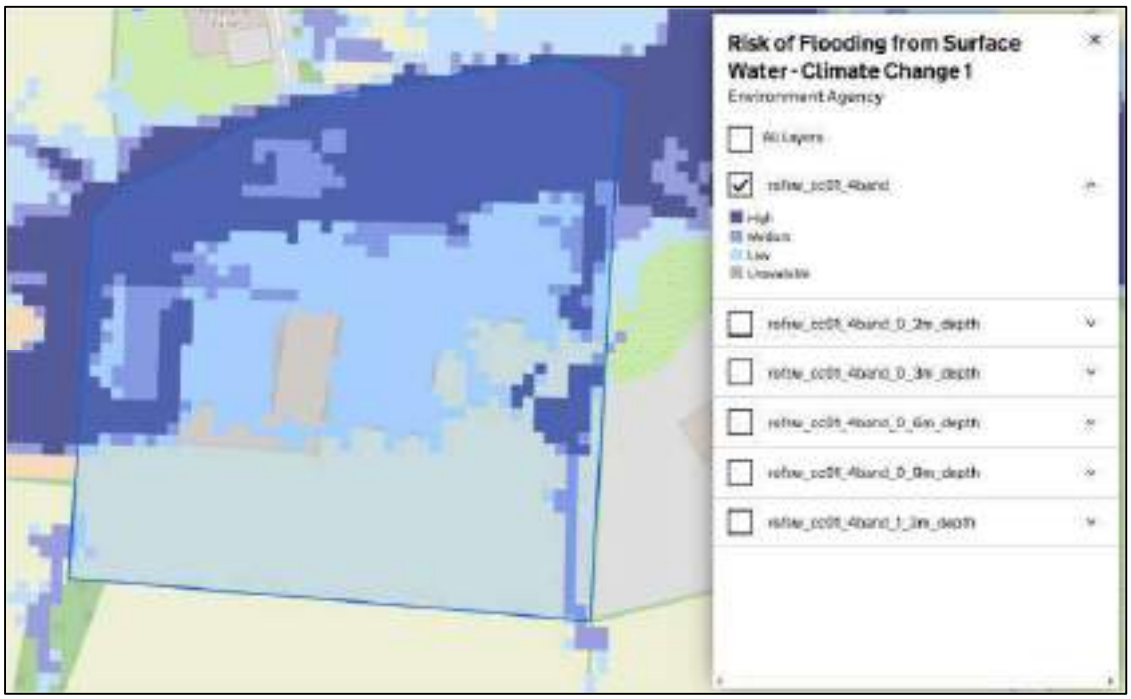
Peak River Flows

5.1 Because Lower Perrylands Farm is not within an area represented by fluvial flood modelling or shown to be within an area at risk of fluvial flooding within the present day, future fluvial flood risk due to climate change cannot be quantified.

Peak Rainfall Intensity and Climate Change

5.2 The NaFRA2 RoFSW mapping has recently released outlines for surface water flood risk, inclusive of climate change-related increases in peak rainfall intensity. This is for the 2050's epoch, and the distribution of future surface water flood risk can be seen in Figure 5.1, below.

Figure 5.1 – RoFSW Outline with Climate Change



5.3 While the extents of the 'Medium' and 'High' surface water flood risk areas do not seem to increase with climate change, the extent of the 'Low' surface water flood risk area is more extensive when climate change increases are included.

5.4 The area of future 'Low' risk partially coincides with the location of the proposed residential dwellings. This can be seen in the overlay plan in Appendix O. This means that more of the site is at surface water flood risk, but no part of the site is in an area of flood risk with a return period that makes the development inappropriate in this location (as per Table 3 of the PPG to the NPPF).

5.5 The flood depth mapping for the climate change outlines shows that flooding of 200mm is only present in a small area and in the 'Low' risk event. Most of the site would experience less than 200mm of flooding. Advice in the Defra/Environment Agency guidance document FD2321 is clear that where there is 300mm or less of flooding, Flood Hazard is 'Very Low'. This is the lowest category of Flood Hazard and does not

preclude safe access and egress to anyone, even the young, elderly, and vulnerable. Moreover, the rear of the properties are also not within a flood risk area, so safe, dry access can still be easily achieved.

6.0 Summary of Flood Risk

6.1 Table 6.1, below, summarises the level of flood risk at Lower Perrylands Farm from all sources.

Table 6.1: Summary of Flood Risk

Flood Source	Risk Level				Comment
	High	Medium	Low	Very Low	
Fluvial				X	Flood Zone 1 (present day and in the future)
Tidal				X	Not within a tidal flood risk area
Groundwater				X	Not in an area susceptible to groundwater emergence
Surface Water			X		Residential dwellings in areas of 'Very Low' risk. Car ports and accesses in areas of 'Low', 'Medium' and 'High' risk.
Canals				X	There are no canals in the vicinity
Reservoirs				X	The Reservoir Flood Risk Map places the site well outside a maximum extent of flooding
Infrastructure Failure				X	The site's infrastructure will be responsibly managed and maintained, as per the prescription in the drainage management and maintenance plan, which will minimise the risk of flooding due to infrastructure failure.
Increase due to Climate Change		X			Residential dwellings to be in future 'Low' risk areas, but risk to access and car ports unchanged over current scenario.

7.0 Surface Water Drainage Strategy

Sustainable Drainage Overview

7.1 Current planning policy and Environment Agency guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that a development's surface water drainage closely reflects the natural hydrology of the pre-developed site.

7.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with current guidance and best practice.

7.3 Source control systems treat surface water close to the point of origin, in features such as soakaways, permeable paving and swales, to name a few.

7.4 The key benefits of SuDS are as follows:

- Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g., roads);
- Improving amenity through the provision of open green space;
- Improving biodiversity through increased areas for wildlife habitat; and
- Enabling a natural drainage regime that recharges groundwater (where possible).

Site Areas

7.5 The developed site areas (the areas of the site undergoing change and new surfacing) will be follows in Table 7.1.

Table 7.1 – Site Areas

Breakdown of site areas	Proposed (ha)
Residential dwellings and car ports	0.101 ha
Driveways and Parking	0.050 ha
Patios and hardstanding	0.042 ha
TOTAL:	0.193 ha

7.6 The developed and impermeable areas of the site, as quantified in Table 7.1, can be viewed in the impermeable areas plan in Appendix P.

Greenfield Runoff Rate

7.7 The greenfield runoff rates have been calculated using the QMED value, which is the index flood in the Flood Estimation Handbook (FEH). QMED has been calculated for rural and urban values in MicroDrainage using the catchment descriptors methodology, which includes the following input variables:

- Site Location
- SAAR – Standard Average Annual Rainfall 1961 – 1990 (mm)
- SPR Host - Standard percentage runoff derived from HOST soils data

- URBEXT - The extent of urban and suburban cover
- BFIHOST - Baseflow index derived from Hydrology of Soil Types (HOST) soils data
- FARL - Index of flood attenuation due to reservoirs and lakes

7.8 The QMED calculation sheet from MicroDrainage can be seen in Appendix Q, but the outputs are summarised in Table 7.2, below, which shows the QMED Values for the 0.193 hectares of impermeable areas that will contribute to surface water runoff.

Table 7.2 – QMED Rural/Urban Values

QMED Rural (l/s/ha)	QMED Urban (l/s/ha)
3.4	3.4

7.9 The QMED Rural value of 3.4 /s will be used to set the final discharge rate from the development so that the greenfield runoff rate (and the local hydraulic regime) is preserved.

Drainage Strategy Overview

7.10 The below overview of the development's drainage strategy should be read in conjunction with the drainage strategy plan in Appendix R of this report.

7.11 The drainage strategy for the proposed development will use composite permeable paving in the driveways and parking areas to provide attenuation and source control. Each driveway and parking area will be constructed from a composite permeable paving that has a 450mm deep subbase that will be formed of 200mm deep geocellular tanks covered with 250mm of 30% porosity coarse graded aggregate. The upper layers of the permeable paviours will be 50mm of sharp grit finished with 80mm deep concrete block permeable paviours.

7.12 Due to the presence of surface water flood risk areas in the northern segment of the site, in and around the watercourse corridor and natural areas, it has been decided not to use open SuDS features as they would be compromised during a surface water flood event. Instead, the residual attenuation requirements for the development will be provided by an oversize box culvert (34.52m x 1.20m x 0.80m – L x W x D) that will be located under the existing access to the south of the watercourse.

7.13 Discharge from the oversize box culvert, which is the final attenuation structure, will be limited to a maximum flow of 3.4 l/s for all rainfall events. 3.4 l/s is the QMED Greenfield runoff rate for the development's contributing impermeable areas. This compares very favourably with the 1 in 1-year brownfield runoff rate of 26.71 l/s.

7.14 With regards to the outfall design, because the outflow from the drainage system is low flow (no more than 3.4 l/s) and the drainage ditch is a small-scale hydraulic feature, it is proposed to build an informal headwall structure within the profile of the bank using concrete sandbags. This will be sensitive to the location (as opposed to a pre-cast concrete headwall structure) and will be simple to construct. It is proposed to build the headwall in accordance with WSCC's approved standard details for 'Headwall Detail for pipe sizes up to 600mm diam. (Concrete Bagwork)' which is in WSCC drawing S278/38/23 Rev A.

7.15 The total attenuation volume on site is 187.347m^3.

7.16 The proposed drainage strategy has been modelled in MicroDrainage's Network Hydraulic modelling module and has been shown to be able to fully attenuate surface water during the 1 in 100-year + 45% rainfall event, without flooding, inclusive of the modelling requirements recommended by WSCC as the LLFA (discussed below).

Fulfilment of Design Criteria

7.17 The drainage strategy has been designed in accordance with the design criteria outlined in West Sussex County Council's LLFA Policy for the Management of Surface Water[1].

7.18 This ensures that the current drainage strategy accords with local policy requirements (as well as those of the NPPF and other national guidance). This includes:

- Using FEH 2022 Annual Maximum Catchment data rather than FSR data. It should be noted that the dropdown menu in MicroDrainage's Network module only allows the choice of 1999 data and 2013 data but allows the upload of any data – including FEH 2022. Therefore, the user can use FEH 2022 data but is forced to do it under the label of 2013 data. As such, the MicroDrainage results included with this report state that FEH 2013 data has been used, but we would like to assure that LLFA that FEH 2022 has been used. The LLFA are aware of this issue as it has been discussed with them on a number of other sites.
- Using a runoff coefficient (CV) value of 1.0 in all hydraulic modelling for summer and winter storms.
- Reducing the MADD Factor (which assumes $10m^3$ of pipe storage per hectare) to zero.
- The full suite of rainfall events has been used (up to the 5,760-minute storm, which is maximum allowable when using FEH data).
- The maximum rainfall intensity has been raised to 550mm/hr to ensure that the full hydrograph is included in the hydraulic calculations.
- The outfall has been modelled as fully surcharged for 1,440-minutes (24 hours) to the full depth of the watercourse (invert to cover level).
- WSCC's LLFA Policy requires that the 50% AEP (1 in 2-year) rainfall event does not surcharge in the drainage network. It can be seen in the MicroDrainage results that there is surcharging on 1no. pipe in this return period. This issue has been discussed before with WSCC and accepted by them when it was explained that this is an idiosyncrasy of MicroDrainage where surcharging is shown behind storage structures that are followed by flow control structures, even when there is no surcharging of the system.
- Urban Creep has been considered for the development. Unlike many development layouts, the proposed development plans in Appendix B show that extensive areas of patios have already been included on the plan. Therefore, while many development layouts require urban creep to be added to account for the addition of patios, it is not necessary for this site as runoff from these areas has already been accounted for. The driveway and parking areas are also already at their maximum extent and cannot be increased in size due to being bound by the dwellings, the car ports, property boundaries, and the access road. With the above in mind, urban creep should not be added because it would over-express the future contributing areas on the development.

The Drainage Hierarchy

7.19 To deliver SuDS benefits and ensure that a development reduces overall flood risk, there is an established hierarchy of surface water drainage methods that should be considered. The most preferable and sustainable are at the top and the least preferable and least sustainable at the bottom.

7.20 The drainage hierarchy is a sequential check that intends to ensure that all practical and reasonable measures are taken to manage surface water as high up the hierarchy (with '1' being the highest) as possible, and that the amount of surface water managed at the bottom of the hierarchy is minimised. The Planning Practice Guidance to the National Planning Policy Framework (NPPF) states that "*Generally,*

[1] https://www.horsham.gov.uk/__data/assets/pdf_file/0019/65017/West-Sussex-Surface-Water-Management-Policy.pdf

the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable".

7.21 The drainage hierarchy presented in the NPPF presents only four tiers of drainage options. This has been expanded on and adopted by others and now can be viewed as the following:

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surfaces in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water sewer/drain
7. Discharge rainwater to the combined sewer
8. Discharge rainwater to the foul sewer

7.22 With regards to the proposed development on the Land North of Cowfold Road and its drainage strategy, the tiers of the drainage hierarchy that have been achieved is outlined in Table 7.3, below:

Table 7.3: Compliance with the Drainage Hierarchy

Tier	Discharge Method	Used?	Notes
1	Store rainwater for later use	ü	Water Butts are recommended for use on the downpipes of the dwellings.
2	Use infiltration techniques	û	Infiltration is not viable due to the heavy clay-based geology.
3	Attenuate rainwater in ponds or open water features	û	SuDS basins and open features cannot be used as the space they would occupy areas at risk of surface water flooding, which would compromise their function.
4	Attenuate rainwater by storing in tanks or sealed water features	ü	The drainage strategy will use 'System C' (tanked) composite permeable paviours and will use an oversize box culvert for conveyance and attenuation.
5	Discharge rainwater direct to a watercourse	ü	The drainage strategy will discharge to the ordinary watercourse that passes through Lower Perrylands Farm.
6	Discharge rainwater to a surface water sewer/drain	û	This tier of the drainage hierarchy will not be required.
7	Discharge rainwater to the combined sewer	û	This tier of the drainage hierarchy will not be required.
8	Discharge rainwater to the foul sewer	û	This tier of the drainage hierarchy will not be required.

MicroDrainage Hydraulic Modelling

7.23 The drainage strategy outlined above has been designed in MicroDrainage's Network hydraulic modelling module.

7.24 The results of the MicroDrainage hydraulic modelling for the proposed development can be seen in Appendix S.

7.25 The results of the hydraulic modelling show that the drainage strategy as outlined above can attenuate and discharge all surface water generated in the 1 in 100-year + 45% rainfall event without flooding.

7.26 The maximum half drain time of the system is 552 minutes (in the 1 in 100-year + 45% rainfall event), which is less than the 1,440-minute (24-hour) requirement for this metric. The maximum half drain time for all storms is as follows:

- 1 in 2-year: 440 minutes
- 1 in 10-year + 40% 512 minutes
- 1 in 30-year + 40%: 474 minutes
- 1 in 100-year + 45%: 552 minutes

7.27 The MicroDrainage hydraulic model has been built using the specific modelling requirements of WSCC as the LLFA and these have already been discussed in Paragraph 7.18 of this report.

8.0 Foul Water Drainage

8.1 The peak foul flow rate from the proposed development has been calculated based on Southern Water's foul sewerage modelling criteria, the details of which can be found in Appendix T. In summary, the calculation is based on the foul flow element, plus an allowance for misconnected surface water (which would not be possible on this site).

8.2 Based on Southern Water's foul sewerage modelling criteria, the calculated design foul flow from the three-unit proposed residential development is 0.02 l/s.

8.3 Because there is no public foul sewerage on the site, other options for foul sewage have been considered.

8.4 There are no public foul sewers in the vicinity. Therefore, in accordance with the general binding rules for small sewage discharges (SSDs), which are in effect as of January 2015, it is appropriate to discharge sewage effluent to surface water because there is not a public sewer within 90 metres of the development (the general binding rules states that the number of dwellings must be multiplied by 30 to determine the acceptable distance from a public sewer).

8.5 The foul drainage strategy for the site is to use a Klargester BioDisc BF (or similar approved) sewage treatment plant. Consideration has also been given into how to discharge the sewage effluent from the sewage treatment plant by the most suitable method available. It is proposed to discharge the treated sewage effluent to the ordinary watercourse, which has year-round baseflow and, thus, offers further dilution of effluent.

8.6 Because the ordinary watercourse has a consistent baseflow, it is appropriate and in accordance with Rule 19 of the General Binding Rules that states:

"*You cannot meet the general binding rules if you have a new discharge to:*

- *a ditch or a surface water that does not contain flowing water throughout the year, unless there is a drought or an unusually long period of dry weather, or;*
- *watercourses that seasonally dry up".*

8.7 Because the new connection is to be less than 5,000 litres per day (it will be 1,728 litres based upon a discharge rate of 0.02 l/s) a permit does not need to be applied for.

8.8 The sewage treatment plant will have its own specific maintenance and inspection requirements. The maintenance requirements for a sewage treatment plant are presented, with recommendations, in the Drainage Management and Maintenance Plan in Appendix U, so that the sewage treatment plant can be responsibly owned and maintained in perpetuity.

9.0 Surface Water Runoff Quality

9.1 The NPPF states that development should not have a detrimental impact on the environment, including the water environment. The technical guidance to the NPPF provides further advice on the benefits of ensuring runoff quality is to an appropriate standard.

9.2 The CIRIA SuDS Manual provides guidance on the treatment of surface water runoff. With regards to the proposed development, Table 4.3 of the CIRIA SuDS Manual rates the pollution hazard from roof water runoff as 'very low'. The only requirement for roof water runoff is the removal of gross solids and sediments, which would be achieved using catchpits and silt traps upstream of the composite permeable surfacing on the downstream end of the RWP's.

9.3 With regards to the driveways and parking areas, Table 4.3 of the CIRIA SuDS Manual rates the pollution hazard from residential car parking and low traffic roads as 'low'. To mitigate a 'low' pollution hazard, the CIRIA SuDS Manual recommends using a simple index approach in line with Section 26.7.1. This is discussed, below.

9.4 Table 26.2 of the CIRIA SuDS Manual provides pollution hazard indices for different land use classifications. The land use classification that requires consideration for low traffic roads and parking areas is in Table 9.1 below.

Table 9.1 - Excerpt from Table 26.2 of CIRIA SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, homezones and general access roads) with less than 300 traffic movements per day.	Low	0.5	0.4	0.4

9.5 To deliver adequate pollution treatment and mitigation, the CIRIA SuDS Manual recommends using a SuDS component that has a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).

9.6 Table 26.3 of the CIRIA SuDS Manual provides indicative SuDS mitigation indices for each SuDS type when discharging to surface waters. Table 9.2, below, which is an excerpt from Table 26.3, shows the mitigation index for permeable paviours.

Table 9.2 - Pollution Mitigation Indices for Permeable Pavements

Type of pollution removal component	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Permeable Pavements	0.7	0.6	0.7

9.7 The mitigation indices for permeable pavements exceed those of the highest pollution hazard index figures from Table 9.1.

10.0 Residual Risk and Infrastructure Maintenance

10.1 Whilst the drainage strategy for the development has been designed to attenuate surface water from the 1 in 100-year plus 45% rainfall event, plus an inclusion for urban creep, there could be a small residual risk of flooding due to blockage or failure or poor performance of on-site infrastructure. Therefore, appropriate and regular maintenance of the drainage infrastructure should be undertaken by the site management company or their agents.

10.2 To assist with this process, a Drainage Management and Maintenance Plan has been prepared, which sets out the principles for the long-term management and maintenance of the proposed surface water drainage system on the development. The Drainage Management and Maintenance Plan can be seen in Appendix U.

10.3 The purpose of this document is to ensure that those responsible for site maintenance have a robust inspection and maintenance plan going forwards. This will help ensure the optimum operation of the surface water drainage system and that it will be regularly maintained for the lifetime of the development. This will contribute to reducing the risk of surface water flooding both on- and off-site.

11.0 Exceedance Events

11.1 Exceedance events are those greater than the design rainfall event (i.e., greater than the 1 in 100-year rainfall event plus 45% for climate change).

11.2 Any rainfall events greater than the design rainfall event may cause flooding due to them 'exceeding' the capacity of the drainage system. In this situation it is imperative to check whether flooding would occur and, if so, whether it needs to be contained on site. Exceedance flows should not ingress into any properties on site and should not cause nuisance to any neighbouring sites or buildings.

11.3 The drainage system has some 'freeboard' within it that would provide attenuation during exceedance events. This allows for the attenuation of some surface water in storms beyond the 1 in 100-year + 45% event.

11.4 Should an exceedance event cause the drainage system to surcharge, the topography of the site would allow surface water to directly flow into the ordinary watercourse without impacting other properties or infrastructure. Additionally, the rural location of the development means that there are no local 'downstream' receptors for any exceedance flows, thus there would be no impact off-site from the exceedance flows.

11.5 Although exceedance would be of negligible impact to the development. a high-level plan of exceedance flows has been produced to show the pathway that exceedance flows would take across the site. This can be seen in Appendix V.

12.0 Summary and Conclusion

12.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been produced by Motion on behalf of their client, Church Barn Group. It supports the planning application for three detached dwellings, plus access, parking and landscaping, on the site of Lower Perrylands Farm, Dial Post, West Sussex. This application is pursuant to the consented Class Q application on the site for the change of use from agricultural to five residential dwellings.

12.2 The EA's Flood Map for Planning shows that the proposed development is entirely within Flood Zone 1. Therefore, the site is at very low risk of flooding from rivers.

12.3 The 2025 NaFRA2 RoFSW map shows that large parts of the site, its boundaries, and its access will be affected by surface water flood risk, with the most extensive areas occurring in the 1 in 1,000-year (Low Risk) surface water flooding event. Following the advice within Paragraph 175 of the NPPF, the distribution of surface water flood risk has been used to position the dwellings and inform the distribution of the development. The three dwellings have been sensibly and deliberately located outside of all areas at risk of surface water flooding. It is only the car ports that have been located within areas of 'Low' (1 in 1,000-year) surface water flood risk. As car ports, they are open structures that will not remove volume from the flooded areas and will not alter any flow paths or hydraulic regimes. Low vulnerability land uses are appropriate in areas at 'Low' risk of flooding, as per Table 3 of the PPG to the NPPF.

12.4 When climate change and increases in peak rainfall intensity are included, the extent of the 'Low' surface water flood risk outline becomes more extensive and includes the footprint of the dwellings. This suggests that the development will be at higher surface water flood risk in the 1 in 1,000-year rainfall event in the future but, because this is the 'Low' risk area with 'Very Low' Flood Hazard, residential development is still appropriate in this location.

12.5 With the above in mind, this FRA concludes that flood risk should not form an impediment to the progress of this development because residents and structures are not at 'Medium' or 'High' risk of flooding in the present day or in the future, and safe access and egress can be achieved back to the access to the south of the site, so there are no concerns in this respect. When the current proposals are compared to the consented and extant Class Q Prior Approval application (DC/24/1087), which allows for the conversion of five agricultural units into five residential dwellings, the current application represents a reduction in the number of dwellings, anticipated population, and associated vehicle movements when compared to the consented Class Q scheme. On this basis, refusal of the current application on flood risk grounds would result in the fallback position being the delivery of the extant five-dwelling scheme, which would, in practice, lead to a higher number of people and vehicle trips using the access.

12.6 Furthermore, in terms of overall risk to users of the access, WSCC commented during the consultation process of DC/24/1087 that the five-dwelling scheme would likely have a reduction in vehicle movements when considered against the agricultural site use. This means that the three-unit scheme will result in the lowest number of vehicle movements and the overall lowest risk to users of the access when compared with the existing agricultural use, or the consented Class Q application. The current proposals are the lowest risk scenario of all those that could be allowed to continue.

12.7 The drainage strategy for the proposed development has been produced using source control and sufficient attenuation to accommodate the 1 in 100-year + 45% rainfall event, without flooding, while having a fully surcharged outfall. Surface water generated from the development's impermeable and contributing areas will discharge at the QMED greenfield runoff rate of 3.4 l/s, which is just 12.73% of the brownfield runoff rate from the existing farm's roof and concrete hardstanding areas.

12.8 The proposed drainage strategy can successfully mitigate the expected pollution hazards that will be generated on site.

12.9 A drainage management and maintenance plan has been produced that shows how the proposed surface and foul drainage system will be maintained in perpetuity. Foul drainage will take place via a packaged

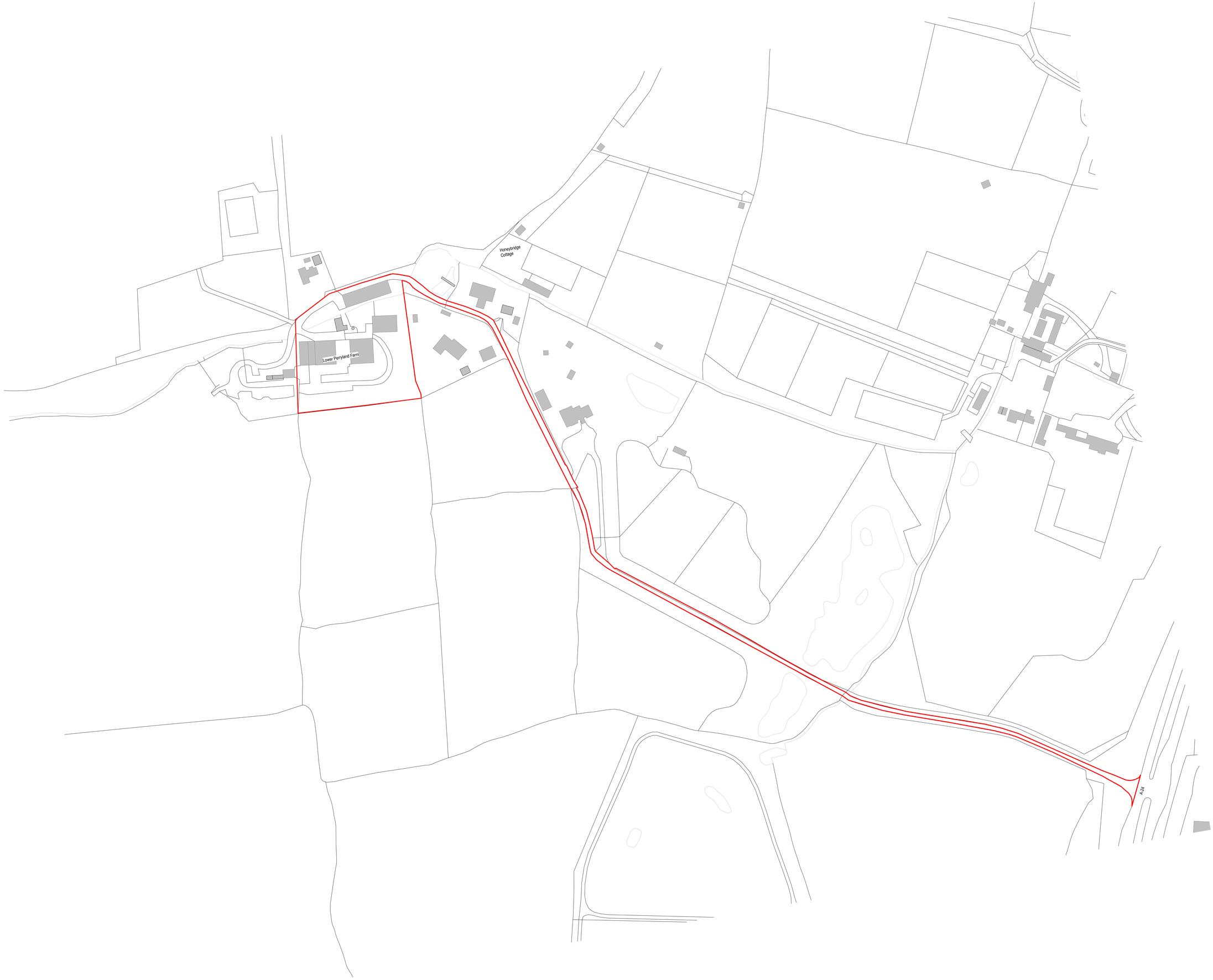
sewage treatment plant that will discharge to the adjacent ordinary watercourse. This discharge will be less than 5,000 litres a day and in accordance with the General Binding Rules, so this does not require a permit from the EA.

12.10 Exceedance flows have been considered and an exceedance plan produced.

12.11 In conclusion, this drainage strategy has shown that the proposed development is at a very low residual risk of flooding, and this makes it appropriate in this location. Similarly, the drainage strategy has shown that the development can manage its foul and surface water sustainably. Therefore, flood risk and surface water management should not form an impediment to the progress of this application.

Appendix A

Site Location Plan



Revisions

No.	Description	Date	By
1	PLANNING	27-05-2025	

Notes:

GENERAL NOTES:

All dimensions & levels are preliminary and approximate and subject to utilities search, legal boundaries and detailed layouts/ design development through consultation.

Dimensions are to be checked on site by contractor & sub contractors prior to commencement of work, any discrepancies are to be highlighted immediately to the architects.

KEY
Ownership Boundary

Scale 1 to 1250
Scale: 1 : 1250 @ A1
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Project No: **504**

Project Name: **Perrylands,Dial Post**

Drawing No. **P001**

Drawing Name: **Existing Site Location Plan**

Revision: **P 1**

Suitability Description: **PLANNING**

Project Issue Date: **JUN 24**

Drawn: MS

Checked: GF

Orig Paper Size: A1

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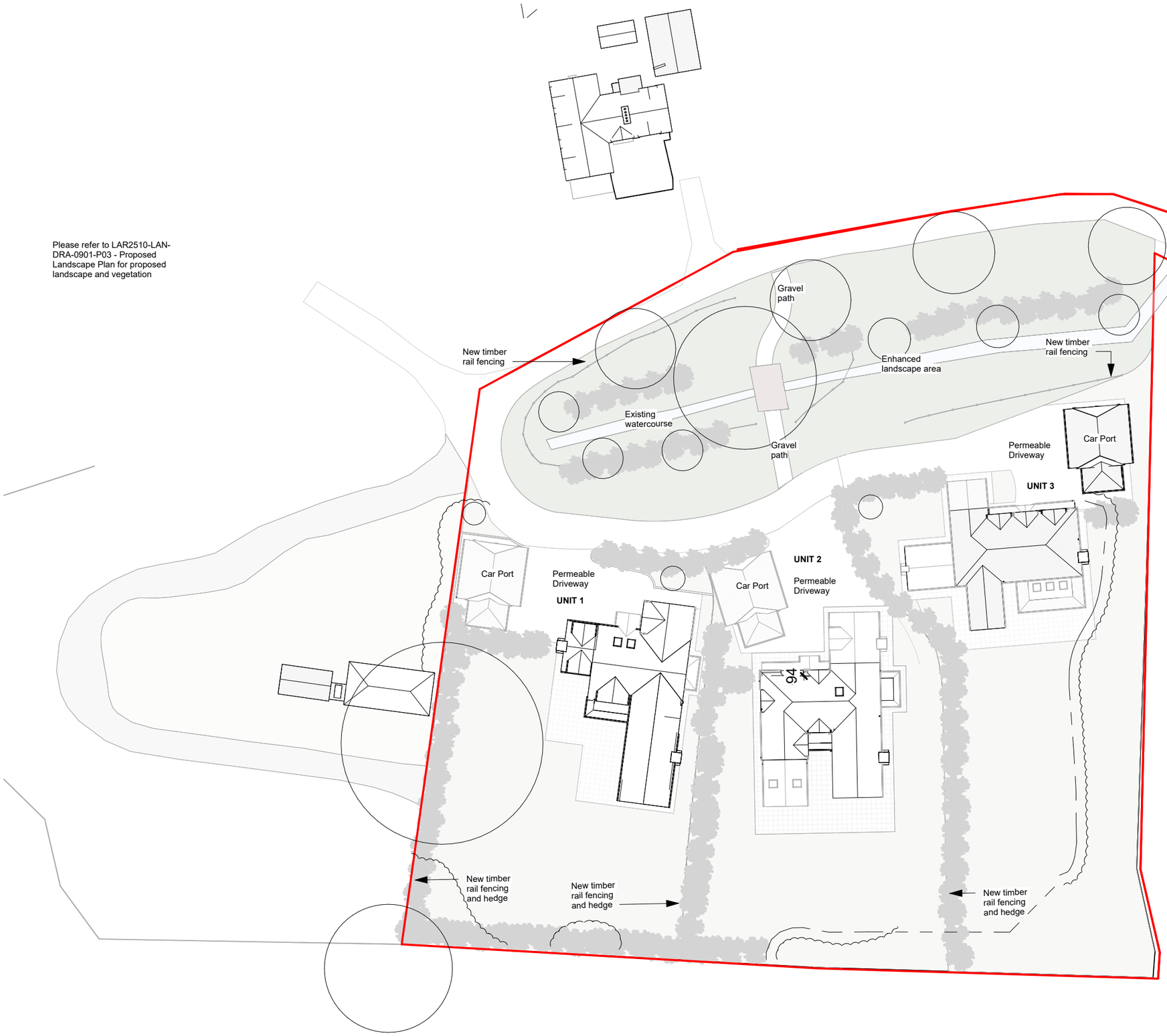
Use figured dimensions only. All levels and dimensions to be checked. This drawing is to be read in conjunction with all other relevant drawings and specifications.

Appendix B

Proposed Development Layout

Please refer to LAR2510-LAN-DRA-0901-P03 - Proposed Landscape Plan for proposed landscape and vegetation



Revisions

No.	Description	Date	By
4	Landscape amendments	18-08-2025	
3	Revised Plans	02-07-2025	
2	Revised Plans	05-06-2025	
1	PLANNING	27-05-2025	

Notes:

GENERAL NOTES:

All dimensions & levels are preliminary and approximate and subject to utilities search, legal boundaries and detailed layouts/ design development through consultation.

Dimensions are to be checked on site by contractor & sub contractors prior to commencement of work, any discrepancies are to be highlighted immediately to the architects.

Scale 1 to 500

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Scale: 1 : 500 @ A3

Project No. **504**

Project Name: **Perrylands,Dial Post**

N

Drawing Name: **Proposed Site Block Plan**

Drawing No. **P016**

Revision: **P4**

Suitability Description: **PLANNING**

Drawn: MS

Checked: GF

Orig Paper Size: A3

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Use figured dimensions only. All levels and dimensions to be checked. This drawing is to be read in conjunction with all other relevant drawings and specifications.

Appendix C

Existing Site Layout

Revisions

No.	Description	Date	By
1	PLANNING	27-05-2025	

Notes:

GENERAL NOTES:

All dimensions & levels are preliminary and approximate and subject to utilities search, legal boundaries and detailed layouts/ design development through consultation.

Dimensions are to be checked on site by contractor & sub contractors prior to commencement of work, any discrepancies are to be highlighted immediately to the architects.

Existing Area Schedule (GIA)

Name	Area
UNIT 1	392 m²
UNIT 2	212 m²
UNIT 3	302 m²
UNIT 4	267 m²
UNIT 5	195 m²
Grand total: 5	1367 m²

Scale 1 to 500

0 5 10 25 M

Scale: 1 : 500 @ A3

Project No. **504**

Project Name: **Perrylands,Dial Post**

N

Drawing Name: **Existing Site Plan**

Drawing No. **P002**

Revision: **P1**

Suitability Description: **INFORMATION**

Drawn: MS

Checked: GF

Orig Paper Size: A3

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Use figured dimensions only. All levels and dimensions to be checked. This drawing is to be read in conjunction with all other relevant drawings and specifications.

Appendix D

Site Photos

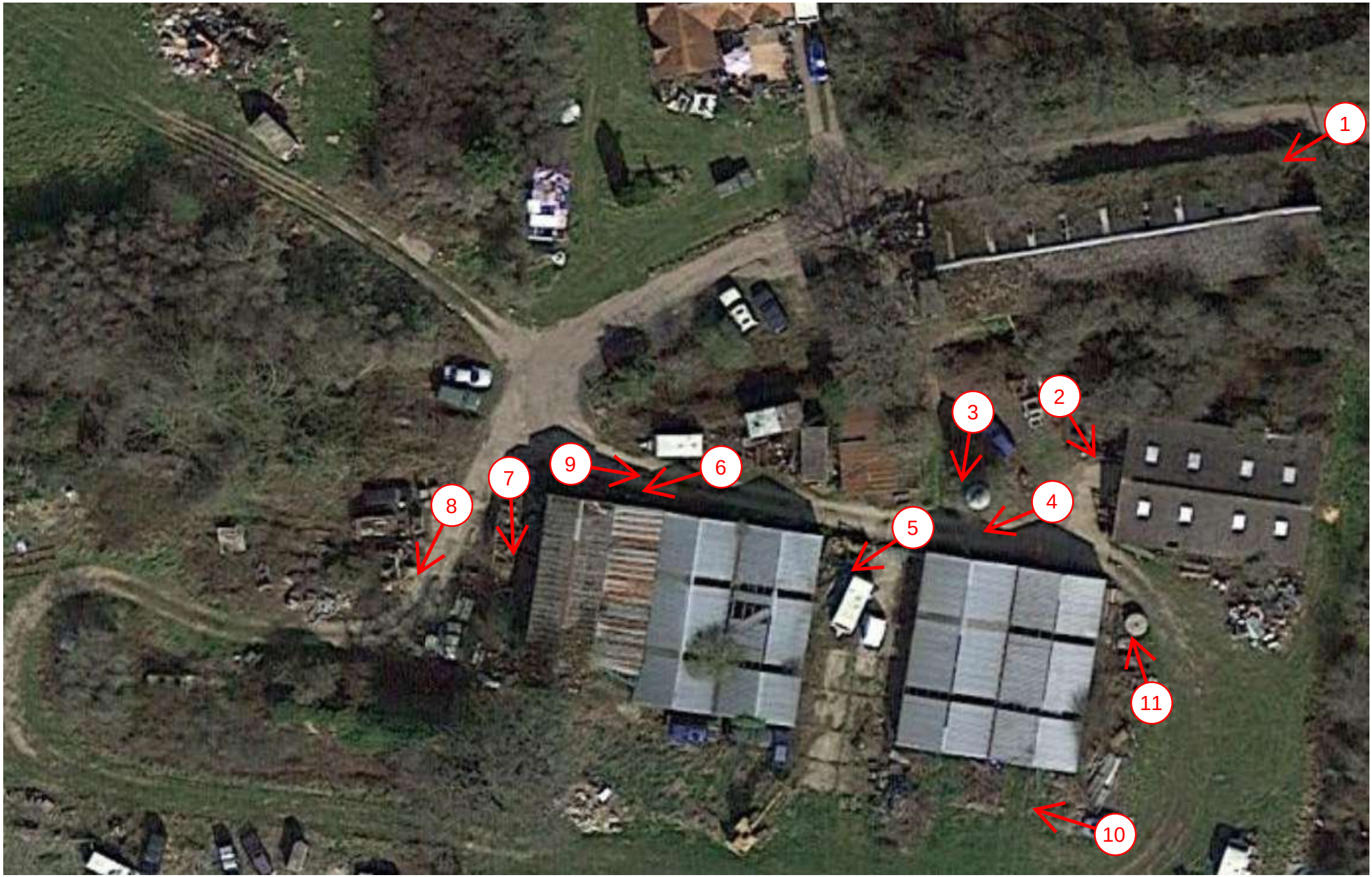
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Photo 1:

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Photo 6:

Photo 7:

Photo 8:

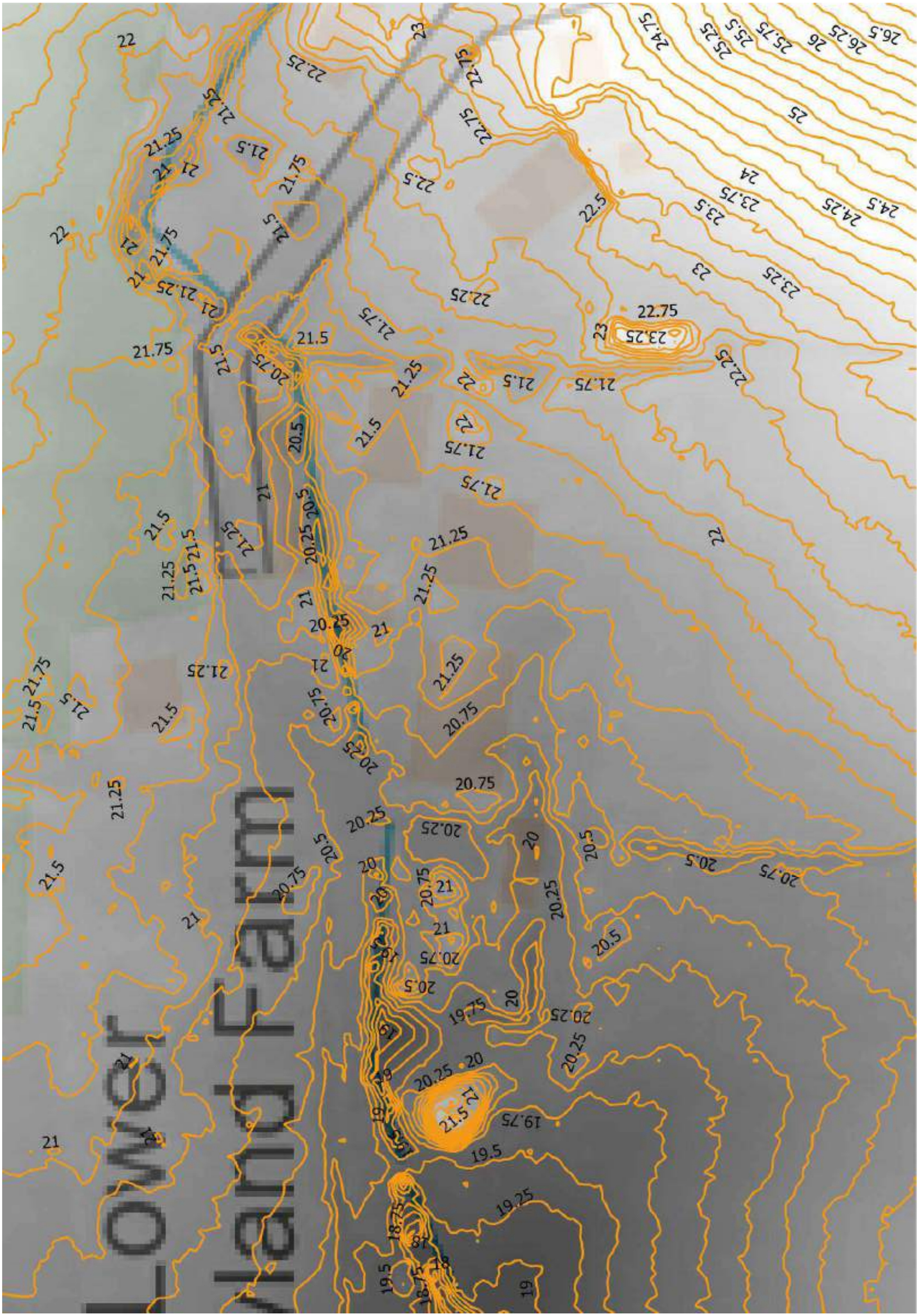
Photo 9:

Photo 10:

Photo 11:

Appendix E

LiDAR Contours


Lower Farland Farm

Appendix F

BGS Geological Categories


Record 1 of 2
Superficial deposits 1:50,000 scale
Description: HEAD - CLAY, SILT, SAND AND GRAVEL
More Information


Record 2 of 2
Bedrock geology 1:50,000 scale
Description: WEALD CLAY FORMATION - MUDSTONE
More information

Appendix G

Borehole Log TQ11NW7

TQ 11 NW 17
1499.1868

318/123 Platts Green, Dial Post, West Grinstead (formerly Longridge Farm)

Surface +93. Lining tubes: 105 x 4½ in from surface; 75 x 3 in from 99 down (perforated 155 to 175). Water struck at -72. R.W.L. +34½. Suction -17. Yield 250 g.p.h. (1 d. test). Hardness: total 33. Dando, Apr. 1939.

WC 175 175

Clay	105	105
Sandstone	7	112
Clay	6	118
Sandstone	2	120
Clay	6	126
Sandstone	2	128
Clay	13	141
Sandstone	4	145
Clay	30	175

N

[illegible]/123 Platts Green, Dial Post, West Grinstead (formerly Longridge Farm)

TQ11/36

Surface +93. Lining tubes: 105 x 4½ in from surface; 76 x 3 in from 99 down (perforated 155 to 175). Water struck at -72. R.W.L. +34½. Suction -17. Yield 250 g.p.h. (1 d. test). Hardness: total 33. *Dando, Apr. 1939.*

BC	...	178	175
Clay		105	105
Sandstone		7	112
Clay		6	118
Sandstone		2	120
Clay		6	126
Sandstone		2	128
Clay		13	141
Sandstone		4	145
Clay		30	175

RECORD OF WELL (SHAFT OR BORE)

318 — 6" N. TQ 11/36 — 1" O.S. — Grid Ref. — 123

At NEW HOUSE TQ 1499 1868

Town or Village DIAL POST, West Grinstead County SUSSEX Six-inch quarter sheet XXVI N.E.

Exact site 400 yds S.S.W. of Dial post on West side of Horsham–Worthing Road in parish of ______ (A copy of six-inch map or a tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) 100 ft. If well starts below ground surface, state how far 0 ft.

Shaft — ft., diameter — ft. Bore 175 ft. Diameter of bore: at top 4½ ins.; at bottom 3 ins.

Details of permanent lining tubes (internal diameters preferred) 4½ i.d. Tubes Surface to 105' 0"
3" i.d. Tubes from 99' to 175' 0". Perforations from 155' to 175'

Water struck at depths of (feet) 165' 0"

Rest-level of water below/above top of well 58½ feet. Suction at 110 feet. Yield on 8/1 hours'/days' test 250 gallons per hr (with pump of capacity 250 g.p.h.); depressing water level to ______ feet below top. Time of recovery ______ hrs. Amount normally pumped daily ______ g.p.h. for ______ hours.

Quality (attach copy of analysis if available) ______

Sunk by Duke & Ockenden Ltd for Mr. H. G. Daniels Date of well April 1939

Information from DUKE & OCKENDEN LTD. WESTMINSTER & LITTLEHAMPTON

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS Feet.	THICKNESS Inches.	DEPTH Feet.	DEPTH Inches.
Weald Clay	Clay	105	0	105	0
	Sandstone	7	0	112	0
	Clay	6	0	118	0
	Sandstone	2	0	120	0
	Clay	6	0	126	0
	Sandstone	2	0	128	0
	Clay	13	0	141	0
	Sandstone	4	0	145	0
	Clay	30	0	175	0
B.					
	Analyses: Grs per gall				
	Total solids 115·0	1643 ppm			
	Chlorine 34·3	490 ppm			
	Ammonia 0·0276				
	Albuminoid Absent				
	Nitrogen as Nitrite "				
	Nitrate "				
	Lead & other metals "				
	Trace of iron —				
	Total hardness 2·3°				
	LONGRIDGE FARM over ½ mile SS(W) of the S end of Dial Post. Well top + 93				
	Visited ? Buchan				

Visited. House at the above site: site as given by E.D. Pollard "Plats Green" — check this with P.O. K. 2.6.47.

For Survey use only

Date received	G.S.M. Office File No	Site marked on 1" map (use symbol)
17/7/41		

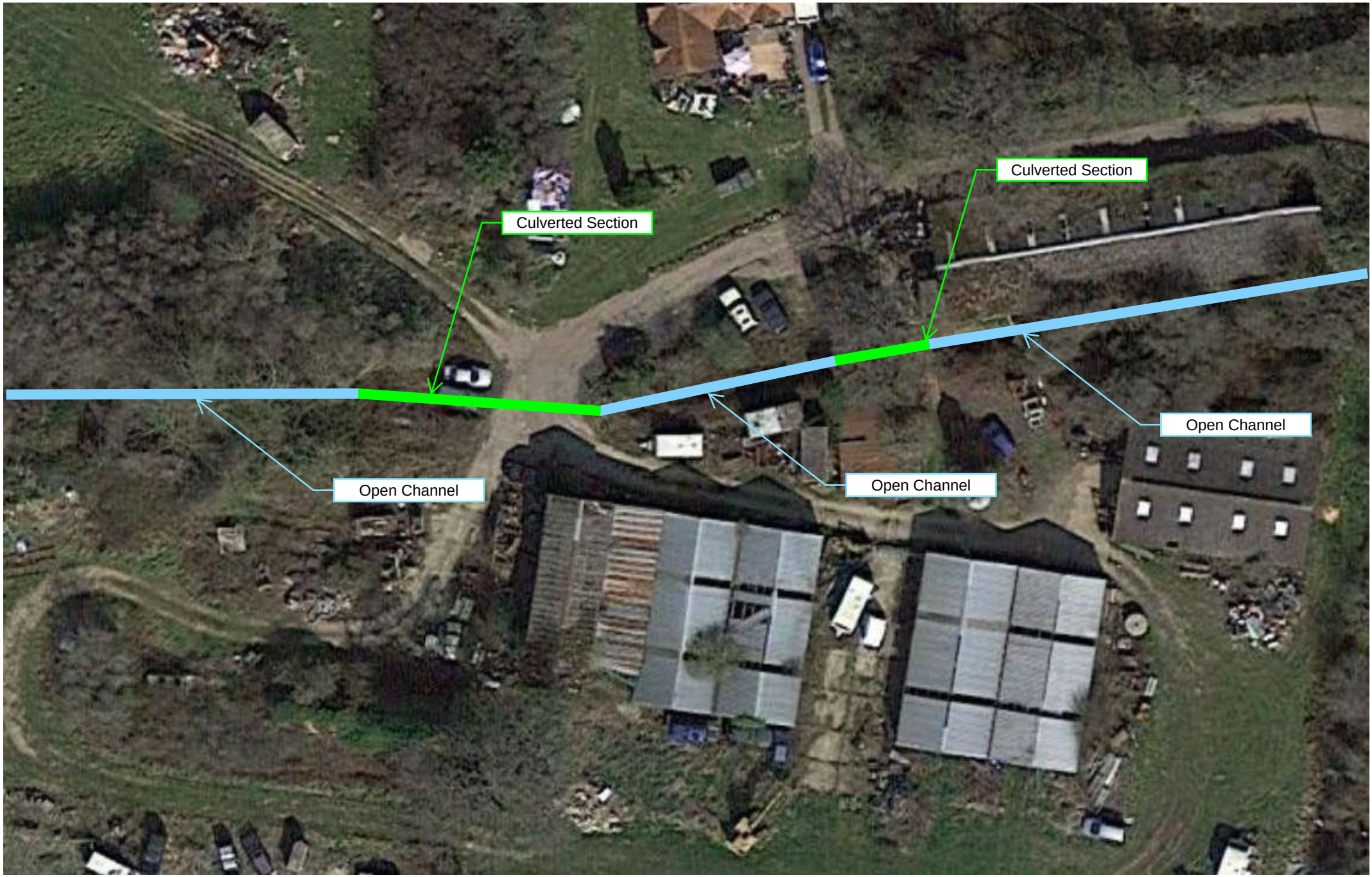
GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.

DATA Bank

(7093) Wt.24084/0849 3,000 12/38 A.&E.W.Ltd. Gp.686

Appendix H

Watercourse Character Plan


Culverted Section
Culverted Section
Open Channel
Open Channel
Open Channel

Appendix I

Watercourse Photos

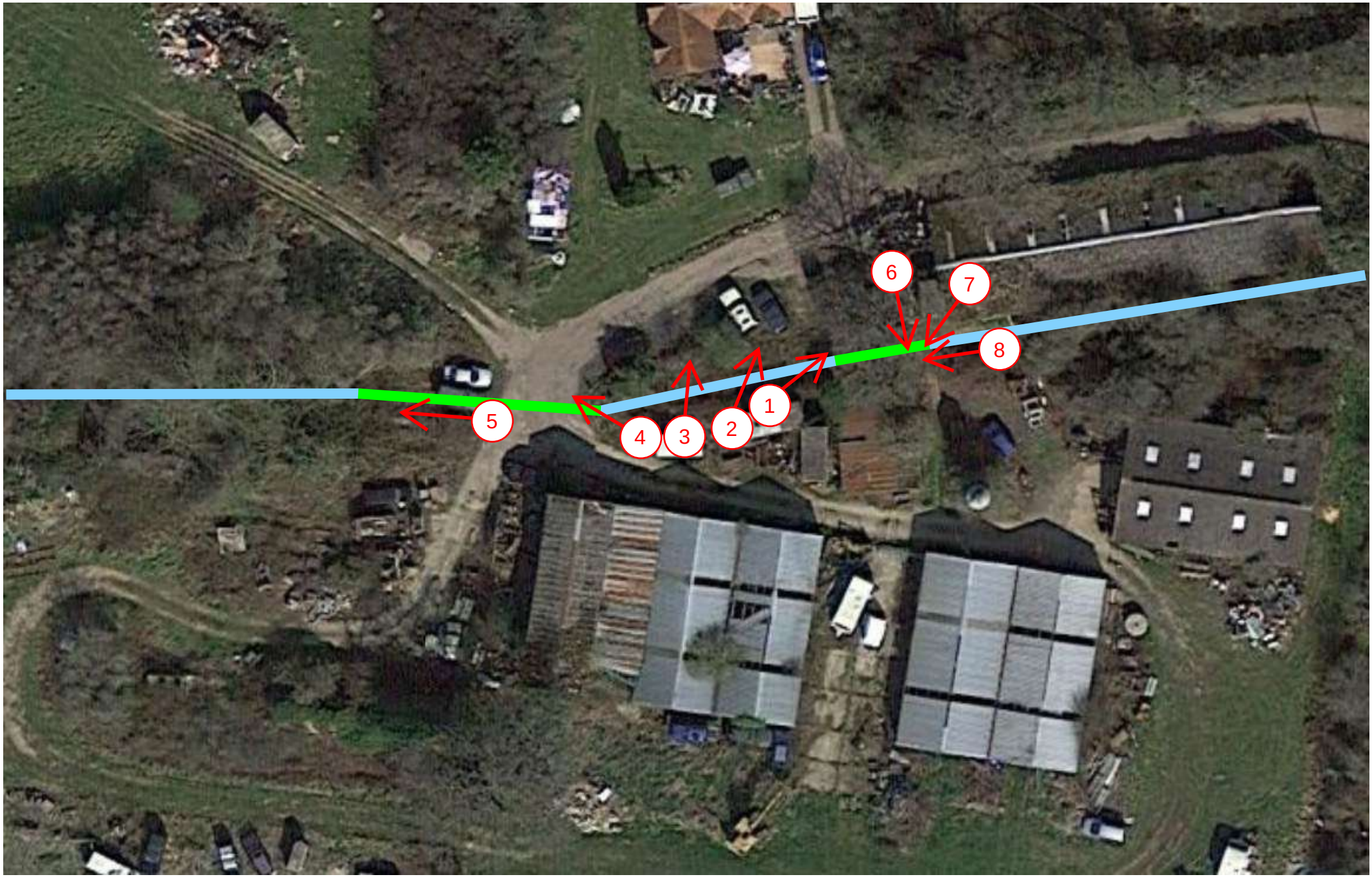

6
7
8
1
2
3
4
5

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:

Photo 6:

Photo 7:

Photo 8:

Appendix J

Environment Agency Flood Map for Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	**514475/118807**	**3 August 2025 15:50**

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

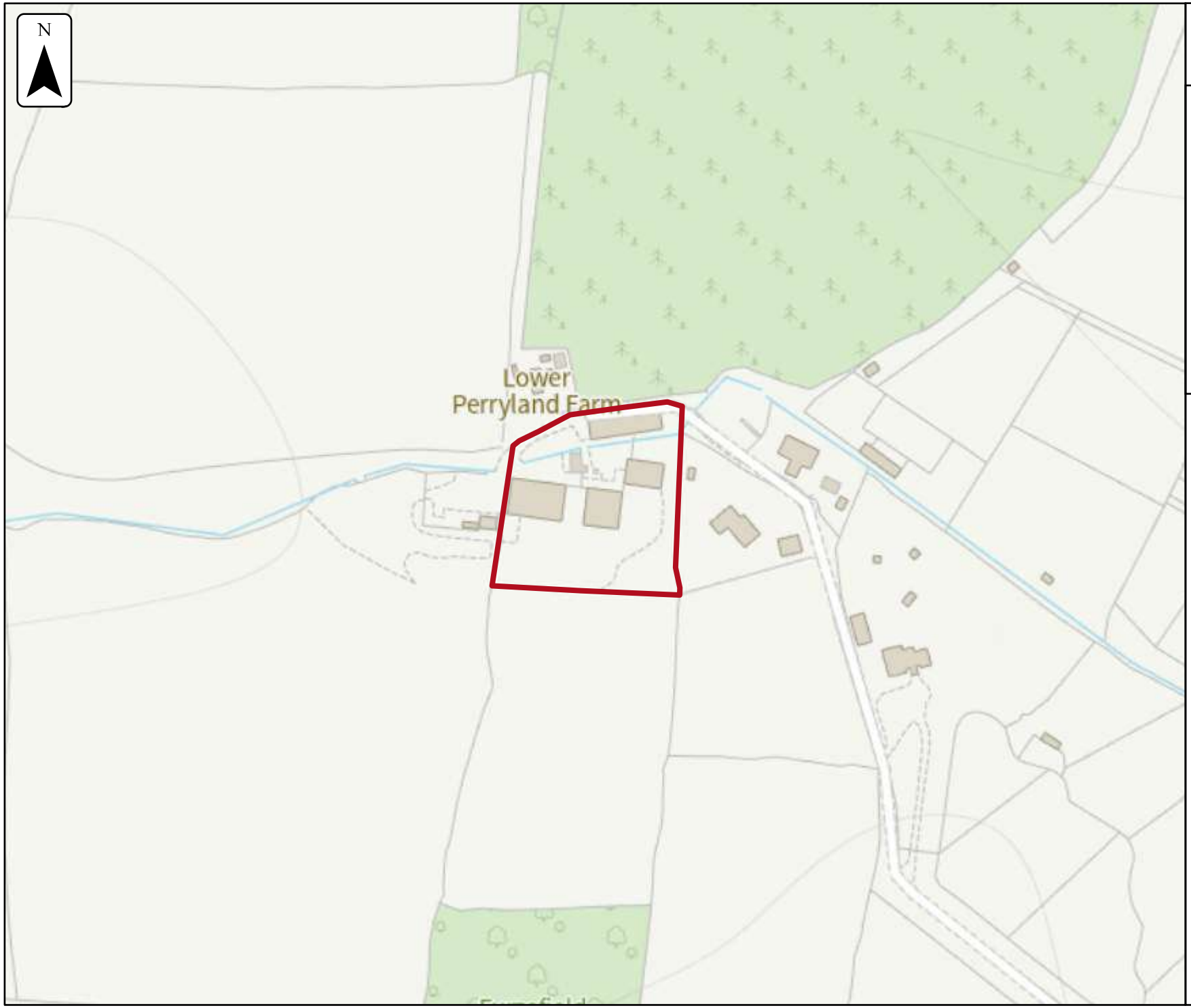
You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

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.



Environment Agency

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
514475/118807

Scale
1:2,500

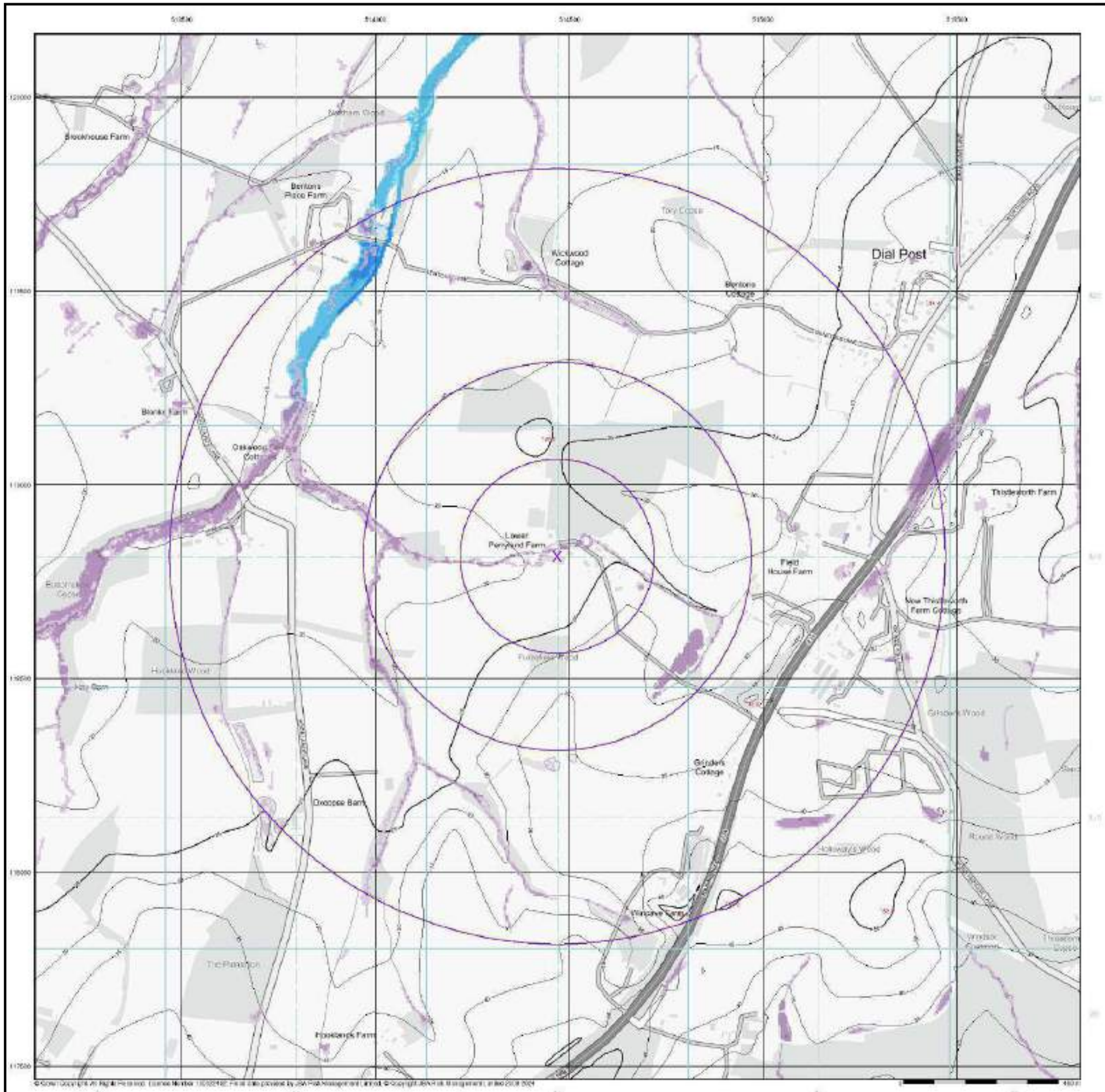
Created
3 Aug 2025 15:50

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60 m

Appendix K

JBA Comprehensive Flood Maps



motion

JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

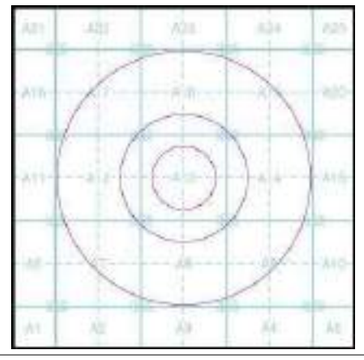
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
Mean Low Water
Mean High Water

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

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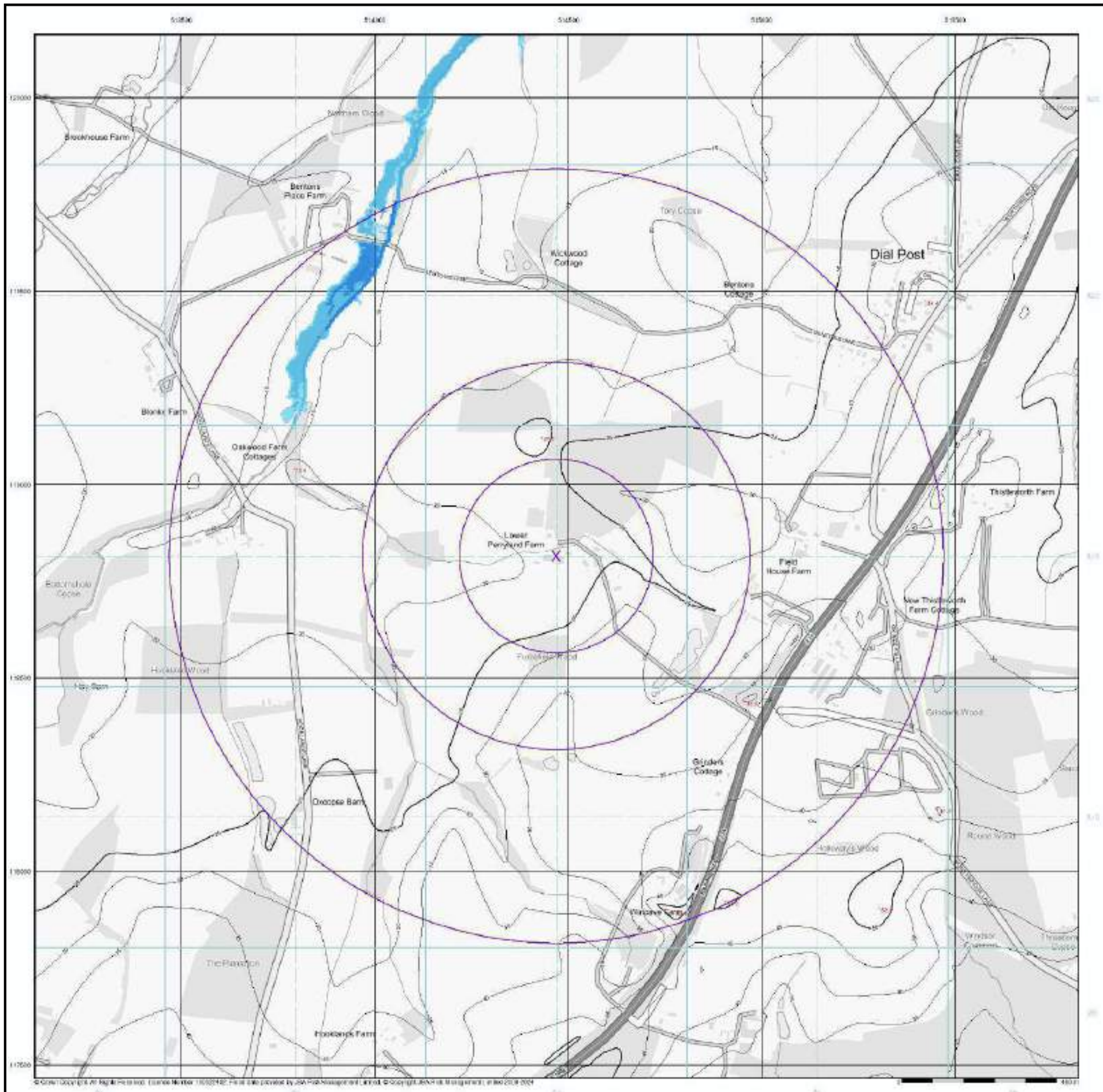
Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

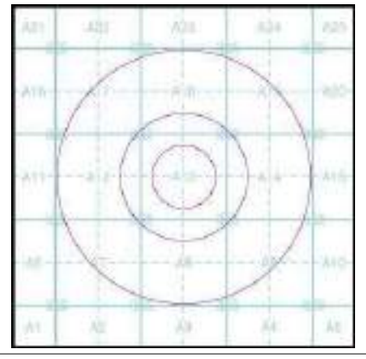
Modelled Flood Depth

Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	345957711_1_1
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Search Buffer (m):	1000

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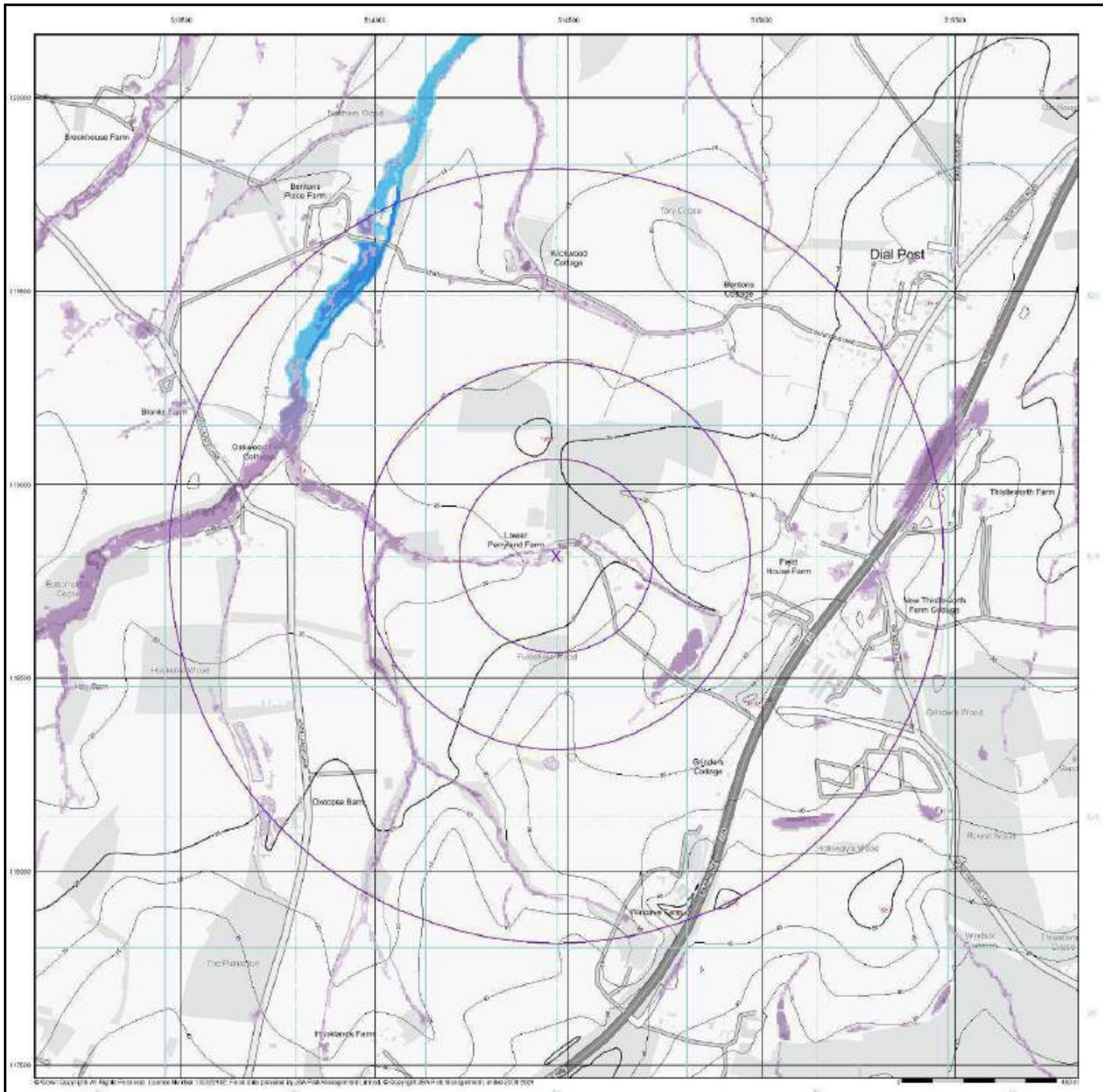


motion

JBA 200 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

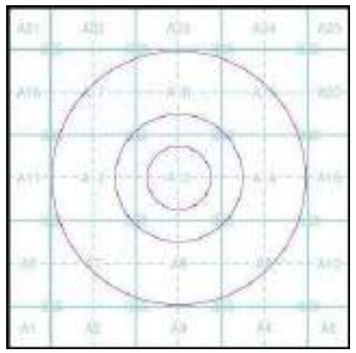
Contours (height in metres)

Standard Contour — Mean Low Water

Master Contour — Mean High Water

Spot Height

JBA 200 Year Return Flood Map (Undefended) - Slice A



N

Order Details

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Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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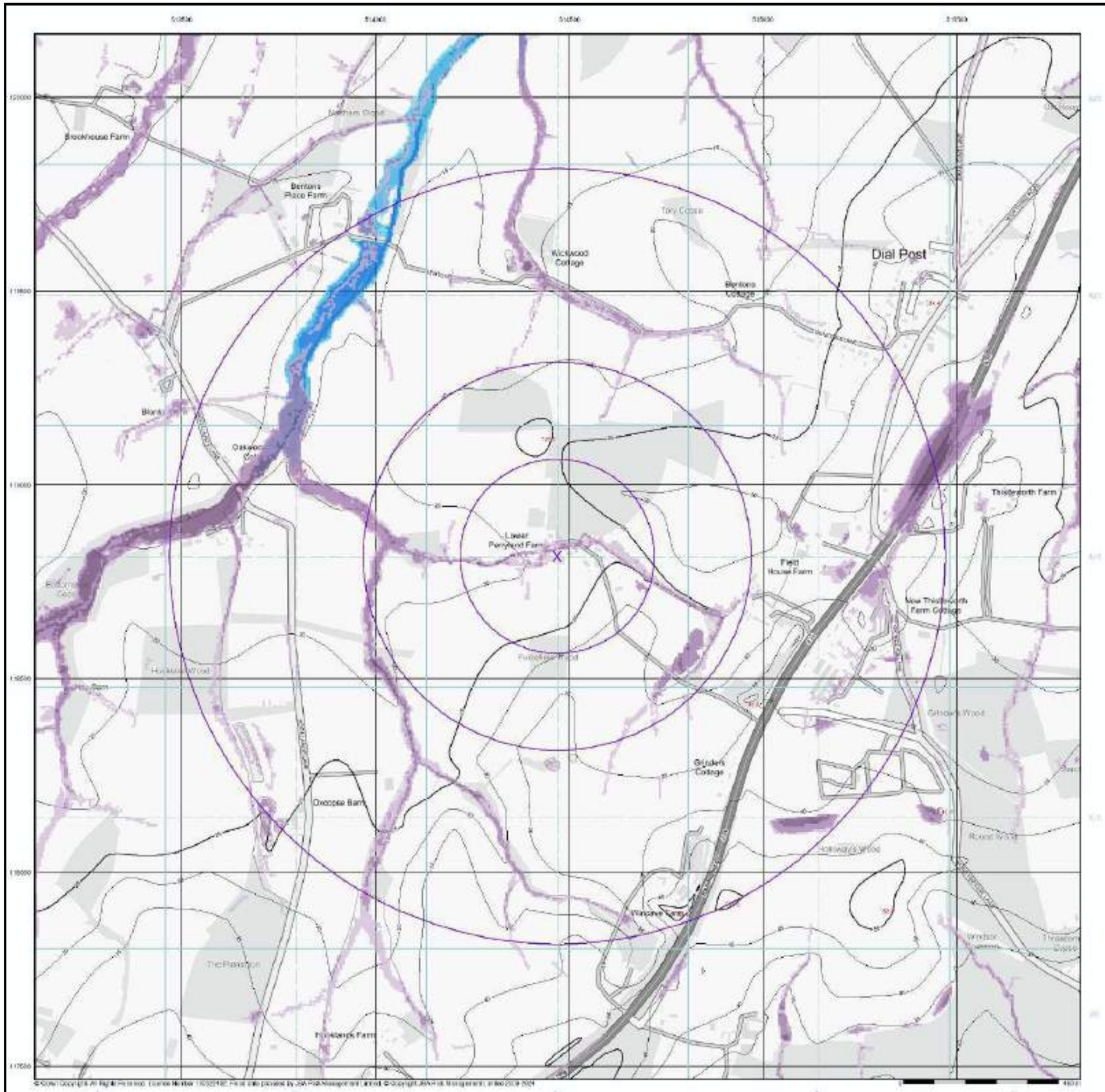


motion

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

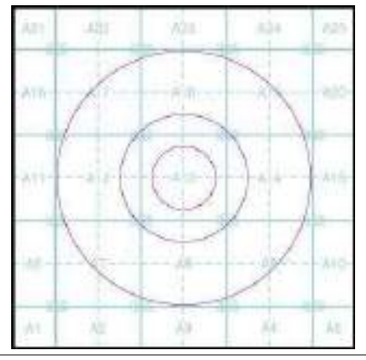
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
Mean Low Water
Mean High Water

JBA 1000 Year Return Flood Map (Undefended) - Slice A



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Order Details

Order Number:	345957711_1_1
Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

Landmark INFORMATION GROUP
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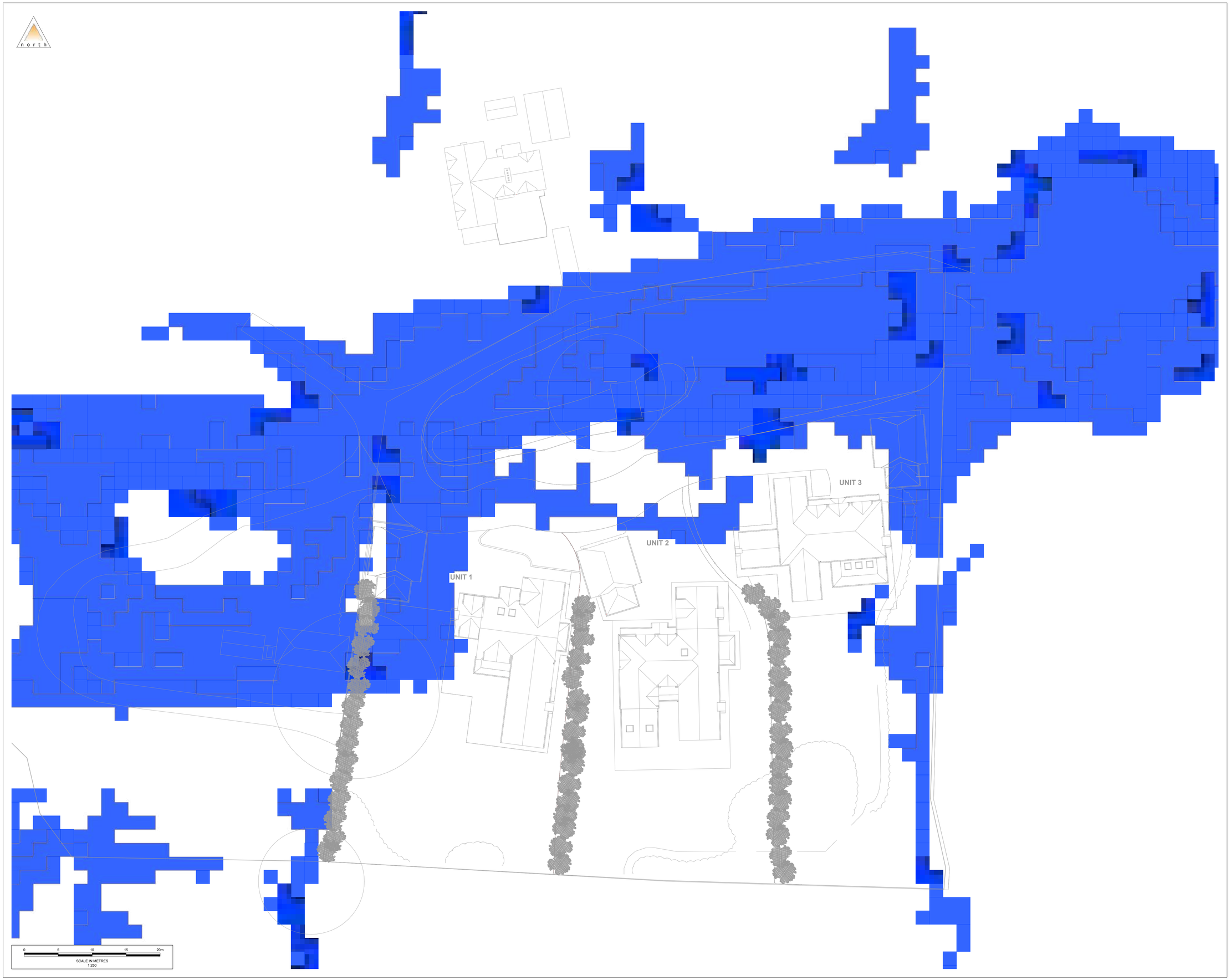
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix L

RoFSW Maps and Development Layout



Notes

1. This Drainage Strategy Plan is for planning purposes and does not constitute detailed designs and should not be used for construction purposes
2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
3. This drawing has been based upon survey supplied information and Motion cannot guarantee the accuracy of the data provided.
4. The drainage levels are based on existing levels, but also proposed levels where existing site features present unusual changes in gradient.
5. Any discrepancies should be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
6. This drawing should be read in conjunction with all other relevant engineering details, drawings and specification.
7. 350mm minimum cover is to be provided for private pipes laid in soft/paved areas, with 900mm minimum cover to be provided for private pipes laid beneath roads / driveways unless not practicable. Where unachievable, shallow pipe drains may require protection using concrete surround or paving slabs bridging the trench, subject to the NHBC Inspector's requirements.
8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.

Legend

Surface Water Flood Risk Area (All Return Periods)

Rev.	Description	Drn	Chk	App	Date
P01	First Issue	PA	PA	PA	04/08/2025

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

motion
Guildford - Reading - London
www.motion.co.uk

Client:
Church Barn Group

Project:
Lower Perrylands Farm

Title:
NaFRA2 Surface Water Flood Extents and Development Layout

Scale: 1:250 (@ A1)

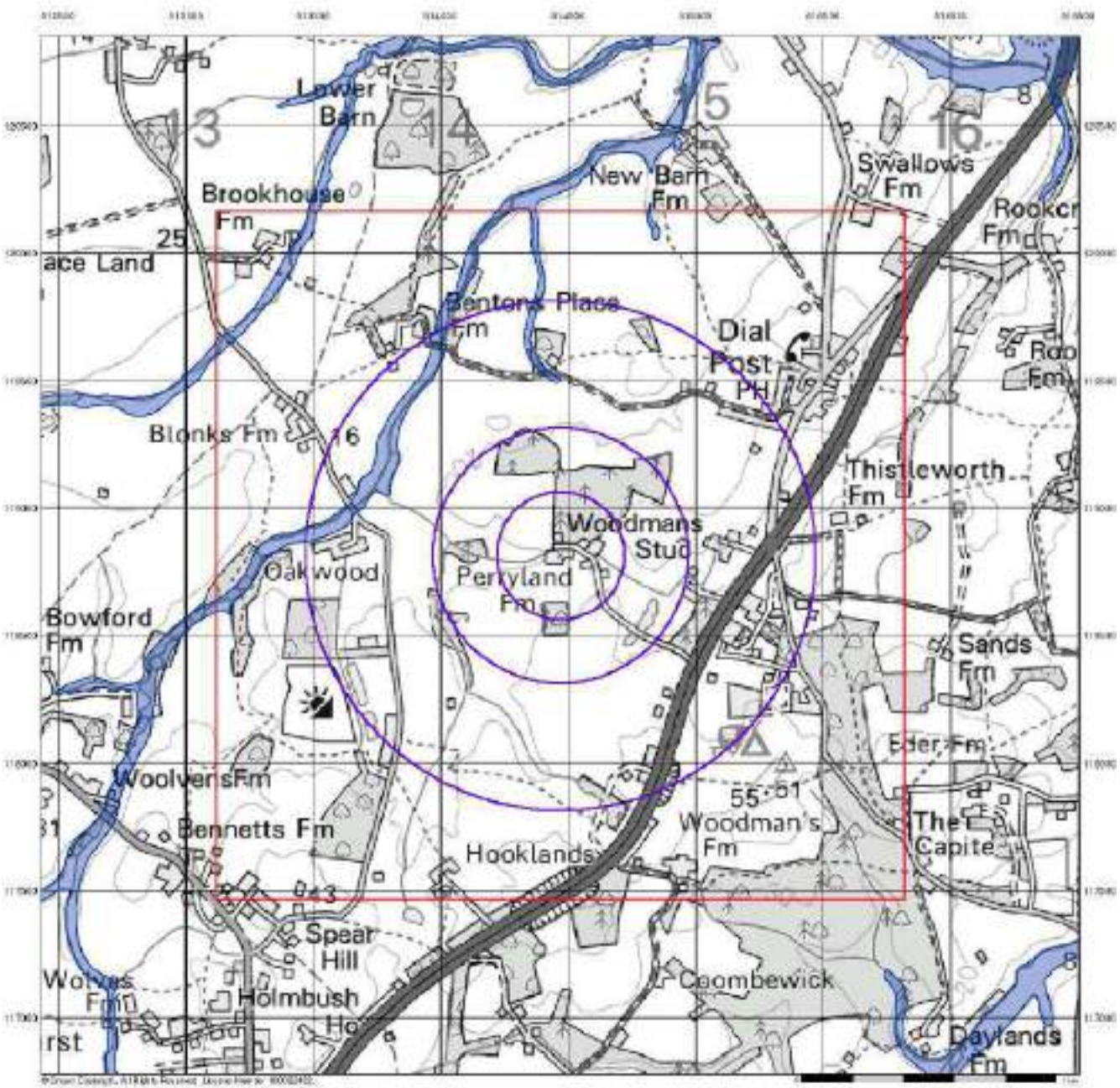
Drawing: 2503099-0400

Revision: P01

C:\Users\phallen\Motion\Staff\Site - Lec\6 2503099\Drawings\2503099-0400-P01-RoFSW Extents.dwg

Appendix M

Groundwater Flooding Susceptibility Mapping



motion

BGS Flood Data (1:50,000)

General

Specified City | Specified Rectangle | Bearing Relative to Point | Site | Map ID

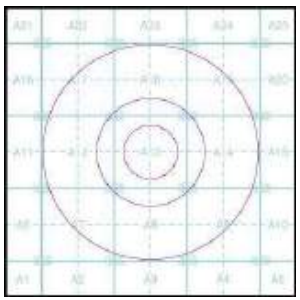
BGS Geological Indicators of Flooding

Coastal

Inland

Bodies of Water

BGS Flood Data Map - Slice A



Order Details

Order Number:	345957711_1_1
Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

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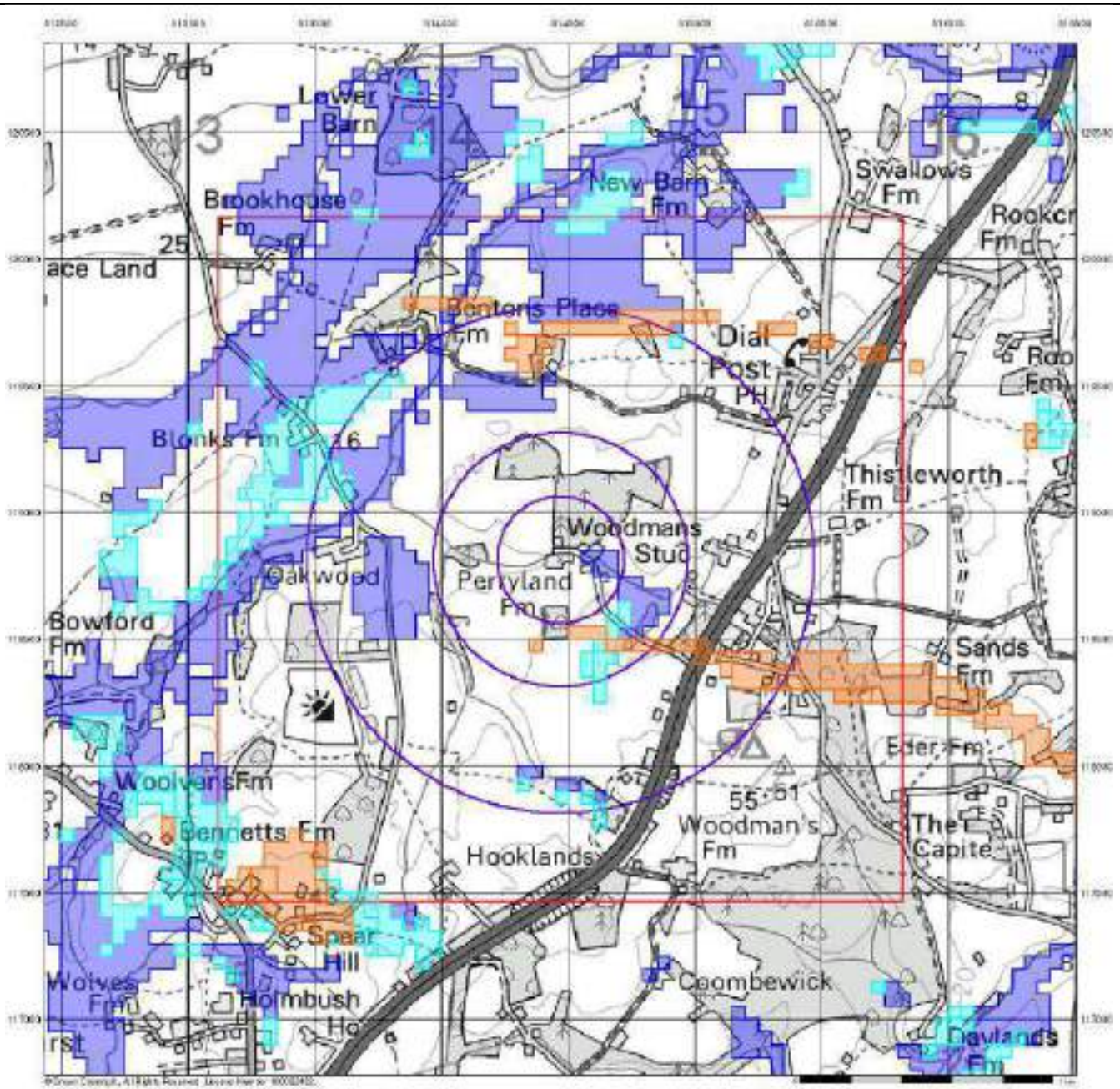
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



motion

BGS Flood Data (1:50,000)

General

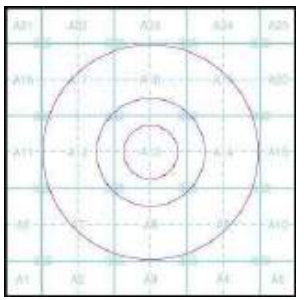
BGS Groundwater Flooding Susceptibility

Potential for Groundwater Flooding to Occur at Surface

Potential for Groundwater Flooding to Property Situated below Ground Level

Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

Order Number:	345957711_1_1
Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

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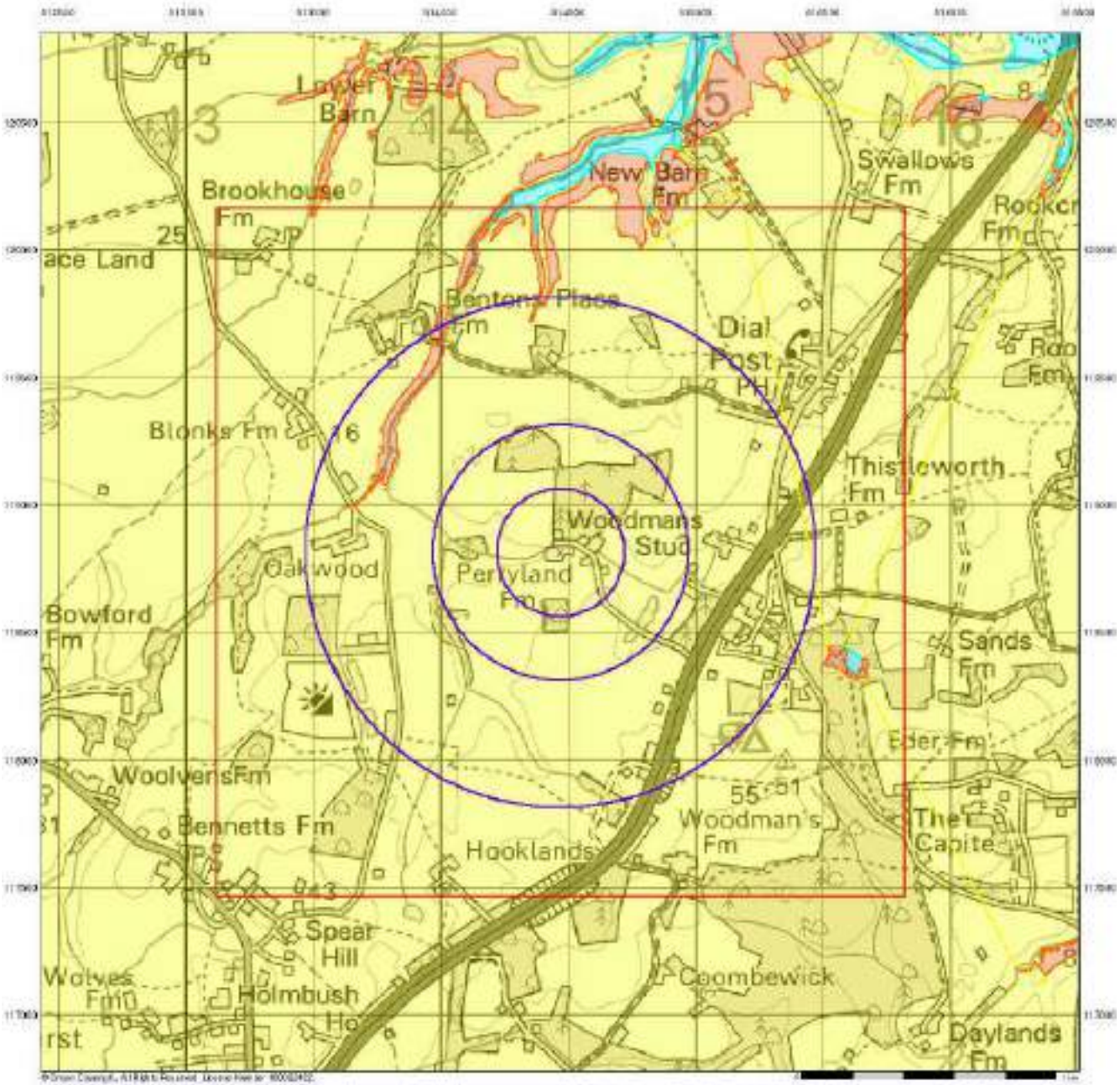


motion

GeoSmart Information Groundwater Flood Map (1:50,000)

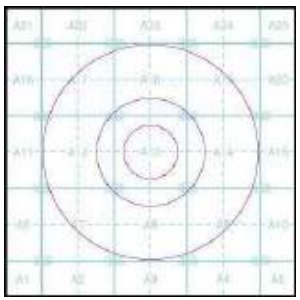
General

Specified Site | Specified Buffer(s) | Boreholes Proposed | Site

GeoSmart Information Groundwater Flooding Risk

High Risk | Moderate Risk | Low Risk | Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



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Order Details

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Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

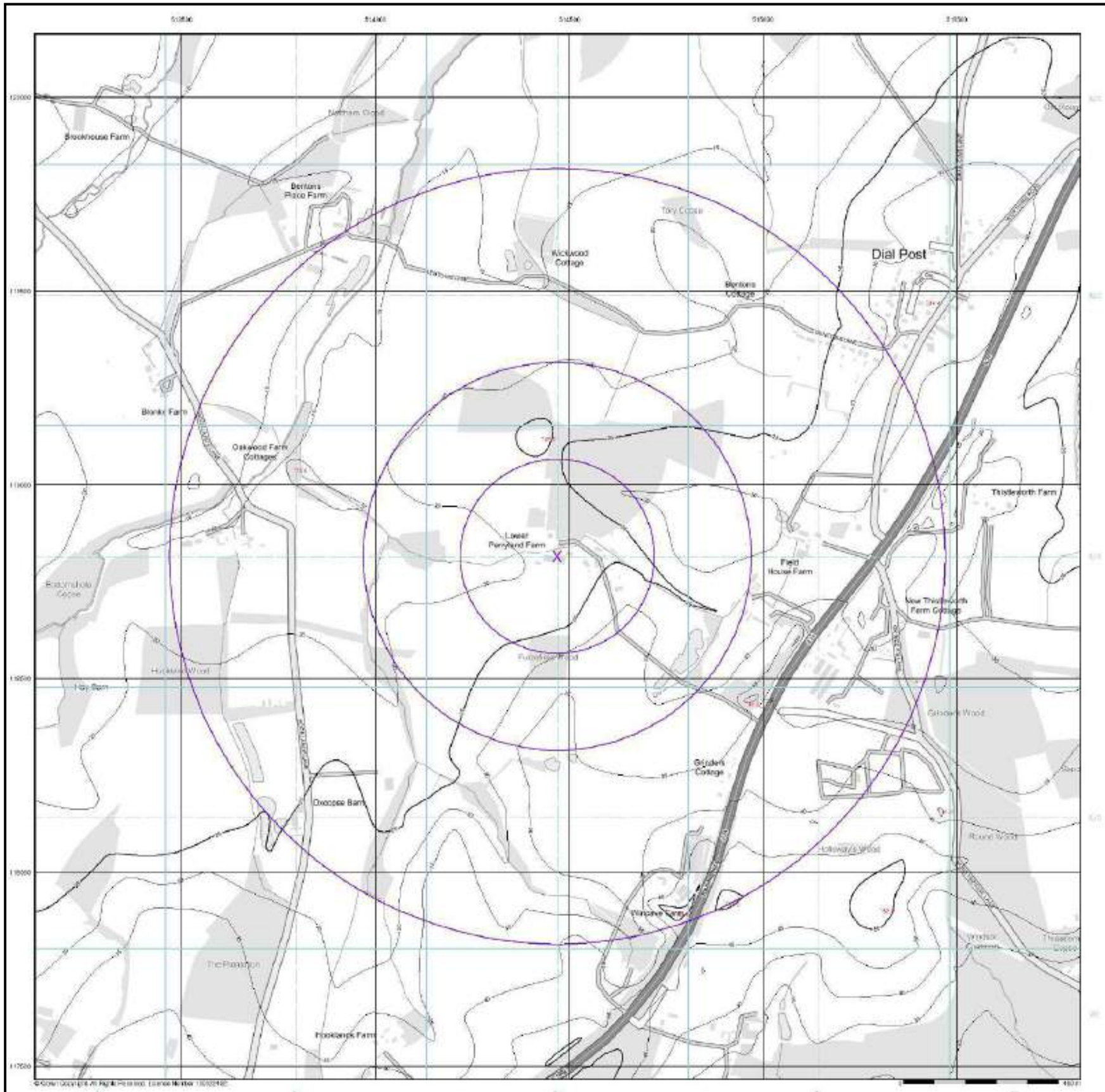
Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix N

Historic Flood Map



motion

EA/NRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Historic Flood Events Data

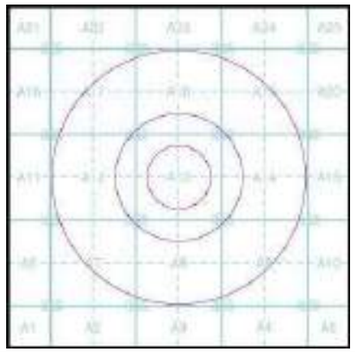
- Channel Capacity Exceeded (no raised defences)
- Channel Capacity Exceeded /Surface Water
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Historical Flood Liabilities
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Surface Water
- Unknown

Contours (height in metres)

Standard Contour 105
Master Contour 100 95
Spot Height *167.8

MLW Mean Low Water
MHW Mean High Water

EA/NRW Historic Flood Map - Slice A



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Order Details

Order Number:	345957711_1_1
Customer Ref:	1ecdia/2404035
National Grid Reference:	514470, 118820
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

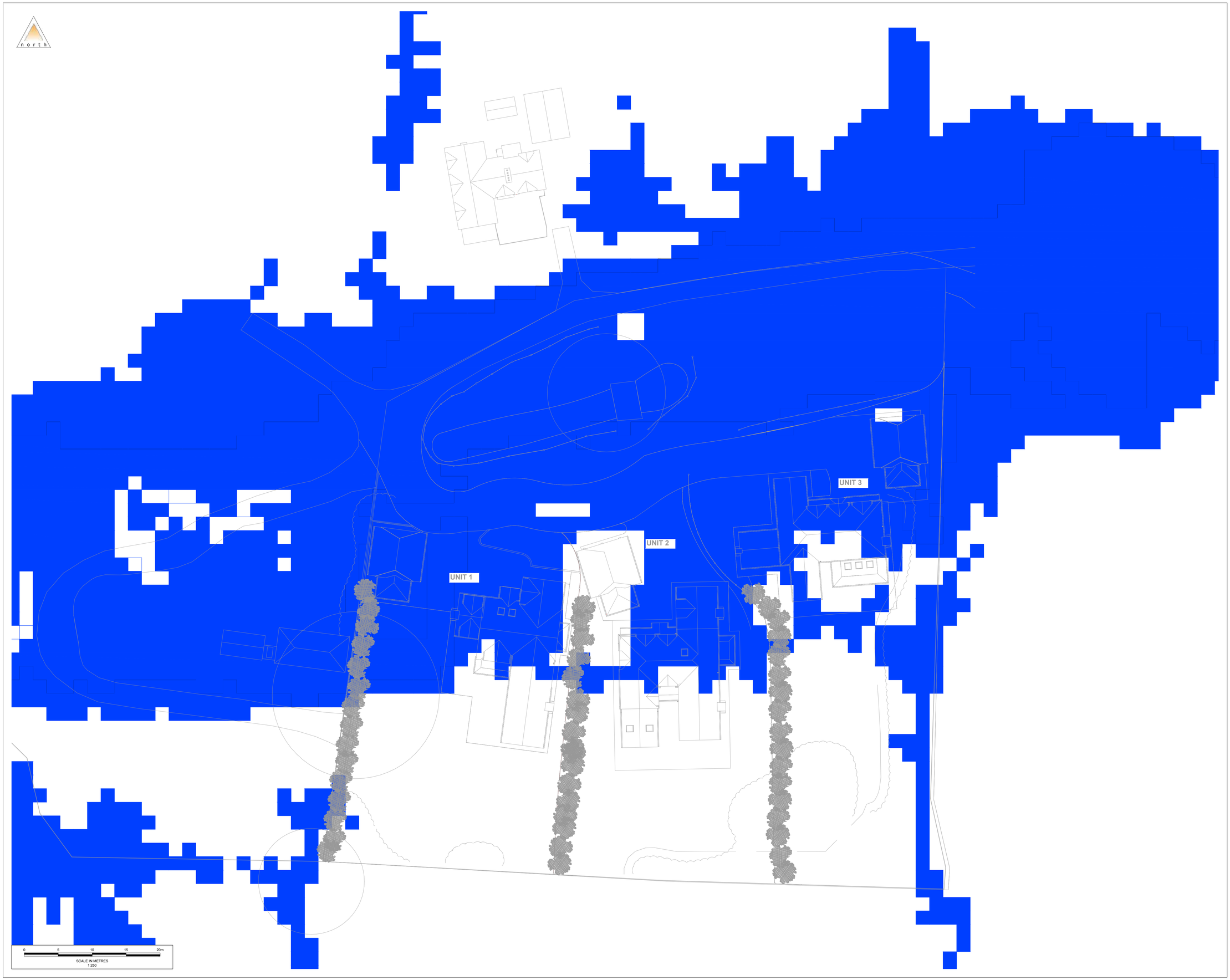
Site Details

Perrylands Farm, Dial Post, HORSHAM, RH13 8NT

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix O

RoFSW Maps + Climate Change and Development Layout



Notes

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2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
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8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.

Legend

Future Surface Water Flood Risk Area (All Return Periods)

Rev.	Description	Drn	Chk	App	Date
P01	First Issue	PA	PA	PA	04/08/2025

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

motion
Guildford - Reading - London
www.motion.co.uk

Client:
Church Barn Group

Project:
Lower Perrylands Farm

Title:
NaFRA2 Future Surface Water Flood Extents and Development Layout

Scale: 1:250 (@ A1)

Drawing: 2503099-0401

Revision: P01

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Appendix P

Impermeable Areas Plan

Residential dwellings and car ports = 0.101ha

Driveways and parking = 0.050ha

Patios and hardstanding = 0.042 ha

Revisions

No.	Description	Date	By
3	Revised Plans	02-07-2025	
2	Revised Plans	05-06-2025	
1	PLANNING	27-05-2025	

Notes:

GENERAL NOTES:

All dimensions & levels are preliminary and approximate and subject to utilities search, legal boundaries and detailed layouts/ design development through consultation.

Dimensions are to be checked on site by contractor & sub contractors prior to commencement of work, any discrepancies are to be highlighted immediately to the architects.

Scale 1 to 500

0 5 10 25 M

Scale: 1 : 500 @ A3

Project No. **504**

Project Name: **Perrylands,Dial Post**

N

Drawing Name: **Proposed Site Block Plan**

Drawing No. **P016**

Revision: **P3**

Suitability Description: **PLANNING**

Drawn: MS Checked: GF Orig Paper Size: A3

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Use figured dimensions only. All levels and dimensions to be checked. This drawing is to be read in conjunction with all other relevant drawings and specifications.

Appendix Q

QMED Calculation

FEH Mean Annual Flood

Input

QMED Method	2008	URBEXT (1990)	0.0000
Site Location	GB 514150 118800 TQ 14150 18800	SPRHOST	49.060
Area (ha)	0.193	BFIHOST	0.233
SAAR (mm)	813	FARL	1.000

Results

QMED Rural (l/s) 3.4 QMED Urban (l/s) 3.4

Appendix R

Drainage Strategy Layout

north

Pipe 2.002/2.003
1200mm x 800mm (w x h) PCC Box Culvert
L = 34.52
Volume = 32.069m³
Cover to PCC Box Culvert: 500mm (min)

Outfall 'Outfall'
Outfall to watercourse
CL: 19.740
IL: 19.127
Modeled as fully surcharged to
0.613m for 1,440-minutes

Pipe 2.004 L = 11.095
1500 1:31.6

Non-return valve

Manhole 4: Hydrobrake
Ref: MD-SHE-0086-3400-1100-2400
CL: 20.750
IL: 19.477
Design Flow: 3.4 l/s
Design Head: 1.100m

Pipe 4.001
L = 3.725
150Ø
1:17.2

'PP Unit 1' Outfall
Orifice [Ø41mm]
Design Flow: 2.4 l/s
Design Head: 0.48m

Node 'PP Unit 1'
Composite Permeable Paviours
Area: 150m²
CL: 21.000
IL: 20.420
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 39.800m³

S3
CL: 21.250
IL: 19.950

Pipe 2.001
L = 11.689
150Ø
1:30.8

Pipe 3.001
L = 2.714
150Ø
1.15.9

'PP Unit 2' Outfall
Orifice [Ø54mm]
Design Flow: 4.2 l/s
Design Head: 0.47m

Node 'PP Unit 2'
Composite Permeable Paviours
Area: 140m²
CL: 21.250
IL: 20.670
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 37.144m³

'PP Unit 3' Outfall
Orifice [Ø32mm]
Design Flow: 1.5 l/s
Design Head: 0.48m

Node 'PP Unit 3'
Composite Permeable Paviours
Area: 210m²
CL: 21.500
IL: 20.920
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 55.717m³

UNIT 1
UNIT 2
UNIT 3

0 5 10 15 20m
SCALE IN METRES
1:250

Notes

1. This Drainage Strategy Plan is for planning purposes and does not constitute detailed designs and should not be used for construction purposes
2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
3. This drawing has been based upon survey supplied information and Motion cannot guarantee the accuracy of the data provided.
4. The drainage levels are based on existing levels, but also proposed levels where existing site features present unusual changes in gradient.
5. Any discrepancies should be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
6. This drawing should be read in conjunction with all other relevant engineering details, drawings and specification.
7. 350mm minimum cover is to be provided for private pipes laid in soft/paved areas, with 900mm minimum cover to be provided for private pipes laid beneath roads / driveways unless not practicable. Where unachievable, shallow pipe drains may require protection using concrete surround or paving slabs bridging the trench, subject to the NHBC Inspector's requirements.
8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.

Legend

- Composite Permeable Paviours
- Surface Water Gravity Pipe
- Surface Water Manhole
- Porous Pavement Outfall with Orifice Plate
- Hydrobrake
- Non-return valve
- Headwall

Rev.	Description	Drn	Chk	App	Date
P01	First Issue	PA	PA	PA	04/08/2025

Drawing Status:
FOR PLANNING
NOT FOR CONSTRUCTION

motion
Guildford - Reading - London
www.motion.co.uk

Client:
Church Barn Group

Project:
Lower Perrylands Farm

Title:
Drainage Strategy Layout

Scale: 1:250 (@ A1)

Drawing: 2503099-0500
Revision: P01

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Appendix S

MicroDrainage Network Hydraulic Model Results

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 514150 118800 TQ 14150 18800
Data Type	Catchment
Maximum Rainfall (mm/hr)	550
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.166	4-8	0.016	8-12	0.006	12-16	0.005

Total Area Contributing (ha) = 0.193

Total Pipe Volume (m³) = 32.626

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	1.429	0.018	80.0	0.021	15.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	11.689	0.380	30.8	0.047	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	2.134	0.020	107.1	0.000	15.00	0.0	0.600	o	100	Pipe/Conduit	
3.001	2.714	0.171	15.9	0.065	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	103.50	15.03	20.938	0.021	0.0	0.0	0.0	0.86	6.8«	7.8
2.001	103.13	15.13	20.920	0.068	0.0	0.0	0.0	1.82	32.2	25.2
3.000	103.43	15.05	20.690	0.000	0.0	0.0	0.0	0.74	5.8	0.0
3.001	103.37	15.07	20.670	0.065	0.0	0.0	0.0	2.54	44.9	24.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.002	27.704	0.380	73.0	0.000	0.00	0.0	0.600	[]	4	Pipe/Conduit	
4.000	1.706	0.016	109.3	0.000	15.00	0.0	0.600	o	100	Pipe/Conduit	
4.001	3.725	0.217	17.2	0.060	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.003	6.816	0.093	73.0	0.000	0.00	0.0	0.600	[]	4	Pipe/Conduit	
2.004	11.055	0.350	31.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.002	102.73	15.25	19.950	0.133	0.0	0.0	0.0	3.92	3643.9	49.2
4.000	103.47	15.04	20.436	0.000	0.0	0.0	0.0	0.74	5.8	0.0
4.001	103.38	15.06	20.420	0.060	0.0	0.0	0.0	2.44	43.2	22.6
2.003	102.63	15.28	19.570	0.193	0.0	0.0	0.0	3.92	3643.9	71.5
2.004	102.28	15.38	19.477	0.193	0.0	0.0	0.0	1.80	31.8«	71.5

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	User	-	100	0.021	0.021	0.021
2.001	User	-	100	0.025	0.025	0.025
	User	-	100	0.007	0.007	0.033
	User	-	100	0.014	0.014	0.046
	User	-	100	0.001	0.001	0.047
3.000	-	-	100	0.000	0.000	0.000
3.001	User	-	100	0.014	0.014	0.014
	User	-	100	0.007	0.007	0.021
	User	-	100	0.029	0.029	0.050
	User	-	100	0.000	0.000	0.050
	User	-	100	0.000	0.000	0.051
	User	-	100	0.014	0.014	0.065
2.002	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.000	0.000	0.000
4.001	User	-	100	0.015	0.015	0.015
	User	-	100	0.026	0.026	0.041
	User	-	100	0.011	0.011	0.051
	User	-	100	0.007	0.007	0.059
	User	-	100	0.002	0.002	0.060
2.003	-	-	100	0.000	0.000	0.000
2.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.193	0.193	0.193

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
2.004	Outfall	19.740	19.127	0.000	0	0

Datum (m) 19.127 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
5	0.613	120	0.613	235	0.613	350	0.613	465	0.613	580	0.613	695	0.613	810	0.613
10	0.613	125	0.613	240	0.613	355	0.613	470	0.613	585	0.613	700	0.613	815	0.613
15	0.613	130	0.613	245	0.613	360	0.613	475	0.613	590	0.613	705	0.613	820	0.613
20	0.613	135	0.613	250	0.613	365	0.613	480	0.613	595	0.613	710	0.613	825	0.613
25	0.613	140	0.613	255	0.613	370	0.613	485	0.613	600	0.613	715	0.613	830	0.613
30	0.613	145	0.613	260	0.613	375	0.613	490	0.613	605	0.613	720	0.613	835	0.613
35	0.613	150	0.613	265	0.613	380	0.613	495	0.613	610	0.613	725	0.613	840	0.613
40	0.613	155	0.613	270	0.613	385	0.613	500	0.613	615	0.613	730	0.613	845	0.613
45	0.613	160	0.613	275	0.613	390	0.613	505	0.613	620	0.613	735	0.613	850	0.613
50	0.613	165	0.613	280	0.613	395	0.613	510	0.613	625	0.613	740	0.613	855	0.613
55	0.613	170	0.613	285	0.613	400	0.613	515	0.613	630	0.613	745	0.613	860	0.613
60	0.613	175	0.613	290	0.613	405	0.613	520	0.613	635	0.613	750	0.613	865	0.613
65	0.613	180	0.613	295	0.613	410	0.613	525	0.613	640	0.613	755	0.613	870	0.613
70	0.613	185	0.613	300	0.613	415	0.613	530	0.613	645	0.613	760	0.613	875	0.613
75	0.613	190	0.613	305	0.613	420	0.613	535	0.613	650	0.613	765	0.613	880	0.613
80	0.613	195	0.613	310	0.613	425	0.613	540	0.613	655	0.613	770	0.613	885	0.613
85	0.613	200	0.613	315	0.613	430	0.613	545	0.613	660	0.613	775	0.613	890	0.613
90	0.613	205	0.613	320	0.613	435	0.613	550	0.613	665	0.613	780	0.613	895	0.613
95	0.613	210	0.613	325	0.613	440	0.613	555	0.613	670	0.613	785	0.613	900	0.613
100	0.613	215	0.613	330	0.613	445	0.613	560	0.613	675	0.613	790	0.613	905	0.613
105	0.613	220	0.613	335	0.613	450	0.613	565	0.613	680	0.613	795	0.613	910	0.613
110	0.613	225	0.613	340	0.613	455	0.613	570	0.613	685	0.613	800	0.613	915	0.613
115	0.613	230	0.613	345	0.613	460	0.613	575	0.613	690	0.613	805	0.613	920	0.613

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
925	0.613	990	0.613	1055	0.613	1120	0.613	1185	0.613	1250	0.613	1315	0.613	1380	0.613
930	0.613	995	0.613	1060	0.613	1125	0.613	1190	0.613	1255	0.613	1320	0.613	1385	0.613
935	0.613	1000	0.613	1065	0.613	1130	0.613	1195	0.613	1260	0.613	1325	0.613	1390	0.613
940	0.613	1005	0.613	1070	0.613	1135	0.613	1200	0.613	1265	0.613	1330	0.613	1395	0.613
945	0.613	1010	0.613	1075	0.613	1140	0.613	1205	0.613	1270	0.613	1335	0.613	1400	0.613
950	0.613	1015	0.613	1080	0.613	1145	0.613	1210	0.613	1275	0.613	1340	0.613	1405	0.613
955	0.613	1020	0.613	1085	0.613	1150	0.613	1215	0.613	1280	0.613	1345	0.613	1410	0.613
960	0.613	1025	0.613	1090	0.613	1155	0.613	1220	0.613	1285	0.613	1350	0.613	1415	0.613
965	0.613	1030	0.613	1095	0.613	1160	0.613	1225	0.613	1290	0.613	1355	0.613	1420	0.613
970	0.613	1035	0.613	1100	0.613	1165	0.613	1230	0.613	1295	0.613	1360	0.613	1425	0.613
975	0.613	1040	0.613	1105	0.613	1170	0.613	1235	0.613	1300	0.613	1365	0.613	1430	0.613
980	0.613	1045	0.613	1110	0.613	1175	0.613	1240	0.613	1305	0.613	1370	0.613	1435	0.613
985	0.613	1050	0.613	1115	0.613	1180	0.613	1245	0.613	1310	0.613	1375	0.613	1440	0.613

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	100	Winter Storms	No
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 514150 118800 TQ 14150 18800	Cv (Winter)	0.840
Data Type	Catchment	Storm Duration (mins)	30

Online Controls for Storm

Orifice Manhole: PP Unit 3, DS/PN: 2.001, Volume (m³): 0.7

Diameter (m) 0.032 Discharge Coefficient 0.600 Invert Level (m) 20.920

Orifice Manhole: PP Unit 2, DS/PN: 3.001, Volume (m³): 0.7

Diameter (m) 0.054 Discharge Coefficient 0.600 Invert Level (m) 20.670

Orifice Manhole: PP Unit 1, DS/PN: 4.001, Volume (m³): 0.7

Diameter (m) 0.041 Discharge Coefficient 0.600 Invert Level (m) 20.420

Hydro-Brake® Optimum Manhole: 4, DS/PN: 2.004, Volume (m³): 13.9

Unit Reference	MD-SHE-0086-3400-1100-3400
Design Head (m)	1.100
Design Flow (l/s)	3.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	86
Invert Level (m)	19.477
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	3.4	Kick-Flo®	0.679	2.7
Flush-Flo™	0.326	3.4	Mean Flow over Head Range	-	3.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	0.800	2.9	2.000	4.5	4.000	6.2	7.000	8.1
0.200	3.3	1.000	3.3	2.200	4.7	4.500	6.6	7.500	8.3
0.300	3.4	1.200	3.5	2.400	4.9	5.000	6.9	8.000	8.6
0.400	3.4	1.400	3.8	2.600	5.1	5.500	7.2	8.500	8.9
0.500	3.3	1.600	4.0	3.000	5.4	6.000	7.5	9.000	9.1
0.600	3.1	1.800	4.3	3.500	5.8	6.500	7.8	9.500	9.3

Storage Structures for Storm

Complex Manhole: PP Unit 3, DS/PN: 2.001

Cellular Storage

Invert Level (m) 20.920 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	210.0	210.0	0.200	210.0	222.4	0.201	0.0	222.4

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.0
Max Percolation (l/s)	58.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	21.120	Cap Volume Depth (m)	0.250

Complex Manhole: PP Unit 2, DS/PN: 3.001

Cellular Storage

Invert Level (m) 20.670 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	140.0	140.0	0.200	140.0	149.6	0.201	0.0	149.6

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	14.0
Max Percolation (l/s)	38.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	20.870	Cap Volume Depth (m)	0.250

Complex Manhole: PP Unit 1, DS/PN: 4.001

Cellular Storage

Invert Level (m) 20.420 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Cellular Storage

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	150.0	150.0	0.200	150.0	160.0	0.201	0.0	160.0

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	41.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	20.620	Cap Volume Depth (m)	0.250

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
2.000	1	0.636	0.011	0.000	0.647
2.001	PP Unit 3	0.656	0.207	55.717	56.579
3.000	5	0.633	0.017	0.000	0.650
3.001	PP Unit 2	0.656	0.048	37.144	37.848
2.002	3	9.189	25.737	0.000	34.926
4.000	7	0.638	0.013	0.000	0.651
4.001	PP Unit 1	0.656	0.066	39.798	40.519
2.003	Junction/Saddle	0.000	6.332	0.000	6.332
2.004	4	8.998	0.195	0.000	9.194
Total		22.062	32.626	132.658	187.347

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 514150 118800 TQ 14150 18800	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 10, 30, 100
Climate Change (%)	0, 40, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	1	600 Summer	2	+0%	10/15 Summer				20.999
2.001	PP Unit 3	600 Summer	2	+0%	10/180 Summer				20.998
3.000	5	360 Summer	2	+0%	10/30 Summer				20.752
3.001	PP Unit 2	360 Summer	2	+0%	10/120 Summer				20.752
2.002	3	360 Summer	2	+0%					19.951
4.000	7	360 Summer	2	+0%	10/60 Summer				20.502
4.001	PP Unit 1	360 Summer	2	+0%	10/120 Summer				20.502
2.003	Junction/Saddle	480 Summer	2	+0%					19.843
2.004	4	480 Summer	2	+0%	2/15 Summer				19.843

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	1	-0.039	0.000	0.20			0.8	OK	
2.001	PP Unit 3	-0.072	0.000	0.02		440	0.5	OK	
3.000	5	-0.038	0.000	0.00			0.0	OK	
3.001	PP Unit 2	-0.068	0.000	0.06		180	1.4	OK	
2.002	3	-0.799	0.000	0.00			1.9	OK	
4.000	7	-0.034	0.000	0.00			0.0	OK	
4.001	PP Unit 1	-0.068	0.000	0.03		228	0.9	OK	
2.003	Junction/Saddle	-0.527	0.000	0.00			2.7	OK*	
2.004	4	0.216	0.000	0.11			3.1	SURCHARGED	

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 514150 118800 TQ 14150 18800	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 10, 30, 100
Climate Change (%)	0, 40, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	1	480 Summer	10	+40%	10/15 Summer				21.089
2.001	PP Unit 3	480 Summer	10	+40%	10/180 Summer				21.089
3.000	5	240 Summer	10	+40%	10/30 Summer				20.848
3.001	PP Unit 2	240 Summer	10	+40%	10/120 Summer				20.848
2.002	3	480 Summer	10	+40%					20.146
4.000	7	360 Summer	10	+40%	10/60 Summer				20.598
4.001	PP Unit 1	360 Summer	10	+40%	10/120 Summer				20.598
2.003	Junction/Saddle	480 Summer	10	+40%					20.146
2.004	4	480 Summer	10	+40%	2/15 Summer				20.147

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	1	0.051	0.000	0.49			1.9	SURCHARGED	
2.001	PP Unit 3	0.019	0.000	0.03		512	0.8	SURCHARGED	
3.000	5	0.058	0.000	0.00			0.0	SURCHARGED	
3.001	PP Unit 2	0.028	0.000	0.09		156	2.4	SURCHARGED	
2.002	3	-0.604	0.000	0.00			3.1	OK	
4.000	7	0.062	0.000	0.00			0.0	SURCHARGED	
4.001	PP Unit 1	0.028	0.000	0.05		264	1.4	SURCHARGED	
2.003	Junction/Saddle	-0.224	0.000	0.00			3.7	OK*	
2.004	4	0.520	0.000	0.12			3.4	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 514150 118800 TQ 14150 18800	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 10, 30, 100
Climate Change (%)	0, 40, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	1	360 Winter	30	+40%	10/15 Summer				21.160
2.001	PP Unit 3	360 Winter	30	+40%	10/180 Summer				21.159
3.000	5	240 Summer	30	+40%	10/30 Summer				20.942
3.001	PP Unit 2	240 Summer	30	+40%	10/120 Summer				20.942
2.002	3	480 Summer	30	+40%					20.375
4.000	7	360 Summer	30	+40%	10/60 Summer				20.689
4.001	PP Unit 1	360 Summer	30	+40%	10/120 Summer				20.689
2.003	Junction/Saddle	480 Summer	30	+40%					20.370
2.004	4	480 Summer	30	+40%	2/15 Summer				20.373

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	1	0.122	0.000	0.50			2.0	SURCHARGED	
2.001	PP Unit 3	0.089	0.000	0.03		474	1.0	SURCHARGED	
3.000	5	0.152	0.000	0.01			0.0	SURCHARGED	
3.001	PP Unit 2	0.122	0.000	0.12		168	3.0	SURCHARGED	
2.002	3	-0.375	0.000	0.00			3.4	OK	
4.000	7	0.153	0.000	0.00			0.0	SURCHARGED	
4.001	PP Unit 1	0.119	0.000	0.06		282	1.7	SURCHARGED	
2.003	Junction/Saddle	0.000	0.000	0.00			4.3	SURCHARGED*	
2.004	4	0.746	0.000	0.12			3.4	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 514150 118800 TQ 14150 18800	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 10, 30, 100
Climate Change (%)	0, 40, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	1	360 Winter	100	+45%	10/15 Summer				21.340
2.001	PP Unit 3	360 Winter	100	+45%	10/180 Summer				21.339
3.000	5	240 Summer	100	+45%	10/30 Summer				21.203
3.001	PP Unit 2	240 Summer	100	+45%	10/120 Summer				21.203
2.002	3	480 Winter	100	+45%					20.741
4.000	7	360 Summer	100	+45%	10/60 Summer				20.940
4.001	PP Unit 1	360 Summer	100	+45%	10/120 Summer				20.941
2.003	Junction/Saddle	720 Winter	100	+45%					20.370
2.004	4	480 Winter	100	+45%	2/15 Summer				20.737

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	1	0.302	0.000	0.64			2.5	FLOOD RISK	
2.001	PP Unit 3	0.269	0.000	0.05		504	1.4	FLOOD RISK	
3.000	5	0.413	0.000	0.06			0.2	FLOOD RISK	
3.001	PP Unit 2	0.383	0.000	0.17		172	4.3	FLOOD RISK	
2.002	3	-0.009	0.000	0.00			4.3	OK	
4.000	7	0.404	0.000	0.03			0.1	FLOOD RISK	
4.001	PP Unit 1	0.371	0.000	0.08		552	2.5	FLOOD RISK	
2.003	Junction/Saddle	0.000	0.000	0.00			4.9	SURCHARGED*	
2.004	4	1.110	0.000	0.12			3.4	FLOOD RISK	

Appendix T

Southern Water Foul Flow Modelling Criteria

Developer Services

Foul Sewerage Modelling Criteria:

Southern Water continues to review its modelling procedures and design standards. Our current update on the impact of a new development on the public sewer network is as below:

Item			
Development Size – Number of units	N		
Per Capita Flow -Litres/ head / day	G	125	(see note 4)
Infiltration – Percentage	I	10	(see note 5)
Occupancy – Persons/Dwelling	O	2.4	(see notes 6 & 7)
Dry Weather Flow multiplier (PF - Peaking Factor) (SD –Storm Duration– minutes)		SD	PF
		30 to 240	2.5
		240 to 480	2.0
		Above 480	1.4
Allowance for misconnected surface water		1.4 Square Metres per Dwelling (see note 8)	
Population – Number of people	P	N x O	

Hence: Design flow = (PF + 0.1) PG (foul flow element) plus the impact of 1.4 x N sq. m. (allowance for misconnected surface water)

Note that the above criteria applies subject to:

1) Only to the case of new domestic foul flow.

2) No proposed discharge of surface water into the foul sewer.

3) Southern Water supports the Hierarchy of H3 of Building Regulations with regards to the disposal of Surface Water.

4) Compliance with G2 of Building Regulations; that reasonable provision must be made by the installation of fittings and fixed appliances that use water efficiency for the prevention of undue consumption of water.

5) That upstream sewers are designed and constructed with materials and method fully compliant with Sewers for Adoption and Southern Water published addendum and corrigendum, in order to ensure that the infiltration of groundwater is minimised to the low rate of 10% of base flow.

Southern Water

6) That unless we are advised otherwise, we will assume the occupancy rate of 2.4 persons per property to be appropriate and in accordance with survey data that Southern Water has for development within its area.

7) Should the makeup of development be known and advised to Southern Water, with regards to the number of 1-bedroom, 2-bedroom units etc. then the modelling can be revised on the basis of:

   - Number of bedrooms + 1, as the occupancy for each unit type.

   - This level of information may not be available for initial Capacity Check assessments and in this case the default figure of 2.4 persons/dwelling is considered appropriate.

8) Should the density of the development be known, (where development density is calculated based on the number of expected new addresses divided by the area of the proposed site development) and advised to Southern Water, then the allowance for misconnected surface water can be adjusted to the following:

Development Density (Properties / 4Ha)	Misconnected surface water allowance m^2/property
<=100	2.1
120	1.6
140	1.1
180	0.6
>=200	0.3

   Flats, housing association, and commercial property addresses will have no misconnected surface water allowance applied.

9) With regards to the allowance for misconnected surface water, reference is made to published guidance or studies including LASOO, CIRIA, DEFRA, and UKWIR.

10) With regards to any proposed pumped flow rates.

   - For the hydraulic design of pumping stations (and associated rising mains) we are guided by Sewers for Adoption and in the case of Edition 7, by clauses D4.6 and D5.3.1.

   - This has a range of velocity of discharge in the rising main between 0.75 to 1.8 m/s, when the pump is operating. Our preference would be for a higher velocity than the minimum.

   - If however the discharge is by gravity, then we would seek flows within the pipe capacity and self cleansing range.

Appendix U

Drainage Management and Maintenance Plan

Lower Perrylands Farm
Dial Post, West Sussex

Drainage Management and Maintenance Plan

For

Church Barn Group

motion

Document Control Sheet

Lower Perrylands Farm

Dial Post, West Sussex

Church Barn Group

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
04/08/2025	Final A	Phil Allen MCIWEM C.WEM	Neil Jaques

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Contents

1.0 Introduction

1.1 This document sets out the principles for the long-term management and maintenance of the proposed surface water drainage system on the Lower Perrylands Farm development.

1.2 The purpose of this document is to ensure that the site management company or their agents have a robust inspection and maintenance plan going forwards. This ensures the optimum operation of the surface water drainage system and that it will be continually maintained for the lifetime of the development. This will contribute to reducing the risk of surface water flooding both on- and off-site.

1.3 All those responsible for maintenance should follow relevant health and safety legislation for all activities listed within this report (including lone working, if relevant). Method statements and risk assessments should always be undertaken and made available, if requested.

1.4 This document has been produced by Motion on behalf of their client, Church Barn Group. This document describes the typical management and maintenance tasks that are known at the design stage (maintenance frequencies and typical tasks, for example). These have been drawn from industry guidance such as CIRIA C753 - The SuDS Manual – and manufacturer's own guidance.

1.5 Maintenance is considered as a construction activity under the CDM Regulations 2015. Under the CDM Regulations, it is a requirement that a competent person be appointed to carry out a required role. CDM defines a competent person as an individual with sufficient knowledge of the specific tasks to be undertaken, as well as sufficient experience and ability to carry out their duties in relation to the task in a way that secures health and safety on site.

1.6 In recognition of the requirements of the CDM Regulations 2015, this surface water management and maintenance plan expects that the maintenance work will be carried out by a competent person who must have prior knowledge of the drainage components and SuDS systems on site.

1.7 There are limitations on what this document can prescribe at this time. At this stage this document cannot name the specific individuals who will carry out the maintenance and what equipment is to be used. Related to this, this document is unable to provide method statements for exactly how maintenance practices will be carried out. These can only be determined at the time of the maintenance being carried out and the exact maintenance need. Therefore, this is to be the responsibility of the site management company and/or the individuals carrying out the work. We urge those who are carrying out the maintenance to record this information and make it available to the Local Planning Authority (LPA), if required to do so. This drainage management and maintenance plan needs to be a living document that is owned and maintained by the adopting site management company.

2.0 Maintenance Categories

2.1 There are three categories of maintenance activities referred to in this report. These are:

Regular maintenance (including inspections and monitoring)

- Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including inspections, vegetation management, and litter, silt and debris removal.

Occasional maintenance

- Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

Remedial maintenance

- Remedial maintenance comprises of intermittent tasks that may be required to rectify faults associated with the system. The likelihood of faults can be minimised by correct installation, regular inspection and timely maintenance. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events and, as such, timings are difficult to predict.
- This document should be read in conjunction with the design drawings of the drainage system, so that the location and type of each feature can be recognised and understood.

3.0 The Drainage System Components

Surface water

3.1 The proposed surface water drainage system is made up of a number of components. These include:

- Water Butts
- Pipes/Culverts
- Manholes
- Composite Permeable Paviours
- Catchpit manholes/silt traps
- Orifice Flow Controls
- A Hydrobrake

3.2 All components should be installed in accordance with the manufacturer's instructions and to the levels/arrangement as defined on the designer's drawings. Not doing so will invalidate any warranty provided by the manufacturer.

3.3 All maintenance and cleaning must be carried out in accordance with manufacturer's recommendations and by competent and suitably qualified staff, as defined in the CDM regulations 2015.

Foul Water

3.4 It is proposed to discharge the foul sewage from the development to a Klargester BioDisc BF (or similar approved) sewage treatment plant, which will discharge treated foul effluent to the ordinary watercourse on the site.

4.0 General Maintenance Principles

4.1 All surface water drainage systems, whether piped gravity systems, Sustainable Drainage Systems (SuDS), or flow control devices and pumps, require regular maintenance to keep them working at optimum efficiency and capacity. The maintenance of the surface water drainage system on the Lower Perrylands Farm development should be carried out alongside other regular maintenance tasks on site.

4.2 Timely and adequate maintenance will increase the lifespan of all the drainage components. Inadequate maintenance will do the reverse. Therefore, the projected lifespan and anticipated replacement date of each drainage component cannot be forecast at the time of this document being produced.

4.3 The site management company and/or their agents are responsible for the maintenance of the surface water drainage system.

4.4 Construction activities can create and discharge significant quantities of sediment that will quickly clog the surface water drainage system. Therefore, construction-stage sediment removal is required immediately post-construction. This may require several cleans of the system during the first year after installation. The construction site manager should assess this and carry out cleaning as necessary.

4.5 Catchpit manholes/silt traps will be specified upstream of the permeable paving. They will remove gross solids and the majority of silts. It is important that any debris build-up in the catchpit manholes/silt traps is removed at regular intervals. This will reduce the risk of the permeable paving becoming silted up. It will maintain its design capacity and function.

4.6 Cleaning should also take place after large storms when there have been increased surface water flows and visible entrainment and deposition of debris.

4.7 An increased frequency of inspection and maintenance should be programmed into the autumn and winter months in acknowledgement that:

- Leaf fall from deciduous trees in autumn will result in an increased amount of leaf litter and an elevated blockage risk of drainage infrastructure.
- Increased rainfall during winter months will result in greater quantities of water moving through the drainage system and a greater input of silt and other debris.

4.8 Table 4.1, one the next page, gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken. Section 5 – Inspection and Maintenance Frequency of Components – will assign typical maintenance frequencies and tasks to the specific components used within the surface water drainage system used on the Lower Perrylands Farm development.

Table 4.1 - Typical maintenance tasks and frequencies

Activity	Indicative Frequency	Typical Tasks
Routine/regular maintenance	Monthly to annually	„ Litter picking „ Silt removal „ Inspection of all inlets, outlets and control structures „ Weed removal and invasive plant control
Occasional maintenance	Annually up to 25 years	„ Silt control around components „ Vegetation management around components „ Sweeping of pavement areas to remove surface silt „ Silt removal from catchpits, cellular storage structures
Remedial maintenance	As required	„ Inlet/outlet repairs „ Erosion repairs „ Reinstatement of edgings „ Reinstatement following pollution „ Removal of silt build-up and leaf litter after storms „ Repair of vandalism „ Replacement of any blocked filter „ membranes/materials

5.0 Inspection and Maintenance Frequency of Components

5.1 Table 5.1 below lists each of the components used within the site's surface water drainage system. It suggests an indicative maintenance frequency for each component and ascribes typical maintenance tasks to them.

5.2 This list is not exhaustive, nor is it prescriptive. As mentioned in Section 3, additional, unscheduled maintenance may be required following adverse weather conditions or after autumn leaf falls. Additional maintenance tasks may be required to adequately clean and maintain individual components.

5.3 The list of components should be cross-referenced with the designer's drawings so that the location of each component can be identified.

5.4 It is the responsibility of the site management company and/or their agents to ensure that all necessary maintenance activities are carried out in a timely manner and that the design performance of each drainage component is preserved.

5.5 If there is any uncertainty regarding the correct and safe methods of cleaning, or what equipment should be used, the manufacturer should be consulted.

Table 5.1 - Maintenance Frequency and Task for Drainage Components

Activity	Indicative Frequency	Anticipated Tasks
Water Butts	Annually in Autumn to Winter	„ Remove falling leaves and seeds from guttering or those that have found their way into the water butt. „ Water may stagnate slightly. If so, use a water butt cleaning disc into the tank. „ In autumn and winter, drain water off every 10 days (or less) to make sure that water butts don't overflow and that water is kept moving. This will stop larvae and flies from using the water butt. „ Use safe products such as vinegar to clean the outside of the tank and the inside of the lid and be careful not to contaminate water with chemicals. „ At least once a year, completely empty the water butt and scrub it out with warm soapy water and then rinse thoroughly. This is best done at a time when the water butt is already nearly empty (end of summer) or when it can readily refill (winter).
Pipes	As required	„ Identify any pipes that may not be operating properly and employ a competent, qualified contractor to inspect using CCTV. „ If the pipe is blocked with silt or debris, the pipe should be jetted clean from an upstream access point. All silt and debris should be captured and removed at a downstream access point. „ Inspect once clean. „ If any other defects are encountered (cracks, displaced joints, root ingress), appropriate solutions should be discussed with a

		competent and qualified contractor. These services are usually provided by the same companies that offer CCTV surveys and pipe jetting services.
Manholes	Annually	„ Inspect/identify any damage or areas that are not operating correctly „ Remove silt, litter, leaves and other detritus. „ Inspect once clean.
Catchpit Manholes/Silt Traps	Twice a year, before and after autumn/winter	„ Inspect/identify any damage or areas that are not operating correctly „ Remove silt, litter, leaves and other detritus. „ Inspect once clean.
Hydrobrake chamber	Every three months for the first year, then annually thereafter	„ Contact manufacturer for instruction on approved and safe inspection and maintenance practices. „ Inspect Hydrobrake and check functionality. Remove any detritus as required. „ Inspect once clean.
Orifice Flow Controls	Every 3 – 6 months.	„ Orifice plates have no moving parts to fail and quality units are made of stainless steel to resist scour, degradation and chemical attack. „ The orifice plates in this scheme are to be downstream of the permeable paviours, so all contributing flows should be heavily filtered and free of any debris. „ Debris and silt should be removed if present. „ Check wear on orifice to ensure no enlargement is taking place. „ Any visible fixing bolts should be checked. „ If there is a suspected blockage, the housing chamber can be inspected internally, the blockage cleared and the orifice returned to its working position.
Composite Permeable paving	Once a year after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.	„ Agitate surface by means of mechanical sweeping or vacuuming to ensure no vegetation or moss is allowed to establish and grow in the joints. „ Mechanical sweeping of paviours and refilling of joints with the correct aggregate need only be carried out at intervals of 5 years or so „ Remove weeds from the surface through the application of glyphosate-based weed killers „ Stabilise and mow contributing and adjacent areas. „ Inspect once clean. „ See Table 20.15 of CIRIA C753 for more information. „ Permeable paving has a nominal 25-year lifespan, if correctly and regularly maintained. „ When subjected to low level oil drips permeable paviours can continue to biodegrade hydrocarbons indefinitely.

		„ Major oil spills have the potential to contaminate the surface and the underlying crushed stone. In the event of a major oil spill, the area of block paviours and crushed stone that is affected should be removed, cleaned and reinstalled.
Geocellular Attenuation Tanks	Annually	„ Contact manufacturer for instruction on approved and safe inspection and maintenance practices. „ Inspect/identify any areas that are not operating correctly. „ Remove debris from catchment surface. „ Remove sediment from pre-treatment structures. „ Check for silt build-up and flush and remove as required (in accordance with manufacturer's instructions). „ Inspect once clean. „ See Table 21.3 of CIRIA C753 for more information. „ Most geocellular units have a 60-year creep limited life expectancy, so they should be planned for replacement by 2075 (approx.).

5.6 Upon completion of maintenance activities, a record should be kept of the work carried out. This should be retained, and an annual maintenance report should be compiled, which should include the following:

- „ Observations resulting from inspections
- „ Maintenance and operation activities undertaken during the year
- „ Recommendations for inspections and maintenance programmes for the following year

5.7 On the last page of this document is a table with suggested information should be recorded and included with the maintenance plan. As mentioned in the introduction to this document, this should be a living document and regularly updated, as required.

5.8 The site's foul water drainage system is proposed to include a sewage treatment plant, which will have its own specific maintenance and inspection requirements. What these will be typically be are presented, with recommendations, below, so that the sewage treatment plant can be responsibly owned and maintained in perpetuity.

5.9 This drainage management and maintenance plan recommends that the manufacturer of the sewage treatment plant, are employed to service, desludge and repair the sewage treatment plant to ensure that all works meet the minimum environmental and British Standards.

5.10 The proper management and performance monitoring of the sewage treatment plant begins with the installation and specification of each unit. The sewage treatment plant should be installed exactly as per the manufacturer's specification.

5.11 Sewage treatment plants are typically fitted with a control panel and alarm beacon, which issue an immediate alert when a problem occurs such as the unit experiencing a loss of rotation. The control panel and alarm beacon must also be installed correctly and be in a publicly accessible and observable location.

5.12 In addition to emergency maintenance, responsible use of the sewage treatment plant is required, as well as a routine maintenance and inspection programme. These are discussed, individually, below.

Responsible Use of the Sewage Treatment Plant

5.13 Sewage treatment plants use colonies of live natural micro-organisms (biomass) to break down pollutants in domestic sewage. Many chemicals found in the household can inhibit or kill these micro-organisms, particularly if they are used in excessive amounts. Users of the sewage treatment plant must observe the below advice to ensure that the biomass is not killed.

5.14 Generally speaking, all common household cleaning fluids are acceptable, provided they are used in accordance with the manufacturer's instructions and prescribed concentrations. The most commonly used cleaning fluids are discussed below.

5.15 Washing machine and dishwasher detergents are generally suitable to use in the normal concentrations and usage. Problems can occur if an excess use of biological detergents are used, which can cause degradation of the biomass. Non-biological washing detergents without enzymes may be substituted.

5.16 Floor cleaners, disinfectants and bleaches are safe to use in accordance with the manufacturer's directions for use and in the minimum necessary concentration. Neat drain cleaners, disinfectant or bleach should not be poured down the sink or outside gullies.

5.17 Waste disposal units do not inhibit the micro-organisms, but, depending on use, they can present the treatment plant with considerable extra load. An excess of solids will fill up the storage capacity of the settlement tank requiring more frequent desludging, thus should be avoided. Users are advised to compost vegetable peelings, etc. as it is a cheaper and more environmentally friendly solution.

5.18 The following must not be discharged into the drains:

- Motor oil, grease, anti-freeze, brake fluid, etc.
- Cooking oil and fat.
- Weed-killers, insecticides, fungicides and other gardening chemicals.
- Acid based brick/stone cleaners.
- Chemical drain cleaners.
- Paint, thinners, white spirit, turpentine, creosote, etc.
- Medicines: Take unused medicines to a pharmacist for safe disposal.
- Photographic developing fluids.
- Nappies, sanitary towels, rags, soft toys, tennis balls etc.

Routine Maintenance and Inspection

5.19 Regular mechanical and electrical servicing should be performed by service engineers on an annual basis to ensure that the sewage treatment plant continues to be non-polluting and efficiently process wastewater.

5.20 A record of service and maintenance visits should be kept in or alongside the table at the end of this report.

5.21 Routine de-sludging and servicing are also vital to a sewage treatment plant ongoing operation and efficiency and should be carried out in accordance with the guidelines.

5.22 Under section 85 of the 1991 Water Sources Act, if a sewage treatment plant fails and discharges effluent into the environment, it is an offence. Therefore, there is a legal requirement to effectively manage the pollution risk a wastewater system poses to the environment. Having a sewage treatment plant emptied

regularly by a licensed waste carrier ensures that the effluent is being properly disposed of, whilst remaining legally compliant.

5.23 The service engineers should tanker and desludge the sewage treatment plant as part of the service. The service engineers will dispose of sewage waste safely and effectively.

Summary

5.24 The above information sets out the measures that must be taken and signed up to by the site management company and the residents to ensure that the sewage treatment plant is regularly inspected, emptied and maintained.

5.25 Therefore, this report has provided all the necessary information, specifications and allocated the responsibilities that are required to ensure that the sewage treatment plant will be properly and regularly maintained in perpetuity, while fulfilling the legal requirement to effectively manage the pollution risk a wastewater system poses to the environment.

Date	Component requiring maintenance	Issues prompting maintenance	Scheduled maintenance (Y/N)	Maintenance carried out	Additional works required (Y/N). If yes, please detail	Next scheduled date of inspection and maintenance

Appendix V

Exceedance Plan

north

Pipe 2.002/2.003
1200mm x 800mm (w x h) PCC Box Culvert
L = 34.52
Volume = 32.069m³
Cover to PCC Box Culvert: 500mm (min)

Outfall 'Outfall'
Outfall to watercourse
CL: 19.740
IL: 19.127
Modeled as fully surcharged to
0.613m for 1,440-minutes

Pipe 2.004
1500
31.6

Non-return valve

Manhole 4: Hydrobrake
Ref: MD-SHE-0086-3400-1100-2400
CL: 20.750
IL: 19.477
Design Flow: 3.4 l/s
Design Head: 1.100m

Pipe 2.001
L = 11.689
150Ø
1:30.8

S3
CL: 21.250
IL: 19.950

'PP Unit 3' Outfall
Orifice [Ø32mm]
Design Flow: 1.5 l/s
Design Head: 0.48m

Pipe 4.001
L = 3.725
150Ø
1:15.9

Pipe 3.001
L = 2.714
150Ø
1.15.9

UNIT 1

UNIT 2

UNIT 3

'PP Unit 1' Outfall
Orifice [Ø41mm]
Design Flow: 2.4 l/s
Design Head: 0.48m

'PP Unit 2' Outfall
Orifice [Ø54mm]
Design Flow: 4.2 l/s
Design Head: 0.47m

Node 'PP Unit 1'
Composite Permeable Paviours
Area: 110m²
CL: 21.000
IL: 20.420
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 39.800m³

Node 'PP Unit 2'
Composite Permeable Paviours
Area: 140m²
CL: 21.250
IL: 20.670
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 37.144m³

Node 'PP Unit 3'
Composite Permeable Paviours
Area: 210m²
CL: 21.500
IL: 20.920
Total Depth 0.580m
Porous Aggregate Depth: 0.250m
Porous Aggregate Porosity: 30%
Geocellular crate depth 200mm
Total Att'n Depth: 450mm
Total Att'n Volume : 55.717m³

0 5 10 15 20m
SCALE IN METRES
1:250

Notes

1. This Drainage Strategy Plan is for planning purposes and does not constitute detailed designs and should not be used for construction purposes
2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
3. This drawing has been based upon survey supplied information and Motion cannot guarantee the accuracy of the data provided.
4. The drainage levels are based on existing levels, but also proposed levels where existing site features present unusual changes in gradient.
5. Any discrepancies should be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
6. This drawing should be read in conjunction with all other relevant engineering details, drawings and specification.
7. 350mm minimum cover is to be provided for private pipes laid in soft/paved areas, with 900mm minimum cover to be provided for private pipes laid beneath roads / driveways unless not practicable. Where unachievable, shallow pipe drains may require protection using concrete surround or paving slabs bridging the trench, subject to the NHBC Inspector's requirements.
8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.

Legend

- Composite Permeable Paviours
- Surface Water Gravity Pipe
- Surface Water Manhole
- Porous Pavement Outfall with Orifice Plate
- Hydrobrake
- Non-return valve
- Headwall

Rev.	Description	Drn	Chk	App	Date
P01	First Issue	PA	PA	PA	04/08/2025

Drawing Status:
FOR PLANNING
NOT FOR CONSTRUCTION

motion
Guildford - Reading - London
www.motion.co.uk

Client:
Church Barn Group

Project:
Lower Perrylands Farm

Title:
Drainage Strategy Layout

Scale: 1:250 (@ A1)

Drawing: 2503099-0500
Revision: P01

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