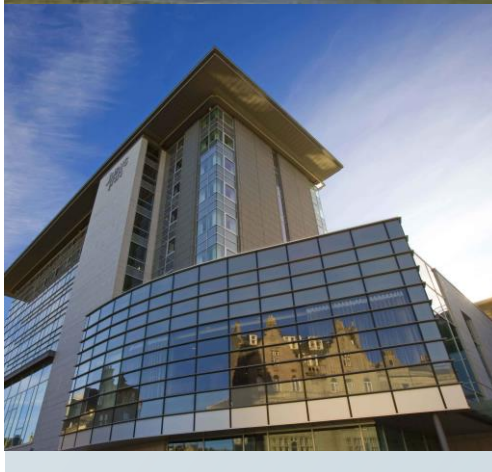


Hensingham (Phase Two), Cumbria

Flood Risk Assessment and Drainage Strategy

March 2021



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CONTROL SHEET

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1. Introduction

Fairhurst have been appointed to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of an outline planning application for a proposed residential development on land adjacent to Egremont Road, Hensingham. The location of the development site is provided in Figure 1.

The aim of this report is to evaluate the current proposals with regard to flood risk and identify potential flood risk to and from the development site. Fairhurst have carried out the following:

- i. Assessment of the redevelopment potential of the site with regards to flood risk in line with the National Planning Policy Framework (NPPF) and Flood Risk and Coastal Change Planning Practice Guidance (PPG).
- ii. An assessment of the surface water runoff.
- iii. An assessment of the foul water flows.

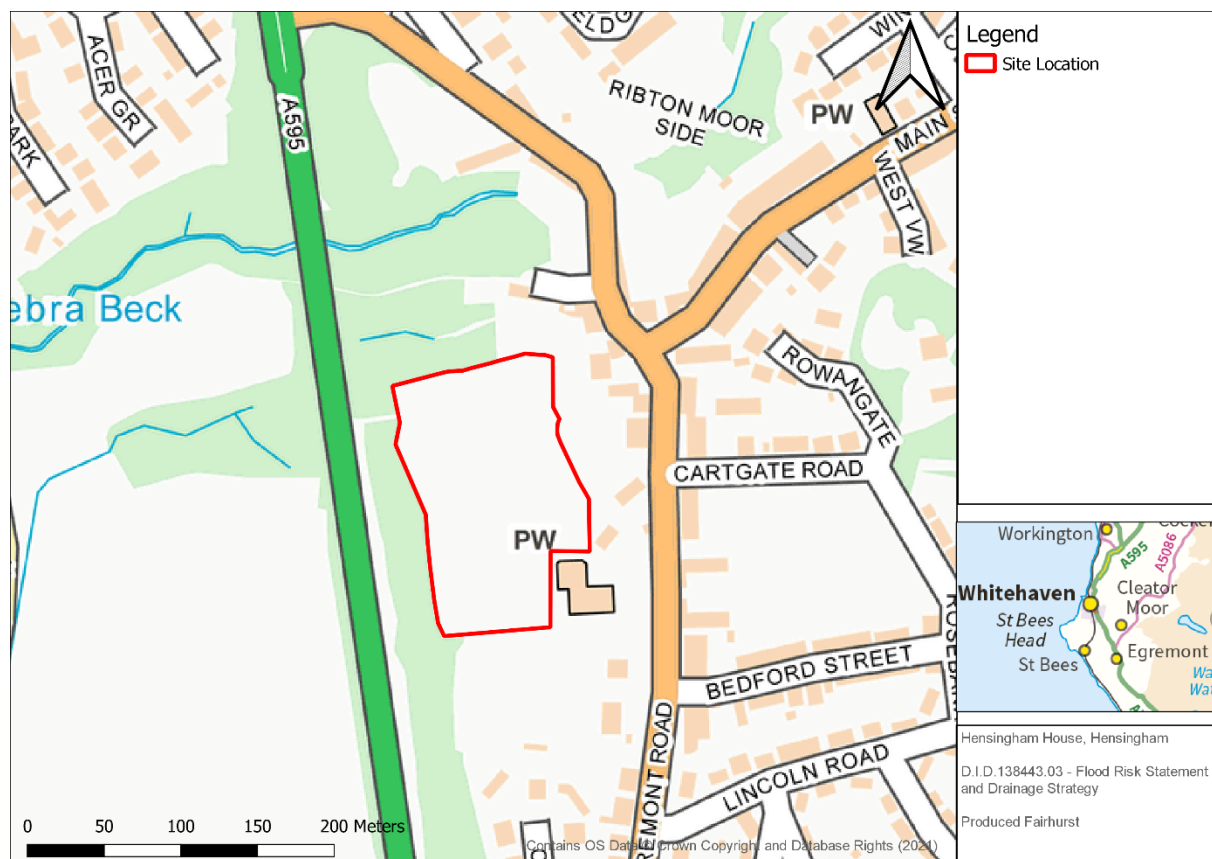


Figure 1 - Site Location

2. Legislative Framework

2.1 National Planning Policy

One of the key aims of the National Planning Policy Framework (NPPF) and Planning Policy Guidance (PPG) is to ensure that flood risk is taken into account at all stages in 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, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

A risk-based approach should be adopted at all levels of planning. Applying the source pathway-receptor model to planning for development in areas of flood risk requires:

- a strategic approach which avoids adding to the causes or “sources” of flood risk, by such means as avoiding inappropriate development in flood risk areas and minimising run-off from new development onto adjacent and other downstream property, and into the river systems;
- managing flood “pathways” to reduce the likelihood of flooding by ensuring that the design and location of the development maximises the use of SuDS, and takes account of its susceptibility to flooding, the performance and processes of river/coastal systems and appropriate flood defence infrastructure, and of the likely routes and storage of floodwater, and its influence on flood risk downstream; and
- reducing the adverse consequences of flooding on the “receptors” (i.e. people, property, infrastructure, habitats and statutory sites) by avoiding inappropriate development in areas at risk of flooding.

A FRA should be carried out to the appropriate degree at all levels of the planning process, to assess the risks of all forms of flooding to and from development taking climate change into account. **The Sequential Test is not required for this development which is classified as a major development but located within Flood Zone 1.**

In areas at risk of river or sea flooding, preference should be given to locating new development in Flood Zone 1. If there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

Flood risk has been categorised as High, Medium and Low based on the probability of inundation. Extracts from Tables 1, 2 and 3 of the Flood Risk and Coastal Change PPG are provided below, which highlights the likely response to planning applications within each Flood Zone.

Residential development is categorised as “more vulnerable” and therefore should only take place within Flood Zones 1, 2 or 3a provided suitable mitigation measures have been undertaken.

Table 1 - Extract from the Flood Risk and Coastal Change Planning Practice Guidance

Zone 1 Low Probability

Definition

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%).

Appropriate uses

All uses of land are appropriate in this zone.

Flood risk assessment requirements

For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention.

Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Zone 2 Medium Probability

Definition

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.

Appropriate uses

Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed.

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

Zone 3a High Probability

Definition

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.

Appropriate uses

The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone.

The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
- relocate existing development to land in zones with a lower probability of flooding; and

create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

Definition

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses

Only the water-compatible uses and the essential infrastructure listed in Table 2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
- relocate existing development to land with a lower probability of flooding.

Where required an exception test must be passed in order for developments of that nature to be justified within the Flood Zone. For the Exception Test to be passed the following must be demonstrated:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

The site is located entirely within Flood Zone 1 and as such the exception test is not required.

Table 2 - Flood risk vulnerability classification from the Flood Risk and Coastal Change Planning Practice Guidance

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use³.

- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).

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.

Less vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops, financial, professional and other services,
- restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.

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- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (**excluding sleeping accommodation**).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a **specific warning and evacuation plan**.

Table 3 - Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗
Extract from the Flood Risk and Coastal Change Planning Practice Guidance Key: ✓ Development is appropriate. ✗ Development should not be permitted.						

The proposed development is classified as a residential development. Thus the development is classified as being 'more vulnerable' and in accordance with the NPPF PPG and is located

within Flood Zone 1. Thus neither the Sequential nor the Exceptions tests are required for the development.

2.2 Local Planning Policy

The Copeland Local Plan – Core Strategy and Development Management Policies was adopted in December 2013 and sets out the council's policies and proposals for development and land use in the local area. The Local Plan contains several key policies relating to flood risk:

Policy ENV1 – Flood Risk and Risk Management:

The Council will ensure that development in the Borough is not prejudiced by flood risk through:

- a. Permitting new build development only on sites located outside areas at risk of flooding, with the exception of some key sites in Whitehaven;*
- b. Ensuring that developments on important regeneration sites in Whitehaven Town Centre and Harbourside and Pow Beck Valley are designed to address the existing levels of flood risk without increasing flood risk elsewhere;*
- c. Ensuring that new development does not contribute to increased surface water run-off through measures such as Sustainable Drainage Systems, where these are practical. Where they are not this should be achieved by improvements to drainage capacity;*
- d. Supporting measures to address the constraints of existing drainage infrastructure capacity and avoiding development in areas where the existing drainage infrastructure is inadequate; and*
- e. Support for new flood defence measures to protect against both tidal and fluvial flooding in the Borough, including appropriate land management as part of a catchment wide approach.*

Individual development proposals will be assessed with regard to Development and Flood Risk under Policy DM24.

Policy DM24 – Development Proposals and Flood Risk:

Where a proposed development is likely to be at risk from flooding or increases risk of flooding elsewhere, a Flood Risk Assessment (FRA) will be required to be submitted as part of the planning application.

Development will not be permitted where it is found that:

- a. There is an unacceptable risk of flooding; or*
- b. The development would increase the risk of flooding elsewhere; or*
- c. The development would cause interference with or loss of access to a watercourse and the benefits of the development do not outweigh the risks of flooding.*

Where a development requires the provision of additional flood defence and mitigation works, any costs, including maintenance, should be met by the developer.

3. Development Site

3.1 Existing Site Conditions

The development site is located on land off Egremont Road in Hensingham. Table 4 presents the key details of the site:

Table 4 - Key site details

Site location	Land at Egremont Road, Hensingham
Site area (ha)	1.7
National grid reference	NX 98513 16702
Postcode	CA28 8QW
Existing land use	Open fields
Local Planning Authority	Copeland Borough Council
Lead Local Flood Authority	Cumbria County Council

The site is comprised entirely of an open field located west of Egremont Road in Hensingham. The site is bounded by wooded space to the north, a mix of mostly residential developments to the east, the grounds of the St John's Church to the south east, open fields to the south west and the Hensingham Bypass to the west. Access to the site is understood to be from the north west via single track concrete track.

3.2 Site Topography

In the absence of a topographic survey at the time of writing, the site's topography was determined using freely available 1m composite LiDAR data. LiDAR data shows that the site generally slopes from south east to north west. High points of the site are recorded north of St John's church where elevations of approximately 84.2m AOD are recorded. The lowest points are recorded in the north west corner of the site, where elevations of approximately 70.4m AOD are recorded. The entire site slopes steeply from east to west. A difference in elevation of over 12m is observed near the northern boundary of the site.

Appendix A shows the topographical elevations on site based on 1m composite LiDAR data.

3.3 Existing Watercourses

The nearest watercourse is small ditch like channel is marked on OS mapping to be c.20m north of the site, which appears to connect with the Pow Beck west of the site (based on the EA's flood risk mapping). Flow appears to travel from east to west past the site. LiDAR data shows that the banks of the watercourse sit over 4m lower than the development site to the south.

Another watercourse, the Snebra Beck is located approximately 90m north of the site. The Snebra Beck flows westwards, eventually joining with the Pow Beck approximately 700m to the west.

There are no other watercourses relevant to the site.

3.4 Proposed Development

The proposed development is for the construction of 27 no. residential properties with associated road access, parking space and green areas. An access is to be created onto Egremont Road (B5295) north of Georgian House and opposite Cartgate Road, in the position of an existing driveway and open area.

The proposed site layout plan is provided in Appendix B.

3.5 Historic Features

Historical mapping for the site and surrounding area has been examined from 1867 in order to identify changes which may be relevant to flood risk.

The earliest available mapping shows the site to be within the boundary of several agricultural fields. The Snebra Beck is located to the north following a similar flow route as is shown in present day mapping. Some development is located north east of the site comprising Hensingham. A railway line is also mapped west of the site, following the same line as can be observed present day.

By 1879 the site is split between two fields. A row of trees divide the two fields extending from east to west. A significant amount of wooded area is located immediately north of the site. A 'Hall' (later referred to as Hensingham Hall) is located immediately north east of the site.

In 1899 a vicarage is marked immediately south east of the site. In 1925 St John's Church is marked for the first time to the north of the vicarage. Land east of the site has also become more developed comprising residential developments with allotment gardens mapped from 1925.

The site remains unchanged until the most recent historical maps from 1979, with the surrounding area gradually becoming more developed over that time. The Hensingham Bypass immediately west of the site was constructed some time during the 1980s.

4. Sources of Flood Risk Information

4.1 Environment Agency (EA)

The EA flood map for planning shows the entire site to be located within Flood Zone 1 (Figure 2). This means that the site is not considered to be at risk from fluvial flooding during the 0.1% AEP (1 in 1000 year Annual Exceedance Probability) event. The nearest flood zone is located ~20m north of the site boundary, associated with the tributary of the Pow Beck.

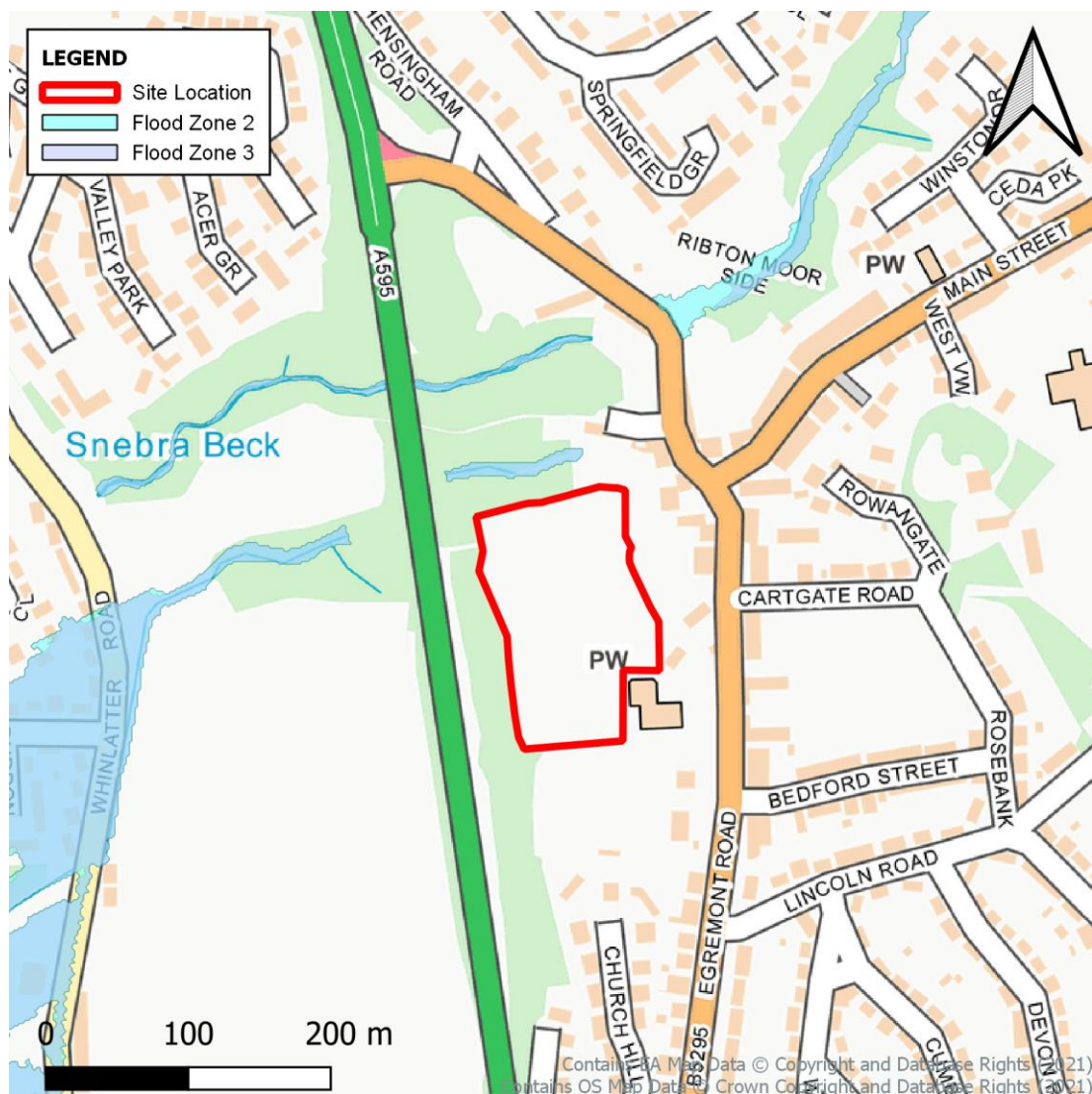


Figure 2 - Extract from the EA's Flood Map for Planning

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The EA's risk from surface water map shows the entire site to be at a very low risk from surface water flooding (Figure 3). This means that the site is outside of the area of risk during the 0.1% AEP (1 in 1000 year) rainfall event.

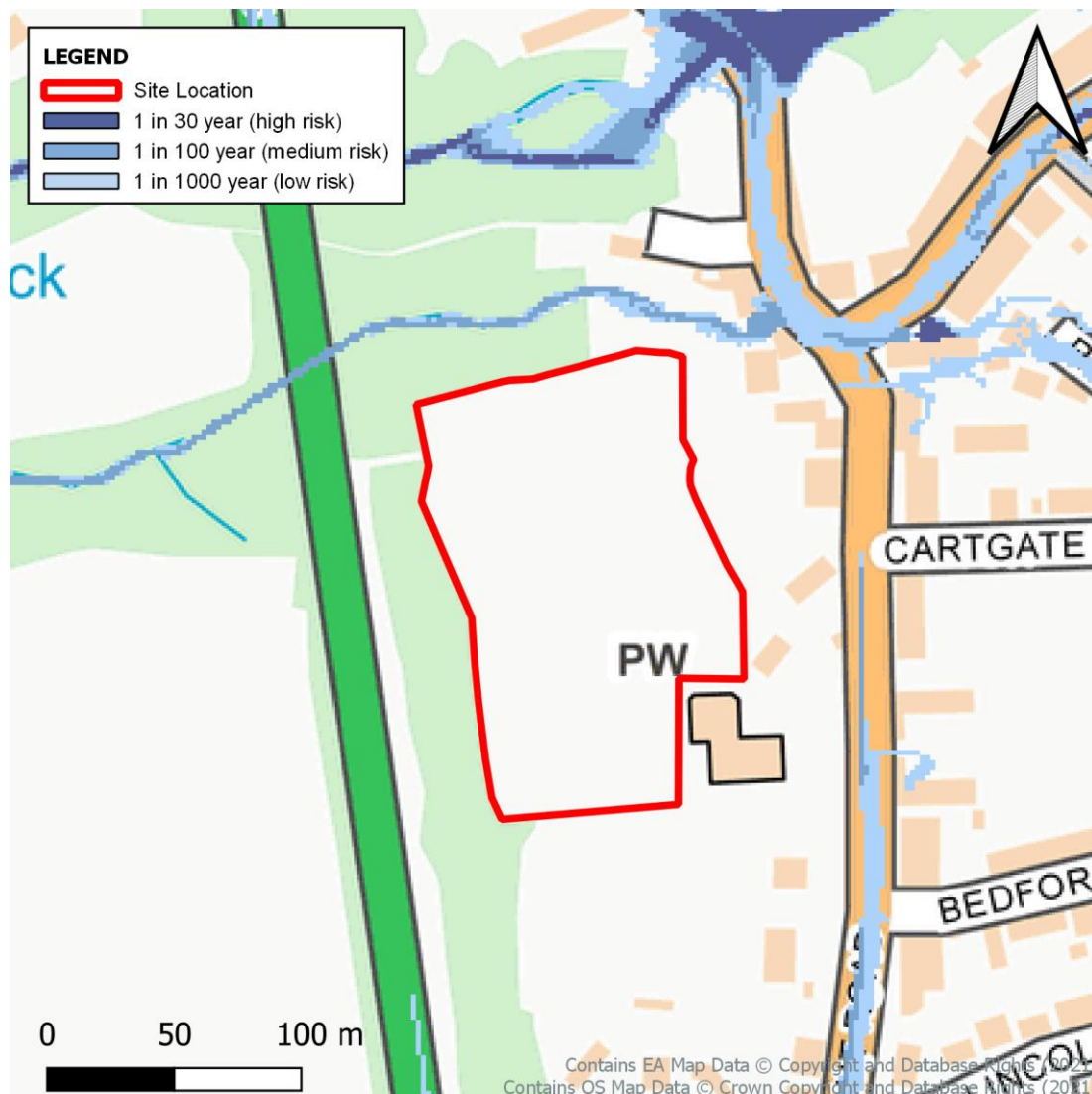


Figure 3 - Extract from EA's Risk of Flooding from Surface Water map.

The EA's recorded flood outline map shows that the site is not located within an area that has been recorded to flood in the past (Figure 4). The nearest record of flooding is approximately 550m south west of the site. Flooding was recorded along the banks of the Pow Beck in November 1999 when the channel capacity of the beck was exceeded.

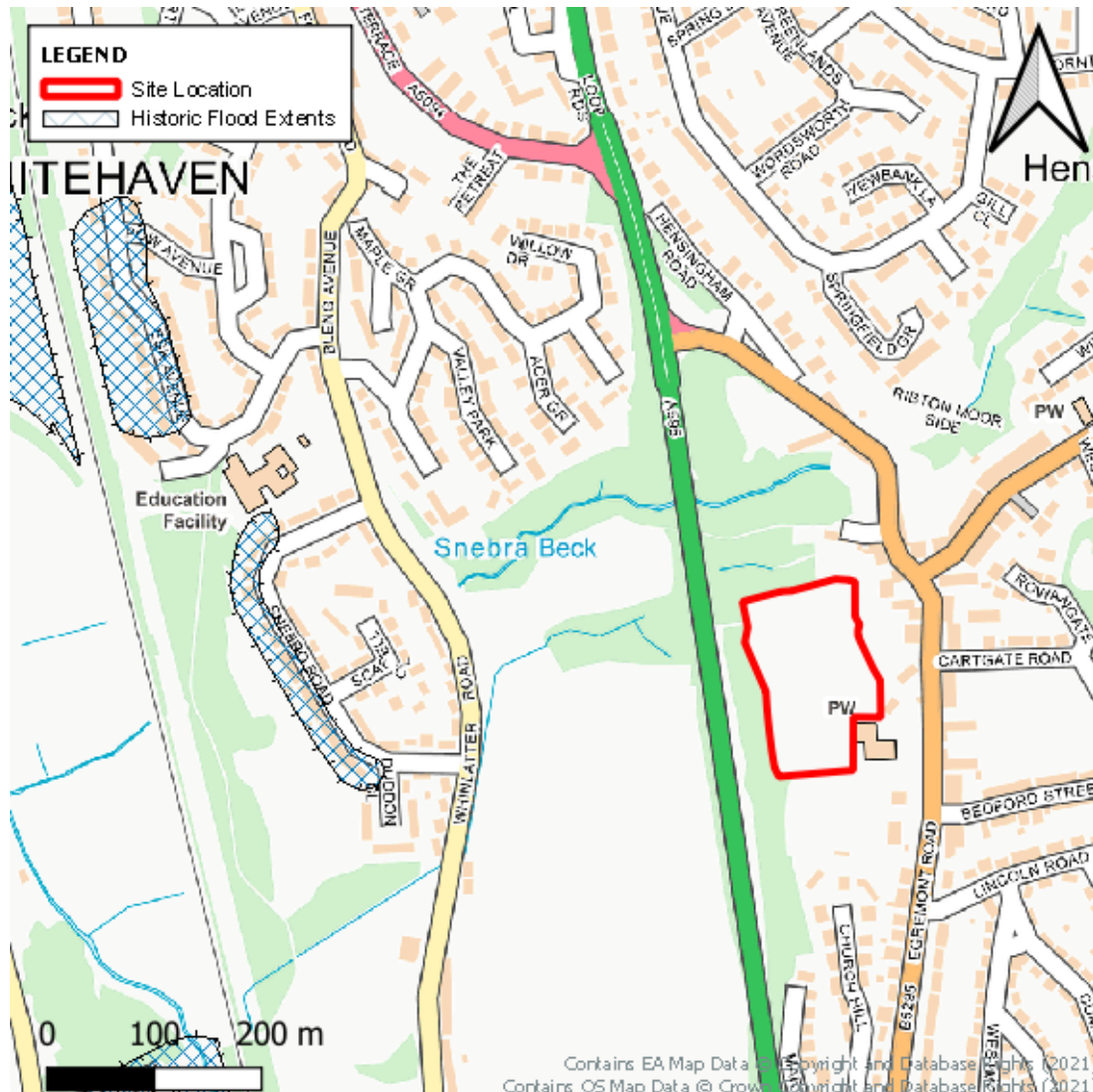


Figure 4 - Extract from EA's Risk Recorded Flood Outlines map.

4.2 Strategic Flood Risk Assessment (SFRA)

The Copeland Borough Council SFRA (August 2007) provides a summary of the main sources of flood risk in the council area. The SFRA describes the main source of flood risk in the council area to be tidal, with many settlements along the Copeland coastline located within the tidal surge limit. Fluvial flooding is described as the next biggest source of risk, followed by culvert related problems and sewer flooding.

The SFRA provides some information regarding the Snebra Beck, which is one of the nearest sources of fluvial flood risk to the site:

- Some settlements located along the banks of the Snebra Beck are at risk from fluvial flooding, particularly at Bleng Avenue and Ribton Moor;
- Area of flood risk at Ribton Moor pose a risk of life, with modelling showing the area to be within the functional floodplain (Flood Zone 3B). Deep, fast moving flows are recorded during flood events; and
- Informal defences are located downstream of the confluence between Snebra Beck and Pow Beck, providing protection to nearby properties.

The SFRA also describes there to be limited potential for groundwater flooding within the council area, with only 10 properties within the whole borough considered to be at risk.

The SFRA does not identify any flood risk information specific to the site.

4.3 Sewerage Company

United Utilities (UU), the sewerage operator in the region, is required by OFWAT to maintain a record of flooding incidents due to hydraulic capacity problems on the sewerage network. Properties are placed on the register following investigations to determine the cause and risk of flooding and are placed on the appropriate register depending on risk – not on the number of occurrences of flooding.

UU have been contacted to determine if they have any records of sewer flooding relevant to the site. They are yet to respond to the request at the time of writing. A copy of any response provided by UU will be forwarded onto the client upon receipt.

4.4 Local Authority

Copeland Borough Council (CBC) are the Local Authority for the development area. CBC have been contacted to determine if they hold any historical records of flooding for the site. CBC are yet to respond to the request at the time of writing. A copy of any response provided by CBC will be forwarded onto the client upon receipt.

CBC are currently updating their software system so that all planning applications and related documents can be viewed on their website. As the system is currently unavailable, it was not possible to review flood risk information for surrounding developments.

4.5 Lead Local Flood Authority (LLFA)

Cumbria County Council (CCC) are the LLFA for the development area. CCC have been contacted to determine whether they hold any historical records of flooding for the site. CCC responded stating that they do not hold any records of historical flooding for the site (Appendix C).

5. Potential Sources of Flood Risk

5.1 Fluvial (Rivers)

5.1.1 Present Risk

Extreme fluvial flood events have the potential to cause rapid inundation of properties whilst posing a threat to the welfare of occupants and potentially preventing emergency access to properties and essential infrastructure. The entire site is located within Flood Zone 1, meaning that it is not identified as being at risk from fluvial flooding up to the 0.1% AEP (1 in 1000 year) fluvial flood event.

The nearest flood zone is located approximately 20m north of the site, associated with the tributary to the Pow Beck. 1m composite LiDAR data suggests a difference in elevation of at least 4m between the lowest point of the site and elevations at the flood zone boundary of the watercourse immediately north. Thus flood risk from this source is considered to be low.

5.1.2 Future Risk (Climate Change)

The EA guidance document 'Flood risk assessments: climate change allowances' was released in February 2016 and included statistical increases in peak fluvial flows by river basin district and allowance categories based on epochs and development vulnerability classification.

Referring to the NPPF PPG (Table 2), the development is residential in nature and thus is classified as being 'more vulnerable'. The proposed development has an expected lifetime of circa. 100 years. As such the guidance suggests that appropriate climate change allowances for the North West River Basin District are the 'Central (30%)' and 'Higher Central (35%)' allowances.

1m composite LiDAR data indicates a difference in elevation of at least 4m between the lowest elevations at the site and the nearest flood zone to the north. Based on this it is considered unlikely climate change will increase flood extents such that they extend onto the site.

5.2 Infrastructure Failure

5.2.1 Conveyance Infrastructure

The failure of conveyance infrastructure such as culverts and bridges could increase the risk of flooding to the site. Both the small tributary to the Pow Beck immediately north of the site and the Snebra Beck located further north are culverted in close proximity to the site. Blockage at either of these culverts could lead to a significant body of flow building up behind the blockage and extend onto the surrounding area.

1m composite LiDAR data suggests a difference in elevation of approximately 4m between the northern boundary of the site and the banks of the watercourse immediately north. Based on this it is considered unlikely that a culvert blockage at either watercourse would cause water levels to rise so significantly that they provide a risk of flooding to the site as flows would more likely overtop the blockage and flow within the watercourse channel.

The nearest bridge is located 100m north west of the site, allowing the Hensingham Bypass to cross over the Snebra Beck. It is possible that a catastrophic failure of this bridge could result in an increased risk of flooding to the site however this is considered unlikely due to the bypass being critical road infrastructure that will be monitored and maintained by the appropriate highway authority. Thus flood risk from this source is considered to be low.

5.2.2 Defence Infrastructure

The nearest EA maintained flood defences are located approximately 2km north west of the site at Whitehaven Harbour. The CBC SFRA (August 2007) identifies that some informal flood defences exist downstream of the confluence between Snebra Beck and Pow Beck. Although the exact location of these defences is unknown; the confluence between the two watercourses is located approximately 700m west of the site. Given the distance from the site from all known flood defences, flood risk due to the failure of defence infrastructure is considered to be low.

5.3 Pluvial (Overland Flow)

The EA's surface water flood mapping does not show the site to be at risk from pluvial flooding. This means that no areas of the site are identified as being at risk during events up to the 0.1% AEP (1 in 1000 year) rainfall event.

The nearest area of risk is located approximately 20m north of the site, associated with the tributary to the Pow Beck.

5.4 Coastal or Tidal

None of the watercourses in proximity to the site are understood to be tidally influenced. As such, flood risk to the site from tidal sources is considered to be low.

5.5 Sewer Flooding

United Utilities are yet to respond to the enquiry for historical sewer flooding information. The Copeland SFRA (August 2007) identifies that there has been sewer flooding incidents within the borough in the past, including at the Pow Beck which has flooded due to '*insufficient sewer capacity, blocked culverts and trash screens*'. It is generally understood within the SFRA that local drainage issues, including those associated with sewer systems, have attributed to inundation from flood waters and increased overland flows during storm events which can often exacerbate flooding.

United Utilities sewer plans (Appendix D) do not show any adopted sewers within the site boundary. The nearest sewers are located adjacent to Egremont Road at the north east boundary of the site. These are identified as 100mm combined that convey flow north west. In the event of a sewer (private or public) exceedance event flows can be expected to pool in low lying areas within the adjacent areas. Overall the site is considered to be at a low risk should a sewer exceedance event occur with flows most likely to be contained in the onsite highways post development.

5.6 Ground Water

Soilscapes mapping describes soils at the site (and across most of the Whitehaven region) as being 'freely draining slightly acid loamy soils' with drainage described as being 'freely draining'. BGS online mapping describes the site to be underlain by superficial deposits of 'Till – Diamicton' overlaying a bedrock geology of 'Stainmore formation – Mudstone, siltstone and sandstone'.

The Copeland SFRA (August 2007) describes there as being limited potential for groundwater flooding within the borough, with only 10 properties identified as being at risk within the entire South West Lakes Catchment. This is due to a sandstone aquifer underlying much of the south-west facing coastline, which is overlain with clays and thus limits groundwater emergence. However the SFRA also caveats that due to the unpredictable nature of groundwater flooding, there is still a risk that it can occur within the borough.

In May 2020 Geoinvestigate Ltd. carried out a report on the natural drainage potential for SuDS schemes at the site. As part of this a review of local borehole records was included. The report notes: *"Clay soils to between 1.90m and 2.50m likely to be extremely low permeability. Underlying siltstone and mudstone likely low and extremely low permeability respectively"*. The full report can be viewed in Appendix E.

In general groundwater flooding tends to be highly localised and will pose the greatest risk to any development properties containing basements or below ground areas. Based on the description provided within the Copeland SFRA, there is considered to be a low risk from groundwater flooding. Should a better understanding of groundwater flooding be required a full groundwater assessment would be required.

5.7 Artificial Water Bodies

Reservoirs and other artificial water bodies have the potential to hold a large volume of water, often above ground level. Should the containment of these waterbodies fail (e.g. due to breach or overtopping) there could be a sudden release of deep fast moving water with little warning able to be provided. However, due to regular maintenance there is a low risk posed from such an event. Reservoir flooding is extremely unlikely to occur and there has been no loss of life in the UK from reservoir flooding since 1925.

The EA's flood risk from reservoir mapping does not show the site or surrounding area to be at risk from reservoir flooding.

6. Mitigation measures

6.1 Finished Floor Levels

In order to reduce the risk from surface water flooding to buildings following development land should be shaped to encourage runoff away from the proposed development. It is recommended that all FFLs should be raised where possible to a minimum of 150mm above adjacent areas of finished ground level to mitigate against the residual risk of flooding from surface water or sewer exceedance flows.

EA flood maps have not identified any areas of the proposed site that fall within the 1% AEP fluvial flood extent. Hence no further alterations to FFLs are required to protect the site from fluvial or pluvial flooding.

6.2 Flood Resistance Measures

The site is elevated above the nearest area of fluvial flood risk, with floor levels to be set above ground level to mitigate against the residual risk from surface water and sewer flooding. As such, flood resistance measures are not considered to be necessary for the site.

6.3 Flood Resilience Measures

The site is elevated above the nearest area of fluvial flood risk, with floor levels to be set above ground level to mitigate against the residual risk from surface water and sewer flooding. As such, flood resilience measures are not considered to be necessary for the site.

6.4 Safe access/egress

As the site is not described as being at significant risk from pluvial or fluvial sources of flooding the site is considered to have safe access and egress.

6.5 Floodplain Compensation

The site is located entirely within Flood Zone 1; as such there will be no change in floodplain storage as a result of the development and no requirement for compensation to be provided.

7. Surface Water Drainage

The development is located entirely within Flood Zone 1. In accordance with the NPPF, the drainage strategy will focus on the management of surface water to ensure that flood risk is not increased on or off site. The surface water strategy for the site has been developed in accordance with the Building Regulations Part H hierarchy.

7.1 Surface Water Runoff Rates

7.1.1 Existing rates

The full site occupies an area of 1.7 ha comprised entirely of open fields. Based on the latest proposed layout (Appendix B) approximately 1 ha of the site is to be made impermeable following development such that formal drainage will be required. The equivalent greenfield rates of this area is provided in Table 5. Full Micro Drainage outputs are provided in Appendix F.

Table 5 - Existing greenfield rates

Event	Greenfield Discharge Rate (l/s) (1 ha)
1 in 1 Year	5.8
Q _{BAR}	6.2
1 in 30 Year	11.3
1 in 100 Year	13.9

7.1.2 Proposed rates

For developments on greenfield land, CCC (i.e. the LLFA for the site) state in their Non-Statutory Technical Standards for Sustainable Drainage – Practice Guidance that *‘for greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.’*

Based on this, it is proposed that surface water is to be discharged at existing greenfield rates for equivalent events using a pumping station at the bottom end of the site. This means that discharge rates will be restricted to 5.8 l/s during the 1 in 1 year event and restricted to 13.9 l/s during the 1 in 100 year event in line with CCC guidance. This will ensure that the system does not create an increase in surface water flows from existing rates.

7.2 Proposed Surface Water Drainage

The Building Regulations Part H sets out a hierarchy for the choice of discharge point for a rainwater system. In order of priority, the possibilities are given as:

- An adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable,
- A watercourse; or where that is not reasonably practicable,
- A sewer.

7.2.1 Discharge via Infiltration

FSR SOIL values range from 0.15 to 0.5 with 0.15 representing freely draining soils and 0.5 representing impeded drainage. Descriptors for the site area indicate a SOIL value of 0.45 for the site, indicating there is limited scope to discharge surface water into the ground.

In May 2020 Geoinvestigate Ltd. carried out a review of the natural drainage potential for SuDS schemes at the site. The review states *“the silty clay soils which are recorded to a depth of ca. 2m at or very close to the study site and the underlying siltstone or mudstone bedrock would all be expected to exhibit intrinsically low or very low permeability and it is therefore concluded that the use of natural drainage such as soakaways, permeable paving or infiltration trenches will not be feasible at this site”*. Thus the report concludes that *“natural recharge via infiltration into subsoils is extremely unlikely to be feasible at this site”*. A copy of the report is provided in Appendix E.

Given the SOIL value for the site and the main conclusions from the SuDS review it is considered that infiltration will not be suitable for removing surface water from the site. In order to confirm this it is recommended that site specific infiltration should be carried out for the site to confirm.

7.2.2 Discharge to a Watercourse

The nearest watercourse is the small tributary to the Pow Beck located approximately 20m north of the site. The raised site slopes towards this watercourse, it is proposed that surface water from the site is discharged to this watercourse at greenfield rates for equivalent events.

It is likely that this watercourse is the receptor for runoff from the current site due its proximity and the existing ground levels, the proposed surface water drainage approach will ensure the natural catchment flows are retained post development.

7.2.3 Discharge to a Sewer

Discharge to a watercourse is already shown to be viable for the site. As such discharging surface water via a sewer connection is not considered to be appropriate.

7.2.4 Climate Change

To ensure that the proposed discharge rates can be achieved, it will be necessary to provide surface water attenuation within the development. The EA generally advises that a lifespan of 100 years should be used for developments..

The latest Technical Guidance from the NPPF also states that new developments should understand the flooding implications for the effect of a 50% increase in the peak rainfall intensity.

In order to ensure no increase in risk as a result of the development, the attenuation storage has considered a 50% increase in climate change for 1% AEP. Taking into account the lifespan of the development and the anticipated increase in rainfall intensity due to climate change, an estimate for the surface water attenuation volume has been carried out for the development using the industry standard software, Micro Drainage.

On the basis that the approximately 58% of the development site will be impermeable (equivalent to 1 ha) approximately 1337m³ of storage will be required (assuming no infiltration) for the site as a whole. This is for events up to the 1 in 100 year return period with 50% increase in rainfall due to climate change restricted to the 1 in 100 year greenfield rate. Approximate storage volume is based upon a four staged design in Micro Drainage.

7.3 SuDS

The SuDS Manual (CIRIA C753) details a wide range of drainage techniques some of which may be incorporated within the proposed drainage design. Some which may be suitable for the site include:

- Underground Attenuation Storage;
- Oversized pipeworks;
- Permeable paving;
- Shallow open attenuation features such as a swale; and
- Rain Gardens.

SuDS will be incorporated into the proposed layout to decrease runoff where possible across the site. Given the large volume of storage that is required, it is anticipated that underground attenuation storage tanks located underneath the proposed play area will provide the majority of the required attenuation storage. Additional tanks or oversized piping may also be required to provide additional storage elsewhere.

There is limited space within the proposed site layout to provide large open SuDS such as basins or ponds. However there may be scope to include some shallow open SuDS features such as a swale or rain gardens to allow some additional treatment to surface water prior to discharge.

It is also proposed that permeable paving is used in all proposed car parking spaces incorporated into the site.

- The available information on ground conditions indicate that infiltration is not viable for the site.

This strategy therefore recommends that permeable paving is lined and drains to the wider drainage system.

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All SuDS installed will attenuate and store surface water runoff from the proposed development prior to discharging into the surface water sewer. The indicative drainage layout for the proposed site can be seen on the Fairhurst drawing 138443/2001 - Indicative Drainage Layout (Appendix H).

The feasibility and suitability of each SuDS solution will be fully appraised during the detailed design stage of the development. It is noted that the site slopes steeply from east to west; however no final levels for the development were available at the time of writing. It is assumed that the final levels will be graded appropriately to allow the drainage layout outlined in Appendix H. Introducing SuDS onto the development may reduce the volume of storage needed; this will be calculated as part of the detailed design stage. However, it is considered that the information provided demonstrates that a feasible solution is available. This will ensure that flood risk will not increase on, or off, site as a result of the proposed development.

8. Foul Water Drainage

Foul flows from the proposed development are calculated to be 1.35 l/s, using the design flow of 0.05 litres/dwelling/second. This is in accordance with The Design and Construction Guidance ('The Code') 2022.

It is proposed that foul flows will be discharged into UU sewers located on between the site boundary and Egremont Road east of the site, which is shown to convey flows north and then west. A pre development enquiry should be submitted to UU to confirm that there is capacity within their sewers to handle flows from the development.

The final site levels and depth of the UU sewer mean private pumping is required. This should be confirmed following the completion of the proposed site levels and any site topographic survey should aim to collect nearby UU manhole depths.

9. Development Potential

The entire development site is within Flood Zone 1 in accordance with the flood map for planning. This suggests that the site will not be at risk of fluvial flooding during events up to the 0.1% AEP event.

Because the entire site is located within Flood Zone 1 there is no requirement to carry out a Sequential Test to identify areas of lower risk. This is in line with the information set out in the Flood Risk and Coastal Change Planning Practice.

The proposed development is classified as 'More Vulnerable' according to Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance. From Table 3 in the Practice Guidance, the proposed development is suitable for the site.

10. Conclusions

This FRA and Drainage Strategy have been produced for the proposed development on land west of Egremont Road, Hensingham. The proposed development is for the construction of 29 no. residential properties including car park area, road access and green space. The report has been prepared in accordance with the NPPF, the Flood Risk and Coastal Change Planning Practise Guidance, and the local planning policy documents.

The planning application boundary is located entirely within Flood Zone 1 in accordance with the flood map flood map for planning and is shown to be at a very low risk from surface water flooding. No other significant sources of flood risk have been identified as part of the FRA. It is recommended that the FFL of all plots are raised above ground level to mitigate against the residual risk from surface water or sewer flooding.

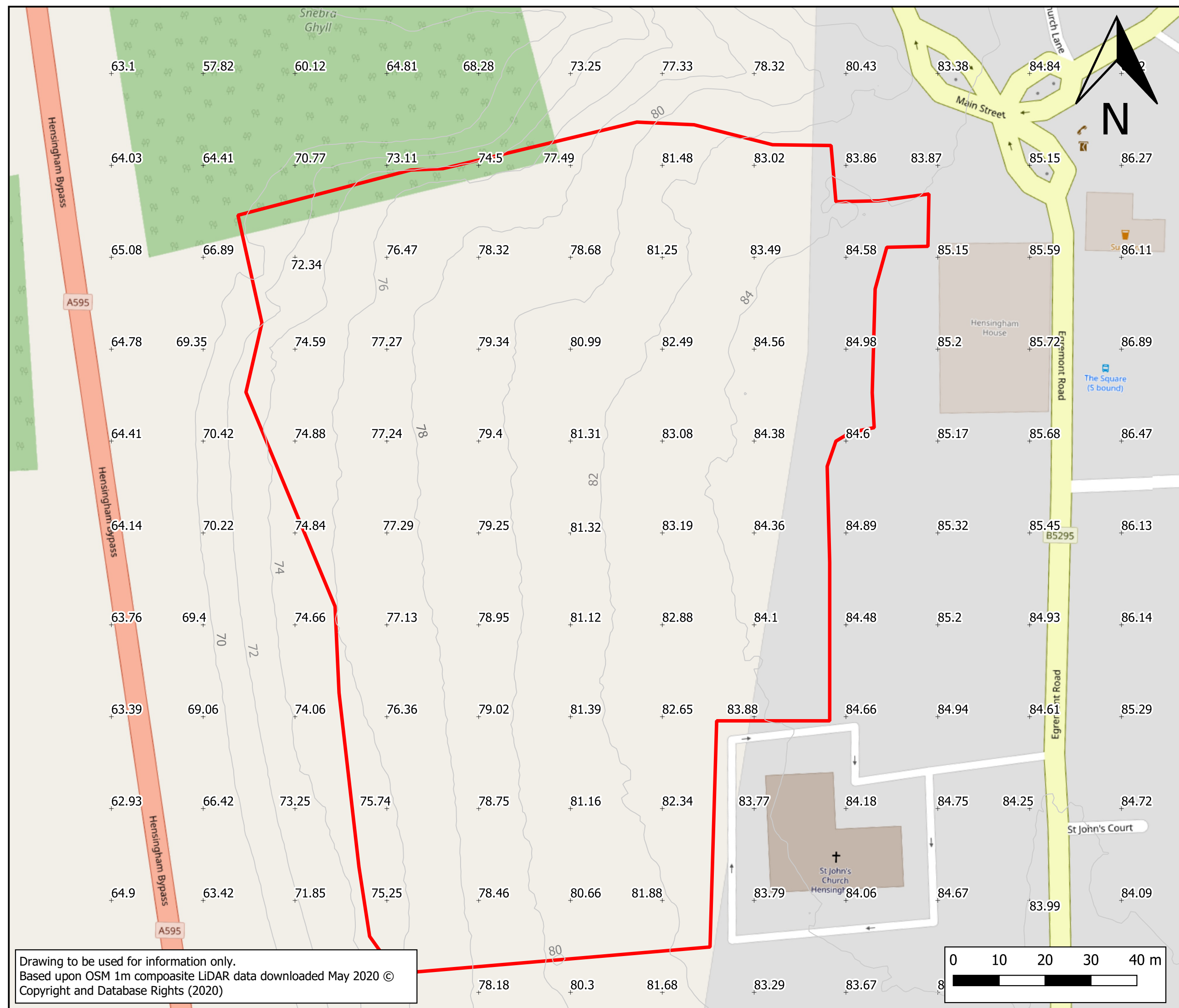
It is proposed that surface water from the development will be discharged into the small tributary of the Pow Beck located north of the site. In line with local guidance it is proposed that surface water rates match existing greenfield rates for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event. Attenuation storage will be provided to ensure that the development can handle flows up to the 1 in 100 year rainfall event with a 50% allowance for climate change.

It is proposed that foul flows are discharged into UU assets located to the east of the site between the development boundary and Egremont Road. A pre planning sewerage enquiry should be submitted to UU to confirm that there is capacity within their assets to handle flows from the development. Following a topographic survey and setting proposed levels it should be confirmed if any pumping of foul water will be required.

It is concluded that the proposed development is appropriate for the site provided that suitable mitigation measures are included and there will be no increase in flood risk to the site or surrounding area as a result of the development.

Appendix A

Topographical Elevations (Based on 1m Composite LiDAR)



Legend

Site Location

+

 Elevations (mAOD)

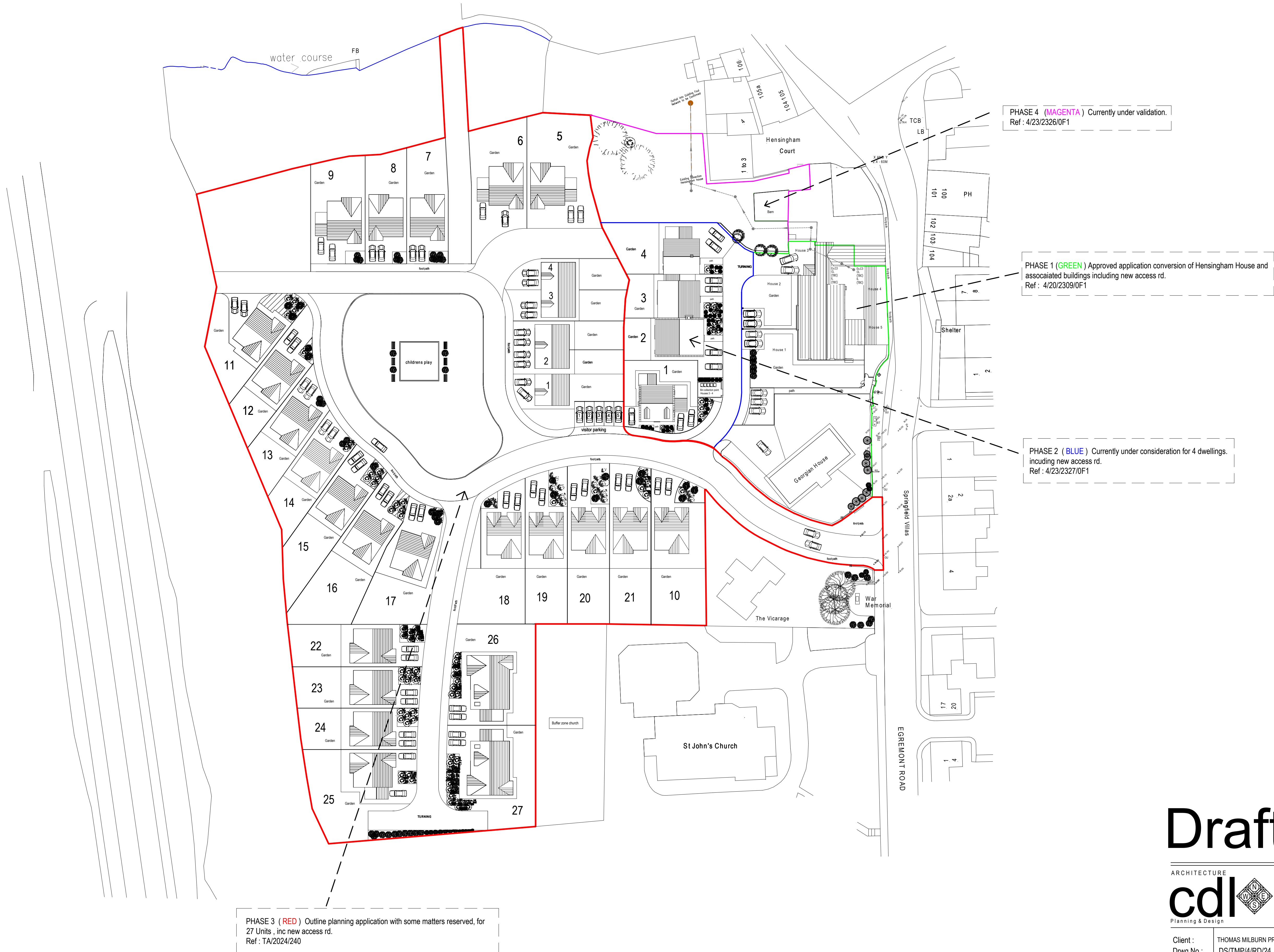
2m Contours

REV	DATE	DESCRIPTION	BY	APP
FAIRHURST		1 Arngrove Court Barrack Road Newcastle upon Tyne NE4 6DB tel: 0191 221 0505		
PROJECT TITLE: HENSHINGHAM (PHASE TWO) CUMBRIA				
DRAWING TITLE: TOPOGRAPHICAL ELEVATIONS BASED ON 1M COMPOSITE LIDAR				
DRAWN: JS		CHECKED: DN	APPROVED: DN	
DATE: 02/06/2020		DATE: 03/06/2020	DATE: 03/06/2020	
DRAWING NUMBER: 138443/SK001			REV: -	

Drawing to be used for information only.
Based upon OSM 1m composite LiDAR data downloaded May 2020 ©
Copyright and Database Rights (2020)

Appendix B

Proposed Layout



PHASE 4 (MAGENTA) Currently under validation.
Ref : 4/23/2326/0F1

PHASE 1 (GREEN) Approved application conversion of Hensingham House and associated buildings including new access rd.
Ref : 4/20/2309/0F1

PHASE 2 (BLUE) Currently under consideration for 4 dwellings, including new access rd.
Ref : 4/23/2327/0F1

PHASE 3 (RED) Outline planning application with some matters reserved, for 27 Units, inc new access rd.
Ref : TA/2024/240

This drawing is copyright, reproduction of this drawing is only with consent from C.D.L Figured dimensions are to be followed in preference to scaled dimensions, and all measurements to be checked on site, and to be taken from the actual work where possible. Any discrepancy must be notified immediately, and before proceeding. All drawings and associated specifications to be returned on request. DO NOT SCALE FROM THIS DRAWING

Draft

ARCHITECTURE

cdl

Planning & Design

Mob : 07786991404
The Studio 26 Corporation Rd
Carlisle
Cumbria CA3 8XB
E Mail : cdlarcdesign@gmail.com

Client :	THOMAS MILBURN PROPERTY LTD		
Drwg No :	DS/TMP/4/RD/24		
Date :	JULY 24	Checked By : DS	REVISION C
Scales :	Elevations : 1 : 100	Detail : PLANNING	
	Floor Plans : 1 : 100	Title : ALL PHASES 1 - 4 WITH REVISION PHASE 2	
	Block Plan :		
	Location Plan :	Address : HENSINGHAM HOUSE, HENSINGHAM, WHITEHAVEN	
	Sections :	CUMBRIA . CA28 8QB	

The logo for Fairhurst, featuring the word "FAIRHURST" in white capital letters on a black rectangular background. This black rectangle is positioned on a blue horizontal bar that spans the width of the page header. A thin red horizontal line is located directly beneath the black rectangle.

FAIRHURST

Appendix C

Cumbria County Council FOI Response

Information Governance Team • The Parkhouse Building • Kingmoor Business Park • Carlisle • Cumbria • CA6 4SJ
T: 01228 221234 • E: information.governance@cumbria.gov.uk

PRIVATE AND CONFIDENTIAL

Jack Shelton

1 June 2020

Dear Jack Shelton

Freedom of Information Act 2000, Reference: FOI-5583-2020

The council has completed its search relating to your request about flood risks at Egremont Road received on Fri, 29 May 2020.

Request

I am investigating flood risk for a site at Egremont Road, Hensingham. The postcode for the site is CA28 8QW and the grid reference is NX 98513 16702. I can also provide a site layout plan is required.

Please could you inform if the council has any records of historical flooding at the site or in the surrounding area? Can you also advise if there is any historical culvert information available for the area?

If there is a charge associated within this information, please can you inform before processing the request.

Response

Cumbria County Council have no records regarding flooding at this location, nor do CCC hold any historical culvert information for the site.

If you have any issues relating to this letter you should attempt to resolve them, in the first instance, with the council, by requesting an Internal Review. If you would like to request a Review please contact the Information Governance Team using the details at the top of this letter.

Further information can be found on the council's website: <http://www.cumbria.gov.uk/council-democracy/accesstoinformation/internalreviewscomplaints.asp>

Yours sincerely

Information Governance Team

Appendix D

United Utilities Sewer Plans

Jack Shelton

1
Arngrove Court, Barrack Road
Newcastle Upon Tyne,
NE4 6DB

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: Stainburn
Our Ref: UUPS-ORD-166134
Date: 02/06/2020**

Dear Sirs

Location: Stainburn

I acknowledge with thanks your request dated 01/06/2020 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

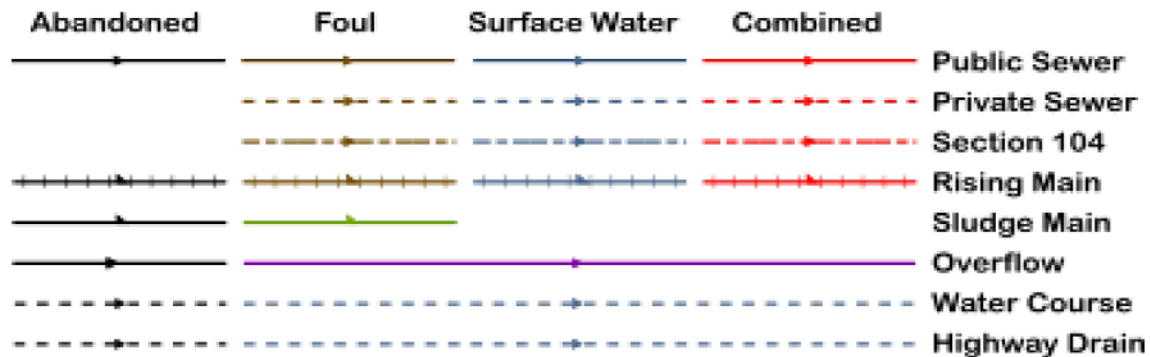
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

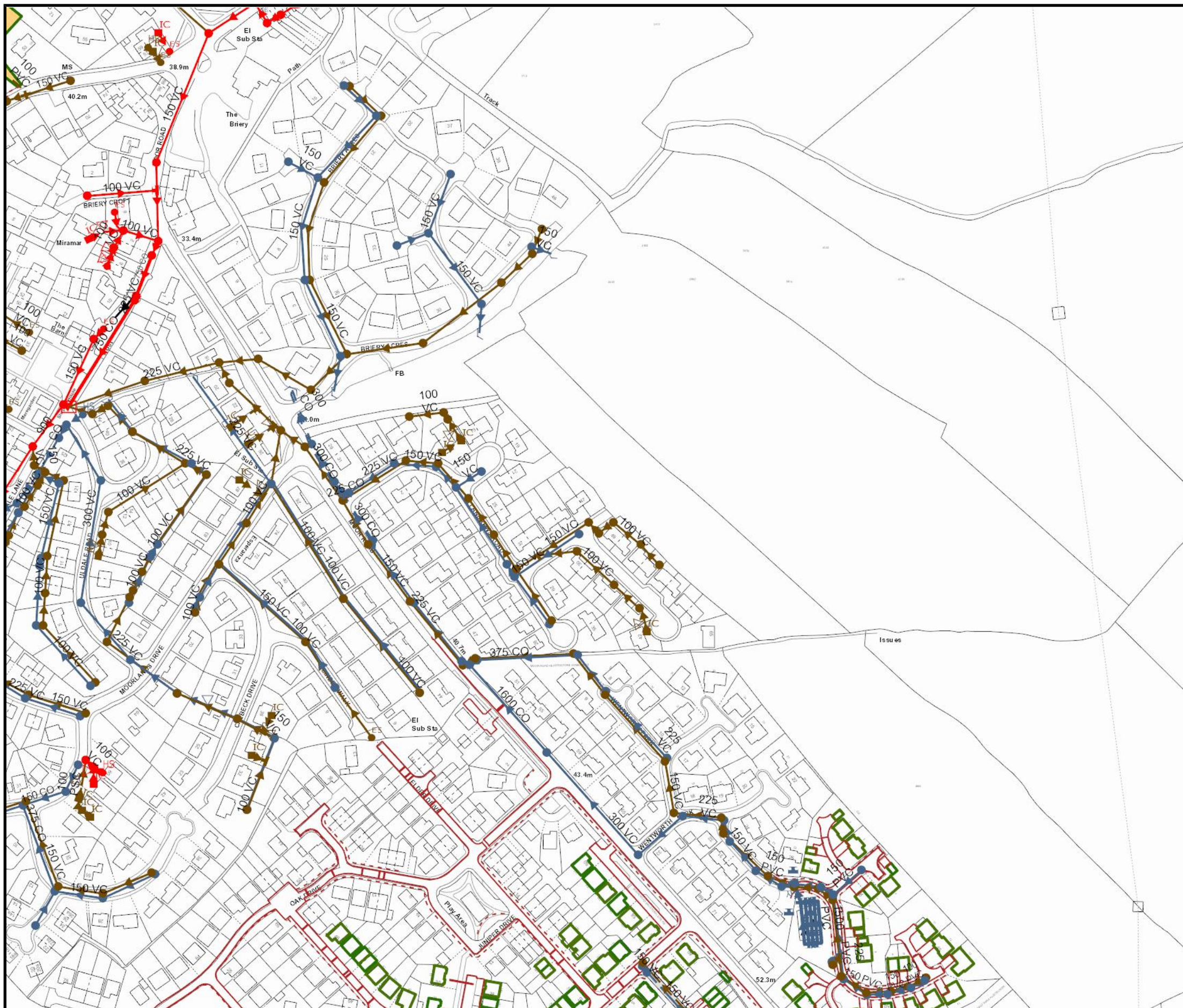
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

Wastewater Symbolology



All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

- | | |
|-------------------------|---------------------------------|
| Manhole | Side Entry Manhole |
| Head of System | Outfall |
| Extent of Survey | Screen Chamber |
| Rodding Eye | Inspection Chamber |
| Inlet | Bifurcation Chamber |
| Discharge Point | Lamp Hole |
| Vortex | T Junction / Saddle |
| Penstock | Catchpit |
| Washout Chamber | Valve Chamber |
| Valve | Vent Column |
| Air Valve | Vortex Chamber |
| Non Return Valve | Penstock Chamber |
| Soakaway | Network Storage Tank |
| Gully | Sewer Overflow |
| Cascade | Ww Treatment Works |
| Flow Meter | Ww Pumping Station |
| Hatch Box | Septic Tank |
| Oil Interceptor | Control Kiosk |
| Summit | |
| Drop Shaft | Change of Characteristic |
| Orifice Plate | |



SEWER RECORDS

Address or Site Reference

Stainburn,

Scale: 1:2500
Date: 02/06/2020

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix E

Geoinvestigate report – SuDS feasibility assessment (May 2020)

Our ref. G20165

Review of Natural Drainage Potential for SuDS Schemes

Proposed Residential Development at Georgian House, Egremont Road, Hensingham, CA28 8QB

Geoinvestigate has been asked to assess the drainage potential of the geology at the above site via a desk-based exercise with regard to the potential implementation of various Sustainable Drainage Systems (SuDS) options.

It is currently proposed to construct a new residential development of some 31 dwellings at the site which currently comprises undeveloped grassed space in the suburbs of Whitehaven. Wooded areas lie adjacent to and beyond the northern and western boundaries of the proposed development site, residential properties and St. John's Church lie to the east of the site, and an extended grassed area lies to the south (with further residential properties beyond). The A595 (Hensingham Bypass) lies downslope and beyond the wooded area to the west of the site. The proposed development plan is understood not to have been finalised at this stage but an outline plan has been provided and is presented in Figure 1 below:

Figure 1: Outline Proposed Development Layout



DRAFT

Recorded Geology

BGS 1:5,000 Sheet number 28 (Whitehaven) shows the site to be underlain by Devensian Till with sandstone bedrock belonging to the Hensingham Formation (also referred to as the Stainmore Formation). A fault is shown to run in an east-west direction to the north of (but outside of) the site through the adjacent wooded area, a stream appears to roughly follow the line of this fault on the OS map and goes below ground to the west below the A595.

The Bedlam Gill Coal Seam is shown on the BGS map to outcrop in an approximate north-south orientation roughly along the eastern boundary of the study area, perhaps encroaching into the site. However, the Coal Authority's interactive online map viewer does not show this outcrop, nor any associated development high risk area but does show what may be the same coal seam further to the north beyond a more distant fault. While it is beyond the scope of this report, perhaps the potential for shallow historical coal mining might need to be further explored by means of a Coal Mining Risk Assessment (CMRA).

Borehole records

BGS borehole scans referenced: NX91NE101, NX91NE127, NX91NE112 and NX91NE103 are all recorded as being very close to, or possibly inside of, the western boundary of the site, and records NX91NE128 and NX91NE114 slightly further to the west and south respectively but still relatively close to the site.

Table 1: Summary of BGS Borehole Records

Borehole:	NX91NE101	NX91NE127	NX91NE112	NX91NE103	NX91NE128	NX91NE114
Surface:	0.50m Topsoil	0.30m Topsoil	0.90m Topsoil	0.45m Topsoil	0.30m Topsoil	0.80m Topsoil
Subsoil:	Slightly sandy silty CLAY to 2.20m	Slightly sandy silty CLAY to 1.90m	Slightly sandy silty CLAY to 1.80m, silty CLAY to 2.50m	Silty CLAY to 2.10m	Silty CLAY to 1.20m	Silty, initially sandy, CLAY to 2.00m. Silty SAND to 2.90m
Rock:	Weathered siltstone into silty mudstone 4.30m. Mostly Sandstone below 13.64m.	Silty clay noted to probably be completely weathered siltstone 1.90m to 2.60m.	Highly weathered silty mudstone to 3.45m.	Variably weathered bands of silty mudstone and mudstone to 7.54m, mostly sandstone below.	Highly weathered mudstone to 2.15m, siltstone to 2.30m.	Highly weathered siltstone and silty mudstone to 3.45m.
Other Notes:	COAL 15.24m-15.51m below a band of mudstone. Perched groundwater ca. 1.9-4.0m during early drilling, GW at 13m in deeper sandstone.	Trial pit. Halted at 2.60m.	Trial pit. Halted at 3.45m.	Thin COAL 7.54m-7.75m. Groundwater at 1.6m on 19/7/85 and 11.45m on 20/7/85.	Trial pit. Halted at 2.30m.	Borehole halted at 3.45m.
Implications on Drainage:	Clay soils to between 1.90m and 2.50m likely to be extremely low permeability. Underlying siltstone and mudstone likely low and extremely low permeability respectively.				Similar to others, though a lesser depth of clay subsoils over the bedrock. Further from site.	0.90m thick silty sand band present in this more distant borehole unlikely to be sufficient for soakaways etc.

Summary

The silty clay soils which are recorded to a depth of ca. 2m at or very close to the study site and the underlying siltstone or mudstone bedrock would all be expected to exhibit intrinsically low or very low permeability and it is therefore concluded that the use of natural drainage such as soakaways, permeable paving or infiltration trenches will not be feasible at this site.

Other SuDs features might be incorporated into the development such as green roofs, storage ponds and other attenuation/retention features such as tanks and swales placed to slow runoff from the site prior to discharge into local sewers, but the use of natural recharge via infiltration into subsoils is extremely unlikely to be feasible at this site.

Kind regards,



Jack Harper BSc(Hons) MSc CSci MEnvSc
Contaminated Land Division Manager

Geoinvestigate Ltd.

www.geoinvestigate.co.uk

Tel. (01642) 713779 / 07795 845729



Appendix F

Micro Drainage – Rural Runoff rates

Fairhurst		Page 1
1 Arngrove Court Barrack Road Newcastle-Upon-Tyne NE4 6DB	138443 Hensingham Phase 2	
Date 01/03/2021 File	Designed by JF Checked by JS	
XP Solutions Source Control 2020.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years) 2 SAAR (mm) 1000 Urban 0.000
Area (ha) 1.000 Soil 0.450 Region Number Region 10

Results 1/s

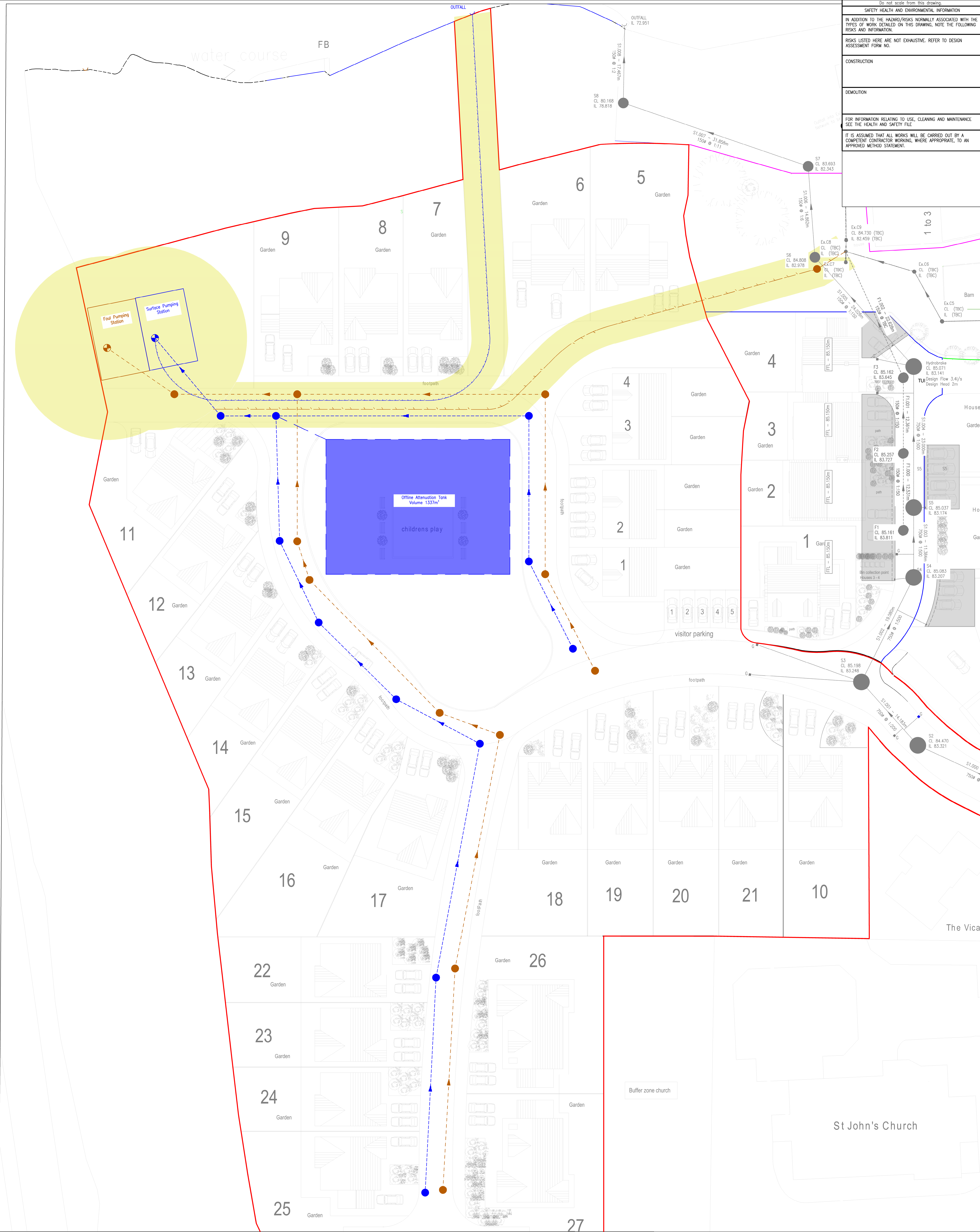
QBAR Rural 6.7
QBAR Urban 6.7

Q2 years 6.2

Q1 year 5.8
Q30 years 11.3
Q100 years 13.9

Appendix G

Indicative Drainage Layout



Do not scale from this drawing.
SAFETY HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION:
RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.
CONSTRUCTION
DEMOLITION
FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

- NOTES**
- This drawing is based on the following received information:
CDL Architecture Proposed Site Plan – DS/IMP/4/RO/24 REV C
 - This drawing is to be read in conjunction with the following FAIRHURST drawings:
 - Topographical data is based off LIDAR data downloaded from the EA.
 - IL and CL's for existing combined network are required for the next stage of the design process.

KEY	
—	Site boundary (Phase 1 & 2)
- - -	Proposed Surface Water Sewer
- - -	Proposed Foul Water Sewer
●	Proposed Foul Pumping Station
●	Proposed Surface Water Pumping Station
 	Easement for Pumping System
	Offline Attenuation Tank

Rev	Date	Description	Drawn	Checked	Approved
E	02/06/24	UPDATED TO SUIT LATEST SITE LAYOUT	AH	FM	SKT
D	30/07/24	PUMPED SURFACE WATER ROUTING REVISED.	FM	SKT	SKT
C	24/07/24	UPDATED TO SUIT LATEST SITE LAYOUT	AN	FM	SKT
B	17/06/24	UPDATED NEW SITE LAYOUT.	FM	SKT	SKT
A	04/06/24	PHASE 1 AND 2 DRAINAGE REVISED TO REMOVE SURFACE PUMPING STATION.	FM	SKT	SKT

Notes:

Client:
**THOMAS MILBURN
PROPERTY LTD.**

Project Title:
HENSINGHAM HOUSE

CUMBRIA

**PHASE 3
HENSINGHAM HOUSE
PROPOSED DRAINAGE LAYOUT**

FAIRHURST 1 Angrove Court, Barrow Road, Barnesley, S61 1JN, UK Tel: 0191 231 0505 Fax: 0844 361 4412	
Scale: 1:200	Revision: Planning
Drawing Title: MP	Checked: FM
Date: 23/05/24	Date: 23/05/24
Drawing No: 138443/2011	Revision: E

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DEVELOPMENT • WATER SERVICES • CDM COORDINATOR SERVICES

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