COAST
CONSULTING ENGINEERS

Parkside Road
Cleator Moor

Flood Risk Assessment
and Drainage Strategy

Issue Date:
13 December 2024

Report Number:
23098-01

Client:
Genesis Homes

Revision:
A

Contents

Revision	Date	Comments	Prepared by	Checked by
A	13.12.2024	Initial issue	JM	KR

Executive Summary

Site Location	Land north-west of Parkside Road, Cleator Moor, CA25 5HD
Site Proposals	Construction of 95 residential dwellings and associated infrastructure.
Ground Conditions	The site is located in an area likely to be underlain by clay/clayey loam. Bedrock comprises of sandstone and mudstone.
Nearest Watercourse	River Ehen is located approx. 335m South-East of the development.
Nearest Surface Water Sewer	None within vicinity of the site.
Nearest Foul Water Sewer	None within vicinity of the site.
Nearest Combined Sewer	A 225mm diameter combined sewer is located south within Frizington Road.
Flood Zone	EA flood maps indicate that the development boundary is located entirely within an area classified as a **Flood Zone 1**.
Surface Water Flooding	Risk of surface water flooding is **low**
Ground Water	The risk of flooding due to ground water is **low**.
Surface Water Discharge Rate	Surface water should be restricted to 42 litres/sec (Qbar) peak discharge for all events up to and including the 100 year +50% climate change.
SUDS	Detention basin Vortex flow control

The above summary should not be used in isolation and reference should be made the full report.

1. Introduction

Coast Consulting Engineers have been commissioned by Genesis Homes to assess the flood risk associated with a proposed development on land to the north-west of Parkside Road, Cleator Moor, CA25 5HD. This Flood Risk Assessment is reviewed in accordance with the National Planning Policy Framework (NPPF) for Development and Flood Risk. In conjunction with assessing the site for flood risk a proposed drainage strategy has been prepared.

This site-specific Flood Risk Assessment (FRA) has been undertaken to determine the risk of flooding to the proposed development from all sources in accordance with the National Planning Policy Framework (NPPF) and to assess the flood risk to others as a result of the development. The assessment will recommend how the risk can be managed in line with planning policy requirements.

One of the key aims of the National Planning Policy Framework (NPPF) is to ensure that flood risk is considered at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. Where new development is necessary in such areas, the policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

1.1 National Planning Policy Framework (NPPF)

The NPPF requires that:

- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account the vulnerability of its users, without increasing flood risk elsewhere, and where possible, will reduce flood risk overall.

- A site-specific flood risk assessment is required for proposals greater than 1 ha in size in a Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as identified in the Strategic Flood Risk Assessment).

The following definitions for flood zones are derived from NPPF:

FLOOD ZONE 1:

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

FLOOD ZONE 2:

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

FLOOD ZONE 3:

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

In addition to the risk of flooding from rivers or sea, consideration must also be given to surface water flooding, flooding due to ground water and flooding from artificial sources such as sewer failure or overtopping of reservoirs.

2. Site location, Existing Topography and Proposals

2.1 Site Location

The proposed development is located north-west of Parkside Road, Cleator Moor, CA25 5HD, site location is indicated in figure 2.0.1 below.

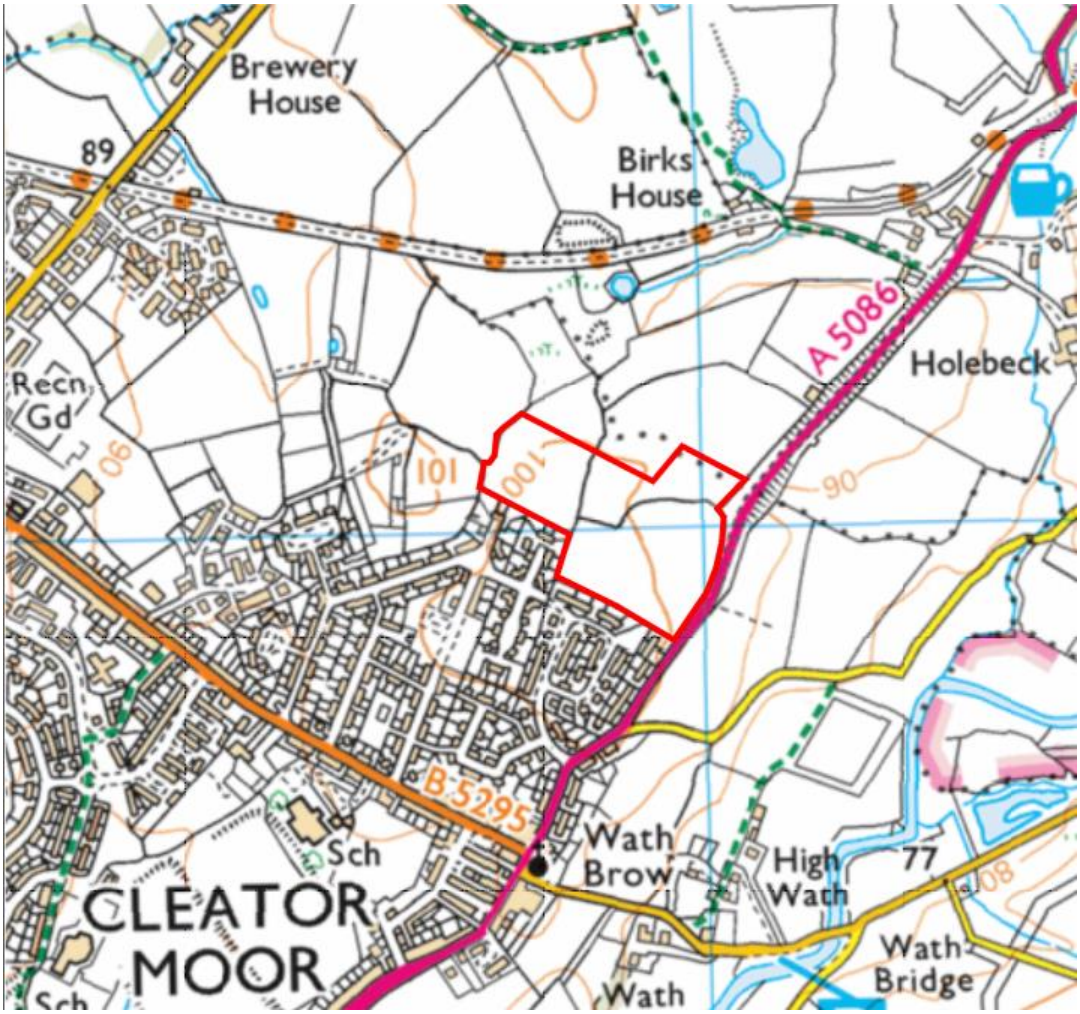

Figure 2.1.1 – Site location Plan.

2.2 Topography

A topographical survey has been completed which shows relatively steep slopes across the site, a high point is located around the south-western boundary at c.101.80, falling generally north-east at c.90.00 and north-west c91.65.

The site is bounded to the north by further undeveloped land to the north and west, the A5086 to the east and a residential estate to the south.

The topographical survey can be found in Appendix A.

2.3 Development Proposals

A copy of the proposed architectural site layout comprising of a residential development of 95 units and associated infrastructure can be found in Appendix B. An exact is also shown below in figure 2.3.1.

Figure 2.3.1 – Development proposals.

3. Potential Sources of Flooding and Proposed Mitigation

As required by the National Planning Policy Framework (NPPF) and Technical Guidance to the NPPF, each potential source of flooding needs to be considered; rivers and sea, land, groundwater, sewers and artificial sources (such as reservoirs and canals). Consideration also needs to be given to the flood risk vulnerability classification for this type of development.

3.1 Flood Zone Mapping

Environment Agency flood maps have been acquired to assist with this assessment. The flood maps indicate that the development boundary is located entirely within an area classified as a **Flood Zone 1**. Land located within a flood zone 1 is defined as having less than a 1 in 1,000 annual probability of river flooding (low risk). Environment Agency maps also confirm that the site does not lie within an area served by their flood warning scheme. Refer to the extract below which identifies the Flood Zones within and in proximity to the development site. The site is not considered to be at risk of flooding from rivers or sea.

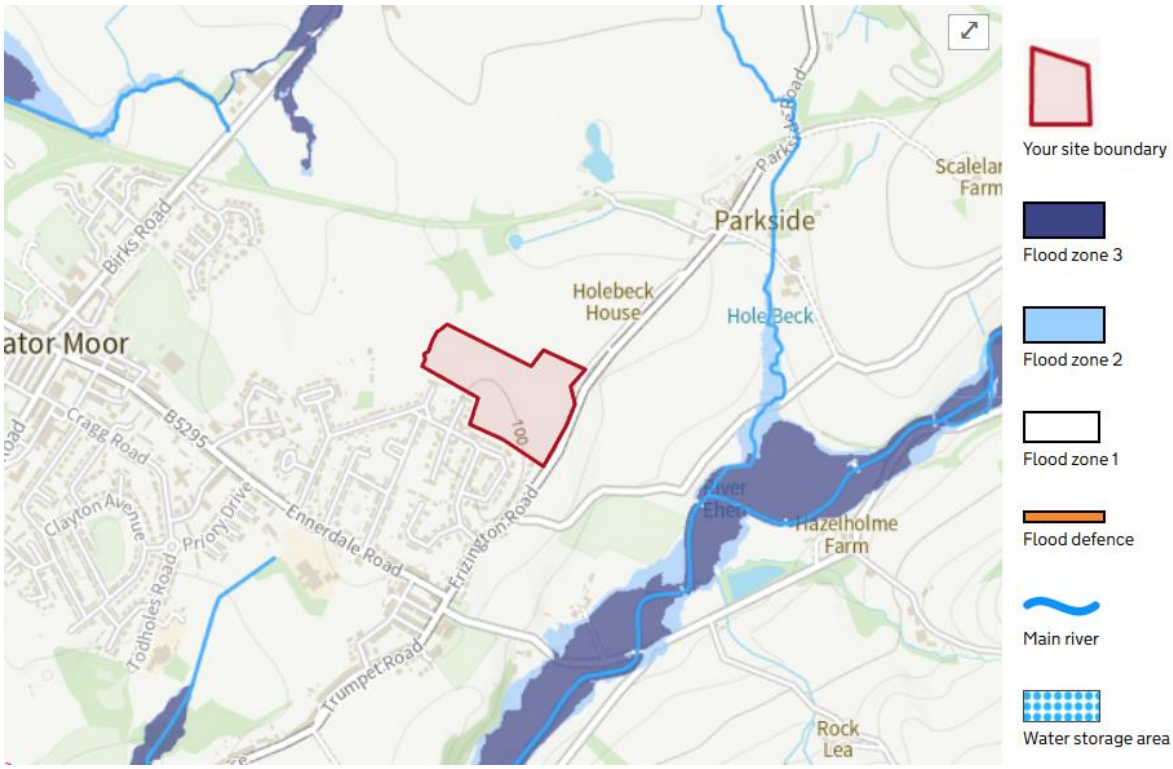

Figure 3.1.1 – Flood zone map.

3.2 Flood Risk Vulnerability Classification

Table 2 of the Technical Guidance to the National Planning Policy Framework states the following with respect to flood risk vulnerability classification.

3.2.1 More vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan

Table 3 of the Technical Guidance to the National Planning Policy Framework states the following with respect to appropriate land uses:

Table 3: flood risk vulnerability and flood zone 'compaibility'

Flood Risk Vulnerability Classification (See Table 2)	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

Key: ✓ Development is appropriate.
X Development should not be permitted.

An exception test will not be required in this instance as development is located outside of a flood zone 2 or flood zone 3.

3.3 Surface Water Flood Risk

Surface water flood risk mapping shows the site is at **low** risk of surface water flooding. See figure 3.3.1 below.

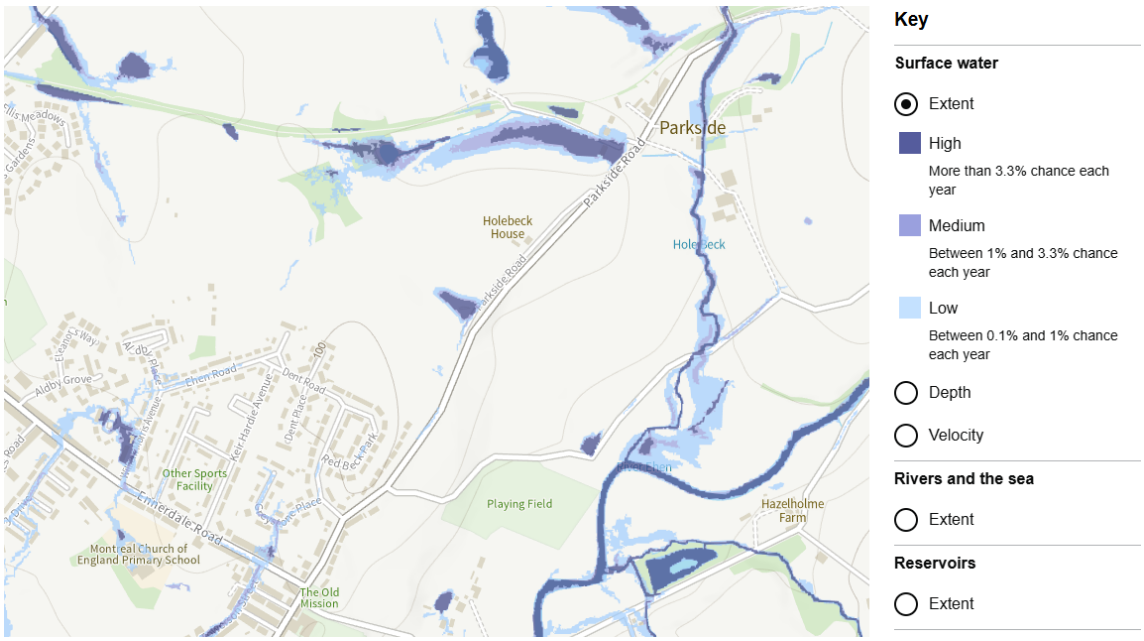

Figure 3.3.1 – Surface Water flood risk map.

3.4 Ground Water Flooding

Flooding due to ground water occurs when the levels of water below the ground rise and emanate above finished ground level.

Government published long term flood risk service states that flooding from ground water is unlikely in this area.

Based upon the information outlined above the risk of flooding due to ground water rise can be considered as **low** throughout the site.

3.5 Sewer Flooding

Sewer record drawings show existing combined sewers are present to the south of the development site. Due to the relativley steeply sloping topography any flooding from existing sewer would trend away from proposed development. Risk to the develoment from sewerflooding is considered **low.**

Figure 3.5.1 - Sewer Record Drawing.

3.6 Reservoir Flood Risk

Artificial sources of flood risk such as man-made ponds or reservoirs can cause a potential risk of flooding. The flood map below shows that there is no potential flooding of the site from reservoirs, therefore the risk of flooding due to this source can be deemed **low**.

Figure 3.6.1 – Reservoir flood risk map.

The proposed development is considered appropriate within a Flood Zone 1 in line with the guidance contained within the National Planning Policy Framework for flooding.

4. Surface and Foul Water Disposal

National guidance and regulations including Part H of the Building Regulations provides a hierarchy for surface water disposal as follows:

1. By infiltration
2. To watercourse
3. To surface water sewer
4. To combined sewer

4.1 Infiltration

In order for infiltration drainage to provide an effective means of dealing with surface water run off from development the natural ground needs to be sufficiently permeable. This should be tested and proven by means of intrusive site investigation including soak-away testing to determine the natural soil's permeability. In addition, soak aways need to be positioned sufficient distance from buildings and roads in line with building regulations. At the time of writing a site investigation has not been undertaken.

Although a site investigation has not yet been undertaken for proposed development it is anticipated that soil conditions are likely to be underlain by clay/clayey loam. Bedrock comprises of sandstone and mudstone.

British geological survey data records superficial deposits as clay, see figure 5.1.1 below.

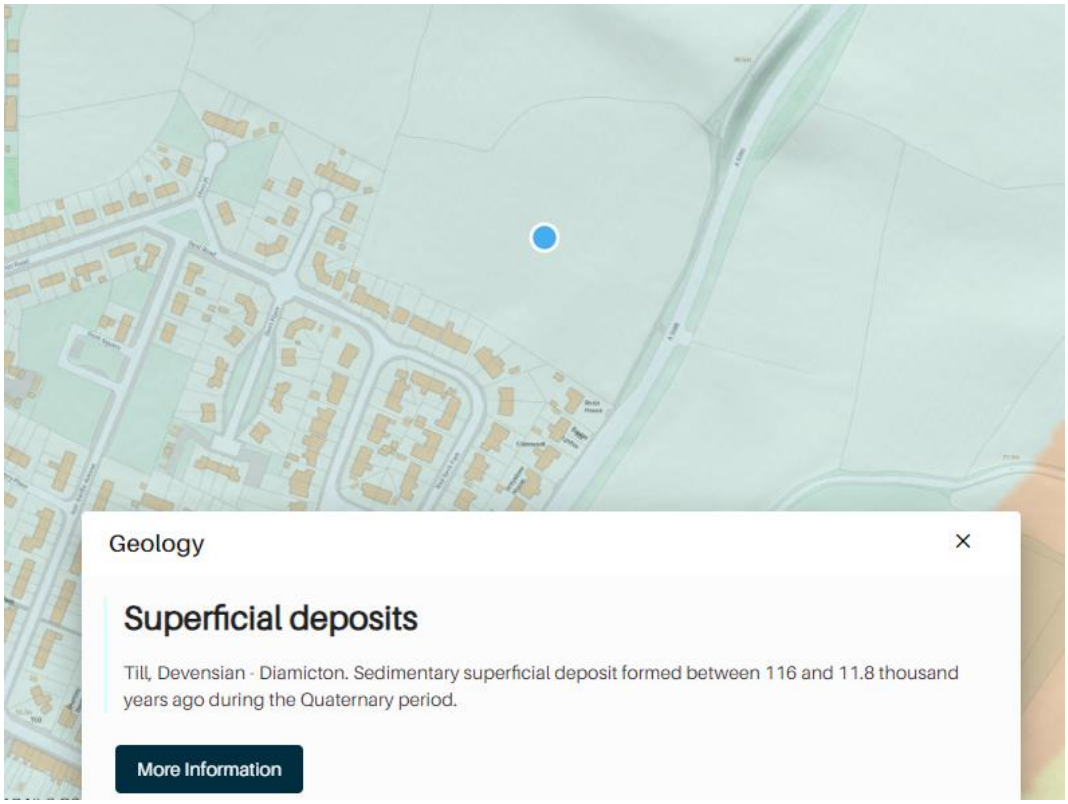

Figure 4.1.1 – Superficial deposits recorded on British Geological Survey.

Without a site specific site investigation detailing ground conditions at the site, including permeability testing and water table levels it is not possible to conclude that infiltration drainage would be an effective means of dealing with surface water run off for proposed development.

4.2 Watercourse

The nearest watercourse to the proposed development site is River Ehen located approximately 335m to the south-east of the development. The site is separated from the watercourse by third party land. A culverted drainage ditch leading to a watercourse is located at the north-east corner of the site boundary.

4.3 Sewer

The nearest recorded adopted combined sewer is located in Frizington Road with manhole at the head of the public sewer located approximately 245m from the site boundary. Extract from public sewer record drawing is included in Figure 3.5.1 above.

4.4 Proposed Discharge Rate

In line with national and local standards surface water discharge from development should match the natural greenfield run off.

Calculated Qbar discharge rate using greenfield run off estimation tool on HR Wallingford website https://www.uksuds.com/tools/greenfield-runoff-rate-estimation are indicated in figure 4.4.1 below and in Appendix C.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	42.28	42.28
1 in 1 year (l/s):	36.78	36.78
1 in 30 years (l/s):	71.87	71.87
1 in 100 year (l/s):	87.93	87.93
1 in 200 years (l/s):	100.19	100.19

Figure 4.4.1 – Calculated greenfield runoff rates.

By restricting the peak rate of discharge from the site to 42l/s for all rainfall events up to the 1 in 100 year return period with a 50% allowance for climate change, the proposed development will provide betterment from the existing regime in line with the table below:

Return Period	Existing	Proposed	Betterment
Qbar	42.2 l/s	42.2 l/s	0%
1	36.7 l/s	42.2 l/s	-15%
30	71.8 l/s	42.2 l/s	70%
100	87.9 l/s	42.2 l/s	108%

4.5 Proposed Surface Water Drainage

The proposed surface water drainage network will include an online detention basin to provide temporary storage for run-off from the proposed impermeable areas up to the 1 in 100 year rainfall event with an allowance of 50% for climate change, and discharge to an existing culverted drainage ditch leading to a watercourse.

The required volume of surface water attenuation in the basin has been calculated to be 1997m^3 based on a discharge rate of 42l/s.

A detailed drainage strategy can be found in Appendix D, Hydraulic calculations for the proposed drainage network are included in Appendix E.

Hydraulic calculations are based on the following criteria:

- Climate change allowance of 50% applied to account for current predicted increase in peak rainfall intensity.

- Volumetric runoff coefficient (Cv value) of 1.0 of measured impermeable areas.
- FSR rainfall data used. M5-60 = 17.6. R = 0.256.
- Storm duration up to 1440 minutes analysed.

4.6 SuDS Techniques

In line with National Planning Policy, SuDS techniques are to be utilised as part of the design of the surface water network. The appliable techniques and the benefits that they bring to the development are outlined below. Proposed basin details are included in Appendix F.

- Detention basin or ponds: An online detention basin will be installed to contain flows up to and including the 100 year event with a 50% allowance for climate change. Detention basins are effective in peak flow reduction, water quality treatment in the settlement of solids and have good amenity and ecological potential.
- Peak flow control: A vortex flow control will be utilised to restrict flows to no greater than pre-development greenfield runoff rates.

4.7 Proposed Foul Water Drainage

There are no foul or combined sewers within the site boundary. A 225mm diameter combined sewer is located south of the development boundary and flows south. UU records confirm a gravity connection would not be achievable and therefore a pumping station and rising main will be required. Proposed foul water drainage layout is included in Appendix G.

4.8 Water Quality Treatment

SuDS provided are used to mitigate against pollution from runoff of different land types within the development proposals. An assessment of the suitability of SuDS proposed has been undertaken utilising Simple Index Approach published by CIRIA and HR Wallingford. The pollution hazard level varies between land types, figure 4.8.1 shows the proposed SuDS features to have greater mitigation indices than the pollution hazard indices therefore providing adequate water treatment.

Pollution Hazard Indices				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roof	Very Low	0.2	0.2	0.05
Residential Parking	Low	0.5	0.4	0.4
Low Traffic Highways	Low	0.5	0.4	0.4
Mitigation Indices				
Detention Basins		0.5	0.5	0.6

Figure 4.8.1 – Pollution hazard matrix based on SIA.

COAST
CONSULTING ENGINEERS

Civil

Structural

Geotechnical

www.coastconsult.co.uk
admin@coastconsult.co.uk