

TC/L9523/2020/03

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

AT

**Lakeside School
Naylor's Road
Liverpool
L27 2YA**

FOR

The Witherslack Group



Lakeside School, Naylor's Road, Liverpool, L27 2YA

REPORT VERIFICATION

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1 INTRODUCTION

1.1 Project Scope / Client Brief

Thomas Consulting has been commissioned by The Witherslack Group to carry out a site-specific flood risk assessment and drainage strategy report in accordance with the National Planning Policy Framework (NPPF) to support a planning application that fulfils the requirements of the Local Planning Authority, Lead Local Flood Authority and the Local Water Authority.

1.2 Site Location & Topography

The site is located at the Lakeside School, Naylor's Road, Liverpool, L27 2YA and the report is to support the upgrading, demolition and redevelopment of the barns surrounding the existing school. The approximate Ordnance Survey (OS) grid reference for the site is SJ 43770 89318 and the location of the site is shown on Figure 1.

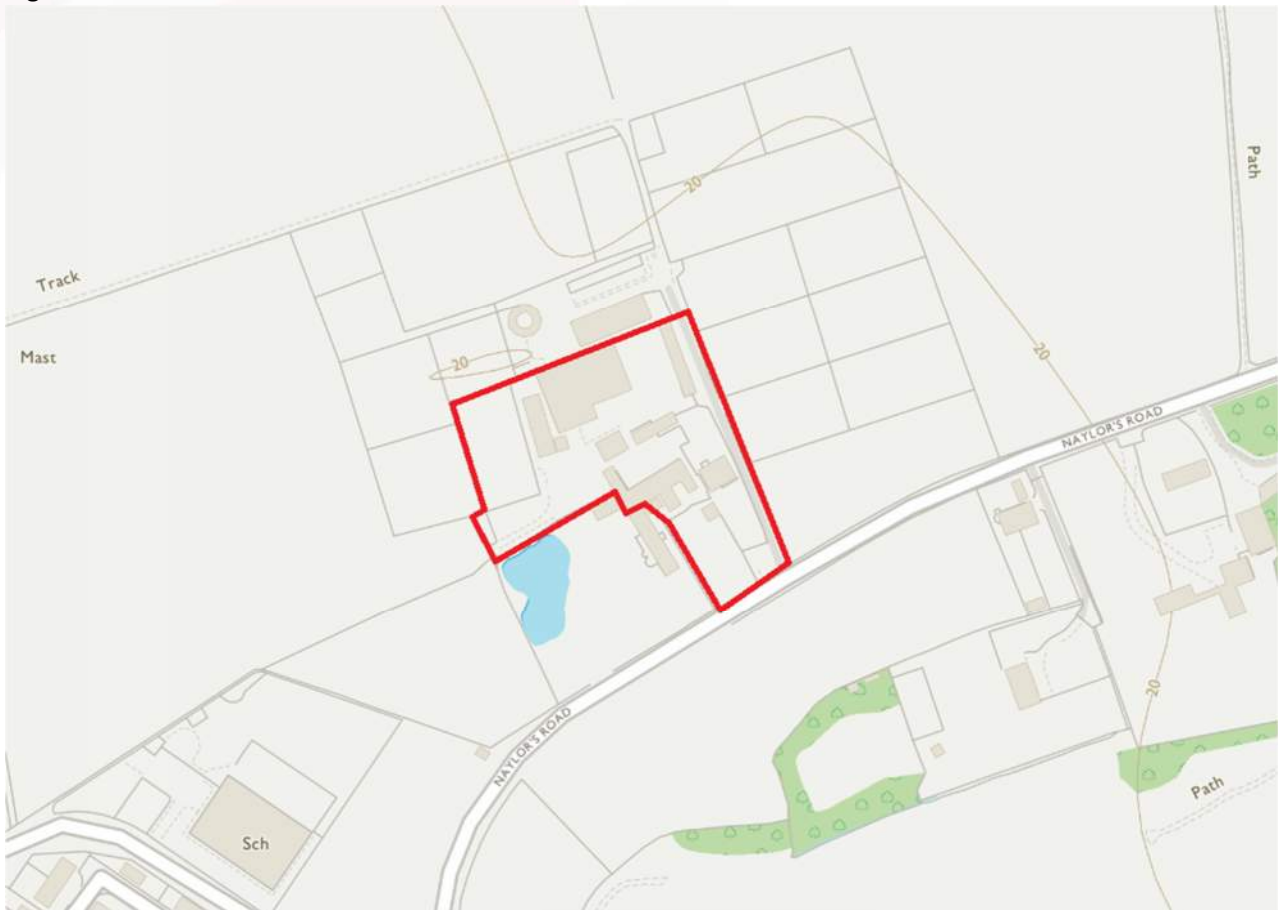


Figure 1: Site location plan (Source: OS Maps, 2020)

The development area covers a total area of approximately 1.12ha and comprises Wheathill Farm and House to the South East and Riding School/Barns to the north. The site is located approximately 1.15km east of the suburb Belle Vale and 0.8km north of Netherley. The site is generally flat by observation, a topographical survey was not provided at the time of writing this report. The site is currently made up of a mixture of hardstanding surfaces and landscaped areas, and is bound to the north, east and west by agricultural farm/green fields, and to the south by Naylor's Road.

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1.3 Development Class in terms of Planning

The NPPF and its Planning Practice Guidance (PPG) states any development other than the following outlined below is classed as a major development.

- Minor non-residential extensions: industrial/commercial/leisure etc extensions with a footprint less than 250 square meters.
- Alterations: development that does not increase the size of buildings e.g. alterations to external appearance.
- Householder development: For example, sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling e.g. subdivision of houses into flats.

1.4 Planning Policy

The NPPF and its PPG follows on to state a site-specific flood risk assessment is required for the following site proposals.

- A site proposed in Flood Zone 2 or 3 including minor development and change of use in development type to a more vulnerable class.
- More than 1 hectare (ha) in Flood Zone 1
- Less than 1 ha in Flood Zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
- In an area within Flood Zone 1 which has critical drainage problems as notified by the Environment Agency

1.5 Environment Agency Flood Map for Planning

National Planning Policy Framework (NPPF) Flood Zones comprise Flood Zone 1, Flood Zone 2 and Flood Zone 3. The Environment Agency's Indicative Flood Map for Planning (Figure 2) shows that the site is located within the NPPF defined Flood Zone 1.

Flood Zones are based on an areas Annual Exceedance Probability (AEP) of River or Sea Flooding. For example, Flood Zone 1 has a 'Low Probability' of flooding as it has an AEP of <0.1% (Less than 1 in 1000 year) of occurring in any one year. Flood Zone 2 has a 'Medium Probability' having an AEP of 0.1-1.0% (1 in 1000 – 1 in 100 year) chance of river flooding, or 0.1-0.5% (1 in 1000 – 1 in 200 year) chance of tidal/sea flooding.

Flood Zones 3 is split between 'a' and 'b' classifications. Flood Zone 3a has a 'High Probability' of flooding as it has an AEP of >1.0% (More than 1 in 100 year) chance of river flooding, or >0.5% (More than 1 in 200 year) chance of sea/tidal flooding. Flood Zone 3b (The Functional Floodplain) comprises land where water has to flow or be stored in times of flooding. Local planning authorities should identify in the Strategic Flood Risk Assessments areas of function floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map for Planning).

The extent of the flood zones do not take into account the presence of any formal flood defences, or other features which also act as informal flood defences.

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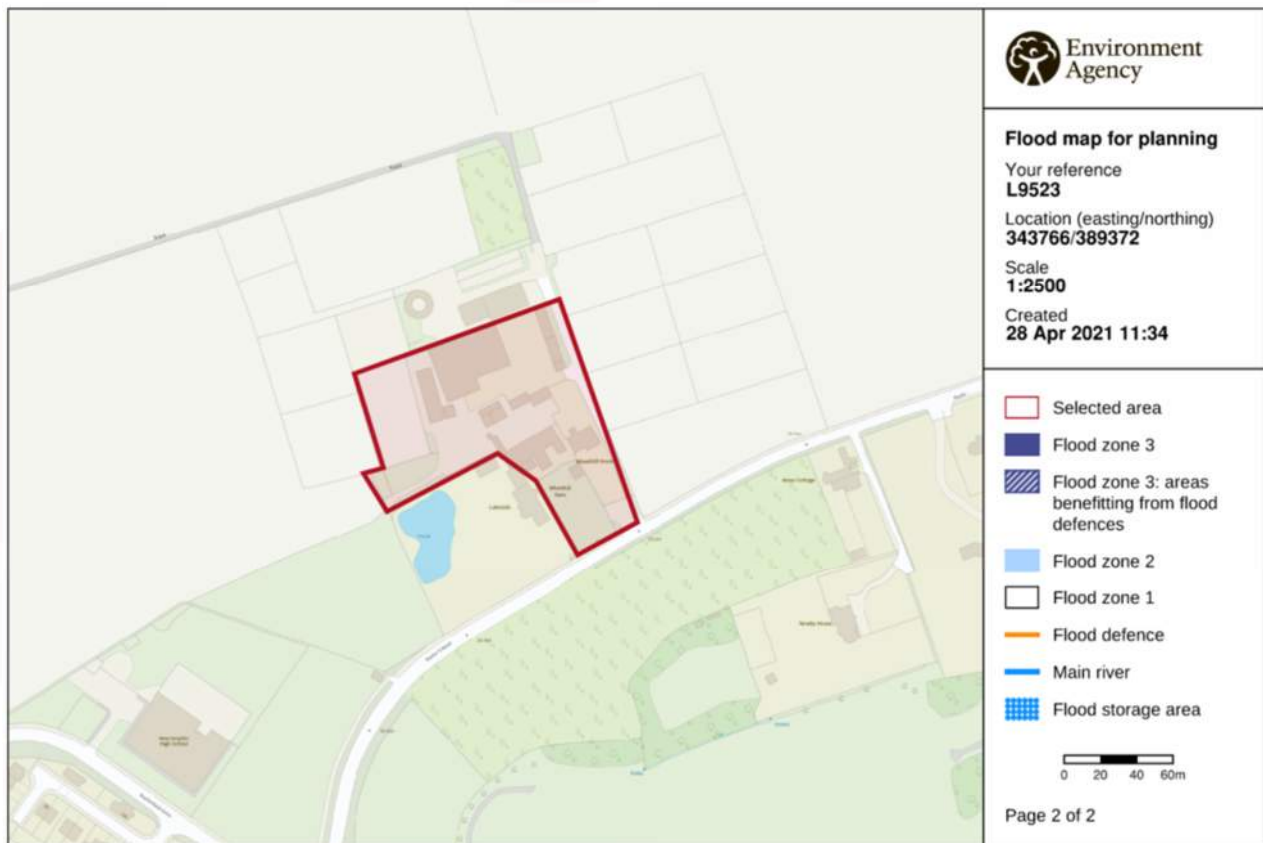


Figure 2: Environment Agency Flood Map for Planning (Source: Environment Agency, 2021, GOV.UK)

The NPPF is accompanied by the Planning Practice Guidance (PPG) documents which classifies each development into a vulnerability class, depending on the type of development, which are outlined in Figure 3. According to the PPG a School would fall under the “More Vulnerable” class. “More Vulnerable” developments are acceptable in Flood Zone 1 as shown in Figure 4.

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Vulnerability Classification	Development
Essential Infrastructure	- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk - Essential utility infrastructure, which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood - Wind turbines
Highly Vulnerable	- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operation during flooding. - Emergency dispersal points - Basement dwellings - Caravans, mobile homes and park homes intended for permanent residential use - Installations requiring hazardous substances consent
More Vulnerable	- Hospitals - Residential institutions such as residential care homes, children's homes, prisons and hostels. - Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. - Non-residential uses for health services, nurseries and education establishments. - Landfill and sites used for waste management facilities for hazardous waste. - Sites used for holiday or short let caravans and camping, subject to a specific warning and evacuation plan
Less Vulnerable	- Police, ambulance and fire stations which are NOT required to be operational during flooding. - Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distributions; non-residential institutions not included in the 'more vulnerable' class; and assemble and leisure. - Land and buildings used for agriculture and forestry - Waste treatment (except landfill & hazardous waste facilities) - Minerals working & processing (except for sand & gravel working) - Water treatment works which do not need to remain operational during times of flood - Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development	- Flood control infrastructure - Water transmission infrastructure & pumping stations - Sewage transmission infrastructure & pumping stations - Sand & gravel working - Docks, marinas and wharves - Navigation facilities - Ministry of Defence installations - Ship building, repairing & dismantling, dockside fish processing & refrigeration & compatible activities requiring a waterside location - Water based recreation (excluding sleeping accommodation) - Lifeguard and coastguard stations - Amenity open space, nature conservation & biodiversity, outdoor sports and recreation and essential facilities such as changing rooms - Essential ancillary sleeping or residential accommodation for staff required by uses in this category subject to a specific warning & evacuation plan.

Figure 3: NPPF Flood Risk Vulnerability Classification (Source: National Planning Practice Guidance, 2014)

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

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Figure 4: NPPF Flood Risk Vulnerability Classification (Source: National Planning Practice Guidance, 2014)

1.6 Proposed Development in context of Planning

The site is located within Flood Zone 1 but is classed as a Major Development due to being over 1ha in size. As this is the case a brief flood risk assessment is required with more emphasis based on the drainage strategy.

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2 SITE CHARACTERISTICS

2.1 Site Geology & Hydrogeology

British Geological Survey (BGS) and Land Information Systems (LandIS) mapping indicates the site is underlain by the geology sequences outlined in Table 1.

Geological Layer	Classification	Description	Aquifer Class
Soil	Soilscape 18	Loamy and Clayey	Impeded Drainage
Superficial (Drift)	Till	Devensian – Diamicton	Secondary (Undifferentiated)
Bedrock (Solid)	Wilmslow Sandstone Formation	Sandstone	Principle

Table 1: Site Geological Summary

Principal Aquifers - These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.

Secondary A Aquifers - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Secondary B Aquifers - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary (Undifferentiated) Aquifers - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Magic Maps document DEFRA/EA information on Drinking Water, Source Protections and Groundwater Vulnerability. The maps indicate the following:

- Drinking Water Protected Area = N/A
- Drinking Water Safeguard Zone (Surface Water) = N/A
- Drinking Water Safeguard Zone (Groundwater) = N/A
- Source Protection Zone = Located within Zone 3 (Total Catchment)
- Groundwater Vulnerability Map = Medium – Low

Drinking Water Protected Areas (Surface Water) are, within the Water Framework Directive, where raw water is abstracted from rivers and reservoirs. Raw water needs to be protected to ensure that it is not polluted which could lead to additional purification treatment. To do this water companies and the Environment Agency identify raw water sources that are 'at risk' of deterioration which would result in the need for additional treatment. These zones are areas where the land use is causing pollution of the raw

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water. Action is targeted in these zones to address pollution so that extra treatment of raw water can be avoided. This data includes what substances are causing the drinking water protected area to be 'at risk'.

Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water), which are at risk of failing the drinking water protection objectives. These non-statutory Safeguard Zones are where action to address water contamination will be targeted, so that extra treatment by water companies can be avoided. Safeguard Zones are a joint initiative between the Environment Agency and water companies. Safeguard Zones are one of the main tools for delivering the drinking water protection objectives of the Water Framework Directive. This data includes what substances are causing the drinking water protected area to be 'at risk'.

Drinking Water Groundwater Safeguard Zones (SgZs) are established around public water supplies where additional pollution control measures are needed. The Water Framework Directive requires that Drinking Water Protected Areas are identified (WFD Article 7.1) and that they are given the necessary protection (WFD Article 7.3) with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required in the production of drinking water.

The geometry of Groundwater Safeguard Zones are based on Groundwater Source Protection Zones (SPZs), usually the SPZ 2, and use additional assessment to identify areas, which may or may not coincide with the SPZ, where additional measures are required to ensure that abstraction waters meet Article 7.3 of the WFD. SgZs can be large or small depending on the pollution problem and may not cover the whole of a catchment or sub-catchment.

Source Protection Zones have been created as public facing outlines where common boundaries and overlaps (based on zone number) have been removed. Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction. This is part of an initial screening process in assessing impacts to groundwater resources. Zones around location sites are defined by groundwater travel time to an abstraction. This is determined through applying Environment Agency groundwater flow models run at the location of abstractions, inputting parameters such as flow direction, geology type, rainfall and hydrological boundaries. SPZs provide a visual representation of the increased risks as you get closer to the abstraction.

The following subdivisions are defined within SPZs:

Zone 1: (Inner Protection Zone) - This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. Additionally, the zone has as a minimum a 50-metre radius. It is based principally on biological decay criteria and is designed to protect against the transmission of toxic chemicals and water-borne disease.

Zone 2: (Outer Protection Zone) - This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction. The travel time is derived from consideration of the minimum time required to provide delay, dilution and attenuation of slowly degrading pollutants.

Zone 3: (Total catchment) - This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

Some zones have been extended to include areas where there is protective geology cover, such as clay. This is because activities below the surface, such as deep drilling, could create pathways for pollutants to enter the groundwater. The SPZ maps show them as zones 1c, 2c and 3c.

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A further Zone 4, or 'Zone of Special Interest' is occasionally defined for some groundwater sources. These zones highlight areas (mainly on non-aquifers) where known local conditions mean that potentially polluting activities could impact on a groundwater source, even though the area is outside the normal catchment of that source.

As the site is located in a source protection zone and is in a Medium – Low Groundwater Vulnerability location the EA should be consulted following a planning decision to determine any additional treatment methods required to surface water drainage leaving the site which may potentially impact natural stratus. The EA may provide these comments/conditions as a statutory consultant at the planning application stage.

2.2 Existing Watercourses

According to the EA Main River Maps the closest known watercourse is 0.5km west from the site. This watercourse is unnamed. Netherley Beck is also situated 0.75km east of the site. Neither are close enough to utilise as a discharge point.

2.3 Existing Sewers

Reference to the detailed United Utilities (UU) sewer records (included in Appendix A), indicates that there are numerous sewers within Naylor's Road to the south of the site, with no sewers directly crossing the site boundary.

- Unknown Size Surface Water Sewer – Located directly south of the site's pond. Running in a westerly direction.
- 225mm Surface Water Sewer – Located within Naylor's Road to the south of the site running in a southerly direction.
- 300mm Combined Sewer – Located directly south of the site's pond. Running in a westerly direction.

It is clear that the existing UU records are incomplete, as some of the sewers have not been surveyed through their full extents. However, as detailed records have been obtained, connection levels have been made available.

2.4 Ground Conditions

Ground investigations have not been completed during the time of writing this report.

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3 ASSESSMENT OF FLOOD RISK

3.1 Flood Risk Terminology

Flood risk considers both the probability and consequence of flooding. Flood events are often described in terms of their probability of recurrence or probability of occurring in any one year. The threshold between a medium flood and a large flood is often regarded as the 1 in 100-year event. This is an event which statistical analysis suggests will occur on average once every hundred years. However, this does not mean that such an event will not occur more than once every hundred years. Table 2 shows the event return periods expressed in years and annual exceedance probabilities as a fraction and a percentage. For example, a 1 in 100-year event has a 1% probability of occurring in any one year, i.e. a 1 in 100 probability. A 1000-year event has a 0.1% probability of occurring in any one year, i.e. a 1 in 1000 probability.

Return Period (Years)	Annual Exceedance Probability (AEP)	
	Fraction	Percentage
2	0.5	50%
10	0.1	10%
25	0.04	4%
50	0.02	2%
100	0.01	1%
200	0.005	0.5%
500	0.002	0.2%
1000	0.001	0.1%

Table 2: Flood return periods and exceedance probabilities

3.2 Fluvial Flood Risk

The site is not located in proximity to a main river. The nearest main river/watercourse is 0.5km west from the site and possesses no flood risk to the site. The Flood Zone 1 outline in Figure 2 and the Fluvial Flood Map in Figure 5 indicates the site is not at risk of fluvial flooding.

The fluvial flood map in Figure 4 shows areas that may be at risk of fluvial flooding from rivers or the sea. High risk is a >3.3% Annual Exceedance Probability (AEP) event, meaning this area has a chance of flooding of greater than 1 in 30 years (dark blue). This takes into account the effect of any flood defences in the areas. However, these defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. Medium risk is an AEP event of between 3.3-1% (1 in 30 - 1 in 100 - year, blue) chance of flooding. Low risk is an AEP event of between 1-0.1% (1 in 100 – 1 in 1000 year, light blue) chance of flooding. Very Low risk is an AEP event of <0.1% (Less than 1 in 1000 year, white) chance of flooding.

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The Flood Map shows the current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences. The potential impact of climate change is not considered by the mapping.

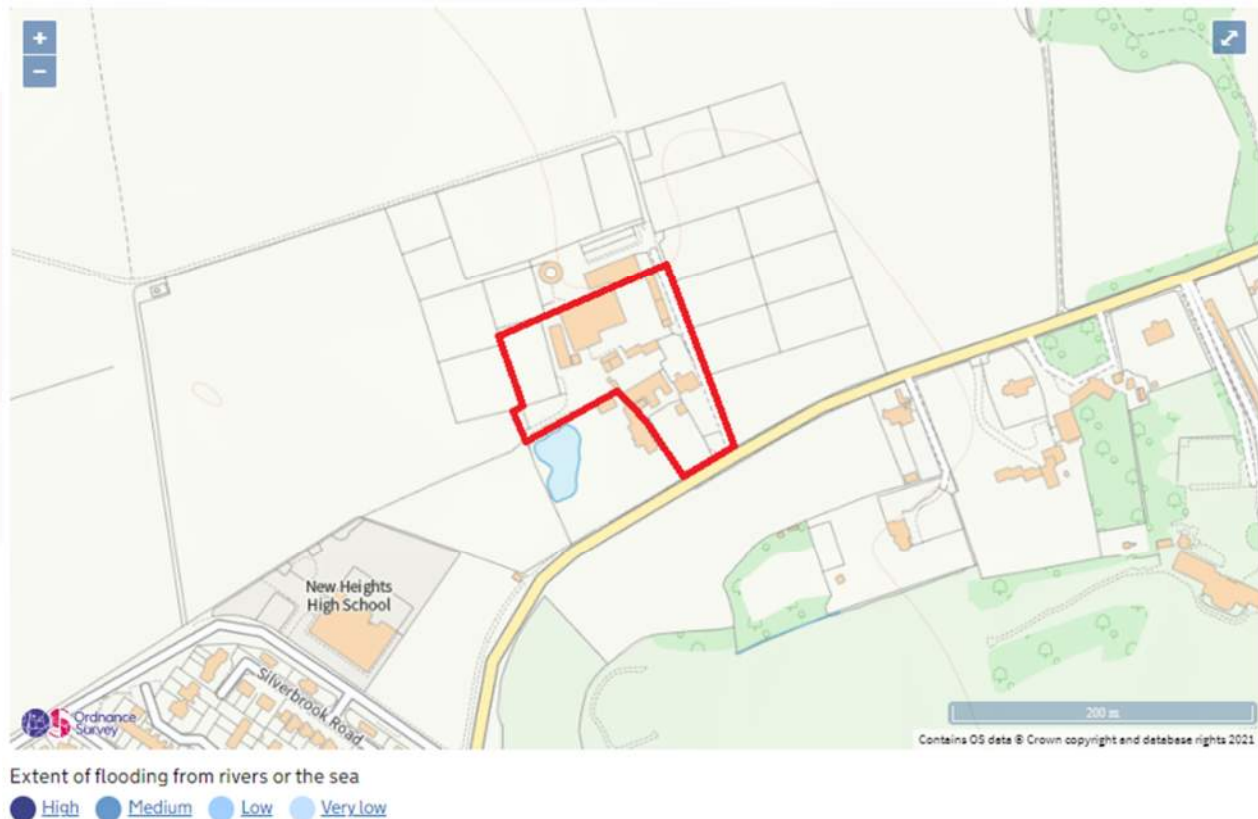


Figure 5: Environment Agency Fluvial Flood Map (Source: Environment Agency, 2020, GOV.UK)

3.3 Surface Water Flood Risk

The EA have mapped areas prone to surface water flooding based on historic flooding information received from the lead local flood authorities and modelling based on a LiDAR/IfSAR digital terrain model, Ordnance Survey information on urban areas and a direct rainfall approach using Flood Estimation Handbook (FEH) methodology. The critical (worst case) of the 1,3 and 6-hour storm durations have been mapped with no areal reduction factor applied. No allowance is made for climate change, the mapping therefore indicates the current predicted flood risk.

The maps work in the same colour coding as described above for the fluvial maps where High Risk AEP events are displayed in Dark Blue, Medium Risk in Blue, Low Risk in Light Blue and Very Low Risk in White. The maps do not account for culverts/underground drainage and due to digital terrain model resolutions may also underestimate or omit small drainage channels/ditches. Figure 6 shows the resulting predicted flood risk from surface water.

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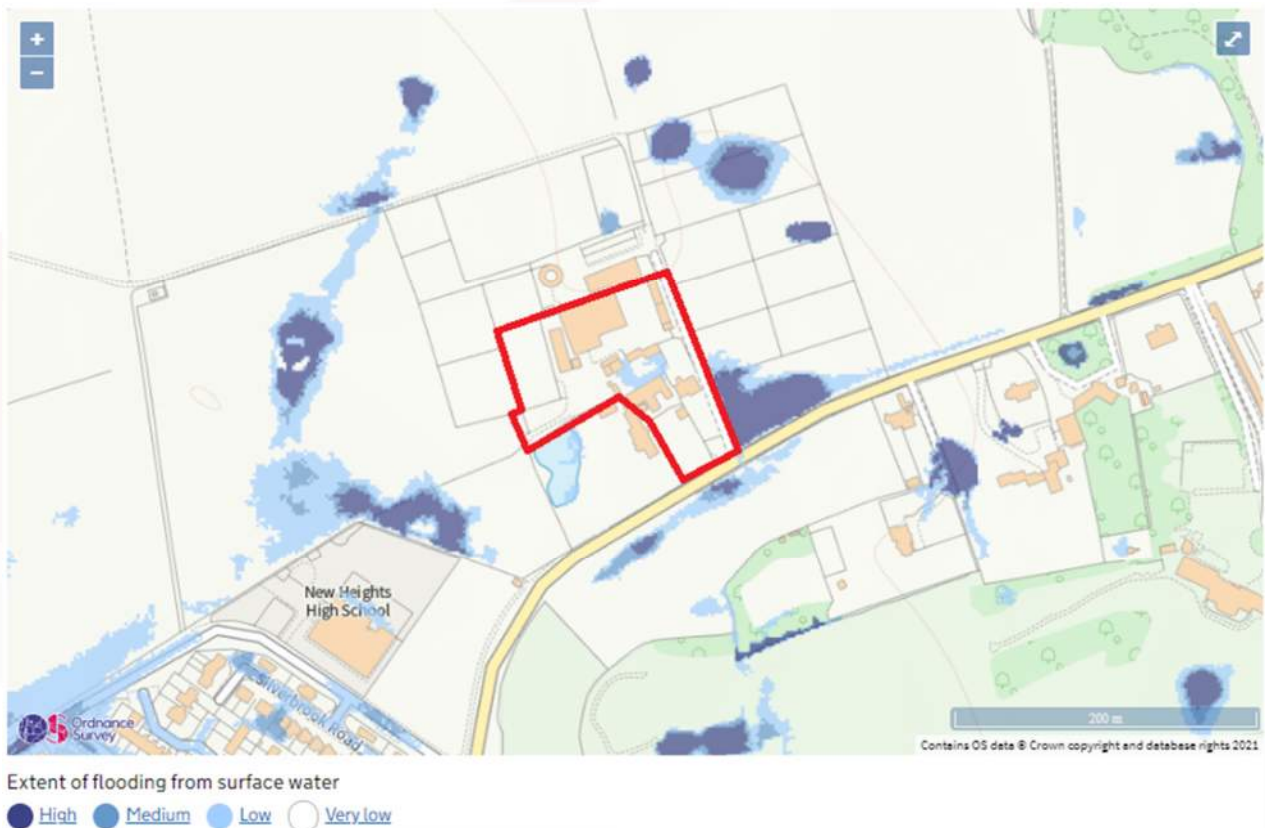


Figure 6: Environment Agency Surface Water Flood Map (Source: Environment Agency, 2020, GOV.UK)

The EA surface water flood map indicates the site is predominantly not at risk of surface water flooding. A small area of the site which is currently unused and backs onto the existing school is shown to be at 'Low' risk with a predicted chance of flooding of between 1 in 1000 year (0.1% AEP) and 1 in 100 year (1% AEP). This area is likely to be affected due to lack of existing drainage therefore the general redevelopment of this area and the inclusion of drainage should provide a betterment.

Figure 7 & Figure 8 show the low risk depth is between 900mm - <300mm with the direction of flow heading into the existing pond and away from the existing school building. Figure 9 shows the area of high risk adjacent to boundary has a direction of flow away from the site.

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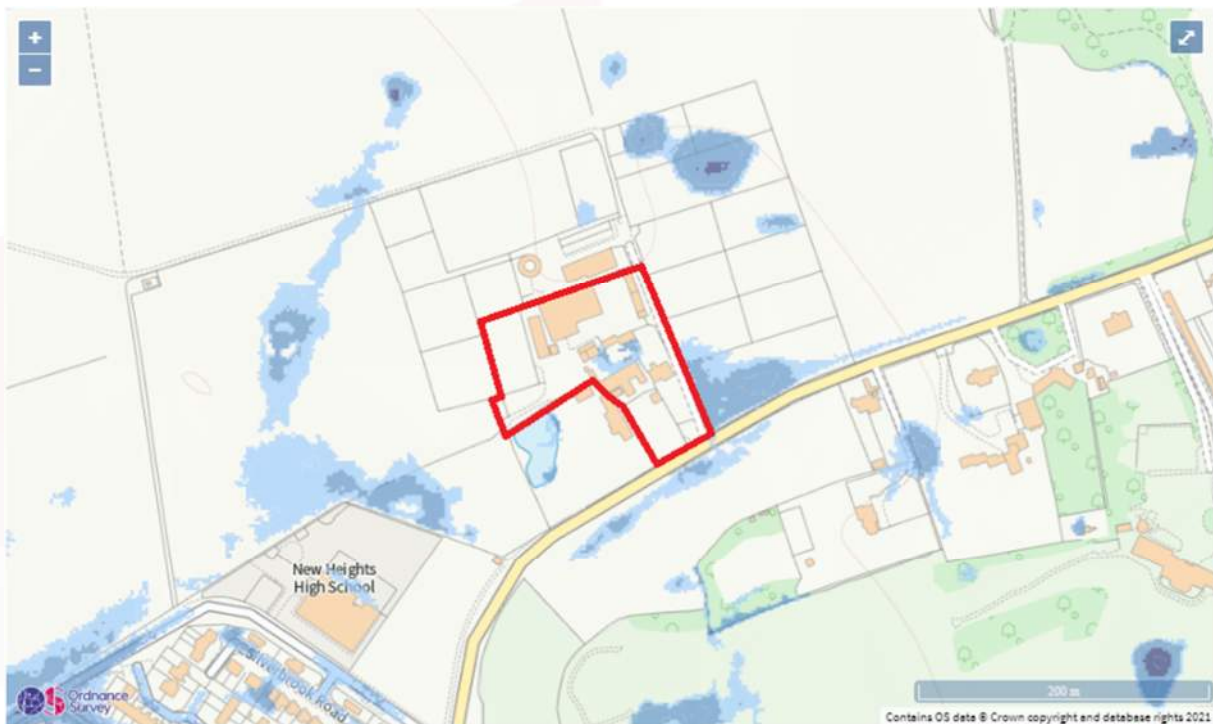


Figure 7: Environment Agency Surface Water Flood Risk: Low Risk Flood Depth Map (Source: Environment Agency, 2020, GOV.UK)



Figure 8: Environment Agency Surface Water Flood Risk: Low Risk Flood Velocity Map (Source: Environment Agency, 2020, GOV.UK)

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3.4 Groundwater Flood Risk

A Level 1 Strategic Flood Risk Assessment (SFRA) was completed by JBA Consulting for Liverpool City Council in January 2018 this report states in section 5.4 (Page 39) that Liverpool has no records of historic groundwater flooding.

A Level 1 SFRA was completed by Atkins for Knowsley and Sefton Metropolitan Borough Councils in June 2009 this report in section 3.6.5 (Page 32) refers to Groundwater Emergence Maps in Appendix E of their report, which is also referenced by the Level 2 SFRA completed by Capita Symonds in October 2012, who goes on to states that in exceptionally wet winters, groundwater may be expected to rise close to the ground surface. This is most likely to happen in areas of low-lying areas such as Knowsley Brook, Kirkby Brook and Croxteth Brook. The River Alt, Netherly Brook and Bowring Park are also areas of concern.

As per Section 2.2 of this report states the site is located 0.75km west of Netherly Beck which has associated flood risk not affecting the site. Therefore, it is assumed groundwater flood risk would be in continuity of this fluvial risk. It is recommended that when boreholes are conducted across the site that groundwater strikes are identified and recorded if applicable.

3.5 Flooding from Artificial Sources

The Reservoir Flood Map which can be seen in Figure 10, indicates the maximum extend of flooding from reservoirs highlighted in light blue. As can be seen the site is not at risk of flooding from reservoirs and has no other canals or artificial sources nearby that pose any risk of flooding.

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Figure 10: Environment Agency Reservoir Flood Map (Source: Environment Agency, 2020, GOV.UK)

3.6 Flooding from Sewers

UU do not provide information on flood risk from their assets. As discussed in Section 2.3, UU Sewers records (included in Appendix A) indicate that there are no sewers crossing the site.

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4 FLOOD MITIGATION

4.1 Summary of Flood Risk

There is no known risk of flooding from fluvial sources, groundwater, sewers or artificial sources and reservoirs. It is considered there is to be a low risk of flooding from surface water sources and therefore it is recommended that mitigation measures are not necessary in this respect for the proposed development. However, with the low threat of surface water flooding near the pond and to the rear of the school careful consideration of the use of drainage in this area will mitigate the issues most likely associated the existing lack of drainage.

Source of Flood Risk	Predicted Flood Risk (AEP, %)	Interpreted Risk Classification	Justification
Fluvial	<0.1%	Very Low	As predicted by EA
Tidal	<0.1%	Very Low	As predicted by EA
Surface Water	0.1 – 1%	Low	As predicted by EA
Groundwater	N/A	Very Low	SFRA's and continuity of Fluvial Risk
Artificial Sources	N/A	Very Low	As predicted by EA and observation of sources on OS Maps
Sewer	N/A	Very Low	Review of Sewer Maps

Table 3: Flood return periods and exceedance probabilities

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5 SURFACE WATER DRAINAGE STRATEGY

5.1 Site Areas

The total development area is 1.12ha (11,225m²). To prepare the exploration of options for site drainage, the spatial extent of existing approximate land cover and proposed estimated land cover area on the site have been assessed in Table 4 and Table 5. As can be seen, resulting from the proposed development is a 16% increase in impermeable area therefore, a 30% betterment over the pre-development QBar runoff shall be made and restricted across all post-development return periods as can be seen in Table 6.

Table 4: Existing Approximate Land Cover Areas

Land Cover	Area		Percentage of total site area
	m ²	Ha	
Total impermeable area	3,465	0.347	31%
Remaining permeable area	7,760	0.776	69%

Table 5: Proposed Estimated Land Cover Areas

Land Cover	Area		Percentage of total site area
	m ²	Ha	
Total impermeable area	5,295	0.530	47%
Remaining permeable area	5,930	0.593	53%

5.2 Rate of Runoff Assessment

Full details of the calculations and the methodology for deriving the Peak Rate of Runoff are included in Appendix B. A summary of the results is included in Table 6 below.

Table 6: Surface Water Rate of Runoff

Peak Rate of Runoff (l/s)				
Event	Greenfield	Pre-Development Brownfield	Un-Restricted Post-Development Brownfield	Proposed Restricted 30% Reduction on Pre-Dev Brownfield QBar
Q1	5.9	37.1	56.7	38.3
QBAR	6.7	54.7	83.6	38.3
Q10	9.3	74.2	113.4	38.3
Q30	11.5	91.1	139.2	38.3
Q100	14.0	117.9	180.2	38.3
Q100 + 40% CC	18.2	165.1	252.3	38.3

5.3 Surface Water Disposal

Surface water disposal has been considered in line with the SuDS Hierarchy outlined in CIRIA Report 753 - The SuDS Manual_V6. The approach considers infiltration drainage in preference to disposal to a watercourse, in preference to a positive discharge to the public sewer network.

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5.4 Surface Water Drainage Design Parameters

The surface water drainage system will be designed considering the following parameters using the modified rational method and a generated rainfall profile:

5.4.1 Rainfall Model

The calculations will use the most up to date available catchment descriptors (2013) provided by the Centre for Ecology and Hydrology Flood Estimation Handbook (FEH) web service.

5.4.2 Volumetric Runoff Coefficient (Cv)

The volumetric runoff coefficient describes the volume of surface water which runs off an impermeable surface following loss due to infiltration, depression storage, initial wetting and evaporation. The coefficient is dimensionless. Default industry standard volumetric runoff coefficients are 0.75 for summer and 0.84 for winter.

5.4.3 Percentage Impermeability (PIMP)

The percentage impermeability (PIMP) for all impermeable areas is modelled as 100%. The entirety of the impermeable areas is therefore assumed to be positively drained.

5.4.4 Design Infiltration Rate

As stated in Section 2.4 ground investigations have not been completed at the time of writing this report. However, it has been assumed infiltration methods shall be unachievable given the existing natural pond on site, most likely provided by the till soil stratum which is a Secondary (Undifferentiated) aquifer explained within Section 2.1 of this report. Following ground investigations, if infiltration methods are proven achievable these will be given preference over positive drainage methods or used in tandem if rates show Type B (partial infiltration) methods are viable.

5.4.5 Climate Change

Projections of future climate change indicate that more frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall are likely to occur over the next few decades in the UK. These future changes will have implications for river flooding and local flash flooding. These factors will lead to increased and new risks of flooding within the lifetime of planned developments.

In February 2016, new climate change guidance issued by the Environment Agency came into effect outlining the anticipated changes in extreme rainfall intensity.

Table 7 shows anticipated changes in extreme rainfall intensity in small and urban catchments. Guidance states that for site-specific flood risk assessments and strategic flood risk assessments, both the central and upper end allowances should be assessed to understand the range of impacts. A climate change allowance of 40% has been selected for the purpose of drainage design based on the 100-year anticipated design life of the proposed development. This intermediate figure has been selected as the development is based on a pre-developed brownfield site. No properties are located immediately downstream of the site and therefore the site poses low risk to neighbouring property.

Lakeside School, Naylor's Road, Liverpool, L27 2YA

Table 7: Peak Rainfall Intensity Allowance in Small and Urban Catchments (use 1961 to 1990 baseline)

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

5.5 Consideration of SuDS Components

A full range of SuDS components and techniques have been considered for the development of the site and their applicability to the site is discussed below.

- **Green Roofs** - Discounted due to limited of water volume retention on an existing brownfield site.
- **Soakaways** – BGS records and soil values initially indicate the ground conditions are not suitable for infiltration-based SuDS and the presence of the natural pond to the south west of the site indicates there are protective clay layers, therefore soakaway systems would not be effective.
- **Water Butts** – Not suitable for a site of this size or occupation. A school is not always occupied and therefore, water butts could over spill and cause localised flooding if not emptied regularly.
- **Permeable Paving** – As explained above, underlying ground conditions are assumed to be not suitable for infiltration-based SuDS and therefore widely used permeable block paving systems would not be effective.

The car park located to the north of the site is proposed to be formed with a grasscrete product. Although it is not confirmed if infiltration will be viable. If not, this area will be allowed to pond if necessary as it will only be used as an overflow car park and can be formed so to contain water during heavy rainfall periods and closed off to public use.

The remaining access road and parking bays leading to the overflow on the eastern side of the site could utilise a sub-base replacement system or granular storage method which could be positively drained whilst providing initial storage. If infiltration methods are proven viable this can be re-evaluated so that the same permeable paving system is utilised but rather than being positively drained can be designed so that surface water is directed to the underlying sub-strata.

- **Ponds** – Discounted to due increased maintenance requirements. There is already a pond located on the existing lakeside site to the west, providing surface water storage and ecological benefits.
- **Geocellular Storage Tanks** – Will be considered as a primary storage feature for roof runoff and a possible secondary storage option for paved/road area in either open spaces or as a sub-base replacement device for a permeable paving system.

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5.6 Surface Water Drainage Proposals

Based on the above assessment the following SuDS techniques are to be investigated:

- Permeable Paving System
- Geocellular Storage Tanks
- Hydro-Brake/Restricted Outfall

The SuDS are to be designed and sized to contain a future 1% AEP event of critical duration with a future climate change (40%) allowance accounted for. As outlined in Section 5.1, impermeable areas are to increase by 16% following the completion of the proposed development. Therefore, it has been proposed that runoff leaving the site is to be restricted to a 30% reduction of the pre-development brownfield QBar runoff rate across all post-development return periods, providing a significant betterment to site runoff.

Ground investigations have not been carried out at the time of writing this report. However, it has been assumed that the ground does not possess appropriate infiltration properties to consider permeable drainage methods. This is reinforced by the presence of an existing on-site pond and numerous surface water public sewers within the vicinity of the site.

Two points to be noted are as follows:

- 1) The existing school area to the south west is to remain as existing. Therefore, the drainage properties/methods associated with this area will not be altered.
- 2) The car park located to the north of the site is to act as an overflow carpark and will be constructed from grasscrete. If infiltration methods are not proven viable a kerb will be associated with this car park to contain any ponding that may occur during heavy rainfall events, with public/staff access being disallowed during such events.

Therefore, it is proposed that the entirety of the remaining proposed roof areas are to be positively drained via rainwater downpipes, whilst the runoff from newly formed paved areas are to be collected via a combination of gullies and channel drains into a below ground drainage network.

The newly formed access road and associated parking bays to the east of the site will also be drained via either a combination of gullies and channel drains or via a Type C (Impermeable/Positively Drained) Permeable Paving system directed into a below ground drainage system providing initial sediment control.

If infiltration methods are proven viable following ground investigations, then these areas can be re-evaluated so that surface water runoff is directed towards the underlying sub-strata. However, upon initial assessment it is assumed infiltration methods will be unsuccessful.

Runoff will be directed by the below ground drainage system towards the south of the site, where it will be restricted and stored via SuDS devices prior to it being sent off site to the public sewer network. An initial storage estimate has been completed and between 135-225m³ of storage will be required on site. Although this is a broad figure, it can easily be stored within the grounds of the site. The targeted UU manhole is referenced 8201 (See Figure 11) and has a cover level of 62.60 and a invert level of 58.18 giving it a total depth of 4.42m which is easily accessible following the installation of SuDS etc.

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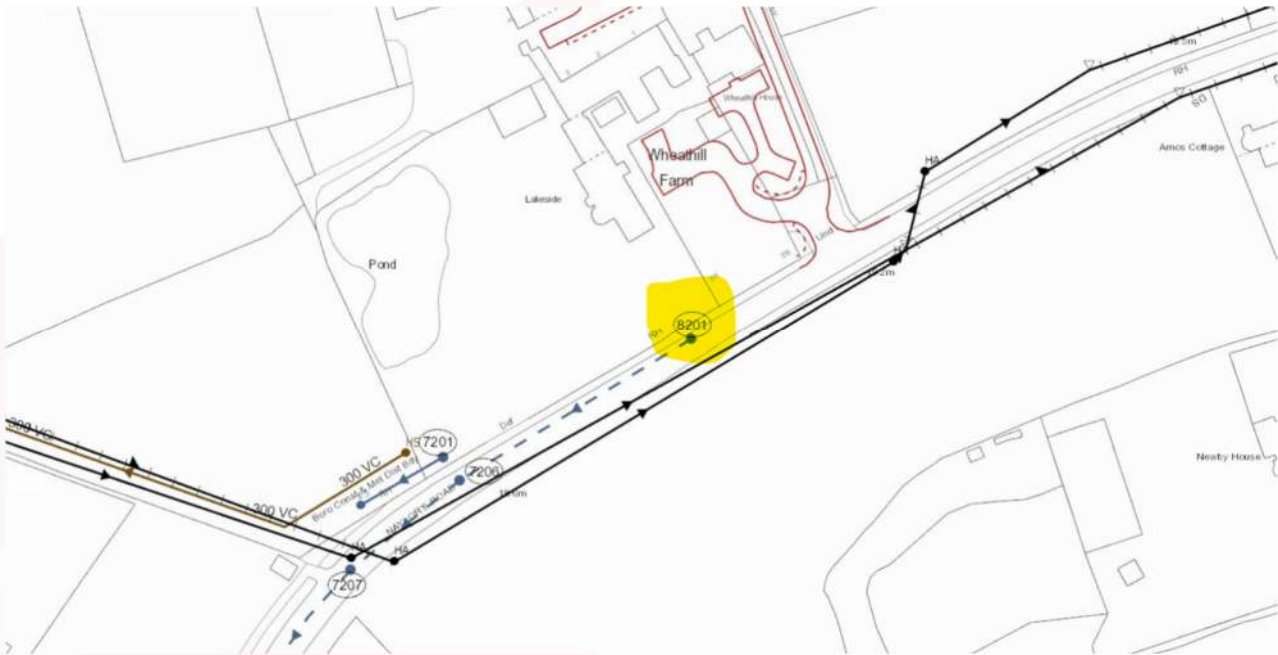


Figure 11: Clip from UU Detailed Sewer Records located in Appendix A (Source: United Utilities, 2021)

It will be assumed a 30% reduction will be satisfactory due to the density of the existing buildings on the brownfield site, unless stated otherwise by the LLFA and UU as statutory consultees at the planning application review.

5.7 Designing for Local Drainage System Failure

In accordance with the general principles discussed in CIRIA Report C635 – Designing for Exceedance in Urban Drainage, the proposed surface water drainage, where practical, should be designed to ensure there is no increased risk of flooding to the buildings on the site or elsewhere as a result of extreme rainfall, lack of maintenance, blockages or other causes.

5.8 Blockage & Exceedance

The site drainage will be designed to store a 100-year design storm including a 40% allowance for climate change. The drainage systems will also provide capacity for lower probability (greater design storm events) which are not of critical duration. Exceedance flows shall be retained on site within the drainage system as far as practical however for storms of a greater return period it may be necessary to pass forward more flow or spill flows. In this unlikely event, exceedance flows from the flow control chambers would be routed down the access road leading to Naylor's Road so that it would be picked up by the existing highway drainage or towards the surrounding greenfield land.

5.9 Treatment Processes

Treatment of the surface water run-off will come from the possible use of permeable paving and/or the use of advance silt traps upstream of the SuDS features.

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6 FOUL WATER DRAINAGE STRATEGY

Foul water from the site shall be connected to the existing 300dia. combined sewer located to the south of the site boundary which heads in a westerly direction away from the site. The UU detailed sewer records in Appendix A do not hold levels for this foul sewer, therefore, a drainage survey is to be carried out to confirm levels and/or another alternative connection point.

Under Section 106 of The Water Industry Act 1991, 'the owner / occupier of any premises shall be entitled to have his drain or sewer communicate with the public sewer of any sewerage undertaker and thereby to discharge foul water and surface water from those premises or that private sewer.' Unless 'the making of the communication would be prejudicial to the undertaker's sewerage system'. The proposed foul drainage system shall be constructed to standards outlined in Part H of the Building Regulations and will remain private.

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7 CONCLUSIONS

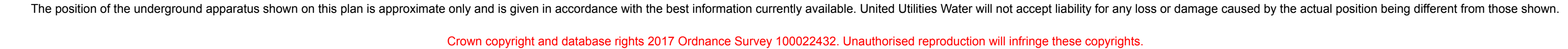
- The site is located within Flood Zone 1.
- The proposed development is classed as a major development and according to the NPPF's PPG as a school the site is classed as more vulnerable to flood risk. More vulnerable developments are deemed acceptable in Flood Zone 1.
- The site is at very low risk of flooding from fluvial sources, tidal sources, groundwater, sewers and artificial sources.
- The site is at a low risk of surface water flooding within a small area behind the main existing school building. As explained in Section 3.3 the surface water issues can be controlled with the inclusion of a positive drainage solution in this area which does not currently exist.
- Surface water drainage for the site shall be drained via a combination of methods. The existing school site to the south west shall remain as it is. The new overflow carpark to the north of the site will be formed from a grasscrete solution and remain independent. The remaining proposed impermeable areas will be drained into a proposed new SuDS device which will have a restricted outfall prior to runoff leaving the site boundary. A 30% betterment to the pre-development brownfield QBar runoff rate has been proposed across all post-development return periods, providing a significant betterment to the existing runoff produced from the site.
- A ground investigation report is currently being undertaken but was not available at the time of writing this report. It is understood that infiltration methods are assumed to be not viable, however, falling head tests are being completed to provide evidence on this. If infiltration methods are proven viable, discharge methods shall be re-evaluated so that the proposed storage methods are designed to discharge runoff directly to the underlying ground rather than being positively drained off-site.
- The discharge point for surface water has been determined and a connection to UU manhole 8201 is proposed. The foul water is to discharge to a nearby foul water sewer. However, levels have not been provided for this sewer within the UU detailed sewer records. Therefore, A CCTV survey is required to determine the level and condition of this sewer and determine if a connection is achievable.

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8 REFERENCES

- [1] Ministry of Housing, Communities and Local Government, *National Planning Policy Framework*, July 2018.
- [2] Ministry of Housing, Communities and Local Government, *Planning Practice Guidance to the National Planning Policy Framework*, October 2019. (Some parts of the guidance backdate)
- [3] GOV.UK, DEFRA/Environment Agency Portal.
- [4] British Geological Survey (BGS), Superficial Deposits and Bedrock Geology Viewer.
- [5] Land Information System (LANDIS), Soilscales Viewer
- [6] Natural England, DEFRA Magic Maps Viewer.
- [7] Environment Agency, Main River Map Viewer.
- [8] United Utilities Sewer Records
- [9] Marshall & Bayliss, *Flood Estimation for Small Catchments, Report No. 124 (IoH 124)*, Institute of Hydrology, June 1994.
- [10] D.B Boorman, J.M. Hollis & A. Lilly, 1995. *Hydrology of soil types, Report No. 126. (IoH126) Institute of Hydrology*, November 1995.
- [11] The Modified Rational Method, Volume 4, *Design and analysis of urban storm drainage, The Wallingford Procedure*, 1983.
- [12] UK SuDS Online Tool in accordance with Environment Agency report SC030419, *Rainfall Runoff Management for Developments*, October 2013
- [13] CIRIA, *The SUDS Manual Version 6, Report C753*, 2015.
- [14] CIRIA, *Designing for Exceedance in Urban Drainage – Good Practice, Report C635*, 2006.
- [15] DEFRA, *Sustainable Drainage Systems – Non-statutory technical standards for sustainable drainage systems*, March 2015.
- [16] LASOO, *Non-statutory SUDS technical standards guidance*, 2016.

APPENDIX A
UU SEWER RECORDS



5012	17.7	FO	0	225	VC	25.58319	1 in 46
5103	17.08	SW	0	225	VC	79.43585	1 in 88
7206	61.75	SW	56.66	0		36.1156	1 in 46
6105	57.84	SW	53.4	300		60.06923	1 in 88

The diagram illustrates the flow of water and wastewater from various sources into a combined sewer system. The sources are categorized into four main sections: Abandoned, Foul, Surface Water, and Combined. The flow paths are indicated by colored lines: yellow for Abandoned, green for Foul, blue for Surface Water, and red for Combined. The flow paths lead to various destinations: Public Sewer, Private Sewer, Section 104, Rising Main, Sludge Main, Overflow, Water Course, and Highway Drain.

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

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

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

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

LAKESIDE NAYLORS ROAD
LIVERPOOL,
L27 2YA

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United Utilities
Water for the North West

APPENDIX B

PEAK RUNOFF RATE AND SURFACE WATER NETWORK CALCULATIONS

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylors Road	Date	Apr-21	Checked	KH
	Liverpool	Page	1 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

Calculation Brief

This spreadsheet has been produced to calculate the peak rate of run-off for surface water. The calculation helps determine changes in peak flow resulting from the development of a greenfield or brownfield site.

Baseline Information & References

For greenfield sites this calculation is to be used when the site area is less than 50ha and subsequently follows methodology outlined in IoH Report 124 to derive QBar. Using regional growth curves originally published in FSSR 14 this calculation then interpolates runoff rates for greater storm return periods.

For Brownfield sites this calculation follows methodology outlined in The Wallingford Procedure Volume 4 and uses the Modified Rational Method. Using this method the pre-development brownfield and post-development brownfield runoff rates are calculated and a post-development restriction documented.

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

- Marshall & Bayliss, IoH Report No. 124, Flood Estimation for Small Catchments, 1994.
- D.B. Boorman et al, Institute of Hydrology, Report No. 126, Hydrology of Soil Types, 1995.
- DEFRA/EA Report No. SC030219, Rainfall Runoff Management for Developments, 2013.
- The Walling Procedure, Design and Analysis of Urban Storm Drainage, V4, The Modified Rational Method, 1983.
- IoH, Flood Estimation Handbook (FEH)
- IoH, Flood Studies Report (FSR)
- CIRIA, Report C753, The SuDS Manual Version 6, 2015.
- The UK SuDS Online Tool.
- NERC, FSSR 2, The Estimation of Low Return Period Flows, IoH, 1977.
- NERC, FSSR 14, Review of Regional Growth Curves, IoH, 1983.

Proposed Land Use Changes

Changes to the existing site are as follows:

Brownfield Site to Brownfield Site

Results Summary

Rate of Run-Off (l/s)

Event	Greenfield	Pre-Development Brownfield	Un-Restricted Post-Development Brownfield	Proposed Restricted 30% Reduction on Pre-Dev Brownfield Qbar
Q1	5.9	37.1	56.7	38.3
QBAR	6.7	54.7	83.6	38.3
Q10	9.3	74.2	113.4	38.3
Q30	11.5	91.1	139.2	38.3
Q100	14.0	117.9	180.2	38.3
Q100 + 40% CC	18.2	165.1	252.3	38.3

Job	Lakeside School	Job No.	L9523	Initial	JP
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	Liverpool	Page	2 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

SITE AREAS

Existing Impermeable & Permeable Land Cover

Total Site Area: **1.1225** ha **11225** m²

Existing Impermeable & Permeable Land Cover

Land Cover	Area		Percentage of total site area
	m ²	ha	
Total impermeable area	3465.0	0.347	31%
Remaining permeable area	7760.0	0.776	69%

Proposed Land Cover Areas

Land Cover	Area		Percentage of total site area
	m ²	ha	
Roof Areas	1145.0	0.115	10%
Paved Areas	1325.0	0.133	12%
Road Areas	2825.0	0.283	25%
Landscaped Areas	5930.0	0.593	53%

Proposed Impermeable & Permeable Land Cover

Land Cover	Area		Percentage of total site area
	m ²	ha	
Total impermeable area	5295.0	0.530	47%
Remaining permeable area	5930.0	0.593	53%

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylor's Road	Date	Apr-21	Checked	KH
	Liverpool	Page	3 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

ESTIMATION OF QBAR (GREENFIELD RUNOFF RATE)

IoH Report No. 124 is based on the research of small catchments < 25 km²

Their methodology is based on regression analysis of response times using catchments from 0.9 to 22.9 km²

QBAR is mean annual flood on rural catchment
 QBAR depends on SOIL, SAAR and AREA most significantly

$$QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$$

For SOIL refer to IoH Report No. 126

Contributing watershed area

Area, A	=	500000	m ²	insert 50 ha for EA
	=	0.500	km ²	small catchment method
	=	50.000	ha	

SAAR	=	843	mm	From UKSuds website (point data)
------	---	------------	----	----------------------------------

Soil index based on soil type, SOIL	=	$\frac{(0.1S1+0.3S2+0.37S3+0.47S4+0.53S5)}{(S1+S2+S3+S4+S5)}$
-------------------------------------	---	---

Where:	S1	=		%
	S2	=		%
	S3	=		%
	S4	=	100	%
	S5	=		%
			100	%

UK Suds website provides a value of 4.

So,	SOIL	=	0.47
-----	------	---	-------------

Note: for very small catchments it is far better to rely on local site investigation information.

QBAR _{rural}	=	0.300	m ³ /s
	=	300.0	l/s

Small rural catchments less than 50 ha

The Environment Agency recommends that this method should be used for development sizes from 0 to 50 ha and should linearly interpolate the formula to 50 ha.

So, catchment size	=	11225	m ²
	=	0.011	km ²
	=	1.123	ha

Excluding significant open space which would remain disconnected from the positive drainage system during flood events.

QBAR _{rural site}	=	0.00674	m ³ /s
	=	6.74	l/s

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylors Road	Date	Apr-21	Checked	KH
	Liverpool	Page	4 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

GREENFIELD RETURN PERIODS

QBAR can be factored by the UK FSR regional growth curves for return periods <2 years and for all other return periods to obtain peak flow estimates for required return periods.

These regional growth curves are constant throughout a region, whatever the catchment type and size.

See Figure A.1.2 of the DEFRA/EA 2013 guide for UK growth curves from FSSR 14

Region

= **10**

Use Figure A1.1 of the DEFRA/EA 2013 guide to determine region

GREENFIELD RETURN PERIOD FLOW RATES

Return Period	Ordinate	Q (l/s)
1	0.87	5.86
2	0.93	6.26
5	1.19	8.02
10	1.38	9.30
25	1.64	11.05
30	1.7	11.45
50	1.85	12.46
100	2.08	14.01
200	2.32	15.63
500	2.73	18.39
1000	3.04	20.48

Interpolation taken from Figure 24.2 (Page 515) SuDS Manual with derives the FSSR14 ordinates

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylors Road	Date	Apr-21	Checked	KH
	Liverpool	Page	5 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

ESTIMATE OF BROWNFIELD RETURN PERIODS

Total site impermeable area, A = **3465** m²

M5-60 rainfall depth **20** mm
 Ratio M5-60/M5-2Day, r **0.40**

Data obtained via the UK SuDS Website or MicroDrainage using the FSR database.

Storm Duration **15** mins

Anticipated critical duration for the site = 15 minutes

Duration factor, Z1 0.63

Data obtained from The Wallingford Procedure 1983 document Figure A.3b, Page 17

M5-15 rainfall depth = 12.7 mm

Return period ratio, Z2

M1-15	0.62
M10-15	1.23
M30-15	1.51
M100-15	1.96

Data obtained from The Wallingford Procedure 1983 document Table 1A, Page 9.

Rainfall

	Depth (mm)	Intensity, i (mm/hr)
M1-15	7.8	31
M10-15	15.6	62
M30-15	19.2	77
M100-15	24.8	99

Peak discharge, $Q_p = C_v C_r i A$

Where:

C_v = Volumetric Runoff Coefficient

C_r = Routing Coefficient

i = Rainfall intensity (mm/hour)

C_v = **0.95**
 C_r = **1.3**

Data obtained from the Wallingford Procedure 1983 document, Chapter 4, Page 5

Peak Runoff

	l/s
Q1	37.1
Q10	74.2
Q30	91.1
Q100	117.9

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylors Road	Date	Apr-21	Checked	KH
	Liverpool	Page	6 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

ESTIMATION OF QBAR (BROWNFIELD RUNOFF RATE)

See Figure A.1.2 of the DEFRA/EA 2013 guide for UK growth curves from FSSR 14

Region = **10**

Use Figure A1.1 of the DEFRA/EA 2013 guide to determine region

Return Period	Ordinate
1	0.87
2	0.93
5	1.19
10	1.38
25	1.64
30	1.70
50	1.85
100	2.08
200	2.32
500	2.73
1000	3.04

Interpolation taken from Figure 24.2 (Page 515) SuDS Manual with derives the FSSR14 ordinates

Qbar	
Ordinate used	l/s
10 year	53.8
30 year	53.6
100 year	56.7

Proposed Brownfield Runoff, Qbar = 54.68 l/s

Using the average Qbar derived from three ordinates.

Job	Lakeside School	Job No.	L9523	Initial	JP
	Naylors Road	Date	Apr-21	Checked	KH
	Liverpool	Page	7 of 8	Revision	Rev B
Title	Peak Rate of Run-Off Calculation				

ESTIMATE OF BROWNFIELD RETURN PERIODS

Total site impermeable area, A = **5295** m²

M5-60 rainfall depth **20** mm
 Ratio M5-60/M5-2Day, r **0.40**

Data obtained via the UK SuDS Website or MicroDrainage using the FSR database.

Storm Duration **15** mins

Anticipated critical duration for the site = 15 minutes

Duration factor, Z1 0.63

Data obtained from The Wallingford Procedure 1983 document Figure A.3b, Page 17

M5-15 rainfall depth = 12.7 mm

Return period ratio, Z2

M1-15	0.62
M10-15	1.23
M30-15	1.51
M100-15	1.96

Data obtained from The Wallingford Procedure 1983 document Table 1A, Page 9.

Rainfall

	Depth (mm)	Intensity, i (mm/hr)
M1-15	7.8	31
M10-15	15.6	62
M30-15	19.2	77
M100-15	24.8	99

Peak discharge, $Q_p = C_v C_r i A$

Where:

C_v = Volumetric Runoff Coefficient
 C_r = Routing Coefficient
 i = Rainfall intensity (mm/hour)

C_v = **0.95**
 C_r = **1.3**

Data obtained from the Wallingford Procedure 1983 document, Chapter 4, Page 5

Peak Runoff

	l/s
Q1	56.7
Q10	113.4
Q30	139.2
Q100	180.2

Job	Lakeside School	Job No.	L9523	Initial	JP
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Title	Peak Rate of Run-Off Calculation				

ESTIMATION OF QBAR (BROWNFIELD RUNOFF RATE)

See Figure A.1.2 of the DEFRA/EA 2013 guide for UK growth curves from FSSR 14

Region = **10**

Use Figure A1.1 of the DEFRA/EA 2013 guide to determine region

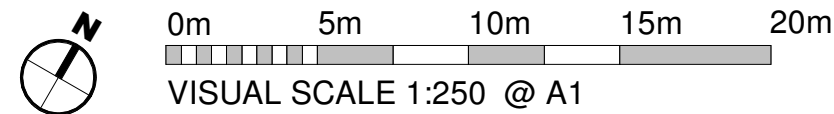
Return Period	Ordinate
1	0.87
2	0.93
5	1.19
10	1.38
25	1.64
30	1.70
50	1.85
100	2.08
200	2.32
500	2.73
1000	3.04

Interpolation taken from Figure 24.2 (Page 515) SuDS Manual with derives the FSSR14

Qbar	
Ordinate used	l/s
10 year	82.2
30 year	81.9
100 year	86.6

Proposed Brownfield Runoff, Qbar = 83.55 l/s

APPENDIX C
DEVELOPMENT PROPOSALS – LAYOUT PLAN



Parking Schedule	
Description	Count
Standard car parking bay	76
Disabled parking bay	3
Electric charging bay	4
TOTAL	83

Proposed New Building GIA	
Building Number	Area
B3	
First Floor Level	448.96 m ²
Ground Floor Level	1020.48 m ²
Loft Level	214.88 m ²
Grand total	1684.31 m ²

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Hazard Identification		
ref	hazard	date

- DEVELOPMENT KEY**
- Ownership
 - Development Boundary
 - Grasscrete
 - Tarmac Road
 - Block Paving
 - Pick up/Drop off Area
 - Paving Flags
 - Tarmac Road
 - Tarmac Path
 - Soft Landscaping
 - Hardstanding
 - Existing Primary School Building
 - 2.4m High Anticlimb Fence PPC Green
 - Bin Store
 - Bicycle shelter. Provision for 8 long stay bicycles
 - Double entrance gates to yard
 - Electric vehicle charging
- Note:** Soft Landscaping shown indicatively, refer to Landscape Architect scheme drawing for detailed proposals

P8	GIA Area and Volume Identification Schedules Amended	AW	16.04.21	JP
P7	Tactile Paving Area Amended	AW	15.04.21	JP
P6	Bike Store Relocated, Fencing and Bike Store Specification Amended, Red Line Boundary Amended, Traffic Hump Added, Paving near the Main Entrance Extended, Tarmac Area near the Main Entrance to the Site Extended	AW	14.04.21	JP
P5	Landscape Design Amended, Path around Football Pitch Added, Fencing Line Amended, Gates to the Primary School Relocated, Paving near the South-West Entrance to the Existing Primary School Building Added, Trees and Trees Protection Zone Amended	AW	07.04.21	JP
P4	Parking Grasscrete Area Amended	AW	30.03.21	JP
P3	Red Line Amended, Secondary School Drop off Area Amended, Roundabout Added, Electric Charging Bays Area Added	AW	26.03.21	JP
P2	Amended Following Comments	AW	26.03.21	JP
P1	First Issue of Drawing	AW	25.03.21	JP
Rev	Revision Details	Drawn	Date	Checked

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Witherslack Group

Project
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Liverpool

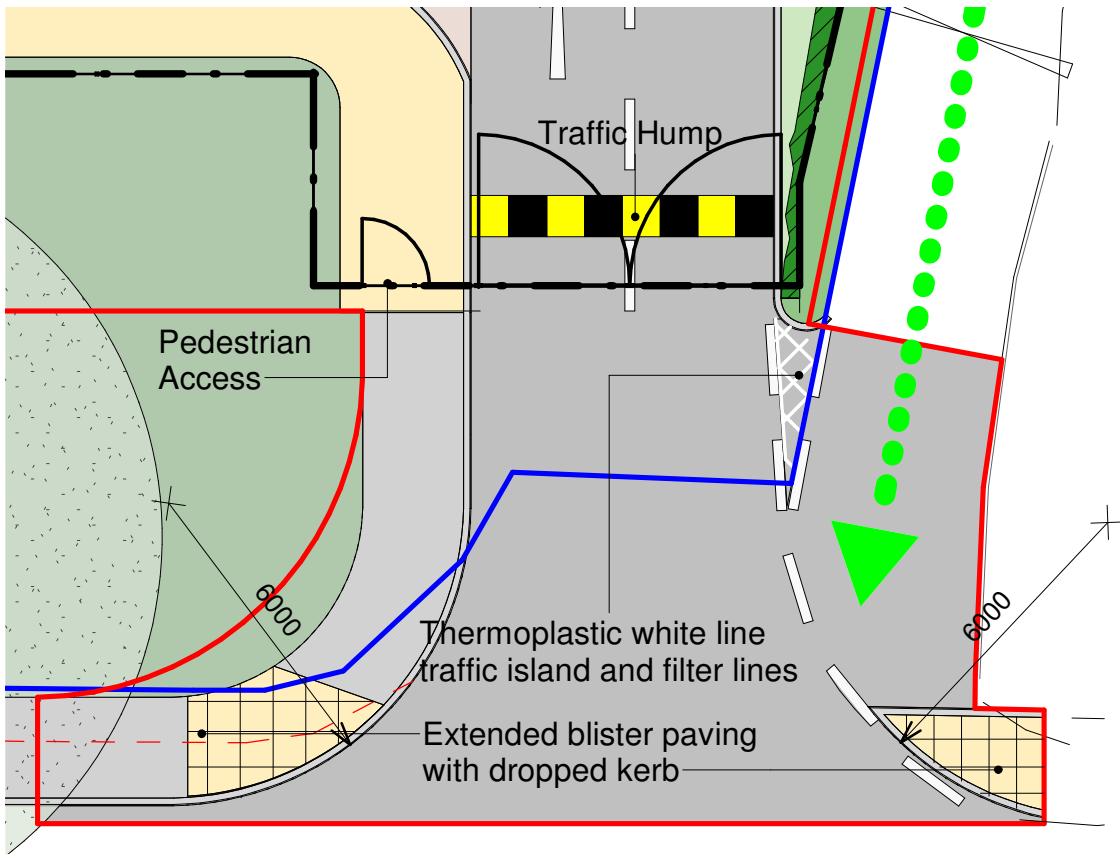
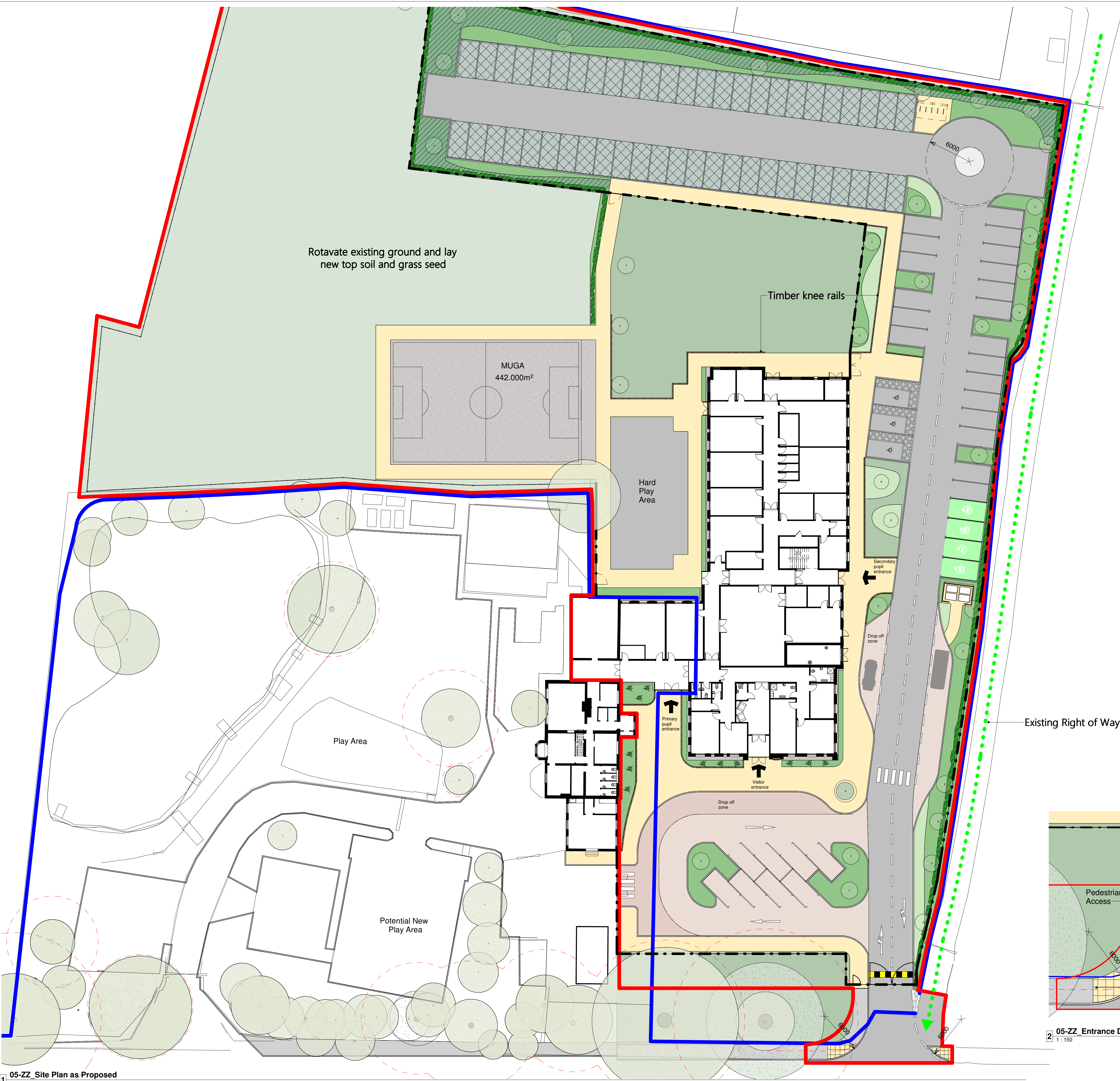
Drawing Title
Site Plan As Proposed

Status Purpose of Issue
S2 SUITABLE FOR INFORMATION

Drawn by JEP **Created** 18.06.20

C4 Job no. 20-034 **Scale** As indicated **@** A1

Drg no. 20034-C4P-AV-ZZ-DR-A-0510 **Rev** P8



05-ZZ_Entrance Detail_Site Plan as Proposed