WATERWAY DRAINAGE ENGINEERING

DRAINAGE STRATEGY REPORT

High House Farm

Whitehaven

Cumberland

CA28 9RB

October 2025
2025-064
Rev A

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APPENDICES

1.0 INTRODUCTION

Waterway Drainage Engineering (WDE) have been instructed to undertake a Surface and Foul Water Drainage Strategy, in accordance with the National Planning Policy Framework (NPPF), for the proposed erection of 5 dwellings at High House Farm, Whitehaven. CA28 9RB.

The purpose of this report is to provide a strategy to manage surface and foul water flows from the site, in support of the planning application, while fulfilling the requirements of the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA).

2.0 PLANNING POLICY

NPPF footnote 55 states that:

"NPPF footnote 50 states that "a site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use."

Paragraph 165 reads "Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

a) take account of advice from the lead local flood authority.
b) have appropriate proposed minimum operational standards.
c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
d) where possible, provide multifunctional benefits."

A major development, as per The Town and Country Planning Order 2015, is partly, but not wholly, categorised as development involving the provision of dwellinghouses where the number of dwellinghouses to be provided is 10 or more and a development carried out on a site having an area of 1 hectare or more.

The Cumbria Minerals and Local Waste Plan – Strategic Flood Risk Assessment (June 2018) references the same criteria for local planning policy.

The site is therefore not to be classed as a major development under the above criteria due to the proposals having fewer than 10 dwellings.

3.0 PLANNING POLICY IN SITE CONTEXT

The site covers 0.282 ha of previously agricultural farm buildings and associated land, and according to the most recent Environment Agency (EA) flood risk maps, lies entirely within Flood Zone 1. The Flood Map for Planning is located within *Appendix A* of this report for reference.

Table 3 in the National Planning Policy Framework (NPPF) technical guidance (Flood Risk Vulnerability Classification) assesses the flood risk vulnerability of a site based on its site operations. Based on this assessment and the proposed site operations it has been concluded that the site falls within the category of 'more vulnerable'.

Using the Sequential Test set out in the NPPF, more vulnerable development uses are permitted in Flood Zones 1 (refer to *Figure 1* below), and therefore the development site will comply with planning policy and pass the Sequential Test.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	X	Exception Test Required	✓
Zone 3b Functional Floodplain	Exception Test Required	✓	X	X	X

Figure 1: Sequential Test Table for Suitable Development

4.0 SITE PLAN

The proposed development is located within an existing agricultural farm to the south Whitehaven, Cumberland; as shown within *Figure 2*. The location details of the proposals are detailed below:

- National Grid Reference:
  - Easting 297368
  - Northing 545642

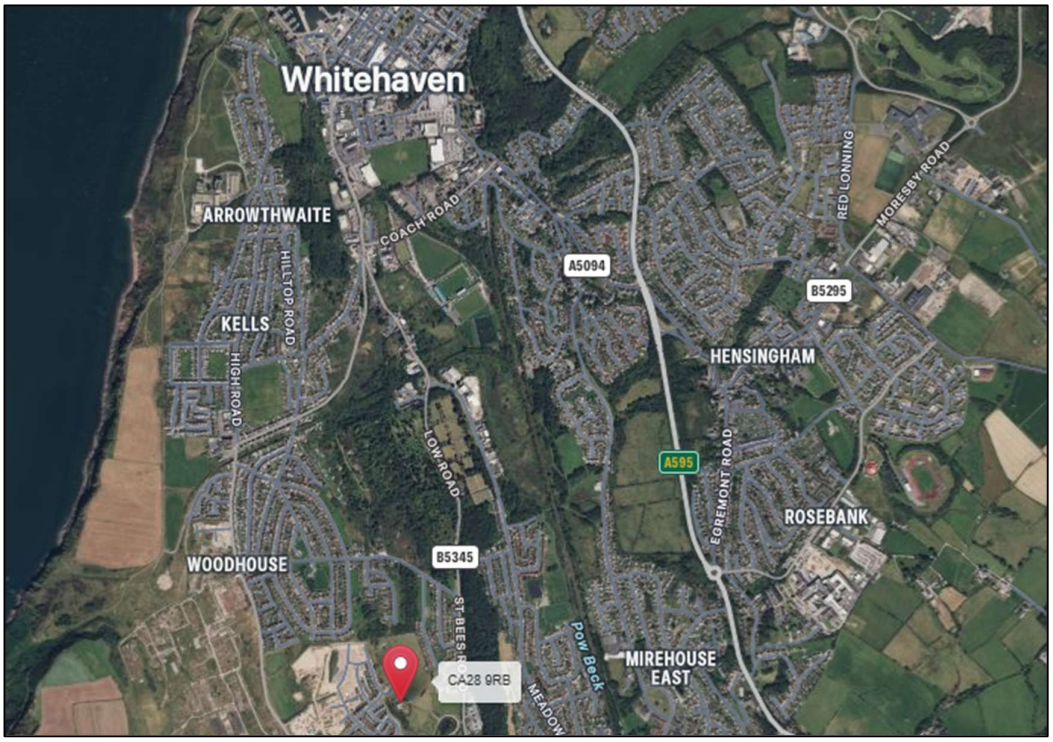

Figure 2: Proposed Development Location Plan

5.0 DEVELOPMENT DESCRIPTION

The proposed development will utilise an existing access onto the adopted highway network from High House Farm onto Gameriggs Road, Whitehaven. The topography of the site is generally sloping from a highpoint on the western boundary (approx. 86.00 m AOD) to the low point in the south eastern corner (approx. 80.00 m AOD).

The site is 0.282 ha in land area. The proposed development impermeable areas are split as follows:

- Dwellings = 0.102 ha
- Carriageway = 0.069 ha
- Greenspace = 0.111 ha

6.0 PERMEABILITY AND SOIL PROFILE

British Geological Survey (BGS) and Land Information Systems (LandIS) mapping services have been used determine the following land make-up:

- Bedrock: Pennine Middle Coal Measures Formation - Mudstone, siltstone and sandstone.
- Soil: Soilscape 6 – Freely draining slightly acid loamy soils

7.0 CURRENT FOUL AND SURFACE WATER DRAINAGE PROVISION

7.1 Existing watercourses

There are no ordinary watercourses which flow through, or along the boundary of the proposed development site at High House Farm. It is noted that an open ordinary watercourse frows west to east approximately 43m south west of the site.

7.2 Combined surface and foul water

A foul sewer network is located to the north east of the proposed development site flowing downstream towards Gameriggs Road.

The United Utilities Map of the locations of the adopted sewerage network are illustrated within *Appendix B*. An extract of the mapping is shown within *Figure 3* below.

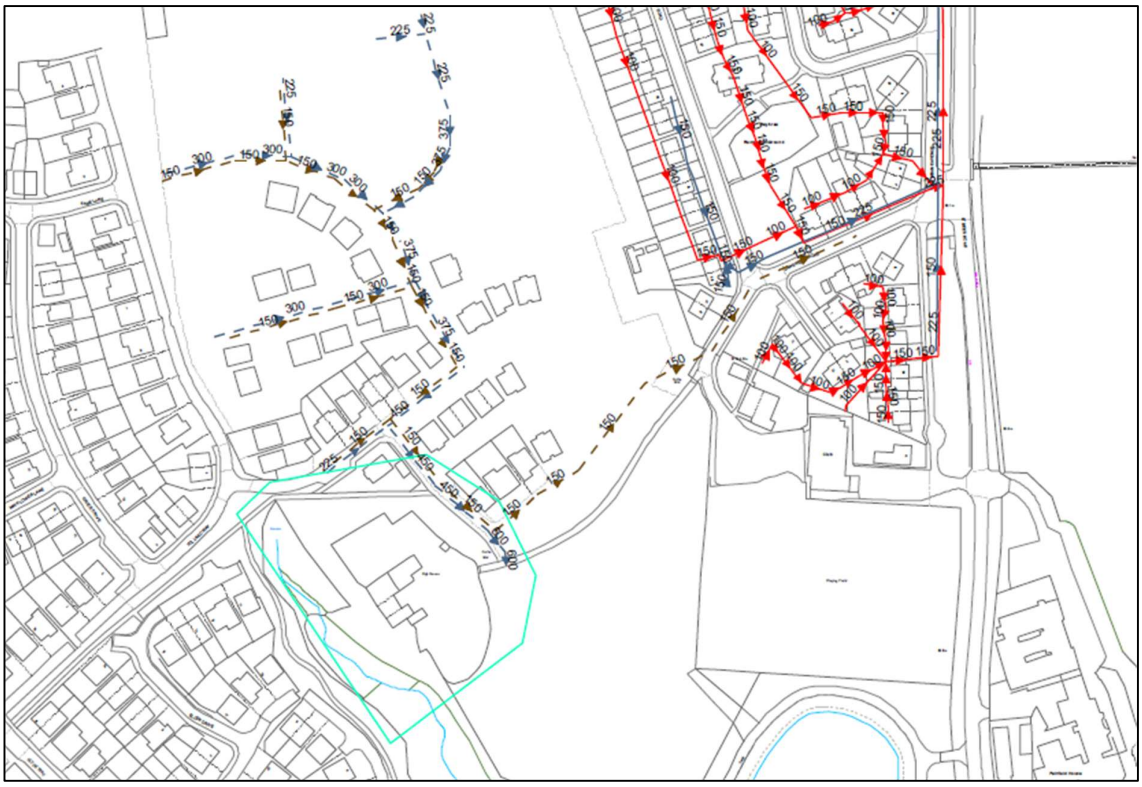

Figure 3: Extract from United Utilities Mapping

8.0 SURFACE WATER DRAINAGE STRATEGY

The aim of the strategy is to provide a design which will avoid, reduce, and delay the discharge of surface water flows into public sewers and watercourses. This will aid in the protection of watercourses but will also ensure that no knock-on effects are seen beyond the site and that the risk of localised flooding and pollution within the site are reduced as far as possible.

To satisfy these criteria, surface water flows shall be subject to assessment via the hierarchy of drainage in accordance with the LASOO Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance. The hierarchy is as follows:

Hierarchy options:

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

The drainage strategy for the site is to be developed using the first level on the above hierarchy for the following reasons:

1. Drain into the ground (infiltration)

It is proposed to discharge surface water through a below ground infiltration soakaway. This will ensure that drainage will be achieved as close to source as possible, therefore limiting any change to on-site flow paths and that there is no increased risk of flooding beyond the site boundaries.

Attenuation will be provided on site to accommodate storm events up to and including a 6 hour 1 in 100 year plus 50% to account for climate change storm event. A hydrobrake will be used on site to discharge surface water into the soakaway at the Greenfield Runoff Rate of 2.3 l/s. For reference, the greenfield runoff rate calculations are located within *Appendix C*.

Tit is noted that the discharge rates are to be confirmed through infiltration testing to be undertaken on site in accordance with the BRE 365 method.

9.0 PROPOSED SURFACE WATER DRAINAGE DESIGN

In accordance with the earlier mentioned hierarchy of drainage options, the system has been designed to utilise attenuation crates discharging into the ground via infiltration to offer the best solution for surface water drainage.

As per the LASOO guidance, the design is required to prevent flooding to any part of the site for storms up to and including the 1:30yr rainfall event, while any exceedance for the 6 hour 1:100yr event should be controlled within the site and should not flood any properties or service areas.

In this case, infiltration crates will allow for storage systems to be sized to store the full 1:100yr events without any overland flow or above ground storage prior to disposal into the ground.

The proposed surface water drainage design is located within *Appendix D*.

9.1 Consideration of SuDS components

A range of SuDS components are available and have been considered for use. Their applicability to the site has been addressed below:

- Rainwater harvesting – Suitable for use on the site, however there is no guarantee the systems will be able to capture flows if already at capacity from previous events. Discounted for site flow calculations.
- Green roofs – Suitable for use on the site. However, due to the nature of the properties and low volume control potential, these have been discounted for inclusion within the site flow calculations.
- Soakaways –Viable for use on Site.
- Water butts – Suitable for use but their effectiveness is dependent on homeowner maintenance which cannot be enforced. Discounted for site flow calculations.
- Permeable paving – Viable on Site.
- Swales – Not considered due to their large land uptake.
- Filter drains – Viable on Site.
- Detention basins – Not required due to large land uptake.
- Ponds/wetlands –. Not required due to large land uptake.
- Underground closed storage crate/tank systems/oversized pipes – Viable on Site.

9.2 Climate change

Environment Agency guidance issued in 2022 estimates that peak rainfall intensity will increase due to climate change over the next 100 years. There is therefore an allowance of 50% attributed to the 30yr and 100yr storm event calculations in line with the Upper End estimate of rainfall increases for small and urban catchments.

9.3 Exceedance Routes

For rainfall events with a return period more than 100 years, surface flooding of open spaces such as landscaped areas is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from the proposed dwellings to the north east and avoid creating hazards for access and egress routes.

The proposed surface water scheme allows for an exceedance route away from the proposed dwellings and towards the south east of the site towards the ordinary watercourse. Outfall manholes are also to be fitted with high level overflows to mitigate against the risk of surface water exceeding onto the surface.

9.4 Percentage impermeability (PIMP)

All impermeable areas are modelled as 100% PIMP. This will allow for sufficient capacity for all hardstanding areas to be positively drained.

9.5 Volumetric Runoff Coefficient (Cv)

Industry standard Cv values vary for summer and winter and account for water volumes which do not enter the drainage system i.e., that is lost through infiltration, depression storage, evaporation, initial wetting etc. Standard values are 0.75 for summer and 0.84 for winter.

9.6 Surface water quality

In the absence of statutory requirements and prescriptive standards, The SuDS Manual provides best industry practice for assessing the pollutant potential of developments and providing mitigation methods to increase run off water quality using SuDS components.

The simple index approach has been utilised here to assess the pollutant hazard indices and proposed treatment components. Note, this has been carried out in conjunction with the above SuDS component suitability assessment for the site.

Table 26.2 from The SuDS Manual below outlines the pollution hazard indices for different land uses.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 4: SuDS Manual Table 26.2 Pollution hazard indices

This development is to be classed as a mix of 'Very low' and 'low' risk land uses due to the presence of residential roofs and individual property driveways.

This level of risk suggests the following level of pollution control:

Land use	Suspended solids	Metal	Hydrocarbons
Residential roofs	0.2	0.2	0.05
Driveways	0.5	0.4	0.4

Table 26.4 from the SUDS Manual, shown below, details pollution mitigation indices for various SUDS components when discharging to groundwater.

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Figure 5: SuDS Manual Table 26.4 SuDS Mitigation Indices

Given the small size of the development and the low risk land use, a balanced view of risk versus reward should be pursued to ensure that while pollution risks are minimised, there are not onerous requirements imposed.

The highest risk elements, albeit still categorised as low, originate from the residential roofs and driveways. It is proposed to incorporate infiltration soakaways on site to manage the surface water on site. The soakaway mitigation is shown below to exceed the potential risk factors and is therefore deemed satisfactory.

	Suspended solids	Metal	Hydrocarbons
Pollution Hazard	0.5	0.4	0.4
Infiltration Soakaway (trench)	0.4	0.4	0.4
Soil with Contaminant Attenuation Pollution	(0.4 x 0.5) = 0.2	(0.3 x 0.5) = 0.15	(0.3 x 0.5) = 0.15
Suitability	Acceptable	Acceptable	Acceptable

10.0 MAINTENANCE

All components shall be maintained in accordance with the relative requirements shown in the SuDS Manual. These intervals should be deemed as a minimum frequency and reference should also be made to the manufacturers guidance to ensure all components are maintained correctly.

10.1 Soakaways

Maintenance Schedule	Required Action	Minimum Frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters or downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill. If performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require the reconstruction of the soakaway)	As required
Monitoring	Inspect silt traps and nore rate of sediment accumulation	Monthly in the first year then annually
	Check soakaway to ensure emptying is occurring	Annually

Figure 6: Typical soakaway operation and maintenance requirements

11.0 FOUL WATER DRAINAGE STRATEGY

All foul water from the proposed 5 dwellings are to be connected into the adopted sewerage network to the north east of the proposed development Site.

A plan of the proposed foul water drainage network is shown in *Appendix D*.

12.0 MANAGEMENT

All separate surface and foul water drainage systems within the site are proposed to remain private and be maintained by a newly formed management company.