West Cumberland Hospital Phase 2 and Phase 3

Flood Risk Assessment and Outline Drainage Strategy

Curtins Ref: 071551-CUR-XX-RP-C-92001

Revision: V02

Issue Date: 01 April 2020

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Rev	Description	Issued by	Checked	Date
V01	First Issue	CJS	AR	13/09/2019
V02	Updated site layout and drainage strategy	DM	CJS	31/03/2020

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1.0 Introduction

1.1 Project Background

In May 2019, Curtins were instructed by CCL Solutions to undertake a Flood Risk Assessment and Outline Drainage Strategy of the site at West Cumberland Hospital, CA28 8JG. The site is centred on NGR 298950, 516040.

The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk and is based on currently available information.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

The total redline site area is approximately 2.7 hectares (ha). Following scrutiny of the Environment Agency flood zone maps it has been identified that the existing site lies entirely within an area classified as Flood Zone 1 (FZ1) indicating that the probability of flooding from rivers or sea is low (less than 0.1% annual probability of river or sea flooding). Since the site is larger than 1 ha in Flood Zone 1, a Flood Risk Assessment is required to accompany a planning application to assess mechanisms of potential flood risk and taking into consideration the management of surface water run-off.

In July 2018, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a requirement for the determination of planning applications for ‘major’ developments. The requirements of a sustainable drainage system is set out in the government’s Non-statutory technical standards for sustainable drainage systems.

An Outline Drainage Strategy will therefore be required as part of the Outline Planning Application for the development, as the site is considered to be ‘major’ development by the Town and Country Planning Order 2015 as total floor space will exceed 1,000m^2.

The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding,
- Consider proposals to mitigate any potential risk of flooding determined to be present; and
- Consider detailed drainage proposals to mitigate flood risk from the site.

This report reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- UK Government Long Term Flood Risk Information for surface water flooding and reservoir flooding.
- Copeland Borough Council Strategic Flood Risk Assessment (SFRA), dated August 2007.
- Copeland Borough Council Core Strategy and Development Management Policies, submitted document including the Council's proposed minor modifications, dated October 2012.
- Topographic Survey by Atlantic Geomatics, ref 3650P01-P06 Rev A, dated July / August 2019.
- Phase 1 Preliminary Risk Assessment by Curtins, dated August 2019.
- Ground Investigation Report by AECOM dated 2010.
- United Utilities Sewer Records.

1.3 Proposed Development

The area of proposed development is split into two areas divided by the ring road that services the hospital. The two areas include a larger northern area, and a smaller southern area. Both areas currently comprise several buildings associated with West Cumberland Hospital, areas of hardstanding inclusive of car parks and foot paths, as well as areas of soft standing.

It is understood that the proposed development within the northern area is to include the demolition of existing and construction of a new larger hospital wing and the refurbishment of existing buildings with associated carparking and communal soft landscaped areas. At this point, the proposals for the southern section of the site are for the demolition of the existing buildings to allow for potential future development, however this information is currently unavailable and will form part of Phase 3 to start at a later date. The proposed development plans are contained within Appendix A.

2.0 Existing Site Details

2.1 History and Current Use

The site is currently occupied by the West Cumberland Hospital. Development on the site comprises several buildings associated with the Hospital, areas of hardstanding inclusive of car parks and foot paths, as well as areas of soft landscaping. Development on the site is largely is largely restricted to the original timeframe between 1959 and 1964, with a number of small piecemeal additions undertaken over the ensuing years.

The site is bounded by a mixture of residential and light industrial development to the north. Further to the north east the land use is in mainly a combination of arable farming and grazing. To the east, land use is primarily farmland. To the south and west, residential development and the A595 highway, the main road along the west coast of the county. Figure 2-1 shows the existing hospital site in its entirety along with the immediate surroundings.

Figure 2.1: Site Location Plan

2.2 Existing Watercourses

No above ground watercourses have been identified within the proposed site

The following watercourses have been identified within the vicinity of the proposed site:

- An unnamed watercourse (main river) lies approximately 0.8km to the north and according to the Environment Agency mapping issues in open channel at the junction of Main Street and Egremont Road (NGR 298582mE 516787mN. This watercourse then flows generally west to join Pow Beck west of the railway (NGR 297925mE 516326mN)
- The Main River, Snebra Beck lies approximately 0.95km to the north of the site and crosses Egremont Road and the A595 main highway as it flows west to join Pow Beck to the west of the railway (NGR 297748mE 516582mN).
- The Main River, Pow Beck, lies approximately 0.95km to the west of the site and flows in a generally northern direction to discharge into Whitehaven Marina
- An unnamed watercourse is located approximately 0.6km to the southeast of the site, the head of which lies at NGR 299492mE 515635mN. The watercourse flows generally to the southwest to join a section of Pow Beck which flows south towards St Bees, and discharges to the seat at Sea Mill Lane, NGR 296923mE 510789mN.
- The Main River, River Keekle lies approximately 1.5km to the east of the site. The River Keekle flows generally south, to join the River Ehen at Wood End, NGR 301189mE 512894mN to then flow south through Egremont.

2.3 Existing Drainage

The public sewer records have been obtained for the development site, and are enclosed in Appendix B.

The records indicate that there are no public sewers within the site boundary, with the exception of both foul and surface water sewers lying just within the site boundary on Homewood Road.

The records indicate that the immediate areas northwest, west, south are well served by a predominantly separate foul and surface water networks:

- There is a 225mm diameter surface water sewer flowing southwest then west along Home Wood Road.
- There is a 150mm diameter foul sewer flowing to the northwest of Homewood Road, which then encroaches into the site before continuing west along Homewood Road.

The site is currently operational and is positively drained and the topographic survey has identified an extensive system of gulleys, rainwater pipes, manholes and inspection chambers. Whilst manhole and CCTV surveys have not been undertaken at the time of undertaking this assessment, it is clear that the onsite drainage discharges to the public sewer network.

2.4 Topography

As referred to above, a topographic survey has been undertaken and covers the key areas where redevelopment is proposed within the red line boundary.

A broader figure, showing the general topography of the site and surrounding is presented in Figure 2-2 below, derived from the Environment Agency 1m resolution Light Detection and Ranging (LiDAR) Digital Terrain Model (DTM).

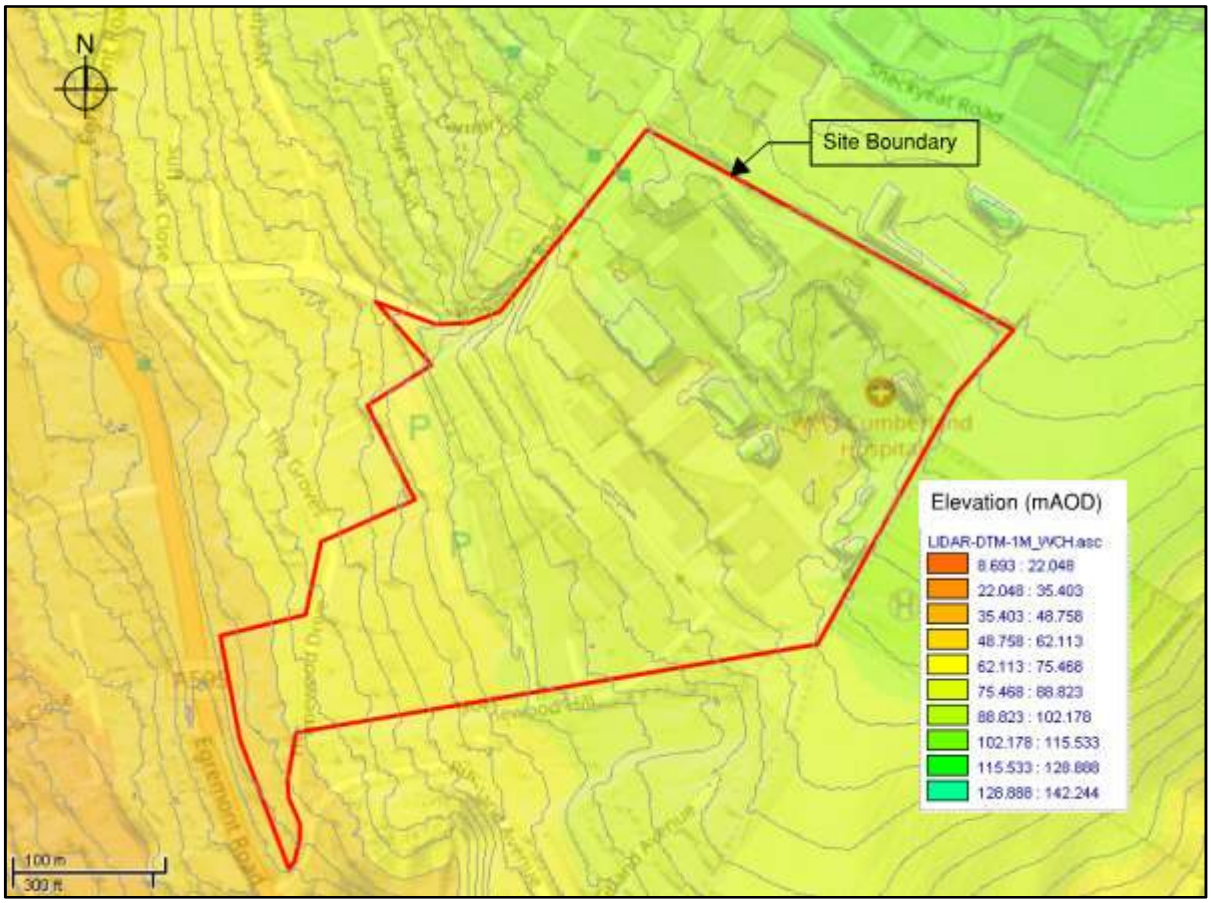


Figure 2.2: General Topography based on LiDAR DTM

The site slopes downwards from northeast to southeast. The contours indicate the north-eastern part be less steep, with an average gradient of 0.061m/m (1 in 16), with gradient increasing in the south-western area, 0.082m/m (1 in 12).

2.5 Geology and Hydrogeology

A study of the Envirocheck records, British Geological Survey (BGS) 1:50,000 mapping records (Bedrock and Superficial Editions) for Whitehaven (Sheet 028) (Ref.2) indicates the following geological and hydrogeological succession underlying the site.

Table 2.1: Geological/Hydrogeological Succession

Geology	Associated Hydrogeological Classification
Till, Devensian[1]	Secondary Undifferentiated[2]
Hensingham Grit[3]	Secondary A Aquifer[4]
Stainmore Formation[5]	Secondary A Aquifer[4]

Notes:

1. *Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions.*
2. *Assigned in cases where it has not been possible to attribute either category A or B to a rock type*
3. *Sandstone. Sedimentary Bedrock formed approximately 328 to 329 million years ago in the carboniferous Period. Local environment previously dominated by rivers.*
4. *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.*
5. *Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 319 to 329 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.*

The British Geological Society (BGS) identifies that superficial deposits of the Devensian Till underlies the entirety of the site. The solid geology comprises the Hensingham Grit which underlies a large proportion of the site. The south western areas of the site is underlain by the Stainmore Formation.

There are no known faults underlying the site directly, however there are numerous faults in the nearby vicinity. The orientation of the faults varies greatly however generally strike in an NW-SE orientation

Details from freely available borehole logs taken from the BGS within close proximity to the site are summarised in Table 2-2 below.

Table 2.2: Borehole Records

Reference	Location (NGR)	Details (depth to top of strata/details/thickness)
NX91NE50/52	298730,515980	0.40m bgl, Topsoil 3.75m bgl, Broken sandstone and sandy clay. 4.50m bgl, Grey sandstone. Borehole completed at 4.50m bgl.
NX91NE/80	299061, 516308	0.00m bgl, Firm to stiff brown sandy boulder clay. 1.50m bgl, Stiff brown sandy boulder clay. 3.20m bgl, Soft brown sandy clay and grey shale. 5.00m bgl, Dark grey weathered shale. *5.00m Borehole completed*
NX91NE/381	299890,515910	0.00m bgl, Sandy gravelly cobbly clay. 6.70m bgl, Sand and gravel with cobbles and boulders. 8.35m bgl, Dark reddish brown sandstone. 18.00m bgl, Dark red sandy clayey siltstone. *Borehole continues to 120m bgl prior to termination.*

The north eastern spur of the site is within a zone of low vulnerability due to the underlying Secondary Superficial Aquifer in respect to groundwater vulnerability. The large proportion of the site is considered high vulnerability due to the underlying Secondary Superficial Aquifer.

There are no groundwater abstraction points located within 1km of the site and the site is not located with an Environment Agency designated Source Protection Zone (SPZ).

3.0 Development and Flood Risk

3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance

In July 2018, the Ministry of Housing, Communities & Local Government published the revised National Planning Framework (NPPF). This document replaces the first National Planning Policy Framework published in March 2012 by the Department of Communities and Local Government. The Planning Practice Guidance (PPG) was published in March 2014 which provides guidance on how flood risk should be assessed during the planning and development process. This guidance remains current.

Table 1: (Extract from Planning Practice Guidance) Flood Zone Classifications

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood.** 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. (Not separately distinguished from Zone 3a on the Flood Map)

Table 2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

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 and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • 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, 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.
- 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.
- 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: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, 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.

3.2 Sequential Test

Paragraph 100 of the NPPF states that 'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk but where development is necessary, making it safe without increasing flood risk elsewhere'.

This policy is implemented through the application of the flood risk Sequential Test which aims to steer new development to areas with the lowest probability of flooding.

3.3 Exception Test

If, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied, if appropriate. As detailed in paragraph 102 of the NPPF, for the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment (SFRA) where one has been prepared; and
- A site-specific FRA must demonstrate that 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.

3.4 Local Planning Policy and Guidance

The Copeland Core Strategy and Development Management Policies (DPD)[1], adopted December 2012, falls under the umbrella title of the Local Development Framework. The DPD sets out the overall strategic direction for planning by providing policies to guide decisions on planning applications over the period 2013 to 2028.

The Core Strategy and Development Management Policies Document (DPD) contains a set of development management policies for the local planning authority area of Copeland. When a planning application is submitted, the Council uses development management policies (planning policies) alongside other policies in the Development Plan to help it assess whether or not the application should be granted planning permission.

The relevant policies of the DPD in respect to development and flood risk are identified as:

- Policy DM11 - Sustainable Development Standards and
- Policy DM24 - Development Proposals and Flood Risk

Policy DM11 and DM24 are reproduced as Figure 3-1 and Figure 3-2 below.

[1] https://www.copeland.gov.uk/sites/default/files/attachments/copeland_local_plan_2013_2028.pdf

Policy DM11 – Sustainable Development Standards

The Council will ensure that development proposals reach high standards of sustainability by:

A Requiring housing to be of an appropriate density – generally at least 30 dwellings per hectare. However, a lower density may be acceptable where it reflects the form and character of development in the surrounding area

B Encouraging developers to achieve high energy efficiency standards in relation to the Code for Sustainable Homes and BREEAM

C Requiring renewable energy generating technology on site in developments of 10 or more dwellings or 1,000m^2 non-residential development

D Orientating and designing buildings to maximise solar gain, so far as practicable without compromising wider design and quality of place objectives

E Encouraging construction materials to be sourced, where possible, from local and sustainable sources of production

F Requiring water saving technology, including grey water recycling to be incorporated in all developments

G Ensuring surface water is managed appropriately, with the inclusion of Sustainable Drainage Systems where possible

Support will also be given to proposals for improvements or alterations to existing buildings that include measures to increase energy efficiency and incorporate renewable energy generation with regard to the standards in this policy.

Development should not result in the unnecessary sterilisation of surface mineral resources, and wherever appropriate should incorporate remediation measures to ensure that the development is not at risk from ground instability arising from mining legacy or other former uses.

Figure 3.1: DPD Policy DM11

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.

Figure 3.2: DPD Policy DM24

3.5 Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the first step was to inspect the Environment Agency web-based flood mapping data for flooding from rivers and seas, surface water and reservoirs. The rivers and sea flood map is used to inform planning of a sites Flood Zone(s); however, the surface water and reservoir flood maps should also be used to identify other flood risks.

From the Environment Agency flooding from rivers and seas map, it can be seen that the proposed site and the surrounding area are entirely located within an area classified as Flood Zone 1 (low risk of flooding from rivers or sea).

3.6 Site Specific Flood Zone Compatibility

The proposals for the development site are likely to fall within the following category:

- 'Hospitals'.
- 'Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.'

This type of development is classed as 'More Vulnerable' development in the Flood Risk Vulnerability Classification (Table 2).

The site is located within Flood Zone 1, for which 'More Vulnerable' development is deemed to be appropriate, and neither the sequential nor the exception test is required (refer to Table 3 for the Flood Zone compatibility table taken from NPPF technical guidance).

It is anticipated that the lifespan of the development will be 60 years. If operational in 2020, the design life will be to 2080.

4.0 Assessment of Flood Risk

4.1 Sources of Flood Risk

This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2 Fluvial Flooding (Rivers and Streams)

From the Environment Agency flooding from rivers and seas map:

- Zone 1 Low Probability: Land having a less than 0.1% (1 in 1,000) annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
- Zone 2 Medium Probability: Land having between a 1% (1 in 100) and 0.1% (1 in 1,000) annual probability of river flooding; or land having between a 0.5% (1 in 200) and 0.1% (1 in 1,000) annual probability of sea flooding. (Land shown in light blue on the Flood Map).
- Zone 3a High Probability: Land having a 1% (1 in 100) or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding (Land shown in dark blue on the Flood Map).
- Zone 3b The Functional Floodplain: This zone comprises land where water has to flow or be stored in times of flood. 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. (Not separately distinguished from Zone 3a on the Flood Map). Notionally, Flood Zone 3b indicates there is a chance of flooding of greater than 1 in 30 (3.3%).

The flood map also contains the following information:

- Flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
- Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would flood.

Flooding to the site from rivers and seas is indicated in Figure 4-1 below and it can be seen that the entire proposed site is located within an area classified as Flood Zone 1, therefore the site is considered to be at low risk from fluvial flooding.

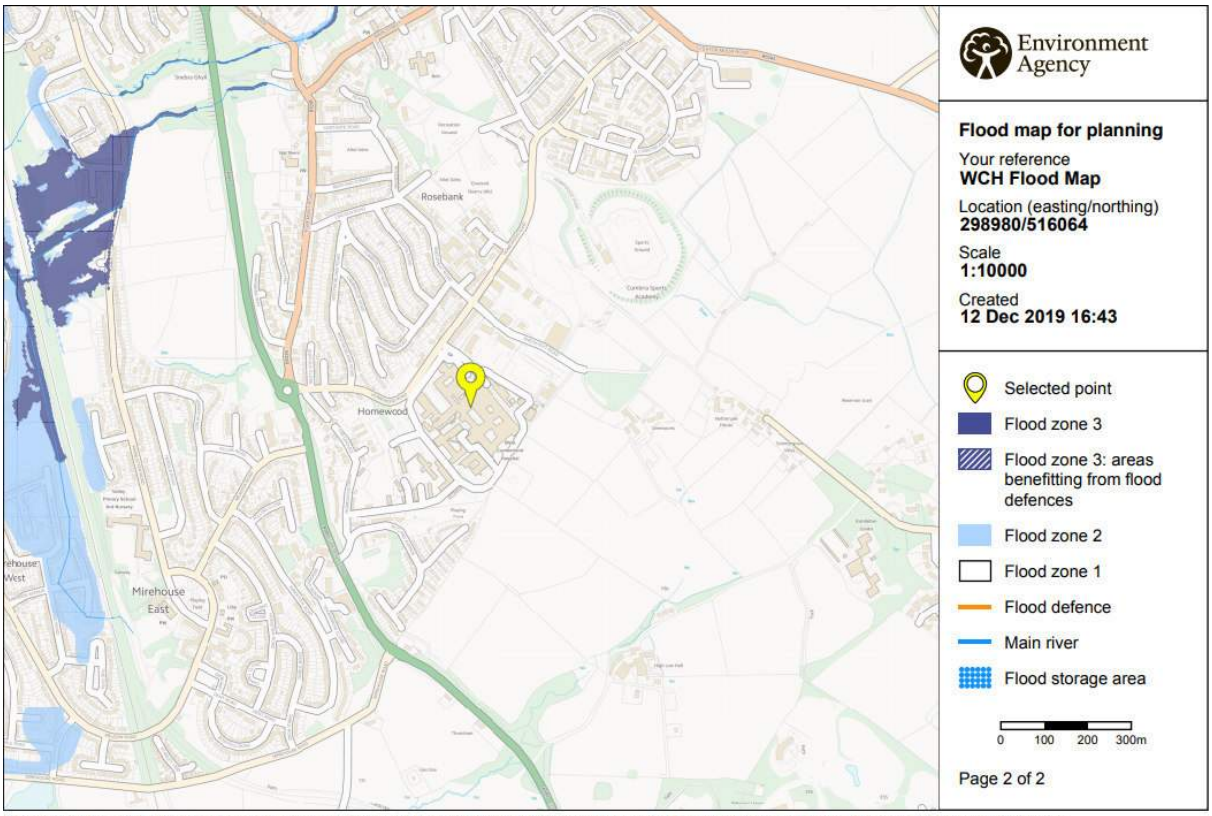


Figure 4.1: Environment Agency Flood Map for Planning (Rivers and Sea)

The Strategic Flood Risk Assessment[2] further confirms that there is no fluvial flood risk associated with the site.

4.3 Tidal Flooding (Coastal or Estuarine)

1.1.1 There is currently no flood risk identified on the Environment Agency flood maps for the site and it is therefore regarded to be at low risk from tidal flooding.

1.1.2 The Strategic Flood Risk Assessment[4] further confirms that there is no tidal flood risk associated with the site.

4.4 Reservoir Flooding

1.1.3 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

[2] Copeland Borough Council, *Strategic Flood Risk Assessment (SFRA)*, Jacobs, August 2007.

1.1.4 The Flood Warning Information Service Long Term Flood Risk from Reservoirs map indicates the site is not at risk from reservoirs in either the local or wider vicinity of the site.

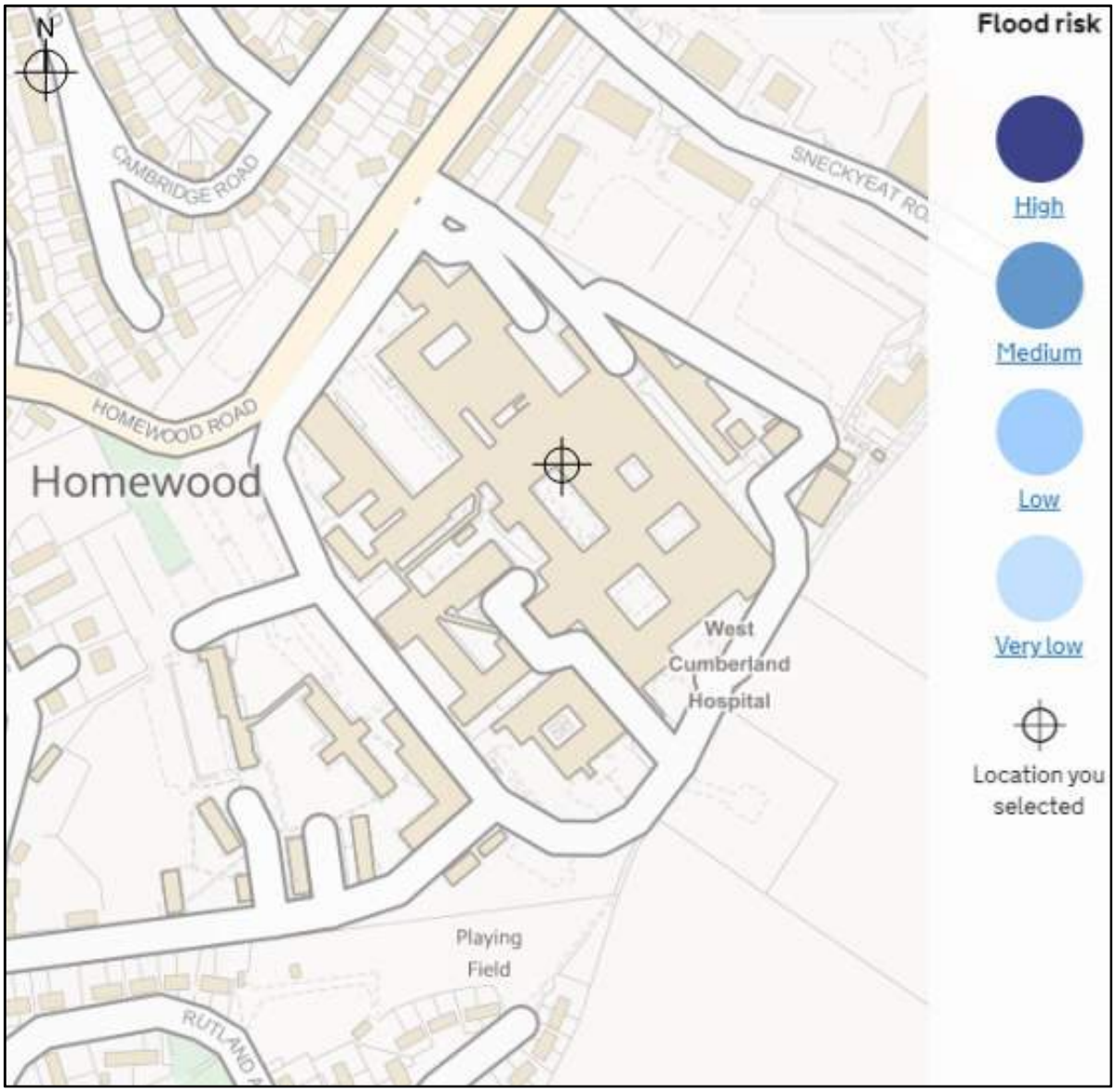


Figure 4.2: Risk of Flooding from Reservoirs - Extent of Flooding

4.5 Canal Flooding

There are no canals in the vicinity of the site.

4.6 Groundwater Flooding

The SFRA[3] indicates a limited potential for groundwater flooding exists in the Borough. If further states that Groundwater flooding can and does occur throughout the Borough and cannot always be predicted.

The Phase 1 Geoenvironmental assessment[4] by Curtins accessed the British Geological Survey (BGS) groundwater flooding vulnerability maps, reproduced as Figure 4-1 below. The map shows a Limited Potential for Groundwater Flooding to Occur on the site.

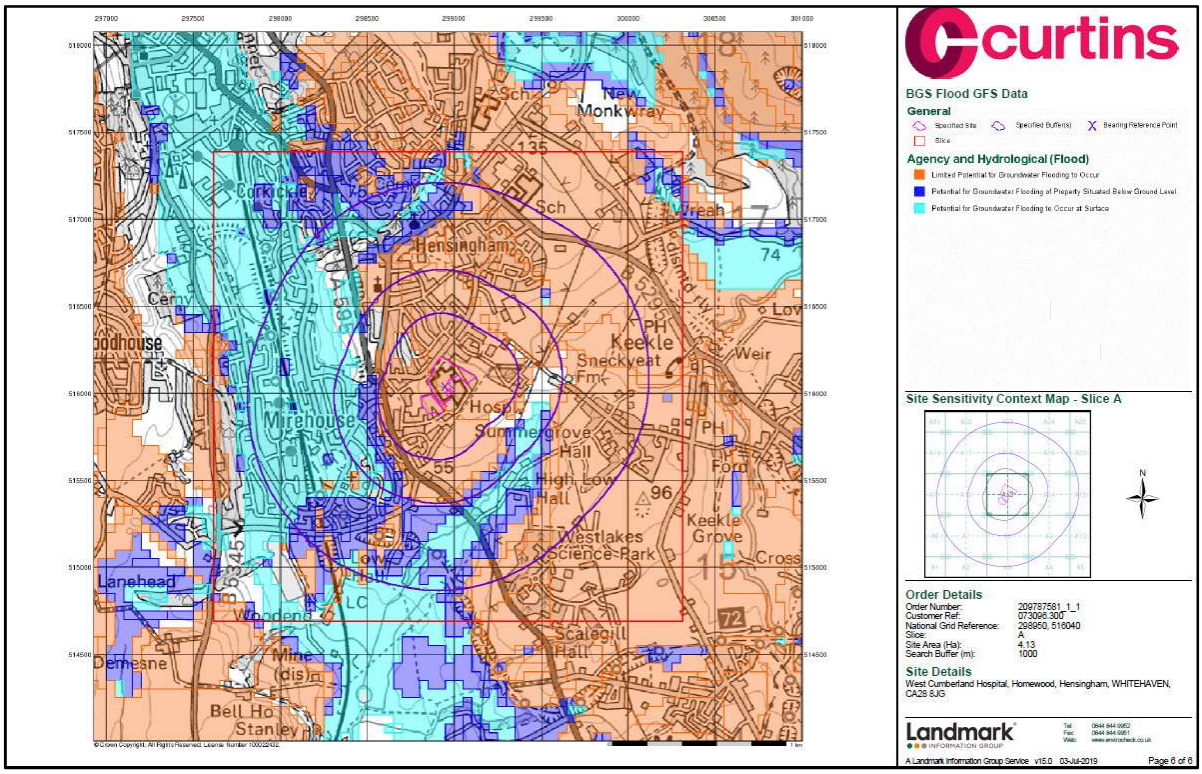


Figure 4.3: BGS Susceptibility to Groundwater Flooding

The map shows a Limited Potential for Groundwater Flooding to Occur on the site.

A Geotechnical Site investigation[5] undertaken in 2010 by AECOM identified the soils to be generally made ground over boulder clay/glacial till (up to a depth of 4.8 m bgl) over mud/sand /siltstone bedrocks and with a high (possibly perched) water table within 1.5m of the surface. It therefore unlikely groundwater poses a risk at surface. However, to ensure that the risk remains low, mitigation measures are proposed in section 5.

[3] Copeland Borough Council, *Strategic Flood Risk Assessment (SFRA)*, Jacobs, August 2007.
[4] 073096-CUR-00-XX-RP-GE-001-V01, West Cumberland Hospital Phase 1 Preliminary Risk Assessment, 21 August 2019.
[5] WCH-ACM-ZZ-ZZ-GN-S-XX-1011, West Cumberland Hospital, Whitehaven Geo-Environmental Interpretative Report, AECOM Ltd, 20 October 2010.

4.7 Public Sewers, Highway Drainage Flooding and Infrastructure Failure

United Utilities are responsible for the public sewer systems in Whitehaven and records of the public sewers have been obtained and are provided in Appendix B. The records shown a minor intrusion of the public sewers in to the development site.

The site contains extensive private foul and surface water drainage systems which are understood to connect to the public sewer system. These serve buildings and hard standings and highways within the site.

There is no record of historic flooding within these private systems. And where possible, this existing drainage infrastructure is to remain.

The hydraulic design standard of the existing surface water drainage system has not been assessed. However, Phases 2 and 3 of the project involve the demolition of some existing buildings and replacement with new with an overall reduction of approximately 1.9 ha in hardstanding/roof areas following the completion of the development.

In that sense, the proposed development will reduce the risk of flooding from the on-site surface water system.

4.8 Surface Water Flooding to the site

Surface water flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

From the UK Government's Flood Risk from Surface Water, (extent of flooding) map, level of surface water flood risk is expressed as;

- Very low risk – meaning that that each year this area has a chance of flooding of less than 0.1%.
- Low risk - meaning that each year this area has a chance of flooding of between 0.1% and 1%.
- Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%
- High risk means that each year this area has a chance of flooding of greater than 3.3%.

The extent of flooding to the site from surface water is indicated in Figure 4-4 along with indicative flood depths for the standard risk scenarios.

Figure 4.4: Risk of Flooding from Surface Water - Extent of Flooding

There are areas identified as at risk from surface water flooding both within and outside the site boundary. Those areas within the site are attributed to localised low spots in the topography and are focussed around existing buildings. However, the topography used in the surface water mapping relies on a digital terrain model rather than ground survey and, whilst it is understood that some modification is also made to account for positively drained areas, it is likely that the algorithms do not fully account for localised positive drainage as is known to existing within the site.

The development proposals include for an element or landscaping of the hospital grounds and where possible, external levels should be set to fall away from the buildings.

Considering the above information, the risk of surface water flooding to the redeveloped site is generally considered low. Mitigation measures to ensure the risk remains low are proposed in Section 5.

1.2 Surface Water Flooding from the site

Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. The proposed surface water drainage network directly relating to the development proposals shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

New development has the potential to increase flood risk where any increase in impermeable areas results in additional run-off from proposed roads, car parks and building roofs being discharged freely into the downstream drainage network. It is therefore encouraged to propose permeable areas, landscaping areas and incorporate sustainable drainage features utilising infiltration or attenuation where possible.

Mitigation measures to ensure the risk remains low are proposed in Section 5 and an assessment of the proposed surface water flows is carried out within the drainage strategy within section 6 of this report.

4.9 Historical Flooding

No historic flood events have been identified in the SFRA.

1.3 Summary of Flood Risk

From the evidence collated and subsequent correspondence and meetings, the main types of flooding that may apply to the proposed development site are as follows:

- Fluvial / Tidal flooding to the site (No potential)
- Reservoir flooding to the site (No potential)
- Groundwater flooding to the site (Low potential)
- Surface water flooding to the site (Low potential / Isolated High Potential)
- Surface water flooding from the site (Low potential).

5.0 Mitigation

5.1 Fluvial/Tidal Flood Mitigation

The development site lies entirely within Flood Zone 1 and therefore is at no risk of fluvial and tidal flooding. No specific measures are required at this location to mitigate against fluvial and tidal flooding.

5.2 Reservoir Flooding Mitigation

There are no reservoirs within the wider vicinity of the site and therefore the site is considered as being no risk of reservoir flooding. No specific measures are required at this location to mitigate against reservoir flooding

5.3 Groundwater Flood Mitigation

Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.

The site is considered at low risk of groundwater flooding based on no recorded instances of flooding from this source. However, Phase 2 geoenvironmental site investigations should include groundwater monitoring to further confirm groundwater levels.

Finished floor levels for the development should be set above the highest groundwater level.

External ground levels across the site should fall away from the proposed buildings and ensure that the creation of low points are avoided (other than those used intentionally for drainage features) in order that in the unlikely event of groundwater flooding, the flood water is safely routed away from the buildings on site.

Providing the above mitigation measures are imposed, the risk from groundwater flooding would be considered low post development.

5.4 Surface Water Flooding to the site Mitigation

The UK Government surface water flood maps indicate that there are localised areas of high - low risk of surface water flooding, predominantly adjacent to existing buildings. Where locations of surface water flooding is predicted, a positive drainage system is known to exists.

Whilst the site is to be redeveloped, the existing drainage systems where possible will be retained. As part of the drainage design the existing site drainage should be reviewed and where retained, continue to be maintained.

Providing the above measures are implemented the flooding risk to the development site from surface water is therefore considered low post development.

5.5 Surface Water Flooding from the site Mitigation

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.

In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 4 demonstrates the climate change allowances with central and upper end allowances being considered.

Based on the nature of the development, a lifespan in excess of 60 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, an allowance of 40% for climate change on peak rainfall intensity will be included in calculations.

Table 5.1: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Section 6 reviews the surface water discharge options and based on the site information obtained it is concluded that an infiltration-based solution will not be appropriate for this site.

To minimise localised flooding within the site, the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Also, all inlet features should have suitably sized sumps to catch silts and should be subject to a documented routine maintenance and cleansing regime.

The surface water should be constrained within the site and this could be attained by enhanced landscaping features where suitable.

Flood water exceedance routes should be identified, both on and off site as detailed design progress.

For any sustainable drainage systems employed in the development, an appropriate management and maintenance plan for the sustainable drainage system for the lifetime of the development should be submitted which should include:

- Any arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Residents' Management Company
- Arrangements concerning appropriate funding mechanisms for its on-going maintenance of all elements of the sustainable drainage system (i.e. inspections, regular maintenance)
- Means of access for maintenance and easements where applicable

Assuming that the proposed drainage system is designed to provide adequate capacity, and that the system will be correctly maintained, it can be assumed risk of flood from blockage or overloading is minimal.

The final design of the drainage networks shall be in accordance with the legislation set by the Copeland Borough Council and Cumbria County Council.

6.0 Outline Surface Water Drainage Strategy

6.1 Overview

The proposed site is split and has two boundaries, the smaller southern site has no proposed impermeable area as the proposals are to demolish two existing buildings, this is therefore a 100% reduction in surface water run-off. The site that this drainage strategy focusses on is the larger northern site. Current development proposals will result in an overall reduction in impermeable area of 5,700m^2, when compared to the existing site. This reduction means that the proposed overall peak surface water run-off from the site is less than the existing (not including climate change). This can be seen in Appendix C with results summarised in Table 6.1 below. The proposed Outline Drainage Strategy is shown on drawing 071551-CUR-00-ZZ-DR-C-04921.

Table 6.1: Pre and post development peak run off rates

	Peak Rate of Run-Off (Litres/sec)		
Event	Pre-development (Brownfield Site)	Post-development	Post-development (Climate change)
QBAR	275.9	201.9	282.6
Q10	375.6	274.8	384.8
Q30	458.7	335.7	469.9
Q100	588.0	430.3	602.4

6.2 Surface Water Disposal

In accordance with the National Planning Policy Framework (NPPF), SuDS Guidance and Part H of the Building Regulations, the surface water disposal hierarchy should in the first instance be discharged to the ground by infiltration. If ground conditions prevent this, surface water should be disposed of to a watercourse or waterbody. If this is not possible, surface water should be discharged to a surface water sewer or drain and only as a very last resort to a combined sewer.

Infiltration

A Geotechnical Site investigation[6] undertaken in 2010 by AECOM has identified the soils to be generally made ground over boulder clay/glacial till (up to a depth of 4.8 m bgl) over mud/sand /siltstone bedrocks and with a high (possibly perched) water table within 1.5 m of the surface. This would suggest that infiltration to ground is unlikely to be feasible, however this should be confirmed during the detailed

[6] WCH-ACM-ZZ-ZZ-GN-S-XX-1011, West Cumberland Hospital, Whitehaven Geo-Environmental Interpretative Report, AECOM Ltd, 20 October 2010.

design stage with BRE 365 infiltration tests undertaken at the location and depths of the proposed attenuation tanks.

Watercourses

There are no apparent watercourses in the vicinity of the site.

Discharge to Surface Water Sewer

United Utility (UU) sewer maps indicate that a 225 mm diameter surface water sewer is present in Homewood Road to the north of the project. Utility mapping of the existing hospital indicates that the existing surface water drainage leaves the site at 3 locations along the southern and western boundaries of the site.

It is proposed to drain the attenuated surface water flows from the proposed development into the existing Surface Water MH on the western boundary of the site which appears to be directed towards the UU sewer in Homewood Road, however the utility mapping does not extend beyond the hospital boundary there this will be subject to confirmation by CCTV during the detailed design stage.

6.3 Storage Volumes

A storage estimate has been conducted for the proposed site based on the impermeable areas and using the existing QBAR (275l/s) as a discharge rate. The calculations can be seen in figure 6.1 below, which gives a required attenuation volume of 470m^3.

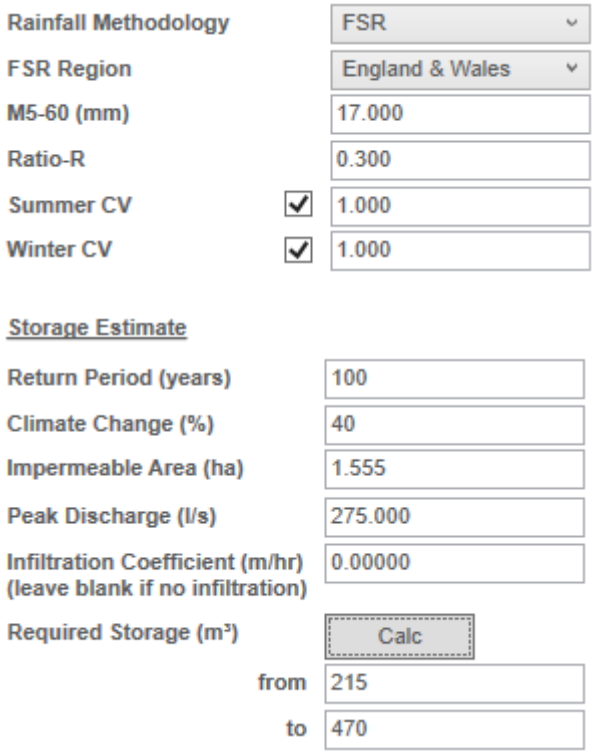


Figure 6.1: Storage Calculation

6.4 Attenuation Methods

It is recommended that sustainable methods of attenuation are implemented where possible; this can be achieved using a combination of ponds, swales, permeable paving with high voids sub-base and percolation pipes. Use of ponds, swales and permeable paved areas would also be considered as methods of filtration to improve water run-off quality.

The site has a number of constraints, primarily related to ground conditions including both made ground and likely inability to infiltrate, and the requirement to provide adequate car parking on the site.

It is therefore proposed to provide attenuation using below ground cellular storage and flow control devices. The locations for these drainage features are indicated on drawing 071551-CUR-00-ZZ-DR-C-04921 in Appendix D. The exact volume and the attenuation structures will be determined during the detailed design phase of the project.

1.3.1 Surface Water run-off from hard paved areas at risk from contamination should receive water quality treatment. Non-residential car parks and in-site access roads, typical for hospitals, are considered Medium hazard in terms of contamination. Figure 6-1 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 6.2: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

Treatment could be provided using sustainable methods such as: filter strips, filter drains, swales, bio-retention systems, and/or permeable paving. Figure 6-3 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015).

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: http://tinyurl.com/qf7yuj7

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Figure 6.3: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

The selection of treatment should ensure that the SuDS mitigation component index (Figure 6-1) exceeds the pollution hazard index (Figure 6-2). Where two stages of treatment are required, the second stage of treatment should account for reduced performance due to lower inflows; therefore 0.5 (mitigation index) should be used.

Treatment could be provided using a combination of sustainable methods such as permeable paving with high voids sub-base/percolation pipes, swales, and filter strips. Other methods of partial treatment include the use of Oil Interceptors, Trapped Gullies, Smart Sponge gullies and chambers.

The type(s) of mitigation should be considered as the site design is finalised i.e. paving surfaces etc. The proposals for pollution protection should be agreed with Cumbria County Council, Lead Local Flood Authority.

7.0 Maintenance

7.1 Introduction

This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

7.2 Components

The following components have been included within the drainage design for the proposed development:

- Inspection, Manhole and Catchpit Chambers
- Pipes
- Drainage Channels and Gullies
- Attenuation Tanks
- Hydro brake

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

It is assumed that the maintenance of the drainage network will be the responsibility of an on-site facilities management team.

A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.

Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.

During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

1.4 Inspection, Manhole and Catchpit Chambers

1.4.1 The indicative locations of the Inspection Chambers, Manholes are indicated on Curtins drainage strategy drawing 071551-CUR-00-ZZ-DR-C-04921.

1.4.2 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.

1.4.3 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

1.5 Pipes

The indicative locations of the drainage pipes are indicated on Curtins drainage strategy drawing 071551-CUR-00-ZZ-DR-C-04921.

Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins drainage specification.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers and manholes.

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

1.6 Drainage Channels and Gullies

The indicative locations of the drainage channels and gullies are indicated on Curtins drainage strategy drawing 071551-CUR-00-ZZ-DR-C-04921.

Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

1.7 Attenuation Tanks

The indicative locations of the attenuation tanks are indicated on Curtins drainage strategy drawing 071551-CUR-00-ZZ-DR-C-04921.

Access for maintenance should be provided, for example by locating inspection chambers within the crate structure.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures, catchpits and filter chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets/outlets.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material.	As required (if infiltration performance is reduced as a result of significant clogging).

	The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	
	Reconstruct soakaway and or replace or clean void area / fill, if performance deteriorates or failure occurs	As required
	Replace clogged geotextile (will required reconstruction of soakaway). Terram 1000 has a life span of 25 years.	As required

8.0 Conclusions and Recommendations

The Flood Risk Assessment (FRA) has determined the level of risk associated with the proposed development.

From the evidence collated the main types of flooding that may apply to the proposed development site are as follows:

- Fluvial / Tidal flooding to the site (No potential)
- Reservoir flooding to the site (No potential)
- Groundwater flooding to the site (Low potential)
- Surface water flooding to the site (Low potential / Isolated High Potential)
- Surface water flooding from the site (Low potential).

In respect to flood risk, the following recommendations are made:

- Proposed external ground levels across the site should fall away from the proposed buildings in a manner which does not create low points where water might collect unintentionally.
- It is recommended that groundwater levels are monitored over a longer period than undertaken during ground investigation works. Typically, groundwater levels are recorded during gas monitoring over a 3-month period.

In respect to surface water drainage, the assessment has concluded that:

- Whilst no Infiltration testing has been undertaken, site investigation results indicate that infiltration drainage is not appropriate for the site.
- There are no nearby watercourses in which to discharge surface water.
- The existing development is discharged to the public surface water sewer system.

It is recommended that:

- The below ground surface water drainage system should be designed to accommodate the 100-year plus 40% increase in peak rainfall event on the 100-yr design rainfall.
- In respect to exceedance flows, i.e. flows in excess of the 100-yr plus climate change design flows, that finished floor levels are set above external levels to minimise risk of internal flooding.
- An assessment of pollution indices and appropriate mitigation measures should be assessed during detailed design stage.
- An operation and maintenance plan is produced and adhered to.

9.0 Appendices

Appendix A **Proposed Development Plans**

Appendix B **Sewer Records**

Appendix C **Surface Water Run-off Calculations**

Appendix D **Drainage Strategy Drawing**

Appendix A Proposed Development Plans

5 0 5 10 15 20 25
SCALE 1: 500 m

N

Rev	By	Description	Date
P06	PMG	New Building Outline updated and new waste compound shown	21/01/20
P05	PMG	Car parking layouts added/updated	16/01/20
P04	PMG	Site boundary amended as shown clouded	10/07/19
P03	PN	Issued for Planning	27/06/19
P02	PMG	Residential Block Updated to allow for reduced bedsit numbers	17/06/19
P01	PMG	Issued for Information	27/03/19

gilling dod architects
The Cruck Barn, Duxbury Park, Chorley, Lancashire. PR7 4AT
t: 01257 260070 f: 01257 260071

Client Name:
North Cumbria Univeristy Hospitals NHS Trust

Site Name:
West Cumberland Hospital

Project Name:
West Cumberland Hospital, Whitehaven - Phase 2

Drawing Title:
Proposed Site Plan

Project No:	Sheet Size:	Scale:	
8060c	A0	1/500	
Drawn by:	Checked by:	Approved by:	Revision:
PMG	AG	AG	P06
Suitability:			Status:
Suitable for Information			S2

Drawing Number:
WCH-GDA-VV-ZZ-DR-A-05_20-5501

Appendix B Sewer Records

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

Curtins Consulting Ltd

51-55
Tithebarn Street,
Liverpool,
L2 2SB

FAO:

Your Ref: B071551
Our Ref: UUPS-ORD-118253
Date: 14/08/2019

Dear Sirs

Location: West Cumberland Hospital

I acknowledge with thanks your request dated 13/08/2019 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

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

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.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

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

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular
EG Egg
OV Oval
FT Flat Top
RE Rectangular
SQ Square
TR Trapezoidal
AR Arch
BA Barrel
HO HorseShoe
UN Unspecified

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

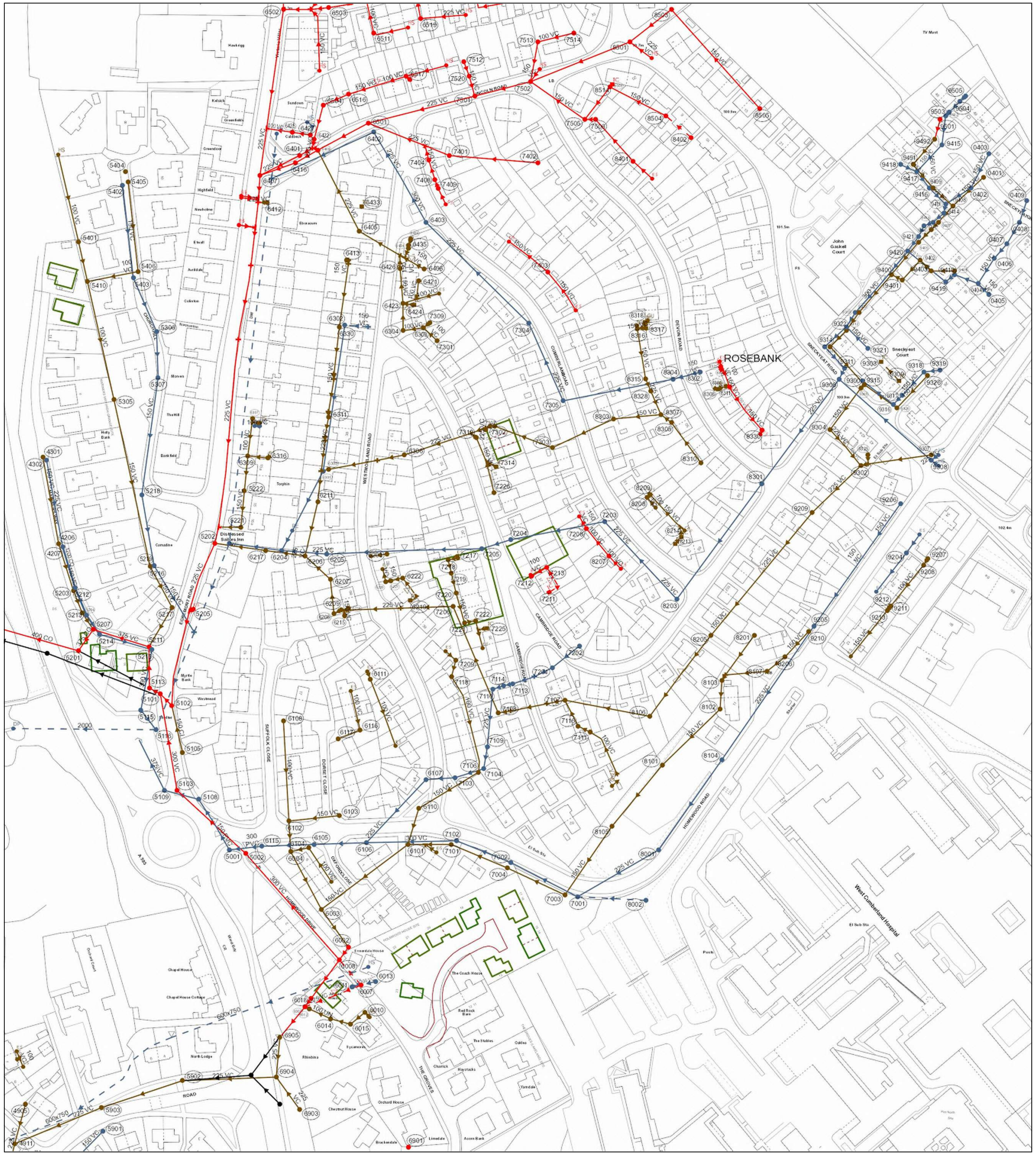
West Cumberland Hospital,

OS sheet Number: NX9915NW
Scale: 1:1250 Date: 14/08/2019
Nodes: 0
Sheet: 1 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly



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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6001	59.71	CO	58.16	225			VC	22.02271	1 in 17
6001	59.71	CO	58.16	225			VC	22.02271	1 in 17
8310		FO		150			VC	27.67902	
9505		SW	0	150			VC	4.24264	
9505		SW	0	150			VC	4.24264	
0401		FO	0	150			VC	23.34524	
0401		FO	0	150			VC	23.34524	
5307		SW		150			VC	65.57507	
5108	58.71	SW	57.06	375			VC	19.64688	1 in 20
8304	96.15	SW	94.73	225			VC	62.16912	1 in 8
5103	58.55	CO	56	300			VC	54.28561	1 in 71
6403	85.49	SW	83.88	300			VC	28.6531	1 in 61
5002	61.5	CO	56.6	300			VC	51.66236	1 in 86
7109	74.88	SW	73.88	225			VC	12.16553	1 in 10
5201	56.4	CO	52.62	400			CO	46.11607	1 in 24
7512	91.5	CO	90.77	150			VC	8.544003	1 in 26
5903	50.87	FO	49.67	225			VC	52	1 in 12
5903	50.87	FO	49.67	225			VC	52	1 in 12
8105	83.8	FO	79	150			VC	46.04346	1 in 8
7114	76.75	SW	75.64	225			VC	6.324555	1 in 14
9210	94.5	FO	93.58	150			VC	19.10497	1 in 22
6215		FO		150			VC	3.370812	
6302	79.16	SW	77.18	225			VC	81.88406	1 in 13
6402	84.8	SW	82.95	225			VC	62.15188	
6330		FO	0	150			VC	26.1725	
8104	88.96	SW	87.76	225			VC	61.03278	1 in 8
8208		FO		100			VC	2.255198	
7104	74.14	SW	72.62	225			VC	16.76305	1 in 6
9501		CO	0	150			VC	11.40175	
9501		CO	0	150			VC	11.40175	
5102	59.23	CO	57.55	225			VC	9.143506	1 in 11
7101	69.44	FO	67.52	150			VC	24	1 in 13
5410		FO		100			VC	67.00884	
6519	89.64	CO	0	225			VC	16.27882	
6304		FO		150			VC	15.11182	
7402	93.71	CO	92.41	225			VC	49.16299	1 in 9
8311		CO		150			VC	1.882831	
0402		SW	0	150			VC	16.64332	
0402		SW	0	150			VC	16.64332	
7206	78.19	FO	74.56	225			VC	29.01724	
6305	73.15	FO	70.85	225			VC	21.24035	
6217		FO	0	225			VC	28.28427	
9503		SW	0	150			VC	2.828427	
9503		SW	0	150			VC	2.828427	
9211		FO		100			VC	1.830842	
6007	63	CO	60.77	300			VC	16.15549	1 in 0.27377553
6007	63	CO	60.77	300			VC	16.15549	1 in 0.27377553
6301	72.98	SW	71.08	225			VC	37.12142	
7102	69.58	SW	68.08	300			VC	50.01	1 in 23
7202	83.46	SW	81.84	225			VC	19.20937	1 in 6
6406	84.32	FO	82.57	150			VC	8.062258	
8328		FO		225			VC	14.29498	
6103	67	FO	66.04	150			VC	28.16026	1 in 8
5901	50.18	SW	49.28	150			VC	65.76473	1 in 15
5901	50.18	SW	49.28	150			VC	65.76473	1 in 15
7108	75.84	FO	74.68	225			VC	64.07808	1 in 534
9404		FO	0	150			VC	13	
9404		FO	0	150			VC	13	
9305		FO	0	150			VC	28.6007	
6222		FO		100			VC	6.748543	
9326		FO	0	150			VC	24.75884	
9326		FO	0	150			VC	24.75884	
9308	102.73	SW	100.13	225			VC	68.0147	1 in 77
9308	102.73	SW	100.13	225			VC	68.0147	1 in 77
5401		FO		100			VC	22.50025	
6110	68.9	FO	67.3	150			VC	20.88061	1 in 12
6221		FO		100			VC	2.867628	
5219		SW		150			VC	43.31205	
7118		FO		100			VC	56.01379	
6427		CO		100			VC	10.0583	
5218		SW		150			VC	39.71027	
6008	62.8	CO	60.67	300			VC	78.64477	1 in 67
6008	62.8	CO	60.67	300			VC	78.64477	1 in 67
6905	58.7	FO	58.7	225			VC	22.09072	
6905	58.7	FO	58.7	225			VC	22.09072	
7213		CO		100			VC	9.773593	
9325		FO		225			VC	5	1 in
9204		SW		0			VC	26.94139	
9204		SW		0			VC	26.94139	
6517	88.17	CO	86.96	100			VC	16.76305	1 in 8
7409		CO		150			VC	5.065056	
7218		FO		150			VC	7.465043	
7004	72.53	FO	70.51	150			VC	33.61547	1 in 11
6426		FO		150			VC	7.297792	
9413	107.45	SW	105.75	225			VC	5.385165	1 in 4
9413	107.45	SW	105.75	225			VC	5.385165	1 in 4
5216		FO		150			VC	25.81408	
6216		FO		225			VC	1	1 in
5305		FO		150			VC	94.7526	
4911	47.33	FO	45.48	225			VC	26.68333	1 in 40
4911	47.33	FO	45.48	225			VC	26.68333	1 in 40
9415		SW	0	150			VC	20.51828	
9415		SW	0	150			VC	20.51828	
9207		FO		100			VC	4.359111	
9207		FO		100			VC	4.359111	
6311	74.98	FO	73.63	150			VC	11.18034	
6903	60.03	FO	57.45	225			VC	22.2036	
6903	60.03	FO	57.45	225			VC	22.2036	
5306		SW		150			VC	25.50625	
9311		SW	0	300			VC	6.708204	
6407	77.77	CO	76.57	225			VC	15.0333	
7208		CO		150			VC	7.790169	
7404		CO		150			VC	8.396434	
9314		FO	0	150			VC	28.3196	
9405		FO	0	150			VC	23.43075	
9405		FO	0	150			VC	23.43075	
6422		CO		225			VC	5.09902	1 in
6104		FO		100			VC	10.1987	
5402		SW		150			VC	51.58201	
9319		SW	0	150			VC	9.055386	
9319		SW	0	150			VC	9.055386	
8402		CO		150			VC	18.43909	1 in
6516	83.45	CO	82.71	150			VC	15.23155	
5203	9.81	FO	4.15	150			VC	13.15617	1 in 29
8209		FO		150			VC	0.5021425	
7501	91.41	CO	89.93	225			VC	60.87693	1 in 6
6207		FO	0	225			VC	19.10497	
8509		CO	0	150			VC	22.80351	
8316		FO		150			VC	28.07528	
6416		CO		225			VC	20.89049	
8305	95.48	FO		150			VC	7.237054	
4905	48.62	FO	46.15	225			VC	22.80351	1 in 34
4905	48.62	FO	46.15	225			VC	22.80351	1 in 34
5116	10.05	SW	4.35	2000				78.91244	
7217		FO		150			VC	5.401602	
6007	63	CO	60.77	300			VC	18.43909	1 in 0.31444558
6007	63	CO	60.77	300			VC	18.43909	1 in 0.31444558
6014	1	FO		100			UN	12.96326	
6014	1	FO		100			UN	12.96326	
9412	106.17	SW	104.47	225			VC	6.708204	1 in 8
9412	106.17	SW	104.47	225			VC	6.708204	1 in 8
9302	100.24	FO	98.58	225			VC	37.48333	1 in 13
8001	81.42	SW	79.75	225			VC	51.97115	1 in 9
8503	100.87	CO	99.22	225			VC	29.20616	1 in 28
6115	61.95	SW	60.9	300			PVC	9.055386	1 in 8
9206	100.5	SW	99.12	150			VC	41.61731	1 in 14
7219		FO		150			VC	11.44081	
7111		FO		100			VC	7.424032	
9306	100.65	SW	98.53	225			VC	72.20111	1 in 22
6108		FO		100			VC	55.67823	
5101	59.45	CO	55.13	375			VC	6.848336	
9414	107	SW	104.85	225			VC	7.81025	
9414	107	SW	104.85	225			VC	7.81025	
6106	67.48	SW	65.88	300			VC	29.01724	1 in 13
5214	9.72	SW	7.11	300			VC	30.26404	1 in 112
7506		CO	0	150			VC	6	
5109	57.51	SW	55	375			VC	31.30495	
6501	80.82	CO	79.7	225			VC	31.76476	1 in 199
9402		FO	0	150			VC	14.86607	
9402		FO	0	150			VC	14.86607	
8101	87.77	FO	84.77	150			VC	44.04543	1 in 8
5113		CO		375			VC	22.91126	
9205	94.7	SW	93.2	225			VC	89.87213	1 in 17
8203	91.46	SW	89.91	225			VC	58.72819	1 in 33
6405	81.63	FO	80.01	225			VC	50.53711	1 in 108
6204	68.3	SW	66.8	300			VC	29.27456	1 in 7
5207		CO		375			CO	14.41117	
0404		SW	0	150			VC	13.92839	
0404		SW	0	150			VC	13.92839	
7220		FO		150			VC	17.02695	
7520	91.49	CO	90.4	150			VC	11.40175	1 in 26
7205	80.33	SW	78.5	300			VC	43.01163	1 in 12
8102	91.17	FO	89.37	150			VC	44.55334	1 in 10
8401		CO		150			VC	31.07613	
4301	11.55	FO	7.63	150			VC	48.91954	1 in 326
7110	76.43	SW	75.18	225			VC	32.14032	1 in 25
6408	80.78	CO	79.54	150			VC	1.414214	
6105	65.18	SW	63.7	300			VC	29.01724	1 in 10
9213		FO		150			VC	32.30826	
7209		FO		100			VC	9.304545	
8504		CO	0	150			VC	34.88553	
8107		FO	0	150			VC	23.08679	
7303	86.66	FO	84.29	225			VC	34.17601	1 in 11
6208	72.55	FO	70.64	225			VC	19.10497	
0405		SW	0	150			VC	8.485281	
0405		SW	0	150			VC	8.485281	
6011	63.21	SW	60.91	600				3.162278	1 in 5.39177776
6011	63.21	SW	60.91	600				3.162278	1 in 5.39177776
7401	88.88	CO	87.23	225			VC	48.46779	1 in 7
4207	10.13	SW	7.37	1200			CO	23.59021	1 in 197
7505	95.98	CO	95.21	150			VC	36.61967	1 in 18
7107	80.48	FO	78.48	225			VC	10.19804	
5001	59.57	SW	58.68	150			PVC	16.12452	1 in 20
9421	105.76	SW	103.66	225			VC	10	1 in 11
9421	105.76	SW	103.66	225			VC	10	1 in 11
4302	11.53	SW	9.8	225			VC	48.94367	1 in 20
6436		FO		100			VC	3.7855	
9313	102.1	SW	100.27	300			VC	9.433981	1 in 23
8505		CO	0	150			VC	73.66138	
7403		CO		150			VC	27.34769	
9321		SW	0	150			VC	16.97056	
6306	78.02	FO	76.47	225			VC	15.29706	
5212	9.66	SW	7.25	1200			CO	16.45719	1 in 206
6205	73.13	SW	71.23	225			VC	12.04159	1 in 5
7301		FO		100			VC	10.43008	
6107	70.12	SW	68.44	225			VC	48.10405	1 in 19
7103	71.42	SW	69.81	225			VC	16.03122	1 in 12
8301	96.86	SW	95.26	225			VC	79.40403	1 in 15
9312	101.51	SW	99.81	300			VC	16.27882	1 in 39
9409		FO	0	150			VC	14.86607	
9409		FO	0	150			VC	14.86607	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6111		FO		100			VC	39.41388	
7304	89.58	SW	86.67	225			VC	79.9062	1 in 29
9320		FO	0	150			VC	22.2036	
7203	89.77	SW	88.1	225			VC	52.95281	1 in 6
9406		FO	0	150			VC	9.899495	
9406		FO	0	150			VC	9.899495	
5221		FO		150			VC	12.37279	
7116		FO		100			VC	16.17083	
5105	58.72	FO	58.07	150			CI	26.60563	1 in 83
9401		FO	0	150			VC	6.708204	
9304	99.88	FO	0	225			VC	13.45362	
8002		SW		300			VC	38.0526	1 in
5403		SW		150			VC	32.51481	
6904		FO	0	225			VC	52.03845	
6904		FO	0	225			VC	52.03845	
5210	64.54	SW		0				53.06074	
7001	76.45	SW	74.13	300			VC	41.59327	1 in 11
6502	82.18	CO	80.56	225			VC	92.91394	1 in 23
9407		FO	0	150			VC	5.656854	
9407		FO	0	150			VC	5.656854	
7302	83.64	FO	81.16	225			VC	2	
6303		FO		100			VC	11.44424	
9212		FO		100			VC	1.523291	
7309		FO		100			VC	4.366651	
7305	89.86	SW	87.26	225			VC	47.01064	1 in 85
9400		FO	0	150			VC	27.65863	
5215	11.16	SW	6.84	300			VC	34.04999	1 in 170
6013	64.09	SW	61.94	300			VC	8.246211	1 in 0.13810435
6013	64.09	SW	61.94	300			VC	8.246211	1 in 0.13810435
6401	79.32	CO	77.94	225			VC	24.59675	1 in 18
9492		FO	0	150			VC	18.43909	
9492		FO	0	150			VC	18.43909	
7513		CO	0	150			VC	22.36068	
6412		FO		225			VC	5	
6435		FO		100			VC	5.693299	
8315		FO		225			VC	7.358759	
5902	54.85	FO	53.77	225			VC	47.43417	1 in 12
5902	54.85	FO	53.77	225			VC	47.43417	1 in 12
7502	94.71	CO	93.16	225			VC	32.01562	1 in 10
8303	92.42	FO	90.74	225			VC	37.57659	1 in 6
9323		FO	0	150			VC	12.20656	
0403		SW	0	150			VC	21.47091	
0403		SW	0	150			VC	21.47091	
9420	104.89	SW	102.68	225			VC	22.02271	1 in 17
9420	104.89	SW	102.68	225			VC	22.02271	1 in 17
6209		FO	0	225			VC	4.472136	
8205	92.82	FO	91.33	150			VC	27.80288	1 in 9
8206	93.14	FO	92.71	150			VC	12.80625	
8330		CO		150			VC	2.447339	
6012	1.2	FO		100			UN	2.707188	
6012	1.2	FO		100			UN	2.707188	
0408		SW	0	150			VC	13.89244	
0408		SW	0	150			VC	13.89244	
9316		SW	0	150			VC	21.40093	
8207		CO		100			VC	19.85966	
5213	9.71	SW	7.17	1200			CO	12.84985	1 in 214
7408		CO		150			VC	11.40206	
6003	63.8	FO	61.87	225			VC	25.80698	1 in 70
6003	63.8	FO	61.87	225			VC	25.80698	1 in 70
6206		FO	0	225			VC	22.2036	
9300		FO	0	150			VC	2.828427	
9410		SW	0	150			VC	6.403124	
9410		SW	0	150			VC	6.403124	
8302	97.28	SW	96.03	150			VC	7.28011	1 in 12
5217		FO		150			VC	25.29301	
0409		SW	0	150			VC	12.64911	
0409		SW	0	150			VC	12.64911	
6413	80.33	FO	79.37	150			VC	1	
7201	80.48	SW	78.45	225			VC	11.18034	
4206	10.11	FO	7.48	150			VC	27.25008	1 in 8
0407		SW	0	150			VC	10.63015	
0407		SW	0	150			VC	10.63015	
5406		FO		100			VC	28.58987	
6511	86.39	CO	85.8	100			VC	18.43909	
7106	73.76	FO	0	150			VC	38.58756	
8307		FO		150			VC	26.31764	
6421		FO		100			VC	18.06347	
6004	63.76	FO	62.76	150			VC	36.23534	1 in 41
9419	105.14	SW	103.24	225			VC	27.01851	1 in 52
9419	105.14	SW	103.24	225			VC	27.01851	1 in 52
7002	72.57	SW	70.37	300			VC	32.31099	1 in 14
8501	99.79	CO	98.17	225			VC	59.23681	1 in 12
8103	91.53	FO	90.75	150			VC	16.03122	1 in 12
9502		SW	0	150			VC	16.12452	
9502		SW	0	150			VC	16.12452	
9307	102.69	FO	0	225			VC	35.35534	
9307	102.69	FO	0	225			VC	35.35534	
6211		FO	0	225			VC	30.80584	
9411	107.52	SW	104.92	225			VC	5.09902	1 in 73
9411	107.52	SW	104.92	225			VC	5.09902	1 in 73
7312		FO		150			VC	3.867599	
5204	9.69	FO	3.7	375			VC	11.08652	
9208		FO		100			VC	28.90358	
9208		FO		100			VC	28.90358	
5211		CO		375			VC	32.31872	
9318		SW	0	150			VC	17.69181	
9318		SW	0	150			VC	17.69181	
6203		FO		100			VC	8.73541	
9416	107.31	SW	105.06	225			VC	12.72792	1 in 91
9416	107.31	SW	105.06	225			VC	12.72792	1 in 91
6503	84.41	CO	82.26	225			VC	10.04988	
9418		SW	0	150			VC	9.848858	
7514	96.98	CO	96.2	100			VC	20.61553	
8106	86.67	FO	85.14	225			VC	47.85394	1 in 7
7307		FO		225			VC	1	1 in
9408		FO	0	150			VC	12.04159	
9408		FO	0	150			VC	12.04159	
6428		CO		100			VC	14.48718	
6101	67.88	FO	65.62	150			VC	60	1 in 16
9310	100.81	SW	99.36	300			VC	16.27882	
9322		FO	0	150			VC	12.72792	
7204	82.14	SW	79.86	225			VC	16.76305	1 in 12
8201	93.47	FO	92.67	150			VC	27.20294	
6504	82.98	CO	0	150			VC	19.64688	
9209	97.6	FO	95.69	225			VC	44.04543	1 in 20
5202	64.59	CO	63.43	225			VC	93.80418	1 in 13
9417		SW	0	150			VC	11.40175	
9417		SW	0	150			VC	11.40175	
6220		FO		150			VC	7.126692	
9317		SW	0	150			VC	7.071068	
7113	77.47	SW	75.9	225			VC	5.09902	1 in 20
6002	63.41	CO	61.5	225			VC	8.602325	1 in 10
6002	63.41	CO	61.5	225			VC	8.602325	1 in 10
7003	76.64	FO	73	150			VC	35.34119	1 in 14
9491		FO	0	150			VC	17.02939	
9491		FO	0	150			VC	17.02939	
6102	64.26	FO	62.66	150			VC	17.02939	
9504		SW	0	150			VC	8.485281	
9504		SW	0	150			VC	8.485281	
5115	10.19	SW	6.64	300			VC	13.63866	1 in 6
6423		FO		150			VC	19.42896	
6434		FO		100			VC	1.655486	
9403		FO	0	150			VC	8.485281	
9403		FO	0	150			VC	8.485281	
0406		SW	0	150			VC	16.64332	
0406		SW	0	150			VC	16.64332	
6307		FO		100			VC	20.92479	
5222		FO		150			VC	20.27811	
7221		FO		150			VC	6.286202	
6010	1.4	FO		100			UN	10.38323	
6010	1.4	FO		100			UN	10.38323	
7222		FO		150			VC	15.70882	
6015	1	FO		100			UN	11.39401	
6015	1	FO		100			UN	11.39401	
6309		FO		150			VC	19.51291	

LEGEND

Abandoned / Foul / Surface Water / Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

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

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

- CI Circular
- TR Trapezoidal
- EG Egg
- AR Arch
- OV Oval
- BA Barrel
- FT Flat Top
- HO HorseShoe
- RE Rectangular
- UN Unspecified
- SQ Square

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforecd Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

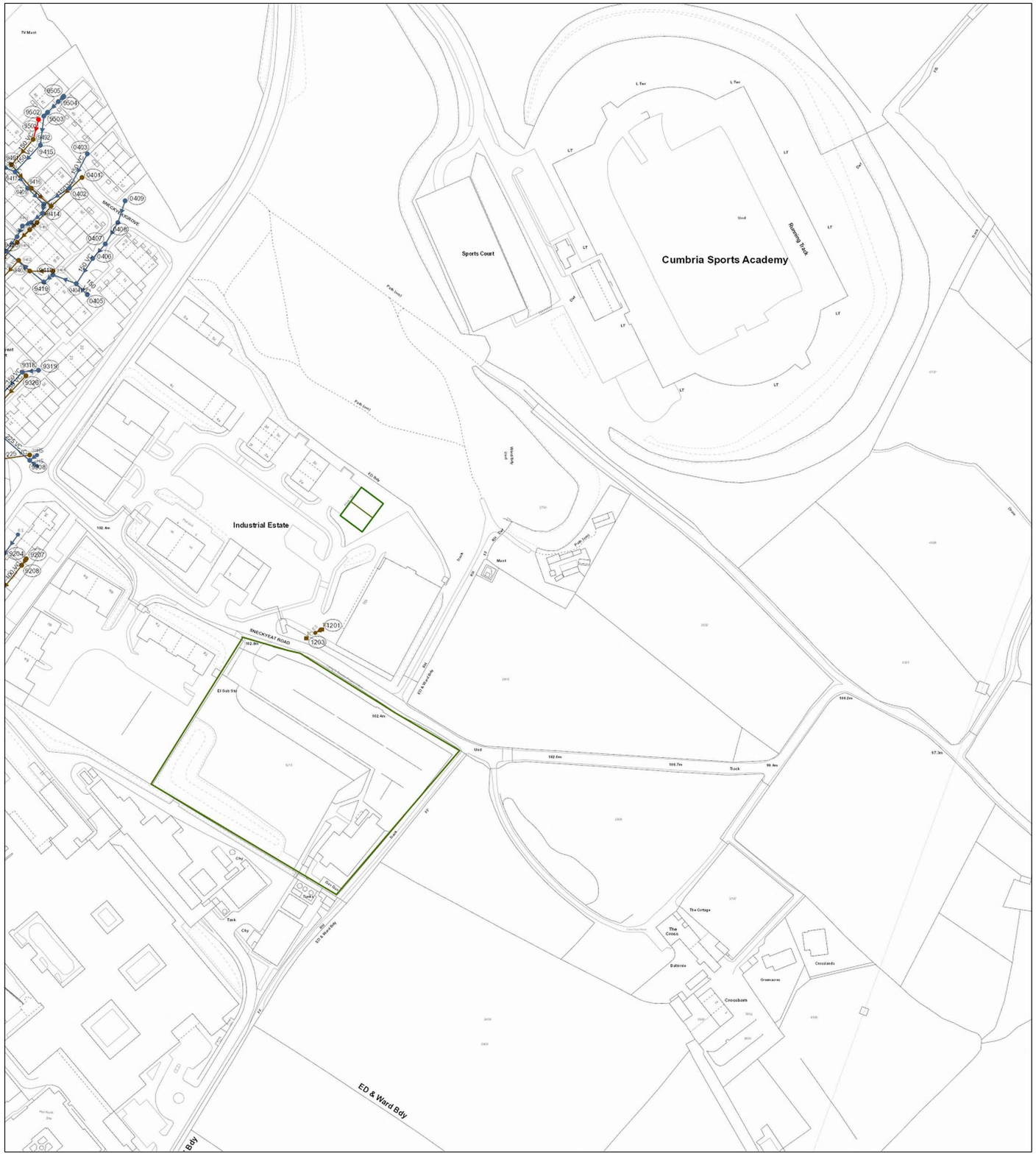
West Cumberland Hospital,

OS sheet Number: NX9816SE
Scale: 1:1250
Date: 14/08/2019
Nodes: 346
Sheet: 2 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
9413	107.45	SW	105.75	225			VC	5.385165	1 in 4
9413	107.45	SW	105.75	225			VC	5.385165	1 in 4
9412	106.17	SW	104.47	225			VC	6.708204	1 in 8
9412	106.17	SW	104.47	225			VC	6.708204	1 in 8
9307	102.69	FO	0	225			VC	35.35534	
9307	102.69	FO	0	225			VC	35.35534	
9505		SW	0	150			VC	4.24264	
9505		SW	0	150			VC	4.24264	
0401		FO	0	150			VC	23.34524	
0401		FO	0	150			VC	23.34524	
9411	107.52	SW	104.92	225			VC	5.09902	1 in 73
9411	107.52	SW	104.92	225			VC	5.09902	1 in 73
9406		FO	0	150			VC	9.899495	
9406		FO	0	150			VC	9.899495	
9415		SW	0	150			VC	20.51828	
9415		SW	0	150			VC	20.51828	
9207		FO		100			VC	4.359111	
9207		FO		100			VC	4.359111	
9208		FO		100			VC	28.90358	
9208		FO		100			VC	28.90358	
0405		SW	0	150			VC	8.485281	
0405		SW	0	150			VC	8.485281	
9318		SW	0	150			VC	17.69181	
9318		SW	0	150			VC	17.69181	
9416	107.31	SW	105.06	225			VC	12.72792	1 in 91
9416	107.31	SW	105.06	225			VC	12.72792	1 in 91
9418		SW	0	150			VC	9.848858	
9404		FO	0	150			VC	13	
9404		FO	0	150			VC	13	
0408		SW	0	150			VC	13.89244	
0408		SW	0	150			VC	13.89244	
9326		FO	0	150			VC	24.75884	
9326		FO	0	150			VC	24.75884	
9421	105.76	SW	103.66	225			VC	10	1 in 11
9421	105.76	SW	103.66	225			VC	10	1 in 11
9408		FO	0	150			VC	12.04159	
9408		FO	0	150			VC	12.04159	
9308	102.73	SW	100.13	225			VC	68.0147	1 in 77
9308	102.73	SW	100.13	225			VC	68.0147	1 in 77
9414	107	SW	104.85	225			VC	7.81025	107
9414	107	SW	104.85	225			VC	7.81025	
9407		FO	0	150			VC	5.656854	
9407		FO	0	150			VC	5.656854	
9405		FO	0	150			VC	23.43075	
9405		FO	0	150			VC	23.43075	
9402		FO	0	150			VC	14.86607	
9402		FO	0	150			VC	14.86607	
9319		SW	0	150			VC	9.055386	
9319		SW	0	150			VC	9.055386	
9410		SW	0	150			VC	6.403124	
9410		SW	0	150			VC	6.403124	
0409		SW	0	150			VC	12.64911	
0409		SW	0	150			VC	12.64911	
9501		CO	0	150			VC	11.40175	
9501		CO	0	150			VC	11.40175	
9417		SW	0	150			VC	11.40175	
9417		SW	0	150			VC	11.40175	
0404		SW	0	150			VC	13.92839	
0404		SW	0	150			VC	13.92839	
0407		SW	0	150			VC	10.63015	
0407		SW	0	150			VC	10.63015	
9491		FO	0	150			VC	17.02939	
9491		FO	0	150			VC	17.02939	
9504		SW	0	150			VC	8.485281	
9504		SW	0	150			VC	8.485281	
9492		FO	0	150			VC	18.43909	
9492		FO	0	150			VC	18.43909	
9204		SW	0				VC	26.94139	
9204		SW	0				VC	26.94139	
0402		SW	0	150			VC	16.64332	
0402		SW	0	150			VC	16.64332	
9403		FO	0	150			VC	8.485281	
9403		FO	0	150			VC	8.485281	
0406		SW	0	150			VC	16.64332	
0406		SW	0	150			VC	16.64332	
9419	105.14	SW	103.24	225			VC	27.01851	1 in 52
9419	105.14	SW	103.24	225			VC	27.01851	1 in 52
9409		FO	0	150			VC	14.86607	
9409		FO	0	150			VC	14.86607	
9503		SW	0	150			VC	2.828427	
9503		SW	0	150			VC	2.828427	
0403		SW	0	150			VC	21.47091	
0403		SW	0	150			VC	21.47091	
9420	104.89	SW	102.68	225			VC	22.02271	1 in 17
9420	104.89	SW	102.68	225			VC	22.02271	1 in 17
9502		SW	0	150			VC	16.12452	
9502		SW	0	150			VC	16.12452	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned — Foul — Surface Water — Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

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

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

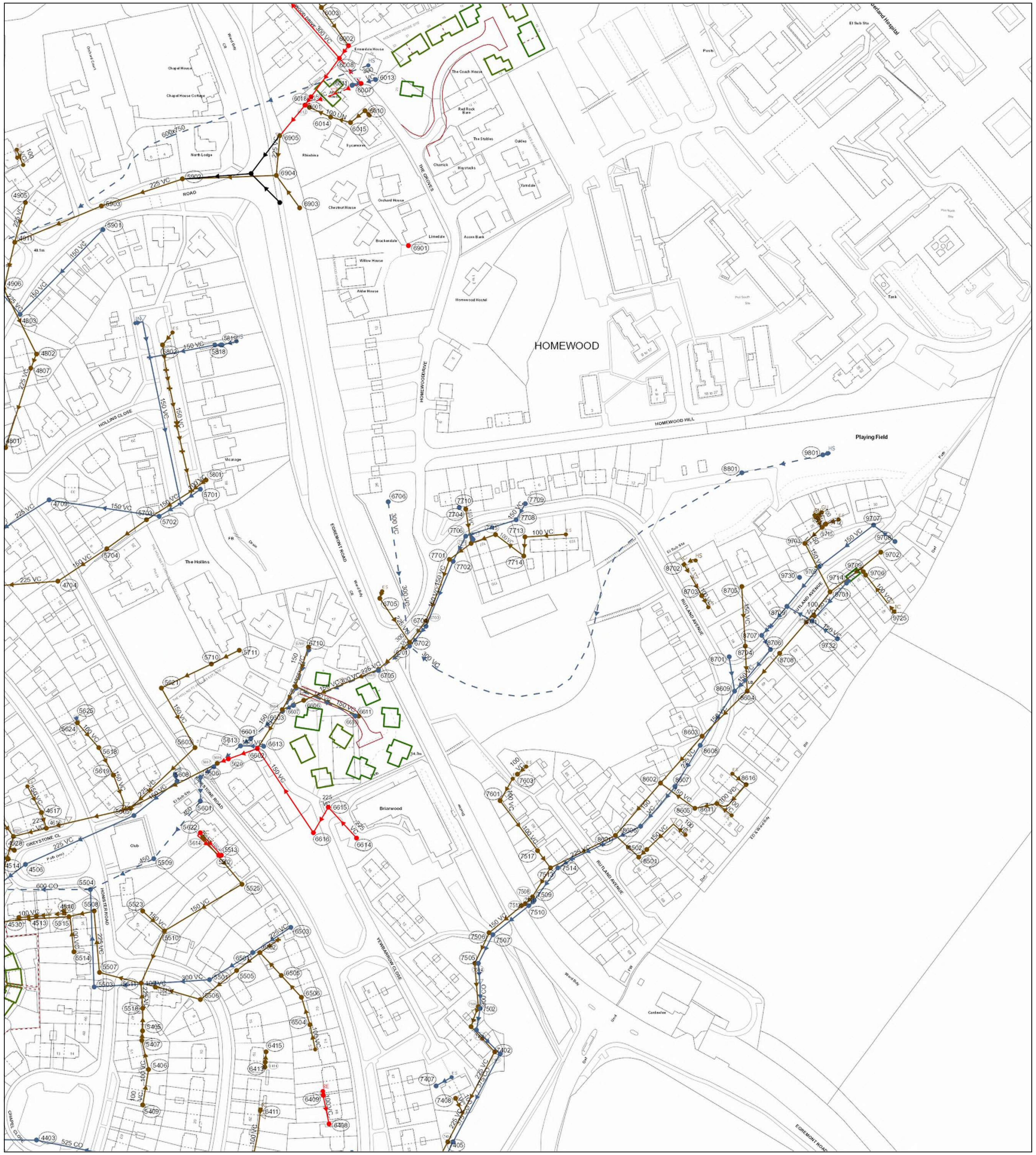
West Cumberland Hospital,

OS sheet Number: NX9916SW
Scale: 1:1250 **Date:** 14/08/2019
Nodes: 87
Sheet: 3 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities — helping life flow smoothly



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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6001	59.71	CO	58.16	225			VC	22.02271	1 in 17
6001	59.71	CO	58.16	225			VC	22.02271	1 in 17
5605	33.53	SW	32.13	225			VC	65.79514	1 in 13
6701	55.04	SW	50.78	300			VC	22.02983	1 in 137.686449
6603	46.88	SW	45.35	300			VC	23.4031	1 in 9.00119430
5608	38.32	SW	36.87	150			VC	30.61046	1 in 7
5903	50.87	FO	49.67	225			VC	52	1 in 12
5903	50.87	FO	49.67	225			VC	52	1 in 12
6502	35.16	FO	34.06	225			VC	16.40122	1 in 4
6502	35.16	FO	34.06	225			VC	16.40122	1 in 4
9714	80.37	SW	0	150			VC	28.3196	
5409		FO		100			VC	20.01115	
5409		FO		100			VC	20.01115	
8501	63.78	FO	62.12	150			VC	17.69181	1 in 61
5506	29.66	FO	27.86	225			VC	34.21954	1 in 71
5506	29.66	FO	27.86	225			VC	34.21954	1 in 71
6616		CO		150			VC	56.06404	
6615		CO		225			VC	16.37895	
6610	49.51	FO	47.62	150			VC	39.25717	1 in 27.4525660
5710	45.51	FO	44.4	150			VC	30.67964	1 in 9
8708	76.28	FO	74.15	150			VC	27.65863	1 in 14
8605	67.67	FO	66.37	150			VC	23.60085	1 in 41
7509	56.55	SW	54.6	225			VC	4.24264	
5711	46.51	FO	45.12	150			VC	17.2714	1 in 25
6611	49.47	SW	47.9	150			VC	36.1031	1 in 24.2302685
6007	63	CO	60.77	300			VC	16.15549	1 in 0.27377553
6007	63	CO	60.77	300			VC	16.15549	1 in 0.27377553
5405		FO		100			VC	12.36931	
5405		FO		100			VC	12.36931	
7512	55.2	FO	54.3	150			VC	2.236068	
6503	40.08	SW	38.7	225			VC	25.23886	1 in 4
6503	40.08	SW	38.7	225			VC	25.23886	1 in 4
5901	50.18	SW	49.28	150			VC	65.76473	1 in 15
5901	50.18	SW	49.28	150			VC	65.76473	1 in 15
7708	65	SW	63.95	150			VC	29.41109	1 in 7
9715		FO		100			VC	12.94631	
7404	41.83	SW	40.2	375			CO	15.65248	1 in 21
7404	41.83	SW	40.2	375			CO	15.65248	1 in 21
7717	66.33	SW	64.78	100			VC	3.162278	
8604	73.98	FO	72.15	150			VC	35.35534	1 in 12
4802	45.42	FO	43.77	225			VC	8.544003	
6414		FO		100			VC	2.759144	
6414		FO		100			VC	2.759144	
5602	33.95	FO	32.09	225			VC	2	
8703		FO		100			VC	7.357398	
4506	28.45	SW	27.1	225			VC	21.68619	1 in 23
6008	62.8	CO	60.67	300			VC	78.64477	1 in 67
6008	62.8	CO	60.67	300			VC	78.64477	1 in 67
6905	58.7	FO	58.7	225			VC	22.09072	
6905	58.7	FO	58.7	225			VC	22.09072	
5704		FO	0	150			VC	32.44996	
6702	55.04	FO	50.76	300			VC	10.80979	1 in 154
6703	56.32	FO	54.54	225			VC	15	1 in 15
9801	78.17	SW	74.87	0				46.09772	1 in 15
6704	56.31	SW	54.47	225			VC	6.403124	1 in 3
8606	64.94	SW	62.64	225			VC	23.25941	
7405	41.74	FO	39.85	225			VC	25.94224	1 in 15
7405	41.74	FO	39.85	225			VC	25.94224	1 in 15
5702	46.78	SW	45.43	150			VC	61.66036	1 in 13
5624		FO		100			VC	18.20085	
7401	45.32	SW	43.2	375			CO	55.47071	1 in 19
7401	45.32	SW	43.2	375			CO	55.47071	1 in 19
4911	47.33	FO	45.48	225			VC	26.68333	1 in 40
4911	47.33	FO	45.48	225			VC	26.68333	1 in 40
9711	78.53	FO	76.79	100			VC	1	
9708	82.26	SW	80.91	150			VC	15	1 in 22
6903	60.03	FO	57.45	225			VC	22.2036	
6903	60.03	FO	57.45	225			VC	22.2036	
5510		FO	0	150			VC	31.7805	
5510		FO	0	150			VC	31.7805	
4807		FO	0	225			VC	46.17358	
5818		SW	0	150			VC	36.67424	
5514		FO		100			VC	19.99409	
5514		FO		100			VC	19.99409	
5404	28.99	SW	27.44	525			CO	56.08921	1 in 42
6413		FO		100			VC	5.739352	
6413		FO		100			VC	5.739352	
7713		FO		100			VC	10.53182	
6604	46.9	FO	44.63	150			VC	25.75065	1 in 14
8709	77.5	SW	75.63	150			VC	14.21267	
7601		FO		100			VC	34.57288	
6706		SW	0	300			VC	80.895	
4905	48.62	FO	46.15	225			VC	22.80351	1 in 34
4905	48.62	FO	46.15	225			VC	22.80351	1 in 34
7709	66.18	SW	64.83	150			VC	10.29563	1 in 12
6602		CO		150			VC	17.04596	
6007	63	CO	60.77	300			VC	18.43909	1 in 0.31444558
6007	63	CO	60.77	300			VC	18.43909	1 in 0.31444558
4617		FO		150			VC	9.226533	
6014	1	FO		100			UN	12.96326	
6014	1	FO		100			UN	12.96326	
9705	79.58	SW	77.42	150			VC	28.42534	1 in 16
5607	41.45	SW	39.93	300			VC	9.433059	1 in 11.9405804
5603	40.75	FO	39.36	225			VC	34.41863	
6504		FO		100			VC	15.91971	
6504		FO		100			VC	15.91971	
7703	61.92	FO	59.58	150			VC	15	1 in 14
9710	78.38	SW	76.68	150			VC	16.12452	1 in 15
7505	49.67	SW	48.36	225			VC	12.04159	1 in 9
7505	49.67	SW	48.36	225			VC	12.04159	1 in 9
5508	29.11	FO	27.01	225			VC	14.31782	
5508	29.11	FO	27.01	225			VC	14.31782	
5511	29.1	FO	0	225			VC	23.76973	
5511	29.1	FO	0	225			VC	23.76973	
6601	44.52	SW	42.75	300			VC	6.945468	
5802	50.54	FO	49.67	150			VC	14.14214	
6506		FO		100			VC	16.48307	
6506		FO		100			VC	16.48307	
4906	46.26	FO	44.81	225			VC	40.24922	1 in 39
5819		SW	0	150			VC	4	
7503	46.78	SW	45.71	375			CO	12.16553	1 in 5
7503	46.78	SW	45.71	375			CO	12.16553	1 in 5
9701	79.47	FO	77.45	150			VC	44.05985	1 in 13
9706		FO		100			VC	2.239773	
5507	28.95	FO	27.17	225			VC	34.1321	1 in 213
5507	28.95	FO	27.17	225			VC	34.1321	1 in 213
5509	34.68	SW	33.29	450				38.91015	1 in 9
6602		CO		150			VC	6.536495	
4530		FO		100			VC	1.376528	
4530		FO		100			VC	1.376528	
6011	63.21	SW	60.91	600				3.162278	1 in 5.39177776
6011	63.21	SW	60.91	600				3.162278	1 in 5.39177776
7506	53.73	FO	50.38	150			VC	18.78829	1 in 10
7506	53.73	FO	50.38	150			VC	18.78829	1 in 10
7502	46.78	FO	45.75	150			VC	5.385165	1 in 5
7502	46.78	FO	45.75	150			VC	5.385165	1 in 5
5604	41.89	FO		150			VC	53.55499	
6505		FO		100			VC	17.31768	
6505		FO		100			VC	17.31768	
6605	52.57	SW	50.62	300			VC	50.94532	
7501	43.85	FO	43.31	225			VC	19.10421	1 in 50
7501	43.85	FO	43.31	225			VC	19.10421	1 in 50
8616		FO		100			VC	21.69431	
8601	63.88	FO	61.83	150			VC	40.24922	1 in 11
6710	49.72	SW	48.15	150			VC	22.29396	1 in 13
5407		FO		100			VC	5.308584	
5407		FO		100			VC	5.308584	
5505	31.31	FO	30.28	225			VC	25.6125	1 in 11
5505	31.31	FO	30.28	225			VC	25.6125	1 in 11
8701	73.51	SW	71.73	150			VC	19.23538	1 in 51
9707	81.69	SW	80.24	150			VC	37.80212	1 in 13
5619		FO		150			VC	20.55012	
8607	67.66	SW	65.86	225			VC	14.21267	1 in 13
6709	49.39	FO	47.59	150			VC	22.97539	1 in 16.4109902
4803	46.65	SW	44.67	225			VC	31.89044	1 in 17
4513		FO		100			VC	9.620073	
4513		FO		100			VC	9.620073	
8603	70.18	FO	69.13	150			VC	34.71311	1 in 10
8609	72.45	SW	71.35	225			VC	35.51056	1 in 11
7403	43.85	SW	43.11	375			CO	18.38478	
7403	43.85	SW	43.11	375			CO	18.38478	
7513	60.48	FO	58.08	150			VC	18.86796	1 in 5
6904		FO	0	225			VC	52.03845	
6904		FO	0	225			VC	52.03845	
9706		FO		100			VC	2.239773	
7508	56.55	FO	54.6	150			VC	5.656854	1 in 19
6612	47.98	SW	46.41	150			VC	14.77557	1 in 9
5613		SW		300			VC	18.76549	
6008	62.8	CO		225			VC	5.62038	
6008	62.8	CO		225			VC	5.62038	
8705	76.67	FO	74.99	150			VC	33.06055	1 in 13
4709	42.93	SW	40.78	225			VC	56.60389	1 in 8
5503	28.97	SW	27.65	300			VC	54.03703	1 in 35
5503	28.97	SW	27.65	300			VC	54.03703	1 in 35
6614		CO		225			VC	23.23131	
7408		FO		100			VC	9.018431	
7408		FO		100			VC	9.018431	
5518		FO	0	225			VC	14.03567	
5518		FO	0	225			VC	14.03567	
7402	44.28	FO	42.93	225			VC	56.35601	1 in 19
7402	44.28	FO	42.93	225			VC	56.35601	1 in 19
6013	64.09	SW	61.94	300			VC	8.246211	1 in 0.13810435
6013	64.09	SW	61.94	300			VC	8.246211	1 in 0.13810435
8801	76.36	SW	71.86	0				236.4736	
7517		FO		100			VC	11.92194	
5902	54.85	FO	53.77	225			VC	47.43417	1 in 12
5902	54.85	FO	53.77	225			VC	47.43417	1 in 12
8502		FO		150			VC	5.895051	
6606		FO	0	150			VC	12.9908	
6613	45.45	SW	43.88	150			VC	12.86137	1 in 5.76742921
8707	75.96	SW	73.63	150			VC	9.433981	1 in 13
7507	53.73	SW	50.38	225			VC	17.88854	1 in 9
7507	53.73	SW	50.38	225			VC	17.88854	1 in 9
7701	60.1	FO	58.4	150			VC	18.02776	1 in 9
7715		FO		100			VC	14.36438	
4704	40.29	FO	39.16	225			VC	52.15362	1 in 8
8608	70	SW	68.24	225			VC	26.92582	1 in 11
7514	60.65	SW	58.01	225			VC	22.2036	1 in 7
6012	1.2	FO		100			UN	2.707188	
6012	1.2	FO		100			UN	2.707188	
5504	31.59	SW	29.19	600			CO	52.28185	1 in 17
6003	63.8	FO	61.87	225			VC	25.80698	1 in 70
6003	63.8	FO	61.87	225			VC	25.80698	1 in 70
8706	74.84	SW	72.89	150			VC	22.02271	
8602	67.44	FO	65.79	150			VC	38.28838	1 in 10
5601	39.48	SW	37.86	450				41.23106	1 in 9
9703	79.45	FO	77.95	150			VC	30.41381	1 in 61
6409		CO		100			VC	16.23578	
6409		CO		100			VC	16.23578	
5501	30.02	SW	28.22	300			VC	30.06659	
5501	30.02	SW	28.22	300			VC	30.06659	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4601	29.39	FO	27.68	225			VC	43.38344	1 in 37
5406		FO		100			VC	16.51454	
5406		FO		100			VC	16.51454	
7511		FO	0	150			VC	23.43075	
7511		FO	0	150			VC	23.43075	
6501	34.04	SW	32.84	225			VC	28.30194	1 in 6
6501	34.04	SW	32.84	225			VC	28.30194	1 in 6
7706	61.6	SW	0	150			VC	15.65248	
6607		SW		300			VC	6.738397	
7504	49.68	FO	48.48	150			VC	24.08319	1 in 9
7504	49.68	FO	48.48	150			VC	24.08319	1 in 9
6004	63.76	FO	62.76	150			VC	36.23534	1 in 41
4616		FO		225			VC	18.83547	
7704	62.76	FO	60.66	150			VC	19.23538	1 in 18
5701	48.95	SW	47.47	150			VC	13.60147	
4801	40.81	FO	39.21	225			VC	40.22437	1 in 10
8704	74.41	FO	72.51	150			VC	25.01999	1 in 69
5525		FO	0	150			VC	50.24938	
5520	28.75	FO	27.94	100			VC	1	
5520	28.75	FO	27.94	100			VC	1	
4403	27.81	SW	26.11	525			CO	64.00781	1 in 20
4403	27.81	SW	26.11	525			CO	64.00781	1 in 20
4528		FO		225			VC	2.701522	
6705		FO		225			VC	29.55906	
5801	48.99	FO	48.02	100			VC	5	1 in 0
5523		FO	0	150			VC	16.27882	
5523		FO	0	150			VC	16.27882	
6101	67.88	FO	65.62	150			VC	60	1 in 16
5618		FO		150			VC	17.28155	
9702	81.85	FO	80.25	150			VC	35.61361	1 in 13
6705	52.57	FO	50.62	225			VC	21.8653	1 in 0.84097320
8611		FO		100			VC	12.5538	
9732		SW	0	150			VC	17.20465	
5703	46.34	FO	44.61	150			VC	27.20294	
5621	41.57	FO	40.96	150			VC	37.95677	1 in 42
5606	40.41	SW	39.14	300			VC	2.305402	1 in 3.60219034
7702	60.06	SW	58.6	150			VC	39	1 in 10
7714		FO		100			VC	19.66671	
7510	55.17	SW	0	225			VC	25.6125	
7510	55.17	SW	0	225			VC	25.6125	
6002	63.41	CO	61.5	225			VC	8.602325	1 in 10
6002	63.41	CO	61.5	225			VC	8.602325	1 in 10
5622		CO		150			VC	18.26448	
5622		CO		100			VC	17.09685	
6609	48.09	FO	46.19	150			VC	14.80399	1 in 15.9182671
6015	1	FO		100			UN	11.39401	
6015	1	FO		100			UN	11.39401	
6010	1.4	FO		100			UN	10.38323	
6010	1.4	FO		100			UN	10.38323	

LEGEND

	Abandoned	Foul	Surface Water	Combined
Public Sewer				
Private Sewer				
Section 104				
Rising Main				
Sludge Main				
Overflow				
Water Course				
Highway Drain				

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

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

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
EG Egg AR Arch
OV Oval BA Barrel
FT Flat Top HO HorseShoe
RE Rectangular UN Unspecified
SQ Square

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

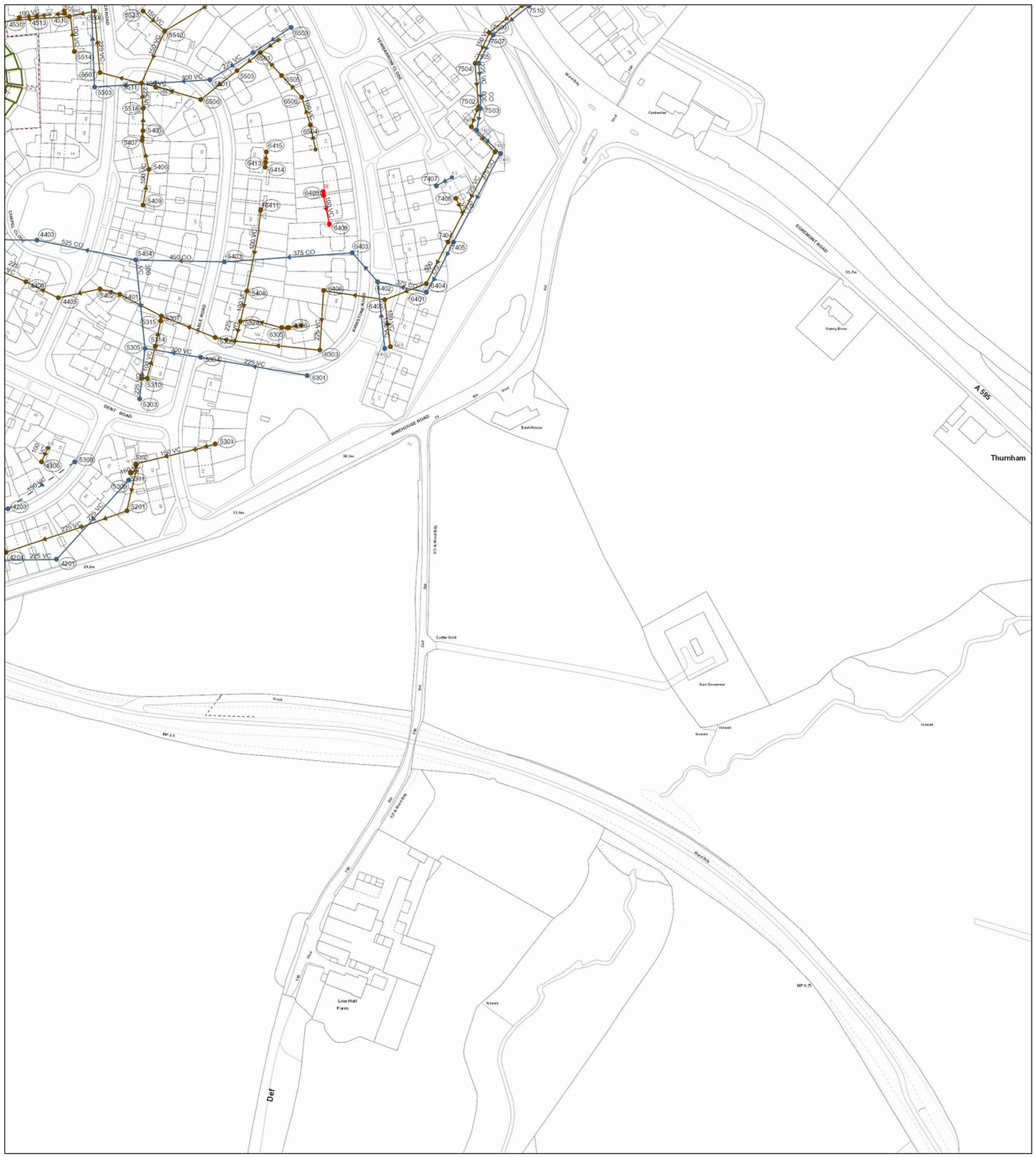
West Cumberland Hospital,

OS sheet Number: NX9815NE
Scale: 1:1250 Date: 14/08/2019
Nodes: 250
Sheet: 4 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly



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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6305		FO		100			VC	23.40878	
4530		FO		100			VC	1.376528	
4530		FO		100			VC	1.376528	
5311		FO		150			VC	3.162278	1 in
7506	53.73	FO	50.38	150			VC	18.78829	1 in 10
7506	53.73	FO	50.38	150			VC	18.78829	1 in 10
6304	38.53	FO	37.56	150			VC	26.1725	1 in 40
6402	38.3	SW	36.96	375			CO	21.26029	1 in 19
7502	46.78	FO	45.75	150			VC	5.385165	1 in 5
7502	46.78	FO	45.75	150			VC	5.385165	1 in 5
6502	35.16	FO	34.06	225			VC	16.40122	1 in 4
6502	35.16	FO	34.06	225			VC	16.40122	1 in 4
5409		FO		100			VC	20.01115	
5409		FO		100			VC	20.01115	
5302	29.44	FO	0	150			VC	4	
6505		FO		100			VC	17.31768	
6505		FO		100			VC	17.31768	
5506	29.66	FO	27.86	225			VC	34.21954	1 in 71
5506	29.66	FO	27.86	225			VC	34.21954	1 in 71
6302	38.51	SW	37.54	150			VC	37.21559	1 in 64
7501	43.85	FO	43.31	225			VC	19.10421	1 in 50
7501	43.85	FO	43.31	225			VC	19.10421	1 in 50
4201	29.17	SW	27.42	225			VC	66.00758	1 in 106
5407		FO		100			VC	5.308584	
5407		FO		100			VC	5.308584	
5401	29.01	FO	27.31	225			VC	11.40175	1 in 190
5505	31.31	FO	30.28	225			VC	25.6125	1 in 11
5505	31.31	FO	30.28	225			VC	25.6125	1 in 11
4406	28.17	FO	26.77	225			VC	84.18546	1 in 19
5328		FO		225			VC	11.40175	1 in
5304	29.85	SW	28.05	300			VC	31.40064	1 in 157
5306	30.29	FO	28.57	225			VC	32.31099	1 in 32
6401	39.85	SW	38.71	375			CO	27.65863	1 in 16
5305	29.37	SW	27.85	300			VC	49.25444	1 in 120
4405	28.95	FO	26.99	225			VC	20.12461	1 in 91
5308	29.74	SW	28.64	150			VC	45.22168	1 in 1.64802027
7509	56.55	SW	54.6	225			VC	4.24264	
5310		FO		100			VC	18.27649	
4513		FO		100			VC	9.620073	
4513		FO		100			VC	9.620073	
5405		FO		100			VC	12.36931	
5405		FO		100			VC	12.36931	
7512	55.2	FO	54.3	150			VC	2.236068	
6503	40.08	SW	38.7	225			VC	25.23886	1 in 4
6503	40.08	SW	38.7	225			VC	25.23886	1 in 4
7403	43.85	SW	43.11	375			CO	18.38478	
7403	43.85	SW	43.11	375			CO	18.38478	
5303	29.33	SW	28.33	225			VC	28.16026	1 in 59
7404	41.83	SW	40.2	375			CO	15.65248	1 in 21
7404	41.83	SW	40.2	375			CO	15.65248	1 in 21
6414		FO		100			VC	2.759144	
6414		FO		100			VC	2.759144	
6406	37	FO	34.87	225			VC	33.06055	1 in 107
5503	28.97	SW	27.65	300			VC	54.03703	1 in 35
5503	28.97	SW	27.65	300			VC	54.03703	1 in 35
7408		FO		100			VC	9.018431	
7408		FO		100			VC	9.018431	
5518		FO	0	225			VC	14.03567	
5518		FO	0	225			VC	14.03567	
7402	44.28	FO	42.93	225			VC	56.35601	1 in 19
7402	44.28	FO	42.93	225			VC	56.35601	1 in 19
7405	41.74	FO	39.85	225			VC	25.94224	1 in 15
7405	41.74	FO	39.85	225			VC	25.94224	1 in 15
4204	29.01	FO	27.21	225			VC	47.92703	1 in 47
6404	39.84	FO	38.08	225			VC	24.69818	1 in 20
7507	53.73	SW	50.38	225			VC	17.88854	1 in 9
7507	53.73	SW	50.38	225			VC	17.88854	1 in 9
6306		FO		100			VC	4.183614	
7401	45.32	SW	43.2	375			CO	55.47071	1 in 19
7401	45.32	SW	43.2	375			CO	55.47071	1 in 19
5510		FO	0	150			VC	31.7805	
5510		FO	0	150			VC	31.7805	
6303	36.1	FO	34.56	225			VC	47.26521	
5514		FO		100			VC	19.99409	
5514		FO		100			VC	19.99409	
6403	37.61	SW	35.72	375			VC	71.17584	1 in 11
5307	29.25	FO	27.55	225			VC	25.94224	1 in 108
5309	29.53	SW	28.56	225			VC	59.46428	1 in 52
5404	28.99	SW	27.44	525			CO	56.08921	1 in 42
6409		CO		100			VC	16.23578	
6409		CO		100			VC	16.23578	
5501	30.02	SW	28.22	300			VC	30.06659	
5501	30.02	SW	28.22	300			VC	30.06659	
5315		FO		100			VC	2.951841	
6413		FO		100			VC	5.739352	
6413		FO		100			VC	5.739352	
5406		FO		100			VC	16.51454	
5406		FO		100			VC	16.51454	
7511		FO	0	150			VC	23.43075	
7511		FO	0	150			VC	23.43075	
6501	34.04	SW	32.84	225			VC	28.30194	1 in 6
6501	34.04	SW	32.84	225			VC	28.30194	1 in 6
7504	49.68	FO	48.48	150			VC	24.08319	1 in 9
7504	49.68	FO	48.48	150			VC	24.08319	1 in 9
4203	29.29	SW	28.09	150			VC	34.0147	
5408		FO		100			VC	17.21699	
5525		FO	0	150			VC	50.24938	
6504		FO		100			VC	15.91971	
6504		FO		100			VC	15.91971	
5314		FO		100			VC	14.23171	
5520	28.75	FO	27.94	100			VC	1	
5520	28.75	FO	27.94	100			VC	1	
4403	27.81	SW	26.11	525			CO	64.00781	1 in 20
4403	27.81	SW	26.11	525			CO	64.00781	1 in 20
7505	49.67	SW	48.36	225			VC	12.04159	1 in 9
7505	49.67	SW	48.36	225			VC	12.04159	1 in 9
5523		FO	0	150			VC	16.27882	
5523		FO	0	150			VC	16.27882	
5301	29.85	FO	28.45	150			VC	11.40175	
5508	29.11	FO	27.01	225			VC	14.31782	
5508	29.11	FO	27.01	225			VC	14.31782	
5511	29.1	FO	0	225			VC	23.76973	
5511	29.1	FO	0	225			VC	23.76973	
6301	35.13	SW	33.66	225			VC	59.84146	1 in 11
5402	28.98	FO	27.25	225			VC	23.5372	1 in 91
6506		FO		100			VC	16.48307	
6506		FO		100			VC	16.48307	
7510	55.17	SW	0	225			VC	25.6125	
7510	55.17	SW	0	225			VC	25.6125	
6405	38.51	FO	36.74	225			VC	34.36568	1 in 18
5403	30.8	SW	29.16	450			CO	49.0102	1 in 28
5201	29.45	FO	27.83	225			VC	26.57066	
7503	46.78	SW	45.71	375			CO	12.16553	1 in 5
7503	46.78	SW	45.71	375			CO	12.16553	1 in 5
5507	28.95	FO	27.17	225			VC	34.1321	1 in 213
5507	28.95	FO	27.17	225			VC	34.1321	1 in 213

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

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

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

West Cumberland Hospital,

OS sheet Number: NX9815SE
Scale: 1:1250 **Date:** 14/08/2019
Nodes: 126
Sheet: 5 of 5

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SEWER RECORDS

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Appendix C Surface Water Run-off Calculations

Job Title:	**West Cumberland Hospital**				
Job No:	071551				
Made by:	DM	**Checked:**	CJS	**Sheet No.**	1
Date:	26/03/2020	**Date:**	26/03/2019	**of**	4

curtins

PEAK RATE OF RUN-OFF CALCULATION

Design Brief

The following Peak Rate of Run-off calculations have been undertaken to determine peak run-off comparison from the previously developed site against current development. These calculations are for the **Peak Rate of Run-Off** requirements only. **Volume of Run-Off** calculations should be undertaken seperately using catchment descriptors and the FEH methodology.

Background Information & References

Runoff from the site is calculated using the Modified Rational Method as outlined in the Wallingford proceedure, based on rainfall depths provided in the Flood Studies Report (FSR).

No allowance has been made for the effects of climate change in accordance with the guidance provided in Table 5 of the Technical guidance to the National Planning Policy Framework. Based on the design life of the proposed development of 100 years, an increase in runoff of 40**%** has been used in the calculations for the post-development peak rate of run-off.

The following references have been used in the preparation of these calculations:

- Design and Analysis of Urban Storm Drainage-The Wallingford Proceedure, V4 Modified Rational Method
- Designing for Exceedance in Urban Drainage - good practice, CIRIA Report C635, 2006
- Flood Estimation Handbook (FEH)
- Flood Studies Report (FSR), Volume 1, Hydrological Studies, 1993
- Flood Studies Supplementary Report No 2 (FSSR2), The Estimation of Low Return Period Floods
- Flood Studies Supplementary Report No 14 (FSSR14), Review of Regional Growth Curves, 1983
- Table 2 of the Government Guidance Flood risk assessments: climate change allowances

Results Summary

Post development results indicate a 26.8% decrease in peak discharge as a direct result of the proposed development. The results include a without climate change case to enable direct comparison with the pre-development case. Post-development (Climate change) demonstrates the increase by applying a 40% increase to peak runoff.

	Peak Rate of Run-Off (Litres/sec)		
Event	**Pre-development (Brownfield Site)**	**Post-development**	**Post-development (Climate change)**
QBAR	275.9	201.9	282.6
Q10	375.6	274.8	384.8
Q30	458.7	335.7	469.9
Q100	588.0	430.3	602.4

Job Title:	**West Cumberland Hospital**				
Job No:	071551				
Made by:	DM	**Checked:**	CJS	**Sheet No.**	2
Date:	26/03/2020	**Date:**	26/03/2019	**of**	4

curtins

PRE-DEVELOPMENT PEAK RATE OF RUN-OFF

Total site impermeable area, A = **21250** m^2

M5-60 rainfall depth = **17** mm *[Flood Studies Report (NERC, 1975)]*

Ratio M5-60/M5-2Day, r = **0.30** *[The Wallingford Proceedure - V4 Modified Rational Method, Fig A.2 (Hydraulics Research, 1983)]*

Storm Duration = 15 mins Anticipated critical duration for the site - usually 15 minutes

Duration factor, Z1 = 0.59 *[The Wallingford Proceedure - V4 Modified Rational Method, Fig A.3b (Hydraulics Research, 1983)]*

M5-15 rainfall depth = 10.03 mm

Return period ratio, Z2

[The Wallingford Proceedure - V4 Modified Rational Method, Table A1 (Hydraulics Research, 1983)]

M1-15	0.61
M10-15	1.22
M30-15	1.49
M100-15	1.91

Rainfall

	Depth (mm)	Intensity, i (mm/hr)
M1-15	6.1	24
M10-15	12.2	49
M30-15	14.9	60
M100-15	19.2	77

Peak discharge, Qp = Cv Cr i A

Where:

Cv = Volumetric Runoff Coefficient
Cr = Routing Coefficient
i = Rainfall intensity (mm/hour)

Cv = 1
Cr = 1.3

Peak Runoff

	Litres/sec
Q10	375.6
Q30	458.7
Q100	588.0

Job Title:	**West Cumberland Hospital**				
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ESTIMATION OF QBAR (BROWNFIELD RUNOFF RATE)

See Table 2.39 for region curve ordinates

Use FSSR2 Growth Curves to estimate Qbar

Region = **10**

Return period	Ordinate	
1	0.87	Ordinate from FSSR2
2	0.93	
5	1.19	
10	1.38	
25	1.64	
30	1.68	Linear interpolation b/w 25 and 50 yr RP
50	1.85	
100	2.08	
200	2.24	Linear interpolation b/w 100 and 500 yr RP
500	2.73	
1000	3.04	

Qbar

Ordinate used	Litres/sec
10 year	272.2
30 year	272.7
100 year	282.7

Existing Brownfield Runoff, Qbar = 275.9 l/s

Using the average Qbar derived from three ordinates.

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ESTIMATION OF QBAR (BROWNFIELD PEAK RATE OF RUN-OFF)

Total site proposed impermeable area, A = **15550** m^2

	Rainfall	
	Depth (mm)	**Intensity, i (mm/hr)**
M10-15	12.2	49
M30-15	14.9	60
M100-15	19.2	77

Peak discharge, Qp = Cv Cr i A

Cv = 1
Cr = 1.3

Peak Runoff

	Litres/sec
Q10	274.8
Q30	335.7
Q100	430.3

Qbar

Ordinate used	Litres/sec
10	199.2
30	199.6
100	206.9

Post development Qbar = 201.9 l/s

DETERMINATION AND APPLICATION OF AN ALLOWANCE FOR CLIMATE CHANGE

An allowance should be made for the effects of climate change in accordance with the guidance provided in Table 2 of the Government Guidance Flood risk assessments: climate change allowances
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
Climate change allowance dependant upon design life of development

Design life	**100**	years	Development date	**2020**	to	**2120**
Allowance	**70%**	for	peak river flow			
	40%	for	peak rainfall intensity			
Therefore take	**40%**	to account for future climate change				

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Appendix D Drainage Strategy Drawing

DRAINAGE NOTES:

1. DESIGN IS SUBJECT TO CHANGE FOLLOWING DETAILED DESIGN AND APPROVALS FROM UU.
2. CCTV REQUIRED TO DETERMINE CONDITION OF EXISTING DRAINAGE.
3. OTHER METHODS OF ATTENUATING THE SURFACE WATER DRAINAGE ARE AVAILABLE, INCLUDING PONDS AND THE CAR PARK SUB BASE. THE METHOD OF STORAGE IS TO BE CONFIRMED AT DETAILED DESIGN.
4. LOCATIONS OF POP UPS AND RWP's TO BE CONFIRMED WITH THE ARCHITECT AT DETAILED DESIGN.

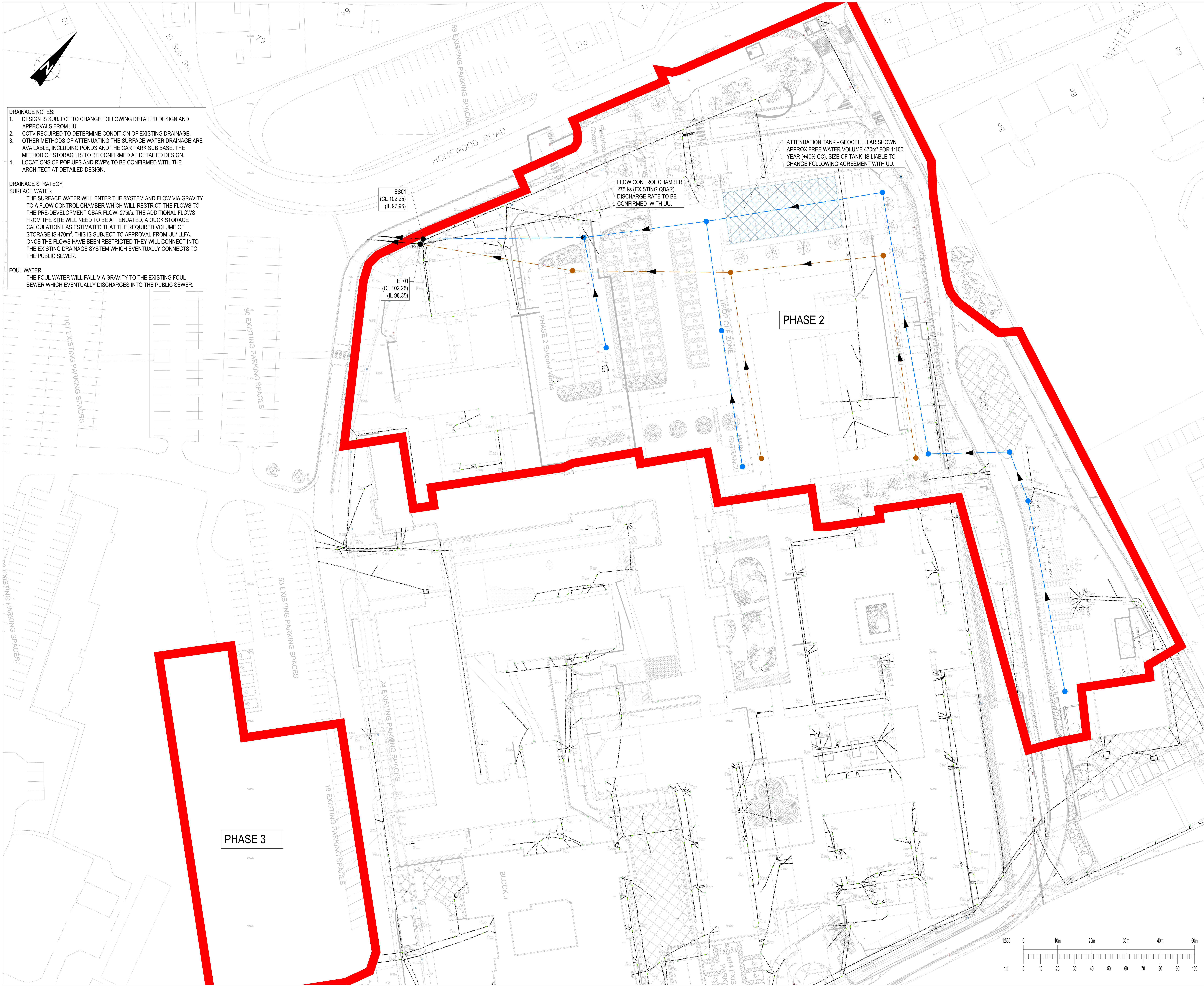
DRAINAGE STRATEGY

SURFACE WATER

THE SURFACE WATER WILL ENTER THE SYSTEM AND FLOW VIA GRAVITY TO A FLOW CONTROL CHAMBER WHICH WILL RESTRICT THE FLOWS TO THE PRE-DEVELOPMENT QBAR FLOW, 275l/s. THE ADDITIONAL FLOWS FROM THE SITE WILL NEED TO BE ATTENUATED, A QUCK STORAGE CALCULATION HAS ESTIMATED THAT THE REQUIRED VOLUME OF STORAGE IS 470m^3. THIS IS SUBJECT TO APPROVAL FROM UU/ LLFA. ONCE THE FLOWS HAVE BEEN RESTRICTED THEY WILL CONNECT INTO THE EXISTING DRAINAGE SYSTEM WHICH EVENTUALLY CONNECTS TO THE PUBLIC SEWER.

FOUL WATER

THE FOUL WATER WILL FALL VIA GRAVITY TO THE EXISTING FOUL SEWER WHICH EVENTUALLY DISCHARGES INTO THE PUBLIC SEWER.



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS OR ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. PRINCIPAL SW AND FOUL DRAINAGE RUNS SHOWN ONLY. DETAILED CONNECTIONS FROM RWP'S, ROAD GULLIES, SVP'S ETC TO BE DETERMINED AT DETAILED DESIGN STAGE.

KEY:

- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED FLOW CONTROL CHAMBER
- PROPOSED GEOCELLULAR TANK
- EXISTING SURFACE WATER
- EXISTING FOUL WATER
- SITE BOUNDARY

Rev:	Description:	Date:	By:	Chkd:
P02	LAYOUT UPDATED	02/04/20	DM	CJS
P01	FIRST ISSUE	21/08/19	AJR	MJS

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Status: SUITABLE FOR INFORMATION S2

Project: WEST CUMBERLAND HOSPITAL

Drg Title: OUTLINE DRAINAGE STRATEGY

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	21/08/19	AJR	MJS	MJS
Scale: 1:500				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
071551	CUR	00	ZZ	DR	C	04921	P02

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