

Construction Environmental Management Plan (CEMP): Surface Water & SuDS Strategy

Planning Application Reference: DM/26/2272

Project: 3-Dwelling Residential Development

Site Location: Chideok, Valebridge Road, Burgess Hill

Document Purpose: Discharge of Planning Conditions (Surface Water Drainage & Highway Build-up)

Design Standard: Compliant with CIRIA C753 SuDS Manual

Guidelines, Environment Agency Climate Change Guidance, and Lead Local Flood Authority (LLFA) / West Sussex County Council standards.

1. Introduction & Objectives

This document establishes the site-wide strategy for managing surface water and groundwater during both the construction and operational phases of the development under Planning Application DM/26/2272.

The design follows a Partial Infiltration (Type B/C SuDS) philosophy. It closely mirrors the site's natural baseline Greenfield state by combining localised structural pavement infiltration with a rainwater harvesting reuse scheme. Peak weather events are regulated by a monitored, pumped fail-safe mechanism releasing to the ordinary watercourse (culvert) running behind the fence line.

2. Hydraulic Modelling & Design Storm Parameters

To satisfy the specific requirements of the Lead Local Flood Authority and Mid Sussex District Council, the development applies a highly conservative hydraulic design framework to ensure zero net increase in runoff compared to the pre-developed site:

- Rainwater Data Model: All system tolerances are assessed against the Flood Estimation Handbook (FEH) 2022 Rainfall Data model, utilising site-specific catchment descriptors for Burgess Hill to analyse critical rainfall depths and durations.

- Volumetric Runoff Coefficient (CV): A strict CV value of 1.0 is applied across all design storms. This guarantees a conservative, 100% conversion factor where every drop of rainfall hitting the catchments is routed as direct runoff, eliminating sub-surface absorption assumptions during the critical hydraulic calculation stage.
- Target Annual Exceedance Probability (AEP) Events & Climate Change: Calculations account for standard and extreme return periods, integrating a +45% climate change allowance (upper-end peak intensity allowance for the 2080s epoch):
 1. 50% AEP Event (1-in-2 Year Recurrence Interval): Establishes standard operational management and the greenfield baseline runoff rate.
 2. 3.33% AEP Event (1-in-30 Year Recurrence Interval) + 45% CC: Verified to ensure zero surface surcharging or pooling across the shared road and private driveways under intense storm conditions.
 3. 1% AEP Event (1-in-100 Year Recurrence Interval) + 45% CC: Evaluates extreme storage capacity. The combined system is designed to hold this extreme volume, containing it safely within the site boundaries without increasing downstream flood risk elsewhere.

2.1 Mitigation Logic for Urbanisation Effects

While the existing unbuilt ground relies on natural distributed infiltration, the introduction of 3 new dwellings creates concentrated, impermeable roof areas. This system directly mitigates that modification through a robust structural balance:

- Volumetric Offsetting: The 15,000L tank acts as a source-control attenuation vessel, stripping the roof footprint out of the immediate runoff equation.
- Void Storage Space: The ~350mm road make-up provides a 30% structural stone void space. This acts as an open stone reservoir that slows the travel time of water, preventing the local ground subgrade from becoming instantly overwhelmed compared to standard dirt.

- **Controlled Point Discharge:** The automated pumping system acts as a hard boundary. By mechanically restricting the pump rate, it guarantees that even if the ground becomes completely saturated during a 1% AEP + 45% CC storm, water is bled out to the culvert in a slow, metered manner rather than an uncontrolled surge.

3. Pavement & Highway Build-up Specification

The access road and driveways are engineered to a total structural depth of approximately 350mm. This profile forms a continuous stone reservoir to slow peak flows, filter hydrocarbons, and maximise natural ground infiltration.

3.1 Private Driveways (Resin Bound)

- **Surface Course:** 15mm–18mm thickness decorative, highly permeable resin-bound aggregate.
- **Binder Course:** 50mm open-graded porous asphalt (macadam) to provide structural stability while ensuring unrestricted vertical water drainage.
- **Sub-Base Structural Layer:** Shared MOT Type 3 layer.

3.2 Shared Access Road (Porous Tarmac)

- **Surface Course:** 60mm open-graded Porous Tarmac / Asphalt with a targeted 16% to 25% void ratio to pass water straight through.
- **Sub-Base Structural Layer:** Shared MOT Type 3 layer.

3.3 Shared Sub-Base Reservoir & Geomat Layer

- **Sub-Base Material:** Minimum 270mm–285mm depth of MOT Type 3 open-graded aggregate (crushed stone, 40mm down to dust with highly reduced fines) to achieve the overall ~350mm pavement build-up profile. (Note: Standard MOT Type 1 is explicitly prohibited on this site due to its high fines content which seals voids.)

- **Void Ratio:** The Type 3 layer guarantees a minimum 30% structural void ratio to store storm runoff temporarily before infiltration or discharge.
- **Separation Geomat:** A high-permeability, non-woven geotextile membrane (e.g., Terram 1000) laid beneath the Type 3 stone to prevent subgrade soil migration from blinding the structural reservoir.

4. Surface Water Catchment & Rainwater Harvesting Hierarchy

The site isolates clean roof runoff from vehicular surface water to optimise storage capacity, water quality treatment, and sustainability benefits through site-wide reuse:

4.1 Catchment A: Roof & Patio Runoff (Rainwater Harvesting)

- **Runoff** from the three residential roofs and domestic patios is channelled via a sealed gravity system into an underground 15,000-litre harvesting and attenuation tank.
- **Water Reuse Scheme:** This tank is equipped with an independent submersible pump network supplying dedicated external tap points for each house. Harvested rainwater is utilised non-potable across the development exclusively for the site landscaping/planting scheme irrigation and car washing.
- **Overflow Protection:** A high-level overflow pipe connects the tank directly to the 1500mm concrete ring sump to safely route water away if storm profiles exceed the tank's operational storage threshold.

4.2 Catchment B: Roadway & Driveway Runoff

- **Rainfall** passes vertically through the porous road and drive surfaces directly into the ~350mm road make-up and its underlying MOT Type 3 stone reservoir.

- Water infiltrates naturally through the geomat into the subgrade soil bed.

5. Sump Infrastructure, Pump Calibration & Discharge Rates

To prevent site inundation during extreme storm profiles (3.33% and 1% AEP events) or periods of low soil infiltration, an automated overflow bypass system links directly to the culvert:

5.1 Sub-Base Interconnection

- Perforated 100mm twin wall land-drain collector pipes are bedded at the inverted base of the MOT Type 3 reservoir layer at local low points.
- These pipes collect lateral water accumulation within the stone and run via gravity through the concrete ring wall into the primary sump.

5.2 Sump Structure & Silt Control

- A 1500mm diameter pre-cast concrete ring sump is engineered to a total depth of 2.0 metres (2000mm) from surface level.
- The lower 600mm zone of this 2m deep sump functions exclusively as a localised infiltration chamber and structural silt trap. This zone remains unpumped to maximise natural baseline soakage and protect pump mechanics from heavy sediments.

5.3 Pump Calibration & Discharge Controls

- Pumping Arrangement: A duty/assist twin pump system is suspended inside the 2m deep sump.
- Float Switches: Calibrated to trigger only when the water level rises past 600mm from the sump floor, signalling that the native ground's natural infiltration rate has been fully overwhelmed by storm volume.

- **Controlled Discharge Rate:** In accordance with national LLFA Greenfield Runoff Guidelines for a small-scale development site, final pumped discharge into the external culvert is mechanically or electronically restricted to not exceed a peak rate of 2.0 litres per second (2.0 L/s). This restriction prevents hydraulic surge or erosion risks to the receiving watercourse downstream.

5.4 Exceedance Flow Routing (What-If Planning & Regional Catchment Integration)

In the event of an extraordinary storm profile exceeding the critical 1% AEP + 45% CC thresholds, or during a total site power failure neutralising the pump station, the development exploits both internal and external topographical assets as a multi-stage structural safeguard:

- **Dwelling Threshold Protection:** In compliance with standard Building Regulations, the finished floor levels (FFL) of the three new dwellings are constructed a minimum of 150mm above the adjacent immediate road and ground contours.
- **Overland Fail-Safe Path:** The overall development site is naturally situated at a higher elevation than the main public transport corridor. Consequently, the private shared access road functions as a dedicated topographic drainage channel. Any catastrophic exceedance water or surface surcharging is naturally shed by gravity away from the residential building envelopes.
- **Final Evacuation & Highways Integration:** Exceedance runoff flows entirely down the gradient of the private access road corridor to shed cleanly onto Valebridge Road. At this boundary, the runoff interfaces directly with the existing public highway drainage assets. The localised road gullies on Valebridge Road will intercept and safely capture the additional sheet flow.
- **Catchment Sink Destination:** The public highway drainage network directly routes regional surface waters down the valley gradient to Valebridge Pond, situated at the lower terminus of the transport corridor. This critical, high-capacity

water body acts as the ultimate structural safety valve for regional storm downpours, ensuring that the development's safe emergency runoff does not pool locally or create secondary flood risks downstream.

6. Construction Phase Protection & Mitigation Measures

The primary risk to permeable highway systems during building works is structural blinding caused by construction silt and muddy tyre tracks. The following mandatory controls apply throughout the build phase under application DM/26/2272:

- **Surface Course Phasing:** The final 60mm porous tarmac surface and 15mm–18mm decorative resin-bound driveways must not be laid until all heavy building work, bricklaying, scaffolding strikes, and structural soft landscaping across all three plots are 100% complete.
- **Base Layer Protection:** During the construction period, site traffic may only utilise the unsealed or protected lower layers. If mud, clay, or cement dust contaminates any part of the MOT Type 3 sub-base, the contractor must excavate the compromised stone and replace it with clean aggregate before applying the asphalt binder courses.
- **Sump Isolation:** The 2m deep, 1500mm concrete sump must be structurally sealed at the surface with temporary ply or steel covers during the construction phase to prevent loose dirt or cement wash from entering the system. The twin pumps must remain decommissioned until the final surface courses are complete and all loose debris has been vacuumed from the drainage network.
- **Pollution Prevention:** Spill response kits must be placed permanently next to the road construction zone. Maintenance and refuelling of plant machinery are explicitly restricted from occurring within 10 metres of the permeable road footprint or the rear culvert boundary.

7. Operational Maintenance Matrix

SuDS Component	Operational Maintenance Action	Frequency
Porous Tarmac & Resin Surfaces	Vacuum sweeping or close-proximity power washing to extract organic detritus, leaves, and fines from surface voids.	Annually (Late Autumn)
15,000L Harvesting Tank	Inspection of filtration units; debris removal from the inlet leaf-filters to maintain clear flows to the irrigation lines.	Bi-annually
1500mm Sump Silt Trap (2m Deep)	Inspection of the lower 600mm zone; removal of accumulated fine sediments using a gully-sucker to maintain baseline soakage capacity.	Bi-annually
Twin Pump Assembly	Manual testing of float switches, verification of electrical connections, and cleaning of pump intake impellers.	Annually