Flintshire County Council - WEPco

Campus Mynydd Isa

Drainage Strategy Report

FL0101-ARP-01-00-RP-C-20001

Issue 1 | 30 June 2021

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 280340

Ove Arup & Partners Ltd
4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

ARUP

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1 Introduction

The Client is promoting the re-development of an existing secondary school located in Mynydd Isa, a village in Flintshire. Ove Arup & Partners Ltd. (Arup) has been commissioned to prepare a masterplan, planning application and supporting technical assessments for the proposed development that includes a Drainage Strategy report.

This report discusses the proposed drainage strategy, taking into account the site conditions, the topography and connection points. This report summarises the findings from the study.

2 The Site

2.1 Site Description

The site is approximately 15 Ha in area and located within the village of Mynydd Isa (centred around grid reference SJ263646) and 2.5km east of Mold town centre as shown on Figure 1.

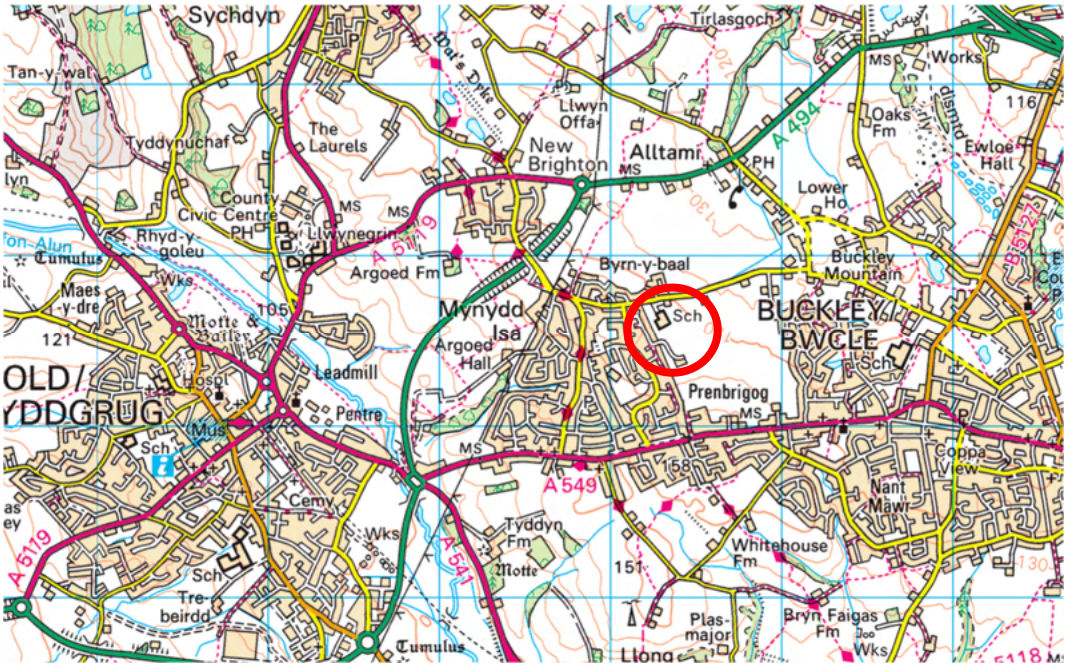


Figure 1: Site Location (circled in red) (streetmap.co.uk)

The proposed site for the new Mynydd Isa Campus project is located on the grounds of the existing Argoed High School. The school site is accessed from the north from Bryn Road.

It is understood that the existing school was built in the mid 1970's, with a platform formed to accommodate the school building.

2.2 Site Terrain/Topography

In plan view, the site has an irregular polygonal shape and is at its widest in the central part of the site (see Figure 2). There is a gradual fall in terrain from west to east, with elevation ranging from 158.9mOD in the west down to 145.4mOD in the eastern corner where a watercourse exits the site.

The west to east watercourse cuts through the centre of the site and accepts flows, via a DCWW storm sewer from the western residential development.

It is understood that the site levels were modified as a part of forming the platform to construct the present school. A significant mound is found between the existing school and the drop off area. It is believed that this was formed from the spoil from the platform.

The site is accessed from Bryn Road via a drop off area which has some vehicular parking. A paved road is located to the west of the drop off area which directs traffic towards the school to the south. Parking is provided within the school grounds to the west of the school.

Figure 2: Site Location on OS Mapping (red – planning application boundary)

The topographic survey of the northern area of the site is shown in Appendix A.

2.3 Published Flood Risk Maps

The Flood Risk maps hosted on the Natural Resources Wales (NRW) web portal have been reviewed for the site.

The maps available are:

- Development Advice Maps
- NRW River and Sea Flooding Maps
- NRW Surface Water Flooding Map

2.3.1 Development Advice Maps

The Development Advice Map (DAM) is for land use planning purposes based on NRW's extreme flood outlines and the British Geological Survey drift data which helps to determine whether a site is within a flood zone. The map shows that the proposed development is located entirely within Zone A, which is considered to

be at little or no risk of fluvial or tidal/coastal flooding. An extract from the DAM is shown in Figure 3.

As the development is within Zone A, a Flood Consequence Assessment (FCA) will not be required.

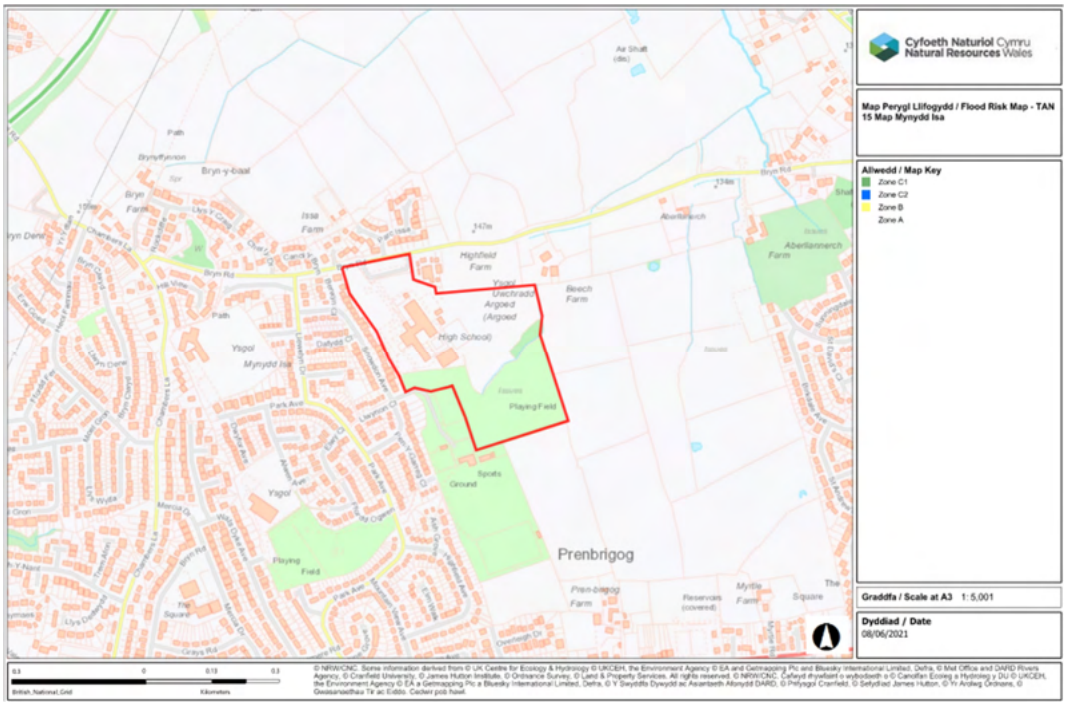


Figure 3: Long term flood risk Development Advice Map for the site. Yellow – Zone B, Blue – Zone C2

2.3.2 NRW Fluvial, Reservoir, Coastal and Surface Water Flooding

NRW's flood map (Figure 4**Error! Reference source not found.**) shows that the site is not at risk from Fluvial, Reservoir or Coastal Flooding. NRW Long Term Flood Risk Maps show flood extent, depths, velocities and hazard. However, it doesn't have an official status for planning purposes.

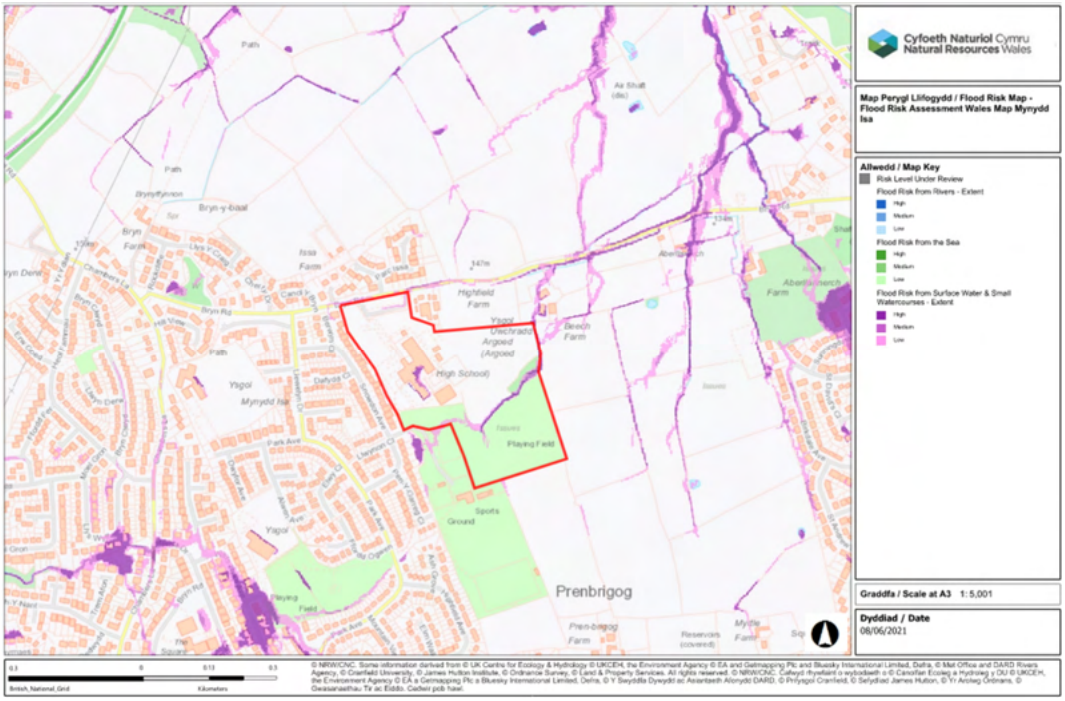


Figure 4: Flooding from rivers & sea, surface water flooding.

NRW also produce surface water flooding maps, see Figure 4. The map shows that most of the site is not at risk of flooding. However, localised areas have low-risk areas of surface water flooding. These appear to be topographical low areas where surface water run-off could accumulate at shallow depth and are centred around the open watercourse flowing from west to east through the centre of the site.

3 Existing Drainage

The existing drainage features for the site are shown on CIV-20001 in Appendix B.

3.1 Foul Drainage

Existing foul water infrastructure is located within and around the site boundary as shown on Figure 5 and within Appendix D.

Dŵr Cymru Welsh Water (DCWW's) foul public drainage is located adjacent to the site to the west in Snowdon Avenue.

Figure 5: Public sewers plans (DCWW)

The foul flows from the existing school building flow are communicated to a pumping station located within the school grounds to the east. An image of the pumping house in relation to the school building is included in Figure 6.

Figure 6: Pumping Station within the school grounds – circled in red

The route of the rising main connecting the pumping station to DCWW's public sewer network is currently not known. Non-intrusive investigations have been conducted on site to map the alignment of the rising main – however the route is yet to be found. Access to the pumping station building has been obtained and it appears the rising main flows to the south. Based on this information, discussions with DCWW, historical mapping/images and the location of the recently built sports hall, an anticipated route has been plotted, as shown on Figure 7. Further investigations are required to confirm this rising main route.

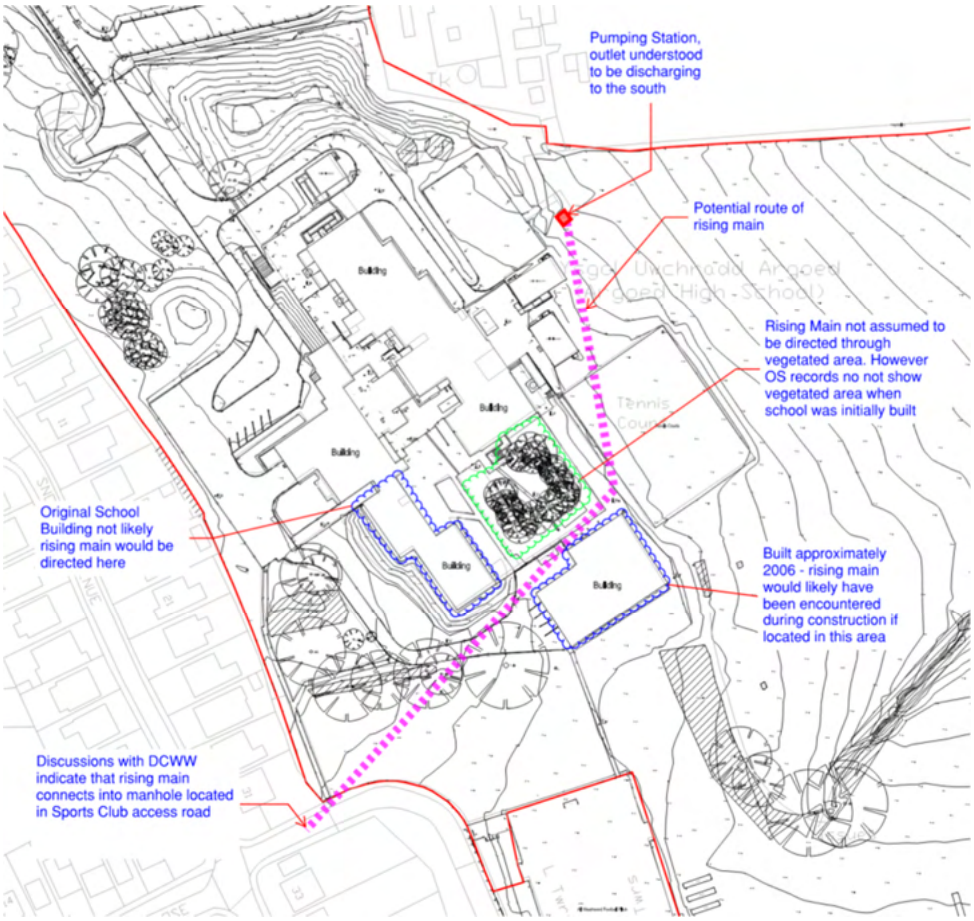


Figure 7: Anticipated route of the foul rising main – to be confirmed by additional investigations

3.2 Storm Water Drainage

The site generally falls from west to east towards the watercourse located within the centre of the site. The watercourse is the main drainage feature within the site, accepting overland flows from the grassed area and the southern extents of the school.

The northern extents of the school drains to the north east. The drainage network was surveyed and terminated within a manhole near the northern boundary. The final manhole is blocked, and it was not possible to identify where the drainage network terminated. However, it is expected that the manhole outfalls into the central watercourse to the east. The drop-off area discharges, unattenuated, into the existing highway network located within Bryn Road.

As shown on DCWW's plans (Figure 5), a 450mm concrete storm water network crosses the southern extents of the site and discharges into the watercourse located within the site, as shown on Figure 8. Since the sewer is present within the site, an easement exists which allows DCWW, as Statutory Undertaker, to gain access their apparatus. It is not expected that the pipe would be affected by the proposed development. However, if necessary, it may be possible for the drainage to be diverted under Section 185 of the Water Industry Act 1991, the cost of which will be charged to the developer.

Figure 8: DCWW culvert outfall into the watercourse located within the site

3.2.1 Rainfall Runoff Catchments

A preliminary geotechnical desktop study indicates that the underlying ground is relatively impermeable. It is therefore expected that the majority of the site's runoff flow into the watercourse located within the site before it flows into the Alltami Brook, to the north-east of the site.

Figure 9 below illustrates the rainfall runoff catchments. The site is split into three main catchments; a southern, a central and a northern 'dropoff' catchment.

Figure 9: Existing Catchment Plan

3.2.2 Greenfield Runoff Rate

Hydrological analysis was undertaken for the site to determine the site's Greenfield Runoff Rate (GRR). The Institute of Hydrology 124 (IoH124) method was used to calculate the GRR for the 1:1, 1:30 and 1:100-year rainfall events. These values are used to inform the proposed drainage design, where Climate Change will also be considered.

The GRR values for the site are shown in Table 1. For further details of the assumptions, calculations and conclusions, refer to the Hydrology Calculations technical note in Appendix C.

Table 1 – Greenfield Runoff Rate for the site calculated using the IH124 method

Return period Event	Greenfield Runoff Rate (l/sec/ha)
1:1 Year	4.7
1:30 Year	9.5
1:100 Year	11.7
Qbar	5.4

3.2.3 Brownfield Runoff Rate

The site has been developed previously as it is currently a school. Investigations conclude that the current site has a conventional drainage network that discharges at an uncontrolled rate, into the watercourse (main school site) and into Bryn Road (drop off area). Therefore, the pre-developed sections of site can be considered brownfield sites which will be used to inform the discharge rates form the site.

The existing storm drainage network, based on the topographical and utility survey, was modelled using Microdrainage software and the 1-year runoff rate for each catchment was calculated as shown: in Table 2

Table 2 – Greenfield Runoff Rate for the site calculated using the IH124 method

Catchment	Existing Impermeable Area (ha)	Brownfield Runoff Rate (l/sec)
Southern Catchment	0.165	12.9
Central Catchment	1.063	92
Northern Drop-Off Area	0.263	29.2
TOTAL	**1.491**	**134.1**

Refer to Appendix C for further information.

4 Proposed Development

Mynydd Isa campus will consist of a nursery, primary and secondary school with SEN facilities.

The proposed building is generally two storey, it is shallow plan in nature with a central spine with protruding 'fingers'. This building form will maximise natural ventilation and daylight while achieving the client's adjacency requirements.

The new school campus is based on approximately 10,300m2 gross internal area and will accommodate 1,400 pupils of various ages. The proposed building will accommodate Art, Food Technology, ICT, Science, Music and general classroom spaces.

Access to the proposed development will be via the existing drop-off area adjacent to Bryn Road to the north. The proposed internal road will be routed around the building to the north and will provide access to all the various section of the development as shown on drawings FL0101-ARP-01-00-DR-C-22011 and FL0101-ARP-01-00-DR-C-22012.

4.1 Finished Levels

Developing the finished levels for the site is challenging. The existing school building needs to remain operational during construction phase and the site slopes from west to east.

As shown on drawing FL0101-ARP-01-00-DR-C-21001 significant earthworks are required to form the level plateau due to the existing site slope. Cut is required under the western extent of the proposed school building and fill is required to the east. Embankments are required to form the plateau. Drawing FL0101-ARP-01-00-DR-C-22021 and FL0101-ARP-01-00-DR-C-22022 shows the development platform levels used to inform the proposed drainage strategy.

5 Proposed Foul Drainage

Foul flows will be generated from the development from facilities such as canteens, classroom sinks, toilets and welfare facilities.

5.1 Domestic Flows

The proposed quantum was considered in assessing the foul flows generated from the proposed development. Based on initial discussions with the client, a population level of 1520 persons per day was estimated on site. Based on the daily staff population the peak domestic foul flow generated from the development has been estimated as 6l/s. The peak flow is based on a 20l/day/person and a peaking factor of 6. There is a near-by public sewer network to the west of the site and it is proposed to transmit these flows into DCWW's public sewer.

The population levels and estimated peak flows were communicated to DCWW in a pre-planning application to ascertain if sufficient capacity exists within the local network to facilitate the proposed development. DCWW stated that their network could accommodate the domestic flows from the site and indicated that the flows should be connected to the 225mm foul sewer at or downstream of manhole SJ26642406 located in Snowdon Avenue to the south west as shown on drawing FL0101-ARP-01-00-DR-C-25001.

The pre-planning response letter and details of further discussions can be found in Appendix D.

5.2 Foul Drainage Strategy

Similar to the existing situation and due to the large expanse of the development, variations in levels and the need to connect to the public sewer to the west, it is necessary to have a foul pumping stations on site. It is proposed to connect the pumping station, via rising mains, to the nearest foul drainage manhole that connects to the public sewer – DCWW's manhole SJ26643406. It is proposed to utilise a buried package pumping station for the pumping station.

Drawing FL0101-ARP-01-00-DR-C-24001 shows the proposed drainage layout, DCWW easement and alignment of the proposed rising main.

Any foul drains constructed for adoption will be subject to a Section 104 Agreement and will require DCWW consent. A Section 106 Agreement will be required for any new connections into DCWW's network. It is envisaged that the foul drainage and pumping station will remain private as it only serves one property.

6 Proposed Stormwater Drainage

6.1 Introduction

The planned surface water drainage strategy for the proposed development will need to implement Sustainable Drainage Systems (SuDS) measures in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems 2018'. The proposed network will need to be approved by the local SuDS Approval Body (SAB). The SAB responsibility is administrated by Flintshire County Council.

The proposed storm water drainage strategy is currently under discussion with the SAB. Therefore, the proposals are subject to confirmation through the SAB Pre-Application process. The Pre-Application sets out the principles of the proposed storm drainage strategy and describes how it conforms to the Statutory Standards. The Pre-Application for the scheme is in the process of being submitted to the SAB.

New surface water networks will be required to service the new development of the site. Principally these catchments follow the existing regime by discharging into the central watercourse.

Three separate catchments within the development will be formed to manage the storm water on site:

- Western (existing school) catchment
- Eastern catchment; and
- Northern drop-off catchment

The eastern catchment will accommodate the majority of the proposed development collecting runoff emanating from the impermeable areas (school building, car park and school yard) and discharging at a controlled rate into the watercourse. The majority of the development will occur during the first phase of construction.

Alternatively, the western catchment that will accommodate the sports pitches and some public areas will be constructed during the second phase once the current school building is demolished. The western catchment will discharge, at a controlled rate, into the watercourse – similar to the existing situation.

The northern drop-off catchment will continue, with modifications, to discharge into the highway drainage in Bryn Road.

Sub-catchments will be formed within each of these main catchments to assist in managing the runoff from smaller areas and ensure suitable treatment are provided for the different uses.

The proposed drainage is shown on drawing FL0101-ARP-01-00-DR-C-24001.

Once the site is developed, the eastern and western catchments will drain to the watercourse located within the site via proposed private surface water drainage, which flows to the north east. The northern drop-off area will discharge into the existing highway drainage which is understood to outfall into the same watercourse that flows through the site.

6.2 Schedule 3 of the Flood and Water Management Act

Schedule 3 of the Flood and Water Management Act 2010 establishes SABs (SuDS Approving Body) in local authorities. Since the 7th January 2019, developments greater than 100m^2 or developments containing more than one building require submitting a SAB application. This application requires developers to utilise Sustainable Drainage Systems (SuDS) in their surface water management for a development.

SuDS aim to manage rainfall on site using methods that mimic natural processes, by making use of the landscape and vegetation to control the flow, volume and quality of the surface water runoff. In addition, SuDS also provide amenity benefits by providing aesthetically pleasing and natural landscapes, and biodiversity benefits by creating habitats for wildlife and vegetated areas.

The Welsh Government's Statutory Standards for Sustainable Drainage Systems contains six standards, which details the requirements for the surface water drainage. The standards are as follows:

S1. Runoff destination

S2. Hydraulic control

S3. Water quality

S4. Amenity

S5. Biodiversity

S6. Construction, operation and maintenance

These form a set of principles which must be considered in the design of the SuDS features in order to obtain approval by the SAB.

6.3 S1 – Runoff Destination

The Welsh Government's SuDS Standard S1 provides a discharge hierarchy for surface water from developments, as well as exemption criteria for each level that must be met before the next level can be considered. The discharge hierarchy is shown below:

- Level 1: Surface water runoff is collected for use;
- Level 2: Surface water runoff is infiltrated to ground;
- Level 3: Surface water runoff is discharged to a surface water body;

- Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;
- Level 5: Surface water runoff is discharged to a combined sewer.

The aim of this is to encourage developments to use runoff as a resource and ensure that runoff is sustainably managed to avoid any negative impacts from the development, such as increased flood risk.

6.3.1 Level 1 – Collected for Use

Rainwater harvesting systems can be effective to reuse grey water to flush toilets or for some industrial uses. These systems require pumps and perform most efficiently when the application for re-use are concentrated together and near to the collected surface water.

The potential use of Rainwater Harvesting was explored for the development, however it is not considered to be practicable due to the required needs and layout of proposed school.

There are lavatories proposed within the building, however they are sparsely spread across the development. Significant internal pipework would be required to pump the harvested rainwater large distances around the building masterplan, meaning that the solution would be inefficient and require significant energy to operate, which would not be sustainable.

6.3.2 Level 2 – Infiltrate to Ground

Level 2 of the hierarchy promotes infiltration of runoff to ground, mimicking natural infiltration and recharging below ground aquifers. The concept of infiltration is intended at trying to prevent runoff from sites when there are small rainfall events. The goal is to minimise the discharge of polluted runoff from entering streams and rivers, particularly in summer periods when there is low flows. The emphasis is on achieving no runoff for small rainfall events which are less than 5mm.

Initial geotechnical desk study indicated that cohesive material is present beneath the site. It is therefore anticipated that the majority of the existing runoff flows overland. Consequently, pending the results of a Ground Investigation, infiltration measures are not considered appropriate as a primary means of disposal for the site. Dependant on Ground Investigation results, there may be an opportunity to dispose some of the storm water via infiltration. However, it is considered that the majority of surface water will need to discharge by other methods.

6.3.2.1 Eastern Catchment

The proposed school building and its associated external areas, including the earthworks, takes up the majority of the eastern catchment to the west of the watercourse. Building Regulation Document H require that no point infiltration should not be built within 5m of a building or a road. Therefore, the space available for potential infiltration is constrained.

The only space that an infiltration feature could be incorporated into the design is to the east of the turning head building. However, due to its proximity to the watercourse, there is unlikely to be much potential for infiltration.

It is proposed that raingardens are to be employed as a SuDS solution. Due to their proximity to the building and the road, they will need to be lined, which will limit their ability to contribute to interception. Evapotranspiration in summer is a key mechanism for reducing runoff.

It is considered that the majority of surface water emanating from this catchment will need to discharge by other methods.

6.3.2.2 Western Catchment

As a part of the storm water management network for this catchment a detention basin is proposed which is proposed to be unlined. Whilst not being the main disposal method for the storm runoff these unlined features could contribute to the interception of the first 5mm of rainfall for the site. Similar to the western catchment, lined raingardens are to be employed which will contribute with evapotranspiration.

6.3.2.3 Drop-off Catchment

Due to the proximity to Bryn Road and the large expanse of road and parking infrastructure there is minimal potential for infiltration. Raingardens are to be employed and will contribute with evapotranspiration.

6.3.3 Level 3 – Discharge to a Surface Water Body

An existing watercourse flows through the centre of the site eventually connecting to Alltami Brook, to the north east of the site. It is proposed that the primary method of dealing with the surface water runoff from site will be to discharge into the watercourse.

The runoff from the site will be collected by a drainage network and be attenuated to before out falling into the watercourse. Raingardens, basins and pervious pavements are proposed in conjunction with hydraulic control measures to attenuate the flows to achieve the required runoff rate. Drawing FL0101-ARP-01-00-DR-C-25001 shows the proposed drainage strategy for the development, including the two basins.

As this will form the proposed discharge destination for the western and eastern catchment, options further down the hierarchy have not been considered for these.

6.3.4 Level 4 – Discharge to a Surface Water Drainage

The drop off area to the north of the site currently discharges its storm drainage at an uncontrolled rate into the highway drainage within Bryn Road.

Diverting runoff from this area into the watercourse was investigated. However, due to the terrain levels connection was not viable. Therefore, it is proposed to

retain the connection into the highway drainage at a controlled rate as shown on drawing FL0101-ARP-01-00-DR-C-25001.

6.4 S2 – Surface Water Runoff Hydraulic Control

Standard S2 details the requirements for hydraulic runoff from the site. It is broadly split into three main sections, runoff control, volumetric control and interception.

6.4.1 Volumetric Control

The runoff volume discharged from site can be as harmful to downstream flood risk as peak flow rates. It is therefore essential to ensure that volume of runoff discharged from the site during rainfall events is controlled. Where possible, for the equivalent rainfall event, the runoff volume from a development should not exceed the volume of runoff from the equivalent area in its natural undeveloped state.

The volumetric control of runoff should be demonstrated to meet greenfield runoff behaviour for all events and particularly those relevant for the mitigation of flood risk in the receiving watercourse.

Additional runoff volumes from impermeable areas can cause an increase in flood risk downstream of the site, even when controlled to the GRR. Where possible, the difference in volume should be infiltrated or discharged at a slower rate.

Greenfield runoff rates are generally 3-4 times greater for the 1 in 100 year rainfall event when compared to the 1 in 1 year rainfall event. To capitalise on the use of the 1 in 100 year Greenfield runoff allowance, long term storage must be provided; whereby a specified volume of water is held on site for a longer period in comparison to the attenuated storage volume.

Long Term Storage is the term given to the volume of time-based storage which should to be provided for additional surface water runoff volume that is generated by a development that is greater than the volume of greenfield runoff. The greenfield runoff volume is calculated using a 1:100 year 6 hour event. Developing solutions incorporating long term storage can be challenging due to special and hydraulic requirements to control the different discharge rate.

An alternative approach to managing the extra runoff volumes from extreme events separately from the main drainage system is to release all runoff (above the 1 year event) from the site at a maximum rate to QBAR. This avoids the need to undertake more detailed long-term storage calculations and simplifies the attenuation provisions. Therefore all areas of the development located on greenfield land will be limited to QBAR.

Volumetric control will need to be considered for each catchment based on the potential future impermeable area.

6.4.1.1 Attenuation

The proposed strategy for attenuating the surface water is by basins, pervious pavement, attenuation cells and raingardens.

Raingardens have been extensively incorporated into the drainage design. These raingardens aim to provide attenuation up to the 1:1 year event which will reduce the reliance on the basins.

Two separate attenuation basins have been included as a part of the proposed drainage networks. The attenuation basins would have a maximum storage depth of 1.5m (south – 1.0m) with 0.3m freeboard to the top of the basin for a 100 year return period including an allowance for climate change. Side slopes would be 1 in 3, with one side slope of 1 in 5.

To restrict flows from the attenuation basins to the watercourse, flow control devices would need to be included within the proposed basin outlets. There may be a requirement for penstock valves to allow for proper maintenance and management of a pollutant spillage.

Due to spatial constraints there is insufficient space to accommodate the all the necessary attenuation volume within the basin. It is proposed to connect the basin to the storage located under the Multi use Games Area(MUGA), where 665m^3 of cellular storage is to be provided .

The unlined basins will contribute to interception requirement. Due to the extents of the development minimal space is available for the basin. Therefore it is proposed to extend its storage by connecting it to attenuation cells located under the nearby MUGA area as shown on drawings FL0101-ARP-01-00-DR-C-25001.

6.4.2 Runoff Control

Some historical works have taken place on site to form plateaus when the school estate was developed. Investigations conclude that the current site has a conventional drainage network that discharges at an uncontrolled rate, into the watercourse (main school site) and into Bryn Road (drop-off area). Therefore, the pre-developed sections of site can be considered brownfield sites which will be used to inform the discharge rates from the site.

As discussed in Section 3.2.2 and 3.2.3, the greenfield and brownfield runoff rates for the site have been calculated and interpreted to deduce discharge rates for each catchment. The amount of existing brownfield contribution for each proposed catchment has been considered, ensuring that a 30% betterment was provided. Then based on the current site use a combined proportional greenfield and brownfield discharge rate was calculated for each catchment.

The eastern section of the site is a rugby pitch and considered mostly undeveloped. Therefore a larger proportion of the calculated discharge rate is based on the greenfield runoff rate. The western part of the site, containing the existing school, is mostly impermeable and has therefore been considered mostly as a brownfield area. The northern drop-off area has been considered as

brownfield. Refer to the hydrology calculations note in Appendix C for full details.

The proposed impermeable areas and calculated discharge rates are as follows:

Catchment	Proposed Impermeable Area (ha)	Discharge Rate Restriction (l/sec)
Western (Phase 1) Catchment	0.798	17.3
Eastern (Phase 2) Catchment	1.407	61.8
Northern Drop-Off Area	0.263	20.4
TOTAL	**2.552**	**99.5**

Table 2 – Proposed catchment flow restrictions

It is proposed that the total discharge rate from the development into the watercourse, from the phase 1 and phase 2 catchments, should be limited to 79.1l/s. The discharge rate from the northern drop-off catchment into the existing highway drainage is proposed to be limited to 20.4l/s. These flow rates will be achieved by installing vortex flow controls upstream of the discharge locations.

A climate change allowance of 30% has been proposed for the development based on Table 2 of UK Government's climate change guidance.[1] This consideration has been confirmed by the North Wales SuDS guidance and will be applied in the modelling.

6.4.3 Interception

The Welsh Governments "*Statutory Standards for Sustainable Drainage Systems*" require that, as far as practical, there should be no discharge from a site during the first 5mm of a rainfall event. This attribute is considered to be met by utilising systems as described in Table G2.1 of the standard or by demonstrating compliance through other means.

The concept of interception is to prevent any runoff taking place from sites when there are small rainfall events. The aim is to minimise the discharge of polluted runoff from entering streams and rivers, particularly in summer periods when they have low flows. Impermeable surfaces generate runoff from nearly all rainfall events, and this can have a negative impact on the morphology and ecology of receiving water bodies. Interception is aimed at trying to replicate greenfield runoff conditions.

Interception mechanisms are based on runoff retention. This can be achieved using rainwater harvesting, using soil storage and evaporation.

[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#history

Greenroofs have been considered for the development. However, following investigation, their use has been discounted from the scheme due to the ongoing maintenance and the increased imposed weight on the roof.

Reviewing Table G2.1 and giving consideration to the site the following SuDS features offer a suitable approach to meet the interception criteria:

- Bioretention areas/ raingardens;
- Detention Basins; and
- Permeable surfaces.

In total, there is approximately 1600m^2 of unlined bioretention features. The total amount of bioretention features across the site has been maximised to provide a greater contribution to interception requirements. Potential for infiltration is however anticipated to be low and may be insufficient to intercept all of the first 5mm of rainfall. In accordance with Table G2.1 in the Welsh Statutory Standards for Sustainable Drainage, it can be said that the first 5mm of rainfall from contributing impermeable area equal to five times the unlined vegetated bioretention areas can be assumed to be intercepted.

There is insufficient space available on the proposed site for bioretention systems with a plan area equivalent to a fifth of the impermeable area, and it will not be possible to use unlined systems in the eastern catchment due to the proximity to the building. However, it is anticipated that 760m^2 of bioretention systems adjacent to the car park in the west could be unlined, thus contributing to the interception requirement. Therefore, it is assumed that 3,800m^2 of impermeable area on the site is sufficiently intercepted through this method.

Two detention basins are proposed as part of the storm drainage network to attenuate and treat flows from the eastern and western catchments. Table G2.1 states that areas up to five times the base area of the basins can be assumed to meet interception requirements. The combined base area of the infiltration basins totals 130m^2 and therefore it is assumed that approx. 650m^2 of impermeable area on the site is sufficiently intercepted through this method.

It is proposed to use 6,250m^2 of permeable pavement for the car parks and MUGAs. Table G2.1 states that all permeable surfaces can be assumed to comply provided that there is no additional area drained to the permeable surface. It is not proposed to drain any additional areas to the permeable surface, therefore it is assumed that 6,250m^2 of impermeable area on the site is sufficiently intercepted through this method.

In total, based on the figures above, it is calculated that the amount of impermeable area on site that can be deemed to be compliant with interception requirements is approx. 1.07ha. Given that the total amount of impermeable area on site is 2.55ha, these measures are providing 42% of the required interception of flows on site, which equates to approximately 2.1mm of the first 5mm of rainfall.

Disposal of significant events using solutions such as soakaway units or infiltration basins usually requires infiltration rates of the order of 1 x 10-6 m/s or higher. However, effective infiltration can be achieved with lower rates under

units such as permeable pavements due to the large storage and infiltrating surface area available and the removal of sediment which would otherwise blind the infiltration surface. Therefore, the true interception provided through the permeable surfacing may be greater than suggested.

The lined bioretention components adjacent to the main building will also contribute to the interception requirements in terms of evapotranspiration. The Additionally the proposed bio-remediation channels will also provide some additional interception through the soil storage.

6.5 S3 – Water Quality

The Welsh Standard S3 covers the necessary water quality requirements for a scheme to prevent negative impacts on receiving waters.

During construction, it is likely that silts will be mobilised by rainfall which if uncontrolled will be conveyed to the downstream watercourses. The contractor will likely need to use a combination of settlement ponds and Siltbusters to capture silt during the earthworks stage. This will be detailed in the Contractor's method statements.

The Simple Index Approach has been used to determine the pollution hazard index for the runoff and appropriate mitigation measures through SuDS. The strategy is to treat runoff at source and then connect to the main storm water network. Appropriate stages of treatment, often referred to as 'treatment trains' will be required to ensure adequate pollution mitigation is provided.

There are several zones within the development that require different treatment considerations. As shown on Figure 10 the various treatment zones are:

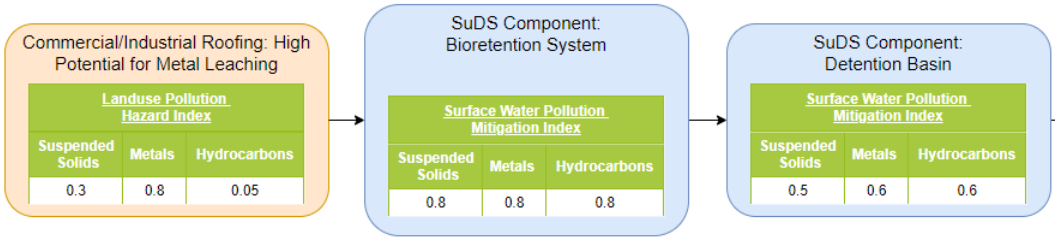
1. Roof (South);
2. Roof (North);
3. Car Parks;
4. Site Access Road;
5. MUGAs
6. Footpaths, school yard and sports yard; and
7. Northern Drop-Off Road
8. All-weather Pitch

Figure 10: Treatment Zones

A summary of the Simple Index Approach for each zone is included in Appendix E.

6.5.1 Roof (South)

The construction makeup of the roof for the proposed building is to be confirmed. However, it is currently expected to be an aluminium type. As such, it has conservatively been assumed that the "Commercial/Industrial Roofing: High potential for metal leaching" land use category could apply. With the source control bioretention system option required for interception, the SuDS treatment train would be as follows:



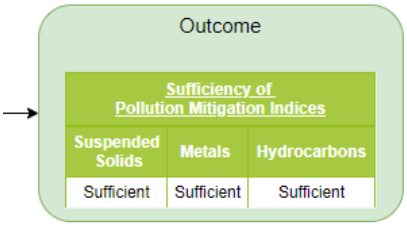


Figure 11: Roof (South) Treatment Train (Simple Index)

Therefore, a bioretention system would be suitable to treat the water to a sufficient level prior to discharging from the site.

6.5.2 Roof (North)

The construction makeup of the roof for the proposed building is to be confirmed. However, it is currently expected to be an aluminium type. As such, it has conservatively been assumed that the "Commercial/Industrial Roofing: High potential for metal leaching" land use category could apply. With the source control bioretention system option required for interception, the SuDS treatment train would be as follows:

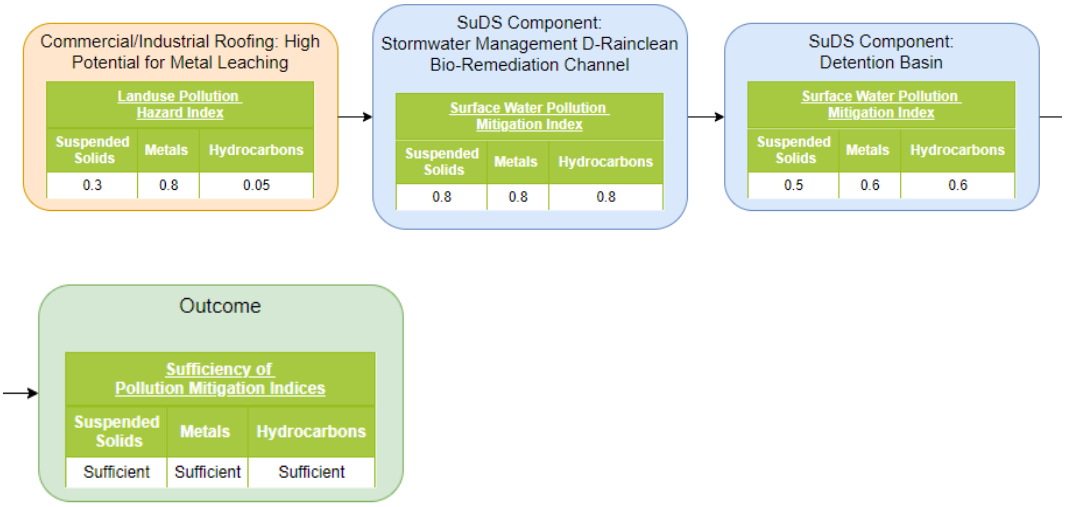


Figure 12: Roof (North) Treatment Train (Simple Index)

Therefore, a bio-remediation channel would be suitable to treat the water to a sufficient level prior to discharging from the site.

6.5.3 Car Parks

"Non-residential car parking with frequent change" category was selected.

It is proposed to use a pervious asphalt build-up for the car park, meaning that the surface water in this area is drained and treated at source. The SuDS treatment train is as follows:

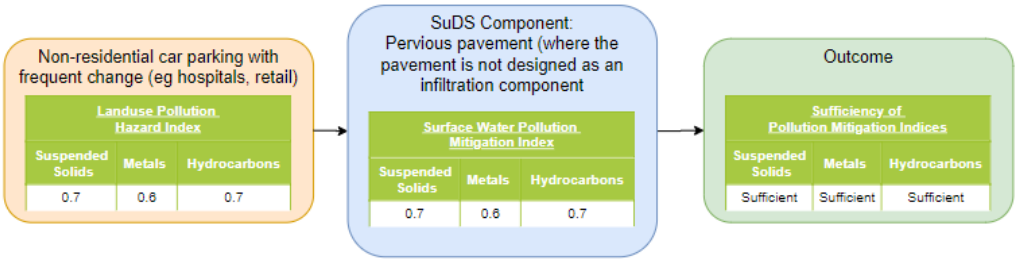


Figure 10: Car Park Treatment Train (Simple Index)

Therefore, pervious pavement would be suitable to treat the water to a sufficient level prior to discharging from the site

6.5.4 Site Access Road

Infrequent LGV movements are expected on site with some deliveries to the school and weekly refuse vehicles using the road. Therefore, the 'low traffic roads' category was selected.

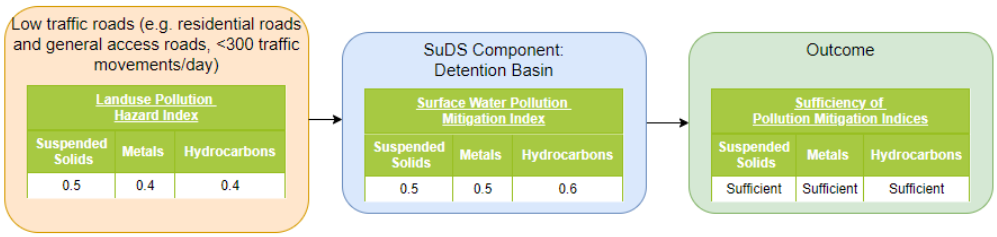
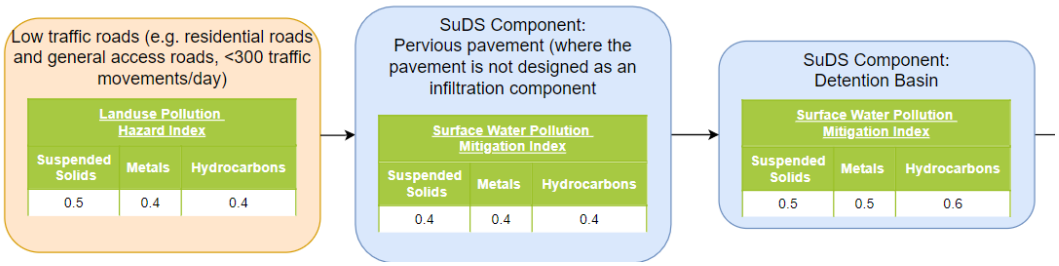


Figure 11: Site Access Road Treatment Train (Simple Index)

Therefore, the detention basin would be suitable to treat the water to a sufficient level prior to discharging from the site

6.5.5 MUGAs

Traffic is not expected on the MUGAs and therefore the 'low traffic roads' category has been selected.



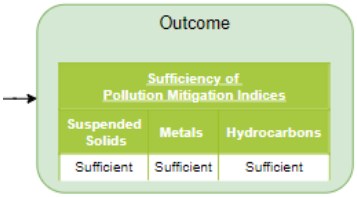


Figure 12: MUGA Treatment Train (Simple Index)

Therefore, the combination of permeable surfacing and the detention basin would be suitable to treat the water to a sufficient level prior to discharging from the site.

6.5.6 Footpaths, School Yard and Sports Yard

Occasional emergency access is expected in these areas of the site. Therefore, the 'low traffic roads' category was selected.

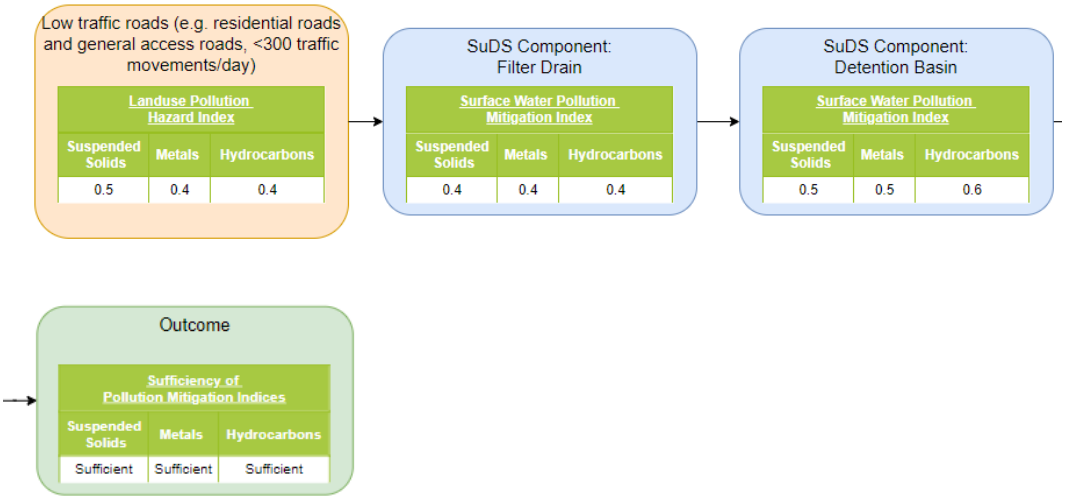


Figure 13: Footpaths, School Yard and Sports Yard Treatment Train (Simple Index)

Therefore, the combination of the filter drain and detention basin would be suitable to treat the water to a sufficient level prior to discharging from site.

6.5.7 Northern Drop-Off Road

Due to the volume of traffic anticipated to use the drop-off area, the 'roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)' category has been selected. Bioretention systems are proposed in this area of the site to capture the flows from the roads.

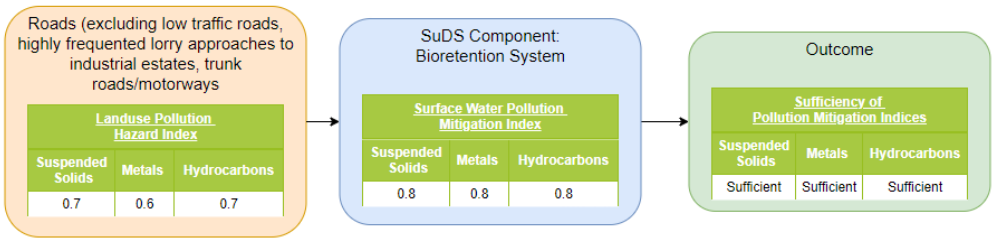


Figure 14: Northern Drop-Off Road Treatment Train (Simple Index)

Therefore, a bioretention system would be suitable to treat the water to a sufficient level prior to discharging from the site.

6.5.8 All-weather pitch

The drainage for the all-weather pitch is proposed to be undertaken by a specialist. The flows will be suitably treated by the construction layer and there will be no potential for contaminants to enter the drainage system, therefore no additional treatment is proposed. However, the detention basin will provide some further treatment downstream if necessary.

6.6 S4 – Amenity and S5 Biodiversity

The Welsh Standard S4 states that the surface water management systems should maximise amenity benefits.

The Welsh Standard S4 and S5 state that the surface water management system should maximise amenity and biodiversity benefits.

The use of bioretention systems would provide a planted green space that would add visual appeal to the development. The planting of the bioretention systems could be selected to provide a diverse range of flora. Similarly, the basins can be shaped to look visually appealing and provide provision for additional flora, fauna and wildlife habitats.

The planting types will be selected by a Landscape Architect in subsequent design stages.

6.7 S6 – Construction, Operation and Maintenance

Standard S6 requires that the proposed surface water drainage systems are designed such that they can be constructed, operated and maintained easily, safely and cost effectively for the whole design life of the systems. They should also aim to minimise the use of natural resources and embedded carbon.

These aspects will be considered through the design of the drainage system. A SuDS Management Plan will be developed to determine how the proposed SuDS features can be effectively and efficiently managed with associated ongoing costs for maintenance included where possible. Where possible, natural resources will be utilised.

The SuDS management plan will be submitted as part of the full SAB application.

An access track has been provided around each of the attenuation basins to facilitate an area for inspection and maintenance. Access to each basins has been incorporated into the design.

6.8 Additional Considerations

6.8.1 DCWW Storm drainage

A section of DCWW's existing storm drainage crosses the existing site to the south. This storm sewer will need to be retained as it services the existing residential development to the west.

7 Summary

This drainage strategy has considered the existing site conditions and constraints, the proposed development, together with potential discharge points.

The site is currently a school– concentrated to the west of the site. The site is within an area with a low risk of fluvial flooding. Localised areas within the site have low risk of surface water flooding. These areas appear to be topographical low areas centred around the watercourse running to the north east through the centre of the site.

DCWW's plans show a storm water network, servicing the western residential development, crosses the south of the proposed development traversing the site and discharging into the watercourse.

Access to the proposed development will be from the north be via Bryn Road as the existing case. The proposed school building and its associated infrastructure take up most of the phase 1 extents. Therefore, limited space is available to locate soft/green infrastructure to aid the SuDS network.

Significant earthworks are required to form the level plateau for the buildings due to the existing site slope. The proposed earthworks have shaped and informed the drainage strategy.

The proposed foul flows from the development were estimated based on inputs from the client indicating the likely population levels. DCWW have been consulted and confirmed they had sufficient capacity to accommodate the expected foul drainage. Due to the site levels and location of the public sewer a foul pumping station will be required to convey the foul flows to the public sewer.

The surface water drainage strategy has been considered in accordance with the Welsh Government's Statutory Standards for Sustainable Drainage Systems. Consideration has been given to the proposed runoff destination, hydraulic control, water quality, amenity and biodiversity for the scheme. The storm drainage proposals for the development will need to be approved by the local SAB. Bioretention media, detention basins and pervious pavements have been incorporated into the concept design, following SuDS standards. The GRR for the site has been estimated. Discharge from the areas current not developed will be limited to the GRR. And the areas that currently house the school and other impermeable areas will be limited to the 1:1 year brownfield rate with a 30% betterment.

Drawings

Drawing 1: Sheet 1	*FL0101-ARP-01-00-DR-C-22011*	*Proposed General Arrangement*
Drawing 2: Sheet 2	*FL0101-ARP-01-00-DR-C-22012*	*Proposed General Arrangement*
Drawing 3: Levels Sheet 1	*FL0101-ARP-01-00-DR-C-22021*	*Proposed External Finished*
Drawing 4: Levels Sheet 2	*FL0101-ARP-01-00-DR-C-22022*	*Proposed External Finished*
Drawing 5:	*FL0101-ARP-01-00-DR-C-21001*	*Proposed Earthworks*
Drawing 6:	*FL0101-ARP-01-00-DR-C-25001*	*Existing Drainage and Utilities*
Drawing 7:	*FL0101-ARP-01-00-DR-C-24001*	*Proposed Drainage Layout*

A1

Legend

Site Boundary

Notes

1. Do not scale from this drawing.

2. The details shown on this drawing are based on a RIBA Stage 3 produced for MIMWEP Stage 2. The details will need to be reviewed and revised during subsequent design stages.

3. Topographic survey based on: Argoed School, Bryn Road, Mold Site Survey May 2020, related to Ordnance Survey G.P.S. Datum HSP Consulting.

4. All levels are shown above ordnance datum (m AOD).

5. The details shown on this drawing are subject to change in subsequent design stages and following any potential comments received from statutory authorities.

6. Layouts are based on conceptual layouts received from Ares on 11-06-2021 and are subject to ongoing coordination and further design development during subsequent stages.

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P01	23/06/21	DS	AR	
Issued for Information				
Issue	Date	By	Chkd	Appd

ARUP

4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client

Flintshire County Council - WEPco

Project Title

Campus Mynydd Isa
Flintshire

Drawing Title

Proposed General Arrangement
Sheet 1

Draft

Scale at A1	1:500	Role	Infrastructure
Suitability	S2 - For Information		
Job No		Rev	
280340		P01	

Drawing No

FL0101-ARP-01-00-DR-C-20011

Do not scale

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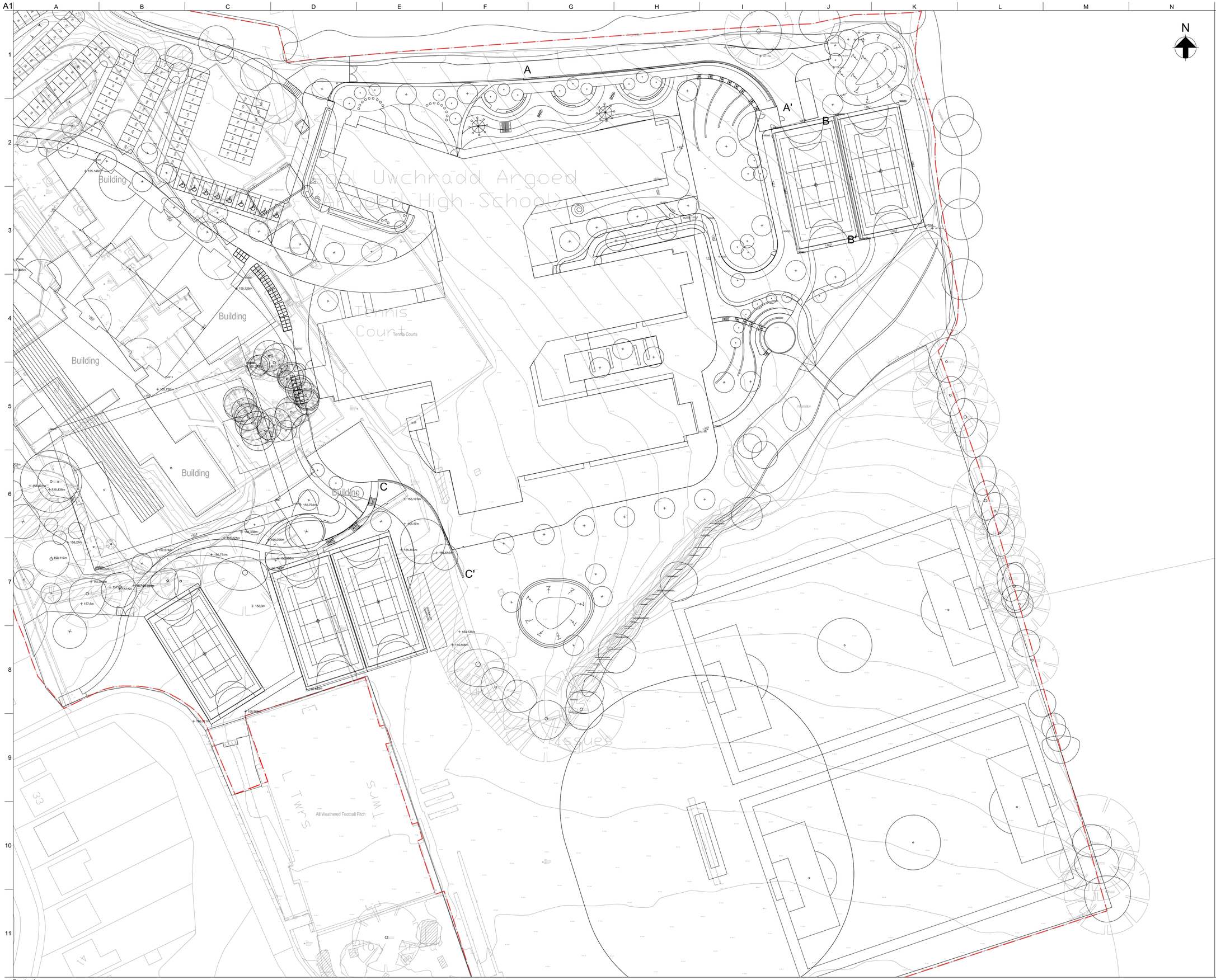

Legend

Site Boundary

Notes

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4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
Proposed General Arrangement
Sheet 2

Scale at A1: 1:500
Role: Infrastructure
Suitability: S2 - For Information
Job No: 280340
Rev: P01
Drawing No: FL0101-ARP-01-00-DR-C-20012

Draft

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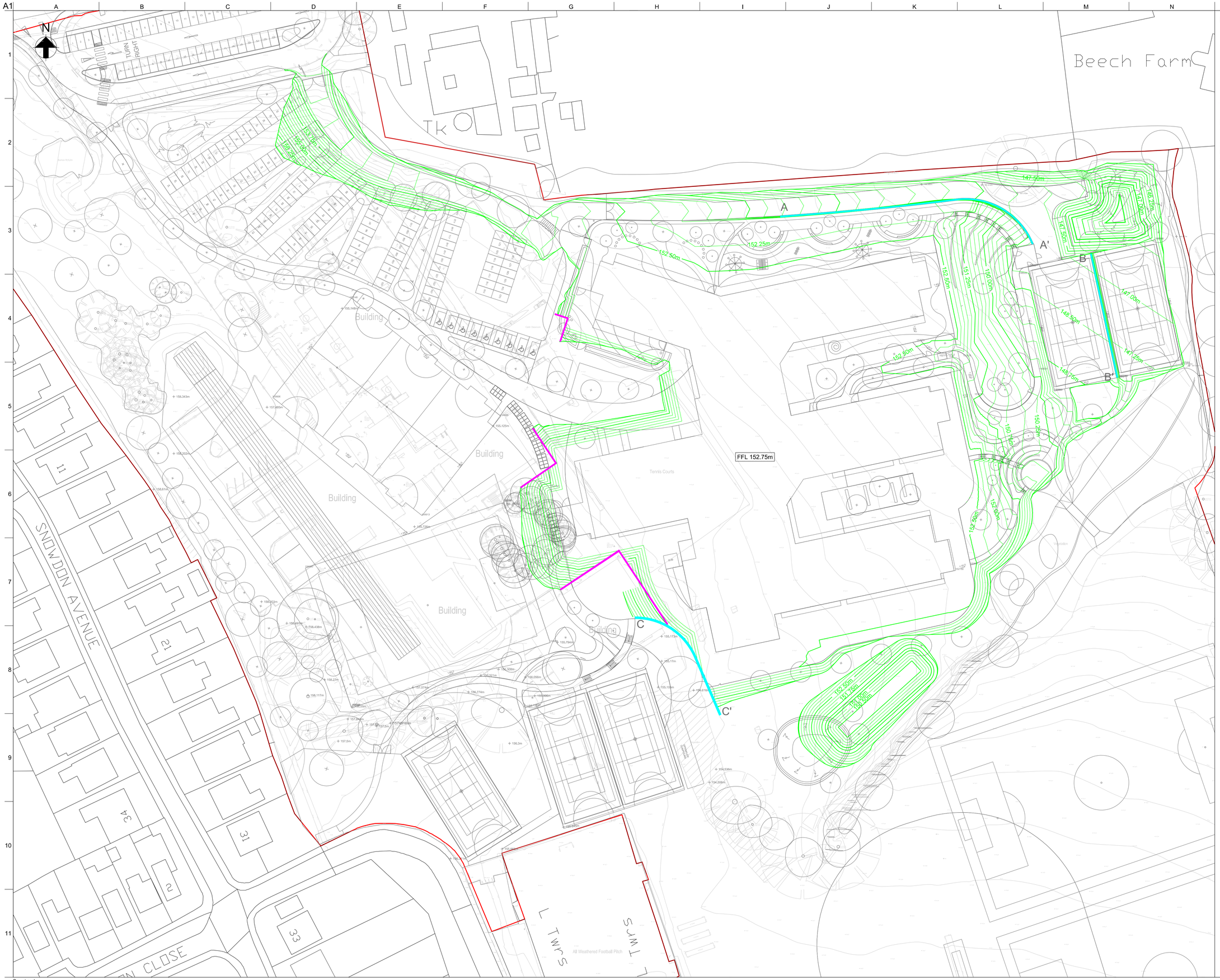

Legend

- Site Boundary
- 148.0m — Proposed Finished Levels Contour
- Permanent Retaining Wall (Refer to Structures drawing for details)
- Indicative Temporary Case Retaining Wall shown for information (done by others)

Notes

1. Do not scale from this drawing.

2. The details shown on this drawing are based on a RIBA Stage 3 produced for MIMWEP Stage 2. The details will need to be reviewed and revised during subsequent design stages.

3. Topographic survey based on: Argoed School, Bryn Road, Mold Site Survey May 2020, related to Ordnance Survey G.P.S. Datum HSP Consulting.

4. All levels are shown above ordnance datum (m AOD).

5. The details shown on this drawing are subject to change in subsequent design stages and following any potential comments received from statutory authorities.

6. Existing school to remain open during construction phase of new school. Consideration needs to be given on how the school will operate and how the new plateau will be formed. A phase boundary is required to inform the earthworks and if interim retaining structure is required during construction phase to accommodate the existing school.

7. Earthworks slopes shown are 1 in 3.

8. All roads to be cambered or with a cross-fall.

9. Layouts are based on conceptual layouts received from Ares on 11-06-2021 and are subject to ongoing coordination and further design development during subsequent stages.

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P01	23/06/21	DS	AR	
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4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
External Finished Levels
Phase 1

Scale at A1: 1:500 | Role: Infrastructure

Suitability: S2 - For Information

Job No: **280340** | Rev: **P01**

Drawing No
FL0101-ARP-01-00-DR-C-20021

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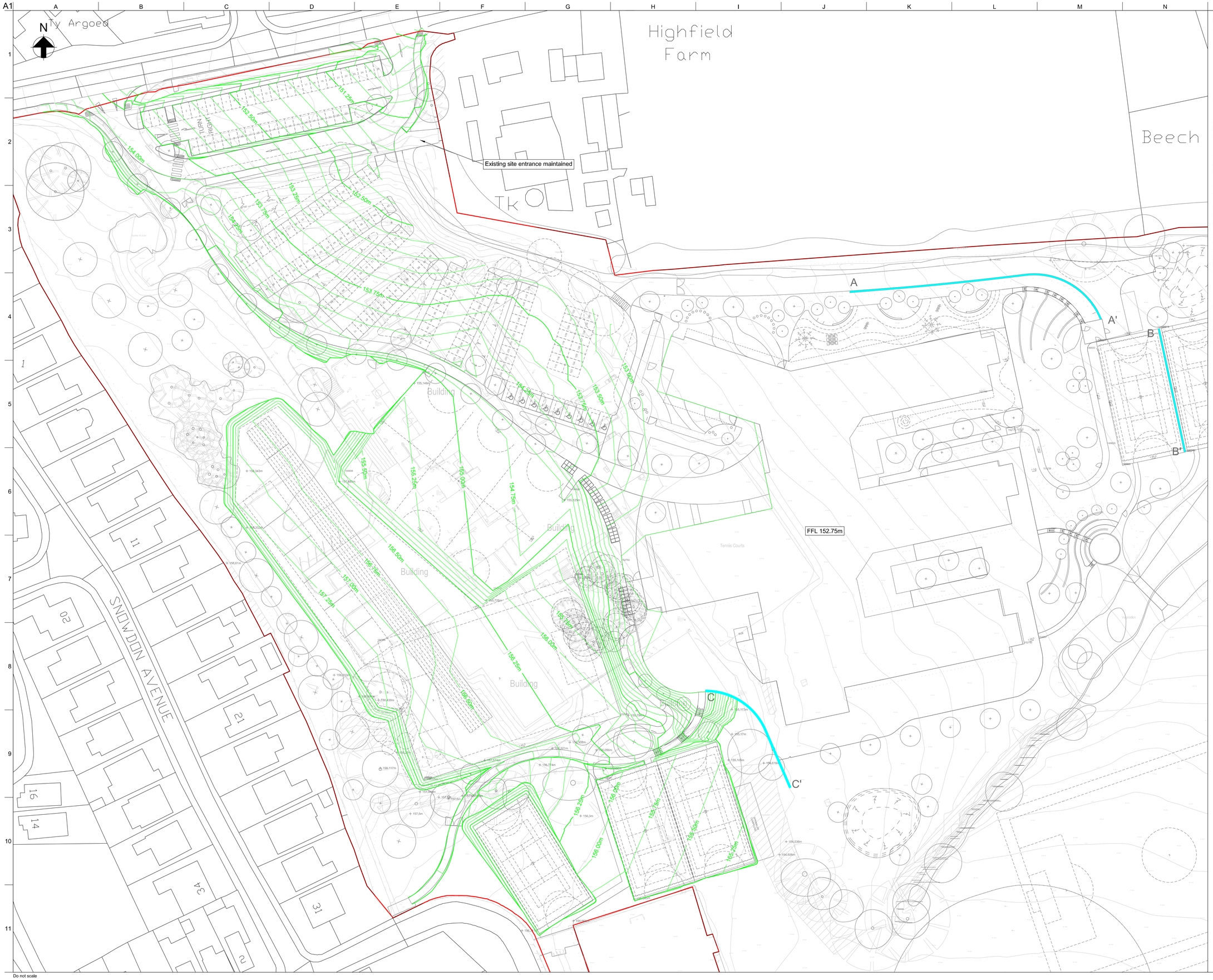

Legend

- Site Boundary
- 148.0m — Proposed Finished Levels Contour
- Permanent Retaining Wall (Refer to Structures drawing for details)

Notes

1. Do not scale from this drawing.
2. The details shown on this drawing are based on a RIBA Stage 3 produced for MIMWEP Stage 2. The details will need to be reviewed and revised during subsequent design stages.
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Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
External Finished Levels
Phase 2

Scale at A1: 1:500
Role: Infrastructure
Suitability: S2 - For Information
Job No: 280340
Rev: P01
Drawing No: FL0101-ARP-01-00-DR-C-20022

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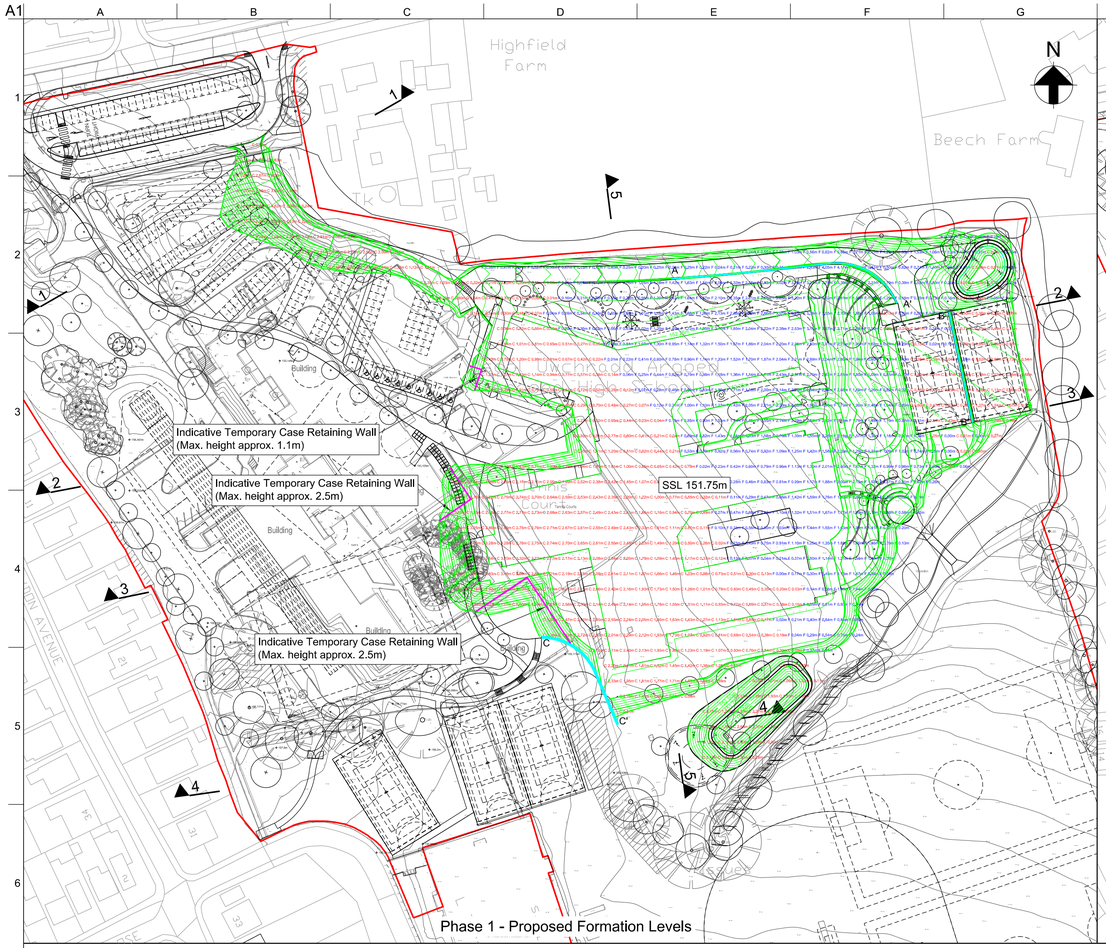
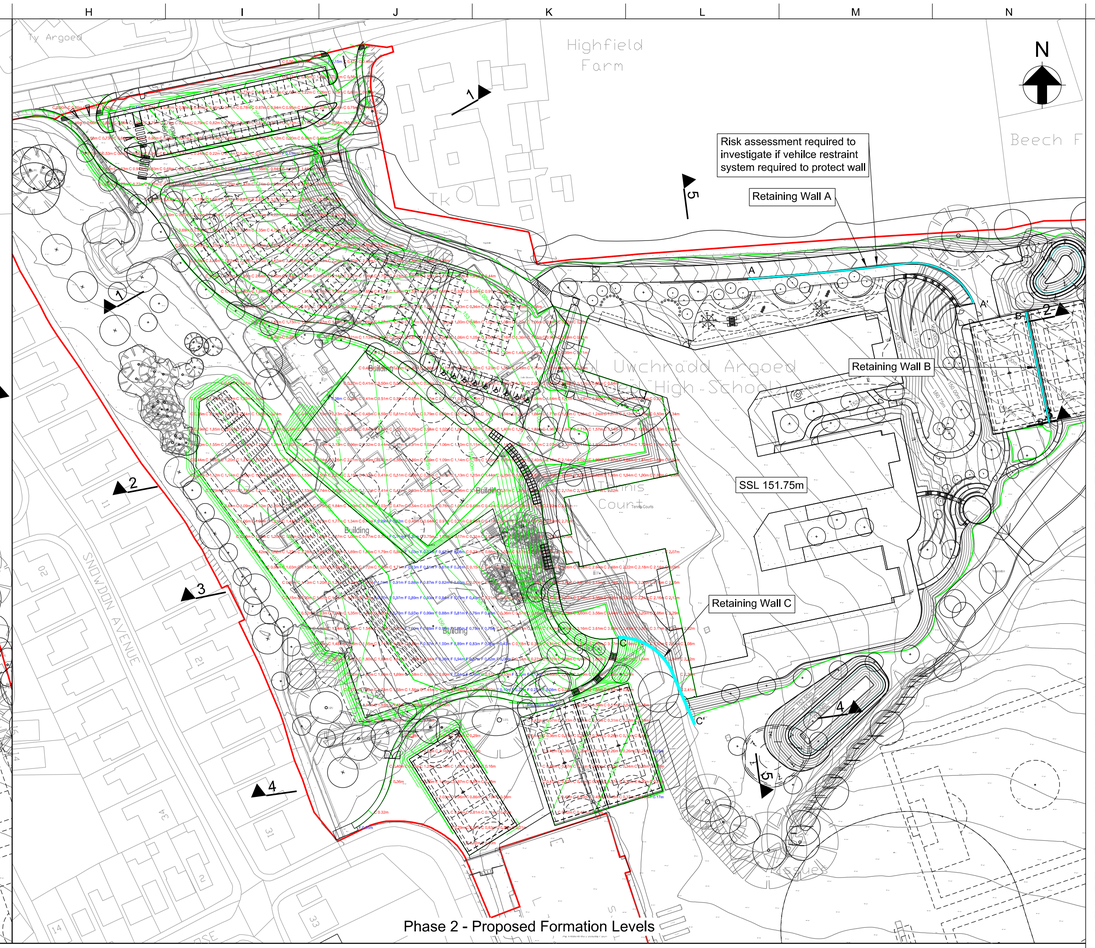
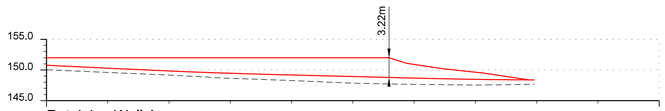


Phase 1 - Proposed Formation Levels



Phase 2 - Proposed Formation Levels



Retaining Wall A
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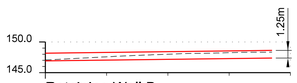

Retaining Wall B
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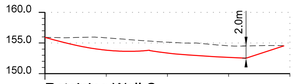

Retaining Wall C
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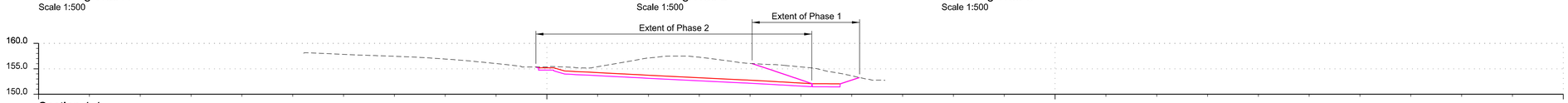

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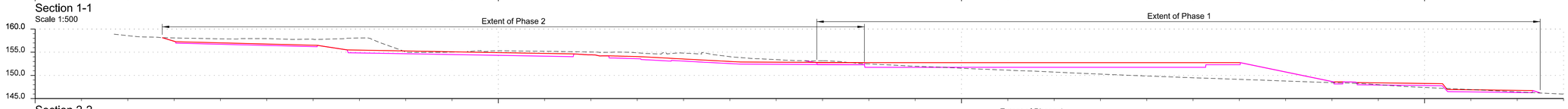

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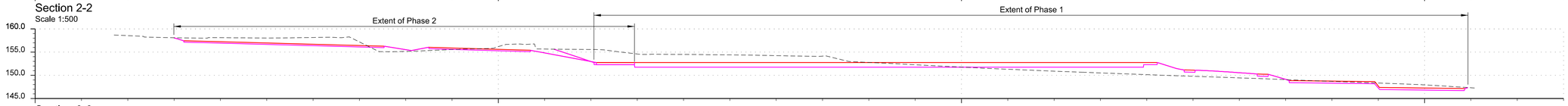

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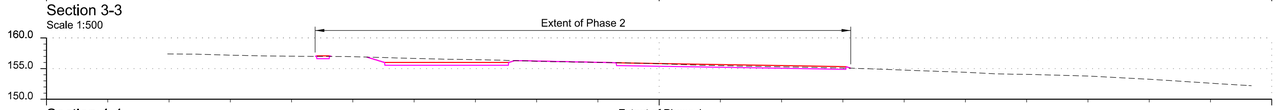

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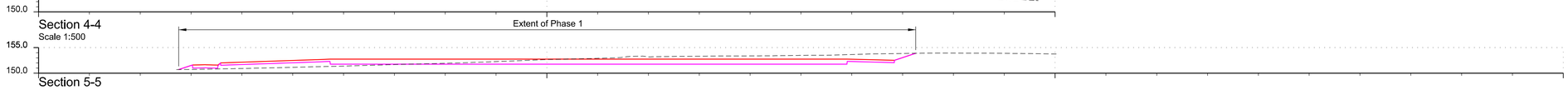

Section 5-5
Scale 1:500

Legend - Plan

- Site Boundary
- Phase 1 and 2 Formation Levels Contours (148.0m)
- C 0.60m — Proposed depth of Cut
- F 0.71m — Proposed depth of Fill
- Permanent Retaining Wall
- Indicative Temporary Case Retaining Wall

Legend - Cross Sections

- Proposed Finished Level
- Proposed Formation Level

Volume Calculations

Phase 1
Cut: 13966 cu m
Fill: 12688 cu m
Net: 1278 cu m

Phase 2
Cut: 29884 cu m
Fill: 890 cu m
Net: 28994 cu m

Basin
Cut: 1025 cu m
Fill: 0 cu m
Net: 1025 cu m

Note - Volumes do not include top soil strip

Notes

1. Do not scale from this drawing.

2. The details shown on this drawing are based on a RIBA Stage 3 produced for MIMWEP Stage 2. The details will need to be reviewed and revised during subsequent design stages.

3. Topographic survey based on: Argoed School, Bryn Road, Mold Site Survey May 2020, related to Ordnance Survey G.P.S. Datum HSP Consulting.

4. All levels are shown above ordnance datum (m AOD).

5. The details shown on this drawing are subject to change in subsequent design stages and following any potential comments received from statutory authorities.

6. All imported material to be Granular Class 1A / 1B general fill and be placed and compacted in layers, in accordance with earthworks specification.

7. The earthworks strategy is to achieve a cut/fill balance for the two phases to minimise amount of imported material and to mitigate the need for temporary stockpiling during construction. A balance has been found for the first phase. The finished levels of the second phase will need to be raised to reduce the current net material - to be undertaken at future design phases.

8. Assumed construction build-ups:-
Phase 1 - 500mm
Phase 2 - 450mm

Build-up depth to be confirmed at future design phases and likely to be revised in due course.

Note the construction build-up refers to the depth between the formation and finished levels.

9. Layouts are based on conceptual layouts received from Ares on 11-06-2021 and are subject to ongoing coordination and further design development during subsequent stages.

Issue	Date	By	Chkd	Appd
P01	23/06/21	DS	AR	

Issued for Information

ARUP

4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
Proposed Earthworks

Scale at A1 1:1000 | Role Infrastructure

Suitability S2 - For Information

Job No 280340 | Rev P01

Drawing No FL0101-ARP-01-00-DR-C-21001

Draft

J:\280000\280340\4 Internal Project Data\4-30 Drawings\4-31 Issue drawings\FL0101-ARP-DR-C-00041.dgn

Do not scale

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Legend

- Site Boundary
- Surface Water Drainage
- Foul Water Drainage
- Rising Main (Assumed location, to be confirmed following further investigation)
- Easement
- Electric
- Telecoms
- Telecoms - Overhead
- Gas
- Water
- CCTV
- Heating and Cooling Main
- Drainage Channel
- Unknown

Notes

1. Do not scale from this drawing.

2. The details shown on this drawing are based on a RIBA Stage 3 produced for MIMWEP Stage 2. The details will need to be reviewed and revised during subsequent design stages.

3. Topographic survey based on: Argoed School, Bryn Road, Mold Site Survey May 2020, related to Ordnance Survey G.P.S. Datum HSP Consulting.

4. All levels are shown above ordnance datum (m AOD).

5. The details shown on this drawing are subject to change in subsequent design stages and following any potential comments received from statutory authorities.

6. Easements of public utilities to be confirmed with Statutory and will be shown on future design stage.

7. The positions of the existing services on this drawing have been interpreted from information and HSP Consulting's survey drawing received from the statutory local authorities. No responsibility can be taken for the accuracy of utilities Information provided.

8. Contractor to identify any unknown services prior to commencement of works.

9. Contractor to consult with appropriate statutory authorities prior to commencement of works on their assets.

10. Refer to MEP drawings for the utility strategy and how the services are to be removed and at what stage of the project.

11. The existing drainage of the school site will need to be accommodated during construction. Details to be confirmed at future design stages.

Issue	Date	By	Chkd	Appd
P01	23/06/21	DS	AR	
Issued for Information				

ARUP

4 Pierhead St. Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
Existing Drainage and Utilities

Scale at A1: 1:1000 | Role: Infrastructure

Suitability: S2 - For Information

Job No: **280340** | Rev: **P01**

Drawing No
FL0101-ARP-01-00-DR-C-25001

Draft

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Do not scale

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A1

Existing 225mm pipe to be retained and drainage for revied bus drop off area and Northern Car Park to connect. Flow rates to be confirmed by SAB. Assume existing flows with an agreed percentage reduction.

Bioretention features collect and treat car park run-off for mobilised pollutants

Filter trench to drain footway

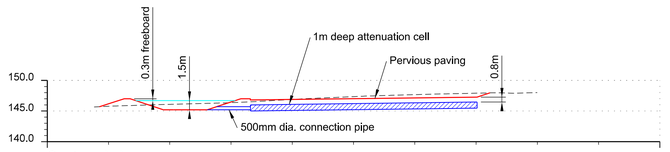
Car park attenuated by pervious paving, approximately 350m³ of storage provided

Proposed drainage connection from all weather pitches. Drainage to pitches to be undertaken by specialist.

Grass fields to have field drainage - designed by others (connection provided)

Rising main connection to existing foul sewer adjacent to Snowdon Avenue (TBC by DCWW).

450mm dia. storm drainage shown on DCWW Asset Plan. Pipe not identified on buried ground survey. Assumed to be retained as existing.



Section A-A

Space allowed for attenuation basin within Masterplan not sufficient for extreme storm events. 150m³ basin provided with connection to 700m³ attenuation cell beneath pervious pavement to attenuate 1.4ha flows from school eastern roof areas and roads.

Stormwater connection to watercourse restricted by Vortex flow control.
Outfall = 17.3 l/s
Design Head = 1.518m

Discharge rate to be agreed with SAB

Location of watermain to be confirmed. Easement shown is plotted realtive to indicative route.

Pervious pavement with additional storage to accomodate large storm events

Eastern Basin (Unlined)

Building Outline - Internal layout not shown for clarity

Hardstanding to be drained into bioretention areas and tree pits

Existing watercourse

Approx. 200m² of bioretention features around building perimeter to treat stormwater flows from roofs prior to outfall to drainage network. Location of bioretention to be reviewed to avoid building entrances and other perimeter features.

Southern Basin (Unlined)

Stormwater connection to watercourse restricted by Vortex flow control.
Outflow = 61.8 l/s
Design Head = 1.018m

Discharge rate to be agreed with SAB.

220m³ basin to attenuate 0.8ha flows from sports pitches and western roof stormwater flow.

Existing field drain retained

Drainage in this area to be retained as existing servicing areas outside the site boundary (See Note 12).

Legend

- Site Boundary

Legend - Existing Services

- Surface Water Drainage
- Foul Water Drainage

Legend - Proposed Services

- Surface Water Drainage
- Perforated Pipes
- Foul Water Drainage
- Rising Main
- Package Pumping Station
- Approximate Attenuation Cell Footprint
- Pervious Paving
- Bioretention
- Filter Trench
- Headwall
- Vortex Flow Control
- Bio-remediation Drainage Channel

Notes

1. Do not scale from this drawing.

2. The details shown on this drawing are based on a RIBA Stage 2 produced for MIMWEP Stage 1. The details will need to be reviewed and revised during subsequent design stages.

3. Topographic survey based on: Argoed School, Bryn Road, Mold Site Survey May 2020, related to Ordnance Survey G.P.S. Datum HSP Consulting.

4. All levels are shown above ordnance datum (m AOD).

5. The details shown on this drawing are subject to change in subsequent design stages and following any potential comments received from statutory authorities.

6. Drainage design and construction is in accordance with Sewers for Adoption 7th edition and the requirements of the statutory undertaker.

7. Level of outfall to be confirmed prior to commencement of construction.

8. Drawing to be reviewed, developed further and revised in subsequent design stage.

9. Drainage of car parks utilises drainage layer beneath the surface as shown in Construction Build Up Drawing ARP-0-0-DR-00061.

10. Existing school drainage network not shown. The existing drainage of the school site will need to be accommodated during construction. Details to be confirmed at future design stages.

11. Location of Rainwater down pipes to be confirmed at future design stages and drainage design to be updated.

12. Layouts are based on conceptual layouts received from Ares on 26-02-2021 and are subject to ongoing coordination and further design development during subsequent stages.

13. All existing drainage servicing existing school building to be removed (Not shown on drawing for clarity).

Issue	Date	By	Chkd	Appd
P01	23/06/21	DS	AR	

Issued for Information

ARUP

4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277

Client
Flintshire County Council - WEPco

Project Title
Campus Mynydd Isa
Flintshire

Drawing Title
Proposed Drainage

Scale at A1: 1:500 | Role: Infrastructure

Suitability: S2 - For Information

Job No: 280340 | Rev: P01

Drawing No: FL0101-ARP-01-00-DR-C-24001

Draft

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Do not scale

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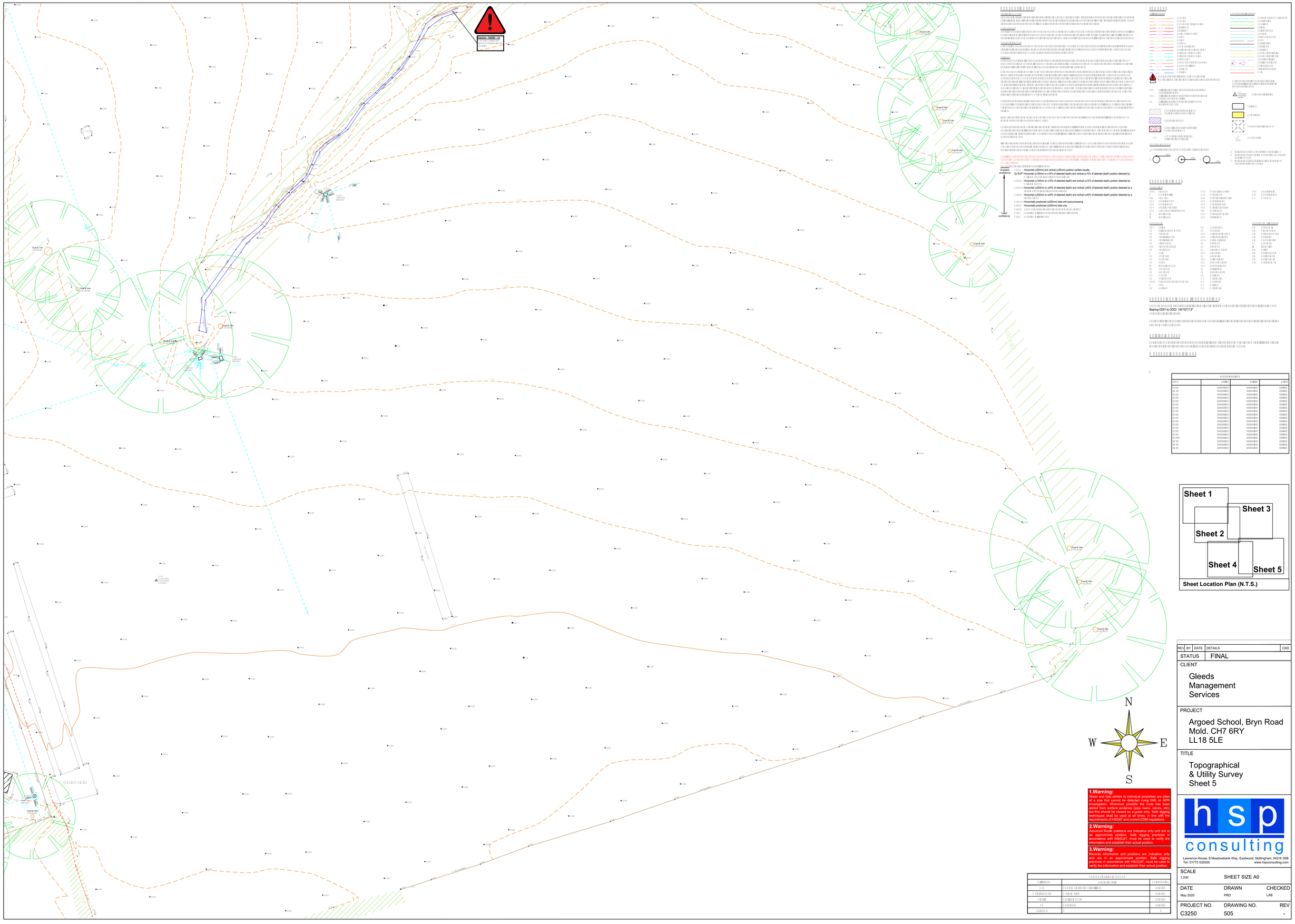
Appendix A

Existing Topography Drawing


Caution - HAZARD - 12
Trunk Ø 1.4m
Trunk Ø 0.6m
Trunk Ø 0.6m
Trunk Ø 0.6

N

W E

S

Trunk Ø 1.4m

Trunk Ø 0.6m

Trunk Ø 0.8m

Trunk Ø 0.4m

Trunk Ø 1.2m

Trunk Ø 0.5m

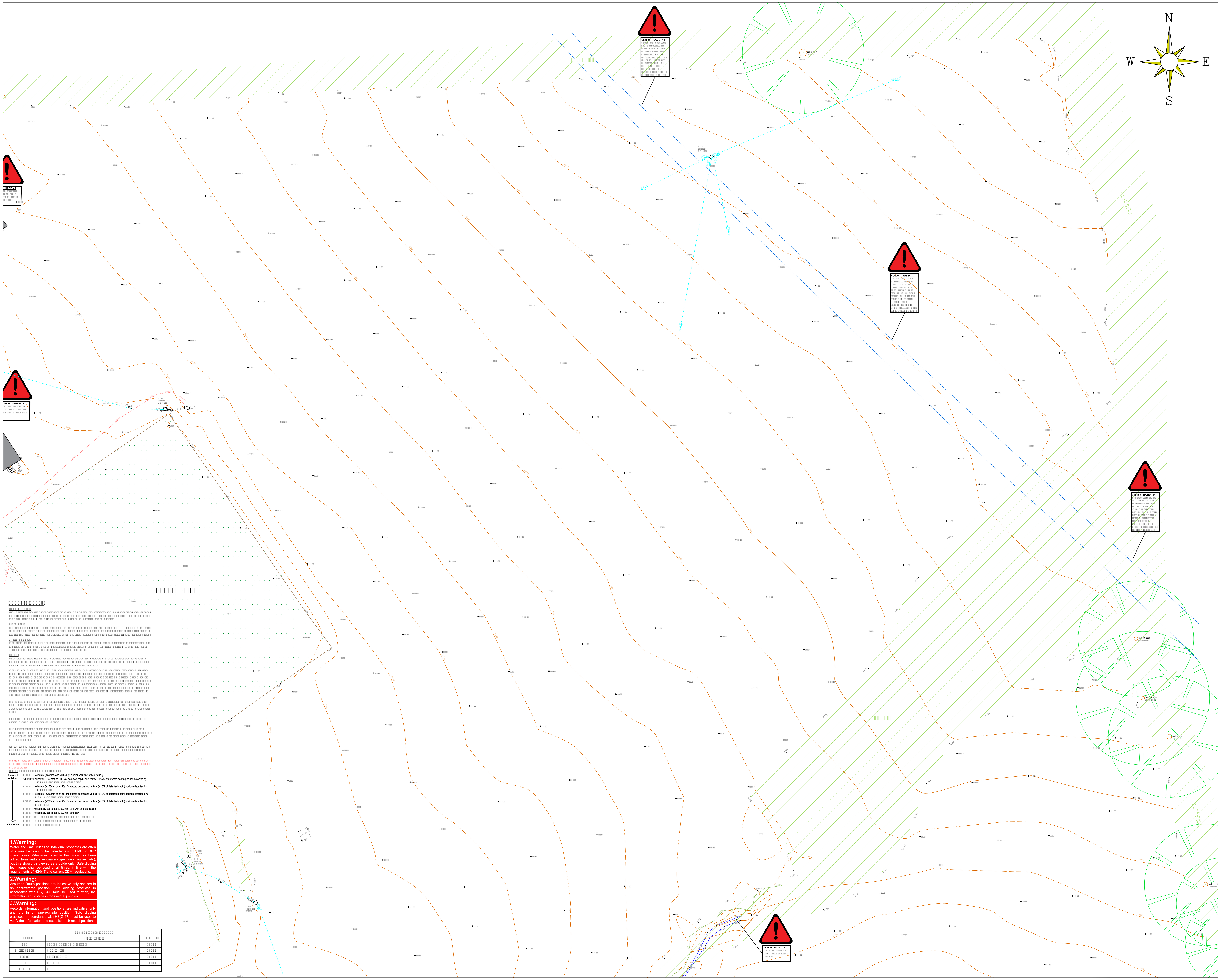
Trunk Ø 0.6m

Trunk Ø 0.8m

Trunk Ø 0.6m

Trunk Ø 0.6m

Trunk Ø 0.6



Bearing OD01 to OD02: 145°03'17.9"

Greatest confidence	Horizontal (±50mm) and vertical (±25mm) position verified visually.
	QL"B1P" Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by
	Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by
	Horizontal (±250mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a
	Horizontal (±250mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a
	Horizontally positioned (±500mm) data with post processing
Least confidence	Horizontally positioned (±500mm) data only

1.Warning:
Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation. Whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only. Safe digging techniques shall be used at all times, in line with the requirements of HSG47 and current CDM regulations.

2.Warning:
Assumed Route positions are indicative only and are in an approximate position. Safe digging practices in accordance with HS(G)47, must be used to verify the information and establish their actual position.

3.Warning:
Records information and positions are indicative only and are in an approximate position. Safe digging practices in accordance with HS(G)47, must be used to verify the information and establish their actual position.

Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5

Sheet Location Plan (N.T.S.)

REV	BY	DATE	DETAILS	CKD
-				

STATUS FINAL

CLIENT
Gleeds Management Services

PROJECT
Argoed School, Bryn Road
Mold. CH7 6RY
LL18 5LE

TITLE
Topographical & Utility Survey
Sheet 3

hsp consulting

Lawrence House, 6 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

SCALE	SHEET SIZE A0	
1:200		
DATE	DRAWN	CHECKED
May 2020	PRD	LAB
PROJECT NO.	DRAWING NO.	REV
C3250	503	-

Greatest confidence

Horizontal (±50mm) and vertical (±25mm) position verified visually.

QL"B1P" Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by

Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by

Horizontal (±250mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a

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Horizontally positioned (±500mm) data with post processing

Horizontally positioned (±500mm) data only

Least confidence

1.Warning:
Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation. Whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only. Safe digging techniques shall be used at all times, in line with the requirements of HSG47 and current CDM regulations.

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3.Warning:
Records information and positions are indicative only and are in an approximate position. Safe digging practices in accordance with HS(G)47, must be used to verify the information and establish their actual position.

REV	BY	DATE	DETAILS	CKD
-				

STATUS FINAL

CLIENT
Gleeds Management Services

PROJECT
Argoed School, Bryn Road
Mold. CH7 6RY
LL18 5LE

TITLE
Topographical & Utility Survey Sheet 2

hsp consulting

Lawrence House, 6 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

SCALE	SHEET SIZE A0	
1:200		
DATE	DRAWN	CHECKED
May 2020	PRD	LAB
PROJECT NO.	DRAWING NO.	REV
C3250	502	-

Greatest confidence

Horizontal (±50mm) and vertical (±25mm) position verified visually.

QL"B1P" Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by

Horizontal (±150mm or ±15% of detected depth) and vertical (±15% of detected depth) position detected by

Horizontal (±250mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a

Horizontal (±250mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a

Horizontally positioned (±500mm) data with post processing

Horizontally positioned (±500mm) data only

Least confidence

Bearing OD01 to OD02: 145°03'17.9"

1.Warning:
Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation. Whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only. Safe digging techniques shall be used at all times, in line with the requirements of HSG47 and current CDM regulations.

2.Warning:
Assumed Route positions are indicative only and are in an approximate position. Safe digging practices in accordance with HS(G)47, must be used to verify the information and establish their actual position.

3.Warning:
Records information and positions are indicative only and are in an approximate position. Safe digging practices in accordance with HS(G)47, must be used to verify the information and establish their actual position.

Sheet 1	Sheet 2	Sheet 3	Sheet 4	Sheet 5

Sheet Location Plan (N.T.S.)

REV	BY	DATE	DETAILS	CKD
-				

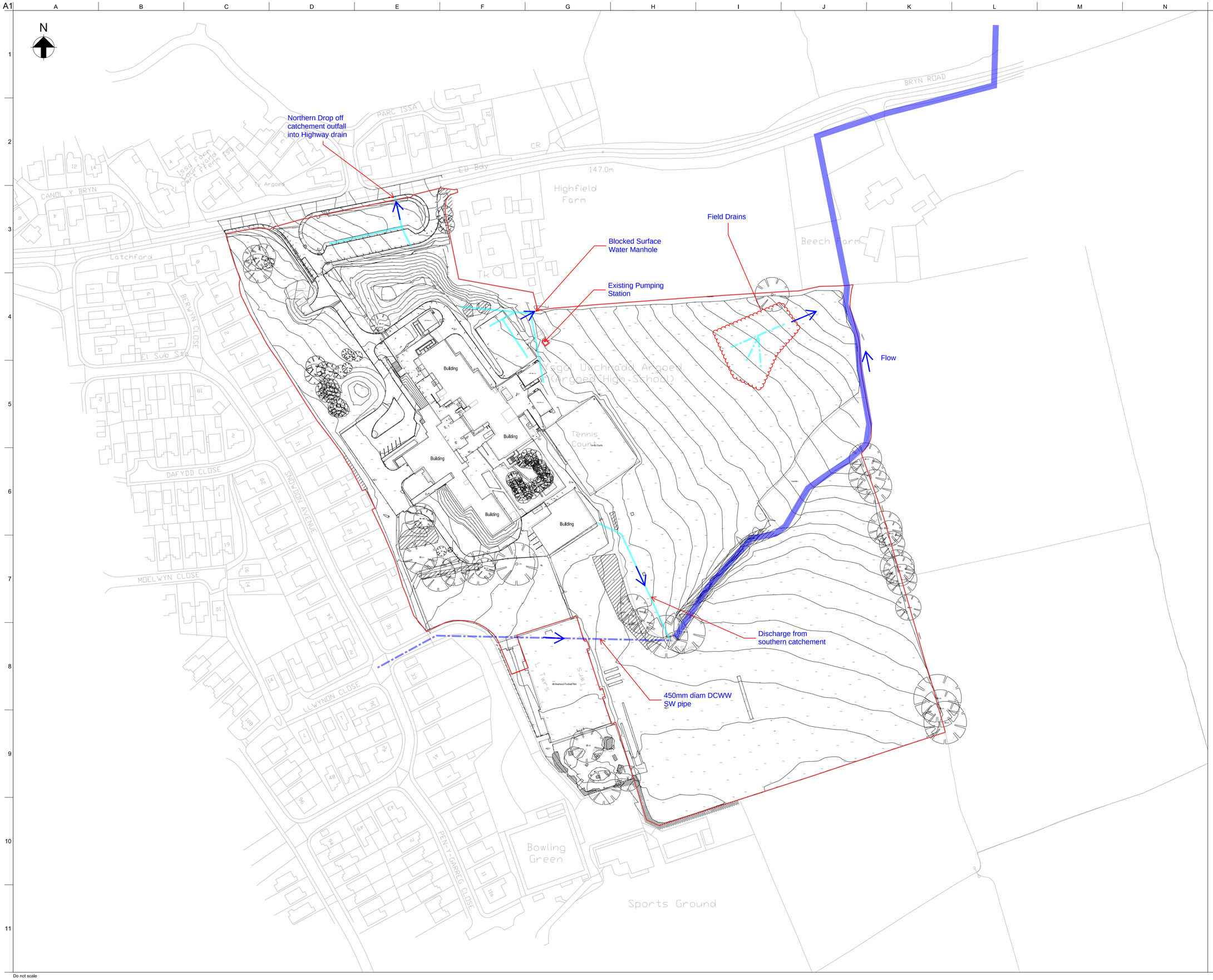
STATUS	FINAL
CLIENT	Gleeds Management Services
PROJECT	Argoed School, Bryn Road Mold. CH7 6RY LL18 5LE
TITLE	Topographical & Utility Survey Sheet 1

hsp consulting
Lawrence House, 6 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

SCALE	SHEET SIZE A0	
1:200		
DATE	DRAWN	CHECKED
May 2020	PRD	LAB
PROJECT NO.	DRAWING NO.	REV
C3250	501	-

Appendix B

Existing Drainage Features



Legend

Site Boundary

Notes

1. Do not scale from this drawing.

Sketch - CIV-20001

Argoed School Site Drainage Features

Do not scale

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Appendix C

Hydrology Calculations

File Note

ARUP

4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

t +44 29 2047 3727
f +44 29 2047 2277

Project title	Mynydd Isa Primary School	Job number	280340
cc		File reference	4-20
Prepared by	Jim Newbold (Cardiff)	Date	24 June 2021
Subject	Hydrology Calculations		

1 Introduction

The note outlines the considerations made when assessing the drainage strategy for the proposed Mynydd Isa primary school in Argoed, Flintshire.

The Greenfield Runoff Rate was assessed using the IH124 method and the ICP SuDS method and which were used to inform the drainage requirements for the site.

The Brownfield Runoff Rate was assessed by creating a Microdrainage model of the existing drainage network, based on the topographical and utility information available.

This technical note outlines the method of calculation for both runoff rates and how the two rates were interpreted to deduce discharge conditions for the site, used to inform the proposed drainage strategy.

2 Existing Drainage

The existing drainage information for the site was assessed and a sketch was drawn to summarise the estimated catchment plan for the existing site. DCWW asset records and a topographical survey carried out by HSP Consulting in May 2020 were used to inform these plans.

Figure 1: Existing Catchment Plan – informed by topographical survey carried out by John Vincent Surveys in July 2019.

3 Greenfield Runoff Rate Calculation

Surface water on the development will be required to be controlled up to the 1:100-year rainfall event. The Greenfield Runoff Rate (GRR) for the 1:100-year event was calculated using the IH124 method and then with the ICP SuDS method in order to check accuracy of the results.

3.1 IH124 Method

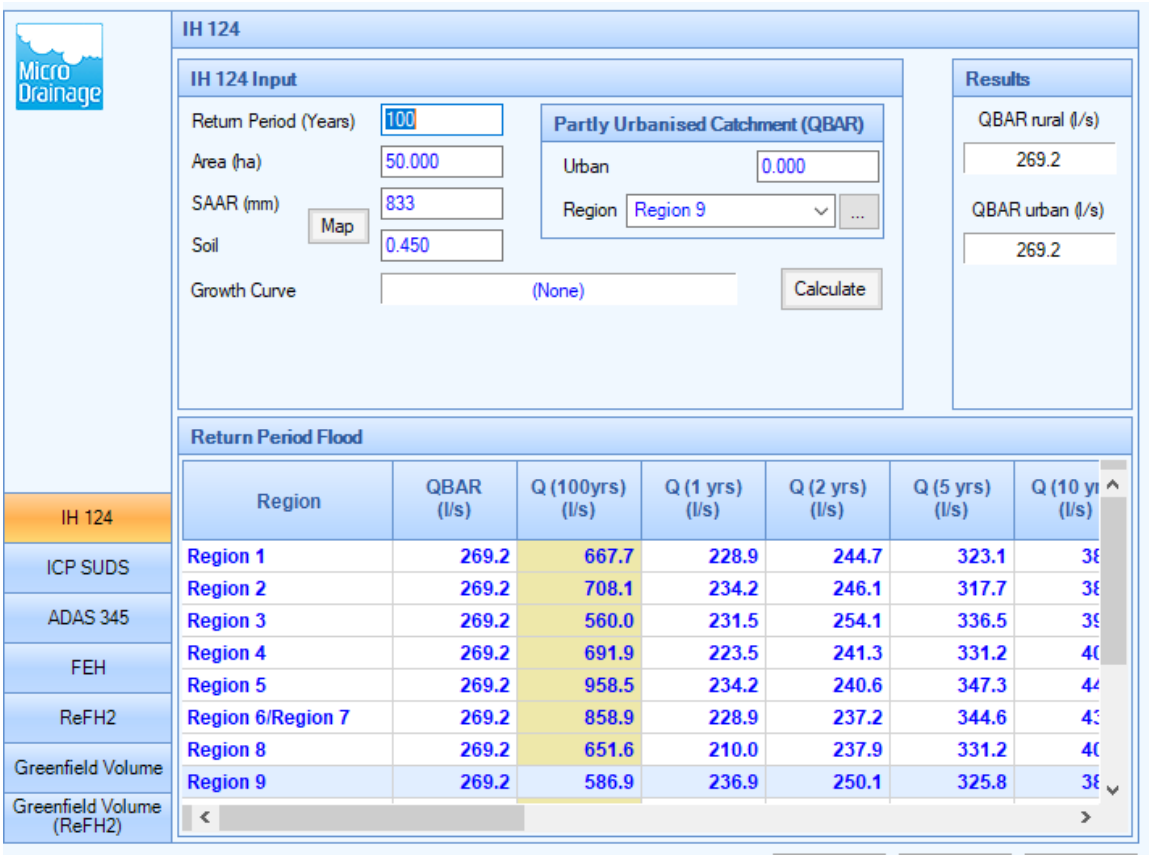
The IH124 method is recommended to be used to calculate GRR for areas of 50ha or above. If a site is less than 50ha it is advised to calculate the flow rate for 50ha and then to prorate the flow for the desired area. The impermeable area of the proposed development was measured to be approximately 15.3ha. Therefore, the Microdrainage Rural Runoff Calculator was used to run the IH124 method for a 50ha area and then the results prorated per ha of proposed impermeable area. Table 1 and Figure A show the results below.

Table 1: Greenfield Runoff Rates (IH124 Method)

Return Period	**Flow Rate (l/s/ha)**
1 in 1-year	4.7
1 in 30-year	9.5
1 in 100-year	11.7
Qbar	5.4

File Note

280340 24 June 2021



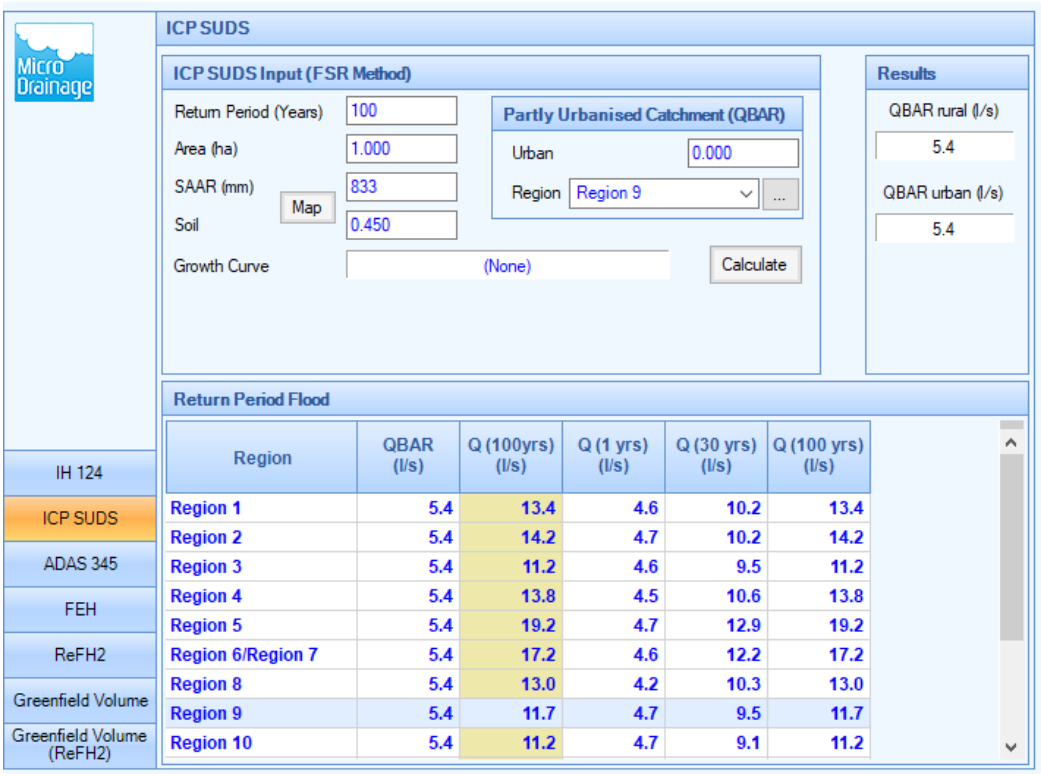
Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yr (l/s)
Region 1	269.2	667.7	228.9	244.7	323.1	38
Region 2	269.2	708.1	234.2	246.1	317.7	38
Region 3	269.2	560.0	231.5	254.1	336.5	39
Region 4	269.2	691.9	223.5	241.3	331.2	40
Region 5	269.2	958.5	234.2	240.6	347.3	44
Region 6/Region 7	269.2	858.9	228.9	237.2	344.6	43
Region 8	269.2	651.6	210.0	237.9	331.2	40
Region 9	269.2	586.9	236.9	250.1	325.8	38

Figure A: Microdrainage IH124 Method Modelling

3.2 ICP SuDS Method

In order to provide an estimate for sites of impermeable area that are less than 50ha, the ICP SuDS method can also be used. This is another function that is also included within the Micordrainage Rural Runoff Calculator. The results are shown in Table 2 and Figure B below.

Table 2: Greenfield Runoff Rates (ICP SuDS Method)	
Return Period	**Flow Rate (l/s/ha)**
1 in 1-year	4.7
1 in 30-year	9.5
1 in 100-year	11.7
Qbar	5.4



Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	5.4	13.4	4.6	10.2	13.4
Region 2	5.4	14.2	4.7	10.2	14.2
Region 3	5.4	11.2	4.6	9.5	11.2
Region 4	5.4	13.8	4.5	10.6	13.8
Region 5	5.4	19.2	4.7	12.9	19.2
Region 6/Region 7	5.4	17.2	4.6	12.2	17.2
Region 8	5.4	13.0	4.2	10.3	13.0
Region 9	5.4	11.7	4.7	9.5	11.7
Region 10	5.4	11.2	4.7	9.1	11.2

Figure B: Microdrainage ICP SuDS Method Modelling

4 Brownfield Runoff Rate

Drainage modelling software called Microdrainage was used to model the existing site storm drainage network, based on the topographical and utilities information. In order to obtain a brownfield runoff rate for the existing site, a 1-year return period event was simulated on the network. The resulting flows are collated in Table 3 below:

Table 3: Brownfield Runoff Rates (Microdrainage Modelling)	
Return Period	**Flow Rate (l/s)**
Southern Catchment	12.9
Central Catchment	92
Northern Drop-Off Catchment	29.2
TOTAL	**134.1**

5 Discharge Rate Calculations

In order to calculate a combined discharge rate for each of the proposed catchments, the existing brownfield contributions to each proposed catchment were considered. Table 4 below shows the brownfield contributions of the existing northern and southern catchments, and the respective contributions to the proposed eastern (phase 1) and western (phase 2) catchments:

Catchment	Existing Impermeable Area (ha)	Existing Impermeable Area within Phase 1	Existing Impermeable Area within Phase 2
Northern	1.063	0.168	0.895
Southern	0.165	0.026	0.139
TOTAL	1.228	0.194	1.034

Table 4: Existing Catchment Brownfield Contributions

In line with the North Wales SuDS design guidance, it is proposed to provide a 30% betterment on the brownfield rate for the impermeable areas on site. Therefore, it was calculated that the total allowable brownfield discharge rate for the site would be **73.4l/s**.

5.1 Eastern (Phase 1) Catchment Discharge Rate

It was calculated using the results in Table 4 that 16% of the brownfield area is within the eastern (phase 1) catchment. Therefore, it is assumed that there is a brownfield contribution of 11.6l/s (16% of the total allowable brownfield discharge rate) to the overall discharge rate for the catchment

The remaining impermeable area in the catchment was then considered at greenfield rate, meaning a greenfield contribution of 5.7l/s (1.213ha at the 1-year GRR) to the overall discharge rate for the catchment.

Moreover, a total restriction of **17.3l/s** has been used for the eastern (phase 1) catchment.

5.2 Western (Phase 2) Catchment Discharge Rate

It was calculated using the results in Table 4 that 84% of the brownfield area is within the western (phase 2) catchment. Therefore, it is assumed that there is a brownfield contribution of 61.8l/s (84% of the total allowable brownfield discharge rate) to the overall discharge rate for the catchment.

As the amount of existing impermeable area in the catchment is greater than the proposed amount of impermeable area, no area was required to be discharged at greenfield rate in the catchment.

Moreover, a total restriction of **61.8l/s** has been used for the western (phase 2) catchment.

5.3 Northern Drop-Off Catchment Discharge Rate

The northern drop-off catchment was considered separately from the other two catchments as the proposed and existing northern drop-off catchments remained equivalent. A 1-year brownfield rate of 29.2l/s was found by modelling the existing network in Microdrainage. Therefore, to provide a 30% betterment the flow restriction for the catchment is proposed to be set at **20.4l/s**

6 Conclusion

The greenfield rates for the site were calculating using the IH124 and ICP SuDS methods and values for the 1-year, 30-year, 100-year and Qbar return periods were found.

The brownfield rates for the site were assessed by using Microdrainage software to model the existing networks, based on the topographical survey.

The above information was then interpreted to find allowable discharge rates for each proposed catchment. Table 4 below states the final calculated discharge rates.

Table 5: Brownfield Runoff Rates (Microdrainage Modelling)

Return Period	**Flow Rate (l/s)**
Eastern (Phase 1) Catchment	17.3
Western (Phase 2) Catchment	61.8
Northern Drop-Off Catchment	20.4
TOTAL	**99.5**

All discharge rates will need to be agreed with the local authority through the SAB process and are subject to change.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Jim Newbold (Cardiff)	Aled Robert	John Smith
Signature			

	Existing Impermeable Area (ha)	1-Year Brownfield Runoff Rate (l/s)	Existing Impermeable Area within Phase 1	Existing Impermeable Area within Phase 2
Northern Catchment	1.063	92	0.168	0.895
Southern Catchment	0.165	12.9	0.026	0.139
TOTAL	1.228	104.9	0.194	1.034

70% of 1-Year Brownfield Runoff Rate (l/s)	73.4	30% betterment to be provided as per Flintshire design guide

1-Year Greenfield Runoff Rate (l/s/ha)	4.7	Calculated using ICP SuDS Method in Microdrainage

Phase 1 Flow Restriction	
Allowable % of Brownfield Rate	16
Allowable Brownfield Flow (l/s)	11.6
Proposed Impermeable Area (ha)	1.407
Area considered for Brownfield Rate (ha)	0.194
Area considered for Greenfield Rate (ha)	1.213
Allowable Greenfield Flow (l/s)	5.733
Combined Allowable Flow (l/s)	17.3
Phase 2 Flow Restriction	
Allowable % of Brownfield Rate	84
Allowable Brownfield Flow (l/s)	61.8
Proposed Impermeable Area (ha)	0.798
Area considered for Brownfield Rate (ha)	0.798
Area considered for Greenfield Rate (ha)	0.000
Allowable Greenfield Flow (l/s)	0.000
Combined Allowable Flow (l/s)	61.8
Total Allowable Flow (l/s)	79.2

includes car park area

Appendix D

DCWW Pre-planning response and correspondence

Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

Gwasanaethau Datblygu
Blwch Post 3146
Caerdydd
CF30 0EH

Ffôn: +44 (0)800 917 2652
Ffacs: +44 (0)2920 740472
E.bost: developer.services@dwrcymru.com

Mr Jim Newbold
Arup
4 Pierhead Street
Cardiff
South Glamorgan
CF10 4QP

Date: 18/03/2021
Our Ref: PPA0005557

Dear Mr Newbold

Grid Ref: 326402 364571
Site Address: Mynydd Isa Campus, Argoed High School, Bryn Road, Mold, Flintshire
Development: Redevelopment of existing school

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

APPRAISAL

Firstly, we note that the proposal relates to the demolition of the existing high school and the erection of a new school which would comprise of nursery, primary and secondary pupils with a total pupil and staff number of 1520 people on/at Mynydd Isa Campus, Argoed High School, Bryn Road, Mold and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

Please note, notwithstanding the following assessment, we would advise there is also a mandatory requirement to undertake pre-application consultation with all 'Specialist Consultees', including Dwr Cymru Welsh Water as the statutory water and sewerage undertaker, in accordance with Schedule 4 of Town & Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016. If the proposal will comprise of a major development, amounting to more than 1000 sqm / an area greater than 1 ha, you will be statutorily required to consult Welsh Water and a substantive response will be issued within 28 days from the date of the notice as per the requirements of Article 2E.

glas
Glas Cymru Cyfyngedig

Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in Welsh and English

Dŵr Cymru Cyf, a limited company registered in Wales no 2366777. Registered office: Pentwyn Road, Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn Nelson, Treharris, Morgannwg Ganol CF46 6LY.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a separate sewerage system, comprising foul and surface water public sewers, which drains to Mold Wastewater Treatment Works (WwTW) via Mynydd Isa Sewerage Pumping Station (SPS).

We can advise that Mold WwTW has a phosphate permit. You will need to discuss this matter further with the local planning authority.

This site is crossed by a public surface water sewer with the approximate position being marked on the attached Statutory Public Sewer Record. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. No operational development will be permitted within the protection zone of the public sewer measured 3 metres either side of the centreline. Our strong recommendation is that your site layout takes into account the location of the assets crossing the site and should be referred to in any master-planning exercises or site layout plans submitted as part of any subsequent planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Flintshire County Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the 225mm foul sewer at or downstream of manhole SJ26642406 located in the road to the south west.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

WATER SUPPLY

A water supply can be made available to service this proposed development. Initial indications are that a connection can be made from the '180mm HPPE' diameter watermain in 'Grid 326226,364733 ' location. The cost of providing new on-site watermains can be calculated upon the receipt of detailed site layout plans which should be sent to the above address.

This site is crossed by trunk public watermains with their approximate position being marked on the attached plan. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. No operational development will be permitted within the easements of the public watermains measured 5 metres either side of the centreline. Our strong recommendation is that your site layout takes into account the location of the assets crossing the site and should be referred to in any master-planning exercises or site layout plans

submitted as part of any subsequent planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Owain George
Planning Liaison Manager
Developer Services

***Please Note** that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.*

Dŵr Cymru
Welsh Water

PPA0005557

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 326493,364591
Map scale: 1:1250
Printed by: Lester Barrow
Printed on: 18 Mar 2021

Dŵr Cymru
Welsh Water

PPA0005557

N
W E
S

LEGEND

Clean network:

- Sluice valve
- Pressure reducing valve
- Meter
- Bulk meter
- Hydrant (FH)
- Cap end
- Air valve
- Stop tap
- Water Treatment Works
- Water Pumping Station
- Existing main
- Non-operational main
- Raw Water

NB: Water main symbol colour indicates the type.

LIGHT BLUE - Trunk
DARK BLUE - Distribution
YELLOW - Raw Water

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref:	326443,364578
Map scale:	1:1250
Printed by:	Lester Barrow
Printed on:	18 Mar 2021

Appendix E

Simple Index Summary

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Commercial/Industrial roofing: High potential for metal leaching	This classification should be informed by an assessment of the leachability of metals from the adopted roofing materials. Particular risks are likely to be posed by materials that include copper and galvanised steel			
Pollution Hazard Level	High				
Pollution Hazard Indices					
TSS	0.3				
Metals	0.8				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Bioretention system (where the system is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Detention basins should be designed to ensure the effective retention and management of sediment, such that the sediment will not be re-suspended and washed out in subsequent events		
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	>0.95	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Commercial/Industrial roofing: High potential for metal leaching	This classification should be informed by an assessment of the leachability of metals from the adopted roofing materials. Particular risks are likely to be posed by materials that include copper and galvanised steel			
Pollution Hazard Level	High				
Pollution Hazard Indices					
TSS	0.3				
Metals	0.8				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Stormwater Management D-Rainclean Bio-remediation Channel	Detailed assessment of performance of designed component in reducing inflow concentrations of each pollutant type required as evidence of adopted indices. Enter indices approved by the environmental regulator in appropriate 'User Defined Indices' row below	SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flow chart with a summary of checks on suitability of a proprietary system	See Chapter 15 Proprietary treatment systems for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment Code of Practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: http://www.britishwater.co.uk/Publications/codes-of-practise.aspx.	
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Detention basins should be designed to ensure the effective retention and management of sediment, such that the sediment will not be re-suspended and washed out in subsequent events		
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	>0.95	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Non-residential car parking with frequent change (eg hospitals, retail)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.7	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Metals	0.6				
Hydrocarbons	0.7				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Hydrocarbons	0.7				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Filter drain (where the trench is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Filter drains should be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that th sediment will not be re-suspended in subsequent events		
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Detention basins should be designed to ensure the effective retention and management of sediment, such that the sediment will not be re-suspended and washed out in subsequent events		
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.65				
Metals	0.65				
Hydrocarbons	0.7				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.65				
Metals	0.65	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Hydrocarbons	0.7				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Bioretention system (where the system is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.8				
Metals	0.8				
Hydrocarbons	0.8				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.8				
Metals	0.8	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Hydrocarbons	0.8				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix F

Initial SAB Consultation

Aled Roberts

From: Aled Roberts
Sent: 02 March 2021 15:06
To: Ruairi Barry
Cc: Claire Owens; Neil L Parry; Jim Newbold; Ed Dolton; Neil Cutting
Subject: RE: Mynydd Isa High School OUR REF: FCC_SAB_PRE_2021_0033

Hi Ruairi,

Thanks again for the meeting earlier it was very useful for us and we will progress the designs based on that basis. Also thanks for the report extracts in your email.

Just to summarise what we discussed:

- The school will be constructed and operated for 25 years by WEPco and the SuDS features within the site will be maintained by the developer until handover.
- The existing school will need to be operational during the construction works.
- The existing site drains into one catchment and there are 3 sub-catchments on site.
- Proposed development will have three sub-catchments and will be broadly the same as existing (based on phasing).
- Existing drainage accepting runoff from the western residential development discharges into the watercourse within the site and will be maintained as existing
- No attenuation structures observed in the buried ground survey and expect existing runoff drains freely into watercourse.
- The existing impermeable areas will be investigated and Brownfield runoff rate +30% betterment will be implemented as part of the runoff rate for each sub-catchment.
- We will use FEH data to inform our drainage design instead of the FSR method.
- We will get in contact Sam Tulley of highways in the coming weeks to present our proposals for the norther outfall into Bryn Road..
- We understand that that the watercourse flows through a culvert in the Beech Farm property to the north east before connecting into Bryn Road.
- Next task for us will be asses the existing site and identify what is brown and what is green field site to inform our drainage design
- Permeable paving will be incorporated into the development.
- Where necessary to provide storage attenuation cells would be acceptable for the development assuming pre-treatment.
- Point G2.1 within the SuDS standard - bioretention planted area to be a fifth of total impermeable area. This can be treated as guidance and an aspirational target which wouldn't be critical for approval.
- DCWW are taking issue with the placement of SuDS features in close proximity to their assets – to be keep in mind with the water main in east of site.

One thing that is not clear in my notes was climate change – are we to use 30 or 40%. As I understood it, the climate change value was 30% but an additional allowance for urban creep actually means that a 40% total allowance would be required?

Again, thank you for your time and we will be back in touch as the design develops in preparation for the pre-SAB application. Any questions or clarification in the meantime please don't hesitate to contact me.

Thanks,

Aled

Aled Roberts
Senior Civil Engineer

Arup
4 Pierhead Street, Capital Waterside, Cardiff CF10 4QP
d: +44 29 2026 6481
www.arup.com

From: Ruairi Barry <ruairi.barry@flintshire.gov.uk>
Sent: 02 March 2021 12:43
To: Aled Roberts <Aled.Roberts@arup.com>
Cc: Claire Owens <claire.owens@flintshire.gov.uk>; Neil L Parry <Neil.L.Parry@Flintshire.Gov.UK>
Subject: [External] Mynydd Isa High School OUR REF: FCC_SAB_PRE_2021_0033

Hi Aled,

Thanks for the meeting which was very useful even at this early stage. Our brownfield and some additional general design requirements below you may find useful. I've created a pre-application reference (FCC_SAB_PRE_2021_0033) in preparation of future submissions/discussions to help me manage the casework.

Regards

Ruairí

Setting and location of SuDS features
SuDS features in enclosed gardens or significantly built up spaces can be difficult to inspect and maintain. The SAB therefore prefer adoptable SuDS features within enclosed private property to be limited and features located where possible in public open spaces. If this is not possible, the developer is expected to provide justification for departing from the SAB's preferred position and seek to minimise the risk to the adopting SAB.

Lifetime of development and design life
For a residential development, the lifetime of development is taken by the SAB to be 100 years for the purpose of approval and adoption. For a commercial development, the lifetime of development is generally taken by the SAB to be 75 years. For either to be altered, the developer would need to provide justification.
It is important to note that the lifetime of development is not the same as the design life of the SuDS features. For example, a SuDS feature within the drainage design may have a design life of 50 years, so the design must consider a required replacement of that feature as part of the Maintenance Plan, as the design life is shorter than the lifetime of development. Both lifetime of development and design life need to be reflected in the Maintenance Plan and in the maintenance funding requirements for adoption.

Drain down times
In accordance with best practice guidance, all drainage elements that perform storage functions should be designed to half empty within 24 hours and fully empty within 48 hours to ensure sufficient storage is available for any subsequent storms.

Easements
Easements are required to demonstrate that the SAB and its authorised representatives can carry out inspections and maintenance of adopted SuDS features without obstruction. The developer must demonstrate the easements are defined and included in the legal agreement with the SAB and also via local land charges on the title deeds of individual plots where applicable.

Greenfield runoff rates
For previously undeveloped (greenfield) sites, the SAB requires the developer to calculate the existing greenfield runoff rates and discharge off site should be as close as reasonably practicable to this rate. This is in accordance with Standard S2 (paragraph G2.20 of the WG Standards). The SAB would expect to see the existing greenfield runoff rates replicated. **It is typical for SuDS designs to be limited to the 1 in 1 year return period greenfield runoff rate.**
The SAB requires the developer to calculate the greenfield runoff rates using either the Institute of

Hydrology IH 124 method or the Flood Estimation Handbook (FEH) method.

Brownfield runoff rates (betterment)
For previously developed (brownfield) sites, the SAB requires the developer to calculate the existing brownfield runoff rates and seek to improve the existing situation. This should be as close as reasonably practicable to greenfield runoff rates. This is in accordance with Standard S2 (paragraph G2.24 of the WG Standards).
If it cannot be demonstrated that previously developed land has functioning positive drainage or the details of components cannot be ascertained (even if there are known outfalls), an assumption should be made that the system is no longer operational and the site should be treated as an "undeveloped site". Where functioning positive drainage has been demonstrated then the existing brownfield runoff rate for the 1 in 1 year event must be determined. The maximum allowable post development rate will be this value reduced by 30% (irrespective of the storm return period).

Runoff volume control
It is important that not only runoff flow rate but runoff volume shall be controlled to manage flood risk. In accordance with G2.26 of the WG Standards, runoff volume should not exceed the greenfield runoff volume for the same rainfall event, where possible. This remains the case when developing previously developed sites. As stated in G2.27, methods such as infiltration and rainwater harvesting can provide volume control.
The SAB requires evidence of runoff volume control in order to approve a SuDS system as explained in G2.28 to G2.31. However, where greenfield volumes cannot be achieved, early discussion with the SAB is essential to identify opportunities to reduce volumes as much as possible.

Overland flow routes
As prescribed in G2.33 of the WG Standards, the drainage design should consider flow routes onto the site from outside the development up to the 1 in 100 year return period event. These flows should be routed around the site if they do not impact neighbouring flood risk, or incorporated into the site drainage.

In accordance with WG Standards G2.37 and G2.38, overland flow routes for exceedance events above the 1 in 100 year return period event should also be considered and managed to mitigate risk to people and property. Conveyance routes should be established which are unlikely to be interrupted by future developments on site.

Geotextile and membrane lap lengths
The design of any membranes or geotextiles should incorporate appropriate lap lengths to the manufacturers' recommendations or a minimum of 500 mm.

Ruairí Barry

Project Engineer | Peiriannydd Prosiec
Flood and Coastal Risk Management | Rheoli Perygl Llifogydd ac Ardordiol

Flintshire County Council | Cyngor Sir y Fflint
Tel | Ffôn | 01352 704707 / 07920 210141
Email | Ebost | Ruairi.Barry@flintshire.gov.uk

http://www.flintshire.gov.uk | http://www.siryfflint.gov.uk
http://www.twitter.com/flintshirecc | http://www.twitter.com/csyfflint

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We welcome correspondence in Welsh and English and will respond to correspondence in the same language. Use of either language will not lead to a delay

Opinions advice, conclusions and other information in this

message that do not relate to the official business of

Flintshire County Council shall be understood as neither

given nor endorsed by it or on its behalf, and consequently

Flintshire County Council shall bear no responsibility

whatsoever in respect thereof.

Croesawn ohebiaeth yn y Gymraeg a'r Saesneg a byddwn yn ymateb i ohebiaeth yn yr un iaith. Ni fydd defnyddio'r naill iaith na'r llall yn arwain at oedi.

Deellir na fydd unrhyw safbwyntiau, na chynghorion, na

chasgliadau nac unrhyw wybodaeth arall yn y neges hon,

nad ydynt yn berthnasol i waith swyddogol

Cyngor Sir y Fflint, yn cael eu cynnig na'u cadarnhau ganddo

nac ar ei ran, ac felly ni fydd Cyngor Sir y Fflint yn derbyn

unrhyw gyfrifoldeb am y rhannau hynny o'r neges.

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