

Leicestershire Highway Design Guide

Part 5e: Highway drainage

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1. Overview

- 1.1 This section refers to the materials and construction requirements for both traditional and Sustainable Drainage Systems (SuDS). Please refer to Series 500 of the council's [Specification and Standard Drawings](#) when designing highway drainage. The council has standard drawings for drainage features including soakaways, filter drains and ditches. Where standard drawings are not currently available, please refer to Ciria's "[Manual for SuDS](#)".

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2. Discharge from the proposed drainage and consents

- 2.1 Piped system discharges should be constructed in accordance with the council's standards. Ideally, the end of the pipe should be directed so it discharges at an angle less than 60 degrees to the direction of flow in the ditch or watercourse. Where this is not possible, the absolute minimum angle a pipe may discharge is 90 degrees to the direction of flow. 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. Banks of the ditch or watercourse must be protected from scouring.
- 2.2 If the outfall is to an existing highway drain, its capacity and condition must be proven before the connection can be approved. For all works incorporating highway drainage a copy of a CCTV survey and report must be provided. Any improvement works, including but not limited to, jetting/cleansing, repairs and capacity improvements must be carried out at the developer's expense. Existing flows should be maintained where new connections to existing drain.

Land drainage consent

- 2.3 Outfalls to land drains, ditches and watercourses from adjacent land or drainage systems must be managed to the satisfaction of the council (ordinary watercourse) or [Environment Agency](#) (main river), this will usually require formal [land drainage consent](#).

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3. Run off from land adjacent to the highway

- 3.1 Where there is or is likely to be run-off from landscaped areas, open spaces and adjoining land, appropriate arrangements must be made for land drainage. This can include providing intercepting drains and ditches with satisfactory outfalls.
- 3.2 Where private non-adoptable drives and other surfaces fall towards the adoptable highway, surface water run-off must be prevented from reaching the highway boundary and entering the highway drainage system.

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4. The hydraulic design of adoptable highway drains

- 4.1 The hydraulic design of adoptable piped highway drains must meet the requirements of the current edition of "[Design & Construction Guidance](#)" (DCG) published by Water UK in accordance with section 104 of the Water Industry Act 1991.
- 4.2 Input data and hydraulic modelling results should be submitted to the council.

Hydraulic design – protection against flooding

- 4.3 The system must be designed to meet the requirements of the current edition of Water UK's [DCG](#).
- 4.4 The system should be designed not to flood any part of the highway or site in a 1% (1 in 100-year return period) design storm or any other design storm event that is set out in the latest version of 'Sewers for Adoption' including an allowance for climate change set in line with current Environment Agency development recommendations plus 10% for urban creep.
- 4.5 Designs should also show the line and extent of flow paths and the potential effects of flooding for storms greater than those allowed for by the design. Water from the highway should not at any time leave the highway. If this is not possible then additional information on where this water goes must be provided along with confirmation/evidence that no property will be subject to flooding from the highway.

Minimum pipe size

- 4.6 The minimum pipe diameter for adoptable highway drains, other than gully connections, is 225mm. The minimum size for a road gully connection is 150mm.
- 4.7 Culverted watercourses will be minimum 450mm. Please refer to the [Flood Risk Management Strategy](#) for further information.
- 4.8 These are absolute minimums, please note all pipe systems should be accompanied by calculations and or modelling providing suitability for ability for use.

5. Use of combined kerb and drainage systems

- 5.1 A combined kerb drainage system must be considered where the minimum longitudinal gradient of a carriageway is less than 1 in 100 for flexible surfaces and less than 1 in 80 for block paved surfaces.
- 5.2 There should be a rodding access at head of the system with periodic outlets as required and an outfall that uses a propriety sumped gully unit. The system should be able to be cleansed in the same manner of a standard gully (with a gully sucker).
- 5.3 A commuted sum is required to cover any additional maintenance where a combined kerb drainage system is used.



Figure 53: Example of a combined kerb and drainage system

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6. Classifying drainage as a structure

6.1 The following will be classified as a highway structure and be subject to the specific requirements that apply to highway structures:

- drain, piped or boxed culvert, sewer or drainage structure that has a clear span or internal diameter of greater than 900mm; and
- headwall greater than 1.5m retained height.

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7. Catchpits

- 7.1 Unless otherwise specified, catchpits and not manholes must be used on adoptable highway drainage systems.
- 7.2 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 demonstrably designed to the relevant loading standards for retention within the highway (Eurocodes).
- 7.3 A catchpit must be provided (an access chamber, with sump, on a drainage system) where there is any discharge into an existing or proposed ditch or watercourse.
- 7.4 On all drainage runs that are to be adopted, where the pipe diameter is 900mm or less, a catchpit must be provided 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 diameters; and

Outfall to existing highway drain

- 7.5 If the outfall is to an existing highway drain, you will have to prove its capacity and condition before we 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.

Catchpit and Manhole Positions

- 7.6 Catchpits or manholes should normally be located within the verge, and not the carriageway, on classified roads and other roads with a higher status than a residential access road 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.
- 7.7 Any catchpits or manholes within a carriageway must be located so that they can be accessed while providing the necessary maintenance access

safety zones (1m) and without preventing traffic from passing. This will generally mean that they should not be sited at or near the centre of the carriageway or within a width restriction. Care should be taken when locating catchpits or manholes within junctions or roundabouts, based on the above criteria.

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8. Positioning and alignment of highway drains

8.1 Highway drains should normally be laid:

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

8.2 Drains and sewers and their associated catchpits or manholes should not be laid in footways, as this space is required for other utility apparatus. All highway drainage should be located within land that the council is adopting. For land outside of the council's control an easement will be required.

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9. Gullies

- 9.1 All gullies should be trapped and the maximum length of gulley connection should not be more than 15m. It will not be acceptable to connect one gulley connection directly into another. Gully spacing should be calculated in accordance with Table 41 and the accompanying notes.

Table 41: Gully spacing

| Carriageway gradient | 1/100 | 1/80 | 1/60 | 1/40 or steeper |
|--|------------------------|------------------------|------------------------|------------------------|
| Area drained (including footways and so on) (m ²) ^(a) | 170 ^{(b) (c)} | 180 ^{(b) (c)} | 200 ^{(b) (c)} | 240 ^{(b) (c)} |

^(a) When calculating the areas drained, allowances must be made for all footways, footpaths, paved areas and verges (classed at 30% impermeable) that fall towards the carriageway.

^(b) 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.

^(c) Double gullies must always be provided at sag points and low points and each must have its individual connection to the main sewer, highway drain or outfall.

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

- 9.3 Gullies upstream of the tangent point at road junctions must be sited so that surface water in the channel does not flow across the junction. Care should be taken to avoid ponding near the mid-point of radius kerbs. Where the road is super-elevated, a gully should be sited just before the point where the adverse camber is removed to prevent water in the upstream channel flowing across the carriageway. A gully should be sited directly upstream of any pedestrian/dropped crossing point to prevent water in the channel causing a hazard to users of the crossing.

- 9.4 Care should be taken 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.
- 9.5 Gullies must not be sited:
- within pedestrian crossing points. Where possible, locate them directly upstream of the crossing point.
 - where traffic would be prevented from passing while they are being emptied, for example within a carriageway width restriction.
- 9.6 Double gullies should be provided at low spots or vertical sag curves along the channel and should not be connected with “y” connection.
- 9.7 A contour plan must be provided to show that gullies are located in the correct position as part of the design submission for works under [Section 38](#) or [Section 278](#) agreements and any other situation requested.
- 9.8 Plans should show the catchment areas for each gully, in accordance with Table 41 above. The area of surface water drained must be shown on the drawing for each gully along with the longfall at the gully location.

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10. Sub-soil drainage and backfilling trenches

10.1 A system of sub-soil drainage must be constructed to a suitable agreed outfall all to the council's satisfaction 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.

Backfilling trenches

10.2 All drainage (other than filler drains), utility and other trenches in the highway for industrial and commercial premises must be backfilled up to formation level with Granular Sub Base (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). Reinstatement standards (such as The National Joint Utilities Group/Highway Authorities and Utilities Committee) do not apply to new development.

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11. Sustainable drainage systems

- 11.1 The use of sustainable drainage systems (SuDS) features to drain the highway is not fully established in Leicestershire and there will be a bedding in period where not all features are currently accepted for adoption. Please see Design Layouts '[Highway Drainage](#)' for currently accepted features. Developers should discuss proposed SuDS features during pre-application discussions where they will be updated on the current position on both acceptability and adoption of different SuDS.
- 11.2 Where SuDS are proposed for highway drainage, discussions must be entered into with all relevant parties before submission of any planning application to agree ownership and responsibility for the facility. The council will not adopt a road until satisfied with the design of the system and that satisfactory arrangements are in place to cover its future maintenance.
- 11.3 The council has standard drawings for drainage features including soakaways, filter drains and ditches. Where standard drawings are not currently available then please refer to Ciria's "[Manual for SuDS](#)".

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