



Part V: Highway Infrastructure and Assets

Chapter 2: Drainage

Update 14/4/26

Definitions

For the purposes of this chapter, the following definitions apply:

Adoptable (Highway Drainage)

Drainage infrastructure that is designed and constructed to standards acceptable to the Highway Authority or a statutory undertaker, and which is proposed to be taken into long-term ownership and maintenance following formal technical approval and completion.

Alternative Drainage Systems

Highway drainage systems that differ from a conventional piped gravity system, including SuDS features such as attenuation, retention, infiltration or storage-based solutions, which may be considered where they do not introduce unacceptable maintenance, safety or operational liabilities.

Exceedance (Exceedance Flow / Exceedance Event)

Surface water flows that occur when the capacity of the designed drainage system is exceeded, whether due to rainfall events greater than the design standard, blockage, partial system failure or other unforeseen conditions. Exceedance design considers how such flows are managed safely and predictably.

Freeboard

The vertical distance between the maximum design water level within a drainage feature (including the critical storm event and any applicable climate change allowance) and the top of the containing structure, embankment or basin. Freeboard is provided as a safety margin to accommodate uncertainty, exceedance, sediment accumulation, construction tolerance and long-term settlement.

Ordinary Watercourse

A watercourse that does not form part of a designated Main River system. This typically includes ditches, streams, drains and other channels, whether natural or artificial, through which water flows. Works affecting ordinary watercourses are subject to land drainage consent.

SuDS (Sustainable Drainage Systems)

A range of drainage techniques designed to manage surface water runoff in a manner that mimics natural drainage processes, controlling the quantity, rate and quality of runoff, and managing exceedance in a safe and sustainable way.

Land Drainage Consent

Statutory consent required for works that affect an ordinary watercourse, including culverts, outfalls, flow controls or other structures that may influence flow or flood risk. Consent is granted by the Lead Local Flood Authority, or by an Internal Drainage Board where the works fall within an Internal Drainage District and is separate from planning permission.

Lead Local Flood Authority (LLFA)

The public authority responsible for managing local flood risk from surface water, groundwater and ordinary watercourses, and for regulating works affecting ordinary watercourses outside Internal Drainage Districts.

Internal Drainage Board (IDB)

A public body responsible for managing water levels and land drainage within a designated Internal Drainage District. Where applicable, an IDB is the regulating authority for works affecting ordinary watercourses within its jurisdiction.

Adoption Dependency

A situation where the safe operation, drainage performance or exceedance resilience of adoptable highways depends on the continued performance or maintenance of drainage infrastructure that is not proposed for adoption and remains in third-party ownership.

2.1 Highway Drainage

The Highway Authority will ensure that developments that include streets to be adopted as highway provide satisfactory adoptable highway drainage arrangements. This should normally be achieved by one of the following methods:

- All highway water should be drained direct into a piped system vested or to be vested to a water company. This is the method the Highway Authority prefer.
- If the above method is not possible, water should be drained by a piped highway drainage system (minimum pipe size 225mm) running to a public sewer vested in a water company or outfall to a ditch or watercourse agreed by the Lead Local Flood Authority (LLFA), Environment Agency (EA), or Internal Drainage Board (IDB) as appropriate and supported by written evidence accordingly. The Highway Authority will normally insist that the street drainage system is adopted where the Highway Authority is adopting the street.

This hierarchy does not remove the requirement for drainage systems to be demonstrably adoptable and maintainable. Where national guidance is updated or superseded, the latest applicable version shall be applied.

2.2 Easements

All highway drains should be located within land that the Highway Authority is adopting. Only in exceptional circumstances will the Highway Authority permit them in land that is to remain private. You must cover any adoptable highway drain outside the limits of the adoptable highway by an easement. The land must be easily accessible and not be in areas that would cause an unreasonable level of disturbance during maintenance such as private gardens or private driveways.

We will not adopt a street unless its associated drainage is to be adopted either by a water company or by the Highway Authority.

2.3 Alternative Drainage Systems and SuDS

2.3.1 The Highway Authority may consider alternative highway drainage systems, including infiltration systems, flow attenuation (reduction) systems, retention systems and other SuDS features (including oversized pipes, tanks, basins and balancing ponds), on a site-by-site basis, provided that such systems do not represent a significantly increased operational, maintenance or safety liability when compared to a conventional piped highway drainage system.

2.3.2 Where SuDS techniques are proposed, the Highway Authority will require suitable design measures to ensure that the system can be readily inspected, accessed and maintained over its lifetime, and can be safely managed in the event of blockage, failure or exceedance. Such measures may include upstream desilting or sediment control features, flow control structures, draw-down or isolation measures (such as penstocks), and a clearly defined emergency overflow to a sewer, watercourse or other suitable lawful discharge point.

2.3.3 In order to minimise the risk of system failure and to improve overall resilience, SuDS features should be appropriately distributed across the site where practicable. The use of a single feature, such as a balancing pond or detention basin, as the sole attenuation or control point for the entire highway drainage system—particularly where located at the lowest point of the site—will not generally be accepted.

2.3.4 All alternative drainage systems proposed for adoption by the Highway Authority will be subject to the payment of a commuted sum to reflect the long-term costs associated with inspection, maintenance, asset management and eventual renewal.

2.3.5 Land drainage consent is required for works that affect ordinary watercourses, including the construction, alteration or removal of culverts, outfalls, flow controls or other structures that may affect flow or flood risk. Consent is granted by the appropriate regulating authority, which will normally be the LLFA, or the relevant IDB where the site lies within an Internal Drainage District and the watercourse falls under its jurisdiction. Such consent is separate from planning permission and must be obtained prior to the commencement of works.

2.3.6 Applications for land drainage consent must demonstrate that the proposed works will not increase flood risk, reduce channel capacity, or adversely affect third-party land, and that appropriate provision is made for exceedance routing, safe access for inspection and maintenance, and the long-term operation of the drainage system.

2.3.7 Drainage attenuation basins, balancing ponds and similar SuDS features are not normally considered part of the adoptable highway infrastructure and will not generally be adopted by the Highway Authority. Such features are ordinarily expected to remain in private or third-party ownership and be maintained in perpetuity through suitable management and funding arrangements secured via the planning process. Adoption of such features will only be considered in exceptional circumstances, at the Highway Authority's discretion, where it is clearly demonstrated that they serve the highway exclusively and meet all relevant technical, safety and maintainability requirements.

2.3.8 Where adoption of a drainage balancing pond, detention basin or similar SuDS feature is proposed, the design must demonstrate adequate freeboard. Freeboard is defined as the vertical distance between the maximum design water level for the critical storm event (including any applicable climate change allowance) and the top of the containing structure, embankment or basin. This safety margin is required to accommodate uncertainty in rainfall estimation, blockage or partial failure of outlet structures, sediment accumulation over time, construction tolerances, long-term settlement and exceedance events beyond the design standard.

2.3.9 Drainage features that do not provide adequate freeboard, or that rely on uncontrolled overspill to manage exceedance flows, are unlikely to be considered safe or robust from an adoption and long-term maintenance perspective. Exceedance flows must be managed in a controlled manner such that water is safely contained or routed without causing uncontrolled flooding, structural erosion, or risk to highway users, adjacent land or third-party property.

2.3.10 The design of any balancing pond or similar feature proposed for adoption must demonstrate safe side slopes, stable containment, resilient hydraulic and structural performance, and safe access for inspection, maintenance and desilting using conventional highway maintenance practices. Features that rely on specialist landscaping treatments, complex management regimes or non-standard operational procedures will not normally be acceptable for adoption.

2.3.11 Where a drainage balancing pond or other SuDS feature is not proposed for adoption but forms a critical part of the drainage system intended to serve adoptable streets, careful consideration must be given to the implications for the wider highway network. Where the safe operation, drainage performance or exceedance resilience of adoptable highways would be dependent on the continued performance, capacity or maintenance of a non-adopted asset, the Highway Authority may be unable to accept long-term liability for those streets.

2.3.12 Where alternative drainage systems or SuDS features discharge to an ordinary watercourse, formal consent from downstream landowners is not normally required. However, applicants must demonstrate that proposed discharges will not result in an increased risk of flooding, erosion, instability or other adverse impacts on downstream land. Drainage designs will be required to control flows appropriately, provide sufficient attenuation and freeboard, and manage exceedance in a controlled manner such that the capacity and function of the receiving watercourse is not compromised.

2.3.13 Where a drainage strategy relies on the continued performance, capacity or maintenance of downstream watercourses or drainage assets beyond the control of the Highway Authority, or where lawful discharge cannot be robustly demonstrated through land drainage consent or other appropriate approvals, the Highway Authority may require the drainage strategy to be amended. In such circumstances, reliance on third-party land or infrastructure may have implications for the adoption of streets served by the drainage system.

2.3.14 Planning permission or land drainage consent does not remove civil liability arising from increased flood risk, erosion or damage to third-party land. Drainage proposals that would unreasonably increase downstream risk are unlikely to be acceptable. Applicants are strongly advised to resolve ownership, consent and adoption matters for SuDS features prior to the submission of any application for technical approval.

2.4 Infiltration Systems

2.4.1 Where there is no reasonable prospect of securing a positive drainage system, as demonstrated by appropriate evidence, infiltration drainage may be considered in suitable ground conditions. This will normally require adjacent soils to exhibit an infiltration rate greater than 10mm/hour, unless otherwise agreed based on site-specific evidence, subject to the payment of a commuted sum, and where infiltration systems can be located at least 1.0m above the highest recorded groundwater level, taking account of seasonal variation.

2.4.2 Infiltration systems must be located outside the carriageway. Where this is not possible, and only in exceptional circumstances, their location must not prevent or severely restrict access for inspection or maintenance. Structural calculations may be required to demonstrate that anticipated loading can be accommodated without adverse impact on the system or the highway.

2.4.3 Infiltration systems should be located a minimum of 5m from buildings. Where systems are proposed outside the highway, they must comply with applicable easement requirements. Easements may also be required to prevent future development encroaching within 5m of an infiltration system where water dispersal could affect structural stability.

2.4.4 The location and spatial requirements of infiltration systems must be identified at the planning application stage to demonstrate that sufficient land is available and that long-term maintenance access can be provided.

2.4.5 The design and installation of soakaways and infiltration systems should accord with relevant industry guidance, including BRE Digest 365, CIRIA guidance on infiltration drainage and the current SuDS Manual.

2.4.6 Where infiltration systems form part of a wider SuDS strategy serving adoptable streets, the requirements set out in Section 2.3 in respect of access for maintenance, system resilience, freeboard (where applicable), controlled exceedance routing and adoption dependency shall also apply.

2.4.7 Any application for adoption involving infiltration drainage must be accompanied by a completed Infiltration Assessment, as set out at Appendix B.

Where you are proposing SUDS, you must hold discussions with all relevant parties at an early stage (and certainly before any planning application) to agree ownership and responsibility for the facility.

2.5 Private Drainage

2.5.1 The Highway Authority will not accept the drainage of non-adopted assets into a highway drainage system either adopted or to be adopted by us. In general, the drainage of most other areas of a development are matters for water companies. You should normally design these drainage systems in line with the water companies' specifications and requirements (which you may treat as complementary to this document) and they should be adopted by them.

2.5.2 Where necessary private development should provide cut-off drainage often in the form of linear drains or ditches to prevent the unregulated discharge of surface water onto adjacent streets.

2.6 Outfall design

2.6.1 Where a piped system discharges into an existing ditch or watercourse, the pipe invert (bottom of the inside of the pipe) must not be lower than the level of the base flow in the ditch or watercourse and it should always be at least 150mm above the ditch or watercourse invert. You must direct the end of the pipe, so it discharges at an angle less than 60 degrees to the direction of flow in the ditch or watercourse. The end of the pipe must have a headwall and apron which supports the bank above and adjacent to the pipe and prevents any scouring underneath the pipe. You must protect the banks of the ditch or watercourse from scouring, and you must meet any requirements laid down by the LLFA, EA, and IDB.

2.6.2 If the outfall is to an existing highway drain, you will have to prove its capacity and condition before the Highway Authority can approve the connection. For all works incorporating highway drainage you will need to carry out and provide a copy of a CCTV survey and report. You must carry out any improvement works found necessary, all at your expense.

2.7 Existing drainage systems

You must deal with any existing drainage systems within the development site, including any land drains, ditches, watercourses, outfalls or drainage systems from adjacent land to our satisfaction and that of the LLFA, EA, and IDB as appropriate and the owners of the systems.

You must have consent to pipe an existing ditch or watercourse, in accordance with Section 23 of the Land Drainage Act 1991.

The discharge of adopted highway drainage to privately maintained drainage systems will not be accepted.

2.8 The hydraulic design of adoptable highway drains

The hydraulic design of adoptable piped highway drains must meet the requirements of the current Design and Construction Guidance (England) for adoptable sewers and drainage infrastructure (DCG).

You must submit calculations using the specified method of calculation and format. The Highway Authority will accept output from an approved computer programme using the specified method and parameters.

2.9 Hydraulic design – protection against flooding

The system must be designed to meet the requirements of the current DCG.

The system should be designed not to flood any part of the highway or site in a 1 in 30-year return period design storm or any other return period that is set out in any latest version of DCG.

Your design should also show the line and extent of flow paths and the potential effects of flooding if storms are greater than those allowed for by your design. Design rainfall events shall include the appropriate climate change allowance agreed with the LLFA.

2.10 Minimum pipe size

The minimum pipe diameter for adoptable highway drains, other than gully connections, is 225mm. The minimum size for a road gully connection is 150mm.

2.11 Use of combined kerb and drainage systems

You must consider a combined kerb and drainage system where the minimum longitudinal carriageway gradient is less than 1 in 100 for flexible surfaces and less than 1 in 80 for block paved surfaces. The Highway Authority will normally require you to pay a commuted sum to cover any additional maintenance where a combined drainage system is used.

2.12 Approving drainage structures

Any drain, pipe or box culvert, sewer or drainage structure that has a clear span or internal diameter of greater than 900mm or any headwall greater than 1.5m retained height, will be classified as a highway structure and be subject to the specific requirements that apply to highway structures.

2.13 Catchpits

Unless otherwise specified, you must use catchpits and not manholes on adoptable highway drainage systems. Soakaway structures (typically over-sized chambers and cover slabs which are greater than 1050mm in diameter), even if they are to be adopted by the relevant water company, must still be designed to the relevant standards for retention within the highway (BS EN 1991-2:2003 Eurocode 1: Actions on structures - Part 2: traffic loads on bridges). You will need to demonstrate to us that this has been achieved.

You must provide a catchpit (an access chamber, with sump, on a drainage system) where there is any discharge into an existing ditch or watercourse.

On all drainage runs the Highway Authority are to adopt where the pipe diameter is 900mm or less, you must provide a catchpit at:

- every change of alignment or gradient,
- the head of all main pipelines,
- every junction of pipelines except for single-gulley connections.
- every change in pipe diameter, and
- a maximum spacing of 90 metres.

2.14 Catchpit and manhole positions

You should normally locate catchpits or manholes within the verge, and not the carriageway, on classified roads and other roads with a higher status than a residential street or industrial access road. The outside of catchpits and manholes should be at least 500mm from the kerb line or the edge of the carriageway. Any catchpits or manholes within a carriageway must be located so that they can be accessed while providing the necessary safety zones and without preventing traffic from passing. This will generally mean that you should not site them at or near the centre of the carriageway or within a width restriction. You should also take care when locating catchpits or manholes within junctions or roundabouts, based on the same criteria.

2.15 Positioning and alignment of highway drains and storm and foul sewers

Highway drains must be laid:

- in straight lengths,
- to straight grades between catchpits, and
- within the carriageway or verge.

You must not lay drains and sewers and their associated catchpits or manholes in footways as this space is required for other utility apparatus.

2.16 Gullies

2.16.1 All gullies should be trapped and the maximum length of gulley connection should not be more than 15m. It will not normally be acceptable to connect one gulley connection directly into another. Gully spacings should be designed in accordance with the requirements of CD526 of the DMRB.

2.16.2 For residential roads with a carriageway of 5.5m or less gully spacings may be calculated using Table 2.1 below and the accompanying notes:

Table 2.1

Carriageway Gradient	1/100	1/80	1/60	≥1/40
Area drained including footways etc.(m ²) assuming 1/40 crossfall	126	141	162	196

- When calculating the areas drained, you must make allowance for all footways, footpaths, paved areas and verges that fall towards the carriageway.
- Gullies must not be spaced more than 40m apart, irrespective of the areas drained, except at summits where the first gully should not be more than 40m from the high point.
- Double gullies must always be provided at sag points and low points, and each must have its individual connection to the main sewer or highway drain.

2.16.3 The gully spacings quoted in Table 2.1 above are based on an assumed flow width of 0.75m. On higher classifications of road such as Industrial Access Roads and Main Streets (i.e. those with a carriageway width greater than 5.5m), the Highway Authority may require a narrower flow width to be applied and gully spacings to be altered accordingly. These should be agreed with the Highway Authority on a site-by-site basis, depending on individual circumstances and geometry.

2.16.4 In footpaths, footways and cycleways separated from carriageways, you must provide gullies or channels connected to the highway drainage system where surface water would otherwise discharge onto adjacent property or cause flooding of footpaths, footways or carriageways.

2.16.5 You should site gullies upstream of the tangent point at road junctions so that surface water in the channel does not flow across the junction. You should take care to avoid ponding near the mid-point of radius kerbs. Where the road is super-elevated, you should site a gully just before the point where the adverse camber is removed to prevent water in the upstream channel flowing across the carriageway.

2.16.6 You should take care to avoid ponding in the transition length, when the longitudinal gradient is flat or where there are traffic islands, central reserves or traffic-calming measures. You must not site gullies within pedestrian crossing points. Where possible, locate them directly upstream of the crossing point.

2.16.7 You should not site gullies where traffic would be prevented from passing while they are being emptied, for example within a carriageway width restriction.

2.16.8 You will need to provide us with a contour plan to show that gullies are located in the correct position as part of your design submission for works under Section 38 or Section 278 agreements.

2.17 Providing sub-soil drainage

You should generally construct a system of sub-soil drainage to a suitable outfall all to our satisfaction unless otherwise agreed where:

- the winter height of the water table is within 600mm of formation level, or
- the sub-soil is unstable because of being waterlogged, or
- there is a likelihood of water running from or out of adjacent ground, or
- springs, land drains or watercourses are present, or
- the finished road is below existing ground level, regardless of the water table; or
- the sub-grade is likely to be altered due to groundwater.

2.18 Backfilling trenches

You must backfill all drainage, utility and other trenches in the highway for industrial and commercial premises up to formation level with GSB type1 granular sub-base material.

Backfill on residential sites should be a granular material to the approval of the highway authority (acceptable material will typically include GSB type 1 or material graded to 6F1).

-End-