



Chapter 5: Drainage and Structures

Streetscape Design Guide 2025

Worcestershire County Council

Contents

- 1. Drainage Requirements 3
- 1.2 Drainage Adoption Requirements 3
- 1.3 Soakaways..... 5
- 1.4 Drainage Design 5
- 1.5 Surface Water Connection to a Publicly Maintained Highway Drain 6
- 2. Highway structures 6
- 2.1 Assessment of Existing Structures 9
- 2.2 Approval Submissions 9
- 2.3 Departures from Standards (Eurocodes) 10
- 2.4 Statutory and other services..... 11

Chapter 5: Drainage and structures

1. Drainage Requirements

Drainage systems intended to be adopted as highway drains shall be hydraulically designed and constructed in accordance with [Sewers for Adoption](#) published by Water UK and with the specifications within this Design Guide. Please visit [our website](#) for flood risk information and [the WCC Sustainable Drainage Design & Evaluation Guide](#) for more guidance.

The Local Highway Authority only accepts adoptable highway drainage that connects directly to systems that are maintained by a statutory body (e.g. Severn Trent Water Ltd.) Worcestershire County Council welcomes the use of Sustainable Drainage Systems (SuDs) but is not currently set up to adopt such schemes. However, where a dedicated highway surface water system is proposed, SuDs may be considered based on design proposals and geotechnical considerations subject to approval.

Pipes that solely carry surface water runoff from an adopted highway are typically the responsibility of the Local Highway Authority for maintenance. This is often part of an agreement made when the highway is adopted. Pipes that carry surface water from the adoptable highway as well as other areas such as roofs, private drives, etc. must be adopted by the relevant water company who operate the public water and sewerage network and must comply with their requirements.

Lateral connections into public sewers will remain private but shall be designed and constructed to adoptable standards. All such connections shall run at right angles to the centreline of the road to minimise their length. Any infiltration, storage or discharge from private SuDs will be on private land.

SuDs for the highway shall drain into the highway drain network, and any infiltration will be within highway/public areas. Worcestershire County Council will consider adopting highways which discharge highway run-off into a SuDs system carrying surface water from private areas, where the applicant can produce a satisfactory design in compliance with the appropriate guidance and standards. The applicant must also demonstrate that the Local Highway Authority will not be exposed to maintenance liability by ensuring that the SuDs system is maintained by a statutory body.

1.2 Drainage adoption requirements

Where foul or surface water sewers are to be laid under the adoptable highway, or where the highway drainage is to be connected into a surface water sewer, written assurance must be obtained beforehand that the relevant Water Authority will adopt the sewers, subject to compliance with their adoption procedure.

The Local Highway Authority will typically not adopt a highway under a Section 38 agreement (s38) until the relevant Water Authority has confirmed the adoption of all sewers within that highway,

including those outside the directly adoptable area but connected to its drainage. This is because the Local Highway Authority needs assurance that the drainage system, including connections, is properly maintained and managed by the Water Authority before taking on responsibility for the highway itself.

Highway drains intended for adoption must discharge into a pipe or watercourse approved by the Local Highway Authority, with the developer proving the right to discharge without liability. Adoption by the relevant Water Authority of all highway sewers is also a prerequisite, including those outside the adoptable highway but contributing to its drainage.

The following important points apply:

1. Private drains will not normally be permitted within the adoptable highway.
2. All prospectively maintainable highway drains shall be located within land that is to be adopted by the Local Highway Authority. Only in exceptional circumstances will they be permitted in land that is to remain private.
3. Where such circumstances do arise, the landowner at the time of completing a s38 Agreement will be required to give a grant of easement keeping three metres each side of the pipe clear of all obstructions, which will be binding on successors in title. The developer is strongly advised not to sell any land that will contain a highway drain before completion of such an Agreement. The Local Highway Authority will not accept any different form of undertaking, which weakens the rights conferred on it.
4. 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.
5. Where the outfall is into a ditch, watercourse, or main river, the approval of the Lead Local Flood Authority or Environment Agency (EA)¹ (as appropriate) must be obtained in writing.
6. Where the outfall is proposed to be through an existing highway drain, the developer will be required to prove its capacity and condition before approval for the connection can be given. This will include a CCTV survey of the drain, and the conducting of any improvement works found to be necessary.
7. Where the highway drain discharges into a watercourse, calculations shall consider the possibility that the watercourse may be flooded.
8. In exceptional circumstances we may consider the use of combined kerb and drainage systems if there is suitable justification of why a more traditional system cannot be accommodated.
9. In certain cases, Worcestershire County Council may require the provision of a larger capacity drain than would normally be needed to accommodate the drainage of adjoining land and/or future development.

¹ Or their successor organisations

1.3 Soakaways

Where soakaways are to be considered, it will be at the discretion and approval of Worcestershire County Council and will be considered by exception. The developer is to note that a Commuted Sum may be charged for each soakaway installed. The size and number of soakaways required will be determined based on the volume of surface water that needs to be handled, the soil conditions, and size of properties.

The following important points apply:

1. The minimum diameter shall be 1500 mm. If more than one soakaway is planned, they are to be linked by a 225 mm diameter pipe and must conform to Building Regulations.
2. The soakaways are to be surrounded by Terram or similar, laid between the chamber and the filter material. The appropriate filter material to be used will vary according to prevalent ground conditions.
3. Where possible, the soakaway is to incorporate an overflow link (minimum diameter 225 mm) to an existing highway drain/outfall system.

1.4 Drainage design

Gullies, which are roadside drains or channels, are strategically placed to manage surface water runoff. They are required immediately before block paving, pedestrian crossing points, and road junctions to collect water and prevent flooding. However, gullies should never be positioned directly on pedestrian crossings to avoid creating a hazard for pedestrians.

Gully spacing should, in most cases, be determined using the recommendations of DMRB: CD 526 for highway improvement (Section 278) schemes and using our Highways Specification for adoptable highway (Section 38) schemes.

It is the developer’s responsibility to demonstrate and ensure that the number and positioning of gullies is adequate to drain the highway including footways, footpaths, paved areas or verges that fall towards a carriageway. The parameters and specification for drainage are shown in table 1.

Table 1: Parameters for drainage

Parameter	Specification
Rainfall average return period	1: 5 years Design (no surcharge of drainage system)
Rainfall average return period	1: 30 years Design (no flooding within highway or third-party land)
Rainfall average return period	The highway system must be assessed for 1:100 years + climate change allowance. * See note 1
Climate change allowance	40% uplift in peak rainfall intensity
Time of entry (default)	4 minutes
Design flow velocities	0.75m/s (absolute minimum)

	7.5m/s (absolute maximum, if greater than 3.0 m/s consult with adopting authority)
Minimum gradient	1:225
Design maximum rainfall	Should be set to the maximum that the modelling software allows. * See note 2.
Minimum pipe diameter	Highway (carrier) drain – 2.25metres Lateral gully connection – 1.5 metres

**Note 1 - Any attenuation storage should be below ground where possible. Using existing highway assets as surface storage shall be considered on a case-by-case basis. The Environment Agency uses depth and velocity criteria to assess flood risk to pedestrians. For adults, the limiting depth is 1.2m and the limiting velocity is 3.0 m/s. For children, these limits are 0.5m and 3.0 m/s, respectively. These values represent the thresholds where the risk of instability and potential harm becomes very high.*

**Note 2 - This parameter can cap the maximum rainfall intensity able to enter a system so if a modelled storm has an intensity higher than the input value then all water above this is lost. Whilst few events exceed this, and only for short periods when they do (meaning the volume lost by capping is small), it can still lead to water being unaccounted for. Therefore, it is recommended that the maximum value be entered to avoid this. Justification and details must be provided if values less than 1.5 metre/hr are used.*

1.5 Surface water connection to a publicly maintained highway drain

If no other reasonably obtainable option exists, then discharge of surface water to a Local Highway Authority maintained highway drainage asset may be considered. However, in most circumstances, it is unlikely that approval to discharge into a highway drainage system will be given.

These systems usually only have the capacity to drain the highway extent. They are not designed to accept any private surface water from individual properties, business, and private developments or discharges from private treatment plants/septic tanks and land drainage. Therefore, any additional connections may increase the risk of flooding on the highway and are unlikely to be approved unless the system capacity is proven and, where necessary, improved. Applications for connection to existing highway drainage shall include hydraulic modelling taking account of the whole contributing catchment area and a dilapidation survey to include CCTV survey of pipe drainage.

2. Highway structures

A ‘highway structure’ refers to any bridge, culvert, subway, retaining wall or other construction built over, under, or adjacent to a highway that affects the support or safety of the highway. This includes

items like tunnels, and even certain pieces of street furniture. The term also encompasses structures that, while not directly supporting the highway, may still impact its stability or safety.

Worcestershire County Council as the Local Highway Authority follow technical approval procedures as set out in the [‘Technical Approval of Highway Structures’ CG 300 \(formally BD 2/12\) of the DMRB Structures manual](#).

Unless agreed with the Technical Approval Authority (TAA), Eurocodes must be used for the design and modification of existing highway structures (including geotechnical works).

For the purposes of this guide, references to the TAA in CG 300 means Worcestershire County Council acting as the Local Highway Authority. All structures shall be designed in accordance with the DMRB and constructed in accordance with the Specification for Highway Works. Where there is conflict between standards within the DMRB, including CG 300, the Eurocodes take precedence. The Local Highway Authority should be contacted for clarification where necessary.

Worcestershire County Council will be able to advise developers of the determined category for any proposed structures. All structures, except for category 0, will require an Agreement in Principle (AIP) to be submitted and accepted prior to any design work (only completed versions of the forms will be accepted, and Microsoft Word versions are available on request). Currently, there is no guidance within the public domain covering the required changes to either the AIP or design and check certificates.

Until the DMRB is updated, the application of Eurocodes guidance should be sought from the TAA on this matter. Any design work completed prior to the acceptance of the AIP will be at the developers’ risk, whether the work completed is compliant with the DMRB.

The Local Highway Authority reserves the right to alter the design standards as it considers necessary, and this will be communicated before and where necessary during the submission of the AIP. Early consultation for structural requirements is strongly advised.

All structures covered by CG 300 will require Design and Check Certificates, and Construction Compliance Certificates (only completed versions of the forms will be accepted and Microsoft Word versions are available on request).

The AIP, or in the case of category 0 structures submitted with the Design and Check certificate, must contain evidence of consultation and discussions with statutory undertakers, the relevant Local Planning Authority, the Environment Agency, and any other relevant body statutory or otherwise.

The AIP must contain relevant extracts from the geotechnical ground investigation including all relevant testing for the proposed design.

A list of structures to be subject of technical approval is as follows:

1. All bridges over or under the highway.
2. All culvert pipes crossing under the highway greater than 0.9 metres span.
3. Pipes or culverted streams or other structures greater than 0.9 metres span or diameter along the highway either maintained privately or by statutory undertakers.
4. Any structures which are not pipes less than 0.9 metres span/diameter.
5. Retaining walls greater than 1.22 metres in height and within 3.66 metres of the highway boundary as described in Section 167 of The Highways Act 1980.
6. Any retaining wall within 3.66 metres of the highway, retaining sloping ground.
7. Any retaining wall supporting the highway regardless of height.
8. Any private cellar or basement under or adjacent to the highway.
9. Reinforced earth structures with or without hard facings, including gabion and crib lock walls.
10. High masts and lighting columns compliant with the standard for the design of minor structures CD 354 will be category 0 unless notified otherwise.
11. High masts and lighting columns not compliant with the standard for the design of minor structures CD 354 will be category 1 unless notified otherwise.
12. Any part of a building structure overhanging the highway.
13. Highway signposts greater than 7 metres in height.
14. Any temporary works which are described as above.
15. Structures required to be assessed by the Local Highway Authority whether or not maintained by them.

This list is not exhaustive, and developers are urged to consult with Local Highway Authority at the earliest possible stage.

Where developers combine various structural components, each with different designers, to be incorporated into one structure, they will undertake to provide one Design and Check Certificate(s) from the Principal Designer that takes responsibility for the whole structure (and includes reference to and copies of the design and check certificates of the component parts). Examples of this might include:

1. A bridge that comprises of in-situ cast abutments with pre-cast concrete deck beams.
2. Cast in-situ or driven piles on which in-situ abutments / piers are constructed.
3. Temporary works Adoption of Structures by Worcestershire County Council. We may adopt certain structures adjacent to, under or over the highway. In normal circumstances, the only structures that will be considered for adoption are those upon which the Highway relies for support and are constructed on Highway land.

All structures to be adopted should have received structural approval in accordance with the procedures, scenarios and requirements as outlined in Appendix G.

The above requirements shall be included in property deed transfers to ensure future owners of the land are kept aware of their liabilities. The Local Highway Authority shall be provided with a copy of the deeds after each transfer of the land.

2.1 Assessment of Existing Structures

Eurocodes are not to be used for the assessment of existing structures.

Assessments will be undertaken in accordance with [CS 454 Assessment of highway bridges and structures](#) and other related standards within DMRB. Where structures are modified using Eurocodes, as stated above, there is the potential for a conflict due to differences in the effect of actions. In these cases, the Technical Approving Authority (TAA) is to be consulted for guidance.

Any existing structure which may be considered to potentially affect highway safety may be required to be assessed in accordance with CG 300. All structures that are to be modified for the purposes of the development or to be subjected to increased magnitude or frequency of loading shall be assessed according to CS 454. This will be undertaken as part of the Design and Check Process in CG 300.

2.2 Approval Submissions

The Technical Approval Process (TAP) shall be applied for all structures whether adoptable or not where an Approval in Principle (AIP) is appropriate. Design and Check Certificates and Construction Compliance certificates will be required.

The AIP will include the following:

1. General arrangement drawing showing location and extent of all structures and in the case of walls detailing lengths to be adopted and/or over 1.20 metre high if applicable.
2. Sufficient to determine wall heights, giving ground levels, behind and in front of wall and any features affecting loadings such as cover to culverts.
3. Clearances to deck soffit and piers/abutments shall be submitted for bridges.
4. Cross section drawings for retaining walls annotated with proposed and existing ground levels.
5. Designers' Risk Assessment - to include risks for design, construction, maintenance and operation, and demolition.
6. Site investigation details and geotechnical assumptions on which the design has been based.

Appropriate sections of the geotechnical report should be included. This must be given in sufficient detail on the drawing to allow the designers' assumptions to be compared with the conditions found on site by those responsible for construction and should include the following:

1. Construction details and material specifications.
2. Agreed departures from standard.

3. For Category 0 structures the design and check certificate must be accompanied by the design calculations with full reference to the design standards used. For structures that are to be adopted or for structures upon which the Highway relies for support, Design and Construction Certificates will be required, and it will be a condition of the approval that developers submit As-Built drawings for the CDM Health and Safety File.

For reference to the required standards, developers are requested to review the Technical Approval Schedule as listed in the current version of CG 300. In addition to the standards in the DMRB. Developers may be required to comply with interim advice notes published by National Highways. Worcestershire County Council will advise developers on a scheme basis during the Technical Approval Process.

2.3 Departures from Standards (Eurocodes)

Departures from Standards (DfS) applicable to Eurocodes will only be accepted where the principle or concept is not covered therein or is a proposed alteration to the national annex which does not conflict with the Eurocode. If it is a requirement that designers comply with the principles of the Eurocodes, these clauses are denoted with a letter 'P.'

It is permissible to use alternative design rules different from the Application Rules, given in EN 1990 for works, if it is shown that the alternative rules comply with the relevant principles and are at least equivalent to the structural safety, serviceability and durability which would be expected when using the Eurocodes.

There may be instances where due to site constraints or nature of the development it is not possible to design works in accordance with the appropriate highway standard. In these cases, the developer can apply for a Departure from Standards.

Departures will only be granted when the site constraints prevent the implementation of the standard. A request for a departure should contain the following:

1. Proposed departure.
2. Reasons for departure.
3. Consequences of the departure, particularly any increases in risks or hazards.
4. A risk assessment for complying with the standard and one for the departure.
5. For bridges, normally all departures are to be agreed prior to the acceptance of the Approval In Principle (AIP) and shall be included in the AIP and the Bridge Maintenance Manual/Health and Safety File. On completion of the work, the developer must provide a Bridge Maintenance Manual containing:
 - a) Details of the materials used in construction and the supplier.
 - b) Requirements for future maintenance.
 - c) Any survey and geotechnical details undertaken on the site of the Structure,

- d) Details of problems encountered during construction may have a long-term effect on the structure.
- e) Any access arrangements for future maintenance.
- f) As-built drawings should be submitted electronically in the format of TIF, DXF or AutoCAD files.
- g) Design calculations: and Special arrangements required for demolition.

The above information will comprise the documentation to be provided under the CDM Regulations. In addition to the contents listed, the following documentation must be included:

1. All relevant documentation from the technical approval process.
2. Approval In Principle.
3. Design and Check Certificates.
4. Construction Compliance Certificate.
5. Copies of the accepted certificate by the Technical Approving Authority:
 - a) Appropriate certification of components, Vehicle Restraint Systems (VRS), quality assurance certification for reinforcement and concrete suppliers, waterproofing and other materials,
 - b) Certificates for any material or integrity testing undertaken, i.e., concrete cube results or integrity testing of piles,
6. Any residual risks or hazards within the structure, similar confined space, hazardous materials used in construction or hazards found within the original ground.

2.4 Statutory and other services

All new roads should be designed to accommodate services. Liaison is, therefore, needed with all statutory undertakers and communications providers at the earliest possible stage. This is to ensure that their equipment is installed in an efficient manner and as much as possible, to comply with the recommendations by [Streetworks UK](#) (Trade Association representing utilities and their contractors on street works' issues) including, but not limited to correct positioning, depth and colour coding.

Any utility equipment that is to be above ground such as a cabinet, box, or pillar should be sited so that it:

1. It is not a danger to the public or maintenance operatives
2. Is clear of any visibility splays
3. Is sited wherever possible at the back of the footway or verge. Where sited nearer a carriageway edge no less than the minimum required clearance distance should be provided.
4. Should not obstruct pedestrians, wheelers chair users, prams, or pushchairs. (The Local Government Association stipulates that footways should be wide enough to accommodate all users, including those with wheelchairs, prams, or pushchairs. A minimum clearance of 1.2 metres is recommended, increasing to two metres in areas with high pedestrian traffic to allow for safe passage and passage of two wheelchair users side-by-side).

5. Does not disproportionately offend visual amenity by restricting the outlook from windows of a house, intruding on areas of open plan front gardens or the line of low boundary walls
6. Does not result in visual clutter by being in an inappropriate place. Consultation is needed with the relevant Local Planning Authority especially if it is sited near a listed building or conservation area.
7. Access doors should always open onto the footway or verge. On footways the position of cabinets shall be such that a minimum distance of 1.2 metres between the edge of an open access door and the edge of the carriageway where pedestrian flows are low, or in areas where pedestrian flows are high the distance should be increased to two metres.

Worcestershire County Council may consider adopting any additional small areas so above ground apparatus can meet national requirements. However, if these requirements cannot be met within adoptable areas, developers should locate equipment such as cabinets, away from the proposed adoptable highway. This may then require an easement to allow Worcestershire County Council or the utility equipment providers future access in perpetuity to enter land not owned by them for specified purposes such as maintenance, readjustment, or relocation. Easements for any highway infrastructure intended for adoption by the Local Highway Authority which are outside of the adoptable areas, must be agreed with Worcestershire County Council and completed prior to any transfer of the land. All apparatus at the highway surface should:

- a) Be positioned so that there is enough access for the equipment and the surrounding area of the highway can be maintained and cleaned.
- b) Not to be located within any tactile paving.
- c) Allow space for associated jointing chambers.
- d) Take account of known highway alterations.
- e) Allow for future surfacing works.

Worcestershire County Council may consider adopting any additional small areas, so above ground apparatus can meet national requirements. However, if a developer cannot meet the requirements within adoptable areas, equipment such as cabinets should be located off the proposed adoptable highway. This may then require an easement to allow Worcestershire County Council or the utility equipment providers future access in perpetuity to enter land not owned by them for specified purposes such as maintenance, readjustment, or relocation. Easements for any highway infrastructure intended for adoption by the Local Highway Authority which are outside of the adoptable areas must be agreed with Worcestershire County Council and completed prior to any transfer of the land.

All apparatus at the highway surface should:

1. Be positioned so that there is enough access for the equipment and the surrounding area of highway can be maintained and cleaned.
2. Not be located within any tactile paving.
3. Allow space for associated jointing chambers.

4. Take account of known highway alterations.
5. Allow for future surfacing works.