WATERWAY DRAINAGE ENGINEERING

FLOOD RISK ASSESSMENT

Blomfield Nurseries
Lowca
Whitehaven
CA28 6PS

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2025-023
Rev A

CONTENTS

1.0 INTRODUCTION

1.1 CONTEXT

Waterway Drainage Engineering Ltd have been instructed by Blomfield Ltd to prepare a Flood Risk Assessment (FRA) for the proposed extension of Woodland Nurseries, Lowca, Whitehaven.

This FRA has been completed in accordance with guidance presented within the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG), taking due account of current best practice documents relating to assessment of flood risk published by the British Standards Institute (BS8533).

1.2 SITE LOCATION

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 *Figure 1*.

The location details of the proposals are detailed below:

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

Figure 1: Location Plan

1.3 TOPOGRAPHY

A review of the topographical data determines that 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.

1.4 HYDROLOGY AND DRAINAGE

The nearest open watercourse to the site is the Lowca Beck ordinary watercourse, located on the western boundary of the site, which flows in a westerly direction into the Irish Sea.

Soils at the site are described by the Cranfield Soil and Agrifood Institute, supported by the Department for Environment, Food and Rural Affairs (DEFRA), as slowly permeable seasonally wet acid loamy and clayey soils.

1.5 GEOLOGY AND HYDROGEOLOGY

British Geological Survey mapping indicates that the bedrock geology of the site consists of Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone.

The bedrock beneath the site is designated by the Environment Agency as a Secondary A Aquifer, these are described as:

"...Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers ."

In addition, the site is located within an area of High groundwater vulnerability.

2.0 FLOOD RISK POLICY STATUS

2.1 FLOOD ZONE CLASSIFICATION

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 *Figure 2*), the site lies entirely within Flood Zone 1 (Low Probability).

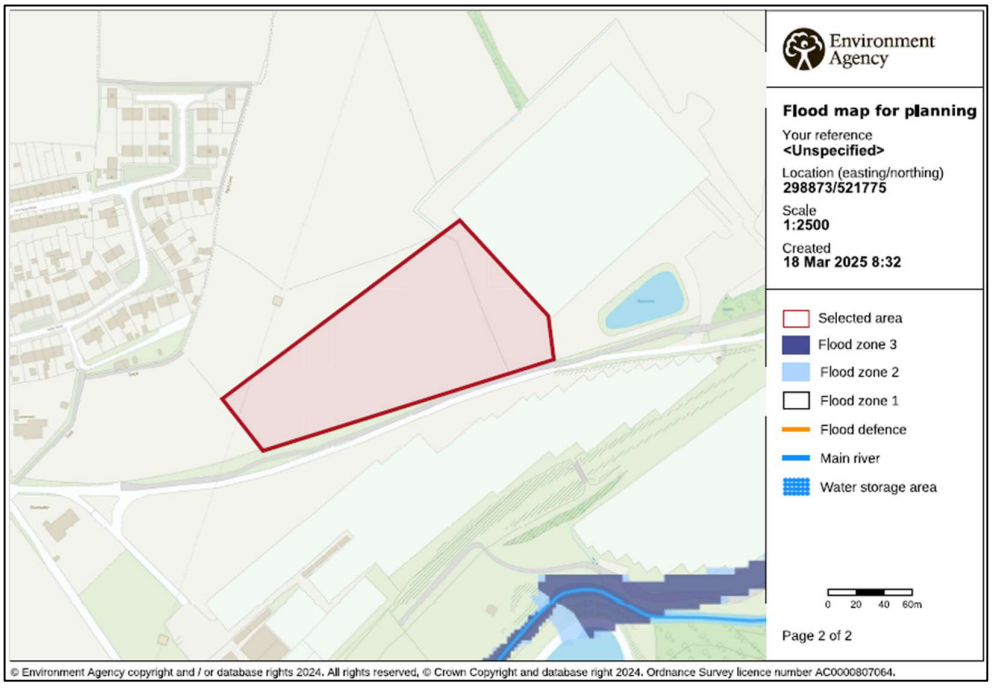

Figure 2: Environment Agency Flood Zone Mapping

2.2 NATIONAL PLANNING POLICY

The FRA has been completed in accordance with the guidance presented within the NPPF and with reference to the PPG.

2.2.1 Flood Risk Vulnerability

With reference to paragraph 66 of PPG Table 2: Flood Risk Vulnerability Classification, the proposed development relating to 'Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure' is considered 'less vulnerable' in terms of flood risk classification.

2.2.2 Flood Risk Compatibility

As discussed in Section 2.2, 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.

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 3: PPG Table 2

3.0 POTENTIAL SOURCES OF FLOODING

3.1 METHODOLOGY AND BEST PTACTICE

This report has been prepared in accordance with the advice and requirements prescribed in current best practice documents relating to management of flood risk in development published by the Construction Industry Research and Information Association (CIRIA), BS85333, and the Environment Agency's National Standing Advice on Development and Flood Risk.

A screening study has been completed to identify whether there are any potential sources of flooding at the Site which may warrant further consideration. If required any potential flooding issues identified in the screening study would then be considered in subsequent sections of the assessment.

3.2 SCREENING STUDY

There are several potential sources of flooding, and these include:

- Flooding from rivers or fluvial flooding.
- Flooding from the sea or tidal flooding.
- Flooding from surface water and overland flow.
- Flooding from groundwater.
- Flooding from reservoirs, canals, and other artificial sources.

The flood risk from each of these potential sources is discussed below.

3.2.1 Flooding from Fluvial and Tidal Sources

Mapping published by the Environment Agency, shown within *Figure 4*, indicates that the proposed development lies predominantly within an area where flooding is considered to have a 'very low probability of occurrence'. A very low probability of occurrence equates to less than a 0.1% chance of a flooding each year.

It is noted that in the 2036 to 2069 scenario the flood risk for the site from fluvial sources remains at a 'very low probability of occurrence'.

Therefore, as the risk of fluvial and tidal flooding on site is considered to be very low; this risk factor is not considered further.

Figure 4: Environment Agency Rivers and Sea Flooding Map

3.2.2 Flooding from Surface Water and Overland Flow

Mapping published by the Environment Agency, shown within *Figure 5*, illustrates that the proposed development site is within an area considered to be at a very low risk of flooding. A very low risk of surface water flooding represents a risk of flooding of less than 0.1% each year. It is also noted that the risk of surface water flooding remains very low during the 2040 to 2060 scenario.

Due to the risk of surface water flooding being very low up to 2060, this source of flooding is not considered further.

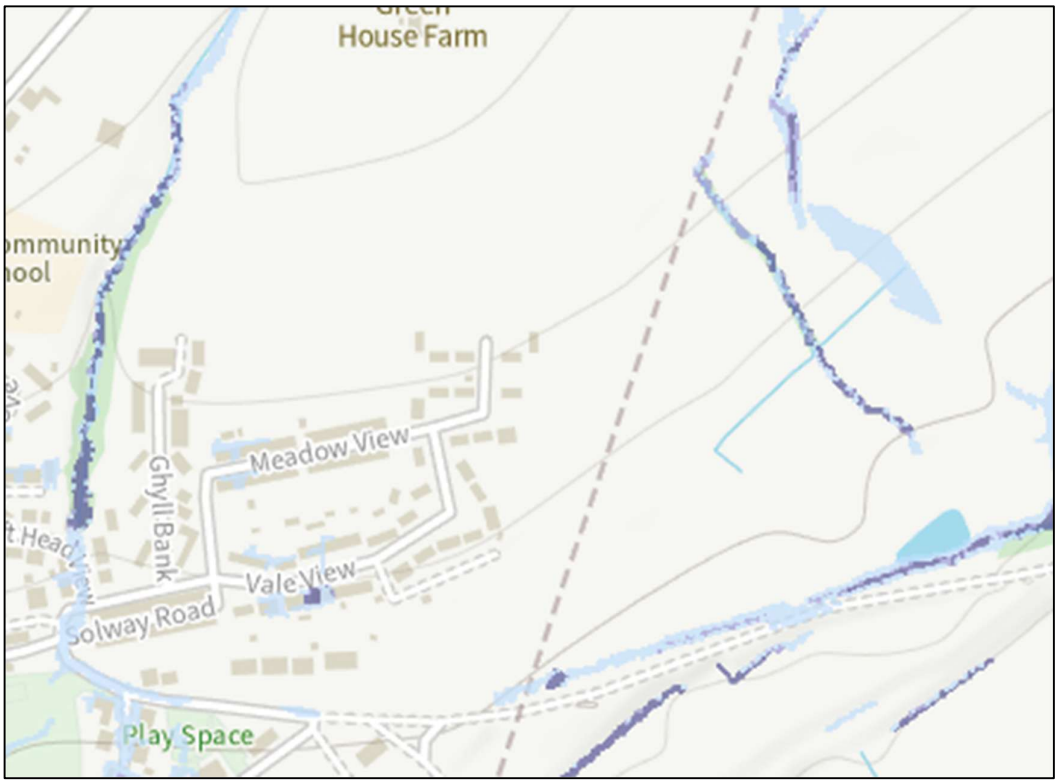

Figure 5: Environment Agency Surface Water Flooding Map

3.2.3 Flooding from Groundwater

Groundwater flooding can occur where sites are located on permeable ground, particularly where there are significant variations in local topography and geology. After a prolonged period of rainfall and groundwater recharge, a considerable rise in the water table can result in this intersecting the ground surface, resulting in flooding. Due to the slow response of groundwater systems any resulting flows and inundation could persist for an extended period.

The Environment Agency flood risk mapping, available online, consider the risk of flooding from groundwater to be unlikely in the area of the proposed development.

Flooding from this source is therefore considered to be low and is not considered further.

3.2.4 Flooding from Reservoirs, Canals, and Artificial Sources

With reference to the risk of flooding from reservoirs, the Environment Agency consider that flooding from reservoirs is unlikely in the location of the proposed development site.

There are no canals or other artificial water sources located near the site.

Flooding from this source is considered to be low due to the reservoirs upstream being managed by a competent authority. Therefore this is considered a residual risk and is not considered further.

3.2.5 Flooding from Infrastructure Failure

The site is not within an area benefitting from flood defences.

As such, flooding from this source is therefore considered to be low and is not considered further.

3.3 SUMMARY OF FLOODING

A summary of potential sources of flooding and the flood risk arising from them is presented in *Figure 6*.

Potential Flood Source:	Potential Flood Risk of site:
Fluvial and tidal sources	Very Low
Surface water and overland flow	Very Low
Groundwater	Unlikely
Reservoirs, canals, and artificial sources	Low
Infrastructure failure	Low

Figure 6: Summary of potential sources of flood risk

4.0 CLIMATE CHANGE

4.1 ANTICIPATED LIFETIME OF THE DEVELOPMENT

PPG and best practice recommend that, in the absence of more specific information, a 60 year lifetime is assumed for a commercial development.

4.2 CLIMATE CHANGE REVIEW

In May 2022, the Environment Agency issued updated guidance on the impacts of climate change on flood risk in the UK to support the NPPF. This advice sets out that peak rainfall intensity, sea level, peak river flow, offshore wind speed, and extreme wave heights are all expected to increase in the future.

PPG recommends that considerations for future climate change are included in FRA's for proposed developments. The consideration of climate change for the proposed development site considers the possible changes in peak rainfall intensity and peak river flow. The guidance acknowledges that there is considerable uncertainty with respect to the absolute level of change that is likely to occur. As such the document provides an estimate that reflect a range of different emissions scenarios.

4.2.1 Peak Rainfall Intensity Allowance

For peak rainfall intensity the guidance states that flood risk assessments should assess both the 'central' and 'upper end' allowances to understand the range of impact. As detailed, these equate to uplifts of 35% and 50% respectively. For the purposes of this assessment the 1% annual exceedance rainfall event upper end allowance is to be utilised (50%) for all surface water drainage calculations.

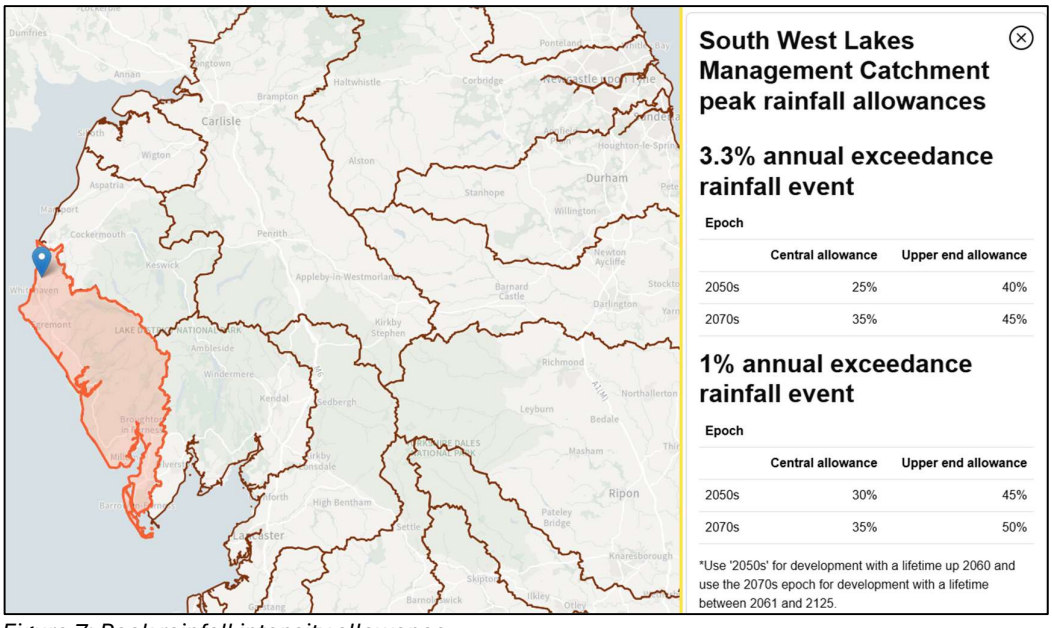

Figure 7: Peak rainfall intensity allowance

4.2.2 Peak River Flow Allowance

Peak river flow allowances show the anticipated changes to peak flow by management catchment. Management catchments are sub-catchments of river basin districts. The peak river flow allowances are for management catchments.

The allowances are based on percentiles from UKCP18 data. A percentile is a measure used in statistics. They describe the proportion of possible scenarios that fall below an allowance level. The:

- Central allowance is based on the 50th percentile.
- Higher central allowance is based on the 70th percentile.
- Extreme allowance is based on the 95th percentile.

An allowance based on the 50th percentile is exceeded by 30 % of the projections in the range. At the 70th percentile it is exceeded by 39 %. At the 95th percentile it is exceeded by 63 %.

For the South West Lakes Management catchment, the guidance for peak river flow allowances are shown below within *Figure 8*.

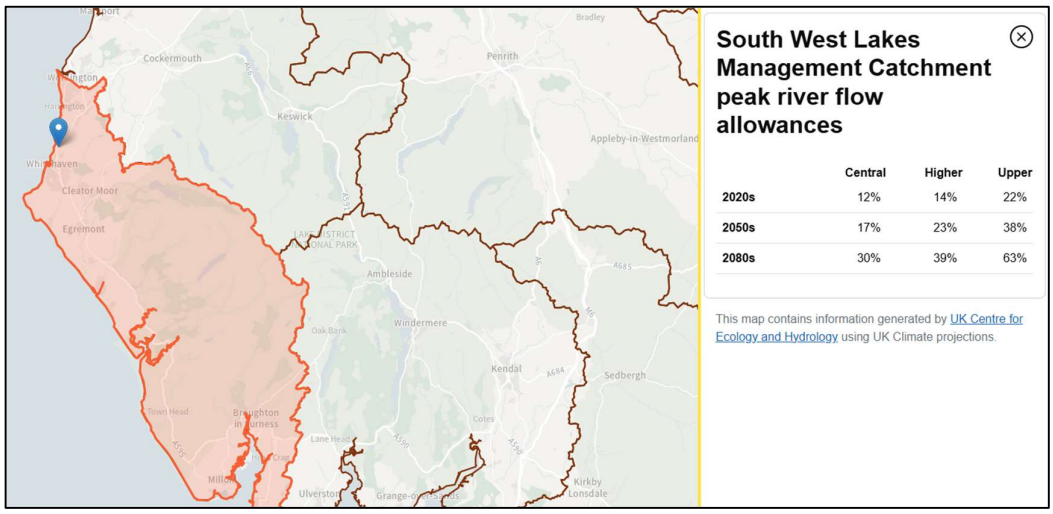

Figure 8: Peak River flow allowance

5.0 ASSESSMENT OF FLOOD RISK

5.1 POTENTIAL SOURCES OF FLOOD RISK

The flood screening assessment reported in Section 3.0 indicates that the development site is at a low risk from all sources of flooding.

5.2 HISTORICAL FLOODING

The Historic flood maps have been reviewed, these are based upon the Environment Agency database. There is no flooding identified on the proposed development site or within 250m. The historic flooding records agree with the findings of the other flood maps in identifying the proposed development site as a low risk.

6.0 FLOOD RISK MANAGEMENT MEASURES

6.1 SITE DRAINAGE

A drainage system is to be provided within the existing building to manage all potential rainfall and subsequent surface water flows at the Site. Attenuation will be provided 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 existing drainage network discharges into the existing attenuation basin which is to remain unchanged. As the surface water discharge is to remain the same as existing on Site (87.6 l/s), there will be no increase in flood risk within, or to off-site areas, from the proposed development.

7.0 CONCLUSION

Waterway Drainage Engineering Ltd have been instructed by Blomfield Ltd to prepare a Flood Risk Assessment (FRA) for the proposed extension of Woodland Nurseries, Lowca, Whitehaven.

With reference to the site-specific flood data provided by the Environment Agency, the Site is considered to lie entirely within Flood Zone 1. Planning Practice Guidance defines the proposed development as a 'Less Vulnerable' use. This type of development is considered appropriate for the Flood Zone classification.

The risk of flooding on Site from all sources is considered to be low. The drainage design for the proposed extension is also to be in accordance with Lead Local Flood Authority guidance through discharging at the greenfield runoff rate and providing attenuation on Site to account for storm events up to and including a 6 hour 1 in 100 year plus 50% to account for climate change.

The technical assessment of risk presented within this flood assessment demonstrates that the flood risks present at the Site are manageable and that development on the site could be designed in a way that, subject to approvals and appropriate ongoing management, is 'safe' in flood risk terms throughout its lifetime without increasing flood risk elsewhere.