Drainage

Drainage is an important factor of a development mitigation of flooding and its impact must be considered at the beginning of the design. Adoptable highway drainage usually only has positive components such as pipes, gullies and carrier drains. Other types of drainage infrastructure that are used will require a commuted sum for the Authority to be able to maintain the over and above costs to the highway standards required. It is best practice to approach a recognised statutory water company at the inception of the scheme to determine what drainage they will also adopt.

A sustainable approach to drainage mitigates the impact of new development on flood risk and builds our resilience to flooding. It also provides opportunities to remove pollutants from urban runoff at source, and combines water management with green space with benefits for amenity, recreation and wildlife.

Sustainable Drainage Systems (SuDS)

We actively encourage and expect the use of green infrastructure and SuDS (Sustainable Drainage Systems) including both water quantity and quality measures for new developments, in preference to conventional drainage design. This is in order to reduce the impact of new developments on flooding, whilst also delivering amenity and environmental benefits.

Designers are expected to consider surface water drainage at the start of the design process to pre-empt or reduce the chance of issues arising that could conflict with the ability of the development proposals to incorporate Sustainable Drainage Systems (SuDS).

Design Guidance documents have been developed through the West of England Partnership Flood Risk Working Group, with specific guidance notes available relating to Bristol here: www.bristol.gov.uk/planning-and-building-regulations/flood-risk-drainage-and-development

This guidance gives detailed design advice on the use of the most appropriate type of drainage system. Each site will be assessed on its own merits.

General considerations that designer will need to be aware of during preliminary highway design are as follow:

- Generally any proposals for outfalls into existing watercourses or ponds shall be accompanied by an environmental impact report and such outfalls will need Consent to Discharge from the Environment Agency/Local Authority as appropriate.
- SuDS for the highway shall drain into the highway drainage network or an adopted surface water sewer and any infiltration will be within highway/public areas where appropriate. Each site's appropriateness will be assessed on its own merits.
- Where SuDS are proposed within the adopted highway, funded maintenance arrangements need to be put in place in the form of commuted sums.
- Private SuDS drainage shall, subject to written agreement with the asset owner, drain directly into an adopted surface water sewer and any infiltration will be into private land.

- We also allow infiltration and attenuation devices for highway drainage in private areas provided the appropriate legal agreements and management company arrangements are put in place in perpetuity.
- Private pipes **will not** be allowed under adopted highway.
- Highway drains cannot directly connect or outfall into a privately maintained asset.

Fig 1: **On-street SUDS feature**

We will examine all proposals for SuDS and judge them on their individual merits. Should it be agreed, following discussions with our Flood Risk and Asset Management (FRAM) team, that a SuDS solution is not viable due to the size of development, site constraints or other mitigating factors then a conventional drainage solution will be required based on the following design criteria:

Conventional drainage design

Where private non-adoptable driveways and other surfaces fall towards the adoptable highway they will be required to provide positive drainage on the private land to prevent surface water run-off from discharging onto the highway. Private pipes shall be positioned within private land and **not** under the highway.

Gullies

It is the responsibility of the Designer to demonstrate and ensure that the number and positioning of the gullies are adequate to drain all areas of carriageways, footways, footpaths and cycle routes. All gullies are to be trapped and provided in accordance with our Standard Details.

The parameters to be used during the drainage design are as per the West of England SuDS Guide and current standards in Sewerage Sector Guidance (Water UK).

Gully spacing should provide for a maximum of 150m^2 of surface water run off per gully. Where there are low points there may be a requirement to install more gullies.

Specific considerations for positioning of road gullies, to ensure positive drainage with no areas of ponding, include provision immediately upstream of:

- Block paving;
- Pedestrian crossing points,
- Speed tables, and
- Road junctions

Roads will be the subject of a wet weather inspection and will not be adopted until we are satisfied that the drainage system is performing in a satisfactory manner.

Gullies shall be as per the Standard Details, and be both pedestrian and cycle friendly.

We will not accept new slot drains in the highway.

We adopt gullies and their connections provided they are designed to our specification and connected to a recognised statutory water company.

Plastic gullies and pipes will not be accepted.

Consideration will only be given to the use of combined kerb and drainage systems where significant constraints have been demonstrated, and conventional gullies are proved to be insufficient. This may include 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. A commuted sum may be necessary in this instance to cover any additional maintenance where a combined drainage system is used. Alternatively channels are required if the long fall is slacker than 1 in 120.

Fig 2: **Standard gully cover in carriageway**

Fig 3: **Heel guard gully cover in footway**

Pipelines

Where new gullies are to connect into a highway drain before entering the surface water sewer and where pipes of 450mm diameter or less are laid in a trench with cover of between 6.0m and 1.2m under the carriageway, the pipe should be surrounded in clean, single sized aggregates.

For all pipes of 450mm diameter or less with a cover of less than 1.2m or more than 6m, the pipe shall be bedded on and surrounded with concrete.

UPVC pipes will not be accepted.

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

Inspection chambers (manholes)

Inspection chambers shall be provided in accordance with our standard details. Inspection chambers shall be provided at a maximum interval of 90m and at every pipe junction and change of pipe size, direction or gradient.

Outfalls and watercourses

Outfall into an existing ditch or watercourse will require approval from the Environment Agency or us as appropriate.

Before adoption, outfall into an existing highway system requires the proven capacity of the system to be sufficient to cope with the surface water discharge from the highway and any additional areas that are the subject of the application. Satisfactory condition of the connections into the sewer will also be required. A CCTV survey will need to be undertaken to demonstrate the condition of the connections together with recommended mitigation measures that will need to be undertaken if additional works are required. These works would need to be undertaken at the expense of the developer.

Public Foul or Surface Water Sewers

In general, drainage systems shall be designed in accordance with the current edition of Sewers for Adoption.

All pipes that only carry surface water from the adoptable highway, and are located within land that is to be adopted, are prospectively maintainable by the Highway Authority. Their design and construction shall comply with the standards required in this document.

Pipes that carry surface water from the adoptable highway as well as other areas such as roofs, private drives etc. must be adopted by a recognised statutory water company and must comply with their requirements.

Where public 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 from a statutory water company that it will adopt the sewers subject to compliance with its requirements. The Developer shall apply for the adoption of the sewers under Section 104 of the Water Industry Act 1991. It will be necessary to submit this agreement for the adoption process.

We will normally decline to adopt any road covered by a Section 38 agreement until a statutory water company has confirmed the adoption of all sewers within the street.

All prospectively maintainable highway drains shall be located within land that is to be adopted by the Highway Authority. Only in exceptional circumstances will they be permitted in land that is to remain private. Where such circumstances do arise the land owner at the time of completing a Section 38 Agreement will be required to give a grant of easement keeping 3m either 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. We will not accept any different form of undertaking.

If groundwater is likely to be present which may affect the integrity of the road or adjoining structures, a subsoil drainage system shall be provided to our satisfaction where:

- the sub-soil is unstable due to waterlogging; or
- the sub-grade could be altered due to groundwater; or
- the height of the winter water table is within 600mm of the formation level of the road; or
- water could run from or out of adjacent land; or
- the finished road level is below the existing ground level, regardless of the water table; or
- springs, land drains or watercourses are present.

For further guidance refer to:

- *West of England Sustainable Drainage Developer Guide Section 1* (March 2015 – Issue Version 1)
- *West of England Sustainable Drainage Developer Section 2 Annex, Bristol Local Sustainable Urban Drainage Design Guidance Note* (March 2015 – Issue Version 1)
- *Sewerage Sector Guidance (Water UK)*