WATERWAY DRAINAGE ENGINEERING

DRAINAGE STRATEGY REPORT

Woodland Nurseries

Lowca

Whitehaven

CA28 6PS

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Rev A

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1.0 INTRODUCTION

Waterway Drainage Engineering (WDE) have been instructed to undertake a Surface Water Drainage Strategy, in accordance with the National Planning Policy Framework (NPPF), for the proposed extension of Woodland Nurseries, Lowca, Whitehaven.

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 "*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 169 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 a building or buildings where the floor space to be created by the development is 1,000 square metres 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 classified as a major development under the above criteria due to the proposals having a site area greater than 1 ha and a floor area over 1000m^2.

3.0 PLANNING POLICY IN SITE CONTEXT

The site covers 1.837 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 'less vulnerable'.

Using the Sequential Test set out in the NPPF, less 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 north of Woodland Nurseries, Lowca as shown on the site plan located within *Appendix B*.

The location details of the proposals are detailed below:

- Woodland Nurseries, Lowca, Whitehaven. CA28 6PS
- National Grid Reference: Eastings 298920 Northings 521791

5.0 DEVELOPMENT DESCRIPTION

The proposed commercial development will create a new extension to the existing glasshouse at Woodland Nurseries to the north of the Site. The topography of the site is generally sloping from a highpoint on the northern boundary (approx. 74.997 m AOD) to the low point in the southwestern corner (approx. 38.696 m AOD).

The site is 1.837 ha in land area with 100% of the land area to be impermeable. The site access is via an existing road/track on the southern extent of the proposed development area.

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 Lower Coal Measures Formation - Mudstone, siltstone and sandstone.
- Superficial drift: Till, Devensian - Diamicton
- Soil: Soilscape 17 – Slowly permeable seasonally wet acid loamy and clayey soils

As part of the full planning approval 4/20/2022/0F1 for the Site, infiltration testing was undertaken on site. The testing undertaken demonstrated that infiltration is not viable for the discharge of surface water on Site. This was accepted by the LLFA as part of the full planning approval and is relevant for the proposed planning application.

7.0 CURRENT SURFACE WATER DRAINAGE PROVISION

7.1 Existing watercourses

There is an existing ordinary watercourse (Lowca Beck) located on the western boundary of the Woodland Nurseries site boundary. It is noted that surface water from Woodland Nurseries is currently discharged into Lowca Beck.

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 second level on the above hierarchy for the following reasons:

1. Drain into the ground (infiltration)

As demonstrated within Section 6.0 of this report, the discharge of surface water to soakaways is not an option due to the poor infiltration rates observed during testing undertaken on Site as part of the planning approval 4/20/2022/0F1.

2. To a Surface Water Body

The discharge of surface water from the proposed development site is to be into Lowca Beck to the west of the Site. The existing attenuation basin constructed as part of the planning approval 4/20/2022/0F1 is to be utilised to provide attenuation to accommodate storm events up to and including a 6 hour 1 in 100 year plus 50% to account for climate change storm event.

The discharge rate for the existing attenuation basin, and approved as part of the planning application 4/20/2022/0F1, is to remain unchanged at 87.6 l/s post construction.

In addition, the proposed glass houses will include for rainwater recycling and in the event of any surplus flows attenuation will be provided on site to accommodate excess flows and ensure a greenfield rate of discharge is achieved.

9.0 PROPOSED SURFACE WATER DRAINAGE DESIGN

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

The proposed surface water drainage design is located within *Appendix C*, with the Causeway Calculations 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 – Not suitable for use on the site. Also, 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 not 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 not suitable to be utilised for infiltration. However, permeable paving can be utilised for the attenuation and treatment of surface water prior to discharge.
- Swales – Not considered due to the gradient of the land surrounding the development.
- 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 Woodlands Nurseries and towards Lowca Beck to the south. 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 commercial roof. This level of risk suggests the following level of pollution control:

Land use	Suspended solids	Metal	Hydrocarbons
Other Roofs (commercial / Industrial Roofs)	0.3	0.2	0.05

The highest risk element (albeit still categorised as 'low') originate from the commercial roof of the proposed glass house extension. It is proposed to route the surface water associated with the development through an ACO V Septor to ensure efficient removal of pollutants.

Land use	Suspended solids	Metal	Hydrocarbons
Other Roofs (commercial / Industrial Roofs)	0.3	0.2	0.05
ACO V-Septor	0.5	0.5	0.4

The above table shows that an ACO V-Septor would provide sufficient pollutant removal for the individual property driveways and residential car parking 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 E*.

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

Figure3: Typical piped system operation and maintenance requirements

10.2 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.

10.3 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 4: Overflows and flood route operation and maintenance requirements

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	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 MANAGEMENT

All surface water drainage systems within the site are proposed to remain private and be maintained by the Site owners (Blomfield Ltd).