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**Director of Engineering Memorandum**  
**DEM 167/18**  
**DEM TITLE: Highway Drainage Design for Sustainability**

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<b>Author :</b>	S Tweed
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### **Classification**

<b>Level 1 (Title / Key Words):</b>	Drainage, sustainability, Long Term Water Strategy
<b>Level 2 :</b> (Directorate/Owner):	Engineering
<b>Level 3:</b> (DfI Roads HQ or HoBU Managed Function):	Network Development
<b>Level 4 :</b> (Work Areas)	Design, Development Control

### **Purpose**

Road drainage standards and advice is provided by the Overseeing Organisations of the UK Highway Authorities via the Design Manual for Roads and Bridges. The relevant road drainage standards are as follows:

- HD45 Road Drainage and the Water Environment (Volume 11) – which deals with obligations under EU and national legislation including the Water Framework Directive and the Floods Directive.
- HD49 Highway Drainage Design Principal Requirements; and,
- HD33 Design of Highway Drainage Systems (Volume 4 Section 2) – which establishes the principles of design for sustainability to be followed for highway drainage in the UK.

As well as referencing the above sustainability standards, this Memorandum sets out the Department's commitments in terms of helping deliver the NI Executive's Sustainable Water – A Long Term Water Strategy for Northern Ireland (2015-2040).

It also introduces the Department's document 'Joint Working on Stormwater Separation - Information for Practitioners', which provides background and information to DfI Roads, DfI Rivers and NI Water staff on how stormwater separation can be implemented on DfI Roads projects.

### **Scope**

This Memorandum applies to all DfI Roads staff associated with the design, specification, provision, procurement, assessment or approval of new roads infrastructure.

### **Policy/Guidance**

HD49 Highway Drainage Design Principal Requirements<sup>(2)</sup> sets out the main principles of design for sustainability of highway drainage including the importance of drainage of the carriageway, pavement and earthwork structures; the management of road run-off at source and on the surface where reasonably practical; and the consideration of maintenance, climate change and energy use as design criteria.

HD33 Design of Highway Drainage Systems<sup>(3)</sup> guides the designer in selecting the most appropriate solutions for surface and subsurface drainage of the road network, including the drainage of earthworks associated with highway schemes, and describes the various alternative solutions available to deal with pollution and flood risk.

The Long Term Water Strategy for Northern Ireland<sup>(4)</sup> was published by the Department in March 2016. The Strategy presents a framework for action which will facilitate a range of initiatives aimed at delivering a sustainable water sector in Northern Ireland, and sets out the Executive's approach to:

- Drinking Water Supply and Demand;
- Flood Risk Management and Drainage;
- Environmental Protection and Improvement; and,
- Water and Sewerage Services.

The Strategy encourages a more joined-up approach to the delivery of the policies contained within it. DfI Roads has an important role to play by, where practicable, implementing the sustainable drainage principles in HD49 and HD33 in dealing with surface run-off.

'Joint Working on Stormwater Separation', aims to progressively transform the existing sewerage network into one that separates foul and stormwater sewers across Northern Ireland. Improved stormwater management can only be achieved by the co-ordinated action of all relevant organisations. A key part of this will be acting together to reduce the amount of stormwater entering the existing combined sewerage network. To achieve this reduction, the principles contained in the DfI Joint Working on Stormwater Separation – Information Paper for Practitioners should be applied at both the strategic and local operational levels within DfI Roads and NI Water with the assistance of DfI Rivers and NIEA.

### **Action required**

When considering or developing any project, designers should be aware of the design for sustainability principles for highway drainage set out in the above listed standards.

In particular, designers should take the following specific actions in support of the Department's Long-Term Water Strategy:

1. If any project appreciably increases highway run-off, the designer shall investigate the implications as follows:
  - i) If the run-off discharges directly or via a field drainage system to a watercourse, the designer must determine whether there is a flood risk area downstream. If there is, the designer must take reasonable steps to attenuate the additional flow or consider the implementation of other measures to mitigate against this additional risk. The latest flood hazard information is available via Flood Maps (NI) <sup>(5)</sup>.
  - ii) If the run-off discharges directly or indirectly to an NIW sewer, consent to discharge must be sought from NIW for the additional flow. The designer should make every effort to attenuate the flow and to reduce existing flows into combined systems.
2. In any project, whether or not there is any increase in run-off, designers should:
  - i) seek to retain natural drainage systems or elements where they exist e.g. sheughs or other natural open drains/ditches that are acting as swales, soakaways, areas of wetland etc. rather than replace them with conventional piped systems.
  - ii) look for low cost/ low problem/ low maintenance opportunities to use natural drainage elements rather than introduce piped systems.
3. Designers should engage with DfI Rivers early in the design process where works or discharges affect a watercourse, to seek clarity on drainage design issues such as green field runoff rates and required land-take for attenuation measures.
4. When considering or developing any capital project, designers must assess all new drainage infrastructure 'for exceedance', and incorporate measures that safely channel excess water when the system becomes overwhelmed.
5. In all capital works schemes where the civil engineering costs are estimated at over £500k, and where the drainage in the area discharges to a combined system, the designer should investigate the possibility of separating all or part of the system as part of the works.
6. Consider incorporating SuDS into all new DfI developments including road schemes, Park & Ride sites and new surface car parks.

7. Give consideration to the use of stormwater separation and SuDS when designing Public Realm and Environmental Improvement schemes.

Cost implications must be considered carefully and any sustainable drainage solution must be economically viable within the overall cost of the project.

### **References and Further Reading**

1. HD45 Road Drainage and the Water Environment  
<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/hd4509.pdf>
2. HD49/16 Highway Drainage Design Principal Requirements  
<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol4/section2/hd4916.pdf>
3. HD 33/16 Surface and Sub-surface Drainage Systems for Highways  
<http://www.standardsforhighways.co.uk/dmr/vol4/section2/hd3316>
4. Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)  
<https://www.infrastructure-ni.gov.uk/articles/long-term-water-strategy-northern-ireland>
5. Flood Maps (NI) <https://www.infrastructure-ni.gov.uk/articles/what-flood-maps-ni>
6. [DFI Joint Working on Stormwater Separation - Information for Practitioners](#)

### **Equality**

Equality issues were considered by the lead Overseeing Organisation Highways England in the development of HD49/16 and HD33/16. It was concluded that drainage systems designed in accordance with the standards should be beneficial to all and that any adverse or beneficial impacts resulting from the introduction of the standards were not expected to discriminate against any defined group.

The overarching strategy document '*Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)*' was subject of a Section 75 Equality of Opportunity screening analysis and it was considered that a full Equality Impact Assessment of it was not required as all members of society have the potential to benefit from the aims from it. It was also concluded that no section 75 group will be disadvantaged or adversely affected by the aims of the Strategy. The screening form was included in the Department's quarterly consultation exercise with Section 75 consultees on 19 June 2014 and no issues relating to Section 75 groups have been raised as a result.

