

SUDS Component Type & Description	Design Criteria						Appropriate for Design Consideration	Suitability for Use
	Water Quantity			Water Quality	Amenity	Biodiversity		
	Peak Runoff Rate	Runoff Volumes						
		Small Events (Interception)	Large Events					
Bioretention Systems A shallow landscaped depression allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils prior to collection or infiltration. In its simplest form, it is often referred to as a rain garden. Engineered soils (gravel and sand layers) and enhanced vegetation can be used to improve treatment performance. Generally used for managing and treating runoff from frequent rainfall events. To drain relatively small catchments, close to source of runoff.							Viable – Not proposed. (The surrounding levels to the SSC building have been designed to fall away from the building, preventing surface water from ponding on the surface of the bioretention system. Due to poor ground conditions at surface level, shallow infiltration is unlikely to be feasible.)	
SuDS Tree Pits Trees can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively, they can be used as standalone features within soil-filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment (via filtration and phytoremediation).							Not Appropriate. (There are currently no proposed infiltration features in the design, due to poor ground investigation results.)	
Porous Pavements Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the sub-base and potentially allowed to infiltrate into the ground.							Viable – Not proposed. (Due to poor ground conditions at surface, shallow infiltration would likely not be possible)	

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Attenuation Storage Tanks Large, below-ground voided spaces can be used to temporarily store runoff before infiltration, controlled release or use. The storage structure is often constructed using geo-cellular or other modular storage systems, concrete tanks or oversized pipes.							✓	Viable - Proposed. (Below ground attenuation does not provide benefits to water quality, amenity and biodiversity, however due to space constrains, and the requirement to discharge at Greenfield rates into an existing network, this option has been implemented to provide on-site attenuation.)
Detention Basins During a rainfall event, runoff drains to a landscaped depression with an outlet that restricts flows, so that the basin fills and provides attenuation. Generally, basins are dry, except during and immediately following the rainfall event. If vegetated, runoff will be treated as it is conveyed and filtered across the base of the basin.								Not Appropriate (There is not sufficient space available for detention basins to be used within the drainage strategy to attenuate runoff.)
Ponds and Wetlands Features with a permanent pool of water can be used to provide both attenuation and treatment of runoff, where outflows are controlled, and water levels are allowed to increase following rainfall. They can support emergent and submerged vegetation along their shoreline and in shallow, marshy zones, which enhances treatment processes and biodiversity.								Not Appropriate (There is not sufficient space available for ponds / wetlands to be used within the drainage strategy to attenuate runoff. They also pose the hazard of standing water, which is not appropriate as young children will be using this site.)

4.3 Proposed Surface Water Drainage Strategy

The existing catchments associated with the school complex, including the playing fields to the east and the car park/play area to the south, are assumed to be served by the existing drainage infrastructure and soakaways, with some replacement and/or additional yard gullies and drainage channels to be provided.

The catchment associated with the proposed new SSC building, located to the west of the main school block, together with adjacent hardstanding areas, is assumed to discharge to a new SuDS network, which will connect to the existing Southern Water manhole in line with the current arrangement.

This catchment has been assessed based on the assumed proposed site levels to accommodate the SSC building, with each sub-catchment captured and drained to the proposed surface water network. The percentage impervious (PIMP) values of all proposed buildings/structures and hardstanding have been assumed as 100%. Proposed greenspace around the SSC building has been assessed with a conservative PIMP value of 30%.

The western catchment area draining to the new proposed SuDS network has a total area of 0.227 ha, with approximately 0.186 ha of this area being classed as impervious area, representing around 82% of the total catchment (Refer to **Figure 4-2**).



Figure 4-2 – Homefield primary School – Extension Catchment

The primary sub-catchments across the area include the single-storey building rooftop, pedestrianised hardstanding areas, a safety-surface play area, and soft landscaping areas. These areas present a low contamination risk.

A filter drain has been positioned along the western boundary of the site to collect superficial runoff and allow exceedance flood path along the boundary towards the south of the site. All other surface runoff is managed using either yard gullies or drainage channels, which connect into the proposed pipe network alongside the rainwater downpipes from the extension roof and covered areas.

A single connection from this proposed network is provided into the existing surface water drainage pipe network, with a proprietary silt filtration system located immediately upstream from this connection.

A practical minimum discharge rate of 3 l/s is proposed for the new SSC building site catchment, subject to agreement with the LLFA and Southern Water (refer to **4.6.1** for further details). This has been applied using a

68 mm internal diameter hydrobrake, located upstream of the proprietary silt filtration system and the connection to the existing drainage network. A further reduction in the flow control device is not recommended, as this would increase the risk of blockages and potential surface water flooding.

On-site attenuation, which has been sized to facilitate the proposed greenfield discharge rate of 3 l/s, is provided via a buried cellular storage tank. A fully-perforated pipe surrounded by a layer of filter medium is proposed to distribute flows through this tank avoiding the risk of siltation.

Liaison with the LLFA/EA will take place to consult and agree the drainage strategy in order to discharge the planning conditions at the detailed stage of design. A preliminary hydraulic modelling assessment has been carried out for the proposed surface water network using MicroDrainage version 2020.1. The model has been developed as defined by the design criteria as defined in Section 4.1.

4.4 Standard 1 – Runoff Destination (Outfall Strategy)

This section determines the viability of each outfall option from the hierarchy of drainage options based on National Standards for NSuDS Standard 1.2. The summary of the outfall assessment is shown below in **Table 4-2**.

Table 4-2 – Drainage Hierarchy Evaluation

No.	Discharge Hierarchy	Evaluation Comments
1	At-source reduction and reuse.	Not viable: Anticipated volumes of runoff expected from site will require complex rainwater harvesting infrastructure and low demands. Hence, this will not be a viable discharge solution for the proposed site usage. Water butts may be implemented to intercept and reuse surface water runoff originating from proposed structure roofs.
2	Infiltration to ground	Not viable: Ground investigation indicates the presence of clayey soil and a high groundwater table. Infiltration testing has indicated poor rates.
3	Discharge to an above ground surface water body	Not viable: Nearest water body is the Teville Stream in the vicinity of the site which is approximately 1.1 km away from the site.
4	To a public surface water sewer	Viable – Proposed connection to the existing surface water drainage public network (675mm Southern Water Sewer).
5	To highway drain, or other private drainage system	Not required
6	To a combined sewer where there are no other options, and only where agreed in advance with the relevant sewage undertaker	Not required

Based on the outcome of the outfall hierarchy assessment, discharge to the public surface water sewer has been identified as the most appropriate means of managing surface water runoff. This solution aligns with existing site



constraints, restricts discharge rates, and facilitates reuse of the existing drainage connection to the Southern Water manhole to avoid the excavation under the HV electrical lines.

4.5 Standard 2 – Interception

The proposed drainage strategy, such as water butts, have not been incorporated into the design of the SSC building due to the number of rainwater downpipes and the relatively small roof areas. The feasibility of introducing rainwater harvesting could be explored at the next design stage. Any excess overflow from such systems would be discharged to the surface water drainage network.

The proposed impermeable area is approximately 0.186 ha, equivalent to 1,860 m². The first 5 mm rainfall volume is therefore approximately 9.3 m³. Full interception of this volume is constrained by poor infiltration rates, shallow groundwater and the requirement to line the attenuation tank to prevent groundwater ingress. The strategy therefore provides interception as far as reasonably practicable through the western filter drain and potential future water butts, with further opportunities to be reviewed at detailed design in coordination with the landscape team.

Full interception is proposed for the drainage of the car park areas located to the south of the main school building, with runoff directed to the existing soakaways in accordance with current conditions. This approach helps to offset the limited interception opportunities associated with the proposed SSC building.

4.6 Standard 3 – Management of Extreme Rainfall and Flooding

4.6.1 Proposed Discharge Rate

Discharge should be restricted to Q_{BAR} (also as West Sussex County Council LLFA preference). As stated in NSSuDS Standard 3.18, 'the peak allowable discharge rate from the development to surface waters or sewers for the 50% AEP event shall be limited to the equivalent 50% AEP greenfield runoff rate, or 3 l/s/ha, whichever is the greater'. In accordance, with NSSuDS Standard 3.27 50% AEP event shall be considered equivalent to the calculated Q_{BAR} .

$$Q_{BAR} = 3 \text{ l/s/ha} \times 0.227 \text{ ha} = 0.681 \text{ l/s}$$

The greenfield run off rate has been calculated using Flood Estimation Handbook (FEH) statistical 2025 methodology using FEH22 rainfall point data as per the NSSuDS. A *BFIHOST scaled of 0.553 and SAAR9120 values of 757mm were used. The greenfield runoff rate equivalent Q_{BAR} has been estimated in **Table 4-3** for the entire extension catchment, 0.227 ha, (NSSuDS Standard 3.27 & 3.29) excluding climate change.

Refer **Appendix E** for the Greenfield Runoff Calculations.

Table 4-3 – Greenfield Runoff Rates per ha

Return Period	Flow Rate (l/s/ha)
1 in 1 year	2.6
1 in 2 year	2.7
1 in 10 year	5.0



1 in 30 year	7.1
1 in 100 year	9.8

An in-line Hydro-Brake flow control device has been proposed to limit the discharge rate at the outfall. The outlet pipe from the Hydro-Brake will be 150 mm in diameter, consistent with the existing connection. The risk of blockage within the flow control device will be assessed and appropriate mitigation measures implemented to ensure the proposed discharge rate is maintained.

Due to the very low calculated greenfield runoff rate, a practical minimum discharge rate of 3 l/s is proposed to reduce blockage risk with an internal diameter of 68mm and enable a maintainable flow control arrangement. This is subject to agreement with the LLFA and Southern Water.

In accordance with NSSuDS Standard 3.33, urban creep has not been factored into the proposed discharge as the site is not a residential development.

Refer **Appendix F** for the Southern Water Engagement Meeting Minutes.

4.6.2 Exceedance

In line with NSSuDS Standard 3 and local guidance, the design of the site must ensure that flows resulting from rainfall in excess of a 1 in 100-year (+45% allowance) rainfall event are managed in exceedance routes that minimise the risks to people and property, and do not increase flood risk off site.

The current design ensures that any flooding that occurs during 1 in 100-year (+45% climate change) rainfall event is managed effectively onsite and events exceeding 1 in 100-year (+45% climate change) are managed to minimise adverse flooding. Any surface water flooding from off-site sources for a 1 in 100-year rainfall event, will be rerouted around the site as indicated in the Exceedance flood routing plan (**Appendix G**). Hence, the exceedance strategy for the site mitigates the impacts of flooding on and offsite, where exceedance events greater than 1 in 100-year events occurs.

The exceedance route outside the development boundary of the site, will flow away from the school site towards Chesswood Road as per existing conditions.

The hydraulic model results indicate surcharging will occur at for a 1 in 30-year +CC storm event and 1 in 100-year +CC storm event across the SuDS network, however no surface flooding is observed for any scenario.

4.7 Standard 4 – Water Quality

The proposed drainage strategy ensures that all pollution originating from onsite runoff is managed and treated effectively.

All sub-catchments within the extension catchment are classified as a 'low' pollution hazard level. No remedial water quality treatment measures are proposed for the catchments entering the existing drainage network under the scope of these works.

Along the western side of the extension, run off from the area will be managed by a filter trench.

Catchpits have been proposed throughout the network to improve water quality by capturing sediment, debris, and floatable pollutants before they enter the downstream system.



A combination of SuDS and proprietary treatment will be required to ensure pollutants are segregated from surface water for the site. Runoff will originate from proposed roofs and pedestrianised areas, hence a low hazard pollution levels will be expected to be mitigated.

The Simple Index Approach (SIA) from the CIRIA SuDS Manual (C753) has been applied to ensure the water quality of surface water is managed appropriately in accordance with NSSuDS Standard 4. The relevant pollution indices for the site usage are summarised in **Table 4-4**.

Table 4-4 – Pollution Hazard Indices for Homefield Primary School Extension

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Commercial/industrial roofs	Low	0.3	0.2	0.05

The indicative SuDS mitigative indices for discharge to receiving surface water bodies (Table 26.3 of the SuDS Manual) has been followed to ensure sufficient water treatment is provided to the drainage design. The mitigation indices are summarised in **Table 4-5**.

Table 4-5 – Indicative SuDS Mitigation Indices for Discharge to Surface Waters

Type of SuDS Component	Mitigation Indices		
	TSS	Metal	Hydrocarbons
Filter trench	0.4	0.4	0.4
Proprietary Silt Filter	0.4	0.2	0.2

Where the mitigation index of an individual component is insufficient, two components (or more) in series have been provided, where the total SuDs mitigation – $\text{mitigation index}_1 \times 0.5 (\text{mitigation index}_2)$ (Ref- [C753 T](#) The SuDS Manual Pg.568). The treatment strategy is shown to be sufficient in meeting the minimum mitigation requirements for all categories. See **Table 4-6** for the Simple Index Approach (SIA) calculation summary for respective network runs.

The combinations of SuDS features proposed will provide sufficient treatment of surface water prior to discharge (Table 4-6). Refer to **Figure 4-3** for the treatment pathways for the site.



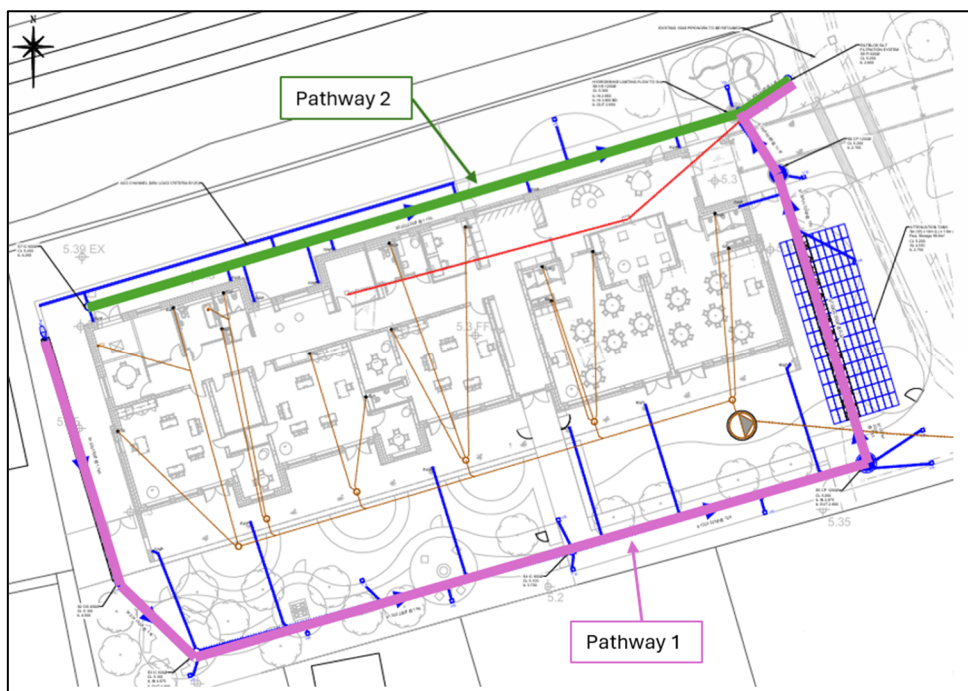


Figure 4-3 - Treatment Pathways for the SSC Building Site

In accordance with NSSuDS Standard 4.14, pollution control shall be considered at the outfall of the surface water network prior to discharging into the proposed outfall pipe.

Table 4-6 – Summary of SIA Mitigation Calculations for Selected SuDS design

SuDS Combination	TSS	Metal	Hydrocarbons
Pathway 1 –Filter drain, Proprietary Treatment	0.6 $=0.4+(0.4*0.5)$ Sufficient	0.5 $= 0.4+(0.2*0.5)$ Sufficient	0.5 $= 0.4+(0.2*0.5)$ Sufficient
Pathway 2 –Proprietary Treatment	0.4 = Sufficient	0.2 = Sufficient	0.2 = Sufficient

Refer **Appendix H** for the Surface Water Below Ground Drainage Layout.

Refer **Appendix I** for the Below Ground Drainage Construction Details.

Refer **Appendix J** for the Hydraulic Calculations for the Surface Water Drainage Network.

4.8 Standard 5 – Amenity

Due to the site's function as a school, SuDS features will be integrated with the landscape design where practicable and visible within the school environment. SuDS features will be provided to minimise impacts of the development and enhance the existing landscape. **Table 4-7** outlines the amenity typical benefits of the selected SuDS features proposed within the drainage strategy. The proposed amenity benefits are currently based on the proposed landscape and the selection on the SuDS assessment, found in **Table 4-1**.

Table 4-7 – Amenity Benefits of SuDS Features

SuDS Type	Amenity Benefits
Filter drain	Filter drains can provide vegetated grassed edgings and attractive boundary lines to soften hardscaped areas.

4.9 Standard 6 – Biodiversity

In line with NSSuDS Standard 6, the surface water strategy has incorporated SuDS features to maximise biodiversity within the site. SuDS features shall be designed using the CIRIA C753 SuDS Manual to maximise biodiversity betterment for the site. A summary of SuDS biodiversity benefits is shown below in **Table 4-8**.

Table 4-8 – Biodiversity Benefits of SuDS Features

SuDS Type	Biodiversity Benefits
Filter drain	Where vegetated or integrated with adjacent planting, filter drains can provide minor habitat value and support soil microorganisms and invertebrates.

Coordination will be required to ensure the SuDS strategy is integrated with the landscape design to meet both statutory biodiversity net gain (BNG) requirements and the overall biodiversity strategy. Evidence of betterment shall therefore be provided to the approving body to demonstrate the inclusion of biodiversity is proportional to the scale and ecological sensitivity of the development site.

This shall include the provision of a biodiversity risk and opportunity assessment in line with NSSuDS Standard 6.4 & 6.5. Refer to the Homefield Primary School Biodiversity Net Gain Report (document reference: 20250110_ECO_BNG_2.0) for a detailed review.

4.10 Standard 7 – Design of Drainage Systems for Construction, Operation, Maintenance, Decommissioning and Structural Integrity

4.10.1 Construction and Structural Integrity

The drainage strategy has been developed to ensure that both SuDS and drainage infrastructure is safely constructed, operated and maintained in accordance with recognised standards. All surface water components will be designed to ensure structural integrity for all anticipated loading conditions within the design life of the development.

Materials and components utilised will have a minimum design life equivalent to the design life of the development (including appropriate factors of safety) or the ability to be rehabilitated or replaceable as per **Table 4-9**. The materials chosen for the construction of SuDS features will be selected for sustainability, which is underpinned by values to reduce material wastage on site and minimise embedded carbon. The specified materials will not negatively impact health and safety, water quality and ecological performance of the operational drainage system. Construction of and operation of SuDS will not create risk towards any nearby infrastructure including existing roads, utilities and buildings.

A phased management plan shall be developed to demonstrate the operation of the surface water drainage network at respective construction phase. This will include the management of flow control compliant with NSSuDS Standard 3 and shall be developed in the next stage of design.



The structural design of the attenuation tank, including maintenance and anti-flotation checks due to shallow groundwater levels, will be undertaken. Dewatering works are likely to be required during the construction of the attenuation tank, catchpit, and hydrobrake manholes.

Utility clearance requirements in proximity to the existing high-voltage (HV) cables and the public sewer will be confirmed at the detailed design stage.

4.10.2 Operation and Maintenance

The proposed surface water network shall be maintained to ensure it is free of debris, detritus, leaf litter and sediment accumulation. Such will prevent the risk of blockages and inefficiencies to develop within the system. The responsibility of maintenance shall be with Homefield Primary School.

The summary of maintenance and frequencies for the proposed drainage systems and infrastructure shown below in **Table 4-9**.

Table 4-9 – Summary of Required Maintenance Schedules

Symbol	Meaning
✓	Will be required
○	May be required
–	Not required

Operation / Maintenance activity	Pipes	Catchpits / Chambers	Gullies / Channel Drains	Attenuation Tank	Filter Drain
Regular Maintenance:	–	✓	✓	–	✓
Occasional Maintenance	○	✓	✓	✓	✓
Remedial Maintenance	✓	○	○	○	✓

The detailed operational and maintenance plans for proposed SuDS features are shown in below in **Table 4-10**. These requirements have been extracted from the CIRIA C753 the SuDS Manual. A full maintenance and management plan will be developed at the next design stage. This will identify the responsible party, maintenance