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Drainage Strategy Report

ERECTION OF 5 CAMPING PODS, LAND TO SOUTH OF SOUTHRIGG, NETHERTOWN ROAD, ST BEES

23-C-17369

Rev A

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APPENDICES

1.0 INTRODUCTION

A L Daines & Partners LLP (ALD) have been engaged to undertake a Surface and Foul Water Drainage Strategy, in accordance with the National Planning Policy Framework (NPPF) [1] for the proposed creation of five wooden camping pods.

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

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 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 dwellinghouses.

3.0 PLANNING POLICY IN SITE CONTEXT

The site covers 0.69ha of greenfield land and according to the most recent Environment Agency (EA) flood risk maps, lies entirely within Flood Zone 1. The Flood Risk Mapping for the site is detailed within *Appendix A*.

The NPPF site categorisation Table 1.1 puts a residential development of this nature within the 'More vulnerable' category. Developments in the 'More vulnerable' category are acceptable within Flood Zone 1 and therefore the site-specific Flood Risk Assessment (FRA) need only be brief.

The FRA statement is included within this report.

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: Aerial photo of site - Google Maps

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 FOUL AND SURFACE WATER DRAINAGE PROVISION

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.

Existing sewers

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 UU search records are shown in *Appendix C*.

8.0 FLOOD RISK ASSESSMENT

The definition of the Environment Agency Flood Zone is provided within PPG Table 1: Flood Zones and is included for reference below:

- Flood Zone 1 – Low probability. Is defined as land which could be at risk of flooding from fluvial or tidal events with less than 0.1% annual probability of occurrence (1:1,000 year).
- Flood Zone 2 – Medium probability. Is defined as land which could be at risk of flooding with an annual probability of occurrence between 1% (1:100 year) and 0.1% (1:1,000 year) from fluvial sources and between 0.5% (1:200 year) and 0.1% (1:1,000 year) from tidal sources.
- Flood Zone 3a – High probability. Is defined as land which could be at risk of flooding with an annual probability of occurrence greater than 1% (1:100 year) from fluvial sources and greater than 0.5% (1:200) from tidal sources.
- Flood Zone 3b – the Functional Floodplain. Is defined as land where water has too flow or be stored in times of flood. Local Planning Authorities should identify in their Strategic Flood Risk Assessment areas of functional floodplain in agreement with the Environment Agency. In the absence of definitive information, it is often defined as land that would flood with an annual probability of occurrence of 5% (1:20) or greater.

In assessing the Flood Zone, the protection offered by any flood defence structures, and other local circumstances, is not considered by the Environment Agency. Based upon the Environment Agency Flood Map for Planning (illustrated in *Appendix A*), the site lies within Flood Zone 1 (low probability).

With reference to paragraph 66 of PPG Table 2: Flood Risk Vulnerability Classification, the proposed development relating to 'buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels' is considered 'More Vulnerable' in terms of flood risk classification.

As discussed in Section 3.0, the site lies entirely within Flood Zone 1. With reference to PPG Table 2: Flood risk vulnerability and flood zone compatibility confirms that the development use is appropriate, and the Exception test need not be applied. A full FRA is therefore not required, although the Environment Agency long term flood risk maps are included below to further inform this report.

8.1 Flooding from Fluvial and Tidal Sources

Mapping published by the Environment Agency indicates that the proposed development lies predominantly within an area where flooding is considered to have a 'very low probability of occurrence'. Flood Zone 1, which represents a risk of flooding from fluvial sources of less than 0.1% (1:1,000 year) each year.

Figure 2: EA Flood risk mapping from rivers or the sea

The risk of fluvial flooding on site is considered to be low and is not considered further.

8.2 Flooding from Surface Water

Mapping published by the Environment Agency illustrates that areas considered to be at a very low risk of flooding throughout the development site. A very low risk of surface water flooding represents a risk of flooding less than 0.1% (1:1,000 year) each year.

However, it is noted that to the north of the site is an area of high risk of surface water flooding (3.3% chance of flooding per year). The areas of high-risk flooding are located within a depression in the topography of the ground at 35.825m AOD. The Environment Agency Flood Risk mapping details that the flooding in this location is less than 300mm in depth.

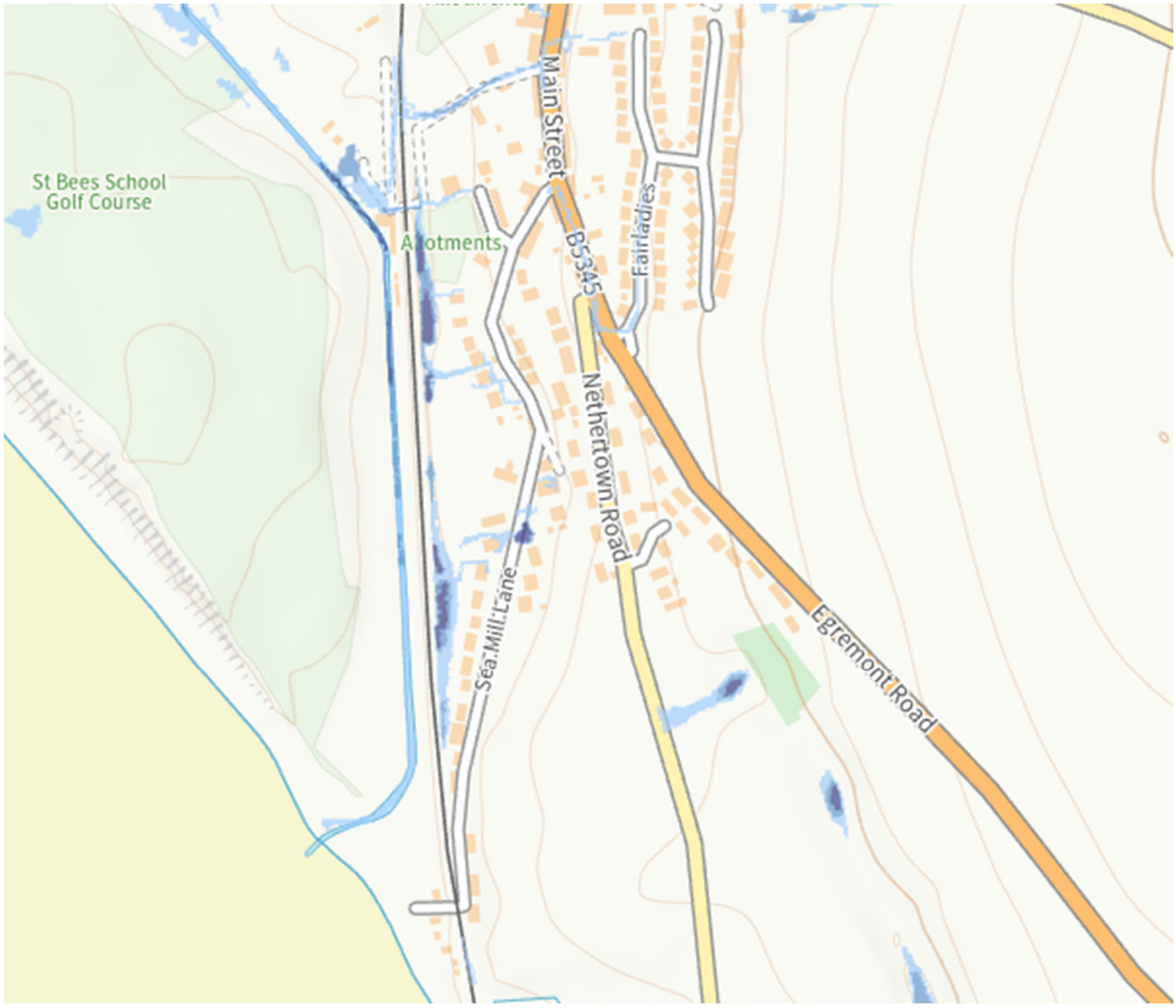

Figure 3: EA Flood risk mapping for surface water

As the risk of flooding is not located within the development site, this risk factor is not considered further.

9.0 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:

Drain into the ground (infiltration) – proved possible.

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

10.0 SURFACE WATER PROPOSED 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.

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 – underlying ground conditions make this a suitable method for providing site drainage close to source and will be used to store and dissipate rainwater from the hardstanding areas. **Viable**
- 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 a suitable and cost-effective method of drainage for a large portion of the driveway areas. **Viable**
- Swales – Not considered due to their large land uptake and porosity of the ground.
- Filter drains – Not required.
- Detention basins – Not required due to available ground infiltration rates.
- Ponds/wetlands –. Not required due to available ground infiltration rates. The site owner may introduce these if desired but shall not be used for site flow calculations.
- Underground closed storage crate/tank systems – Not required.

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.

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.

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.

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 through the use of 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, 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

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

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 minimized, there are not onerous requirements imposed.

The highest risk elements (albeit still categorised as 'low') originate from the residential car parking areas and low traffic roads. It is proposed to provide an ACO V Septor for all access roads, car parking areas and the residential roofs to treat the surface water prior to discharge via a soakaway.

The ACO V Septor mitigation for the residential car parking areas, low traffic access road and residential roofs 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
ACO V Septor	0.5	0.5	0.4
Suitability	Acceptable	Acceptable	Acceptable

The manufacturers specification sheets for the proprietary treatment systems stated above are located within *Appendix D*.

11.0 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.

Table 13.1 from the SuDS Manual for soakaways has been included below for reference.

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical 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 on 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 reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Figure 5: SuDS Manual table 13.1 Soakaway maintenance

12.0 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 23-C-17369-002.

13.0 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.