WEPco | Rhondda Cynon Taf County Borough Council

RCT 3 Primaries Batch

Llanilltud Faerdref Drainage Strategy Report

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1 Introduction

The Client is promoting the re-development of an existing primary school site located in Llanilltud Faerdref, Rhondda Cynon Taf. The site is currently an operational school and the proposal is to construct a new single school building with associated car parking and Multiple Use Games Area (MUGA). This will require phased demolition of the existing school buildings. Ove Arup & Partners Ltd. (Arup) has been commissioned to support masterplan development, and compile the planning application and supporting technical assessments for the proposed development including a Drainage Strategy report.

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

2 The Site

Llanilltud Faerdref Primary School is currently an operational primary school located in Rhondda Cynon Taf, South Wales. Topographical survey of the site is contained in Appendix A.

The site is approximately 1.22 Ha in area and located within Church Village (centred around OS grid reference 308661,186028), approximately 2km west of Treforest Industrial Estate. The school location is shown on Figure 1.

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

The proposed site for the new school building and associated car park and MUGA is located on the grounds of the existing school. The school site is accessed from St Illtyd Road to the south.

2.1 Site Terrain/Topography

In plan view, the site has a square shape and is approximately 105-115m wide (see Figure 2).

There is one main existing school building with associated asphalt car park that spans the length of the north western boundary and covers approximately half of the site. The remaining south eastern side of the site is predominately grassed playing field.

In general, the site slopes from south west to north east towards the woodland. The existing asphalt playground north of the school building is sloped at 1:18, the grassed playing field 1:60 and a 1m tall 1:4 slope from the playground and building down to the playing field separates the land uses. Across the grassed area on the eastern boundary and the hard paved playground north of the building, the slope is gradual and consistent however becomes steeper nearer to the woodland. The elevation ranges from approximately 107mOD near the western corner to 101m OD in the eastern corner.

Figure 2: Site Location on OS Mapping

An existing woodland is located on the northern side of the site and this runs beyond the site boundary. Within the woodland is an existing watercourse, Nant yr Aran, located just outside the north eastern boundary. This runs in an easterly direction and enters a culvert before continuing east. A storm and combined outfall serving the site discharge into the watercourse. There is a private storm pipe that runs from outside the site to the south west and under the playing field before outfalling to the watercourse also.

The site is bounded to the east by Central Park Lane and public car park, and beyond this residential housing. To the south is an all-weather sports pitch and to the west, a grassed rugby sports field.

The vehicular access to the site is to the south western corner. This runs alongside the all-weather sports pitch, a building and car park before connecting to St.Illtyds Road. There is a gated access to the playing field in the north western corner of the road on to Central Park Lane that leads to Main Road via the Llantwit Fardre Sports Club access road

3 Published Flood Risk Maps

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

The maps available are:

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

3.1.1 Development Advice Maps

The TAN 15 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 new TAN15 DAM is due come into effect on 1st December. Both the current and proposed DAMs have been obtained.

The previous version TAN l5 DAM has been obtained and is shown in Figure 3.

Figure 3 – Llanilltud Faerdref TAN 15 Flood Map

The River and Sea flood zones depicted in the 1st December Flood Maps are shown in Figure 4.

Figure 4 – Llanilltud Faerdref 1st December TAN 15 Flood Map

The current DAM shows the site is within Zone A which is considered to be at little or no risk of fluvial or tidal/coastal flooding. The 1st December DAM shows the site is outside Flood Zone 2 and 3. As the site is in Zone A and not in Zone 2 or 3, a Flood Consequence Assessment (FCA) will not be required covering the River and Sea flooding.

3.2 Fluvial, Reservoir, Coastal and Surface Water Flooding

NRW's flood maps show the sites risk from Fluvial, Reservoir or Coastal Flooding. NRW Long Term Flood Risk Maps show flood extent, depths, velocities and hazard.

Figure 5 shows that the site is located outside of the River and Sea flood risk zones.

Figure 5 – Llanilltud Faerdref NRW Flood Map

The surface water flooding shown on the NRW flood map for Llanilltud Faerdref is shown in Figure 6.

Figure 6 – Llanilltud Faerdref NRW Surface Water Flood Map

Figure 7 shows the flooding from surface water and small watercourses indicated on the 1st December DAM map in pink (Flood Zone 2) and purple (Flood Zone 3).

Figure 7– Llanilltid Faerdref 1st December TAN15 Flood Map

Within the site boundary, surface flooding is identified west of the existing school building. The surface water flooding identified north of the site boundary is associated with the Nant yr Aran watercourse. This encroaches slightly onto the site and on to the existing grassed playing fields.

As the site contains areas of Flood Zone 2 and Flood Zone 3 surface water and small watercourse flooding, the site will require an FCA.

4 Existing Drainage

The site is currently served by a positive combined and storm drainage network. The foul drainage is collected in a combined network along with storm drainage from some parts of the building roof and building and is assumed to outfall into the Nant yr Aran watercourse.

The storm drainage network captures the runoff from the remainder of the building and portions of the hardstanding areas and conveys the flow to an outfall point which is assumed to discharge into the Nant yr Aran. There are also green areas on the site where the run off is not captured in a network and either infiltrates into the ground or flows overland to the woodland and the Nant yr Aran.

Topographical, drainage and utility surveys were undertaken by Technics Group Ltd between August and September 2019. These surveys have been used to assess and understand the existing drainage within the site.

The surface water and combined drainage pipework identified in the non-intrusive survey is shown on drawing RH0301-ARP-ZZ-00-DR-C-00021.

4.1 Foul Drainage

The DCWW assets located adjacent to the site are shown in Figure 8.

Figure 8: Public sewers plans (DCWW)

There are no immediate DCWW assets adjacent to the site. There is a 225mm diameter combined network located in St Illtyd Road to the south west of the site. The 3D levels of the site imply that the level of St Illtyd road is higher than the site levels. There is a 375mm diameter concrete pipe north east of the site that runs along the Llantwit Fardre Sports Club access road. Just downstream of the sports club access road, a 150mm diameter network joins and downstream further

a 525m diameter joins. This network then enters a Combined Sewer Overflow (CSO) which is assumed to overtop into Nant yr Aran. A 225mm diameter network then continues from the CSO.

The Llanilltud Faerdref existing school building has multiple foul drainage outlets that are collected into a private combined sewer network around the building perimeter. This is shown on RH0301-ARP-ZZ-00-DR-C-00021. This network then runs north east across the existing asphalt playing ground and playing field. The outfall and catchment is shown in Figure 9. The non-intrusive survey was terminated at the site extents and therefore the outfall location of this combined network is unknown however it is assumed that this outfalls into the Nant yr Aran watercourse.

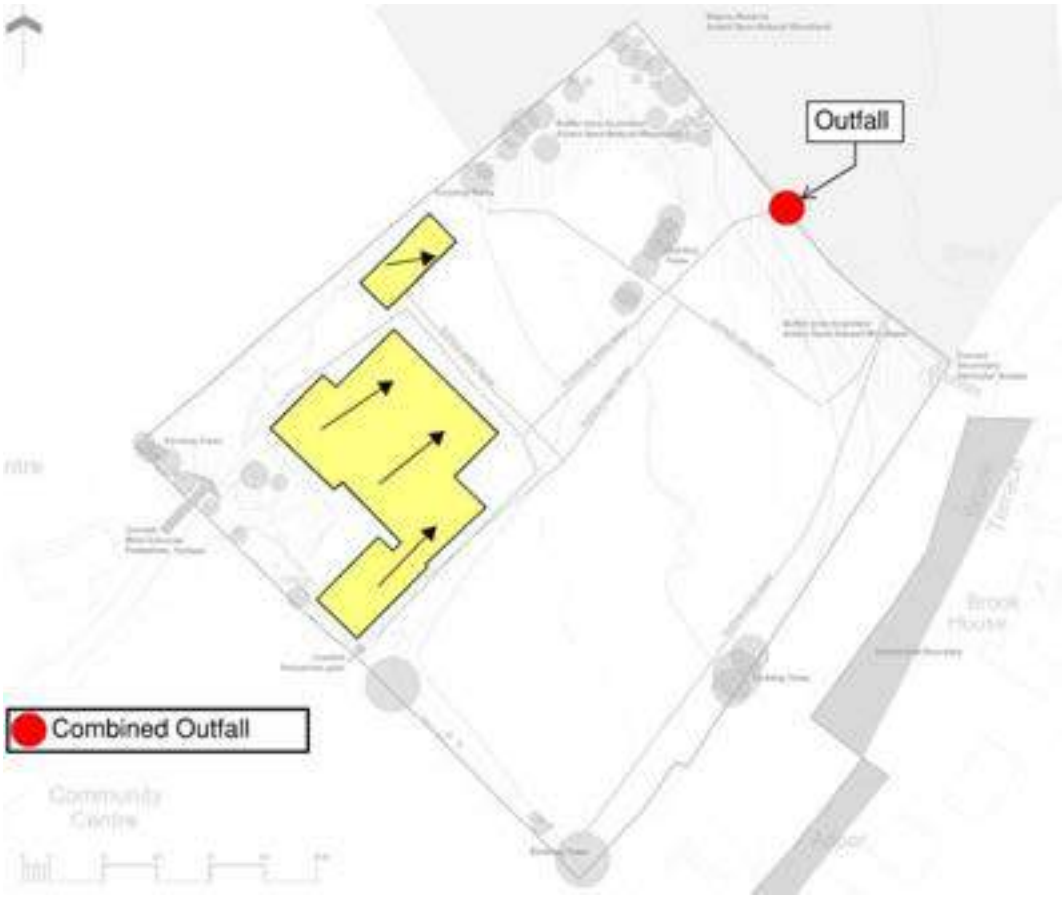


Figure 9. Llanilltud Faerdref outfall point and catchment

4.2 Storm Water Drainage

The existing Llanilltud Faerdref site generally falls from south west to north east towards the existing watercourse Nant yr Aran. This forms one single large catchment however the water is conveyed to the watercourse through different methods and forms 2 sub catchments. The existing surface water catchment is shown in Figure 10.

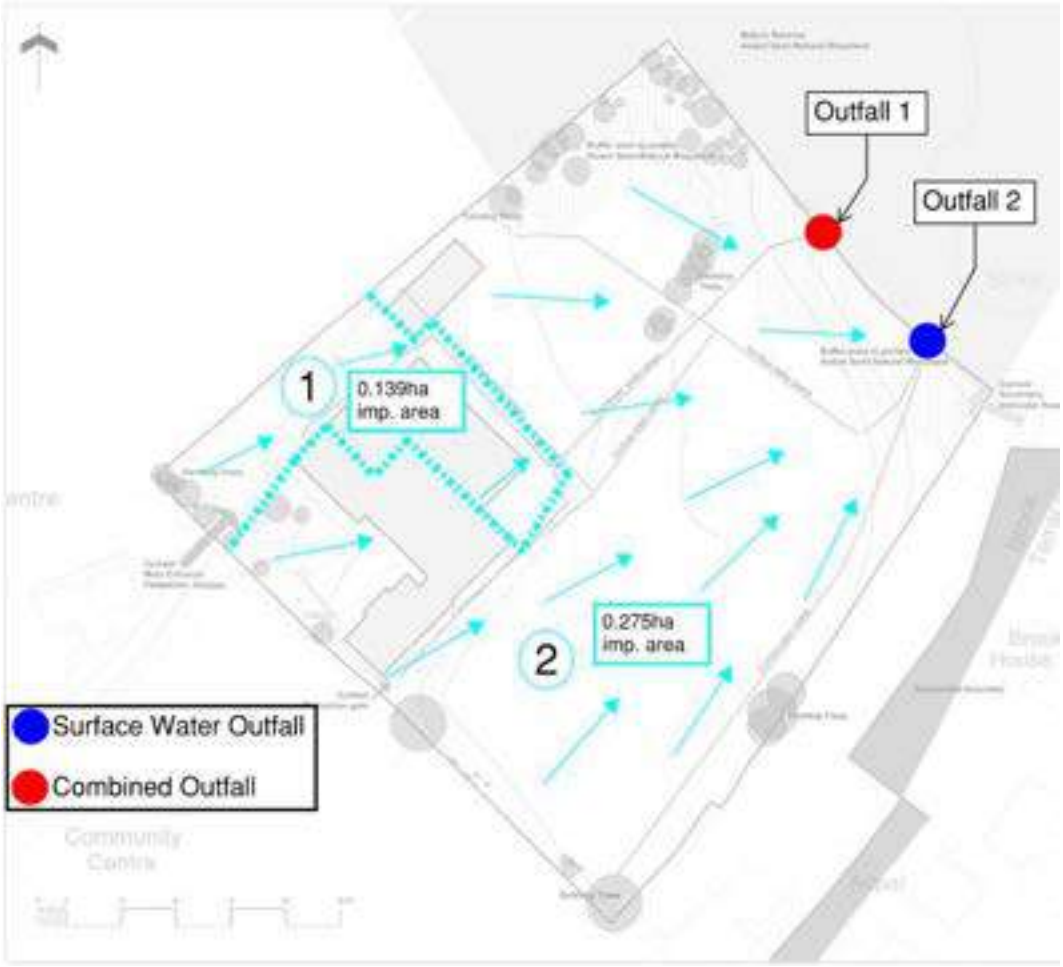


Figure 10: Llanilltud Faerdref storm/combined drainage outfall points and catchment

The catchment boundaries are derived by the surface contours of the playground, playing field, carpark and hard surface areas as well as the existing roof pitches, guttering and downpipe locations and routes of the underground storm drainage pipework.

The school building and parts of the associated adjacent impermeable hardstanding collect the rainwater through roof gutter/downpipe or gullies. This is then conveyed to the watercourse through either the combined network (Outfall 1) or predominantly the piped storm network (Outfall 2). These pipes vary from 100 to 150mm diameter with the storm pipes at approximately 1-1.5m depth and the combined pipes 1m-2.3m depth with the deepest pipes at the site boundary.

The non-intrusive survey shows that the combined network serves the existing buildings foul discharge points and a number of storm gullies and rainwater pipes however the storm drainage is predominantly collected through the dedicated storm network. These pipes serve both the impermeable playground area and the other rainwater downpipes not collected by the combined network. The small section of impermeable area south of the building is assumed to connect to Outfall 2 (when determining the existing flow calculations) although the non intrusive survey implies this could outfall along the site access road.

The rainfall landing on the large area of grassed playing field is assumed to either percolate into the ground or run overland into the woodland north of the site before reaching the watercourse. The slope of the asphalt playground is also such that runoff not captured through a positive drainage network would run to the grassed playing field.

The school operators inform that the pitches are often wet which implies that the upper layers of the ground have low permeability. The rainfall is therefore likely to flow overland to the woodland in heavy rainfall events.

There is a 225mm diameter pipe (approximately 1-2m deep) that enters the site across the southern boundary, runs underneath the playing field in a north east direction and is assumed to outfall into the Nant yr Aran adjacent to Outfall 2. This pipe could connect to the school network outside the boundary and this needs to be confirmed through further survey. This pipe is not shown on DCWW records and is assumed a private network for a development south of the site.

It is assumed that no significant flow enters the site overland from the surrounding areas. The general topography runs from south west to north east and directly south of the site, the all-weather sports pitch is assumed to have its own storm drainage system.

It is assumed that the catchments are attenuated.

4.2.1 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	6.7
1:30 Year	13.5
1:100 Year	16.7
Qbar	7.7

4.2.2 Brownfield Runoff Rate

The site has been developed previously as it is currently a school. Investigations conclude that the current site has a two piped drainage networks (combined and storm) and it is assumed that both outfall at an uncontrolled rate into the Nant yr

Aran at Outfalls 1 and 2. Therefore, the pre-developed impermeable sections of site can be considered brownfield sites which will be used to inform the discharge rates from the proposed impermeable areas of the site.

The existing 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 – Brownfield Runoff Rate for the site calculated using the IH124 method

Catchment	Estimated Impermeable Area (ha)	Indicative Estimated 1-Year Flow (l/s)	Indicative Estimated 100-Year Flow (l/s)	1-Year Flooded Volume (m3)	100-Year Flooded Volume (m3)
Outfall 1	0.139	11.5	16.5	0	7
Outfall 2	0.275	15.8	17.4	0	30
TOTAL	0.414	27.3	33.9	0	37

Refer to Appendix C for further information. Note that the flow discharging through the combined Outfall 1 only assumes the storm water portion. This is therefore likely to be an underestimate as the foul flow is not considered.

5 Proposed Development

To provide the appropriate school facilities, the proposed site will contain a single school building, 2 number MUGA pitches, car parking and a mixture of impermeable and grassed landscaping.

The location of the various site features are influenced by numerous factors. Primarily, the masterplan needs to function as a school but also needs to consider the existing constraints including utilities, topography and site phasing.

The existing school needs to remain operational during construction. Once the new building is constructed and functional, school operations can be moved to the new building allowing the rest of the site to be developed. This significantly limits the location of the proposed building and crucial infrastructure needed for the new building to become operational. This has an impact on the location of drainage features including raingardens and attenuation basin.

The proposed masterplan is shown in Appendix B.

The primary driver of the site finished levels is to provide a site that complies with the Equality Act with suitable slopes achieved across all land uses, whilst minimising the number of retaining structures. The levels and slopes have been designed to retain the existing site slope directions (and therefore catchments) where possible and to allow the foul and storm drainage to drain via gravity where possible.

5.1 The masterplan and finished levels

The proposed building and associated hard landscaping works are generally located on the eastern portion of the development on the existing playing field. This allows the existing school building and playground to remain operational during construction of the new building. The MUGA and car parking are located over the existing school building and can be constructed following the existing building demolition. The existing school playground north of the existing building is to be removed and replaced with grassed landscaping.

The existing vehicular site entrance is to be retained as will the gated access to the existing playing field. Generally, the existing utilities run along the site entrance and serve the building from that direction. The existing dedicated pedestrian access in the centre of the southern site boundary will be retained.

The storm drainage pipe entering the site from the south will need to be diverted around the new building footprint.

Reprofiling will be required to provide a suitable platform for the new building footprint which is set at 105mAOD FFL. 105mAOD has been used to enable a reasonable gradient to rise from the building and connect at the pedestrian entrance located just south west of the building on the red line boundary.

In general, 1:40 slope shave been used around the site however 1:20 slopes have been used where necessary in the car park. A 1:100 slope has been proposed across the MUGA. Earthwork fill batters and cut slopes have been limited to 1:3.

All proposed slopes are in the general direction of the Nant yr Aran to retain the existing catchment flow paths. The proposed finished levels are shown on drawing RH0301-ARP-ZZ-00-DR-C-00031.

6 Proposed Foul Drainage

The existing school is served by a combined network and the proposed development will also require a network to serve the proposed buildings including canteens, classroom sinks, toilets and welfare facilities. It is proposed that rather than outfall the foul drainage into the watercourse, outfall is to be into a DCWW piped network.

A pre-planning application has been submitted to DCWW to confirm the proposed foul connection point for the site. As the flow currently does not enter a DCWW system, any discharged flow will be additional to the current regime and DCWW have commented on capacity. Correspondence is contained in Appendix D.

Any foul drains constructed for DCWW adoption will be subject to a Section 104 Agreement and will require DCWW technical and legal consent. A Section 106 Agreement will be required for any new connections into DCWW's network and S185 will be required for the diversion.

6.1 Llanilltud Faerdref Domestic Flows and Strategy

The proposed quantum has been considered in assessing the foul flows generated from the proposed development. The peak flow generated from the development has been estimated as 2l/s based on assuming 431 persons (split between pupils and staff) per day. An allowance for an expansion of 30 additional pupils has been accounted for in the 2l/s assumption.

The peak flow is based on a 20l/day/person and a peaking factor of 6.

Although the existing combined network is assumed to discharge to the existing watercourse, the aim of the proposed development should be to keep the foul and storm flows separate and outfall the foul flows to a public sewer where possible.

Two routes were presented to DCWW in the pre planning application as shown in Figure 11.

Figure 11. Llanilltud Faerdref potential outfall points

In the pre planning response, DCWW offered a connection to the 225mm diameter combined sewer network in St Illtyds Road (yellow route in Figure 11). DCWW assumed that the existing school building outfalls foul discharge into this sewer in the existing case however when presented with the non intrusive survey of the site, confirmed that this was not the case. DCWW then raised concerns over the capacity of the 225mm sewer if the site outfalls there therefore a Hydraulic Modelling Assessment may be required if this option is explored further. Due to the site levels, the foul drainage would need to be collected at a low point of site and then pumped to a suitable high point in the access road. From the high point,

the pipework could drain by gravity to the combined sewer. As this is the main vehicular access to the site, works would need careful phasing and planning to ensure the school remains operational during construction.

The preferred route is to connect to the 375mm diameter concrete combined network in the access road to Llantwit Fardre Sports Club site access (orange route in Figure 11). The proposal is to design a foul drainage ring around the building which will be taken to a low point and leave the site to the east and continue along Central Park Lane to an existing DCWW manhole at the junction of Central Park Lane and the sports club access road. The DCWW operations team initially raised concerns with the capacity of the CSO downstream of the 375mm diameter pipe however DCWW have confirmed in principle that the 375mm diameter pipe in Llantwit Fardre Sports Club site access is acceptable connection point.

The existing combined network will not be required in the fully built case although will remain operational whilst those school buildings are operational.

7 Proposed Stormwater Drainage

7.1 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 Rhondda Cynon Taf County Council.

Early engagement with the SAB has been sought and a meeting with the RCT SAB officer was held on the 2nd of March 2021 where the initial drainage strategy was presented and discussed. A pre drainage strategy review has been undertaken by the SAB and received in August 2021. The level of detail provided was suitable for early design therefore a full drainage strategy review could not be completed. This review is contained in Appendix E.

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.

The site has the opportunity to utilise rainwater harvesting to reuse grey water for flushing toilets etc. Rainwater would be collected from parts of the building roof and conveyed to an underground tank via gutters/downpipes. From here the water would be pumped into a small break tank located within building and then pumped around the building to the required locations.

The areas of the roof not contributing to the rainwater harvesting tank, and the other impermeable areas, the intention is to collect water through raingardens. These ensure that the drainage solution offers the required water quality, amenity and biodiversity qualities.

Where raingardens are not possible, surface water run-off generated from impermeable areas of the proposed development can be collected via rainwater pipes, gullies, in built fall linear drainage channels or through permeable paving.

The intent is to reuse the existing outfall from the site into the Nant yr Aran if condition allows.

In general, the runoff will collected by a drainage network and be attenuated to an agreed rate before outfalling to the existing connection point. Raingardens, a dry basin, and pervious pavements are proposed in conjunction with hydraulic control measures to attenuate the flows to achieve the required runoff rate. The desire of the headteacher is to avoid standing water where possible.

The proposed built, impermeable area is a similar area to the existing built, impermeable area. As the built portion of the existing site is assumed to outfall to the watercourse unattenuated, it is proposed that the outfall rate for the proposed built area for storms up to the 1:100 year event will be reduced to 70% of the existing 1:1 year flow rate. The proposed green landscaped areas are to be sloped towards the Nant yr Aran and rainfall that does not infiltrate into the ground will be directed overland to the watercourse as per the existing playing field conditions.

7.2 Schedule 3 of the Flood and Water Management Act

Schedule 3 of the Flood and Water Management Act 2010 establishes SABs 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 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.

The proposed storm water drainage provisions are shown on drawing RH0301-ARP- ZZ-00-DR-C-00041

7.2.1 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.

7.2.1.1 Level 1 – Collected for Use

Rainwater harvesting is proposed to be used and an 40m^3 volume tank is proposed. Although rainwater harvesting is being utilised, the demand is not high enough to discharge all water through this method. There are also other catchments that will not contribute and will need another runoff destination.

7.2.1.2 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.

The Phase I Geo-Environmental Desk Study Report indicated that Diamicton Till which consists of a heterogenous mixture of clay, sand, gravel and boulders varying in size and shape, is present beneath the site. The school operators have raised that the playing fields are often wet after heavy rainfall implying the surface layers have low permeability. A Ground Investigation has been proposed to determine if infiltration measures will be possible hydraulically.

Even if a soakaway could dispose of a portion of the surface water, it likely that another disposal route is required to supplement.

It is proposed that raingardens are to be employed as a SuDS solution. Due to their proximity to the building, 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. Raingardens located further from the building could be unlined depending on the planned soakaway.

As a part of the storm water management network a dry detention basin is proposed which could be unlined subject to site survey. Whilst not being the main disposal method for the storm runoff this unlined feature could contribute to the

interception of the first 5mm of rainfall for the site. The lined raingardens will contribute with evapotranspiration.

The proposed landscaping will encourage infiltration in the top soil layer as well as offer evapotranspiration benefits. The permeable paving will hold and slow the water compared to the existing regime.

7.2.1.3 Level 3 – Discharge to a Surface Water Body

As per the existing site storm drainage regime, it is proposed to outfall the piped storm drainage into the Nant yr Aran. It is also proposed to retain the existing site slope directions so that the green landscaped playing field also directs flow overland into the woodland and the watercourse.

The site forms a single catchment split into sub catchments. The sub catchments are shown in Figure 12.

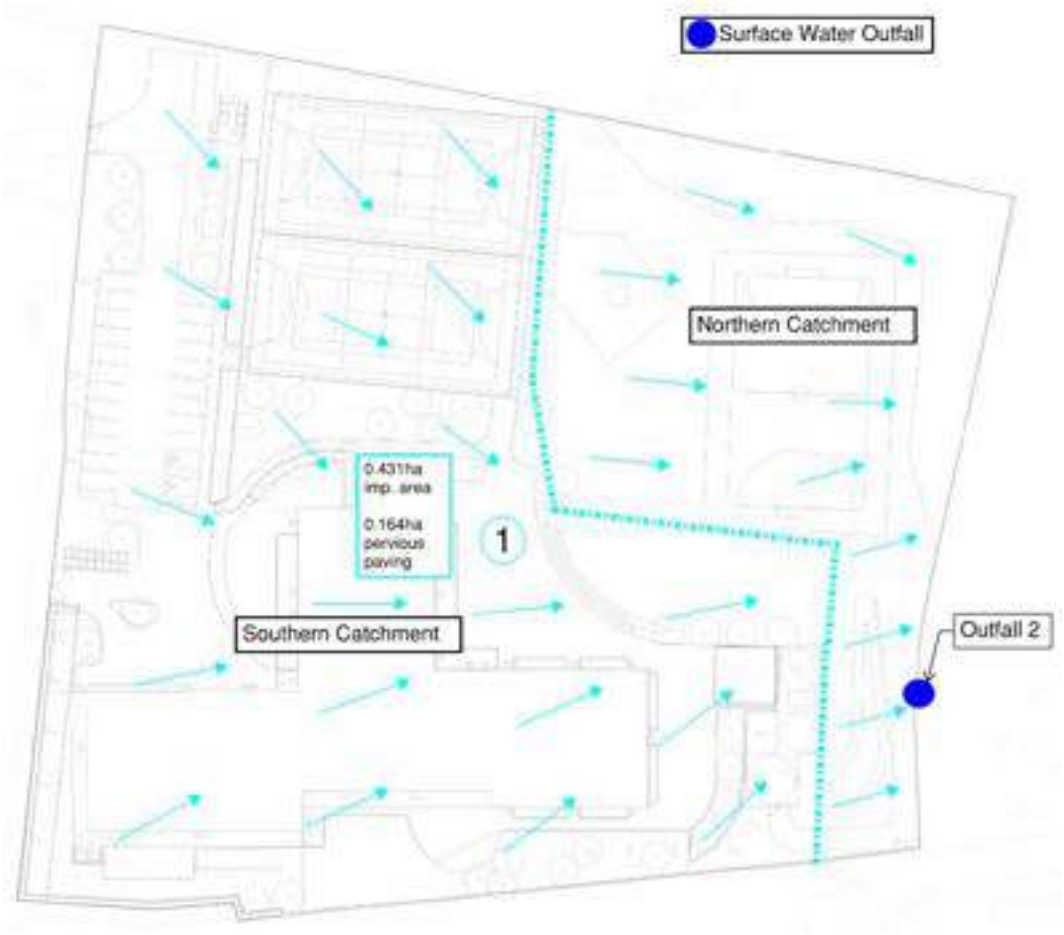


Figure 12: Proposed Llanilltud Faerdref catchments

The main subcatchment (southern catchment) is a piped network that will retain the existing outfall location and form if suitable. This is to be confirmed through additional survey. Storm flow will be conveyed from all the impermeable areas of the site, including the building roof, to the outfall. The network will run through a dry basin with vortex control device used to restrict the rate. The permeable paved

car parking bays and the permeable surfaced MUGA will also connect to this piped network and drain through the dry basin.

The smaller northern sub catchment is predominantly green landscaping and playing field. The slope of the catchment is towards the woodland and watercourse therefore any flow that does not infiltrate to ground will flow overland towards the waterbody. It is intended to replicate the existing conditions of the existing playing field which is assumed to discharge directly to the watercourse by over land flow when infiltration is not possible. The total area of green landscaping is approximately 0.18Ha less than the existing scenario.

No further Runoff Destination Levels have been explored as all runoff can be discharged to a surface water body.

7.2.2 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.

The total runoff into the Nant yr Aran from the impermeable areas will be less than the current brownfield site discharge and the flow from the proposed greenfield area will be less than the existing greenfield contribution. With the combined drainage flow removed from the Nant yr Aran also, in total less flow will enter the Nant yr Aran compared to the existing situation.

7.2.2.1 Runoff Control

The existing site is split between impermeable building with associated asphalt surfacing and grassed playing field. Figure 13 and Table 3 shows the comparison between the existing and proposed permeable and impermeable areas

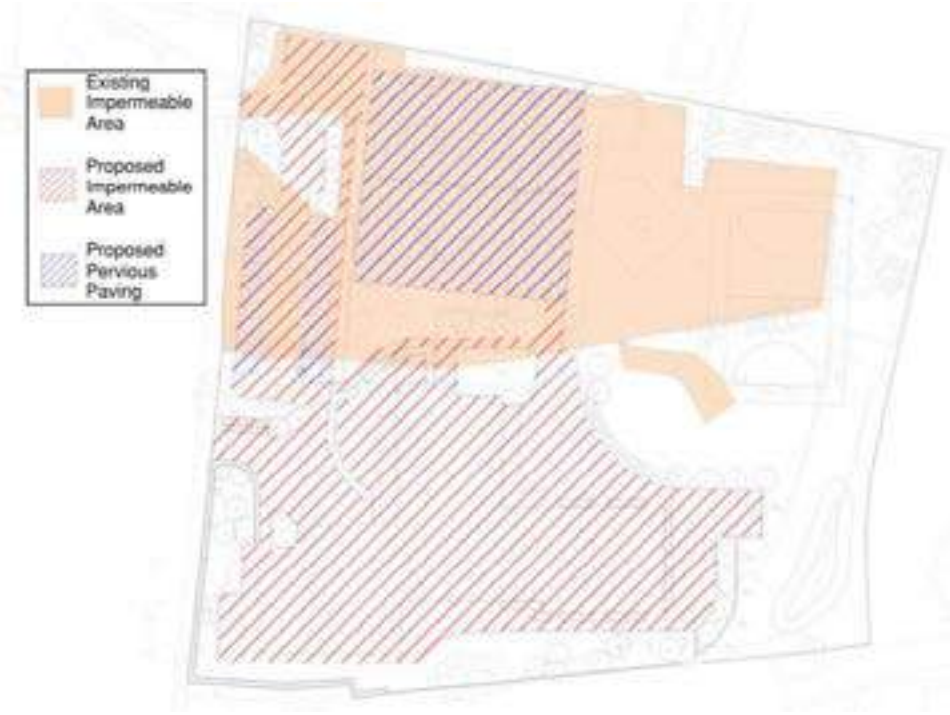


Figure 13: Llanilltud Faerdref existing impermeable/permeable areas

Table 3: Existing Impermeable Area versus Proposed Impermeable Area

Outfall	Existing Impermeable Area (ha)	Proposed Impermeable Area (ha)	Proposed Pervious Pavement (ha)
Outfall 1	0.139	0	0
Outfall 2	0.275	0.431	0.164
TOTAL	**0.414**	**0.431**	**0.164**

The site investigation shows that the existing impermeable area of 0.414Ha is currently drained to the site boundary and assumed to outfall into the Nant yr Aran through an unattenuated piped network. It is therefore assumed that this portion of the site is brown field. The proposed impermeable area which comprises of the proposed building and hard landscaping is a similar area at 0.431Ha. Although the location of the impermeable surfacing in the catchment is different to the existing situation, the outfall location is proposed in a similar location therefore the brownfield discharge rates of the existing situation can be used to inform the discharge rate of the proposed impermeable area.

The remainder of the existing site is grassed playing field and assumed permeable and slopes towards the watercourse. Although the area of grassed area is closer to the watercourse compared the existing layout, the overall grassed area is reduced with the remining area taken up with permeable paving.

Rainfall will be captured in the southern subcatchment through a number of ways. Water falling on the roof will be captured through guttering and downpipes before running into a raingarden. The overland flow will be directed into raingardens,

permeable paved areas or through an in built fall linear drainage at the building entrance. The MUGA and car parking bays are permeable paving (asphalt or blocks) and will capture and slow the water before connecting to the main piped network. The piped network will then connect to the outfall point. Flow will be controlled using a dry basin and vortex control devices to restrict the discharge.

The brownfield flow from the existing impermeable catchment has been considered and it is proposed that the outfall rate from storms up to the 1:100 year event will be reduced to 70% of the existing 1:1 year brownfield flow rate for the southern catchment only.

The existing catchment brownfield 1.1 year rate and proposed sub catchment discharge rate are as per Table 4:

Outfall	Proposed Impermeable/permeable paving Area (ha)	Existing 1:1 Discharge Rate (l/s)	Proposed Discharge Rate (l/s)	Required Attenuation Volume – including porous paving (m^3)
Outfall 1	0	11.5	0	0
Outfall 2	0.595	15.8	19.1	280
TOTAL	**0.595**	**27.3**	**19.1**	**280**

Table 4 – Proposed catchment flow restrictions

It is proposed that the total discharge rate from the southern sub catchment impermeable area is limited to 19.1l/sec. The total discharge leaving the site and reaching the watercourse is reduced by 30% in the 1-year event and by up to 40% in the 100-year event (+ 40% climate change). As the foul portion is removed, the total discharge removed will be higher. The flow leaving outfall 2 is increased by 3.3l/sec in the 1:1 year event compared to the existing case however the total entering Nant yr Aran leaving the site will be significantly less.

The existing combined outfall will not being required following construction. This flow rate will be achieved by installing vortex flow controls upstream of the discharge location. The total flow leaving the site is significantly reduced compared to the existing scenario.

A climate change allowance of 40% has been proposed for the development.

7.3 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.

The volumetric control for the two catchments detailed below.

7.3.1 Southern subcatchment

The network has been sized to accommodate the 1:100 year flow plus climate change. A vortex flow control near the outlet will restrict the flow in all return periods up to the 1:100 year storm to 19.1l/sec. Storage of the attenuated storm water upstream of the flow control device will be in the pipes in the network as well as 280m^3 in the dry basin. The dry basin has been designed with a maximum storage depth of 1.5m with 0.3m freeboard to the top of the basin for a 100 year period including an allowance for climate change. Side slopes will be 1 in 3, with one side slope 1 in 5.

Landscaping areas adjacent to the impermeable areas e.g. raingardens, earthwork slopes to connect the various land uses etc… will be captured by the positive drainage network serving the impermeable areas. These areas will therefore be attenuated in the dry basin and discharge controlled.

With the proposed impermeable area being similar surface area to the existing brownfield catchment area and the greenfield area being less than the existing, the remaining area is proposed to be permeable pavement. The MUGA will be constructed with permeable asphalt and although will connect to the piped storm system serving the proposed impermeable area and restricted, the runoff will be slowed and stored at source before entering the network. It has been assumed the MUGA will contribute 130m^3 of storage in the pavement layers.

Storage will likely be provided in the rain gardens and permeable paved car parking bays however this volume has not been included in the calculations.

7.3.2 Northern greenfield playing field catchment

It is common practise to meet greenfield runoff behaviour for green landscaped areas. The existing playing field currently demonstrates greenfield runoff characteristics with the storm flow either percolating into the ground or running overland into the Nant yr Aran.

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

The proposed grassed playing field has been designed to slope towards the woodland and the Nant yr Aran. The intention is to replicate the existing playing field regime, albeit in a different location, with rainfall infiltrating into the ground or running overland directly to the watercourse. It should be noted that the school operators have reported that the existing playing field is often wet which demonstrates that overland flow is likely to occur.

The area of the grassed playing field is 1800m^2 less than the existing greenfield therefore assuming that the proposed grassed area behaves similarly to the existing green field (with similar infiltration and overland flow characteristics), the volume of water reaching the Nant yr Aran will be less from greenfield areas of the site compared to the existing scenario.

It is proposed that the runoff from the greenfield will not be managed or attenuated as per the existing scenario.

7.4 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. Note however the existing impermeable areas do not behave as a green field site

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

A green roof has been considered for the site however, following investigation, 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:

- Rainwater harvesting
- Bioretention areas/ raingardens;
- Detention Basis; and
- Permeable surfaces.

The site is to employ rainwater harvesting. The harvesting system is designed to take runoff falling on certain sections of the roof and recycle this water for use within the building. This runoff therefore will not enter the drainage network. This is an effective use of water in smaller storm events however when the tank is full, the effects are lost as runoff will likely bypass the harvesting system and enter the piped network. The rainwater harvesting system is designed to accommodate $40m^3$ of rainwater. Table G2.1 assumes that all surfaces drained to rainwater harvesting systems are treated as long as the system design is based on regular daily demand for non-potable water from surface water runoff.

There are approximately $190m^2$ of bioretention features on Llanilltud Faerdref. The total amount of bioretention features across the site has been maximised to provide a greater contribution to interception requirements however the majority are likely to be lined due to proximity to the proposed school buildings. Those that may be unlined are subject to further ground investigations. Potential for

infiltration is therefore 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 assumed that the first 5mm of rainfall from contributing impermeable areas equal to five times the unlined vegetated bioretention areas can be intercepted.

There is approximately 4310m^2 impermeable area on Llanilltud Faerdref. Assuming 115m^2 of the raingardens can be unlined as they are sufficient distance from the building and the ground conditions allow, up to 575m^2 of impermeable area could be sufficiently intercepted through this method.

There is insufficient space available in appropriate areas on the proposed site for bioretention systems with a plan area equivalent to a fifth of the impermeable area as the land use is required for other purposes for the school to function.

A dry basin has been proposed as part of the storm drainage network to attenuate and treat flows. There is an opportunity for the basin to be unlined subject to survey. Table G2.1 states that areas up to five times the base area of the basins can be assumed to meet interception requirements. The base area of the Llanilltud Faerdref basin is 30m^2 therefore it is assumed that approx. 150m^2 of impermeable area is sufficiently intercepted through this method, if the ground conditions allow.

It is proposed to use permeable pavement for the car parks and MUGAs and there is approximately 1750m^2 on Llanilltud Faerdref. 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. In all cases, additional flow will enter the permeable paving therefore only the surface area of the permeable paving itself has been considered and 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 between approx. 0.175 and 0.248ha depending on ground conditions. Given that the total amount of impermeable area on site is 0.431ha, these measures are providing 40-57% of the required interception of flows on site, which equates to approximately 2-2.9mm of the first 5mm of rainfall. Although not the entire 5mm is captured, this is providing significant betterment to the existing regime and this excludes the rainwater harvesting contribution.

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.

7.4.1 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 or pipework. The contractor will need to control silt runoff, particularly during the earthworks stage. This will be detailed in the Contractor's method statement.

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. The various treatment zones are:

1. Main building roof
2. Car Parks;
3. Site Access and internal circulation road in the car park;
4. MUGAs
5. Footpaths, school yard, and hard paved areas

7.4.2 Main Building Roof

The construction makeup of the roof for the proposed building is 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 Figure 14:

Figure 14: Roof 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. The dry basin adds an additional treatment where the roof runoff drains through this.

7.4.3 Car Parks

All carparks have been assumed "Non-residential car parking with frequent change" category.

It is proposed to use a pervious block paving build-up for the car park, resulting in the surface water in this area draining and being treated at source. The SuDS treatment train is as Figure 15.

Figure 15: 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. The car park will also drain through the dry basin which will provide additional treatment.

7.4.4 Site Access and internal circulation road in the car park

In general the site access road and circulation road will be captured through a in build fall channel which will outfall into the dry basin before outfalling to the watercourse. The remaining flow will be captured by the car parking pervious paving. 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 for all sites and treatement shown in Figure 16.

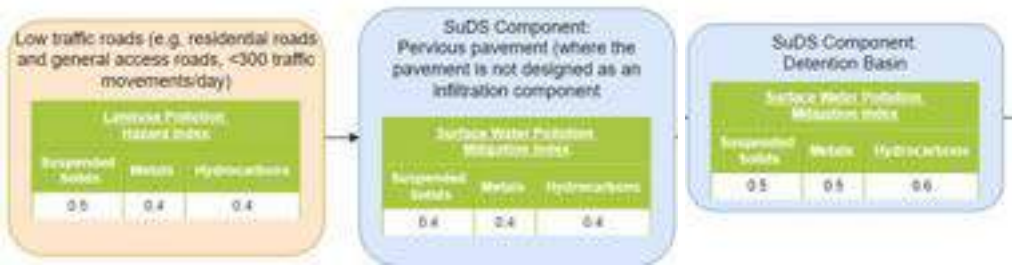


Figure 16: Site Access Road Treatment Train (Simple Index)

The detention basin alone offers the required level of the treatment for a low trafficked road. The areas percolating through the pervious paving with benefit from additional treatment.

7.4.5 MUGAs

Traffic is not expected on the MUGAs however the lowest category in the simple index tool is 'low traffic roads' therefore this has been used as benchmark in Figure 17.

Figure 17: MUGA Treatment Train (Simple Index)

The detention basin alone offers the required level of the treatment for a low trafficked road. The MUGA storm flow will also be treated by the pervious paving. No vehicles will use the surface therefore low traffic road is an 'over classification' reinforcing the treatments effectiveness.

7.4.6 Footpaths, school yard and other hard surfaces

Occasional emergency access is expected in these areas of the site. Therefore, the 'low traffic roads' category was selected however the volume of traffic is in emergency only in Figure 18.

Figure 18: Footpaths, School Yard and Sports Yard Treatment Train (Simple Index)

The majority of the hard surfaces are captured through raingardens. This bioretention system would provide sufficient treatment alone. The hard surfaces will also drain through the detention basin which offers additional treatment. The water is therefore treated to a sufficient level prior to discharging from site.

7.5 S4 – Amenity and S5 Biodiversity

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

Raingardens are proposed to capture the storm water for the majority of the site. The raingardens will likely be planted with trees and lower level shrubs which provide the opportunity to house birds, small mammals and insects as well as

offering a visual benefit from the school and development outside of the school boundary.

Well positioned raingardens with trees can provide natural shaded areas for the children in the summer months and those near to the buildings windows can aid with keeping the classrooms cool in hotter periods.

Raingardens and other green infrastructure may also offer an educational opportunity with green landscaping generally improving physical health, e.g. clean air from trees improving air pollution and children's wellbeing, e.g. the 'restorative' experience where landscape increases relaxation levels, reducing stress and improving concentration. This can lead to positive effects on emotional, behaviour and cognitive development.

Locating raingardens adjacent to the pedestrian walkways will allow them to be enjoyed as people enter, leave and move around the site.

A majority of the attenuation is proposed to be through a dry basin. The basin could be planted with appropriate plant species for the wet/dry conditions adding additional habitat variety. Locating the basin near to the woodland will compliment the existing habitats in the woodland

The emphasis of the design is to retain the existing outfall location and control the flow to an appropriate rate. By outfalling into the Nant yr Aran at the assumed same point as the current location, the biodiversity that has established itself around the existing outfall and the existing flow it provides into the watercourse can remain.

7.6 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.

A flat width has been provided around the dry basin to provide a safe platform for inspection and maintenance. Access to the basin has been incorporated into the design and there is potential for the existing gate in the north east corner of the site to be used as a maintenance entrance keeping the maintenance staff and vehicles separate from the rest of the school operations.

8 Summary

This drainage strategy has considered the existing site conditions and constraints, the proposed development at Llanilltud Faerdref together with potential discharge points. DCWW have been consulted to determine an appropriate foul connection to their network and the SAB consulted regarding the storm drainage. The storm drainage follows the principles of the Welsh Government's Statutory Standards for Sustainable Drainage.

Flood maps have been acquired for the site and the site is outside of Zones 2 and 3 for river and sea flooding however there are area of Zones 2 and 3 surface water and small watercourse flooding identified. A Flood Consequence Assessment will be required for the site.

The site is currently an active primary school with an associated private utility network including storm drainage and combined drainage disposing the foul discharge. Both are assumed to outfall into the Nant yr Aran watercourse and this is to be confirmed through further survey work. The topography slopes generally from south west to north east toward the existing woodland and watercourse. There is one vehicular access point and dedicated pedestrian access points on the southern boundary and these are being retained in their existing location.

The proposed school site is to contain a new building, car parking, MUGA, hard landscaping for play areas and circulation, and green space for play and landscaping. When determining the locations of the features, a number of constraints needed to be considered. These included site phasing as the existing schools need to remain operational during construction, existing utilities, topography and a working proposed masterplan with a suitable relationship between proposed uses. These constraints limit the location of the proposed building and crucial infrastructure for the new building to be made operational, including drainage.

Earthworks reprofiling is required to form the level plateau for the building and suitable slope directions and gradients for the other land uses. The proposed earthworks have shaped and informed the drainage strategy.

Foul flows have been estimated based on the anticipated school population and use and a pre planning application has been submitted to DCWW to determine a suitable foul drainage connection point. A new connection to the 375mm DCWW combined sewer located in the Llantwit Fardre Sports Club access road has been offered in principle. The proposal is to drain the site via gravity to this point. The existing combined drainage system will not be required following construction with no foul drainage entering the watercourse.

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.

Rainwater harvesting will be employed however is not sufficient to manage all of the rainwater. Soakaways tests have been proposed to inform whether infiltration

to the ground will be possible hydraulically. The possibility of infiltration also needs to consider proximity to buildings.

It is proposed the existing outfall is reused, subject to survey. It is assumed that the storm water will discharge into the Nant yr Aran. The existing storm drainage serving the existing building and impermeable areas will no longer be required.

Rainwater landing on the roof will be captured using guttering and downpipes which will then be fed to a raingarden. Raingardens will be used to capture surface water runoff where possible but will be supplemented with an in built fall channel at the building entrance. Permeable block paving has been employed in the car parking bays and the MUGAs will be constructed using permeable asphalt paving.

The existing catchments have been analysed with the piped networks modelled to determine the existing catchment areas and the brownfield flow, assuming all catchments are unattenuated. The GRR has also been calculated for the existing playing field.

The proposed impermeable area is similar (although 0.2Ha larger) to the existing impermeable area with the remainder of the site either permeable paving or grassed landscaping. As the existing impermeable area is brownfield, the existing brownfield rate can be used to inform the proposed discharge rates from the proposed impermeable area. It is proposed to limit the flow from the southern subcatchment to the existing 1:1 year brownfield rate with a 30% betterment.

The green landscaped areas and playing field runoff in the northern sub catchment will either naturally infiltrate or run overland to the watercourse. This replicates the existing regime and as the proposed playing field is smaller in area to the existing, it is proposed that the green landscaped area are unattenuated.

To attenuate the flow in the southern catchment, a dry basin combined with vortex control devices will be used to limit the discharge. The MUGA will provide an attenuation function and although raingardens and permeable paving in the parking bays will offer attenuation, these have not been included in the calculations.

Through these systems, the first 2-2.9mm of rainfall will be intercepted. Although this is not the entire first 5mm, this is a significant betterment compared to the existing situation. The treatment train for each land use has been calculated and all uses are adequately treated.

The storm drainage proposals for the development will need to be approved by the local SAB and an initial pre drainage strategy review has been submitted. The SAB has agreed in principle to the proposed discharge rates on confirmation of the assumptions made through additional survey.

Amenity, biodiversity and construction, operation and maintenance have all been considered and will be further detailed in the SAB application.

Appendix A

Existing Topography Drawing

N

Caution - HAZID - 1

Caution - HAZID - 2

Caution - HAZID - 3

Caution - HAZID - 4

Building

Llanitud Faerdref
Primary School

Play Area

Asphalt

Grass

Pool

Gl. Illtyds Road

1.Warning:
Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation. Wherever 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 HSG147, must be used to verify the information and establish their actual position.

3.Warning:
Records information and positions TFR are indicative only and are in an approximate position. Safe digging practices in accordance with HSG147, must be used to verify the information and establish their actual position.

Greater confidence

Lesser confidence

QL"B1P" Horizontal (±50mm) and vertical (±25mm) position verified visually.

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 (±220mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a

Horizontal (±220mm or ±40% of detected depth) and vertical (±40% of detected depth) position detected by a

Horizontally positioned (±500mm) data with post processing

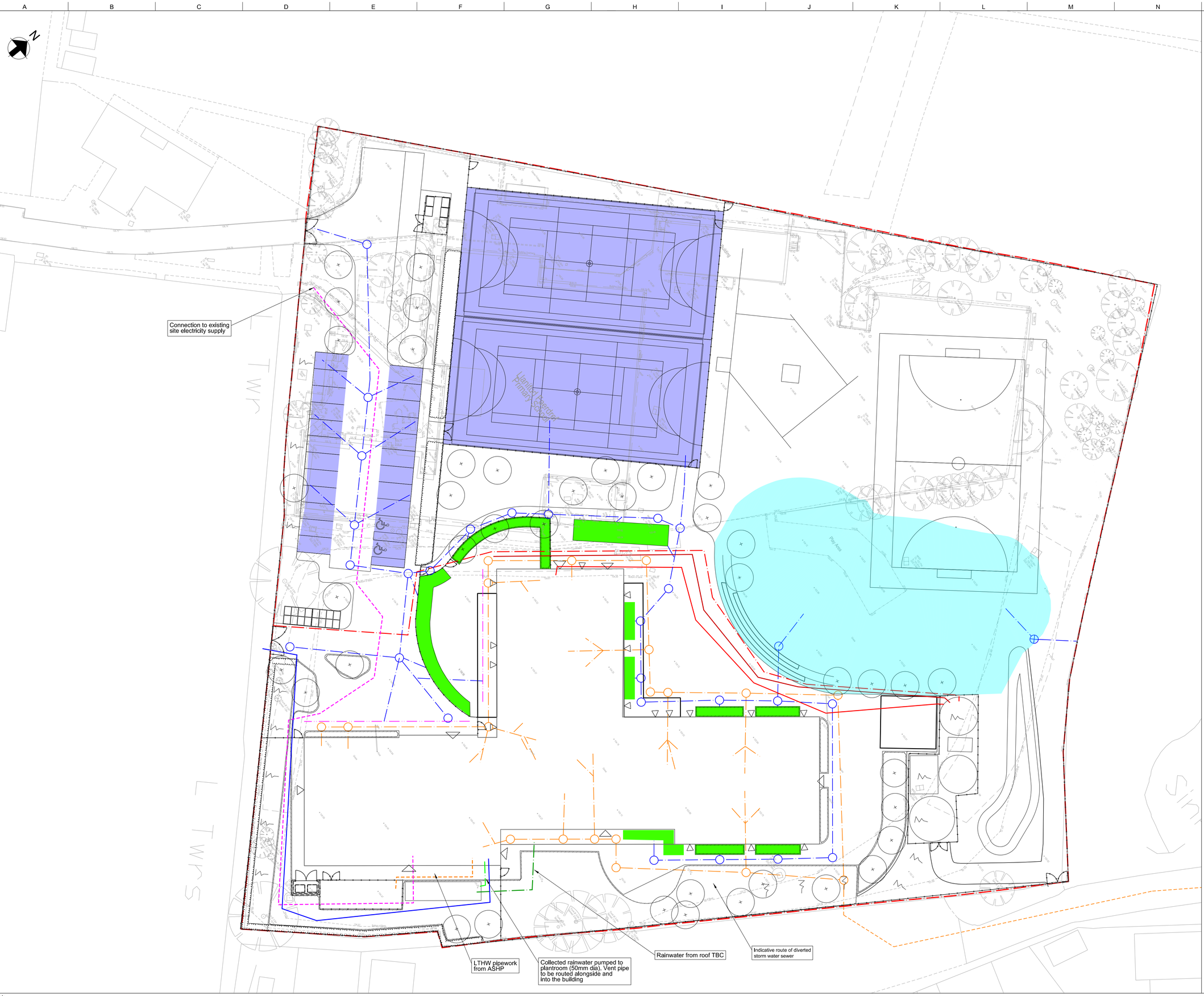
Horizontally positioned (±500mm) data only

Bearing STN01 to STN02: 44°19'49.9"

Appendix B

Proposed Drawing Pack

A1



Legend

- Site Boundary
- Proposed Surface Water Drainage
- Proposed Foul Water Drainage
- Proposed Rising Main
- Proposed Bio-remediation Drainage Channel
- Proposed Potable Water
- Proposed Fire Water
- Proposed Hydrant Main
- Proposed LV Electric

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. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in September 2019. No responsibility can be taken for the accuracy of this survey.

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 servies to the existing school building to be removed not shown on this drawing for clarity.

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

8. Contractor to investigate and identify all known and unknown services prior to commencement of works.

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

10. The existing drainage of the school site will need to be accommodated during construction.

11. No gas is required

Issue	Date	By	Chkd	Appd
P01	24/09/21	IA	JN	IA
Issued for RIBA Stage 3				

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Client
MIMWEP
Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Proposed Utilities

Scale at A1	Role
1:250	Civils

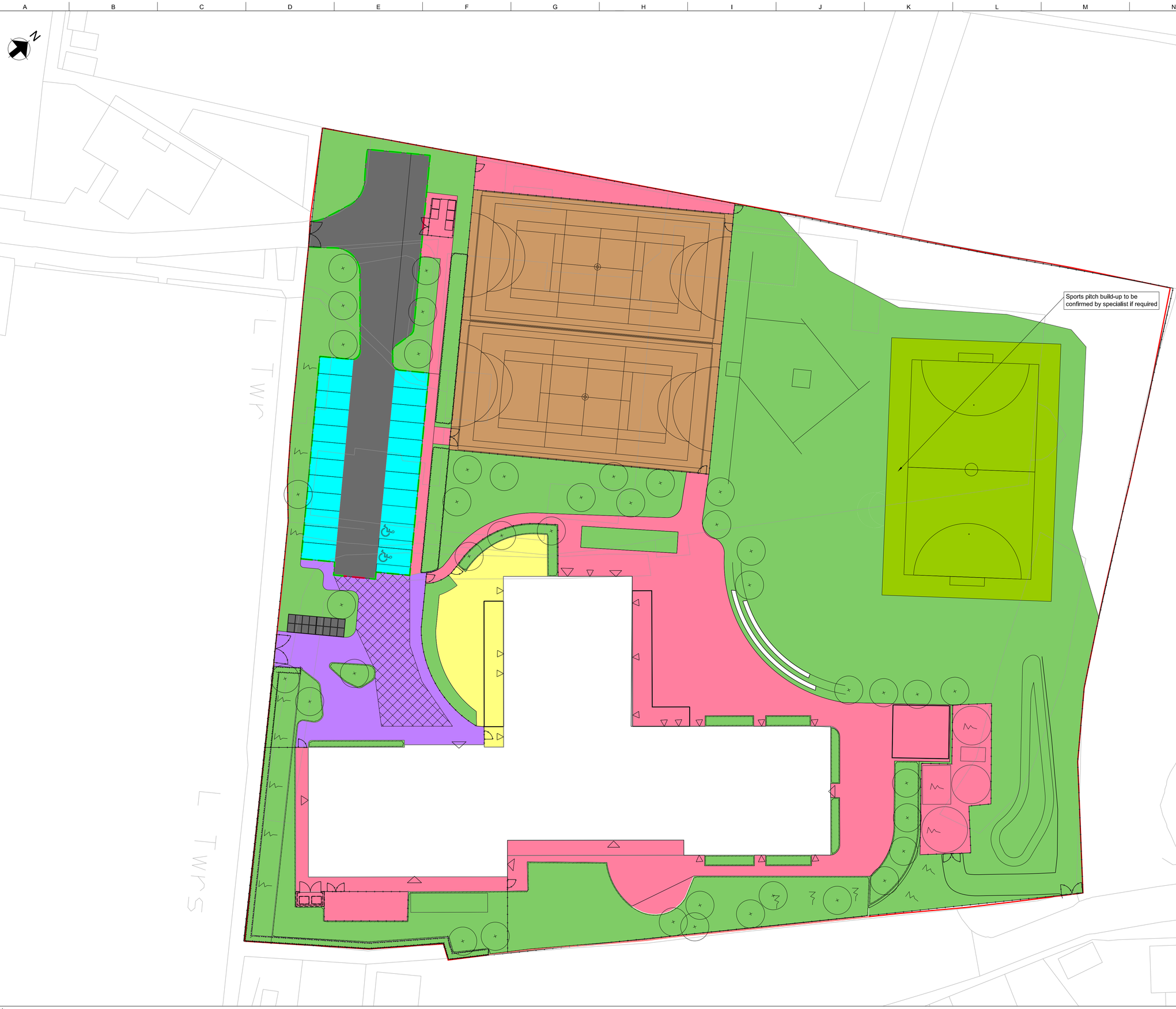
Suitability
S3- Suitable for Review and Comment

Job No	Rev
281143	P01

Drawing No
RH0301-ARP-ZZ-00-DR-C-00081

J:\281000\281143\004 Internal Project Data\4-50 Drawings\4-31 Issue drawings\RH0301-ARP-0A-DR-C-00081.dgn

Do not scale



Legend

- Site Boundary
- Proposed Highway - Asphalt
- Proposed Pedestrian Area - Asphalt
- Permeable Asphalt
- Permeable block paving
- Feature paving/concrete block
- Feature paving/concrete block (trafficked)
- Proposed Landscaping (grass and rain garden)
- 'Wet Pour'
- HB2 kerb
- Flush kerb

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. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in August 2019. No responsibility can be taken for the accuracy of this survey.

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

5. Drawing does not show proposed soft landscaping details to be incorporated for the SuDS design.

6. Soft landscaping soil details to be advised by landscape architect.

7. The construction thickness of the permeable block paving, feature block paving and 'Wet Pour' are to be designed by the chosen supplier for the desired use and trafficking

8. An edging kerb to architect specification will be required between all footway and landscaping areas and any change of surface.

9. The construction finishes are designed by the Landscape Architect. Refer to drawing RH0201-ARP-0-0-DR-C-00091 for the construction build-ups.

10. Layouts are based on conceptual layouts received from Ares on 01-09-2021 and are subject to ongoing coordination and further design development during subsequent stages.

11. Transition kerbs will be requierd between flush and HB2 kerbing.

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

13. Hard landscaping finishes based on Ares drawings received 20/09/2021

Issue	Date	By	Chkd	Appd
P01	24/09/21	IA	JN	IA
Issued for RIBA Stage 3				

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Client
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Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Construction Finishes

Scale at A1	Role
1:250	Civils

Suitability
S3- Suitable for Review and Comment

Job No	Rev
281143	P01

Drawing No
RH0301-ARP-ZZ-00-DR-C-00051

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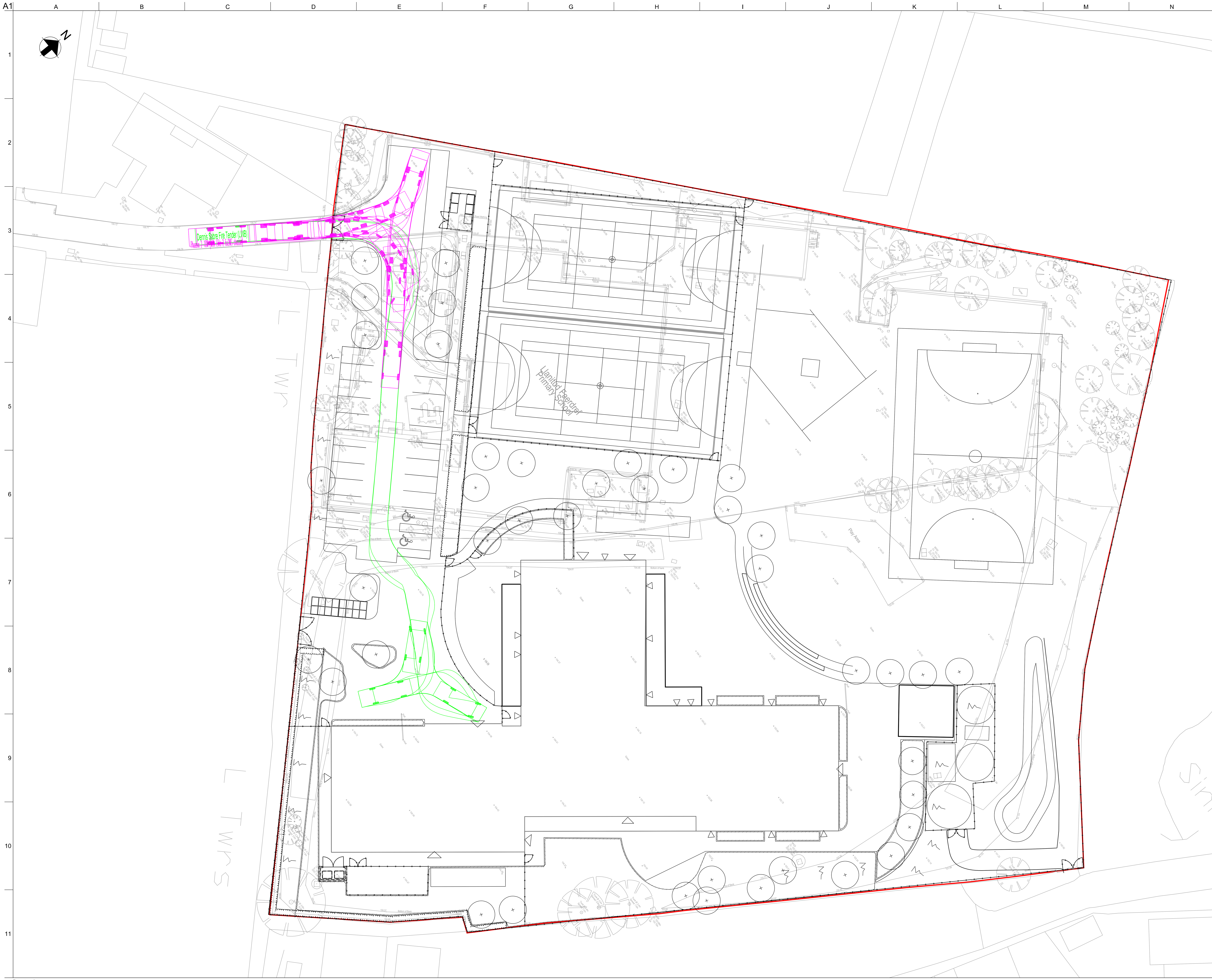
A1



Legend

- Site Boundary
- Large Refuse Vehicle
- Fire Tender

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. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in August 2019. No responsibility can be taken for the accuracy of this survey.

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.

Issue	Date	By	Chkd	Appd
P01	24/09/21	RL	JN	IA
	Issued for RIBA Stage 3			

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Client
MIMWEP
Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Vehicle Tracking

Scale at A1: 1:250
Role: Civils
Suitability: S3- Suitable for Review and Comment
Job No: 281143
Rev: P01
Drawing No: RH0301-ARP-ZZ-00-DR-C-00061

Do not scale

Legend

- Site Boundary
- Structure demolition shown by others
- Asphalt and associated pavement removed to bottom of porposed subbase
- Landscaping to be removed to bottom of porposed subbase
- Wall and pallisade fencing to be removed
- Internal wall to be removd
- Existing tree to be removed
- Fenceline to be removed

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. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in August 2019. No responsibility can be taken for the accuracy of this survey.

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

5. The contractor should review the bottom of subbase levels and remove and exisitng pavement/landscaping above this level.

6. All existing furniture/equipment/structures to be removed

7. All kerbing to be removed within side boundary

8. All existing sheds/canopies/greenhouses or any other buildings/structures associated with the existing school main buldings are to be removed.

9. All stairsets and walling within the red line boundary is to be removed (excluding the perimater walling around the red line boundary

8. All existing redundant utilities (including chambers to be removed)

8. If possible, contractor to retain existing features e.g. fencing/kerbing and reuse

Issue	Date	By	Chkd	Appd
P01	24/09/21	IA	JN	IA
Issued for RIBA Stage 3				

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Client
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Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Site Cearance

Scale at A1	Role
1:250	Civils

Suitability
S3- Suitable for Review and Comment

Job No	Rev
281143	P01

Drawing No
RH0301-ARP-ZZ-00-DR-C-00071

J:\281000\281143\004 Internal Project Data\4-30 Drawings\4-31 Issue drawings\RH0301-ARP-0A0-DR-C-00071.dgn

Do not scale

A1

Pervious paving to provide additional attenuation for car park flows.

In-built fall slot drain with sump at the low point

Building internal layout not shown for clarity. Locations of internal foul drainage to be confirmed and coordinated further at future design stages.

Approx. 70m² 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.

Existing surface water pipe to be diverted. Route to be confirmed in subsequent design stages.

Indicative diversion route

Proposed to form new off-site foul drainage route to connect to existing combined sewer in Llantwit Fardre Sports Club access road. To be confirmed by DCWW.

Indicative pipe route to Llantwit Fadre Sports Club connection pipe

Outline of attenuation earthworks required to attenuate flows to the existing 1-year rate prior to discharge to watercourse. 280m3 attenuation provided to attenuate 0.595ha flows. Size to be refined in next Stage

Surface water network proposed to outfall to Nant yr Afan offsite. Discharge rate to be agreed with the SAB.

Potential to outfall the storm drainage using the existing site outfall. Additional survey requested to confirm location and invert levels of headwall and the pipework to it

Legend

- Site Boundary
- Existing Storm Sewer
- Existing Foul Sewer
- Existing Combined Sewer
- Proposed Bioretention
- Proposed Storm Drainage
- Proposed Flow Control
- Proposed In-Built Fall Grated Channel
- Proposed Detention Basin
- Proposed Porous Paving
- Proposed Foul Drainage

Notes

1. Do not scale from this drawing.

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

3. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in September 2019. No responsibility can be taken for the accuracy of this survey.

4. All levels are shown above ordnance datum (mAOD)

5. Storm drainage proposals to be agreed with RCT SAB officer including form and location of treatment/attenuation and the outfalling discharge rate.

6. Attenuation sizes are based on attenuating all return periods up to 1:100 to the 1:1 year discharge rate. The area and volume of attenuation required is subject to agreement with the SAB and DCWW.

7. Manhole and pipe sizes/locations to be confirmed in subsequent design stages.

8 Awaiting soakaway test results to determine if a soakaway solution is acceptable. Further Ground Investigation works may be required.

9. Foul and storm drainage provision to be retained for the operational school buildings during construction.

10. Continued coordination with the landscape architect required through the subsequent design stages.

11. Location of rainwater downpipes to be confirmed at future design stages and drainage design to be updated. Locations of bioretention features are indicative and liable to change as as a result. Location of attenuation, rain gardens and pipe routes to be coordinated through future design stages.

Issue	Date	By	Chkd	Appd
P02	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				
P01	24/05/21	DS	JN	IA
Issued for Information				

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Client
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Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Proposed Drainage

Scale at A1 1:250 | Role Civils

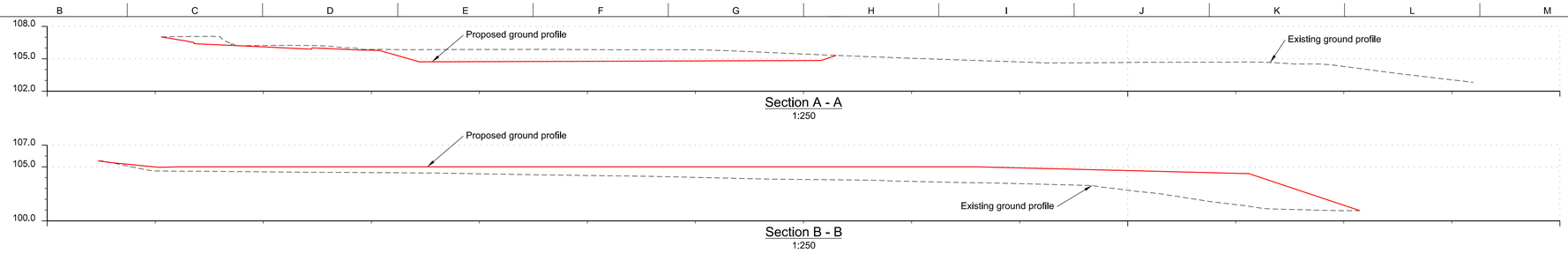
Suitability S3- Suitable for Review and Comment

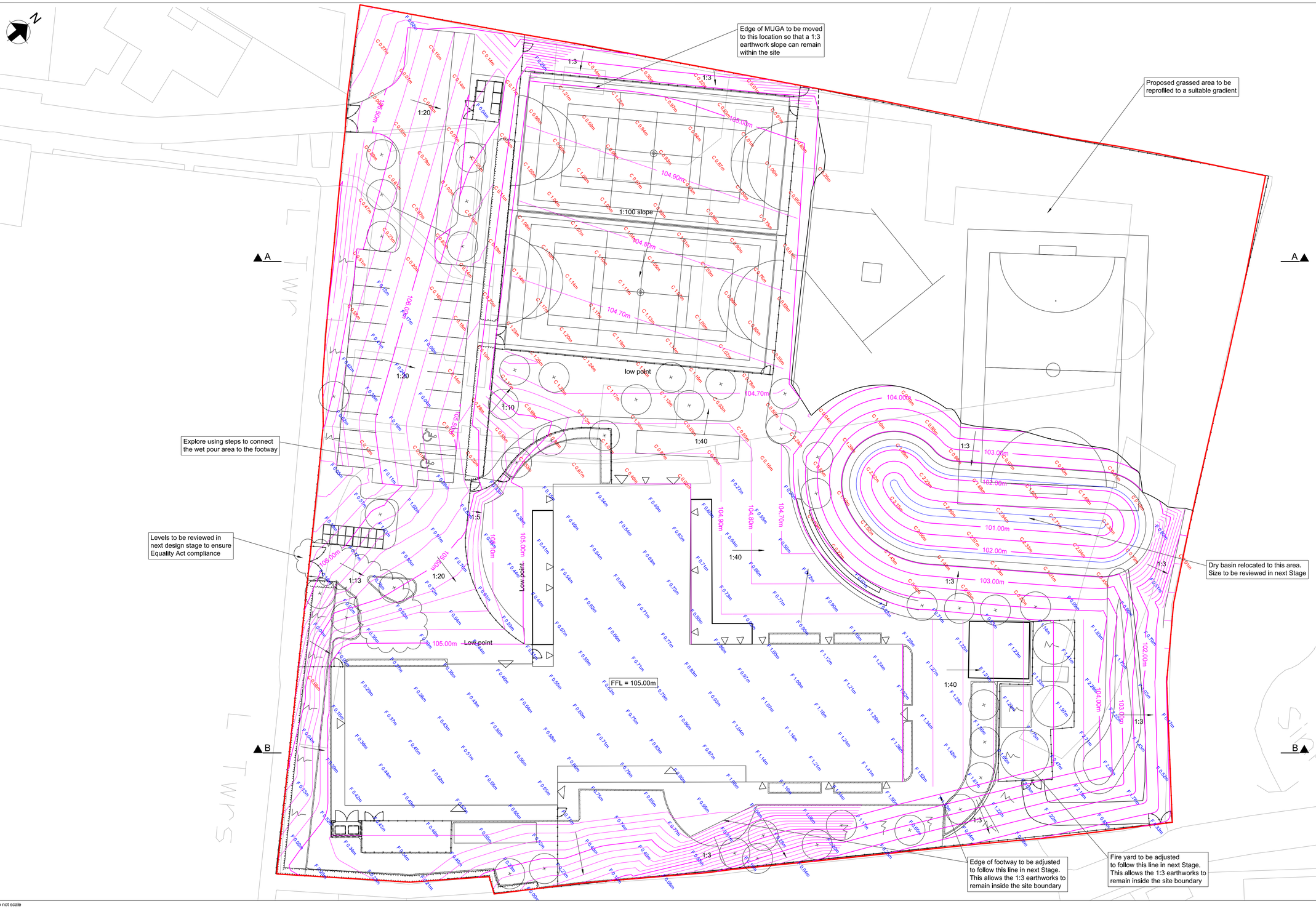
Job No 281143 | Rev P02

Drawing No RH0301-ARP-ZZ-00-DR-C-00041

J:\281\80028143\4-004 Internal Project Data\4-50 Drawings\04-31 Issue drawings\RH0301-ARP-SA-DR-C-00041.dgn

Do not scale





Legend

- Site Boundary
- 47.00m — Proposed Contour
- C 0.11m — Depth of Cut
- F 0.12m — Depth of Fill

Notes

1. Cut and fill depths shown are based on the difference between the proposed finished levels and the existing ground level.

2. All levels at the site boundary are retained at existing level.

Issue	Date	By	Chkd	Appd
P02	24/09/21	CB	JN	IA
Issued for RIBA Stage 3				
P01	24/05/21	DS	JN	IA
Issued for Information				

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Client
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Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
External Finished Levels

Scale at A1	1:250	Role	Civils

Suitability: S3- Suitable for Review and Comment

Job No	Rev
281143	P02

Drawing No
RH0301-ARP-ZZ-00-DR-C-00031

J:\281\80002811\43-00\4 Internal Project Data\4-50 Drawings\4-31 Issue drawings\RH0301-ARP-0-XX-DR-C-00031.dgn

Do not scale

Legend

- Site Boundary
- Storm Sewer
- Foul Sewer
- Combined Sewer
- Gas
- Water
- Telecoms
- Electric
- Electric (Overhead)
- Unknown

Notes

1. The positions of services and plant shown on this drawing are indicative only and reflect the level of information obtained from a survey carried out by 'Technics Group' in August 2019. No guarantee is given for the accuracy of this information and it is intended for general guidance only.

2. Services may exist at various depths and their routes may deviate within the vicinity of the routes shown. The information must not be relied upon for excavation or other works. The onus of locating the services before using mechanical excavator or other plant, rests entirely upon the contractor.

3. Where utilities are indicated there may be multiple cables present.

4. Other utilities may be present underground that are not shown on this drawing. Before any works are undertaken, the contractor is to ensure they are satisfied that the works area is utility free or that any identified utility can be managed safely.

5. Contractor should review all factual information related to utilities, liaise with statutory authorities and undertake further checks and surveys to ascertain location and depth of utilities prior to undertaking intrusive, construction or diversion works.

6. Utility location and depth should be read at the appropriate accuracy in accordance with PAS128.

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

8. The existing drainage of the school site will need to be accommodated during construction.

Issue	Date	By	Chkd	Appd
P02	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				
P01	24/05/21	DS	JN	IA
Issued for Information				

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Client
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Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Existing Drainage and Utilities

Scale at A1	Role
1:250	Civils

Suitability
S3- Suitable for Review and Comment

Job No	Rev
281143	P02

Drawing No
RH0301-ARP-ZZ-00-DR-C-00021

J:\281\80002811\43-00\4 Internal Project Data\4-30 Drawings\RH0301-ARP-0-0-DR-C-00021.dgn

Do not scale

Legend

Site Boundary

Notes

1. Do not scale from this drawing.

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

3. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in September 2019. No responsibility can be taken for the accuracy of the survey.

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 01-09-2021 and are subject to ongoing coordination and further design development during subsequent stages.

Issue	Date	By	Chkd	Appd
P02	24/09/21	RL	JN	IA
	Issued for RIBA Stage 3			
P01	24/05/21	DS	JN	IA
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Client
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Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Proposed General Arrangement

Scale at A1	1:250	Role	Civils
Suitability	S3- Suitable for Review and Comment		
Job No	281143	Rev	P02

Drawing No
RH0301-ARP-ZZ-00-DR-C-00011

J:\281000\281143-0004 Internal Project Data\4-30 Drawings\4-31 Issue drawings\RH0301-ARP-XX-DR-C-00011.dgn

Do not scale

Legend

Site Boundary

Notes

1. Do not scale from this drawing.

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

3. The topographic survey detail shown on this drawing is based on a survey carried out by 'Technics Group' in September 2019. No responsibility can be taken for the accuracy of the survey.

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.

Issue	Date	By	Chkd	Appd
P02	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				
P01	24/05/21	DS	JN	IA
Issued for Information				

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Client
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Project Title
RCT Batch Primary

Drawing Title
Llanilltud Faerdref
Existing Site Layout

Scale at A1	Role
1:250	Civils

Suitability
S3- Suitable for Review and Comment

Job No	Rev
281143	P02

Drawing No
RH0301-ARP-ZZ-00-DR-C-00001

ares LANDSCAPE ARCHITECTS

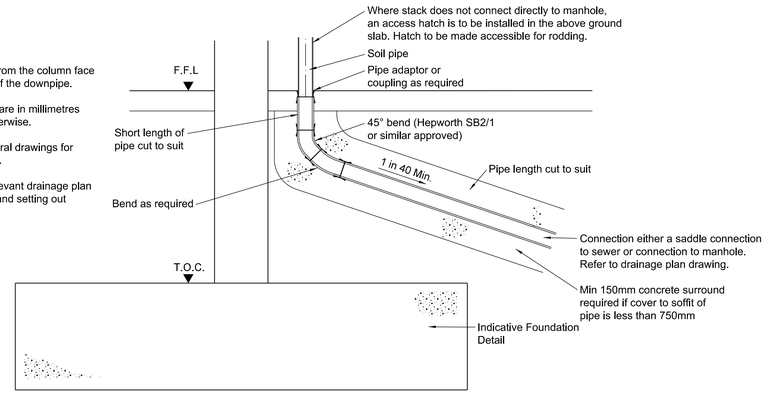
Notes:

1. All offsets are from the column face to the centreline of the downpipe.

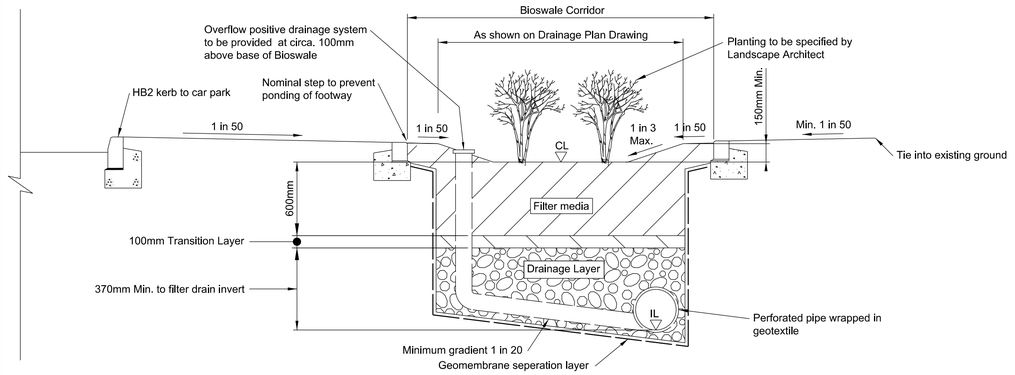
2. All dimensions are in millimetres unless shown otherwise.

3. Refer to structural drawings for foundation details.

4. Refer to the relevant drainage plan drawing for level and setting out information.

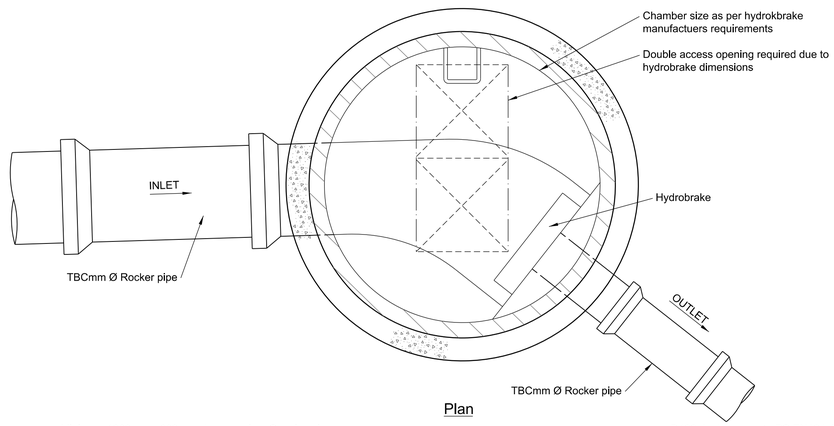


Connection Detail For Downpipes

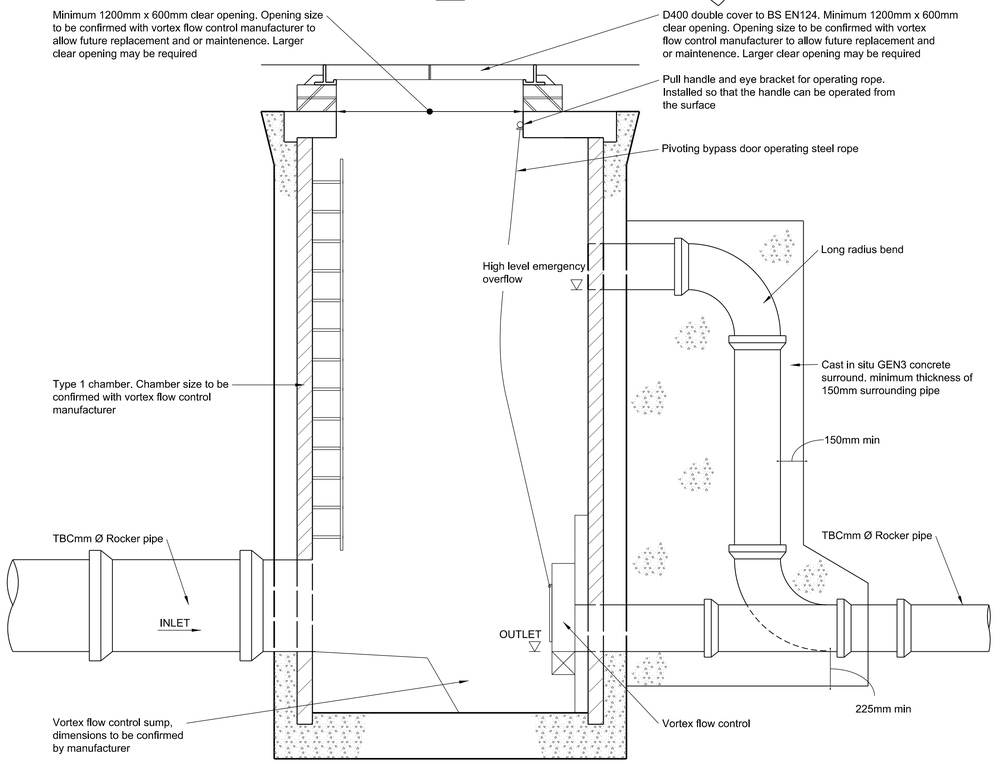


Bioretention Feature with low planting

Scale 1:25

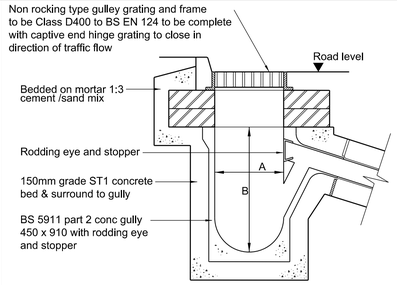


Plan

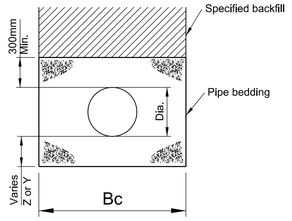


Section

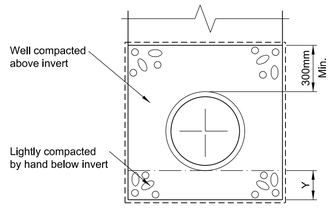
Flow Control Chamber



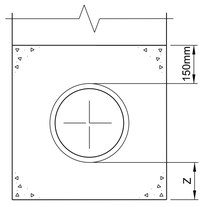
Gully Detail



	Yard Gully	Road Gully
A	300	450
B	600	750



Class S Granular Bed and Surround (Bedding factor 2.2)



Class Z Concrete Bed and Surround (Bedding factor 4.5)

Legend

- Concrete mix ST4
- Granular pipe bedding material Type 'A' (See Table A)
- Selected excavated material (Refer to specification)
- Clay (See CESWI 7, clause 2.18)

Pipe Dia. (mm)	Aggregate Size: Graded (mm)	Aggregate Size: or single sized (mm)
100	-	10
150	14 - 5	10 Or 14
225-300	14 - 5 Or 20 - 5	10, 14 Or 20
375-525	14 - 5 Or 20 - 5	10, 14 Or 20
EXCEEDING 525	14 - 5 Or 20 - 5 Or 40 - 5	10, 14, 20 Or 40

Table A - Granular pipe bedding material Type 'A'

Table of Dimensions

Letter		Pipe Sizes	Dimension (mm)
L		100 - 450	25
		525 - 900	30
Y*	Y1	100 - 150	100
		225 - 900	150
	Y2	100 - 750	200
		825 - 900	225
Z		100 - 375	100
		450 - 600	150
		675 - 900	225

* Y1 - Unifrom Soil
* Y2 - Rock

Notes:

1. All excavation in excess of Bc shall be backfilled with concrete Mix ST2.

2. Dimension Y2 shall be increased at a rate of 40mm per additional 1000mm cover to pipe in excess of 5000mm.

Pipe Dia.	Width Bc: Max.	Width Bc: Min.	Y: Y1 (Uniform soil)	Y: Y2 (Rock) *	L	Z
						Min.
100	550	450	100	200	25	100
150	600	490	100	200	25	100
225	700	580	150	200	25	100
300	750	680	150	200	25	100
375	1050	950	150	200	25	100
450	1150	1030	150	200	25	150
525	1200	1120	150	200	30	150
600	1350	1240	150	200	30	150
675	1450	1330	150	200	30	225
750	1500	1400	150	200	30	225
825	1600	1490	150	225	30	225
900	2100	1900	150	225	30	225
975	2150	1950	175	250	30	300
1050	2250	2050	175	275	30	300
1200	2500	2250	200	300	30	300
OVER 1200	Outside Dia. + 1000	Outside Dia. + 800	DIA/6	DIA/4	54	400

Table B - Trench widths and other dimesions
* See Note 2

Pipe Bedding Details

Notes

1. Do not scale.

2. All levels are in metres above ordnance datum unless stated otherwise.

3. All propriety products to be installed to manufacturers requirements and specifications.

4. Drainage design and construction is in accordance with Sewers for Adoption 7th Edition.

5. The details shown on this drawing are for RIBA Stage 3. The details will need to be reviewed and revised following Full SABS.

6. Refer to drawing RH0201-ARP-0-0-DR-C-00041, RH0301-ARP-0-0-DR-C-00041 and RH04 01-ARP-0-0-DR-C-00041 for plan extents of raingarden features.

Issue	Date	By	Chkd	Appd
P01	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				

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Client
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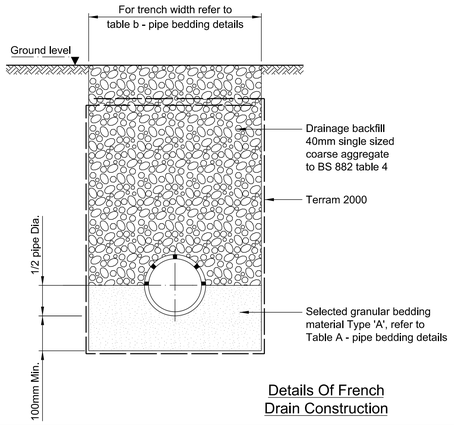
Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Proposed Drainage Details
Sheet 2 of 2

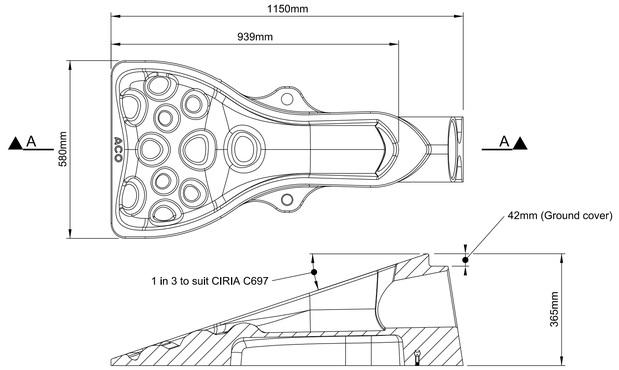
Scale at A1: N.T.S
Role: Civils
Suitability: S3- Suitable for Review and Comment
Job No: **281143**
Rev: **P01**
Drawing No: **RH0101-ARP-ZZ-00-DR-C-00120**



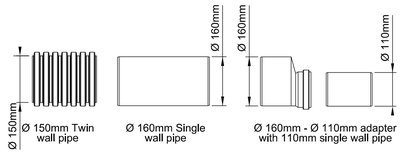
Details Of French Drain Construction

Notes

1. Top soil may be extended over the drainage stone with the engineer's approval.
2. For details of pipes refer to the layout drawings.
3. Terram 2000 to be used to surround backfill as specified by the engineer.
4. All dimensions are in mm.
5. Filter drain detail as existing. To be confirmed on site.



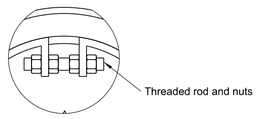
SECTION A-A



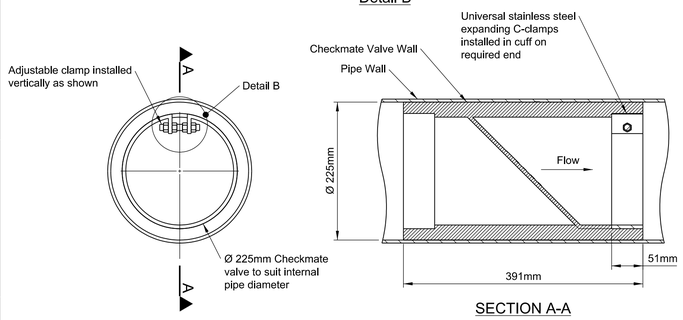
Notes

*Grating kit contains 1 x Grade 304 Stainless Steel mesh grating (mesh size is 42mm), 3 x anchors, 3 x washers and 3 x fixing screws
+ Ground Anchor kit contains 2 x ground anchors, 2 x washers and 2 x bolts

ACO Swale Inlet



Detail B



SECTION A-A

In-Line Non-Return Valve
Althon Checkmate or Similar Approved

Notes

1. Clamp installed in upstream or downstream cuff depending on installation orientation.
2. Shorter lengths available.

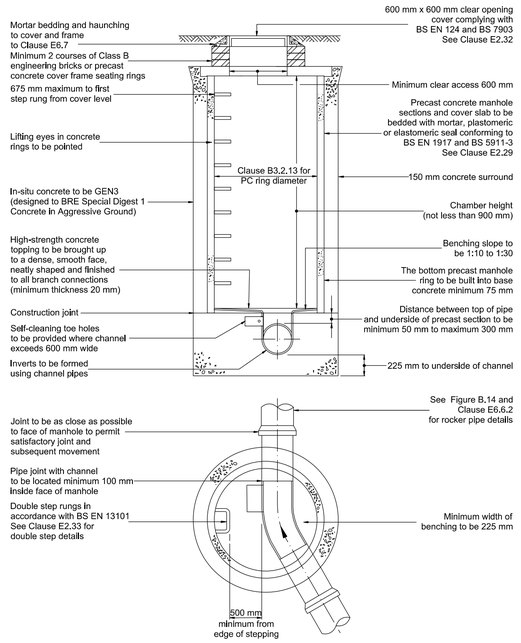


Figure B.12
Typical Manhole Detail - Type 2
Maximum depth from cover level to soffit of pipe 3.0 m

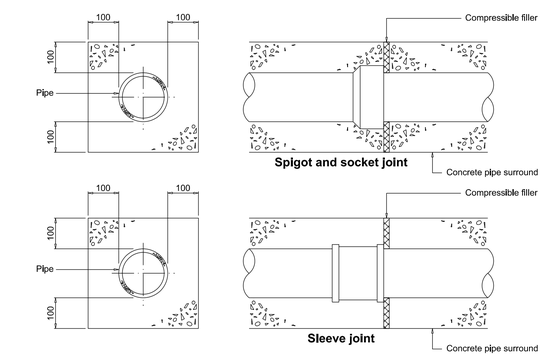
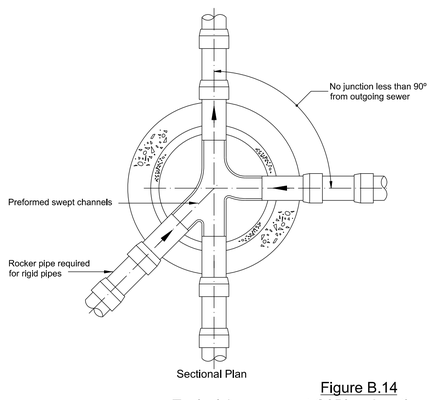


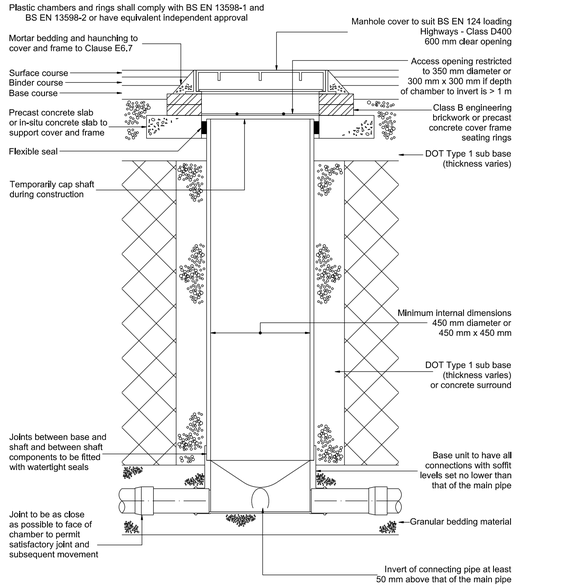
Figure B.26
Joints For Concrete Encased Pipes



Nominal diameter (mm)	Maximum effective length (m)
150 - 600	0.6
601 - 750	1.00
over 750	1.25

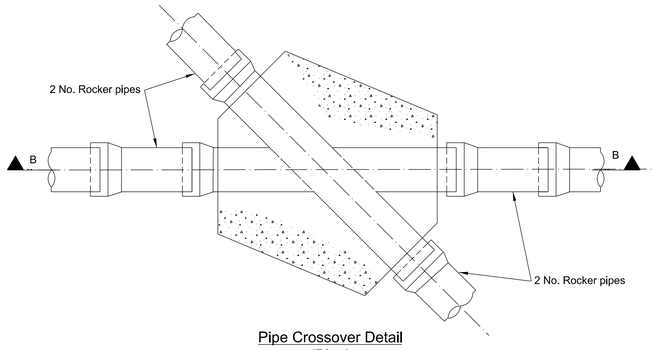
Table 1-Rocker Pipe Lengths

Figure B.14
Typical Arrangement Of Pipe Junctions Within Manholes

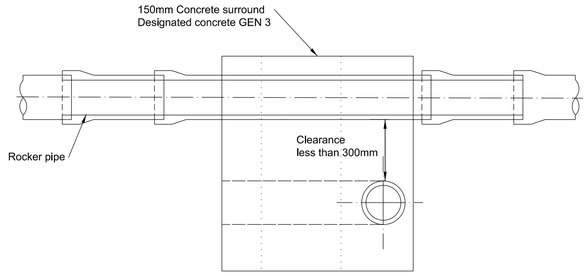


Note: Where the access chamber is in the highway the Highway Authority can have specific requirements

Figure B.16
Typical Inspection Chamber Detail - Type 3 (Flexible Material Detail)
Maximum depth from cover level to soffit of pipe
in areas subject to vehicle loading 3 m, non-entry



Pipe Crossover Detail
(Plan)



Section B-B
Pipe Crossover Detail

Notes

1. Do not scale.
2. All levels are in metres above ordnance datum unless stated otherwise.
3. All propriety products to be installed to manufacturers requirements and specifications.
4. Drainage design and construction is in accordance with Sewers for Adoption 7th Edition.
5. The details shown on this drawing are for RIBA Stage 3. The details will need to be reviewed and revised following Full SAB process.

Issue	Date	By	Chkd	Appd
P01	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				

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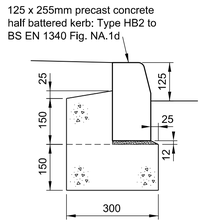
Client
MIMWEP
Rhondda Cynon Taf County Council

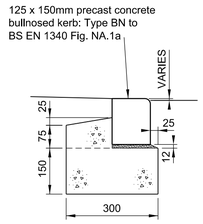
Project Title
RCT Batch Primary

Drawing Title
Proposed Drainage Details
Sheet 1 of 2

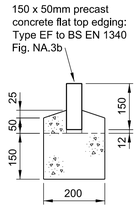
Scale at A1 N.T.S | Role Civils
Suitability S3- Suitable for Review and Comment
Job No 281143 | Rev P01
Drawing No RH0101-ARP-ZZ-00-DR-C-00110



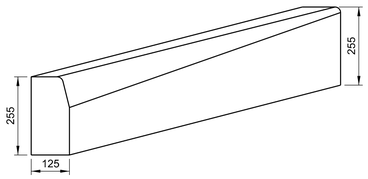
KERB TYPE HB2



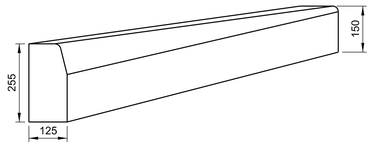
KERB TYPE BN (FLUSH KERB)



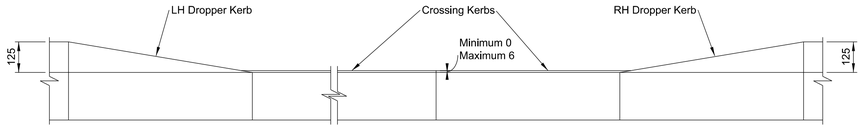
EDGING TYPE E F



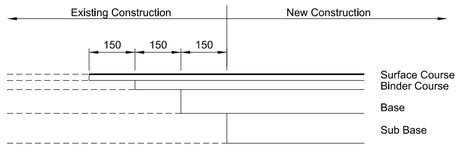
TRANSITION KERB (125x255 HB - BN)



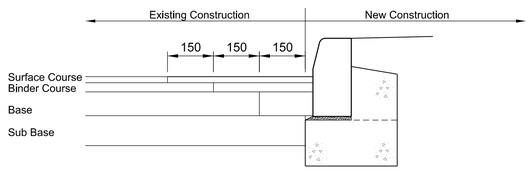
DROP KERB (125x255/150 HB - BN)



DROPPED KERB CROSSING POINT DETAIL - HALF BATTERED TO BULLNOSED



LONGITUDINAL TIE IN DETAIL

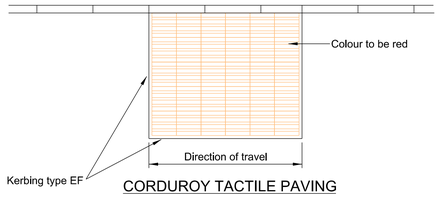


REINSTATEMENT DETAIL

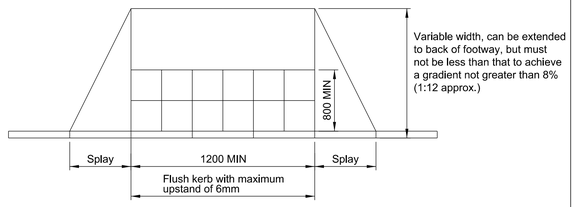
MODULE TYPE	SIZE	PITCH DIMENSION(mm)	
		A	B
A	400 x 400	66.8	33
B	450 x 450	64	33
C	200 x 133	67	33

Notes:-

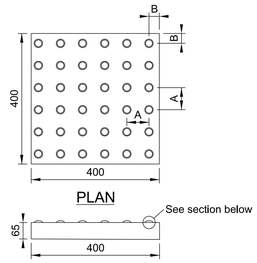
1. Textured slabs to be laid parallel to the crossing studs which may not necessarily be square to the crossing.
2. Flush kerb is type 4 dropped kerb laid flush with the carriageway surface or with a maximum upstand of 6mm.
3. Textured slabs to be coloured red at controlled crossings and buff coloured at uncontrolled crossings as detr mobility unit 'guidance on the use of tactile paving surfaces'.
4. Textured slabs to be bedded on 25mm sand bed on 100mm thick type 1 sub-base to CL 803.



CORDUROY TACTILE PAVING

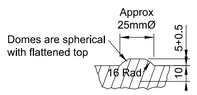


HAZARD TACTILE PAVING



PLAN

ELEVATION



BLISTER PAVING

Notes:

1. Do not scale from this drawing.
2. All dimensions are in millimetres unless noted otherwise.

Issue	Date	By	Chkd	Appd
P01	24/09/21	RL	JN	IA
Issued for RIBA Stage 3				

ARUP

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Client
MIMWEP
Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Construction Details

Scale at A1: NTS
Role: Civils
Suitability: S3- Suitable for Review and Comment
Job No: 281143
Rev: P01
Drawing No: RH0101-ARP-ZZ-00-DR-C-00100

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	PROPOSED HIGHWAY - ASPHALT	
LAYER	SPECIFICATION	THICKNESS (mm)
SURFACE COURSE	AC10 CLOSE SURF, PSV 65 MIN, AAV 12 MAX TO BE EN 13108-4 AND BS 594987:2015	40
BINDER COURSE	AC20 DENSE BIN 40/60 REC. TO BS594987:2015 AND CLAUSE 906 OF THE SHW	60
BASE COURSE	AC32 DENSE BASE 40/60 REC. TO BS594987:2015 AND CLAUSE 906 OF THE SHW	150
SUB BASE	TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	230
CAPPING LAYER	CAPPING TO CLAUSE 613 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	380

	PROPOSED PEDESTRIAN AREA - ASPHALT	
LAYER	SPECIFICATION	THICKNESS (mm)
SURFACE COURSE	AC6 DENSE 100/150 (EXCLUDING LIMESTONE) TO BS EN 13108-1 AND BS 594987:2015 (BUFF COLOURED TO ARCHITECTS SPECIFICATION)	20
BINDER COURSE	AC 20 DENSE BIN 100/150 REC. TO BS594987:2015 AND CLAUSE 906 OF THE SHW	50
SUB BASE	TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	225

	PERMEABLE ASPHALT	
LAYER	SPECIFICATION	THICKNESS (mm)
SURFACE COURSE	10mm 'SUPER DRAIN ASPHALT' THIN SURFACE COURSE SYSTEM, BIN 20mm OR SIMILAR APPROVED MATERIAL	30
BINDER COURSE	14mm 'SUPER DRAIN ASPHALT' BINDER COURSE SYSTEM WITH >18% VOID CONTENT OR SIMILAR APPROVED MATERIAL	50
BASE COURSE	32mm 'SUPER DRAIN ASPHALT' BASE COURSE SYSTEM WITH >18% VOID CONTENT OR SIMILAR APPROVED MATERIAL	70
SUB BASE	TYPE 3 GRANULAR MATERIAL TO CLAUSE 805 (SPECIFICATION FOR HIGHWAY WORKS) WITH PERFORATED CARRIER DRAINS AT REGULAR INTERVALS. SEE NOTE 1.	230
CAPPING LAYER	CAPPING TO CLAUSE 613 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	380
SUBGRADE SEPARATION	GEOMEMBRANE WRAPPED IN NON-WOVEN GEOTEXTILE. SEE NOTE 2.	-

	PERMEABLE BLOCK PAVING	
LAYER	SPECIFICATION	THICKNESS (mm)
CONCRETE BLOCKS	TBC BY ARCHITECT	TBC
LAYING COURSE	TBC BY MANUFACTURER. ASSUME 6-2mm OPEN GRADED CRUSHED ROCK WUTH 6mm JOINTS FILLED WITH CRUSHED ROCK	50
SUB BASE	TBC BY MANUFACTURER. ASSUME 20-4mm OPEN GRADED CRUSHED ROCK WITH MARSHALLS MT120 (OR SIMILAR) FILTRATION TEXTILE SEPERATING SUBBASE AND SUBGRADE	200

	FEATURE PAVING/CONCRETE BLOCKS	
LAYER	SPECIFICATION	THICKNESS (mm)
CONCRETE BLOCKS	TBC BY ARCHITECT	TBC (50mm min)
SAND-LAYING COURSE	SAND LAYING COURSE WITH SAND FILLED NARROW JOINTS IN ACCORDANCE WITH BS7533-4	50
SUB BASE	TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	360

	FEATURE PAVING/CONCRETE BLOCKS WITH LIGHT TRAFFICKING	
LAYER	SPECIFICATION	THICKNESS (mm)
CONCRETE BLOCKS	TBC BY ARCHITECT	TBC
SAND-LAYING COURSE	SAND LAYING COURSE WITH SAND FILLED NARROW JOINTS IN ACCORDANCE WITH BS7533-4	30
ROADBASE	AC20 DENSE BASE WITH 100 PEN. LAID IN 2 LAYERS	125
SUB BASE	TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 (SPECIFICATION FOR HIGHWAY WORKS). SEE NOTE 1.	360

	PROPOSED SOFT LANDSCAPING - TO BE CONFIRMED BY LANDSACPE ARCHITECT	
LAYER	SPECIFICATION	THICKNESS (mm)
TOP SOIL	CLEAN TOPSOIL	TBC
SUB SOIL	CLEAN SUB-SOIL	TBC

	WET POUR RUBBER SURFACING	
LAYER	SPECIFICATION	THICKNESS (mm)
WET POUR	RUBBER PLAYGROUND SURFACING. REFER TO MANUFACTURER AND ARCITECT SPECIFICATION	TBC
PEDESTRAIN AREA ASPHALT	MATERIALS AS PER PEDESTRAIN AREA ASPHALT. ALL LAYERS REQUIRED	AS PED AREA ASPHALT

Legend

- Proposed Highway - Asphalt
- Proposed Pedestrian Area - Asphalt
- Permeable Asphalt
- Permeable block paving
- Feature paving/concrete block
- Feature paving/concrete block overridden by vehicular traffic (note 4)
- Proposed Landscaping (grassed areas)
- 'Wet Pour' (see note 3)

Notes

1. A design CBR value of 3% has been taken across the site. CBR to be confirmed by contractor.

2. Wrapped geomembrane used for car park areas to stop infiltration due to the potential for water seepage through the construction layer.

3. Wetpour is a rubber surfacing that is to be applied on top of the pedestrian asphalt construction build up. Refer to manufactuer and architecture specification

4. Traffic loading is to be less than 5 vehicles a day with no more than 0.5msa over the pavement lifetime

Issue	Date	By	Chkd	Appd
P01	24/09/21	IA	JN	IA

Issued for RIBA Stage 3

ARUP

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MIMWEP
Rhondda Cynon Taf County Council

Project Title
RCT Batch Primary

Drawing Title
Construction Build-Ups

Scale at A1 1:250 | Role Civils

Suitability S3- Suitable for Review and Comment

Job No 281143 | Rev P01

Drawing No
RH0101-ARP-ZZ-00-DR-C-00091

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Appendix C

Hydrology Calculations

File Note

ARUP

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Project title	RCT 3 Primary Batch	Job number	281143
cc		File reference	4-20
Prepared by	Jim Newbold (Cardiff)	Date	6th October 2021
Subject	Hydrology Calculations – Llanilltud Faerdref Primary		

1 Introduction

This technical note outlines the hydrological calculations to determine the existing and proposed discharge rates for Llanilltud Faerdref Primary School and estimate the storm water attenuation volume required.

Hydrological analysis has been undertaken on the existing catchments to inform the storm flows generated from the existing development. The proposed allowable discharge rate leaving the site has been investigated with two calculation methods explored:

1. Restricting the impermeable area outflow (up to the 1:100-year event plus 40% climate change) to the 1:1 year Greenfield Runoff Rate (GRR);
2. Restricting the proposed impermeable area flow (up to the 1:100-year event plus 40% climate change) to 70% of the existing 1:1 year brownfield rate (providing 30% betterment on the 1:1 year storm event and more for higher events).

Both methods offer a reduction in the flow leaving the site compared to the existing situation and therefore will reduce the risk of flooding in the receiving watercourse.

The restricted water will need to be stored on site and the method used to calculate the allowable discharge will directly impact the attenuation volume.

2 Existing Storm Drainage

Topographical, drainage and utility surveys were undertaken for the site by Technics Group Ltd between August and September 2019. These surveys have been used to assess and understand the existing drainage within the site.

The existing site generally falls from south-west to north-east towards the existing watercourse Nant yr Aran. This forms a single large catchment, however the water is conveyed to the watercourse through different methods and smaller sub-catchments.

Figure 1 below shows the assumed existing storm drainage scenario for the site:

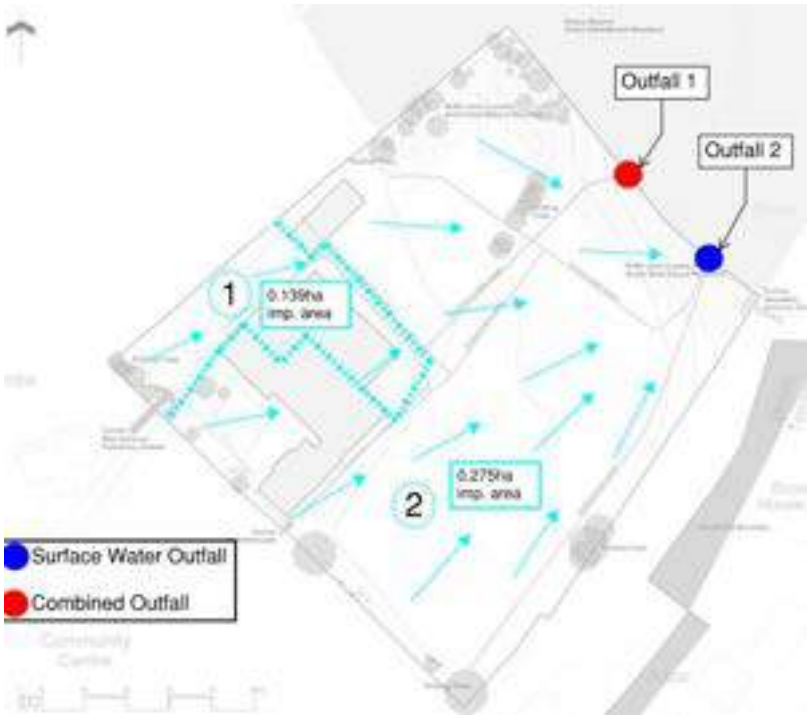

Figure 1: Llanilltud Faerdref Primary School existing catchment plan – informed by topographical survey carried out by Technics Group Ltd between August and September 2019.

Two outfall points have been identified. Outfall 1 is a combined outfall that serves the school building and a portion of the south-western areas of hardstanding. Outfall 2 is assumed to serve the rest of the site.

The school building and associated adjacent impermeable hardstanding collect the rainwater through roof gutter/downpipe or gullies. It is assumed this is then conveyed to the watercourse through either the combined network or the piped storm network. The non-intrusive survey shows other drainage pipes located on the site which connect to these networks before outfalling to the watercourse.

The rainfall landing on the large area of grassed playing field is assumed to either percolate into the ground or run overland into the woodland north of the site before reaching the watercourse. The

slope of the asphalt playground is also such that runoff not captured through a positive drainage network would run to the grassed playing field.

The school operators inform that the eastern playing field is often wet which implies that the upper layers of the ground have low permeability. A portion of the rainfall is therefore likely to flow overland to the woodland in heavy rainfall events.

The final destination of the outfall points is unknown and it is recommended that the non-intrusive survey is extended to the ultimate outfall. It is assumed that both outfalls drain into the Nant yr Aran.

3 Calculated discharge rates from the existing site

The greenfield runoff rate and the brownfield runoff rate have been determined for the site. The existing drainage networks have been modelled on each site to inform the brownfield runoff.

3.1 Greenfield Runoff Rate Calculation

The Greenfield Runoff Rate (GRR) is the flow rate that stormwater from the site would discharge if it was undeveloped. The GRR for the Qbar, 1:1 year, 1:30 year and 1:100-year event have been calculated for the site using the ICP SuDS method. This is an industry standard method to estimate the GRR based on the Institute of Hydrology 124 (IoH124) method. The results are given in Table 1 below.

Table 1: ICP SuDS Method Results

	Greenfield Runoff Rate (l/s/ha)
1:1-Year	6.7
1:30-Year	13.5
1:100-Year	16.7
Qbar	7.7

3.2 Brownfield Runoff Rate

Microdrainage was used to model the existing site storm drainage network for the development, based on the topographical and utilities information. The flow rates have been assessed for both the 1-year and 100-year storm events.

Table 2 shows the measured impermeable areas for each of the existing site catchments (as denoted in Figure 1 previously), as well as the 1-year and 100-year flows from the model outputs. The results showed that no flooding occurred for the 1-year event on the sites, with the 100-year flooded volume for each catchment shown in the table.

Table 2: Existing Storm Water Runoff Flows					
Catchment	**Estimated Impermeable Area (ha)**	**Indicative Estimated 1-Year Flow (l/s)**	**Indicative Estimated 100-Year Flow (l/s)**	**1-Year Flooded Volume (m3)**	**100-Year Flooded Volume (m3)**
Outfall 1	0.139	11.5	16.5	0	7
Outfall 2	0.275	15.8	17.4	0	30
TOTAL	0.414	27.3	33.9	0	37

It is assumed that the green areas on the site do not enter the drainage network. It is likely therefore that these figures are an underestimate.

4 Proposed storm drainage strategy

A positive drainage network is proposed to serve the school building and the associated impermeable areas. Areas of landscaping and green spaces will not be positively drained as it is assumed that the majority of runoff will locally percolate into the ground. Alternatively, where this doesn't occur, it is assumed the flows will run over land to an area which it can percolate or into a positively drained impermeable area.

Although the site comprises of new built development, the existing school buildings and portions of the associated hardstanding will be demolished and broken out. Some of these areas will be replaced with permeable surfaces.

Figure 2 below shows the proposed drainage strategy for the site. It is proposed to discharge the storm drainage to the Nant yr Aran and reuse the existing storm Outfall 2, subject to survey.

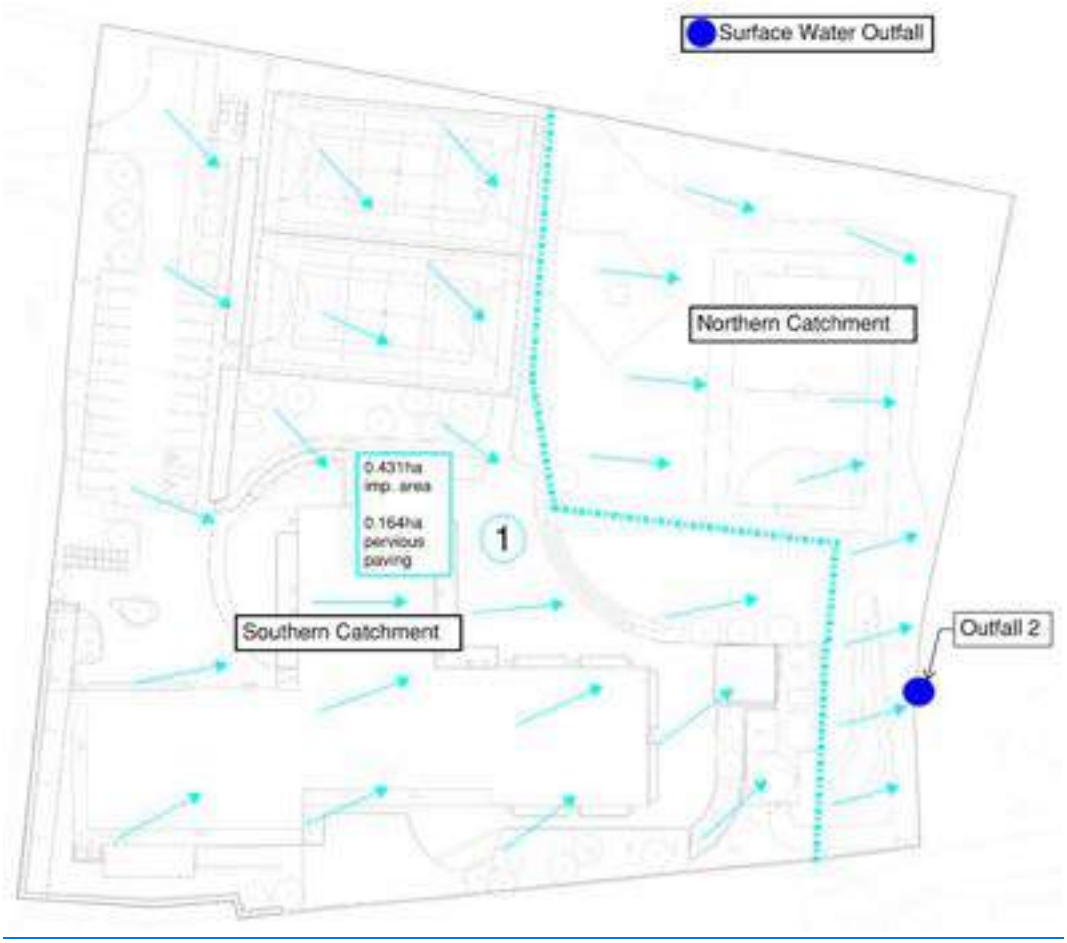

Figure 2: Llanilltud Faerdref Primary School proposed drainage catchment plan

Figure 3 and table 3 below show the comparison of impermeable and permeable area in the existing case and the proposed case for each proposed catchment.

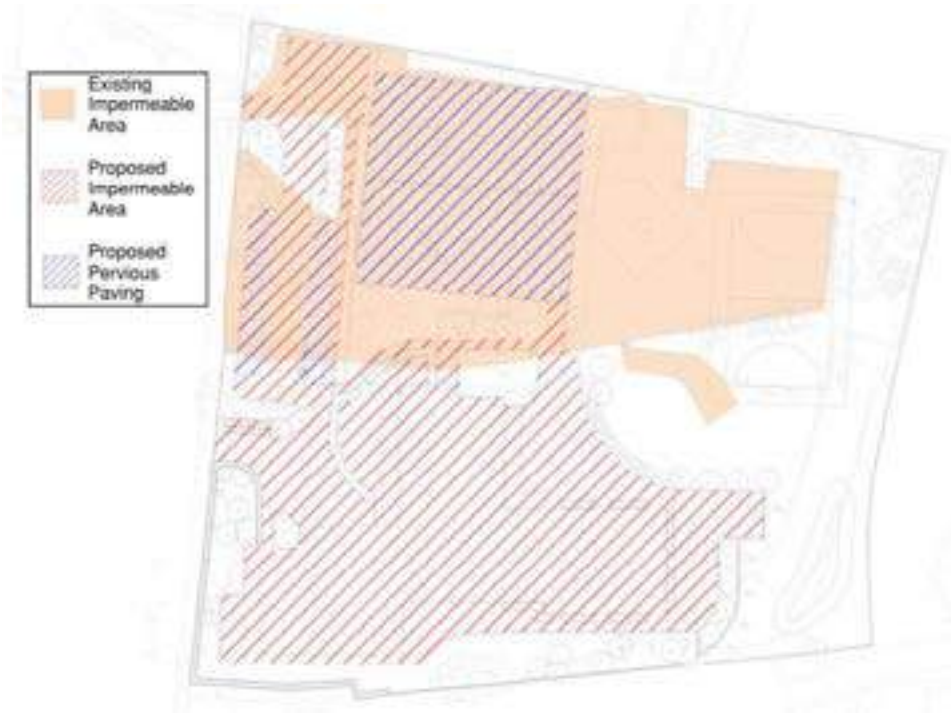

Figure 3: Llanilltud Faerdref Primary School impermeable area plan

Table 3: Existing Impermeable Area versus Proposed Impermeable Area			
Site	**Existing Impermeable Area (ha)**	**Proposed Impermeable Area (ha)**	**Proposed Pervious Pavement (ha)**
Outfall 1	0.139	0	0
Outfall 2	0.275	0.431	0.164
TOTAL	**0.414**	**0.431**	**0.164**

The total area of proposed pervious paving and impermeable surfacing combined is higher than the existing total impermeable surfaced area. However, it is anticipated that the rate of flow through these 'hard-paved' areas will be significantly slower than existing due to the mechanisms of capture i.e. raingardens and porous asphalt, compared to the existing gully/downpipe collection methods.

The existing green areas of the site will remain at their existing gradients whilst the newer green areas replacing the existing impermeable areas will be sloped to run towards the Nant yr Aran. The layout of the masterplan is such that the flow path of the majority of the green areas will avoid the impermeable areas.

It should be noted that in addition to the restrictions imposed on the storm flows from the site, the foul discharge is proposed to be connected to a DCWW public sewer rather than discharged through the combined network into the Nant yr Aran, further reducing the existing overall flow rate from the site into the watercourse.

5 Proposed Hydraulic Control

The two scenarios below have been considered to estimate the flow restrictions for the proposed sites. The two methods were discussed with the SAB.

1. Restricting the proposed impermeable area outflow (up to the 1:100 year event plus 40% climate change) to the 1:1 year Greenfield Runoff Rate (GRR);
2. Restricting the proposed impermeable area outflow (up to the 1:100 year event plus 40% climate change) to 70% of the existing 1:1 year brownfield rate (providing 30% betterment on the 1:1 year storm event and more for higher events).

It was agreed in principle that restricting the proposed outflows to 70% of the existing 1:1 year brownfield rate would be a suitable approach to ensure a reduction in the flow leaving the site compared to the existing situation and therefore a reduction in the risk of flooding in the receiving watercourse.

Moreover, the following estimates for required attenuation volumes have been calculated on the basis of restricting the proposed flows to 70% of the existing 1:1 year brownfield rate.

5.1 Attenuation Estimates

Restricting the flow rate to 70% of the 1-year existing discharge rate would be achieved by throttling the flows within the drainage network and providing attenuation storage.

It is proposed to place this restriction on all flows up to and including the 1:100-year event, with suitable allowance for climate change. The National Planning Policy Framework (NPPF) sets out how the planning system should minimise vulnerability and provide resilience to the impacts of climate change. Table 2 within the guidance shows the potential peak rainfall intensity change anticipated for different time intervals. It is recommended to use the upper end allowance, which for a 100-year event is a 40% increase in the peak rainfall intensity.

The discharge restrictions for the proposed site have been calculated and an indicative estimate of required attenuation volumes has been made by modelling the proposed network in Microdrainage.

Table 4 below shows the allowable discharge rates and attenuation volume estimates, along with the impermeable area for each catchment. The areas of porous paving have been included in the impermeable area figures for the estimates to allow a conservative approach to be taken.

Due to the close proximity of existing outfalls 1 and 2, and because they are both discharging to the same watercourse, the existing discharge rates have been combined (and reduced by 30%) to calculate the proposed discharge rate for the single proposed outfall.

Table 4: Attenuation modelling estimates for restriction to 70% of 1:1-Year Flows

Site	Proposed Impermeable/permeable paving Area (ha)	Proposed Discharge Rate (l/s)	Required Attenuation Volume – (m^3)
Outfall 1	0	0	0
Outfall 2	0.595	19.1	280
TOTAL	0.595	19.1	280

As shown in Tables 2 and 4, the total flows to the watercourse through outfalls 1 and 2 will be reduced by 30% in the 1-year event and by up to 40% in the 100-year event (+ 40% climate change). This is in addition to the termination of any discharge of foul flows to the watercourse, as it is proposed to connect the proposed foul network to a DCWW public sewer network. Therefore, this represents a significant reduction in total discharge rate for the site to the watercourse.

The figures above represent the total amount of storage volume required to be included through dedicated attenuation features such as basins and cellular storage as well as the MUGA. Currently the 280m^3 is provided by the dry basin alone and the additional storage provided by the MUGA has not been included in the storage volume calculations.

Additional storage volumes provided by the smaller areas of porous car park have not been modelled at all currently and so may further reduce the estimates for required volumes of dedicated storage in future design stages.

6 Conclusion

A positive storm drainage system is required to serve the new school building and associated impermeable hardstanding.

For the existing school site, greenfield runoff rates and brownfield rates have been calculated. The greenfield run off rate has been calculated for each site using the ICP SuDs methods for the 1-year, 30-year, 100-year and Qbar return periods. The existing school site has an existing drainage network and this has been modelled in Microdrainage to determine estimated brownfield rates.

For the proposed development, it is assumed that rainfall on the green landscaped areas will either percolate into the ground or runoff overland to a location where it can percolate to ground, to the Nant yr Aran or into the positively drained network for the impermeable area. The desire is to retain the existing regime of the green areas where possible and for the new green areas, slope these to direct the runoff to an appropriate receptor. It is proposed that as the area of green landscaping sloped directly towards the Nany yr Aran is less than the existing area, this will not be attenuated.

When determining the appropriate discharge rate for the impermeable areas leaving the site, two runoff scenarios have been explored.

1. Restricting the impermeable area outflow (up to the 1:100 year event plus 40% climate change) to the 1:1 year Greenfield Runoff Rate (GRR);
2. Restricting the proposed impermeable area flow (up to the 1:100 year event plus 40% climate change) to 70% of the existing 1:1 year brownfield rate (providing 30% betterment on the 1:1 year storm event and more for higher events).

The site has been previously developed and the proposed impermeable area is similar to the existing impermeable area, therefore it is proposed that impermeable area flow (up to the 1:100 year event plus 40% climate change) is restricted to 70% of the existing 1:1 year brownfield rate, as per Scenario 2 above.

On this basis, a Microdrainage model of the proposed drainage network for the site was built and attenuation volumes were estimated for each catchment.

It was found that a total of 280m^3 of dedicated attenuation features will be required.

Appendix D

DCWW Pre-planning response and correspondence

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
Glamorgan
CF10 4QP

Date: 24/05/2021
Our Ref: PPA0005709

Dear Mr Newbold,

Site Address: Llanilltud Faerdref Primary School, St. Illtyds Road, Pontypridd
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 pre-planning enquiry proposes the redevelopment of the existing school comprising 300 pupils and 33 staff (whereas the existing currently is 176 pupils with approximately 22 staff). Whilst it does not appear an assessment has been previously undertaken of the public sewerage system; 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. As a major development, amounting to more than 1000 sqm, 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.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a foul water and combined sewerage system, which drains to Rhiewsaeson (NEW) Wastewater Treatment Works.

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.

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. Please refer to further detailed advice relating to surface water management included in our attached Advice and Guidance note.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that the additional flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the 225mm combined sewer at or downstream of manhole ST08855903 and manhole ST08855902 located in St Illtyd Road as indicated on the extract of public sewer record provided.

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. In addition, for the purpose of any forthcoming planning application submission. 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**

We would also point out, that if any of the private connections from the former school were not to be utilised, then they will need to be abandoned and capped off before entering our public sewer. We require these drains to be capped off as to ensure no water infiltration is entering our sewer via your private drain.

SEWAGE TREATMENT

No problems are envisaged with the Wastewater 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 100mm diameter watermain in NGR 308554,185987. 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.

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

<u>Please Note</u> 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.

[redacted]

SEWER PLAN PPA0005709

[redacted]

LEGEND(Representative of most common features)

[redacted]

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.

Map Ref:	308662,186043
Map scale:	1:2000
Printed by:	Natalie Walmsley
Printed on:	25 May 2021

Appendix E

Initial SAB Consultation

RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

Sustainable Drainage Approval Body

Llanilltud Faerdref Primary School

Pre-Application Strategy Review Report

August 2021

ANDREW STONE
Strategic Projects Manager
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RHONDDA CYNON TAF

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RHONDDA CYNON TAF

DOCUMENT VERIFICATION

Applicant	Ian Amos on behalf of Arup
Site Name	Llanilltud Faerdref Primary School
Document Title	Pre-Application Strategy Review Report
Document Ref	SR – 21 – RCTSAB126-001-PA

Revision Status	FINAL
Date of Issue	August 2021
Prepared by	Liam Swanwick BSc (Hons), MSc
Checked by	Owen Griffiths BSc (Hons), MSc
Approved by	Owen Griffiths BSc (Hons), MSc

This report should only be used in its entirety.

This report is confidential to the Client. Strategic Projects accepts no responsibility to third parties to whom the report, or any part thereof, is made known. Any such party using any information contained within the report do so at their own risk.

RHONDDA CYNON TAF

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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The purpose of the report is to undertake an appraisal of the site and assess the overall strategy of an application compliance with the National Standards. The report will also inform the applicant, where required, what additional information is required for the full application in order for the application to constitute as a validly made application.

1.2 SITE PROPOSAL

The applicant proposes to construct a new school building with associated play areas, car parking and MUGA. The footprint of the new building and hardstanding are generally situated on the eastern area of the site, whilst the landscaped and MUGA pitches are to be on the western extent.

1.3 SUSTAINABLE DRAINAGE PROPOSAL

An unknown extent of runoff from the school building roof is to drain to a rainwater harvesting tank 40m^3 in volume, and therefore utilise rainwater as grey water for flushing toilets.

All areas of the roof that do not drain to the harvesting tank are intended to drain to a rain garden. The strategy notes where rain gardens are not possible, surface water runoff will be collected via rainwater pipes, combined kerb drainage, gullies, linear kerb drainage or permeable paving. Of note, the drainage layout is not exactly clear where runoff will exactly drain to from the roof, access road or pedestrian footpaths.

Car parking spaces are to be of permeable construction, and therefore will percolate through the pavers and either infiltrate to ground or be collected and conveyed to the outfall. The aisles will be of standard impermeable asphalt construction but assumed to shed to the permeable pavers.

The Multi-Use Games area (MUGA) is to be of permeable construction, and therefore will percolate through the asphalt and either infiltrate to ground or be collected and conveyed to the outfall.

The overall drainage proposal intends to collect rainwater as detailed above and convey to a dry attenuation basin which will provide the required attenuation whilst

flows are restricted to the Nant Yr Arian immediately beyond the north eastern boundary of the site.

Green landscaped and grassed field areas will slope towards the existing woodland and Nant Yr Arian, as it does currently. Where rainfall exceeds percolation through the soil, runoff will shed towards the woodland and watercourse, as per the existing regime.

1.4 Site Location

The land to be developed lies at the existing Llanilltud Faerdref primary school off St Illtyds Road, Church Village, CF38 1DA.

1.5 Submitted Documentation

As part of the application, the following documents were submitted:

- Pre-App Application Form
- SAB pre preapp
- Llanilltud Primary School GI
- Llanilltud Drawings
- Hydrology Calculations Technical Note
- ALA679SK016 Llanilltud - Sketch plan CEM6
- Llanilltud DAP
- Llanilltud surface water map

2 SITE APPRAISAL

2.1 SUSTAINABLE DRAINAGE APPLICATION HISTORY

No sustainable drainage application has previously been submitted within the boundary of the development.

2.2 EXISTING SITE USE

The land is currently occupied by the existing primary school, associated hardstanding and playing field.

2.3 EXISTING SITE DRAINAGE

The applicant commissioned Technics Group to asses and establish the existing drainage on site.

As stated above, the existing site comprises of the existing school buildings, hardstanding for car parking and playgrounds. Hardstanding areas are drained via roof gutters, gullies or channel drainage. Following a non-intrusive survey, it was identified that the site is split into two catchments.

Catchment 1 is the smallest of the two catchments and is 0.139ha in impermeable area, comprising of an extent of the building and hardstanding. Outfall to catchment 1 is situated on the north of the site and conveys to a combined sewer. It is unknown as to whether this discharges to the watercourse or the DCWW combined network.

Catchment 2 is 0.275ha in impermeable area and comprises of an extent of the building and hardstanding play areas. This outfall is situated at the north eastern boundary, and it is assumed this discharges to the Nant Yr Arian.

There is a grassed area on the eastern extent of site, but unknown if positive drainage does serve this area. Therefore, it is assumed runoff percolates to ground or sheds with the contours of the land. It has been identified the grassed pitch is often wet following rainfall which would indicate poor percolation and lack of positive drainage.

2.4 Flood Risk Review

Following a review of the Development Advice Map, it was found that the site does not lie within a Tan15 C1 or C2 zone.

The risk of surface water flooding has been investigated utilising Natural Resources Wales' Flood Risk Assessment Wales maps. The results of which have identified a low risk of surface water flooding west of the existing school building and medium to low risk on the northern boundary which slightly encroaches onto the site (figure 1). This originates from the Nant yr Aran watercourse and currently only impacts the grassed field. The development is proposed away from the medium risk areas.

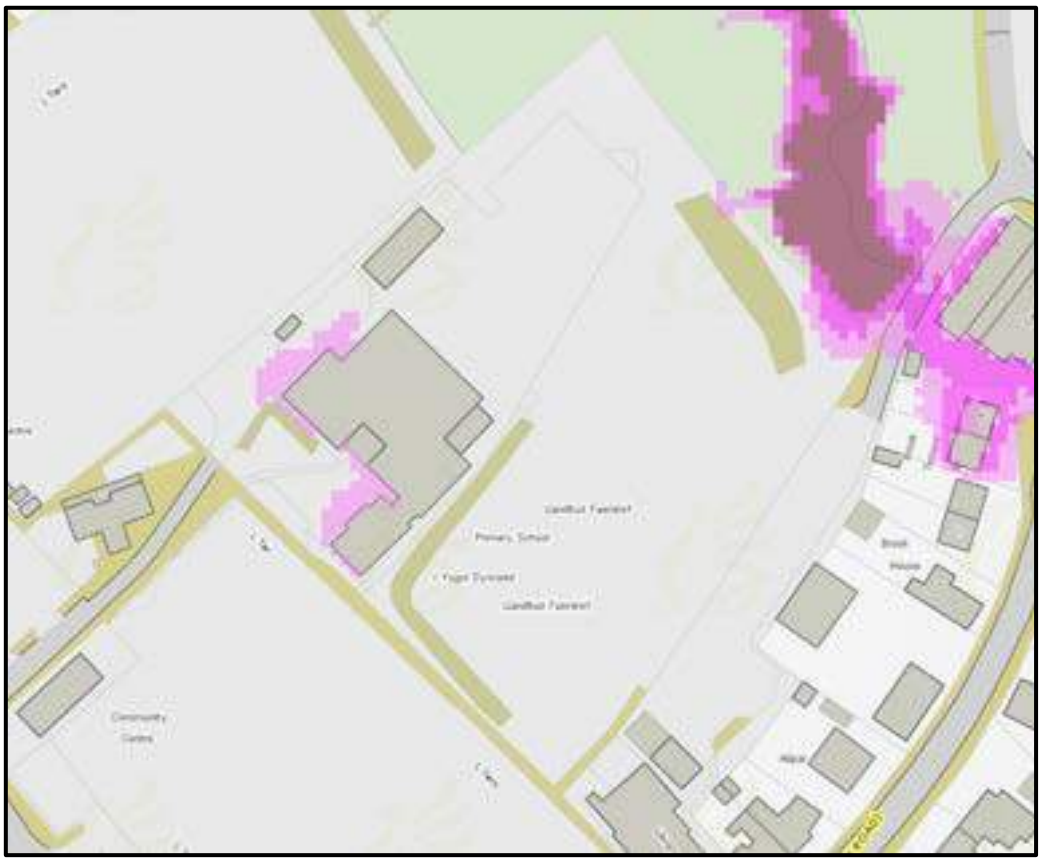

Figure 1. Areas of Low/Medium/High Surface Water Flood Risk at the proposed site, as per NRW Flood Risk Assessment maps.

2.5 Environmental Impact Assessment

The applicant has stated that the proposed development does not require an environmental impact assessment, and therefore the determination period for the full application will be 7 weeks once the application is determined as validly made.

2.6 Ordinary Watercourse Consents

Since the Lead Local Flood Authority became responsible for authorising ordinary watercourse consents (OWC) in 2012, no OWC have been authorised within the boundary of the site.

2.7 Dwr Cymru Welsh Water Apparatus

Following a review of the Dwr Cymru Welsh Water (DCWW) GeoWeb, no DCWW apparatus was identified within the site boundary. However, it is recommended that Dwr Cymru Welsh Water be contacted regarding any abandoned apparatus, as this is a brownfield site.

2.8 Ordinary Watercourses

No known ordinary watercourses lie within the boundary of the site. The Nant Yr Arian lies 10m north east of the site boundary within the existing woodland.

2.9 Main River

No main river lies within or in close proximity to the boundary of the site.

2.10 Assets

There are no known land drainage assets situated within the boundary of the site. However, a highway culvert is situated approximately 12m north east of the site and this drains the Nant Yr Arian. The details of this culvert are unknown to the SAB.

3 VALIDITY OF APPLICATION

3.1 REQUIREMENTS FOR A FULL APPLICATION

Paragraph 9 (2) of schedule 3 states that an application must be in any form required by the Approving Body. Within Regulations 'The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018', regulation 3 states that an approving body may refuse to determine an application for approval which is not made in accordance with Paragraph 9(2) of Schedule 3.

The table below summarises the general documentation determined to be the minimum required to constitute a valid application, based on the development proposed. Table A and Table B found within the "Guidance on completing the full application form" has been utilised to determine the required documentation for a validly made application.

It is recommended that the applicant considers Table A and Table B prior to submitting a full application to the SuDS Approval Body (SAB). Supporting documentation required for each of the standards is stated and discussed in chapter 5 "compliance with National Standards" of this report.

Please note that where insufficient detail has been found on a drawing, that documentation has been determined to not be provided.

The SAB application form must be completed in full.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
A Site Plan	Construction area extent (1:2500 scale)	Y	Y
	Extent of Drainage system	Y	Y
	Location Plan	N	Y
General documentation	EIA Statement	N	N
	Drawing Issue Sheet	N	Y

Table 1. General documentation required for the Full Application

3.2 CONSTRUCTION AREA AND ASSOCIATED FEE

An applicant must pay the correct fee in order for the application to constitute as a valid application. Each full application will be charged by the SAB in accordance with the regulations i.e. the application fee is related to the construction area of the proposed development. A review has been undertaken regarding the construction area and an estimate can be found in the table below. However, the applicant must provide a plan illustrating the construction area, preferably in AutoCAD form in which the SAB can determine an exact construction area and associated cost.

Criteria	Estimated construction area (m^2)	Required Fee (£)	Comments
Application fee	12,000	990	Applicant needs to define construction area.

Table 2. Required Fee based on an estimation of the Construction Area

It is of note that the Application fee does not need to be provided to the SAB until the SAB has confirmed the validity of the application. Please visit the below webpage address which states the process of submission and validation for a full application.

Web Link - www.rctcbc.gov.uk/sustainabledrainage

4 ADOPTION

4.1 REQUIREMENT FOR ADOPTION

The SuDS proposed is designed to provide drainage for a single property as defined by Regulation 9 of The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018 and therefore **the SAB does not have a mandatory duty to adopt** as per the exemption detailed in paragraph 18 (1) and (2) of Schedule 3 of the Flood and Water Management Act 2010.

5 COMPLIANCE WITH NATIONAL STANDARDS

5.1 STANDARD S1 - SURFACE WATER RUNOFF DESTINATION

Priority 1 – The drainage proposal includes water re-use on the site via a rainwater harvesting tank. Although the extent of roof to drain to the rainwater harvesting tank has not been provided, preliminary size of the tank is to be 40m^3 which would serve the school building and provide grey water for the toilet. It is considered that the implementation of this tank would maximise priority level 1, but discharge at a lower priority level will be required.

Priority 2 – The current drainage proposal does not include for runoff to be discharged wholly via infiltration. Whilst infiltration testing has not been undertaken, wet ground conditions has been identified which would indicate soil with poor infiltration properties.

A ground investigation was undertaken by HSP. Ground conditions were varying across the site but generally found topsoil underlain by reworked natural ground to a thickness of 0.9mbgl overlying diamicton till which is described as sandy gravelly clay. This was found to be of varying thickness with Hughes member bedrock encountered at 2.80mbgl. Groundwater strikes were encountered at 1.8m and 2.5m within the diamicton till layer.

Whilst the wet conditions identified on site and sandy gravelly clay superficial deposits would indicate infiltration is not a viable route to discharge all runoff, it is considered that there is potential for losses via infiltration i.e. dry basin, bioretention areas or permeable surfaces and would recommend infiltration testing in accordance with BRE365 to be undertaken to establish the potential of this. HSP also state in their GI that infiltration drainage may be possible on site.

Priority 3 – Whilst infiltration testing has yet to be undertaken, given the above, it can be reasonably assumed that runoff is unlikely be accommodated purely via infiltration. As such, the proposal is for all runoff to drain to the Nant Yr Arian at a restricted rate. Assuming the rate is acceptable, it is considered this is a suitable destination for surface water runoff.

Priority Level	Primary destination	Secondary destination	Comments
Priority Level 1	N	N	
Priority Level 2	N	N	
Priority Level 3	Y	N	
Priority Level 4	N	N	
Priority Level 5	N	N	

Table 3. Primary and secondary destination of surface water runoff

Should any works be proposed to the channel of the ordinary watercourse such as an outfall structure, then an ordinary watercourse consent will be required from the Lead Local Flood Authority prior to undertaking the works.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S1.

A likely compliance with Standard S1 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

Please see Table 4 which summarises the documentation required to satisfy standard S1. As a result of the sites previous use, evidence will have to be provided to demonstrate that infiltration is not feasible via BRE365 testing and must demonstrate that if infiltration is proposed, that it will not a pollution risk to groundwater.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S1	Detailed whole Site SuDS Drainage Design Proposals	Y	Y
	Detailed Geotechnical factual and interpretive report	N	Y
	Unstable and Contaminated Land Reports	N	Y

Table 4. Documentation required to satisfy Standard S1 for the Full Application

5.2 STANDARD S2 – SURFACE WATER RUNOFF HYDRAULIC CONTROL

Interception of runoff

The drainage proposal includes for numerous SuDS that provide interception such as permeable surfacing, bioretention areas and a dry basin which provide interception regardless of whether the features will allow for infiltration or not. Currently, the proposal does not currently state as to whether the rain gardens, permeable surfacing or dry basin are to be lined. Should they not be lined with an impermeable geomembrane, they will provide additional interception losses via infiltration to ground as well as evaporation, evapotranspiration and uptake by plants in the bioretention areas.

Although the extent of roof to drain to the rainwater harvesting tank has not been provided, this tank will provide interception for the area it drains if designed to BS 8515.

As stated, the SuDS proposed such as rain gardens, permeable paving and dry basin will provide interception, but to confirm as to whether the interception criteria is met, the contributing areas to each and size and construction of systems will determine acceptability. Overall, it is considered that it is likely that the proposal will satisfy the interception criteria.

The existing drainage regime via traditional methods such as gullies, channel drainage and pipe network would offer no interception. As such, the proposal would provide significant interception benefits in comparison to the existing should all impermeable areas drain to the proposed SuDS.

Morphological protection of receiving surface water bodies

The drainage proposal proposes to discharge runoff to a Nant yr Arian watercourse. The applicant has stated that the existing Q1 and Q100 runoff rate is 27.3 and 33.9l/s, respectively. The proposed discharge rate of 70% of the existing Q1 rate would suggest that the proposal would not increase morphological damage to the watercourse. Furthermore, the drainage methods proposed including rain gardens, dry basins and permeable paver, this would collect and covey the water slower than the traditional methods currently on site.

Flood Risk mitigation for receiving surface water bodies

As previously detailed in chapter 2, the site currently outfalls at two separate locations.

Based on the impermeable area currently on site of 0.414ha, the existing Q1 rate has been calculated as 27.3l/s. Whilst the SAB does not technically object to the method used to obtain the rate via microdrainage, the microdrainage simulation that evidences this flow must be provided at the full application stage.

Total outfall from the site is proposed to be 19.11l/s which offers a 30% betterment in comparison to the existing Q1 flow rates of 27.3l/s, and a larger significant betterment in comparison to the Q100 of 33.9l/s. Of note, the Q100 rate is conservative given the system floods.

However, without knowing the exact nature of the outfalls, the SAB cannot confirm acceptability as the applicant must demonstrate that flows have been reduced to an acceptable rate to the watercourse. Given the existing outfalls could be separate drainage systems, the applicant must establish if both outfalls to the river. For example, should outfall 1 discharge to the combined sewer, then by including this catchment in the proposed to the watercourse, then the proposal does not provide 30% to the watercourse. The SAB would not raise an objection to the proposed solution of 30% betterment to existing Q1 rate to the watercourse in line with paragraph G2.24 of the Statutory Standards.

Flood Protection for the site

At the drainage strategy review stage, hydraulic models are not reviewed. Although, it is noted the applicant has calculated likely storage requirement to discharge at the above detailed rate. Storage is to be provided via the dry basin and potentially the void space within the sub-base of the permeable paving and MUGA pitches. The preliminary drainage layout outlines the dry basin will provide the 400m^3 of storage. However, it does not the void space within the sub-base of the pervious paving of the car could be used.

Within the technical note, an appropriate allowance of 40% is stated to be incorporated into the proposed hydraulic model.

At the full application stage, the applicant must demonstrate that the drainage system can successfully restrict the runoff to an appropriate discharge rate as detailed previously, whilst also accommodating the Q100 plus CC event in line with the principle criteria detailed in paragraph G2.34 of the Statutory Standards.

Extreme event exceedance management of surface water runoff

The drainage strategy does not consider this element at this early stage. At the full application stage, the applicant must demonstrate via a flow exceedance plan the flow routes of runoff during an exceedance event.

Evaluation of impact of potential failure of a drainage system

The drainage strategy does not consider this element at this early stage. At the full application stage, the applicant must assess the potential failure of the drainage system such as blockage of a flow control and incorporate mechanisms to alleviate the impact of such event.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S2.

A likely compliance with Standard S2 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

Please see table 5 which summarises the documentation required to satisfy standard S2. At the full application stage, an engineering layout which includes levels, gradients, locality and storage is required. Furthermore, detailed hydraulic calculations will be required to demonstrate the hydraulic suitability of the proposed drainage system. The hydraulic calculations will have to demonstrate that the proposed drainage system can accommodate the Q100 plus climate change event, whilst successfully restricting runoff to the proposed rates. This will need to be accompanied by a contributing area plan that will depict the contributing areas inputted into the hydraulic calculations at each manhole. Detailed cross sections and construction drawings will be required to demonstrate suitable design.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S2	Detailed whole Site SuDS Drainage Design Proposals	N	Y
	Flood Consequence Assessment	N	N
	Detailed hydraulic calculations	N	Y
	Cross section drawings and standard detail drawings	N	Y
	Longitudinal section coloured drawings	N	Y
	Natural and artificial drainage catchment and sub-catchment plan	N	Y
	Concept drawings	Y	Y
	Contributing area plan	N	Y
	General engineering layout coloured drawings	N	Y

Table 5. Documentation required to satisfy Standard S2 for the Full Application

5.3 STANDARD S3 – WATER QUALITY

The proposed development of a new school building with associated access road, parking and MUGA pitches results in pollutant loadings to the surface water runoff (table 6). This assessment will consider the proposed land use and associated treatment from the proposed SuDS. Given the lack of feasibility for infiltration and in particular concentrated infiltration via soakaway, this review of S3 has predominantly focussed on water quality of discharge to the Nant Yr Arian.

Area	Proposed Land Use	Pollution Hazard Level	Total suspended Solids (TSS)	Metals	Hydrocarbons
1	School Roof	Low	0.3	0.2	0.05
2	Access Road	Low	0.5	0.4	0.4
3	Car Park spaces and aisles	Low	0.5	0.4	0.4
4	Pedestrian areas	Low	0.5	0.4	0.4
5	MUGA pitch	Low	0.5	0.4	0.4

Table 6. Pollution hazard level and pollution indices for each of the proposed land uses Proposed based on Ciria SuDS Manual C753, table 26.2

Area	Contaminant	Risk Indices	Permeable Paving	Bioretention system	Total Mitigation indices	Compliant
1	TSS	0.3	-	0.8	0.8	Yes
	Metals	0.2	-	0.8	0.8	Yes
	Hydrocarbons	0.05	-	0.8	0.8	Yes
2	TSS	0.5	NC	NC	NC	NC
	Metals	0.4	NC	NC	NC	NC
	Hydrocarbons	0.4	NC	NC	NC	NC
3	TSS	0.5	0.7	-	0.7	Yes
	Metals	0.4	0.6	-	0.6	Yes
	Hydrocarbons	0.4	0.7	-	0.7	Yes
4	TSS	0.5	NC	NC	NC	NC
	Metals	0.4	NC	NC	NC	NC
	Hydrocarbons	0.4	NC	NC	NC	NC
5	TSS	0.5	0.7	-	0.7	Yes
	Metals	0.4	0.6	-	0.6	Yes
	Hydrocarbons	0.4	0.7	-	0.7	Yes

Table 7. Mitigation indices for proposed SuDS on site

*NC denotes not clear.

A risk indices approach as per the Ciria SuDs Manual has been undertaken with the proposal at concept stage. Due to the uncertainty of conveyance and collection of runoff, the dry detention basin has been discounted from the assessment, but it is noted that this can provide treatment of runoff if designed appropriately.

As stated in chapter 1, the strategy notes where rain gardens are not possible, surface water runoff will be collected via rainwater pipes, combined kerb drainage, gullies, linear kerb drainage or permeable paving. However, it is not clear from the current layout as to where exactly all the runoff will drain. Therefore, areas 2 and 4 could not be reviewed and suitability of water quality established.

Regarding area 1, where runoff from the roof does not drain to the rainwater harvesting tank, it is assumed it will drain to bioretention areas. Whilst specific drawings have not been provided, should the runoff drain directly to the surface of the bioretention areas then this will provide sufficient treatment.

Regarding Areas 3 and 5, the car parking spaces and MUGA pitches are to comprise of permeable construction, and therefore treatment provided at source. The aisle is to contour towards the permeable construction which provide sufficient treatment.

Regarding area 2 and 4, it is currently unclear from the drawings or sketch as to the exact nature of how runoff from the tarmac access road and asphalt footpath will drain. Should runoff from the access road convey to the surface of any of the SuDS proposed, then runoff would undergo sufficient treatment. However, this will be dependent on sufficient size rain gardens when in comparison to the contributing area. It is stated within the strategy that SuDS will be sized for the Q1 runoff event. For events that are greater than the Q1, the dilution effect will take place, and therefore the SAB accepts this proposal.

Whilst the asphalt footpath has been regarded as a low pollution, this is a conservative assessment due to its absence from the Ciria SuDS Manual. Should runoff from this area convey to the surface of any of the SuDS proposed, then runoff would undergo sufficient treatment.

Please note that gullies and linear kerb drainage do not offer treatment benefits, and therefore if collection is via this method, conveyance to a downstream SuDS will be required.

The following was detailed in S1 “Groundwater strikes were encountered at 1.8m and 2.5m within the diamicton till layer”. Whilst infiltration from the proposed systems has not been suggested or confirmed, it is worth noting that in line with paragraph G3.32

of the Statutory Standards, there should be 1m of unsaturated ground between the base of an infiltration system and groundwater level.

The ground investigation undertaken by HSP did not identify any contaminants of concern. This would suggest that infiltration would not pose a pollution risk to the underlying groundwater.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S3.

A likely compliance with Standard S3 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

Please see Table 8 which summarises the documentation required to satisfy standard S3.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S3	Water quality treatment and pollution prevention strategy and Plan	N	Y
	Contaminated Land Report	N	N

Table 8. Documentation required to satisfy Standard S3 for the Full Application

5.4 STANDARD S4 – AMENITY

The drainage proposal includes for bioretention areas across the site to drain hardstanding areas including building roofs and a large dry basin. The bioretention areas are proposed in close proximity to the building, and therefore provide valuable amenity benefits to staff and site users. The close proximity of the vegetation and trees will provide shading and thus cooling of the classrooms and play areas which will be beneficial during hot spring and summer days.

Whilst the exact planting arrangement has not been provided given the early stage of the design, it is noted in the application form that the intention is to plant trees within the bioretention areas which will provide significant amenity benefits. It is noted that by instruction from education that there should be no standing water SuDS on site. As such, a dry basin is proposed which will only have water at times of storm events. It is preferable that the drainage proposal includes water at the surface as this provides amenity, biodiversity and maintenance benefits. However, the SAB will not object to the use of the dry basin, as per the request from the head teacher.

It is considered that the inclusion of rain gardens across the site and a dry basin will likely satisfy the amenity standard. Importantly, in comparison to the existing site layout, the proposal provides a significant betterment whilst also integrating the drainage with the landscaped areas.

In summary, the proposed design **demonstrates a likely compliance** with Standard S4.

Further information required

At the full application stage, a landscape plan and layout will be provided to demonstrate the locality and composition of the landscaped areas. Please see Table 9 which summarises the documentation required to satisfy standard S4.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S4	Amenity Plan	N	Y
	Landscape Plan	N	Y
	Landscape Layout drawings	N	Y

Table 9. Documentation required to satisfy Standard S4 for the Full Application

5.5 STANDARD S5 – BIODIVERSITY

The drainage proposal includes for bioretention areas across the site to drain hardstanding areas including building roofs.

Whilst the exact planting arrangement has not been provided given the early stage of the design, it is noted in the application form that the intention is to plant trees within the bioretention areas which will provide significant amenity benefits including cooling classroom and play areas.

The proposal of bioretention areas and a dry basin would suggest that biodiversity is maximised and therefore satisfy the biodiversity standard. However, the submission will need to demonstrate appropriate planting of the bioretention areas and dry basins. In particular, whilst trees provide significant hydraulic and biodiversity benefits, they must be incorporated suitably such as sufficient soil volume, appropriate tree species etc. All other vegetation such as shrubs must be suitable for its purpose as a SuDS system. Furthermore, it must be designed appropriately to ensure that the tree roots will not have any adverse impact on the building i.e. root protection barrier.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S5.

A likely compliance with Standard S5 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

At the full application stage, a landscape plan and layout will be provided to demonstrate the locality and composition of the landscaped areas. Please see table 10 which summarises the documentation required to satisfy standard S5.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S5	Biodiversity Plan	N	Y
	Landscape Plan	N	Y
	Landscape Layout drawings	N	Y

Table 10. Documentation required to satisfy Standard S5 for the Full Application

5.6 Standard S6 – Design of Drainage for Construction, Maintenance and Structural Integrity

At this stage, the applicant has provided very little information relative to standard S6 given design is only at early stages. Therefore, this standard cannot be properly reviewed by the SAB.

A small note is included within the pre-app report regarding the phasing of the construction. The new school building is proposed on the existing playing field and therefore the existing school can remain in place and operational whilst the new school is built. Of particular importance is related to the site entrance. The two options are the existing access which would operate as both the school and site entrance, but this would require construction management. The second is the gate in the north eastern corner, but this would involve access and therefore movement across the proposed area of the detention basin. Both are plausible, but will require a management plan to ensure that the drainage systems aren't impacted during the construction phase.

At the full application stage, the applicant must provide a suitable maintenance plan that details appropriate schedules and demonstrates ease of access to all elements of the drainage system. Furthermore, the design life of all elements of the drainage system must be considered, and should it be less than the design life of the development, a replacement must be incorporated into the maintenance schedule as per paragraph G6.17 of the Statutory Standards.

The applicant has highlighted that all drainage features will have hard paved routes in order for the appropriate person and associated plant to have access to undertake maintenance. Furthermore, the proposed dry basin is proposed to be situated on the northern extent of the site, and this can be accessed via a gate on the north eastern corner with lane access for plant. Access will need to be particularly evidenced to the flow control chamber.

It is noted that there is no requirement for pumping as the entirety of the drainage system drains via gravity.

At the full application stage, full construction details will be required of all drainage elements including the flow control chambers. SuDS should be designed in accordance with best practice such as Ciria SuDS Manual and suitable specification of material.

Of particular note is the proposal for permeable surfacing. Given the traffic loads on the car parking area, a suitable depth of sub-base and capping layer should be

proposed depending on the Californian Bearing Ratio (CBR). An important further consideration to the SAB is the amount of runoff that will drain to the permeable parking spaces from the hardstanding area if any. It is recommended that the ratio of impermeable to permeable should not be greater than 2:1 due to the increased risk of clogging. The SAB is currently unable to provide advice regarding this as the specific area of permeable surfacing and hardstanding that may drain to it has not been provided.

Whilst Dwr Cymru Welsh Water have not been consulted as part of the pre-application, on previous sites, they have stated the following regarding the interaction of permeable systems and their adoptable assets “Service strips within permeable paved areas apply for all adoptable drainage, so any pipe that is conveying flows of more than one property, or a single property carrier pipe that leave the curtilage of a property (lateral)”. It is also noted DCWW will not accept any SuDS structure crossing or overlying their existing or any proposed adoptable infrastructure.

It is noted that an existing 225mm surface water sewer has been identified to cross the existing grassed pitch. This will be required to be diverted to cater for the proposed layout and building footprint. Whilst the SAB cannot objection to this diversion, it is recommended establishing the owner and responsible person for this drainage pipe, and ensure they are satisfied with the diversion.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S6.

A likely compliance with Standard S6 can be achieved through the inclusion of the ‘further information required’ outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

Please see table 11 which summarises the documentation required to satisfy standard S6. Further construction details will be required such as specification of all materials in the design. Further details are required regarding the construction in terms of management and phasing to ensure a structured approach is utilised.

A Maintenance plan must be provided to ensure the SuDS will be properly maintained and can function across its entire design life. A maintenance plan must include the schedules including activity and frequency, access arrangements for each drainage

feature including the flow control chamber and the responsible person to undertake the tasks for each drainage feature.

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S6	Construction details (to calculate non-performance bond)	N	N
	Construction Management Plan	N	Y*
	Construction Phasing Plan	N	Y*
	Information and communications plan	N	Y
	Detailed SuDS Assets Maintenance Plan	N	Y
	Specialist drawings	N	Y
	General engineering layout coloured drawings	N	Y

Table 11. Documentation required to satisfy Standard S6 for the Full Application

Please note the asterisk illustrates documentation that is required but can be conditioned as part of any approval.

6 FURTHER INFORMATION

6.1 USEFUL WEBPAGES

For further information, it is recommended you visit the below webpages:

RCT SAB Pre-Application Webpage –
https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/SustainableDrainage/PreapplicationAdvice.aspx

RCT SAB Full Application Webpage –
https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/SustainableDrainage/MakeaSustainableDrainageApplication.aspx

RCT Ordinary Watercourse Consent Webpage -
https://www.rctcbc.gov.uk/EN/Business/LicencesandPermits/Otherlicences/OrdinaryWatercourseConsenting.aspx

Natural Resources Wales Environmental Permitting Website -
https://naturalresources.wales/permits-and-permissions/environmental-permits/?lang=en

Welsh Government – Sustainable Drainage Systems on new Developments -
https://gweddill.gov.wales/topics/environmentcountryside/epg/flooding/drainage/?lang=en

Susdrain Website - https://www.susdrain.org/

Wallingford Hydrosolutions – http://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate- estimation

Ciria Website - https://www.ciria.org/

Dwr Cymru Welsh Water Website - https://www.dwrcymru.com/en/Developer-Services/Pre-Planning.aspx

Please note:

The advice given in this response represents an informal opinion, provided in accordance with the Council's Planning Pre-Application Service. In particular, it is emphasised that while this pre-application advice will be carefully considered in reaching a decision or recommendation on an application, the final decision on any application that you may make can only be taken after we have consulted statutory consultees. It does not therefore prejudice any decision which the SuDS Approval Body may make should an application be submitted.