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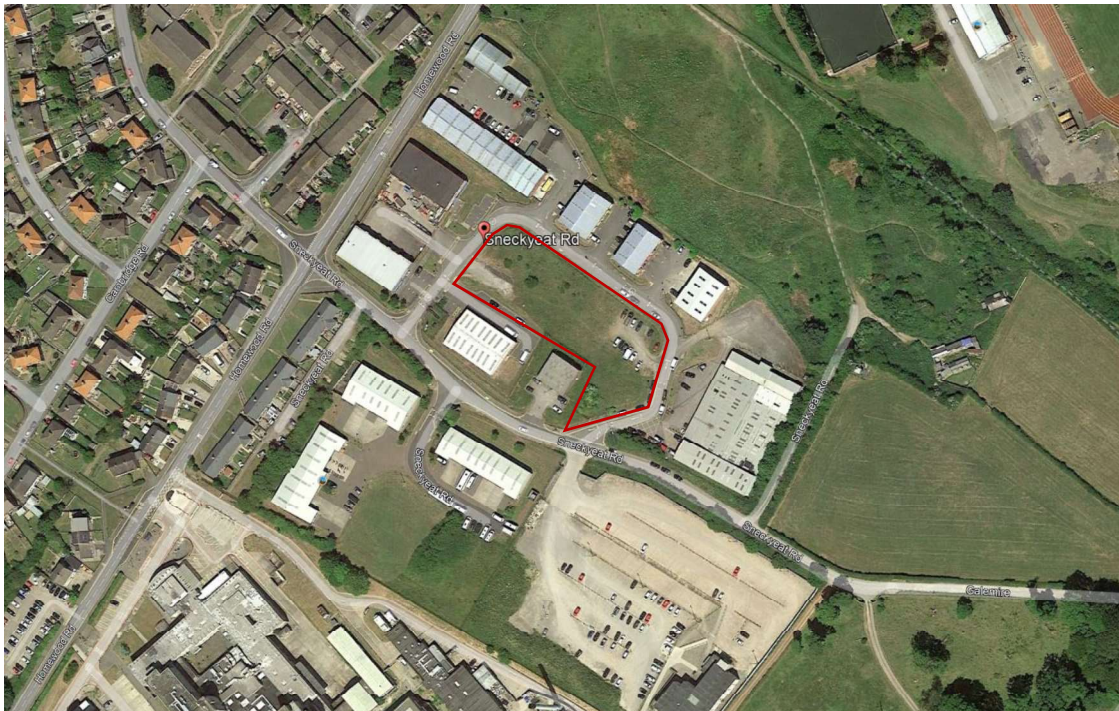
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**DRAINAGE STRATEGY REPORT
FOR
PROPOSED COMMERCIAL UNITS AT
SITE 2 SNECKYEAT INDUSTRIAL ESTATE, WHITEHAVEN**



**FOR
NORTHERN TRUST CO. LTD**

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Engineer : I. Schofield

Report Control

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1.0 Brief

Graham Schofield Associates Ltd have been appointed by Northern Trust Co. Ltd to undertake a Drainage Strategy in support of a planning application to construct a new commercial/light industrial unit on an existing undeveloped plot at Sneckyeat Industrial Estate, Whitehaven.

1.1 Limitations

The opinions expressed within this review are based upon sourced documentation available. Graham Schofield Associates Ltd have not undertaken any or quantitative assessments or special investigations other than monitoring the required excavation of the trial holes required for the percolation tests.

The report is based upon current guidance and may therefore require revision to incorporate any future changes in guidance or legislation.

2.0 Existing Site Description and Location

2.1 Site Location

The site is located at National Grid Reference 299099 (E), 516278 (N) and is currently a vacant plot used informally for parking it is a mixture of topsoil and wild growth. The site is loosely rectangular in shape and has an area of 0.345 Ha. Figure 1 below shows the site boundary within the local context.

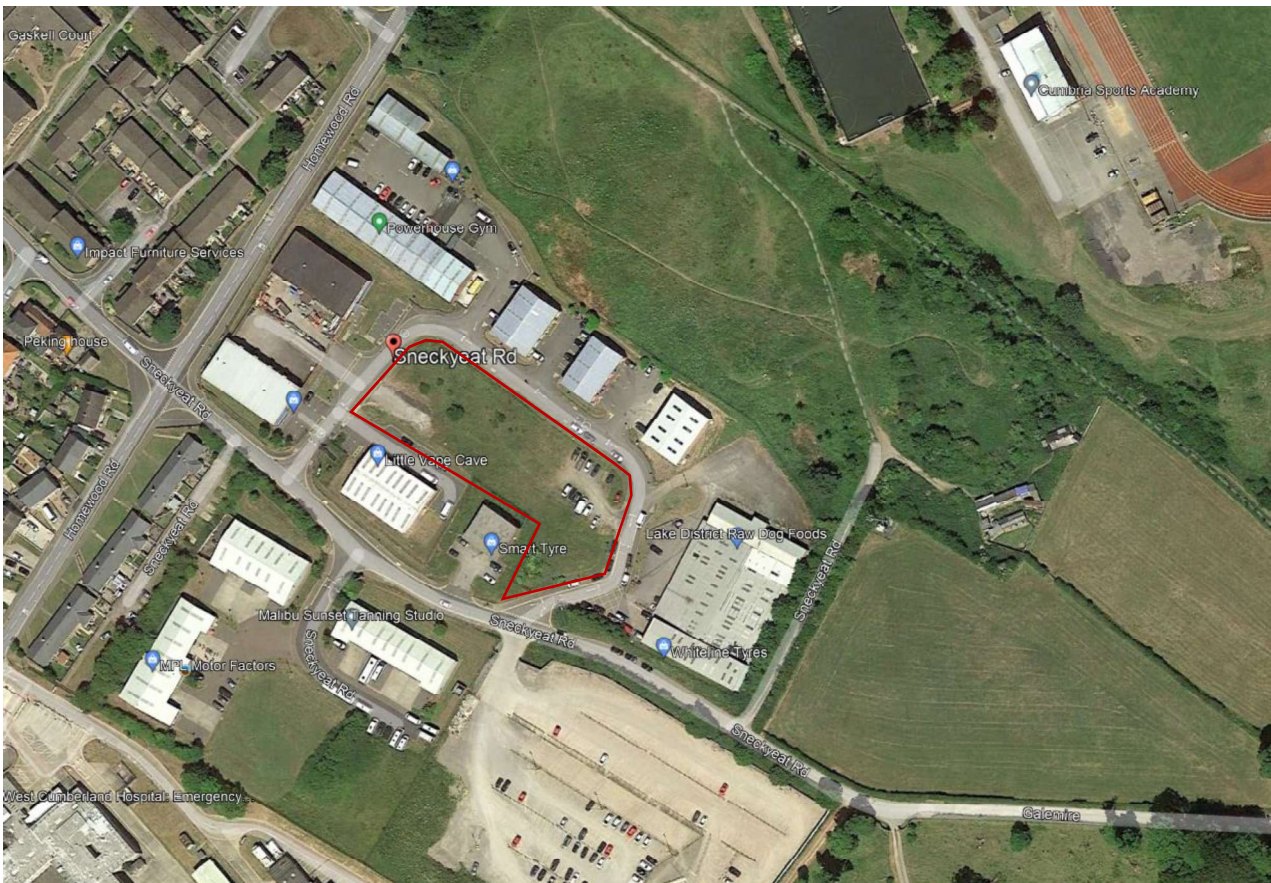


Figure 1: Site Location Plan

The site is bounded by Sneckyeat Road (private estate distributor road) to the north, east and west and to the south by Units 9A, 9BB and Unit 7.

2.2 **Notable Features**

A topographical survey of the site was undertaken by JLP Surveying Consultants Ltd. in February 2023 and provides level data at metres above Ordnance Survey datum (mAD0). An inspection of the data indicates the ground levels fall fairly steeply from north east to south west, with a range in levels across site of 104.567m AOD at the south western boundary of the development and a maximum of 108.106m AOD at the north eastern boundary. The topographical survey referenced above is included within Appendix A of this report.

3.0 **Development Proposals**

The proposal for the development is to construct one block of commercial/light industrial units. This block will consist of 2no. units at 205sqm and 1no. unit at 412sqm, to provide 3no. units in total. The block is located centrally within the site and extends between the north and south boundaries. To the west and east there is provision for two separate hardstanding areas that are provided for car parking, service yard and access/egress circulation. A copy of the development proposals are provided in Appendix B for information.

4.0 **Surface Water Management**

This drainage strategy report aims to examine the current site and its context in terms of any existing drainage regimes. Based on this information and paying due regard to any Environmental / Topographical constraints associated with the site, examination of available options for the satisfactory disposal of foul and surface water flows will be investigated. From these investigations a preferred Surface Water Management Plan is to be developed for later detailed design development.

The basis of this strategy will be to identify a robust and workable drainage solution that can be delivered for the site that is fully compliant with current Planning Policy, Building Regulations, and design guidance. The site is in Flood Zone 1, the site is less than 1 ha and does not appear to have critical drainage problems as notified by the Environment Agency or identified in the Copeland Borough Council Strategic Flood Risk Assessment.

5.0 **Existing Site Drainage Arrangements & Flood Risk**

5.1 **Existing Site Drainage**

From the asset search information and CCTV drainage investigation it was determined that there is a 300Ø private surface water sewer located in the private section of Sneckyeat Road. This sewer loosely follows the estate road from its head in the northwest corner before it discharges into a private drain within the adopted length of Sneckyeat Road. This SW drain appears to service the upper sections of Sneckyeat Industrial Estate and it is believed that it eventually discharges into a culvert located to the east of Hensingham. The following

referenced information can be found in the Appendices: United Utilities Sewer Records in Appendix C and Drain Alert Drainage Investigation in Appendix D

Existing Flood Risk

The Environment Agency Flood Map for Planning has been reviewed to initially assess the level of flood risk for the area - see Figure 2 below. The flood map shows areas that are a risk of flooding in a 1% (1 in 100 year) fluvial or a 0.5% (1 in 200 year) tidal and a 0.1% (1 in 1000 year) Annual Exceedance Probability (AEP).

This information indicates that the site lies within an area defined as Flood Zone 1 "Low Probability" envelope, which is assessed as having a less than 0.1% annual probability of rivers or sea flooding in any year by reference to National Planning Policy Framework (NPPF). The flood risk mapping indicates that the site is not within an area identified as being at risk. The Flood Map does not provide information on the depth of flooding associated with flood zones.

Flood map showing the flood zone your site is in

The map shows the flood risk to your site and the surrounding area.

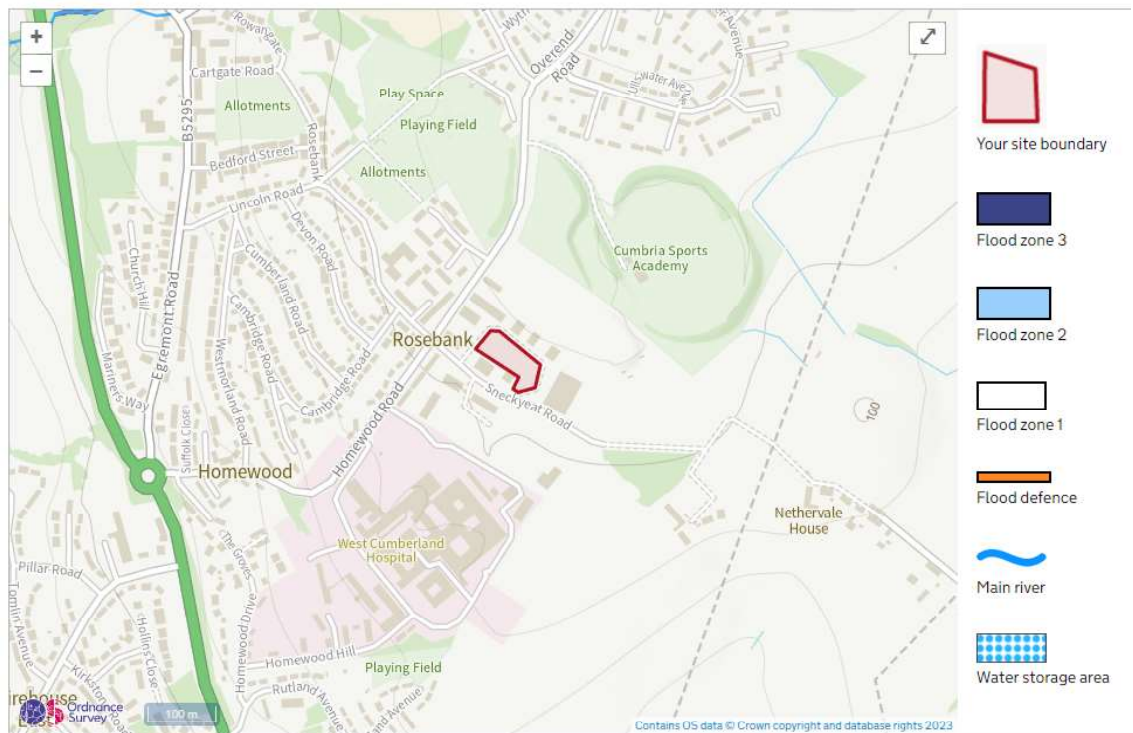


Figure 2: Environment Agency Flood Mapping for Planning

The Environment Agency also predicts the depth of flooding associated with each probability scenario. Figure 3 below indicates extent of depth associated with the High Probability risk. A high probability means that each year, the area has a chance of flooding greater than 1 in 30 (3.3%). In this scenario, the predicted water depth for the site is not at high risk of flooding.

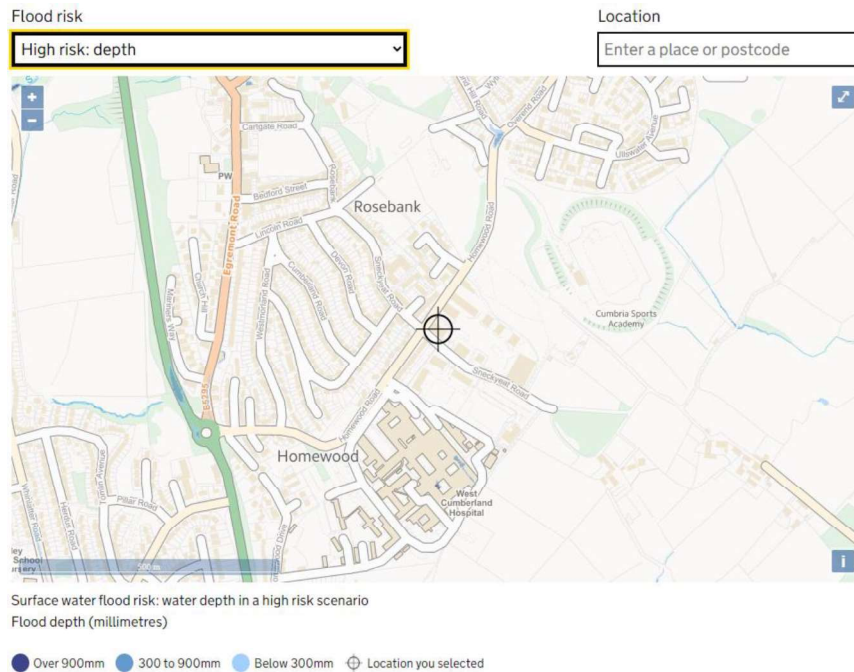


Figure 3: Environment Agency Surface Water Flooding – High Risk: Depth Extract

Surface Water Flooding has also been considered for the Low Probability event, Figure 4 below. In this respect, a Low Probability indicates flooding occurring because of rainfall will have an annual probability of occurring between 0.1% (1 in 1000 years) and 1% (1 in 100 years). The predicted water depth for the site is not at high risk of flooding.

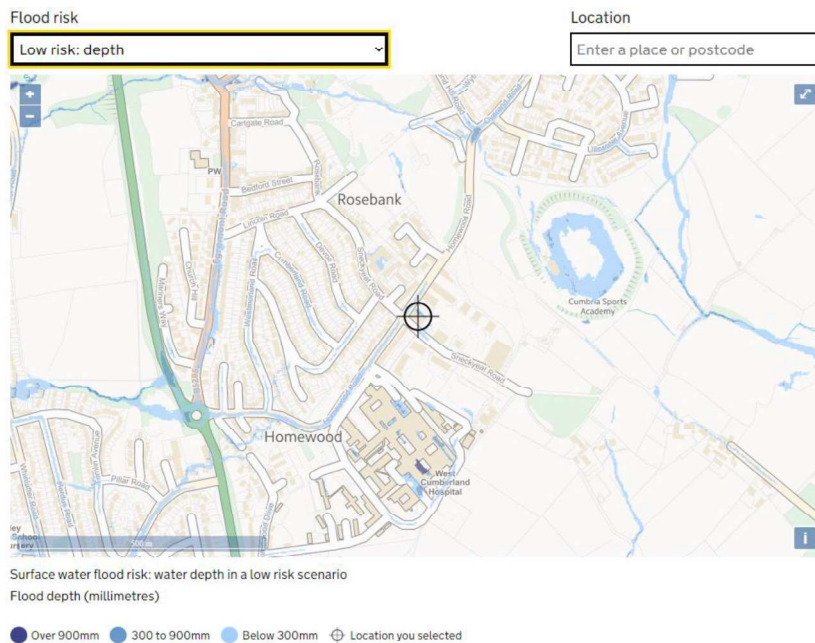


Figure 4: Environment Agency Surface Water Flooding –Low Risk: Depth Extract

6.0 Proposed Site Drainage Arrangements

The current site area is 0.37Ha which is currently a vacant plot on the industrial estate comprising grass and topsoil over made ground. The proposals include one block of single storey commercial units, with plan dimensions of 31.7m long by x 26.8m wide

located centrally within the plot. To the west and east of the units there is provision for two separate hardstanding areas that are provided for car parking, service yard and access/egress circulation. The development proposals for the site will result in an increase of the impermeable area of 0.37Ha and therefore an increase in the peak surface water runoff rates and volume from the site. The development proposals and their associated drainage implications are reviewed below.

6.1 Foul Water

United Utilities (UU) currently utilise the guidance provided by Sewers for Adoption (6th Edition) which indicates that for gravity sewers serving industrial developments the domestic flow design is 0.6 litres/second per hectare of developable land, which equates to a domestic flow design of 0.222l/s. It is understood that the development will be 'normal industry' usage, thus the trade effluent figure of 0.5 litres/second per hectare has been employed, hence the trade effluent output would be 0.185 litres/second, giving a total design flow of 0.407l/s.

From the drainage investigation survey, there is a foul water sewer that loosely follows the route of the SW drain, around the private section of Sneckyeat Road, before discharging into a manhole within the adopted length of Sneckyeat Road. The 'radial' drain has a 150Ø tail branching off it that terminates, with a MH, within the proposed development site. It is intended to discharge all the sites FW runoff into this existing chamber.

6.2 Surface Water

Following the drainage hierarchy as presented in Paragraph 80 of the National Planning Policy Guidance the options for surface water management/discharge must be considered in the following order:

1. Infiltration (percolation) through the soil/sub strata
2. To a Surface Water Body (pond, ditch, stream, river)
3. To a Surface Water Sewer or a Highway Drain
4. Combined Water Sewer

A review of the British Geological Survey's viewers for Bedrock and Superficial Deposits revealed the substrata consisted of clay deposits overlying sandstone (refer to Figures 5 & 6 for details). The infiltration rates associated with the soils are not considered sufficient for the practical use of infiltration devices such as soakaways or permeable surfaces. BRE Digest 365 and Section 13.4 of CIRIA 753 require that the time taken for infiltration devices to empty to 50% should be within 24 hours. This requirement is unlikely to be achieved in these soils. Furthermore, Table 25.1 of CIRIA 753 indicates that soils with this level of infiltration capacity are classified as very poor infiltration media. A trial hole investigation was undertaken on site which confirmed the presence of the clay under a varying depth of Made Ground ranging from 400mm to 1000mm in depth.

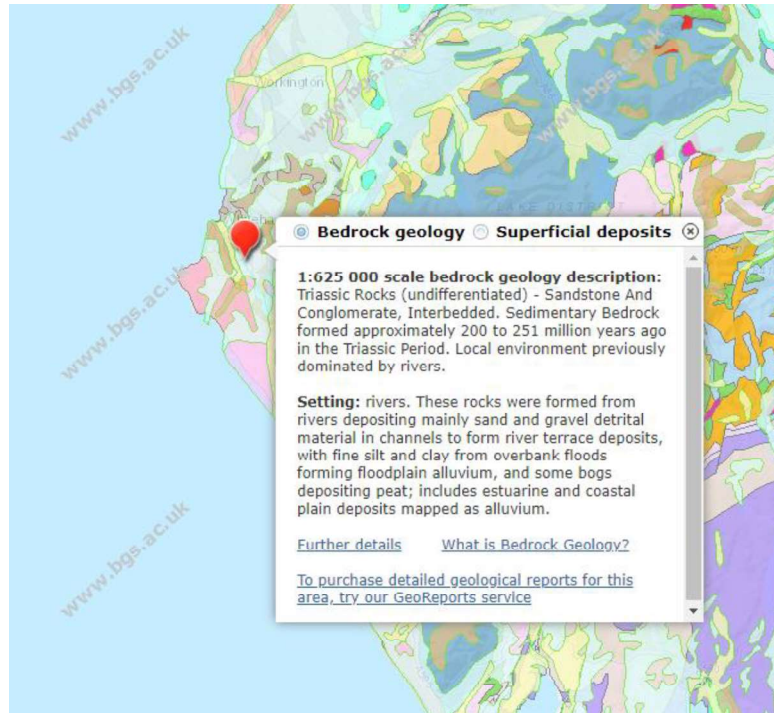


Figure 5: British Geological Survey Viewer - Bedrock Geology

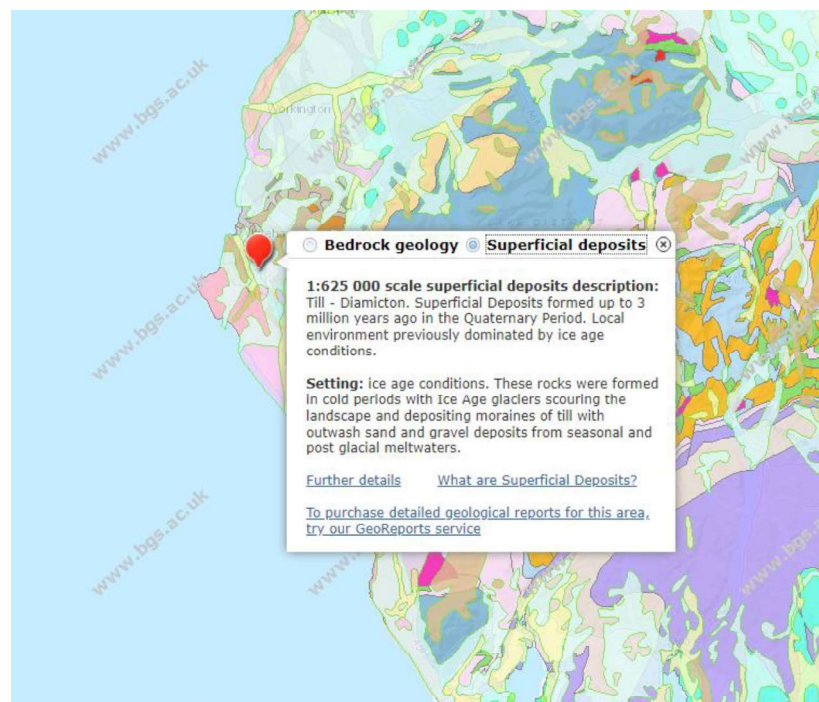


Figure 6: British Geological Survey Viewer – Superficial Deposits

Ordnance Survey mapping for the area indicates the nearest watercourse is the unnamed tributary of the River Keekle which serves as field drainage approximately 500m east of the development site.

The site has been a vacant plot since Sneckyeat Industrial Estate was developed in the mid-1990s therefore it is considered to be Greenfield it is intended to restrict the pass forward flows rates to Greenfield Runoff. The HR Wallingford Greenfield

runoff rate estimation was used to undertake the calculation using IH-124 methodology which gave a Qbar of 3.3l/s. Therefore, onward flow rates will be restricted to 1.6l/s per attenuation 'block'. A copy HR Wallingford Greenfield runoff rate estimation tool report is provided in Appendix E.

It is proposed to construct a geocellular attenuation tank under each of the car parks/service yards to accommodate the volume of surface water which will be required to be stored over and above the restricted flow. A model of the proposed surface water drainage for each block was created and simulated storm events for 1 in 2 year, 1 in 30 year, 1 in 100 year + climate change allowance. The Climate Change Allowance was derived from "*Flood Risk assessments: climate changes allowances*" gov.uk website "*Table 2: peak rainfall intensity allowance in small catchments (less than 5km²) or urban drainage catchments (based on a 1961 to 1990 baseline)*" The structural design cases for wind loading use a design life of 50 years, this will be utilised for the drainage design life, this would put the development in the "*Total potential change anticipated for the '2080s' (2070 to 2115)*" The guidance states that "*Design your drainage system to make sure there is no increase in the rate of runoff discharged from the site for the upper end allowance.*" Hence 40% allowance is used. The results and a proposed drainage layout are provided in Appendix E.

6.3 Flood Risk

The development proposals are not currently located within areas identified by the Environment Agency as being at risk of flooding for planning purposes. Based on being able to satisfactorily manage the surface water flows from the site by means of attenuation and controlled discharge into the network it is considered that the development proposals do not affect upon the current flood risk areas or increase flood risk off

7.0 Summary

A review of the relevant guidance documents and various types of data collected at the site has enabled a full assessment of the flood risks to be quantified. The site is located within the Flood Zone 1 therefore all uses of land are appropriate in this zone.

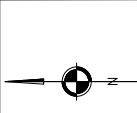
This assessment has investigated the possibility of groundwater flooding and flooding from other sources at the site. It is considered that there will be low risk of groundwater flooding across the site and low risk of flooding from other sources.

It is proposed that a new foul drains from the development sites be connected to be connected to the existing private foul drainage within the estate, using a 1:80 minimum gradient for self-cleansing for pipes of 150mm.

The proposed method of managing the surface water runoff is by means of an attenuated discharge from a mixture of oversized pipes and geocellular attenuation structures, before releasing into the existing surface water drainage network at a proposed controlled rate of 3.3l/s. Pipes are to be laid at a minimum 1:150 minimum gradient for self-cleansing for pipes of 150mm diameter.

Development of the site is not considered to represent an increased flood risk to the site or the wider area. The permeable area of the site will likely decrease, however, with effective storage measures to accommodate the 100yr + 40% climate change events it will be possible to manage efficiently the surface water runoff from the proposed development.

Appendix A: - Topographical Survey



Topographical Survey Legend

1	Spot Height
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100	Spot Height

REMARKS
 All measurements taken with a Leica TS16 Total Station and a Leica PC1100 Auto Level. All measurements were taken in accordance with the requirements of the Survey Act 1975 and the Survey Regulations 1975. The survey was carried out on the 15th day of the month of [Month] 20[Year]. The weather was [Weather] and the visibility was [Visibility]. The ground was [Ground] and the terrain was [Terrain]. The survey was completed on the 15th day of the month of [Month] 20[Year].

NOTES
 1. All measurements were taken in accordance with the requirements of the Survey Act 1975 and the Survey Regulations 1975.
 2. The survey was carried out on the 15th day of the month of [Month] 20[Year].
 3. The weather was [Weather] and the visibility was [Visibility].
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PROJECT INFORMATION
 Project Name: [Project Name]
 Client: [Client Name]
 Location: [Location]
 Date: [Date]

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No.	Description	Date
1	Issue for Approval	15/01/2024
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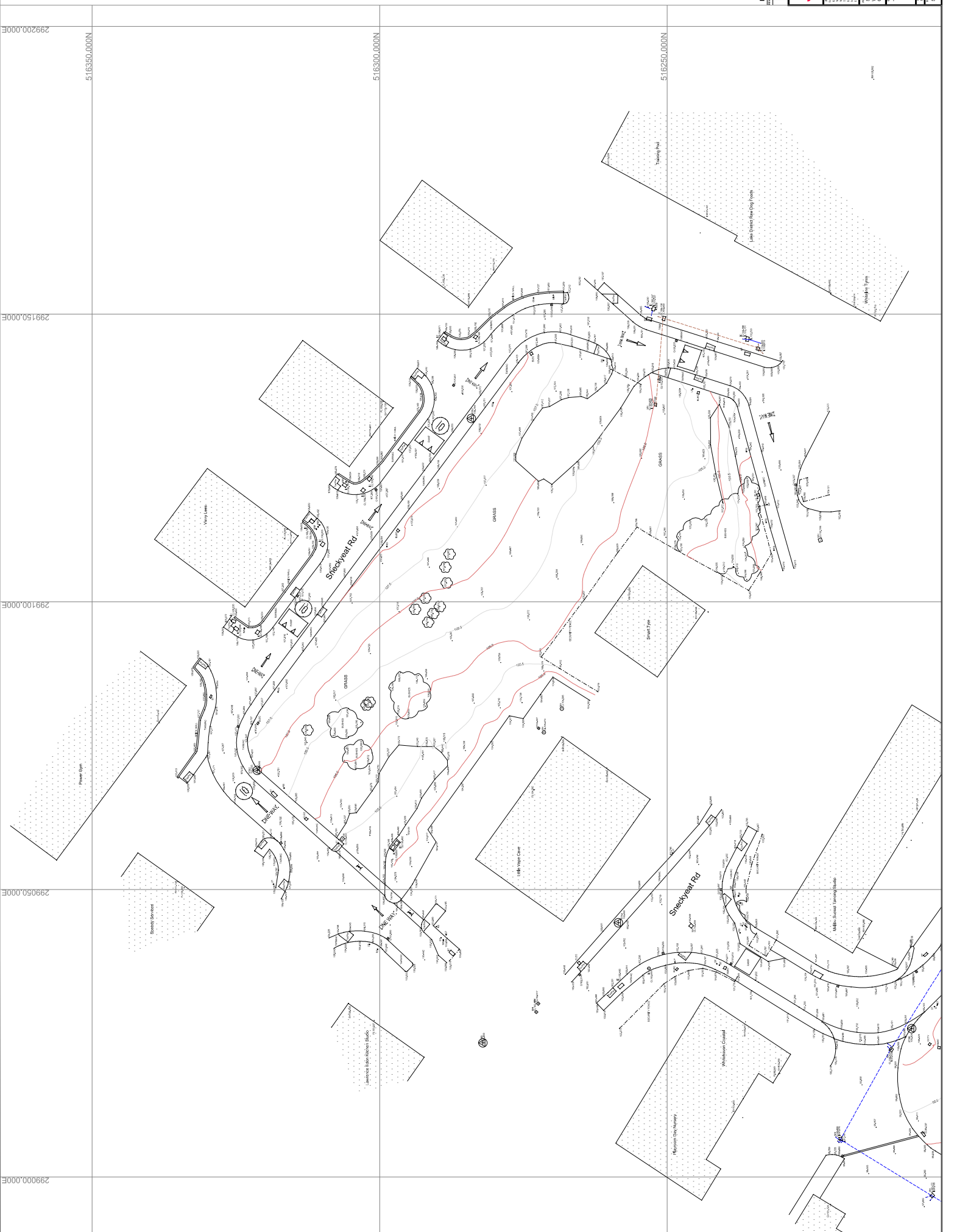
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Appendix B: - Development Proposals

Appendix C: - United Utilities Asset Records