GRAHAM SCHOFIELD
ASSOCIATES

CONSULTING CIVIL AND STRUCTURAL
ENGINEERS

Suite 3 Balfour Court
Off Hough Lane
Leyland PR25 2TF

Tel (01772) 459383
Website: grahamschofieldassociates.co.uk
Email: reception@gsa72.co.uk

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY FOR THE REFURBISHMENT OF AN EXISTING INDUSTRIAL BUILDING AND CONSTRUCTION OF THREE NEW INDUSTRIAL BUILDINGS ON LAND AT NUMBER 1 INDUSTRIAL ESTATE CONSETT, DURHAM DH8 6ST (ON BEHALF OF NORTHERN TRUST COMPANY LTD)

Project : 2023.120
Date : Aug 2023
Engineer : L. Edwards
Issue 01 : 15/08/2023

Report Control

Report Title	Flood Risk Assessment & Drainage Strategy Report			
Project Number	2023.120			
Revision	Issue	Date	Prepared	Approved
01	Issue 1	15/08/2023	L. Edwards	G. Schofield

CONTENTS

1.0 INTRODUCTION

Graham Schofield Associates Ltd have been appointed by Northern Trust Company Ltd, to undertake a Flood Risk Assessment and Drainage Strategy in support of a planning application for the re-development of an existing industrial building and construction of three new industrial units on land at Number One Industrial Estate, Consett, Durham. The site is divided by a communal access road which serves the industrial estate and leads to Werdohl Way (North of the site). Therefore, this site has been addressed as two 'effective parcels' for convenience – Site A lies to the West of the access road and Site B lies to the East of the access road. Proposed site layouts for Sites A and B have been included in Appendix A – Proposed Site Layout, Drawing No. WJ-187-102 (Site A) and WJ-187-0003 Rev. D (Site B), for convenience.

The existing 'combined' site is approximately 0.91 hectares in area. The Western plot (Site A) is presently an undeveloped greenfield site comprised of around 2,789m^2 of grassland, whilst the Eastern plot encompasses an area of 6,285m^2 and presently houses an existing industrial building, which is approximately 1,995m^2 in area. The intentions of this development are to retain and modify the existing industrial building, including relocation of the vehicular access ramps which lead into the building and modifications to the current layout, with a view to creating additional industrial units within the existing premises. In addition, it is intended to construct a second industrial unit on Site B (Eastern plot), which will cover an area of 771m^2, with associated vehicular access and parking provision to serve the premises. It is also proposed to construct a further two new industrial units on Site A (Western plot), with Block 1 to the North of the site and Block 2 to the South of the site. Each unit will cover an area of 621m^2, providing a combined area of 1,242m^2. Therefore, this development will provide an additional 2,013m^2 of new employment space, within this existing and well-established industrial estate.

Historical records indicate that this site was used for agricultural purposes up until the late 1970's, with the earliest indication of industrial units identified on the Ordnance Survey maps, circa 1980-1994. Since this time, there has been substantial development throughout this industrial estate, leading to a more densely populated estate, supporting industrial, commercial, and retail premises.

The latest government guidance on Flood Risk and Coastal Change, states that a Flood Risk Assessment is required for any site located within a flood zone 1 area, which is greater than 1 hectare in size, or where it is proposed to have more than 1,000m^2 in internal floor area(s). Flood Risk Assessments are also required for any proposals for new development (including minor development and change of use) in flood zones 2 and 3, or in areas which lie within flood zone 1 and have been identified as having critical drainage problems, as notified by the Local Planning Authority (LPA), the Lead Local Flood Authority (LLFA), or the Environment Agency (EA).

According to the Environment Agency's published flood maps, this site lies within a flood zone 1 area and as such, has a low probability of flooding from

rivers or the sea, with less than 1 in 1,000 Annual Exceedance Probability (0.1% AEP). This site is a non-residential development, considered to be a 'Less Vulnerable' development, and covers an area of 9,074m^2, which is less than 1 hectare in size. However, the combined footprints of the three proposed new industrial buildings will cover an area of 2,013m^2, which is greater than 1,000m^2 in usable 'internal' floor space and therefore classified as a "Major Development" in a "Flood Zone 1 area".

The latest Government guidance suggests that if there is any indication of flooding from any sources (including surface water sources), then a Flood Risk Assessment is required. These development proposals intend to provide usable internal floor spaces greater than 1,000m^2 and the Environment Agency's flood maps indicate surface water flooding in and around the site. Therefore, a Flood Risk Assessment is required.

This report is intended to cover all forms of flood risk, emergency procedures and surface water drainage matters, in accordance with the most recent revision of the National Planning Policy Framework (NPPF), July 2021 and the relevant Planning Practice Guidance (PPG) on Flood Risk and Coastal Change. Furthermore, this report is also intended to fulfil the requirements of the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) – Durham County Council (DCC), the local sewerage undertaker – Northumbrian Water (NW) and the Environment Agency (EA).

1.1 Limitations

The opinions expressed within this review are based upon sourced documentation available. Graham Schofield Associates Ltd have not undertaken any quantitative assessments, or special investigations as part of this assessment.

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

2.0 EXECUTIVE SUMMARY

This site is situated on Number One Industrial Estate, Consett, Durham and is comprised of two sites – site A to the West of the central access road and site B to the East of the central access road. Site A is an un-developed greenfield site, whilst site B supports an existing industrial building, with approximately half of site B being impermeable, with an existing building, hand-standing surfaces surrounding the existing building and a car parking area to the rear (North) of the building. This site is situated in a well-established industrial estate, which has been used for industrial purposes since the formation of Number One Industrial Estate in the 1980's, and before then was used for agricultural purposes.

This flood risk assessment and drainage strategy has been prepared with the benefit of information compiled from the Environment Agency, Lead Local Flood Authority, Local Planning Authority, and other relevant sources. The

assessment has concluded that the site is classified as a less vulnerable development, due to the proposals being for industrial and/or commercial use. The site lies entirely within a flood zone 1 area, and as such, is considered to have a very low risk of flooding, with less than a 1,000-year (0.1%) Annual Exceedance Probability (AEP) of tidal or fluvial flooding. Furthermore, there is a low risk of flooding from surface water in this area, with less than 1% AEP, in addition to flooding from both reservoirs and groundwater being considered unlikely. Although this site is at very low risk of flooding from the sea, rivers, groundwater, and reservoirs, it has a low risk of flooding from surface water sources. Although the entire site is less than 1 hectare in area, the internal floor space to be created will provide over 2,000m^2 of usable employment space, which will support an internal floor space in excess of 1,000m^2. As such, it was necessary to undertake a flood risk assessment and drainage strategy.

The proposals for this development intend to utilise existing drainage connections from Site B and to construct new connections from Site A. This will result in an un-restricted discharge of foul water from the new premises into the nearby combined public sewer, and a restricted discharge of surface water from the site into the nearby surface water sewer. Although this site is considered to have a low risk of flooding from all assessed sources, there are some areas within and around the site, which are identified to be at risk of surface water flooding. As such, it is intended to reduce the rate of surface water currently discharging from this site into the public surface water sewer, by the provision of subterranean geo-cellular attenuation crates (or oversized storage pipes), to limit the rate of surface water discharge, thereby slowing the flow in-line with current guidance. This is intended to relieve some of the pressure on the already overwhelmed surface water sewer network.

This development will not increase the risk of on-site flooding and will reduce the risk of flooding to nearby locations around the site, during intense and prolonged rainfall events. Residual risks are assessed as being low and there will be a betterment to the flood risk of the surrounding area, resultant from this development.

3.0 EXISTING SITE AND FLOOD RISK

3.1 Site Location

The site is located at National Grid Reference 411205 (E), 551988 (N), and comprises two plots adjacent to one another, but separated by a communal access road which serves the industrial estate. Site A is an undeveloped greenfield site, which lies to the West of the access road and covers an area of 2,789m^2. Site B is a brownfield site, which lies to the East of the access road and covers an area of 6,285m^2. Site B currently houses an existing industrial building, associated car park / delivery area and surrounding pathways, resulting in hard-standing, impermeable surfaces covering around 3,020m^2 of the site.

The site is situated in the Southwestern corner of Number One Industrial Estate, Consett, Durham. Industrial and commercial premises surround this site, with industrial buildings located directly to the North, South, and West of the site. Directly to the East of the site is a small, raised woodland area and beyond this woodland area can be found more industrial and commercial buildings. The nearest residential properties to the site, are located further to the South and West of the industrial estate, with agricultural fields and farmland buildings beyond the industrial estate to the North and West of the site. There is also a woodland area beyond the industrial estate to the East, and this is known as Watling Wood. According to Ordnance Survey maps, ordinary watercourses are identified to pass through this woodland area and appear to flow in a North-easterly direction. It is worth noting that some of these watercourses cannot be seen on satellite imagery but are identified to flow along the same approximate routes as some of the established footpaths, which pass through this woodland area.

This site is comprised of two plots adjacent to one another, but these plots are separated by an access road, which serves the industrial estate. Both plots are rectangular in shape, with Site B (East) being almost square. Both plots are shown below in Figure 1: Site Location Plan, and the communal access road which separates the plots can also be seen.

Figure 1: Site Location Plan

3.2 Site Description and Topography

This site is comprised of two smaller plots, which are both rectangular in shape. Site A (West) occupies approximately 0.28 hectares in area and Site B (East) is almost square in shape and occupies an area of around 0.63 hectares. Both sites are shown above in Figure 1: Site Location Plan.

There is currently one existing industrial building on this site, located in the Northern half of Site B (East). The building is a steel portal frame construction, with brick cladding at ground floor level and corrugated steel above this. There is an access road to the rear (North) of the building, a parking area directly to the North of the access road and a greenfield to the front (South) of the building. Site A (West) is presently unmade ground, covered in entirety by grass and vegetation.

The total site area (including both sites A & B) covers an area of approximately 0.91 hectares, with around 3,019m^2 (33%) being impermeable and 6,049m^2 (67%) being porous grassland and vegetation. The site lies within an established industrial estate known as Number One Industrial Estate in Consett, Durham, and is surrounded by industrial and commercial premises. The nearest residential properties are located approximately 85m to the South of the site and around 150m to the West of the site. Beyond the industrial estate to the North and East of the site can be found agricultural fields and farmland areas, with a woodland area beyond the agricultural fields further to the East. The nearest playground to the site is Consett Park, which lies almost 1km Southwest of the site and Consett Cricket Club lies almost 700m to the West of the site.

There is one existing access road which leads into the site, from the un-named communal road between Sites A and B. The access road leads to the rear of the existing building on Site B, with no vehicular access to the front (South) of Site B, or to any part of Site A. The intentions of this development involve the construction of two vehicular access roads leading into each plot, accessible from the central access road between the two plots.

Site A (West) will comprise two industrial buildings, with Block 1 to the North of the site and Block 2 to the South. Between the industrial buildings will be an access road and associated parking areas around the perimeter of the access road, between the two buildings. Site B (East) contains an existing building, which will be retained and modified to accommodate additional units within the existing building. The vehicular access ramps leading into the building at the rear (North), are to be re-located and to the front (South) of the building (adjacent to the road to the South of the site), it is proposed to construct a new industrial unit, with an access road and parking areas between the existing building and the proposed new building. The access roads can be seen in Appendix A – Proposed Site Layouts.

A topographical land survey was supplied by JLP Surveying Consultants Ltd in June 2022, Drawing No. S22-446, a copy of which is provided in Appendix B – Topographical Land Survey. Inspection of the topographical data indicates that this site is largely flat, with around 1.2m in height difference across the entire site, over a site length of 150m. These levels exclude the building roofs and the raised Eastern embankment, which is almost 3m higher at its pinnacle, than the rest of the site, with elevations identified up to 267.5mAOD. The lowest ground levels ranged around 263.5mAOD, and were recorded in the Northwestern corner of Site A. The highest ground levels (omitting the raised Eastern embankment), ranged around 264.7mAOD and were recorded in the Southeastern corner of Site B, giving rise to a general fall across the entire site

in a North-westerly direction. It should be noted that beyond the raised Eastern boundary lies a public footpath, which is substantially higher than all surrounding ground levels, including the adjacent industrial units.

The nearest main river to the site is the river Derwent, but this lies over 2km to the West of the site and is therefore inconsequential to this development. The nearest charted ordinary watercourse lies almost 500m East of the site – an un-named ordinary watercourse shown to pass through the woodland area in the North-easterly direction, before passing beneath the B6309 public highway, Watling Street and heading towards Pont Burn River, which is a tributary of the Main River Derwent. Pont Burn River is approximately 10km in length, with an estimated catchment area of around 16.8km^2. It should be noted that local references suggest that Pont Burn Catchment has been heavily modified by industry in the past. There is another charted ordinary watercourse Northwest of the site, which leads to Snow's Green Burn, but as this watercourse lies over 1km away from the site, it is also inconsequential to this development.

3.3 Geological Considerations

Study of the British Geological Survey maps for the area, indicate the superficial deposits for the area to be made up entirely of Till, Devensian – Diamicton (formerly referred to as boulder clay). Given the extremely low porosity of boulder clay, it is unlikely that soakaways in this area would be suitable for the discharge of surface water into the ground by infiltration. Figure 3: Superficial Geology Map, is shown below for information:

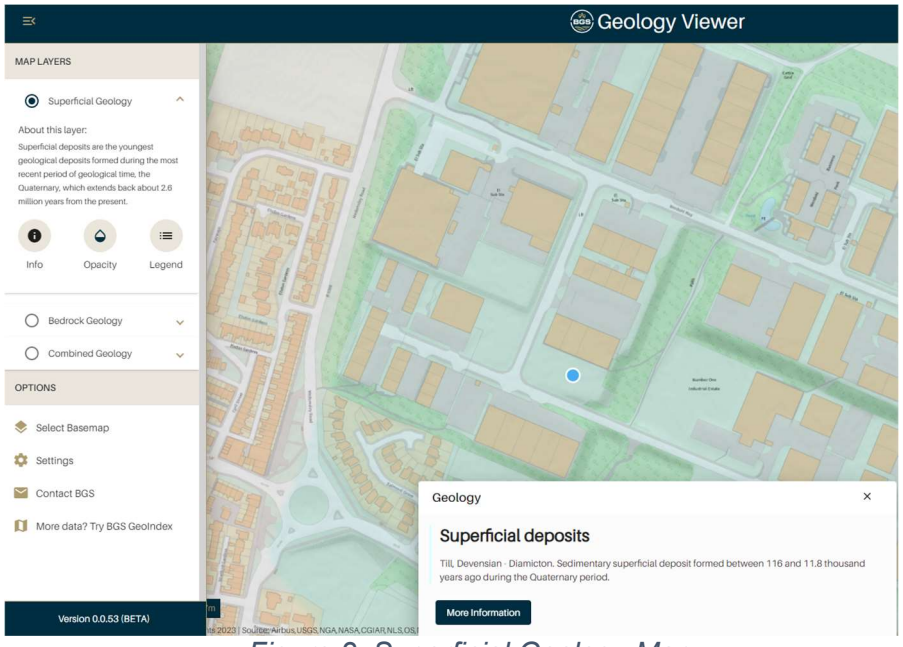


Figure 2: Superficial Geology Map

The bedrock geology map for the site has also been studied and this indicates the underlying bedrock for the entire site to be Sandstone, a typically permeable rock. Directly to the East of the site, is an area identified as Mudstone, Siltstone and Sandstone and this area is almost triangular in shape. Figure 4: Bedrock Geology Map, is shown below for information:

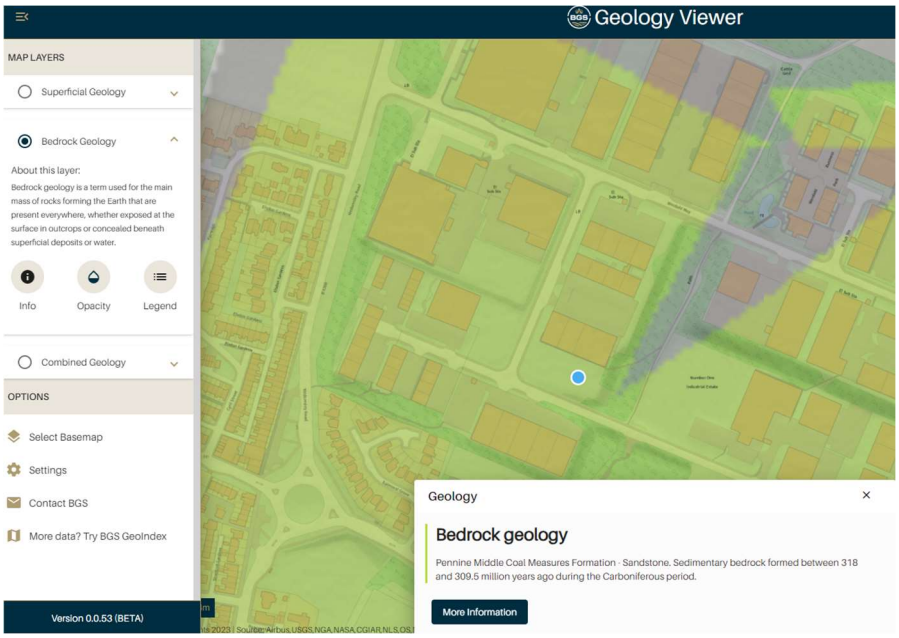


Figure 3: Bedrock Geology Map

Given the whole site is underlain with Sandstone bedrock but overlaid with superficial drift deposits predominantly made up of boulder clay, it is highly unlikely that soakaways would be effective in this area, given the likely depth of the impermeable clay strata compared to the underlying rock strata, which is anticipated to be at a considerable depth.

3.4 Hydrological Considerations

The Magic Mapping Groundwater Vulnerability maps, indicate that this site and the nearby surrounding area lie within the 'Medium Groundwater Risk' category. Therefore, this site is considered to have a medium vulnerability to groundwater resources. As a result, the groundwater source protection zones mapping has also been consulted, which indicates the nearest groundwater source protection zone (SPZ) to lie over 22km to the East of the site. This is a Source Protection Zone 3 (SPZ-3) area – an area around a supply source within which all the groundwater ends up at the abstraction point (the point where the water is taken from – SPZ-1). The nearest SPZ-1 is over 24km to the East and therefore inconsequential to this development. The nearest 'open watercourse' lies approximately 472m to the East of the site and is also considered inconsequential to this development.

3.5 Existing Site Drainage

Historically, this area of land has been used for agricultural purposes up until the 1980's, when the historical maps indicate that Number One Industrial Estate was formed. Since then, site B (East) has been used for industrial / commercial purposes, housing an industrial building and car parking area to the rear, with a grassed area fronting the building. Site A (West) has always been greenfield but is surrounded in entirety by industrial, commercial, and retail premises.

There is no existing drainage provision serving Site A (West), as this area of land has never previously been developed. However, it has been assumed that

the existing industrial building to the West of Site A, could have a foul water connection into the 300mm dia. vitrified clay (VC) combined public sewer, which is identified to run along the Eastern boundary of Site A. It has also been assumed that this adjacent building has a separate surface water discharge, which most likely connects to the 'private' surface water sewer identified to the South. This gives rise to the potential presence of an existing 'private' foul water sewer running through Site A and discharging into the combined public sewer, shown to run along the Eastern boundary of Site A. As such, CCTV investigations shall be undertaken prior to commencement of the development, to ensure there are no un-charted 'private' sewers passing through Site A.

It has been assumed that Site B (East) has an existing connection for foul water discharging into the 300mm dia. VC combined public sewer, identified to run along the Eastern boundary of Site A. It has also been assumed that surface water from the existing building and car park area on Site B (East), currently discharges at an un-restricted rate into the 225mm dia. VC surface water sewer, shown to run along the Western boundary of Site B. It has been assumed that there are no (uncharted) public or private sewers passing through the grassed area fronting the building on Site B.

3.6 Existing Flood Risk

The following Flood Risk Assessment and drainage strategy has been carried out in accordance with the National Planning Policy Framework (NPPF) and associated Technical Guidance. The broad aim of the guidance is to reduce the number of properties at risk of flooding, within the natural and built environment. To achieve this aim, planning authorities are required to ensure that flood risk is properly assessed during the initial planning stages of any development.

Responsibility for this assessment lies with the developers and they must demonstrate:

- Whether the proposed development is likely to be affected by flooding
- Whether the proposed development will increase flood risk in other parts of the hydrological catchment
- That the proposed measures for dealing with any flood risk are appropriate and sustainable

This site is predominantly flat, with approximately 1.2m height difference across the entire site, although the Eastern embankment is almost 3m higher at its pinnacle, compared to the rest of the site, with a maximum recorded elevation of 267.5mAOD. The lowest regions of the site were recorded along the Northern extents of the site, and the lowest ground level adjacent to the existing building was recorded on the topographical survey as 263.594mAOD – which is assumed to be the lowest finished floor level of the existing building. It is worth noting that the floor level of the neighbouring building to the West of the site was recorded on the same topographical survey as 263.709mAOD, which is approximately 115mm higher in elevation than the existing building on site B.

The preliminary check of flood risk for this site has been assessed using the Government's long-term flood risk website, which identifies flood risk in specific areas, based on flooding from various sources. According to the governments' flood risk register, the risk of this site flooding from various sources is as follows:

- Rivers and the Sea – Very Low Risk of flooding.
  The area has a chance of flooding of less than 0.1% each year, from Rivers and the Sea.
- Surface Water – Low Risk of flooding.
  The area has a chance of flooding between 0.1% and 1.0% each year, from surface water sources.
- Reservoirs – Flooding from reservoirs is unlikely in this area.
- Groundwater – Flooding from groundwater is unlikely in this area.

According to the Governments' Flood Risk website, the risk of flooding from surface water is the only identified potential source of flooding in this area, which suggests a 'Low-Risk' of flooding from surface water. As such, further investigations have been undertaken to determine the potential risk of flooding on and around this site, from surface water sources.

3.7 Historic Flooding

In the first instance, it should be determined whether the general area surrounding the development has any history of flooding, as this could be relevant to any future drainage proposals intended for the development area. This could be historic flooding of the site itself, flooding of lower-lying land which may have originated from the site, or flooding of higher-lying land which could potentially impact the site itself.

According to the Environment Agency's historic flood risk maps, the nearest location identified to suffer from historic flooding is near the river Derwent, a main river, but the area identified to suffer from historic flooding lies some 2.1km North-West-West of the site and is therefore considered inconsequential to this development.

Durham County Council's, Level 1 Strategic Flood Risk Assessment (SFRA) 2018, identifies incidences of previous flooding from various sources, including Northumbrian Water, the Environment Agency, and Durham County Council. This assessment has resulted in the identification of sewer flooding and surface water flooding in the general area of Consett. Flooding recorded in this location is said to have occurred on 30th June 2007, as a result of drainage capacity issues. There were six other areas in Durham, which were also identified to suffer from flooding on the same day and for the same reason (drainage capacity issues), following an extreme rainfall event. These flooded areas included Hamsterly, Tow Law, Stanley, Moorside, Pelton and Burnhope. The SFRA also identifies flood flow routes from overland flooding, with the nearest flood flow routes appearing to originate from areas to the South of the site and passing near to the South-western site boundary, heading in a North-westerly direction. As such, there is no indication that any overland flooding currently (or historically) passes through this site.

Durham County Council's Level 1 SFRA, identifies areas which are suitable for potential future development, and these are shown on Page 74 of the SFRA, on a plan produced by AECOM – Title: Level 1 SFRA Potential Development Sites – Inset A, dated 30th May 2018. The plan identifies this specific site (EMP129) with the area being coloured in Brown, which is identified as a potential Employment site. It should be noted that the proposals for this development are for industrial / commercial premises, which will provide local future employment and boost the local economy as a result. As this site has specifically been identified as a potential location for development in the SFRA, this location is considered suitable for the construction of industrial, commercial, and retail premises.

Flooding from Sewers

According to Durham County Council's Level 1 SFRA, this area flooded on 30th June 2007, due to drainage capacity issues. This included surface water flooding resultant from overwhelmed sewers and drains, during an extreme rainfall event.

To reduce the risk of sewer flooding in this area, the storage of surface water below ground is imperative, as this will reduce pressure on the local network of sewers and drains, which are already considered to be undercapacity. Reducing the rate of surface water discharge into these sewers, by holding back surface water during intense rainfall events, will reduce the frequency of sewer flooding in the area, as well as reducing the severity of sewer flooding when this does, unavoidably occur.

Restricting the rate of surface water discharge into the surface water sewer, in combination with the provision of 'below ground' surface water attenuation facilities located within the site, will significantly reduce the occurrence of overloaded sewers and system surcharge, in this low flood-risk area.

Flooding from Groundwater

The strategic flood risk assessment observes that there are no recorded occurrences of groundwater flooding in the development area, and there is no evidence of any groundwater issues on or nearby to this site.

Flooding from Surface Water

In support of information obtained from the Government's flood risk website, the Environment Agency's Flood Map for Planning has been reviewed to assess the level of flood risk for the area - see Figure 6: Flood Map for Planning, shown below for information.

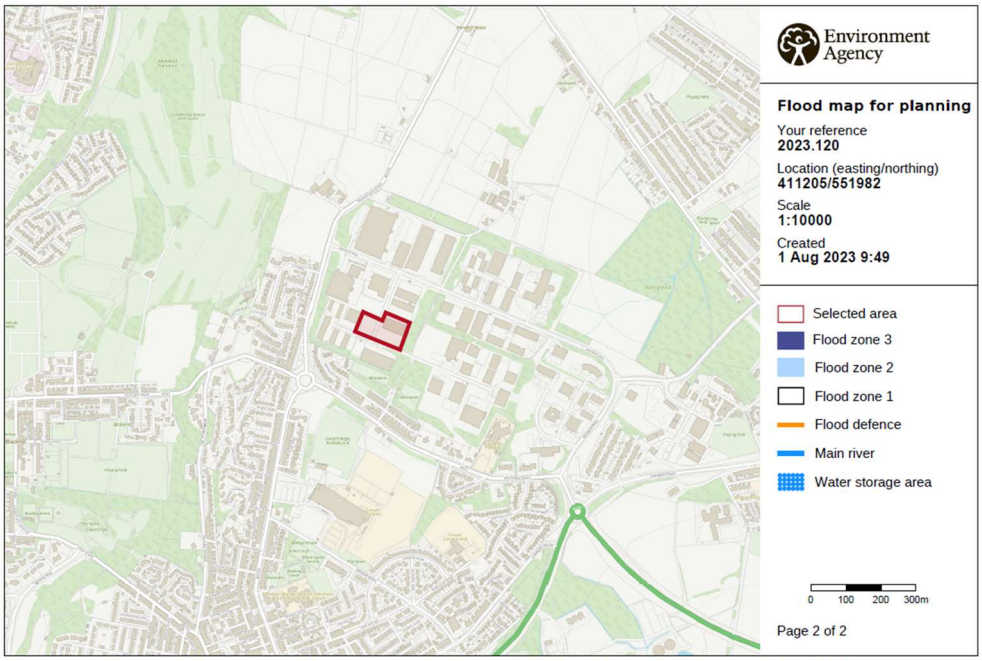


Figure 4: Flood Map for Planning

The flood map indicates areas at 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 this site lies within an area defined as Flood Zone 1, which sits in the "Low Probability" envelope and is assessed as having less than 0.1% annual probability of flooding from rivers or the sea, in any given year, by reference to National Planning Policy Framework (NPPF). The flood risk map indicates that this site is not within an area identified to be at risk of flooding from rivers or the sea. The nearest location which is identified to be at risk of flooding from rivers (or the sea), is approximately 2km North-West-West of the site, in the vicinity of the main river Derwent.

The nearest flood alert areas to this site are a considerable distance away from the site and are therefore considered inconsequential to this development. These flood alert areas include:

- Pont Burn River – 1.9km North-East-East of the site.
- Snow's Green Burn – 2.1km Northwest of the site.
- Stockerley Burn – 2.9km Southwest of the site.

The Environment Agency also predicts the extent of flooding associated with each probability scenario. Figure 5: Surface Water Flooding – Extent of Flooding, shown below, indicates the extent of surface water flooding associated with this site.

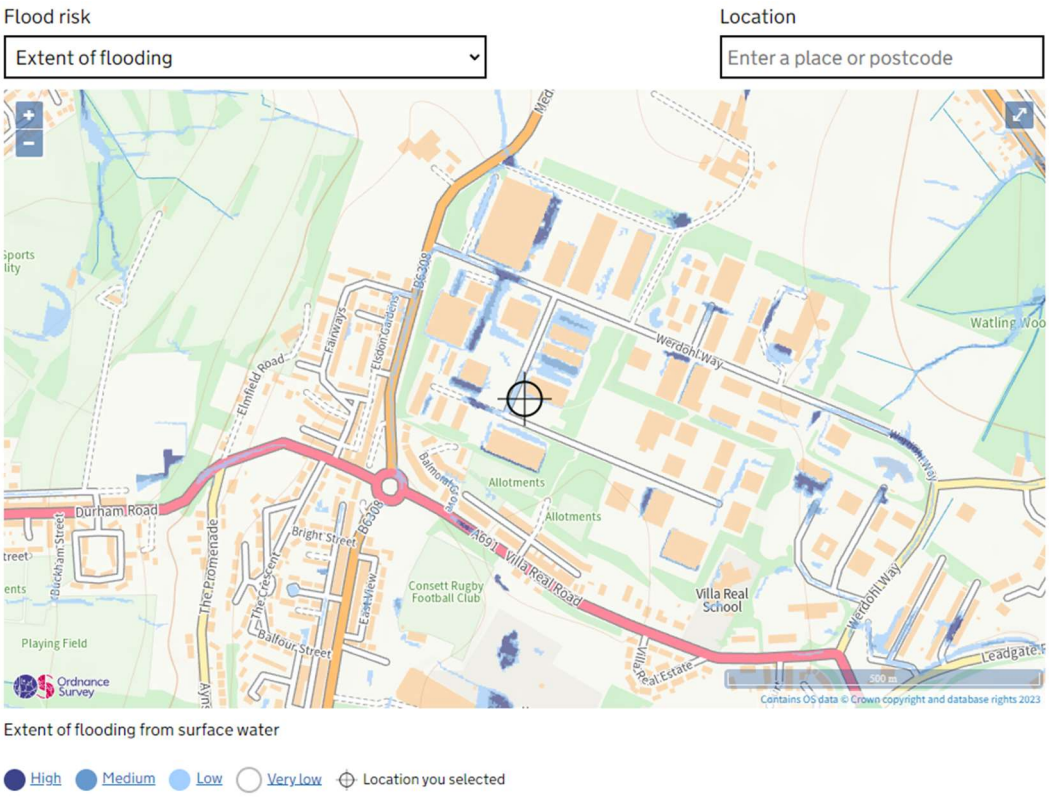


Figure 5: Surface Water Flooding – Extent of Flooding

As shown above, the Environment Agency's surface water flood map suggests that there is a risk of surface water flooding in the area, with flooded areas identified directly to the North, South and West of the site. There is also some flooding identified within the site itself, although this mostly appears to be confined to the car park area at the rear (North) of the building on Site B. Site A shows a small, flooded area along the Western boundary, adjacent to the neighbouring building, whilst Site B shows quite extensive flooding in the car park area to the North of the building, although this flooded area is only shallow. There is also some minor flooding identified directly adjacent to the building, around the Southern and Western boundaries of the existing building. Flooding has also been identified on the access road which lies between sites A and B, and the road to the South of Site A includes the deepest area of floodwater identified on the surface water flood maps. To evaluate the risk of flooding therefore, the depth of flooding maps have also been consulted.

In a high-risk scenario, there is no surface water flooding identified within the site at any location. The only flooded areas are confined to the road (South of Site A), to the front of the neighbouring building (West of Site A), and Northeast of the site. The depth of flooding in a High-Risk scenario is less than 300mm deep. Figure 6: Depth of Surface Water Flooding – High Risk Scenario, is shown below for information.

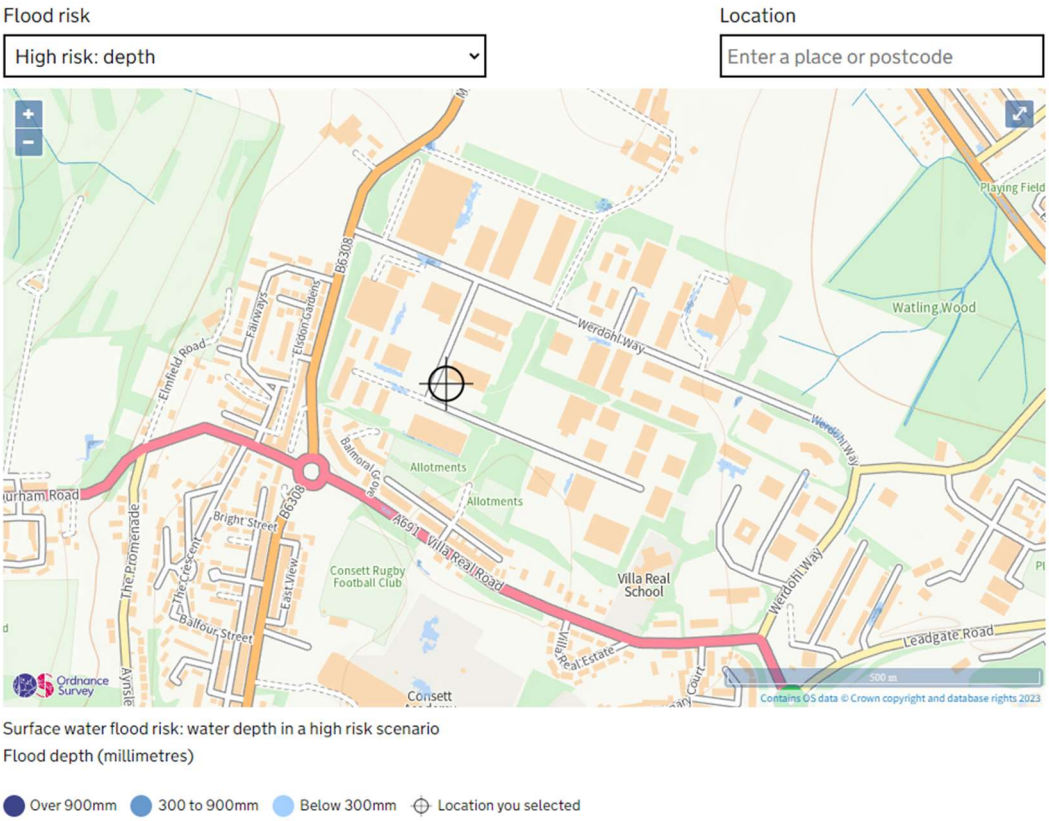


Figure 6: Depth of Surface Water Flooding – Low-Risk Scenario

In a medium-risk scenario, the flooded areas are almost identical to the high-risk scenario, with no flooding having been identified within the site itself and the only flooded areas appear to be constrained to the same places identified in the high-risk flooding scenario, although these areas do appear to be slightly more extensive. In addition, the flooded area identified at the front of the neighbouring building, covers a small area and is identified to lie within the range of 300mm to 900mm deep. Figure 7: Depth of Surface Water Flooding – Medium Risk Scenario, is shown below for information.

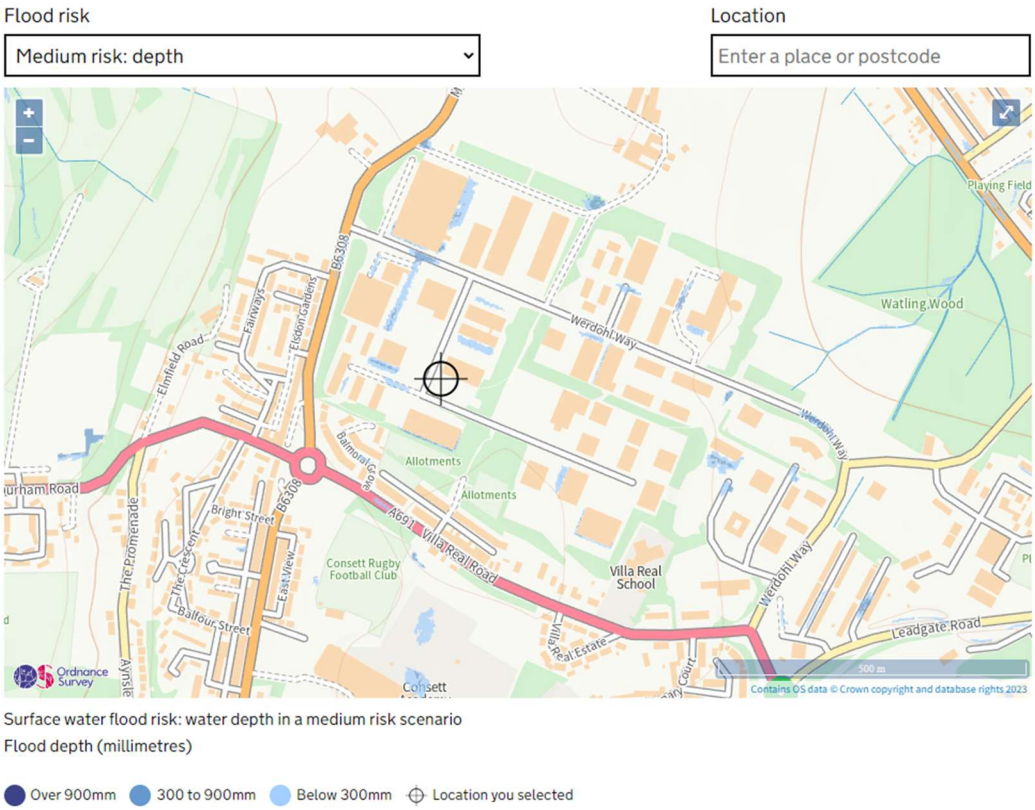


Figure 7: Depth of Surface Water Flooding – Medium-Risk Scenario

As there is no flooding identified within the site itself, in either a high-risk or medium-risk Scenario, the extent of flooding from surface water maps indicates the extent of flooding in a low-risk scenario. A low-risk scenario means that the area has a chance of flooding of less than 1% each year. The depth of flooding in a low-risk scenario map has also been consulted. Figure 8: Depth of Surface Water Flooding – Low-Risk Scenario, is shown below for information.

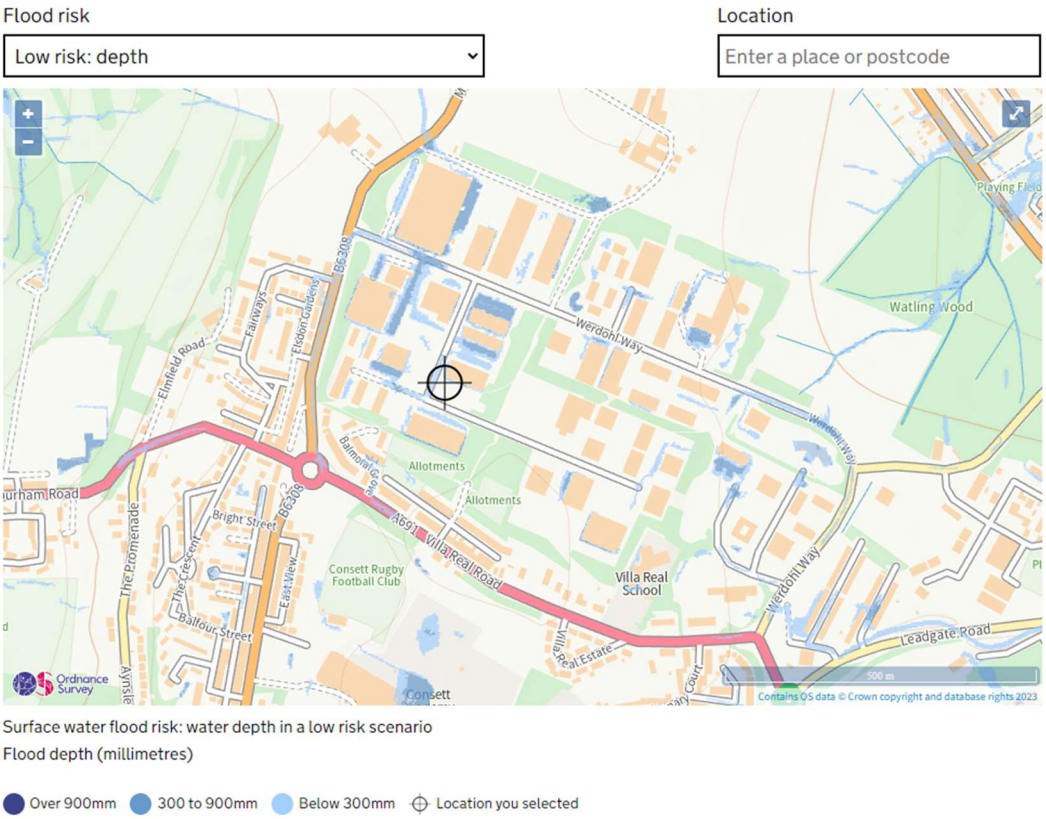


Figure 8: Depth of Surface Water Flooding – Low-Risk Scenario

As shown in Figure 8 above, all floodwater identified within the site itself, appears to lie within the shallowest depth range of less than 300mm deep, and this includes the road between sites A and B. There is a minimal amount of flooding identified within site A, which appears to be an overspill from the adjacent building. Site B identifies quite a substantially flooded area in the car park to the rear of the building, with a thin flood line shown around the Southern and Western perimeters of the building. Flood water identified within the road between sites A and B, appears to remain confined to the road, without any floodwater being shown to overspill from the road and into the site.

To determine the anticipated level of flooding at this site in a low-risk scenario, the flooded areas shown above have been assessed using topographical survey data. Figure 9: Assumed Flood Level from Topographical Data - Low-Risk Scenario, is shown below for information.

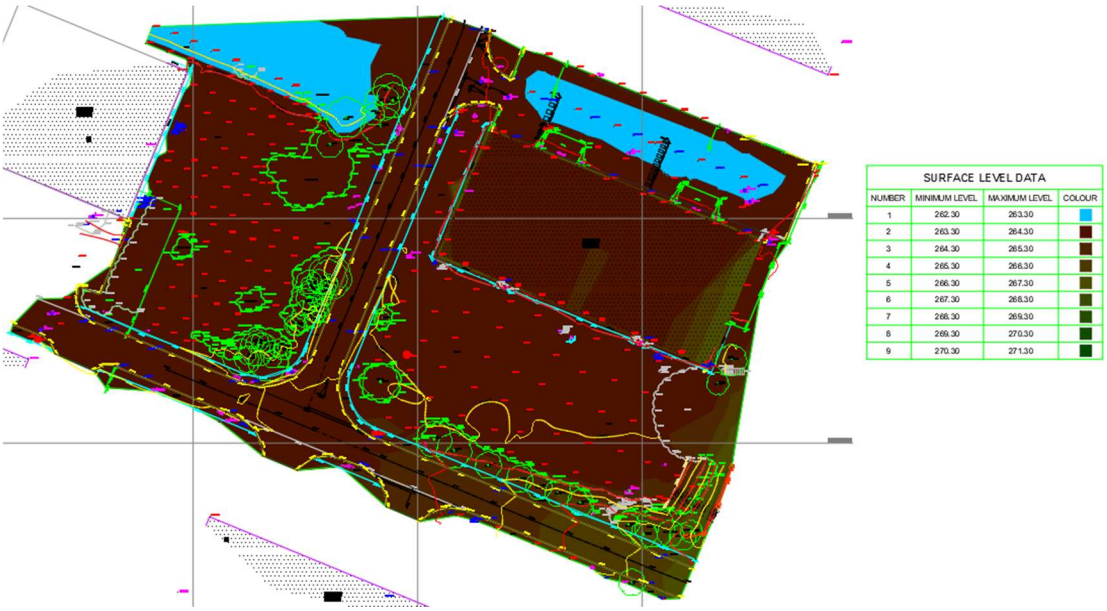


Figure 9: Assumed Flood Level from Topographical Data - Low-Risk Scenario

To estimate the level of flooding in a low-risk scenario, a range of datums have been assessed with a view to replicating the flooding extents identified on the surface water flood map. Figure 9 above, utilises and estimated flood level of 263.30mAOD, based on the topographically surveyed land height data, which is provided in Appendix A. The extent of flooding in the car park at the rear (North) of the existing building, is almost identical to the same area shown on the surface water flood maps. However, this flood level shows no indication of any flooding at any other location within the site itself.

Raising the flood level to incorporate the area around the South and Western perimeters of the existing building on Site B, shows the extent of flooding far in excess of the areas identified on the surface water flood map. Floodwater is shown to completely inundate the car park at the rear of the building and flooding identified within site A is far more extensive to the North of the site, although, there is very little floodwater identified near to the adjacent building, to the West of the site. This suggests that flooding identified around the Southern and Western perimeters of the existing building may not be entirely accurate. This could be due to the Government's flood maps being generated from indicative LiDAR (Light Detection and Ranging) land-height data.

The flood level determined from a detailed analysis of the more accurate, topographically surveyed land-height data, identifies a flood level of 263.30mAOD, which appears to correspond more accurately to all the other flooded areas identified on the flood maps, other than the area immediately to the South of the existing building on site B. Interestingly, the land height analysis carried out using the topographically surveyed data, does not identify any flooding of the highways directly adjacent to the site. This suggests that the highway is above this flood level and therefore, flooding to the highway most likely originates from the highway itself, rather than from any surrounding land. Furthermore, flooding identified within site B appears to be constrained to site B, with no overspill having been identified at any location off this site.

Figure 10: Flood Level Check, is shown below for information:

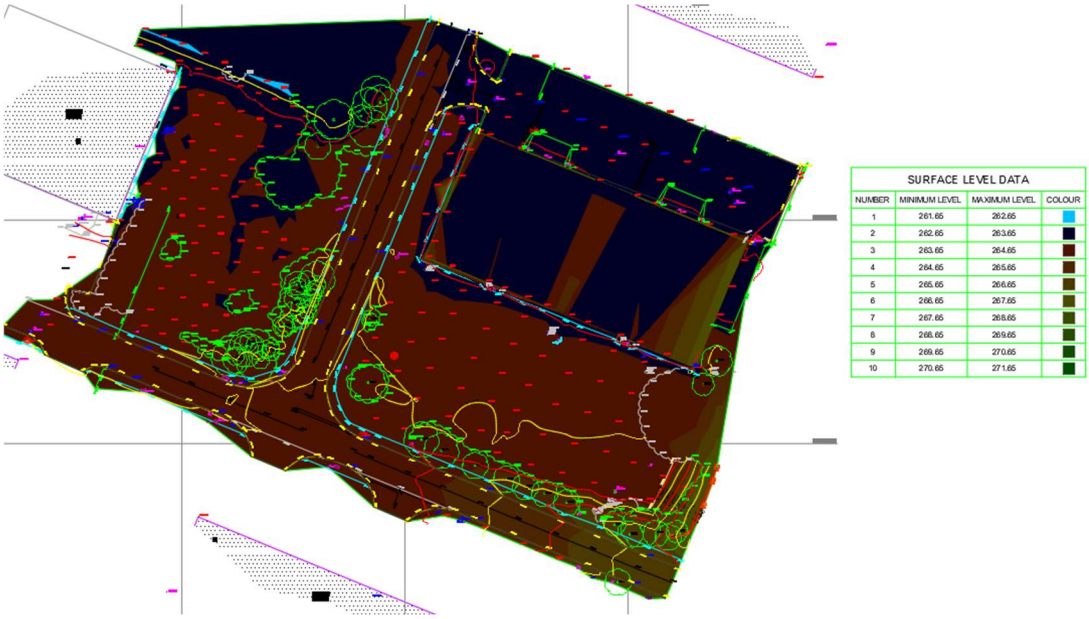


Figure 10: Flood Level Check

As this site lies entirely within a Flood Zone 1 area, it has a low probability of flooding from surface water, with less than 1% AEP (Annual Exceedance Probability). The topographically surveyed land-height data has been utilised to predict the level of surface water flooding in the area, in a low-risk flooding scenario. The flood level estimated for the purpose of this development is therefore 263.30mAOD.

Flooding from Rivers or the Sea

The long-term flood risk for this site has been checked on the government's website, and this states that there is a 'Low Risk' of flooding to the site from rivers and the sea. This site is not shown to be at risk of flooding from Rivers or the Sea, as shown below in Figure 11: Extent of Flooding from Rivers or the Sea.

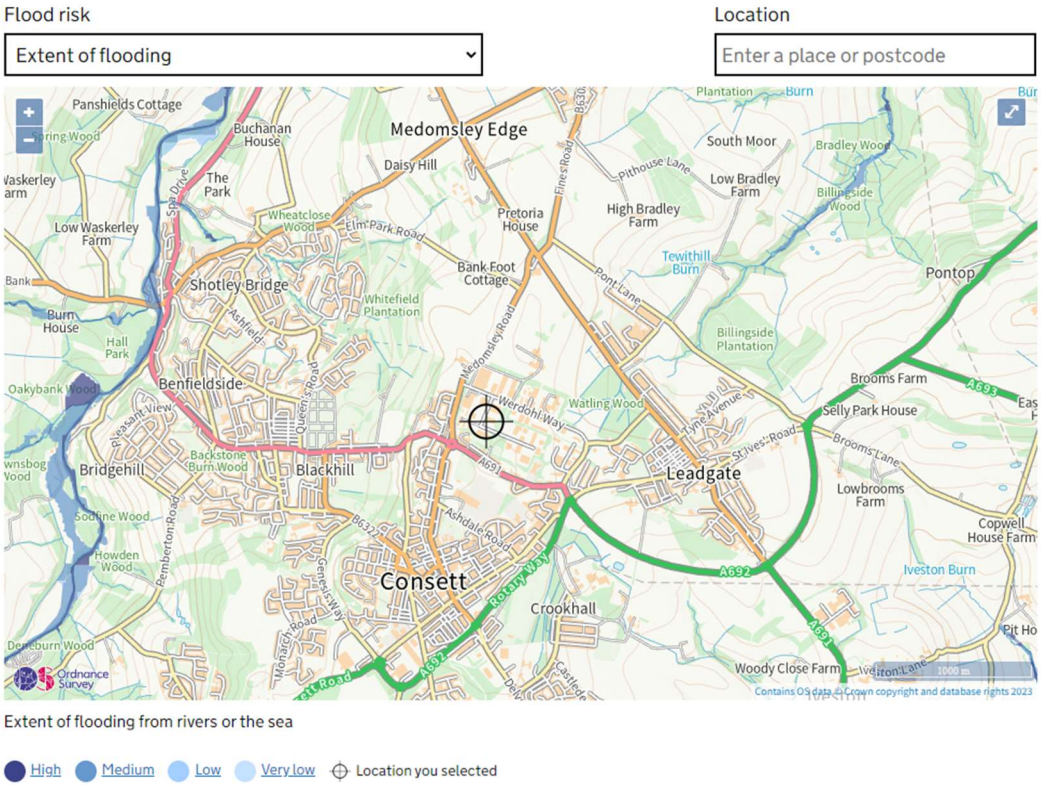


Figure 11: Extent of Flooding from Rivers or the Sea

Flooding from Reservoirs, Canals, and Other Artificial Sources

The Environment Agency's Flooding from Reservoirs Map has also been consulted and is shown below in Figure 12: Maximum Extent of Flooding from Reservoirs. There is no risk of flooding from reservoirs to this site, or to any neighbouring land in the vicinity of this site.

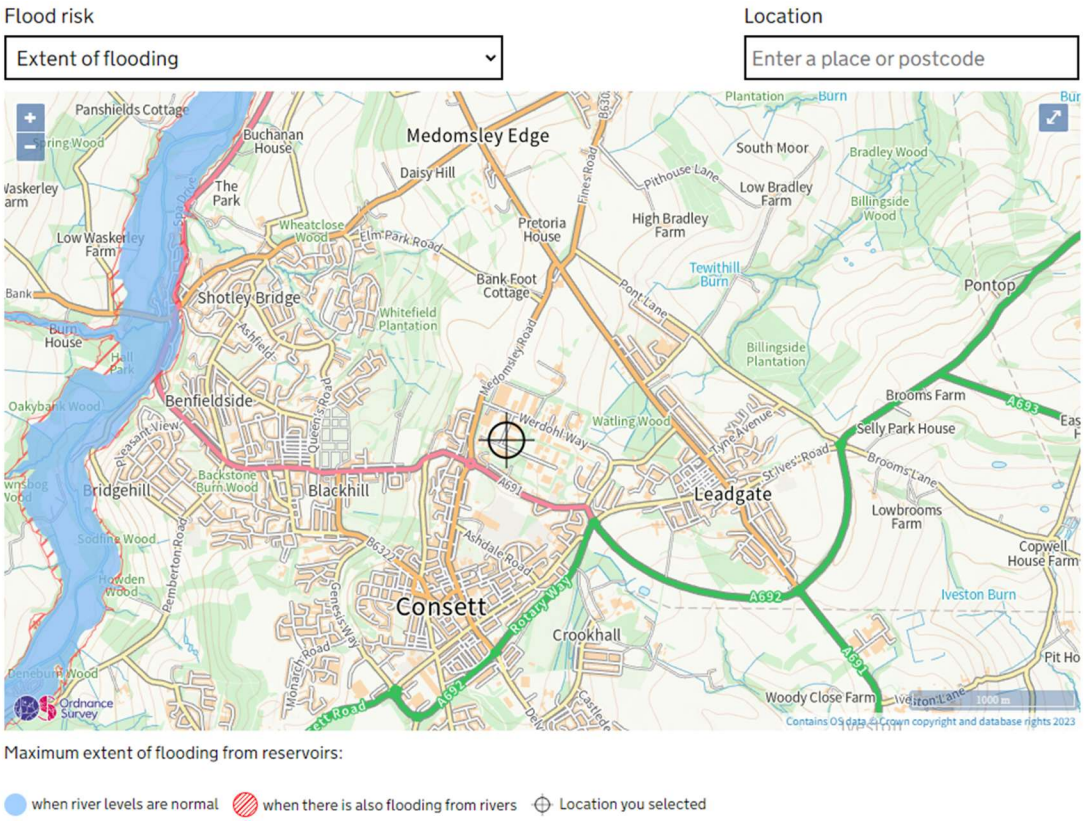


Figure 12: Maximum Extent of Flooding from Reservoirs

The nearest canal to the site is the Tees Canal, but as this lies over 46km Southeast of the site, it does not pose any risk of flooding to this site or the surrounding area. As a result, this site is not considered to be at any risk of flooding from reservoirs, canals, or other artificial sources.

Flooding from Climate Change

Projections of future climate change indicate that short duration, high intensity rainfall events will become much more frequent. There will also be an increase in the less intense, but longer duration rainfall events and the level of the sea is expected to continue to rise. Over the next few decades therefore, these changes are expected to have a major impact on tidal flooding, fluvial flooding, and flash flood events, which will all continue to rise in both frequency and severity.

As a result, developers will see many more challenging aspects of flood prevention, in relation to the flooding of newly constructed sites and the potential flooding of lower-lying land, from these newly constructed sites. Given the design life of new developments is several decades, the impact of flooding from climate change must be an implicit consideration within all new developments. Although the true impact of climate change is almost impossible to predict, recommendations have been included in the Technical Guidance to the National Planning Policy Framework. These recommendations will be adhered to throughout the development process, with particular focus being placed on the features of site drainage, and by adopting an anticipated increase

in rainfall intensity of up to 50%, for all rainfall events with an Annual Exceedance Probability (AEP) of 1%.

According to DEFRA's hydrology data explorer, this site lies at the upper end of the Tyne Management Catchment, but as the site lies so close to the catchment boundary, peak allowances for rainfall and river flow should be obtained from the upper management catchment, which is the Wear Management Catchment. The peak river flow allowance to be used for a less vulnerable development is the central allowance, which is based on the 50th percentile and means that half the possible scenarios for peak river flow will fall below it, and half will fall above it. The central rainfall allowance for climate change up to the 2070's, in the Wear Management Catchment is 30% and the central peak river flow allowance up to the 2080's is 25%.

A climate change allowance of 30% has therefore been adopted, as this is the higher of the two allowances. A 10% allowance has also been adopted for urban creep, which provides a combined allowance of 40%.

3.8 Future Flood Risk

This site is identified on the Environment Agency Flood Map for Planning (Rivers and Sea), to be located within a Flood Zone 1 area, and therefore not considered to be at risk of flooding from groundwater, reservoirs, or the sea. However, the surface water flood maps do indicate some surface water flooding within the site boundary.

Northumbrian Water's, Drainage and Wastewater Management Plan (DWMP), May 2023, identifies options and improvement opportunities for the different drainage areas within their administrative boundary. Plan 04-D02, Consett & Castleside, identifies the drainage area within which the proposed development site lies, with reference to options for Northumbrian Water's, 'Storm Overflow Discharge Reduction Plan". The whole development is located within an area identified for, 'Green Infrastructure and Below Ground Storage'. As this development will unavoidably reduce the available greenspace, by the creation of usable industrial / commercial space (as required to promote the creation of additional employment in the area), it is essential for the surface water drainage proposals to incorporate below ground storage within the site, to accommodate surface water attenuation, in-line with Northumbrian Water's future planning guidance.

Consett and Castleside are located within the 'Rural Tyne Strategic Planning Area' and the 'Storm Overflow Discharge Reduction Plan' states that Water Companies will only be permitted to discharge from a storm overflow, where they can demonstrate that there is no localised adverse economical impact. This target must be achieved for at least 75% of storm overflows discharging in, or close to high priority sites by 2035, with all the remaining storm overflows discharging in or close to high priority sites by 2045. Any remaining sites should be achieved by 2050. There are five existing storm overflows within this drainage area, which are identified on the DMWP as not requiring improvement. There are however, a further six storm overflows which do need to be improved, with a view to undertaking the improvement works between 2035 and 2050. It

is worth noting that 2050 is the most distant date and therefore considered to be of the least priority.

Northumbrian Water's, Long-Term Delivery Strategy for Flooding, aims to reduce sewer flooding by 60% over the next 25 years and this drainage area may be targeted for surface water runoff management, to contribute to that target. By incorporating below ground storage for surface water within the site, to reduce the rate of surface water runoff from the development, in combination with ensuring that all surface water from the development discharges into the surface water sewer at a restricted flowrate (to be agreed with Northumbrian Water), these proposals are considered acceptable in principle, and will support Northumbrian Water's future planning guidance, in addition to promoting Northumbrian Waters' long-term objectives.

4.0 DEVELOPMENT PROPOSALS

The proposals for this scheme are for the development of a greenfield site (Site A) and the re-development of a brownfield site (Site B).

Site A is currently an un-developed greenfield site, located within an established industrial estate and surrounded by industrial and commercial premises. Site B is currently a brownfield site, with the Northern half of the site being occupied by an industrial building and hard-standing parking area to the North (rear) of the existing building. The Southern half of site B is effectively undeveloped greenfield land, the same as site A.

The proposals for this development involve modifications to an existing industrial building and construction of three new industrial units. The existing industrial building is situated at the North-eastern corner of Site B. To the South of the existing building, it is intended to construct a new industrial building, with hard-standing parking provision being located centrally between the new building and the existing building. A new vehicular access point will be created leading into this parking area from the central access road, between sites A and B. In addition, it is intended to construct a further two industrial buildings at the Western end of the site (Site A). This will involve construction of one building at the Northern end of the plot and another building at the Southern end of the plot. As with site B, it is intended to construct a central parking area between the new buildings, with a vehicular access point leading off the central access road between sites A and B.

Copies of the Development Proposals provided by Northern Trust Company Ltd, drawing number WH-187-102 (Site A), dated 28/12/21 and drawing number WJ-187-0003 Rev. D (Site B), dated 13/07/21, are provided in Appendix A for information.

4.1 Proposed Works

It is proposed to re-develop an existing brownfield site and a greenfield site. The entire site will provide four industrial buildings – one existing and three new. Site A is a greenfield site, located to the West of the central access road, and site B is a brownfield site, located to the East of the access road.

Northumbrian Water's, Drainage and Wastewater Management Plan (DWMP), May 2023, identifies this site to be located within an area identified for, 'Green Infrastructure and Below Ground Storage'. As this development will unavoidably reduce the available greenspace, by the provision of usable industrial / commercial space (as required to promote the creation of additional employment space), it will be necessary for the surface water proposals to incorporate below ground storage, to accommodate surface water attenuation facilities in-line with Northumbrian Water's future planning guidance. Although Durham County Council's SWMP identifies the use of green roofs on flat roofed industrial buildings (both retrofit and new), it also acknowledges that this may prove cost prohibitive for incorporation into new (or retrofit) developments.

Therefore, surface water attenuation for this site shall be provided below ground, in the form of geo-cellular attenuation crates located beneath the proposed car parking areas on both sites A and B. These proposals will approximately double the usable industrial / commercial 'employment' space, from its existing floor area of 1,995m^2, to just over 4,000m^2 in floor area. Unfortunately, this means the loss of some green space, although under the making space for water guise, the introduction of below ground surface water attenuation falls in-line with all local policies and requirements, as well as adhering to national standards.

As this is a proposed commercial development in a Flood Zone 1 area, intended to create more usable employment space, and being classified under the National Planning Policy Framework as a 'Less Vulnerable' development, this type of development is considered acceptable in this location.

4.2 Drainage Strategy

In accordance with the National Planning Policy Framework and Building Regulations, the site should ideally be drained on separate systems for foul and surface water. It is proposed to utilise the existing sewer connections serving the premises, with foul water currently discharging into the combined public sewer and surface water currently discharging into the public surface water sewer at an un-restricted rate. It is imperative that surface water is not discharged to the South of the site, as the deepest flood levels have been identified on the surface water flood maps, to the Southwest of the site.

As part of these development proposals, it is intended to reduce the rate of surface water discharge into the public surface water sewer, thereby achieving a betterment of approximately 40%, including 30% for climate change and 10% for urban creep.

4.3 Foul Water

United Utilities (UU) currently utilises the Water UK's new Sewerage Sector Guidance documents, which replaced the Sewers for Adoption guidance on 1st April 2020. The latest edition, 'Sewerage Sector Guidance v2.1', approved 25th May 2021, indicates that for gravity sewers serving industrial and commercial developments, the design flows can contain two elements – domestic flows (from toilets and kitchens) and trade effluent flows (wastewater from industrial processes). Given the proposals are for that of industrial / commercial premises, the domestic design flows have been accommodated, as no industrial 'effluent producing' processes have been proposed at this location. The domestic design flows should be calculated in accordance with BS EN 12056-2 System II, or in the absence of appropriate information, 0.6 litres/second/hectare of developable land.

Frequency Factor (*K*)	0.5			Intermittent use, e.g. In dwelling, guesthouse, office
Site A	**DU**	**No.**	**Sub Total**	
WC with 4.0 l cistern	1.8	12	21.6	
Wash basin bidet	0.5	12	6	
Total DU			27.6	
Site B	**DU**	**No.**	**Sub Total**	
WC with 4.0 l cistern	1.8	19	34.2	
Wash basin bidet	0.5	19	9.5	
Total DU			43.7	
Total for all Units SUM DU			71.3	
			$Q_{ww} = K\sqrt{\Sigma DU}$	
	where:			
			Q_{ww} = Waste water flowrate (l/s)	
			K = Frequency factor	
			ΣDU = Sum of discharge units	
Total Wastewater flowrate (Qww) l/s			4.22	l/s

The foul water discharge rate from this site has been determined as 4.22 litres/second. All foul water flows from this development are to be discharged into the 300mm dia. Vitrified clay combined public sewer (identified to run in a Northerly direction along the Eastern perimeter of Site A) at an unrestricted rate and connected to the combined sewer network via. a new proposed manhole.

4.4 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. Discharge to a Surface Water Body (pond, ditch, stream, river)

3. Discharge to a Surface Water Sewer or Highway Drain
4. Discharge to a Combined Water Sewer

In the first instance, the ground conditions of the site should be investigated to assess the potential for surface water disposal by methods of infiltration. However, given the superficial ground strata on this site is predominantly made up of boulder-clay (Till, Devensian – Diamicton) and the excessive depth of the rock strata, it is unlikely that this site will be suitable for the disposal of surface water by methods of infiltration.

Unfortunately, there are no surface water bodies in the vicinity of this site and as such (and in-line with the drainage hierarchy shown above), it is intended to direct all surface water flows from this development into the nearby public surface water sewer, in the un-named road between Sites A and B. Storage of surface water will be provided by underground attenuation cells (or oversized storage pipes), positioned beneath the parking areas located between the buildings on both sites A and B. The rate of discharge will be limited using a flow control device such as a hydro-brake, to reduce the existing flow rate by up to 40%.

The rate of discharge of surface water into the public surface water sewer will be reduced and delayed, in-line with the latest government guidance.

4.5 Surface Water Management

The Greenfield Runoff Estimation Rate has been assessed for this site using HR Wallingford's – Greenfield runoff estimation for sites, and is shown in Appendix C, for information. The surface water storage estimation has also been assessed using HR Wallingford's – Surface Water Storage Estimation Tool and can be found in Appendix D, for information.

As this site is comprised of two individual plots of land (separated by a communal access road which serves the industrial estate), for the purposes of surface water management at this site, Sites A and B have been addressed and accommodated individually.

Site A is a greenfield site and occupies an area of 0.28 ha. The estimated surface water runoff rate is 2.55 l/sec in a 1 in 30 years rainfall event. The total storage required to accommodate a 1 in 100 years' rainfall event equates to approximately 138m^3.

Site B is a brownfield site and occupies an area of 0.63 ha. The estimated surface water runoff rate is 5.75 l/sec in a 1 in 30 years rainfall event. The total storage required to accommodate a 1 in 100 years' rainfall event equates to approximately 539m^3.

The greenfield runoff estimation rate for a 1 in 30 years rainfall event has been determined as 2.55 l/sec for site A and 5.75 l/sec for site B, providing a combined discharge rate for both sites of 8.30 l/sec. The storage volume

determined to accommodate a 1 in 100 years rainfall event is 138m^3 for site A and 539m^3 for site B, providing a combined storage volume of 677m^3. The required surface water storage of 677m^3 will be provided by the attenuation of 138m^3 on Site A (between the proposed buildings - Blocks 1 and 2), and 539m^3 on Site B (between the existing building and the proposed building - Block A), in the form of subterranean geo-cellular attenuation crates (or oversized pipes) below the car park areas on both sites. This falls in-line with 'Northumbrian Water's, Drainage and Wastewater Management Plan (DWMP), May 2023', which identifies the Consett & Castleside drainage areas for green infrastructure and 'below ground storage'. As this development will unavoidably reduce the available greenspace, by the provision of usable employment space, it has been deemed necessary to provide 'below ground' surface water attenuation at this site.

Site A will provide a single layer of attenuation crates (400mm deep), covering an area of 384m^2, to provide 145m^3 of below ground storage, when considering a 95% void ratio for the geo-cellular crates. The discharge shall be controlled with a hydro-brake or similar flow control device, to limit the discharge to 2.6 l/sec – the equivalent greenfield runoff rate in a 1 in 30 years rainfall event.

Site B will provide a double layer of attenuation crates (800mm deep), covering an area of 720m^2, to provide 547m^3 of below ground storage, when considering a 95% void ratio for the geo-cellular crates. The discharge shall be controlled with a hydro-brake or similar flow control device, to limit the discharge to 5.7 l/sec – the equivalent greenfield runoff rate in a 1 in 30 years rainfall event.

Given the storage capacity of both attenuation crates in combination will be approximately 692m^3, this will provide an additional 15,000 litres of storage, which will accommodate the existing flooded areas identified within the site. A drainage areas plan (drawing number 2023-120-C01 Drainage Areas – Pre and Post Development) has been provided in Appendix E, which indicates the permeable and impermeable areas of the existing and proposed site. An indicative drainage layout (drawing number 2023-120-C02) has also been provided and is shown in Appendix F, for information.

5.0 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 Flood Zone 1 and therefore, all uses of land are appropriate within this flood zone area.

This assessment has investigated the possibility of flooding from all sources at the site. It is considered that there will be a low risk of flooding from surface water and a very low risk of flooding from rivers, and the sea. Flooding from reservoirs and groundwater is considered unlikely in this area. However, surface water flooding is shown on the Environment Agency's flood maps, and identify surface water flooding within the site itself, in addition to some surface water flooding around the site – to the North, South and West of the site.

It is proposed to provide storage for approximately 692,000 litres of surface water in subterranean geo-cellular attenuation crates (or oversized pipes), to reduce the rate of surface water runoff by up to 40% during a 1:100 years rainfall event. The rate of discharge into the 225mm dia. public surface water sewer shown along the Western boundary of Site B, shall be limited by means of hydro-brakes (or other such flow control device) on each site, to achieve a combined discharge rate of 8.30 l/sec in a 1:100 years rainfall event, thereby achieving a 40% betterment.

It is proposed to discharge all foul water flows at an unrestricted rate into the 300mm dia. Combined public sewer, identified along the Eastern boundary of Site A, by the provision of a new manhole, as to be agreed with Northumbrian Water.

Development of this site is not considered to represent an increased flood risk to this site, or anywhere in the immediate vicinity of this site. In contrary, this development will reduce the rate of surface water runoff from this site, both in terms of overland flows and flows discharging into the public surface water sewer, thereby reducing the flood risk at all locations adjacent to the site and all locations downstream of this site.

Appendix A: -

Proposed Site Layouts
Site A: WJ-187-102 and Site B: WJ-187-0003D

SCHEDULE OF ACCOMMODATION
BLOCK 1

Unit	total sq.m	total sq.ft net	cars	m2/ per car
1	154	1658	3	51
2	204	2196	2	51
3	204	2196	2	51
Total NET	562	6050	11	

SCHEDULE OF ACCOMMODATION
BLOCK 2

Unit	total sq.m	total sq.ft net	cars	m2/ per car
1	154	1658	3	51
2	102	1098	2	51
3	102	1098	2	51
Total NET	562	6050	10	
Grand Total NET	1124	12100 sq.ft	21	51

MATERIAL KEY

- Air Entrained Concrete Finish to apron to Loading Doors
- 600 x 600mm Concrete Paving Flags, shading indicates tactile paving
- Tactile paving and dropped kerb
- Gravel infill
- Grassed areas
- Bollards to Loading Doors
- Assumed site boundary [to be checked against title deeds]

parking provision block 1
11 car parking spaces including
[3 disabled parking spaces]
3 loading bay/delivery bay spaces

parking provision block 2
10 car parking spaces including
[3 disabled parking spaces]
3 loading bay/delivery bay spaces

north

scale 1/200

SITE A

BLOCK 1
total net floor area 6050 sq.ft

BLOCK 2
total net floor area 6050 sq.ft

154 sq.m [1658 sq.ft] WAREHOUSE Unit 1
204 sq.m [2196 sq.ft] WAREHOUSE Unit 2
204 sq.m [2196 sq.ft] WAREHOUSE Unit 3
OFFICE 16.3 sq.m 175 sq.ft
OFFICE 22.6 sq.m [243 sq.ft]
dis/wc
wc

setting out point 3500 minimum

15.4m (overall)

21620

2396

3600

2400

retained side access to neighbouring unit

7m

sight line 7m x 60m min 30mph max speed

Setting Out

proposed new access/egress to and from site A.

7m

sight line 7m x 60m min 30mph max speed

02

10d

10c

7a

7b

El Sub Sta

Rev. | Date | Details | Drawn | Checked

Issued for:
PLANNING APPLICATION SUBMISSION

NORTHERN TRUST
INVESTMENT / DEVELOPMENT / REGENERATION
NORTHERN TRUST
LYNTON HOUSE, ACKHURST PARK, CHORLEY PR7 1NY.
Tel: 01257 238 555 Fax: 01257 238 556
Email info@northerntrust.co.uk

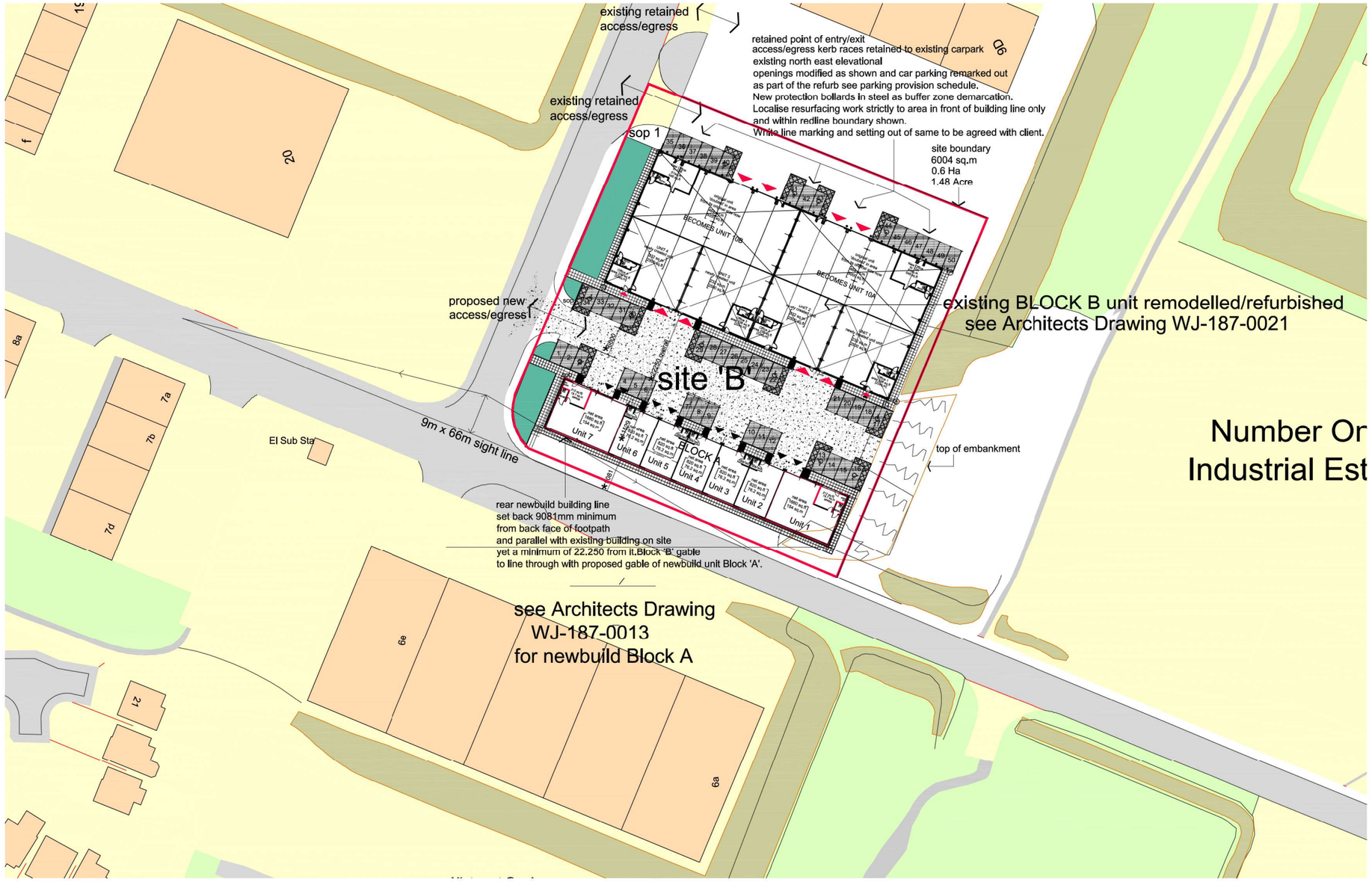
Client

Project
Consett,Durham
DH8 6SZ

Drawing
Proposed site layout
SITE 'A'

Drawn By	DE	Date	28.12.21	Drawing No. WJ-187-102 Rev.
Checked By	DE	Date	28.12.21	
Scale	1/200	@A1		

electronic path to this drawing-WJ- 187



NORTH

All site dimensions shall be verified by the contractor on site prior to work commencing

Do not scale from this drawing
Only work to written dimensions

Notes

SCHEDULE OF ACCOMMODATION
BLOCK A NEW BUILD

Unit	total sq.m	total sq.ft	cars	m2/ per car
1	154	1660	3	51.3
2	76.2	820	2	50.5
3	76.2	820	2	50.5
4	76.2	820	2	50.5
5	76.2	820	2	50.5
6	76.2	820	2	50.5
7	154	1660	3	51.3
total	689	7420	16	43

BLOCK A

BLOCK B REFURBISHMENT/REMODELLING

Unit	total sq.m	total sq.ft	cars	m2/ per car
1	232	2500	4.5	51.5
2	232	2500	4.5	51.5
3	232	2500	4.5	51.5
4	232	2500	4.5	51.5
Unit 10A	464	5000	8	58
Unit 10B	464	5000	8	58
total	1856	20,000	18 new and [units 1-4]	16 existing,remarked [units 10A and 10B]

BLOCK B

Total provision Blocks A and B combined 2,547sq.m or 27,420 sq.ft

MATERIAL KEY

- Air Entrained Concrete Finish to concourse and aprons to Loading Doors
- Dense bitumen macadam to car park areaswith 3mm thickness white thermoplastic markings to bays.
- 600 x 600mm Concrete Paving Flags, shading indicates tactile paving
- Tactile paving and dropped kerb
- Gravel infill
- Grassed areas
- Bollards to Loading Doors
- Assumed site boundary [to be checked against title deeds]

D	28.2.23	Revised internal layout for Block B inserted and parking modified to suit.		
C	29.12.22	Car Park loading bays re-configured.	de	de
B	8.12.22	Block A reduced in depth from 14.400 to 10.800 [preferred site access/egress]	de	de
A	28.4.22	same layout as before except 1 end unit rather than 2.	de	de
Rev.	Date	Details	Drawn	CHECKED

Issued for:
PLANNING APPLICATION

NORTHERN TRUST
INVESTMENT / DEVELOPMENT / REGENERATION
NORTHERN TRUST
LYNTON HOUSE, ACKHURST PARK, CHORLEY PR7 1NY.
Tel 01257 238 555 Fax 01257 238 556
Email info@northerntrust.co.uk

Client

Project
Consett,Durham
DH8 6SZ

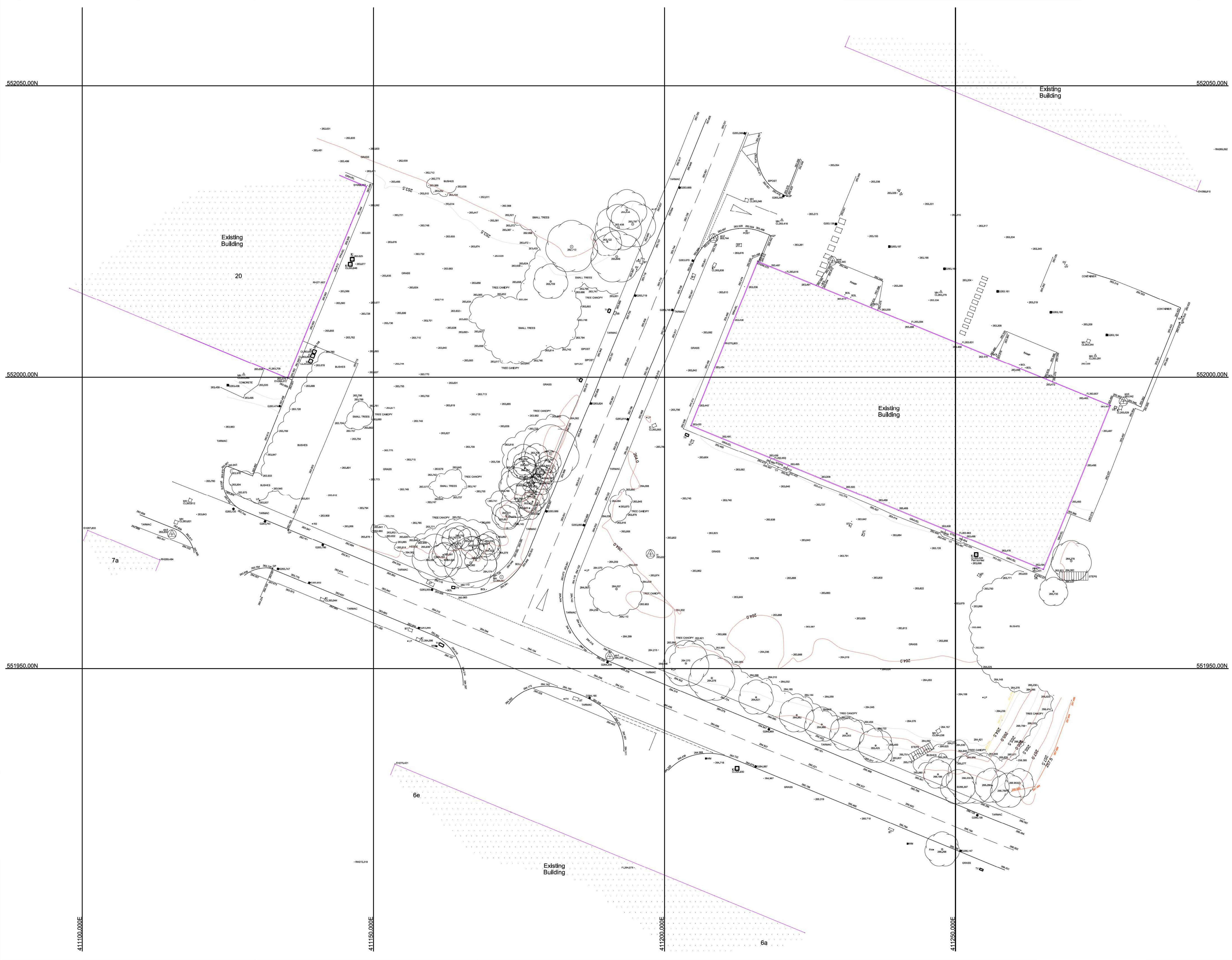
Drawing
proposed site layout
'SITE B'

Drawn By	DE	Date	13.7.21	Drawing No.	Rev.
Checked By	DE	Date	13.7.21	WJ-187-0003...	D
Scale	1/500	@A1			

electronic path to this drawing-WJ- 187

Appendix B: -

Topographical Survey: S22-446



N

Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bol	Bollard	TPS	Tactile paving slabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VP	Vent pipe
DR	Drain	WM	Water meter
Elec	Electrical ic	WO	Wash Out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod		Fence annotation
FH	Fire Hydrant	B/W	Barbed wire
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/I	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hand rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Letter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
Mkr	Utility marker	W/M	Wire mesh
MP	Mile post		Level prefix descriptions
MW	Monitoring Well	AL	Arch level
NP	Name plate	BL	Bed level
P	Post	CL	Cover level
PM	Parking meter	EH	Eaves level
RE	Rodding eye	FL	Floor level
RS	Road sign	IL	Invert level
rwp	Rain water pipe	PL	Parapet level
SP	Sign post	RH	Roof/ridge level
ST	Stop tap	SL	Soffit level
SB	Service Box	Spr	Arch springing level
SV	Stop valve	Top	Top of pipe/culvert
TCB	Telephone call box	WH	Wall height
TH	Trial Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to O.S (Newlyn) Datum, Established using network RTK. Survey plotted on a plane local grid, orientated to National Grid.

NOTES

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS PRIOR TO WORK COMMENCING

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD. THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

SURVEY STATIONS			
stn1	411190.623	551952.053	264.326
stn2	411208.460	552023.911	263.744
stn3	411115.395	551973.102	263.932
stn4	411228.822	552019.982	263.345
stn5	411278.836	551995.908	263.542

REVISIONS

REV.	DESCRIPTION	SURVEYED	DRAWN	DATE

JLP Surveying

JLP Surveying Consultants Ltd,
Suite 45 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL:- peterhouston@jlpsurveys.com

PROJECT
Consett
Durham

DRAWING TITLE
Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1 :200	A0	1	06.06.2022	

DRAWING NUMBER
S22-446

Appendix C: -

HR Wallingford – Greenfield Runoff Estimation

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Luke Edwards
Site name:	2023.120.A
Site location:	Consett, Durham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	54.86268° N
Longitude:	1.82765° W
Reference:	1922602233
Date:	Aug 14 2023 09:00

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.2789

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	749	749
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	1.46	1.46
1 in 1 year (l/s):	1.25	1.25
1 in 30 years (l/s):	2.55	2.55
1 in 100 year (l/s):	3.03	3.03
1 in 200 years (l/s):	3.45	3.45

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Luke Edwards
Site name:	2023.120.B
Site location:	Consett, Durham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	54.86234° N
Longitude:	1.82664° W
Reference:	2656090877
Date:	Aug 14 2023 09:01

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.6285

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	749	749
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	3.28	3.28
1 in 1 year (l/s):	2.82	2.82
1 in 30 years (l/s):	5.75	5.75
1 in 100 year (l/s):	6.83	6.83
1 in 200 years (l/s):	7.78	7.78

Appendix D: -

HR Wallingford – Surface Water Storage Estimation

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Luke Edwards
Site name:	2023.123.A
Site location:	Consett, Durham

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	54.86261° N
Longitude:	1.8277° W
Reference:	3612959744
Date:	Aug 14 2023 09:07

Site characteristics

Total site area (ha):	0.2789
Significant public open space (ha):	0
Area positively drained (ha):	0.2789
Impermeable area (ha):	0.2015
Percentage of drained area that is impermeable (%):	72
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.28
Net impermable area for storage volume design (ha):	0.21
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	61
Rainfall 100 yrs 12 hrs:	--	83.22
FEH / FSR conversion factor:	1.14	1.14
SAAR (mm):	749	749
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 10 year:	1.45	1.45
Growth curve factor 30 year:	1.75	1.75

Design criteria

Climate change allowance factor:	1.4		Growth curve factor 100 years:	2.08	2.08
Urban creep allowance factor:	1.1		Q_{BAR} for total site area (l/s):	1.46	1.46
Volume control approach	Use long term storage		Q_{BAR} for net site area (l/s):	1.46	1.46
Interception rainfall depth (mm):	5				
Minimum flow rate (l/s):	2				

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2.6	2.6
1 in 100 year (l/s):	3	3

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	129	129
Long term storage 1/100 years (m^3):	9	9
Total storage 1/100 years (m^3):	138	138

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Luke Edwards
Site name:	2023.120.B
Site location:	Consett, Durham

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	54.86232° N
Longitude:	1.82671° W
Reference:	690670658
Date:	Aug 14 2023 09:11

Site characteristics

Total site area (ha):	0.6285
Significant public open space (ha):	0
Area positively drained (ha):	0.6285
Impermeable area (ha):	0.5446
Percentage of drained area that is impermeable (%):	87
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.63
Net impermable area for storage volume design (ha):	0.56
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	61
Rainfall 100 yrs 12 hrs:	--	83.22
FEH / FSR conversion factor:	1.14	1.14
SAAR (mm):	749	749
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 10 year:	1.45	1.45
Growth curve factor 30 year:	1.75	1.75

Design criteria

Climate change allowance factor:	1.4		Growth curve factor 100 years:	2.08	2.08
Urban creep allowance factor:	1.1		Q_{BAR} for total site area (l/s):	3.28	3.28
Volume control approach	Use long term storage		Q_{BAR} for net site area (l/s):	3.28	3.28
Interception rainfall depth (mm):	5				
Minimum flow rate (l/s):	2				

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2.8	2.8
1 in 30 years (l/s):	5.7	5.7
1 in 100 year (l/s):	6.8	6.8

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	453	453
Long term storage 1/100 years (m^3):	86	86
Total storage 1/100 years (m^3):	539	539

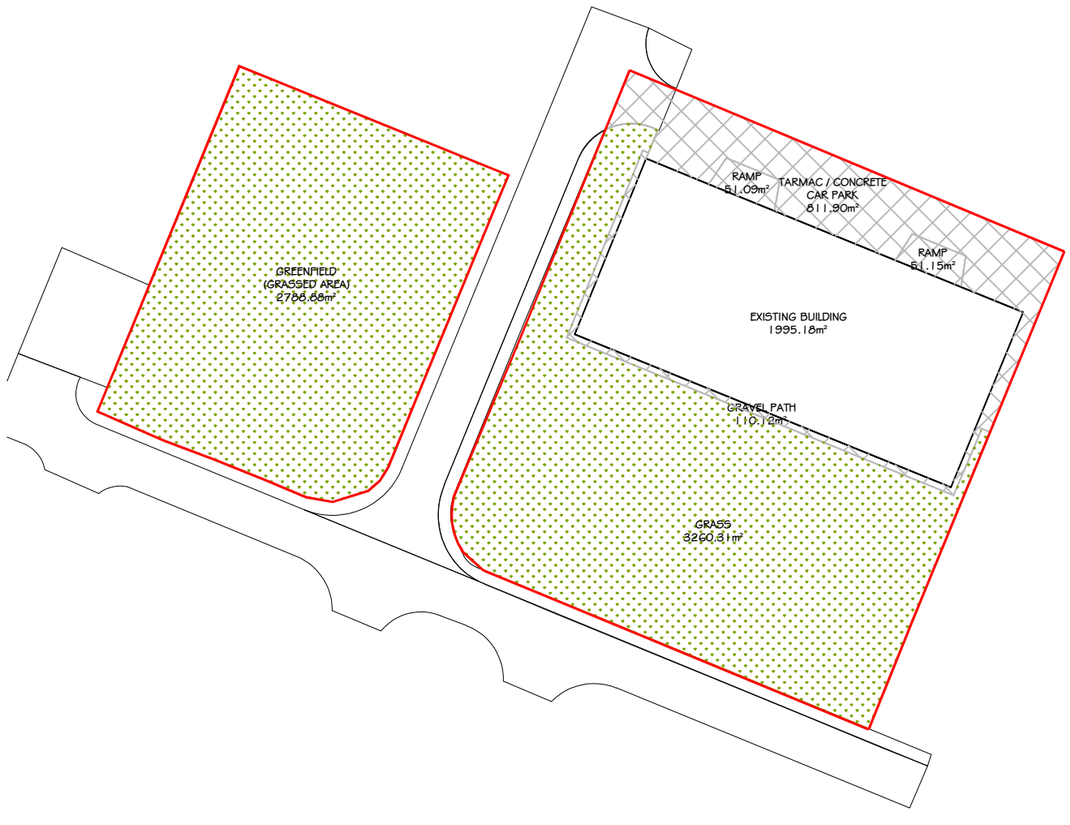
Appendix E: -

Drainage Areas – Pre and Post Development: 2023-120-C01

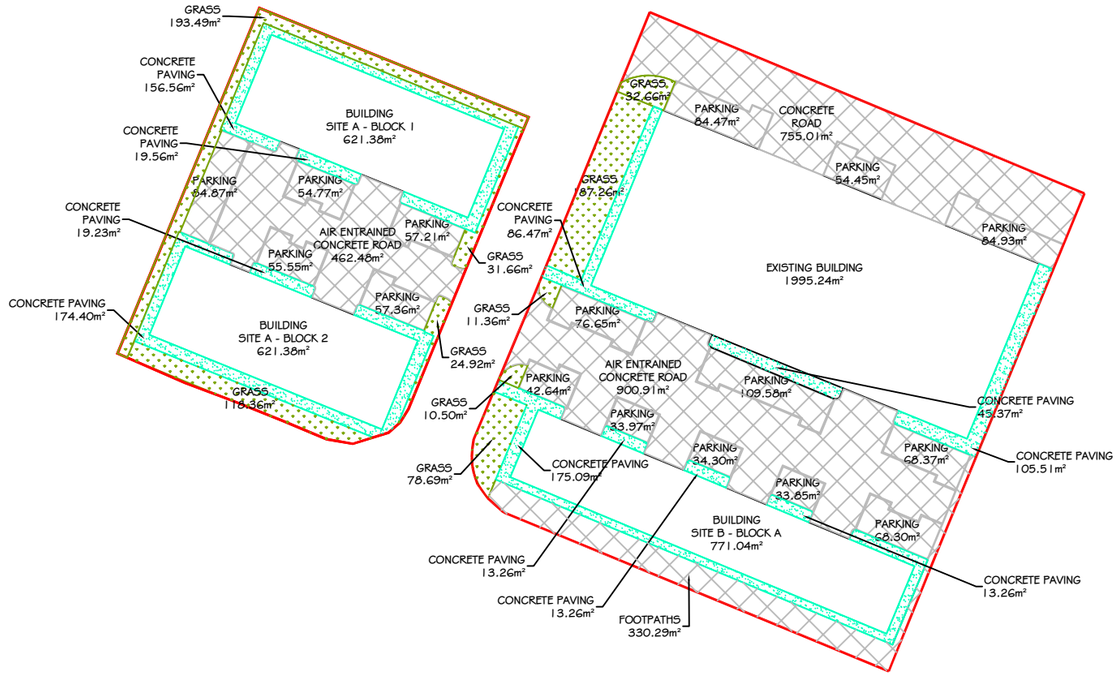
EXISTING SITE AREAS

IMPERMEABLE AREAS TABLE		
PARCEL No.	AREA (m²)	DESCRIPTION
1	1995.18	EXISTING BUILDING
2	811.90	TARMAC / CONCRETE CAR PARK
3	110.12	GRAVEL PATH
4	51.15	RAMP
5	51.09	RAMP
TOTAL	3019.44	33%

PERMEABLE AREA'S TABLE		
PARCEL No.	AREA (m²)	DESCRIPTION
51	3260.31	GRASS
52	2788.88	GREENFIELD (GRASSED AREA)
TOTAL	6049.19	67%



PROPOSED SITE AREAS



PERMEABLE AREA'S TABLE		
PARCEL No.	AREA (m²)	DESCRIPTION
60	193.49	GRASS
61	187.26	GRASS
62	175.09	CONCRETE PAVING
63	174.40	CONCRETE PAVING
64	156.56	CONCRETE PAVING
65	118.36	GRASS
66	105.51	CONCRETE PAVING
67	86.47	CONCRETE PAVING
68	78.69	GRASS
69	45.37	CONCRETE PAVING
70	32.66	GRASS
71	31.66	GRASS
72	24.92	GRASS
73	19.56	CONCRETE PAVING
74	19.23	CONCRETE PAVING
75	13.26	CONCRETE PAVING
76	13.26	CONCRETE PAVING
77	13.26	CONCRETE PAVING
78	11.36	GRASS
79	10.50	GRASS
80	103.95	GRASSED EDGES
TOTAL	1614.82	18%

IMPERMEABLE AREAS TABLE		
PARCEL No.	AREA (m²)	DESCRIPTION
11	1995.24	EXISTING BUILDING
12	900.91	AIR ENTRAINED CONCRETE ROAD
13	771.04	BUILDING SITE B - BLOCK A
14	755.01	CONCRETE ROAD
15	621.38	BUILDING SITE A - BLOCK 2
16	621.38	BUILDING SITE A - BLOCK 1
17	462.48	AIR ENTRAINED CONCRETE ROAD
18	330.29	FOOTPATHS
19	109.58	PARKING
20	84.93	PARKING
21	84.87	PARKING
22	84.47	PARKING
23	76.65	PARKING
24	68.37	PARKING

IMPERMEABLE AREAS TABLE		
PARCEL No.	AREA (m²)	DESCRIPTION
25	68.30	PARKING
26	57.36	PARKING
27	57.21	PARKING
28	55.55	PARKING
29	54.77	PARKING
30	54.45	PARKING
31	42.64	PARKING
32	34.30	PARKING
33	33.97	PARKING
34	33.85	PARKING
TOTAL	7459.12	82%

KEY / NOTES:

SITE BOUNDARY	
EXISTING BUILDINGS TO BE DEMOLISHED	
PROPOSED BUILDINGS (IMPERMEABLE)	BUILDING
ROADS AND FOOTPATHS (IMPERMEABLE)	
CAR PARKS (POROUS ASPHALT)	
FOOTPATHS (PERMEABLE PAVEMENTS)	
GRASS AND WILDFLOWERS (POROUS)	

REV.	DESCRIPTION	DRAWN	APPROVED	DATE

STATUS

GRAHAM SCHOFIELD ASSOCIATES
Consulting Civil and Structural Engineers
Suite 3 Balfour Court,
Leyland
PR25 2TF
tel: (01772) 459383
email: reception@gsa72.co.uk

GSA

client
NORTHERN TRUST COMPANY LTD

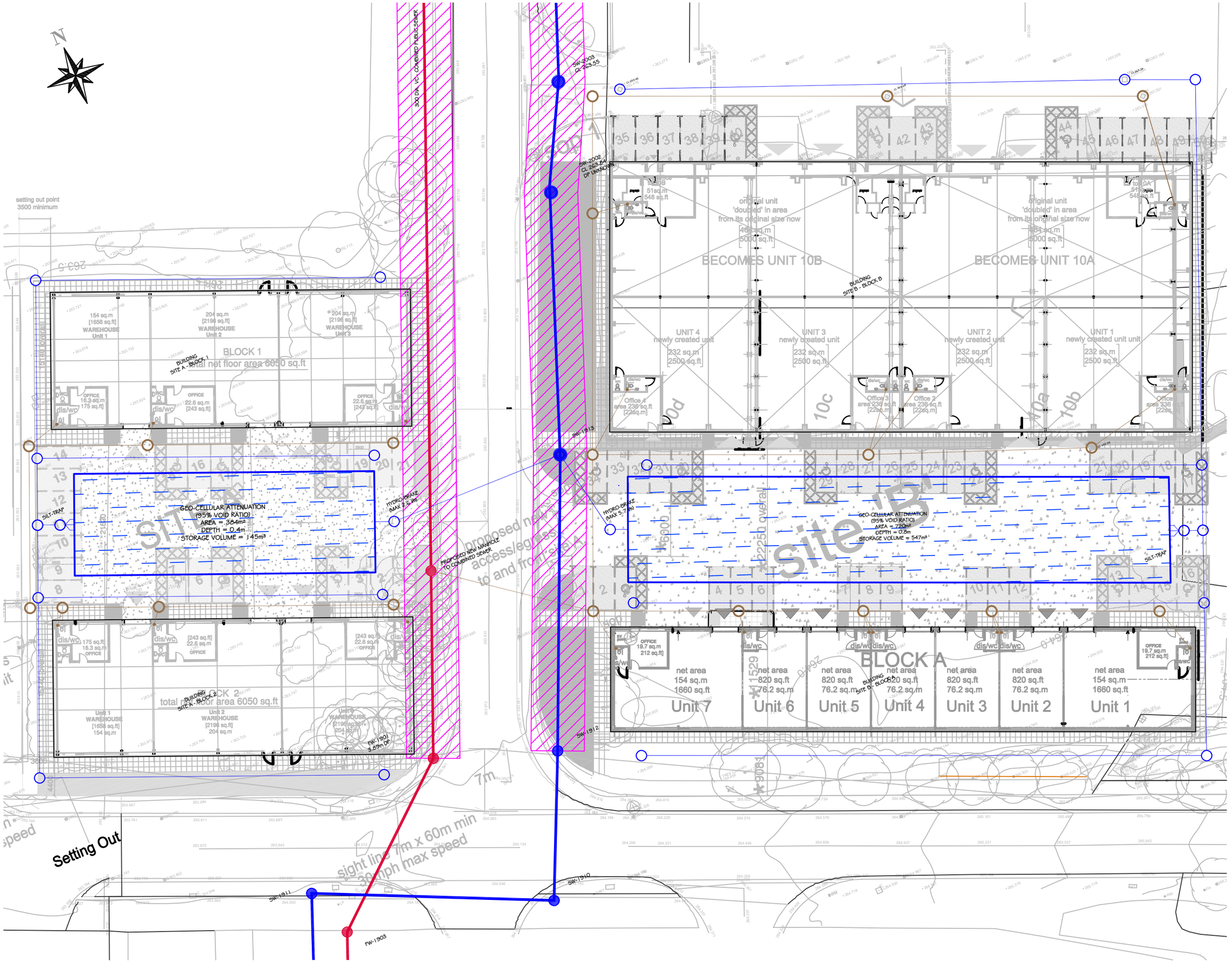
project
INDUSTRIAL DEVELOPMENT
NUMBER ONE INDUSTRIAL ESTATE
CONSETT, DURHAM DH8 6SZ

title
DRAINAGE AREAS
PRE AND POST DEVELOPMENT

drawn LE	checked GS	drawing number	
date 11/08/23	date 14/08/23	2023 - 120 - C01	
scale 1:500	A1		

Appendix F: -

Indicative Drainage Layout: 2023-120-C02



KEY / NOTES:

- SURFACE WATER SEWER / MANHOLE
- PRIVATE FOUL WATER DRAIN / MANHOLE
- PRIVATE SURFACE WATER DRAIN / MANHOLE
- RWP — RAIN WATER PIPE / DOWNSPOUT
- WC / WHB - WASTEWATER
- GY — NEW ROAD GULLY
- SURFACE WATER ATTENUATION GEO-CELLULAR STORAGE CRATES OR OVERSIZED PIPES
- 6m PUBLIC SEWER EASEMENT

REV.	DESCRIPTION	DRAWN	APPROVED	DATE

STATUS

PLANNING

GRAHAM SCHOFIELD ASSOCIATES
Consulting Civil and Structural Engineers
Suite 3 Balfour Court,
Leyland
PR25 2TF
tel: (01772) 459383
email: reception@gsa72.co.uk

GSA

client
NORTHERN TRUST COMPANY LIMITED

project
INDUSTRIAL DEVELOPMENT
NUMBER ONE INDUSTRIAL ESTATE
CONSETT, DURHAM DH8 6ST

title
INDICATIVE DRAINAGE LAYOUT

drawn LE	checked GS	drawing number	
date 15/08/23	date 15/08/23	2023 - 120 - C02	
scale 1:200	A1		