WATERWAY DRAINAGE ENGINEERING

DRAINAGE STRATEGY REPORT

Land to the South of Southrigg

Nethertown Road

St Bees

Cumberland

CA27 0AY

April 2025
2025-030
Rev A

CONTENTS

APPENDICES

1.0 INTRODUCTION

Waterway Drainage Engineering (WDE) have been instructed to undertake a Foul and Surface Water Drainage Strategy, in accordance with the National Planning Policy Framework (NPPF), for the proposed erection of 5 wooden camping pods on land to the south of Southrigg, Nethertown Road, St Bees, Cumbria. CA27 0AY.

The purpose of this report is to provide a strategy to manage surface 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 to be classed as a minor development under the above criteria due to the proposals having fewer than 10 dwellinghouse.

3.0 PLANNING POLICY IN SITE CONTEXT

The site covers 0.69 ha of greenfield 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 on an existing area of greenfield land to the south of South Rigg, Nethertown Road, St Bees as shown on red line bordered plan in Figure 1. It should be noted that a previously approved development (4/23/2086/0B1) is located to the northwest of the development site and consists of 3 detached dwellings. The previously approved development is illustrated within *Figure 1* in white. In addition, a further two dwellings were approved under the application number 4/23/2100/0R1 with the location of the plots highlighted within *Figure 1* in blue.

Figure 1: Location Plan

The location details of the proposals are detailed below:

- land south of Southrigg, Nethertown Road, St Bees, Cumbria. CA27 0AY National Grid Reference: Eastings 297255 Northings 510873

5.0 DEVELOPMENT DESCRIPTION

The proposed development will utilise a previously approved shared access created off the adopted highway network (Nethertown Road), leading to five wooden camping pods. The existing ground is generally open grassed landscape, currently used for grazing land. The development splits a green field and covers approximately 0.69ha. The topography of the site is generally sloping from a highpoint on the eastern boundary of the site (approx. 48.412m AOD) to the low point adjacent to Nethertown Road in the northwest corner (approx. 37.343m AOD).

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: St Bees Sandstone
- Superficial drift: Glaciofluvial deposits, Devensian – Sand and gravel
- Soil: Soilscape 6 – Freely draining slightly acidic loamy soils.

This soilscape is similar to that observed during trial hole excavations which show a 300-600mm topsoil generally underlain by gravely, cobbled sand becoming larger boulders.

Three trial pits were dug to a depth of 1m below ground level to determine the infiltration rate of the ground at the location of the proposed dwellings. These tests were carried out in accordance with the guidance in document BRE 365 Soakaway Design.

The infiltration testing results are shown in *Appendix B* along with the locations of the testing holes on site.

7.0 CURRENT SURFACE WATER DRAINAGE PROVISION

7.1 Existing watercourses

There are no open watercourse features within the site, with the nearest one being Pow Beck running north to south approximately 227m beyond the western site boundary. To access this beck from the site would require routes across greenfield, highways, residential plots and the Cumbrian Coastline railway and is not seen as a feasible route.

7.2 Existing combined sewer

There are no existing United Utilities (UU) owned sewer systems present on the site. There are no UU sewer assets shown close to the site; however, there is an existing private foul system running from the adjacent site along Nethertown Road to the north and connecting into the existing adopted UU combined sewer network. This private sewer connection was approved under planning application 4/21/2369/0R1. The invert level of the closest private manhole on the previously installed system is 36.350m AOD.

The United Utilities search records are shown in *Appendix C*.

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)

The site has been shown through trial hole excavation and percolation tests to be suitable for infiltration. As such, soakaways will be utilised for the discharge of surface water on site. Attenuation will also be provided on site to accommodate storm events up to and including a 6 hour 1 in 100 years plus 50% to account for climate change storm event.

The Causeway Flow calculations demonstrating the attenuation can be safely accommodated on site are located within *Appendix D*.

9.0 PROPOSED SURFACE WATER DRAINAGE DESIGN

In accordance with the earlier mentioned hierarchy of drainage options, the system has been designed to utilise infiltration-based SuDS components 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, the infiltration rates of the ground will allow for storage systems to be sized to store the full 1:100yr events without any overland flow or above ground storage.

The slope of the site, from east to west, dictates that the storage structures will be best placed to the west of the camping pods to aid gravity drainage and to keep the storage away from the buildings. 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 –Infiltration-based SuDS components are viable 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 – Underlying ground conditions make this suitable to be utilised for infiltration and attenuation on site.
- Swales – Not considered due to their large land uptake.
- Filter drains – Not required.
- Detention basins – Viable for usage on Site.
- Ponds/wetlands – Not required due to available ground infiltration rates. Plot owners may introduce these if desired but shall not be used for site flow calculations.
- 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 or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from dwellings and avoid creating hazards for access and egress routes.

The proposed surface water scheme allows for an exceedance route away from the proposed pods and towards Nethertown Road to the southwest. 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 2: SuDS Manual Table 26.2 Pollution hazard indices

This development is to be classed as 'low' risk land uses due to the presence of the residential roofs, residential car park and low traffic access road. 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
Low Traffic Roads	0.5	0.4	0.4
Residential Car Park	0.5	0.4	0.4

The highest risk element (albeit still categorised as 'low') originate from the low traffic road and residential car park of the proposed development. It is proposed to route the surface water associated with the development through an a permeable gravel car park and a Klargester AquaTreat Full Retention Seperator to ensure efficient removal of pollutants.

Area 1, as detailed within *Appendix E*, illustrates that the highest pollution indices to be treated are from low traffic roads. It is proposed for this section of the drainage design to utilise a Klargester AquaTreat Full Retention Separator to provide the necessary treatment.

Land use	Suspended solids	Metal	Hydrocarbons
Low Traffic Roads	0.5	0.4	0.4
Klargester AquaTreat Full Retention Seperator	0.8	0.6	0.9

Area 2, as detailed within *Appendix E*, illustrates that the highest pollution indices to be trated are from the proposed residential car park. It is proposed for this section of the drainage design to utilise a permeable gravel car park to provide the necessary treatment.

Land use	Suspended solids	Metal	Hydrocarbons
Residential Car Park	0.5	0.4	0.4
Constructed Permeable Pavement	0.7	0.6	0.7

The above table shows that a Klargester AquaTreat Full Retention Separator and permeable gravel car park would provide sufficient pollutant removal for the individual residential car park and low traffic road categories on the development site.

The introduction of further treatment would be deemed inappropriate. The manufacturers specification sheets for the proprietary treatment systems stated above are located within *Appendix F*.

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 Underground Piped Systems / Gullies

Maintenance Schedule	Required Action	Minimum Frequency
Regular maintenance	Ensuring drainage intakes are clear of debris/silt.	Monthly (or as required)
Occasional maintenance	Clear gully pots.	6 monthly
	Jet clean sewer lines, gully tails and kerb channels to remove grease, grit, sediment, and other debris to ensure conveyance capacity is not compromised.	Every 2 years
	Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Annually
Intermittent maintenance	CCTV survey of sewer lines to identify any defects/signs of performance degradation such as: • Cracked / deteriorating pipes. • Leaking joints/seals at manholes. • High water lines showing regular high stage in pipes (sign of lack of capacity or downstream constraint); and • Suspected infiltration or exfiltration.	Every 2 – 5 years
Remedial actions	Repair defects using suitable methods. Effective temporary repairs may be sufficient in short term until scheduled/capital improvements can be made.	As required
Monitoring	Record areas of surface ponding / intake bypassing / surcharging (photos, inundated areas, depths) during extreme storm events and investigate the reasoning for this post-storm.	As required

Figure 3: Typical piped system operation and maintenance requirements

10.2 Underground Attenuation Tanks

Maintenance Schedule	Required Action	Minimum Frequency
Regular Maintenance	Inspect and identify and areas that are not operating correctly. If required, take remedial action.	Monthly, or 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface water filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and / or internal forebays	Annually, or as required
Remedial Actions	Repair / rehabilitate inlets / outlets, overflows and vents	As required
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build up and remove if necessary	Every 5 years or as required

Figure 4: Typical attenuation tank operation and maintenance requirements

10.3 Non-Return Valves

The non-return valve should be checked on a regular basis to ensure optimum performance. Key checks that should be performed during maintenance include checking that the valve flap opens freely and has not become caught or dislodged. The valve should also be cleaned of any debris that could be affecting the sealing or closing.

10.4 Overflows and Flood Routes

Maintenance Schedule	Required Action	Minimum Frequency
Regular maintenance	Overflows. Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next SUDS feature – inlet to basin or chamber.	Monthly
	Overflows. Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.	Monthly
	Flood Routes. Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.	Monthly
Remedial actions	Overflows. If overflow is not clear then dismantle structure and reassemble to design detail.	As required

Figure 5: Overflows and flood route operation and maintenance requirements

11.0 FOUL WATER DRAINAGE STRATEGY

All foul water from the proposed 5 camping pods is to be pumped to a stilling chamber within the neighbouring development to the north. This existing private system is connected via gravity fed pipes to the UU adopted sewer network approximately 145m north. This connection to the UU network was approved under previous planning application 4/21/2369/0R1.

The site owner is to liaise with the owner of the adjoining site private network to agree any legal easements and rights of drainage prior to development.

A plan of the proposed foul sewer is shown in *Appendix G* drawing 2025-030-002.

12.0 MANAGEMENT

All separate surface and foul water drainage systems within the site are proposed to remain private and be maintained by the owner of the camping pods.