

## NRA TB 13 (March 2015)

### REVISED ROAD DRAINAGE STANDARDS

In March, 2015, the NRA significantly revised its drainage standards for major road projects. This revision was precipitated by research carried out under the NRA Research Fellowship Programme and mentored by the NRA Environment Unit. The research looked at the impacts of national road drainage systems on both surface and ground water and concluded that the NRA drainage standards needed to be expanded to promote the use of sustainable drainage systems and to maximise environmental benefits. A report entitled *Drainage Design for National Road Schemes – Sustainable Drainage Options* documents this research and provides useful background reading to the NRA drainage standards. This document is available at: <http://nrastandards.nra.ie/latest/other-nra-documents>.

As a result of this research and a follow-on comprehensive review of its road drainage standards, the NRA has created a new standard NRA HD 33/15 entitled *Drainage Systems for National Roads* along with a further thirteen new documents that have been incorporated into the NRA DMRB. A significant amendment has also been made to the NRA MCDRW Series 500 including the creation of a large number of new and revised RCDs.

In order to further assist interested persons, a more detailed (non-exhaustive and non-definitive) outline of notable aspects of changes to the NRA DMRB and the NRA MCDRW is contained in the annexes to this document.



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## Annex A to NRA TB 13 (March 2015)

### Revised Road Drainage Standards

#### 1 Introduction

In March, 2015, the NRA significantly revised its road drainage standards for major projects. The revision was precipitated by research carried out under the NRA Research Fellowship Programme and mentored by the NRA Environment Unit. This research looked at the impacts of national road drainage systems on both surface and groundwater. The research concluded that the standards needed to be expanded to promote the use of sustainable drainage systems and to maximise environmental benefits. A 2014 report entitled *Drainage Design for National Road Schemes – Sustainable Drainage Options* documents this research and provides useful background reading to the NRA drainage standards. This document is available at: <http://nrastandards.nra.ie/latest/other-nra-documents>.

In relation to the revision of the *NRA Design Manual for Roads and Bridges* (NRA DMRB), the NRA has significantly amended one document, NRA Addendum to HD 33/06 *Surface and Sub-Surface Drainage Systems for Highways*, to create a new NRA HD 33/15 *Drainage Systems for National Roads*. In addition, the following thirteen documents were added to the NRA DMRB:

- NRA HA 33/15 Design of Earthworks Drainage, Network Drainage, Attenuation and Pollution Control;
- NRA HD 137/15 Hydraulic Design of Road-Edge Surface Water Channels;
- NRA HD 139/15 Edge of Pavement Details;
- NRA HD 140/15 Determinations of Pipe and Bedding Combinations for Drainage Works;
- NRA HD 45/15 Road Drainage and the Water Environment;
- NRA HD 78/15 Design of Outlets for Surface Water Channels;
- NRA HD 83/15 Safety Aspect of Road Edge Drainage Features;
- NRA HD 102/15 Spacing of Road Gullies;
- NRA HD 103/15 Vegetated Drainage Systems for Road Runoff;
- NRA HD 106/15 Drainage of Runoff from Natural Catchments;
- NRA HD 107/15 Design of Outfall and Culvert Details;
- NRA HD 118/15 Design of Soakaways; and
- NRA HD 119/15 Grassed Surface Water Channels for Road Runoff.

In relation to the revision of the *NRA Manual of Contract Documents for Roadworks* (NRA MCDRW), the following work was completed:

- The significant amendment of Series 500 – Drainage and Service Ducts of *Volume 1 – NRA Specification for Road Works*;
- The amendment of NG Series 500 – Drainage and Service Ducts of *Volume 2 – NRA Notes for Guidance on the Specification for Road Works*;
- The amendment of Series 500 – Drainage and Service Ducts of Section 1 of *Volume 3 – NRA Method of Measurements for Road Works*;
- The amendment of Series 500 – Drainage and Service Ducts of Section 2 of *Volume 3 – Notes for Guidance on Method of Measurement for Road Works*;

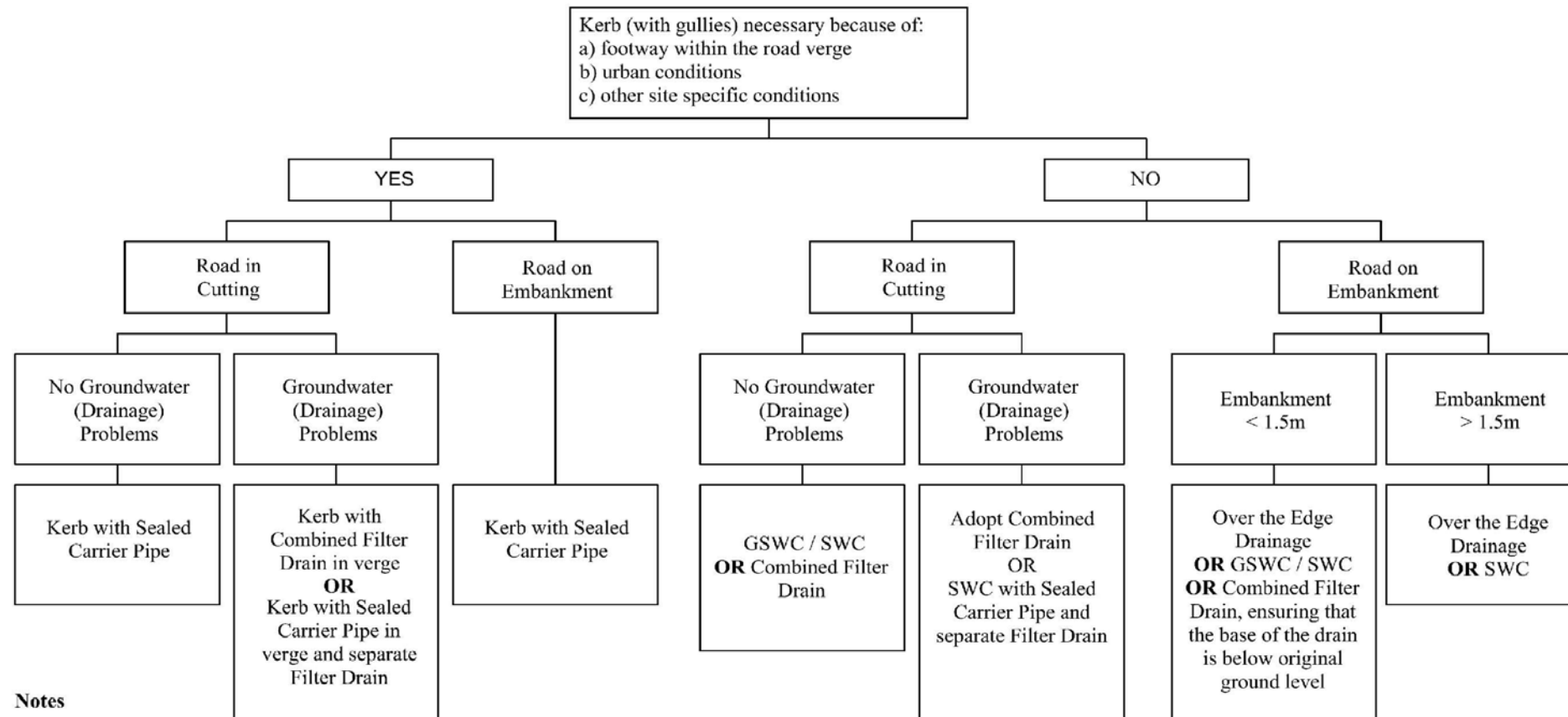
- The creation of a new Series 100 – Edge of Pavement Details within *Volume 4 – Road Construction Details*;
- The significant amendment of Series 500 – Drainage and Ducts of *Volume 4 – Road Construction Details*; and,
- The amendment of other relevant RCDs, namely: RCD/400/7 *Central Reserve Detail of Type 1 Dual Carriageway/Standard Motorway with In-situ Concrete Barrier*; RCD/1000/28 *Gullies in Continuously Reinforced Concrete Pavement or Reinforced Concrete Base*; and, RCD/700/6 *Access Road/Service Road*.

To further assist interested persons, a detailed (but non-exhaustive and non-definitive) outline of notable aspects of changes to the NRA DMRB and NRA MCDRW is contained in the following sections.

## **2 Notable Aspects of Changes to the NRA DMRB**

### **2.1 *NRA HD 33/15* Drainage Systems for National Roads**

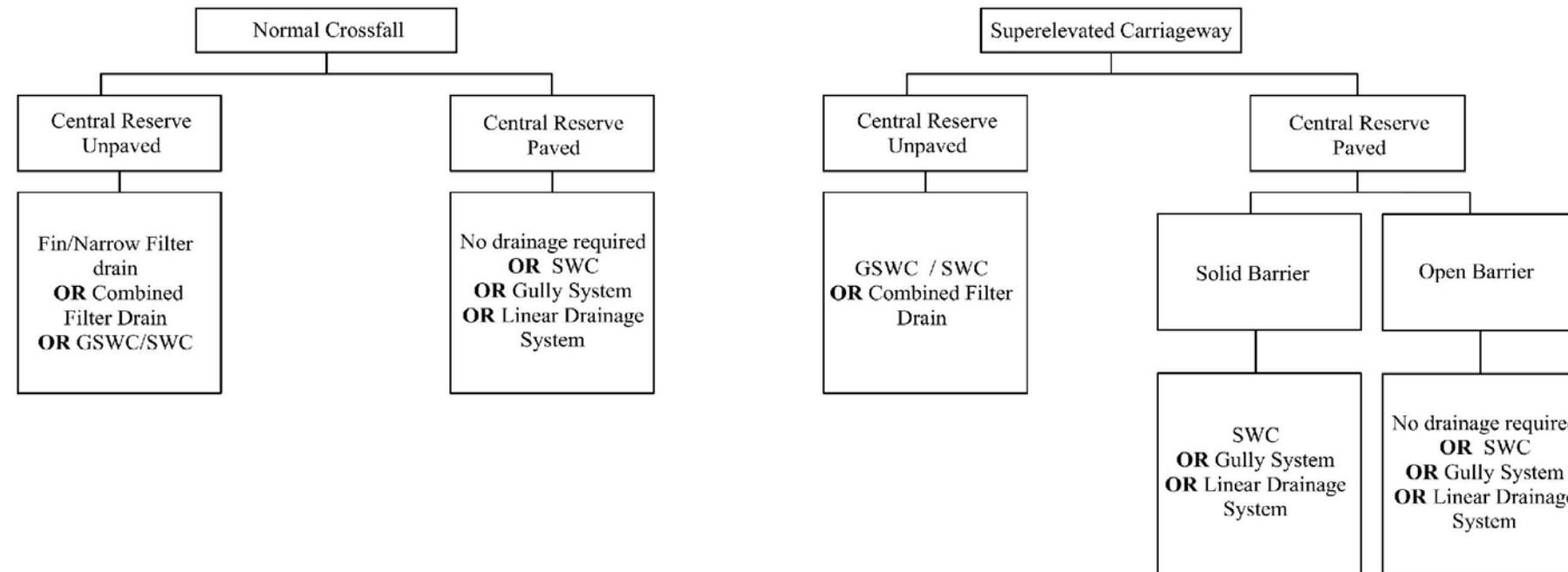
This core NRA DMRB document provides guidance on the selection of the types of surface and sub-surface drainage options for national roads projects. Figure 3.1: Design Options for Verge-side Edge Drainage and Figure 3.2: Design Options for Central Reserve Drainage are extremely important elements of this document and are reproduced directly below.



**Notes**

1. Alternative drainage arrangements to those indicated above require an approved departure from standard/aspect not covered by standard.
2. A separate sub-surface drain shall be incorporated with all drainage options shown in this figure with the exception of a Combined Filter Drain. Separate sub-surface drains include the choice of Fin Drain, Narrow Filter Drain and Extension of Capping Layer. Extended capping is only allowable where the base of the extended capping layer is above the adjacent ground level and not subject to groundwater inundation. Fin Drain usage with road gullies should only be permitted if gully connections have no adverse effect on the Fin Drain.
3. GSWC denotes a Grassed Surface Water Channel and SWC denotes a concrete Surface Water Channel. Drainage channel blocks may only be used as an alternative to GSWC & SWC where sufficient distance between the channel and pavement edge is present in accordance with NRA HD 139 and RCD/100/8.
4. Kerbed Drainage Systems include Kerb & Gully system, Combined Kerb & Drainage system, and Kerb & Drainage Channel Blocks. Linear Drainage Channels are not permitted in verge-side edge drainage.
5. Careful consideration should be given to the type of drainage system to be used in conjunction with the pollution protection assessments provided in NRA HD 45. Site specific conditions for an 'impermeable system' may preclude some of the options provided above. Refer to clause 1.7, 4.12 and 4.14.
6. Groundwater (Drainage) Problems refer to those areas where there is a risk of rising groundwater levels saturating the 300mm zone below pavement formation level (or sub-formation level if a capping is present).

**Figure 3.1: Design Options for Verge-side Edge Drainage**



**Notes**

1. Alternative drainage arrangements to those indicated above require an approved departure from standard/aspect not covered by standard.
2. A separate Fin drain or Narrow filter drain shall be incorporated with all drainage options shown in this figure with the exception of the 'Fin/Narrow Filter drain', the 'No drainage required', and 'Combined filter drain' options. Fin Drain usage with road gullies should only be permitted if gully connections have no adverse effect on the Fin Drain. Consideration for two longitudinal Fin or Narrow filter drains should be given to central reserves greater than 6m in width.
3. Where 'No drainage required' is stated above, suitable assessment of groundwater problems and aquaplaning potential may deem drainage necessary.
4. Groundwater (Drainage) problems refer to those areas where there is a risk of rising groundwater levels saturating the 300mm zone below pavement formation level (or sub-formation level if a capping is present).
5. GSWC denotes a Grassed Surface Water Channel and SWC denotes a concrete Surface Water Channel. Drainage channel blocks may only be used as an alternative to GSWC & SWC where sufficient distance between the channel and pavement edge is present in accordance with NRA HD 139 and RCD/100/11.
6. Careful consideration should be given to the type of drainage system to be used in conjunction with the pollution protection assessments provided in NRA HD 45. Site specific conditions for an 'impermeable system' may preclude some of the options provided above. Refer to clause 1.7, 4.12 and 4.14.
7. A solid barrier denotes a system that doesn't allow runoff to pass through such as a solid concrete barrier or a raised, kerbed central reserve. An open barrier denotes a system that allows runoff to pass through such a wire rope or steel barrier.
8. In some instances a central reserve may have two solid barriers and careful consideration should be given to the area between the two barriers in terms of drainage and maintenance.

**Figure 3.2: Design Options for Central Reserve Drainage**

The following is a list of notable aspects of this new document:

- The use of kerbed drainage systems in the nearside verge is now only permitted where there is a footway in the verge or where there are urban or other site-specific conditions.
- In relation to combined filter drains, geogrid is required at locations that are likely to be subjected to vehicular overrun. The use of geogrid is mandated in certain circumstances, e.g. where the hard shoulder or hard strip is less than 2.5m in width.
- Whilst grassed surface water channels (GSWCs) are now generally permitted for use in verges where kerbs are not required, there are certain restrictions on their use. For example, lined GSWCs or GSWCs on embankments greater than 1.5m in height are not allowed under the standards.
- The required spillage containment capacity is reduced from 50m<sup>3</sup> to 25m<sup>3</sup>. In addition, spillage containment is only now necessary if required by the accident risk assessment.
- Extended capping is generally allowed as sub-surface drainage where its base is above adjacent ground level and not subject to groundwater inundation.
- The use of linear drainage channels in the nearside verge is not permitted.
- Over-the-edge drainage is permitted in embankments over 1.5m in height, whereas previously it was only permitted on embankments between 1.5m and 6m in height constructed of free draining material.
- Following a policy that is contrary to that adopted by the Highways Agency (as manifest in its UK DMRB), the use of combined filter drains in cuttings is still 'encouraged' by the NRA.
- The best possible analysis of groundwater conditions must be undertaken during a sufficiently scoped ground investigation.
- A maximum combined filter drain pipe diameter of 450mm has been retained.
- The maximum length of pipe between access chambers is now 100m, a change from the 90m previously required.
- The drainage design, including pollution control measures, must be developed to an adequate level of detail at Phases 3 and 4.
- Lined ditches are not permitted.
- There should be a 'no worsening' of flow rates up to and including the 1 in 100 year storm. The post-development peak discharge rates for the critical 1 in 100 year storm duration must be equal to or less than the peak 1 in 100 year greenfield runoff rate for the critical storm duration.
- A departure from standard shall be required for any chambers located in the carriageway.

## 2.2 *NRA HA 33/15* Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control

A new HA 33/15, unique to the NRA DMRB, has been introduced to assist in the design of:

- earthworks drainage,
- road network drainage,
- attenuation, and
- pollution control.

This document provides design process flowcharts and worked examples on elements of drainage design.

### 2.3 *NRA HD 137/15* Hydraulic Design of Road-Edge Surface Water Channels

*NRA HD 137/15* describes the method of determining the length of road between outlets that can be drained by a given size of surface water channel constructed along the edge of the road.

### 2.4 *NRA HD 139/15* Edge of Pavement Details

A new *NRA HD 139/15* provides guidance on the use of the various types of edge pavement details.

### 2.5 *NRA HD 140/15* Determinations of Pipe and Bedding Combinations for Drainage Works

A *NRA HD 140/15* has been introduced that describes the method of selecting combinations of drainage pipes and bedding types to meet given loading requirements. A notable point is that the previous requirement for concrete bed and surround for all pipes under carriageways has been removed.

### 2.6 *NRA HD 45/15* Road Drainage and the Water Environment

The new *NRA HD 45/15 Road Drainage and the Water Environment* provides guidance on the assessment and management of impacts on the water environment. This document indicates that '*SuDS should be considered in the first instance over conventional drainage systems.*' It also adopts the methods laid down in *UK HD 45/09* for assessing:

- impacts of routine runoff on surface waters; and,
- pollution risks from accidental spillages.

It also refers readers to the OPW's website for information on assessing flood impacts.

*NRA HD 45/15* also describes a novel Groundwater Protection Response (GPR), which is a 'brand new' risk assessment and management tool dealing with discharges of routine runoff to groundwater. This GPR was devised in collaboration with the Environmental Protection Agency and the Geological Survey of Ireland. This GPR determines whether or not an impermeable system is required, based on:

- Aquifer Category;
- Vulnerability Rating; and,
- Source Protection Area presence.

Regard is also had to the thickness of the unsaturated zone in this determination.

It should be noted, however, that the GPR is a screening tool and may be superseded by a site-specific risk assessment undertaken by a qualified groundwater professional.

Further points to note include:

- Sufficient information should be available during Phase 3 and 4 to carry out these assessments, e.g. winter groundwater levels, site-specific geological strata data.
- ‘Appropriate material’ may be used to artificially create a minimum thickness of unsaturated subsoil.

## 2.7 *NRA HD 78/15* Design of Outlets for Surface Water Channels

The new *NRA HD 78/15* provides information on suitable outlet layouts for different types of surface water channels and provides methods for designing each type according to the flow rate in the channel.

## 2.8 *NRA HD 83/15* Safety Aspect of Road Edge Drainage Features

The new *NRA HD 83/15* provides guidance on safety aspects of road edge drainage features.

## 2.9 *NRA HD 102/15* Spacing of Road Gullies

*NRA HD 102/15* provides design information for determining the length of road between gullies.

## 2.10 *NRA HD 103/15* Vegetated Drainage Systems for Road Runoff

*NRA HD 103/15* provides guidance on how vegetated drainage systems may be used to convey, store and treat road runoff.

## 2.11 *NRA HD 106/15* Drainage of Runoff from Natural Catchments

*NRA HD 106/15* provides design information aimed at minimising the flooding problems associated with runoff from road-adjacent catchments. This new document details methods for:

- Estimating runoff from natural catchments; and,
- Determining suitable earthworks drainage.

## 2.12 *NRA HD 107/15* Design of Outfall and Culvert Details

*NRA HD 107/15* provides guidance on:

- Detailing of outfall structures to road drainage systems; and,
- Design of culverts including scour, but excluding hydraulic design.

It should be noted that matters regulated by Section 50 of the Arterial Drainage Act, 1945, are not covered in this standard.

## 2.13 *NRA HD 118/15* Design of Soakaways

*NRA HD 118/15* provides guidance on how soakaways shall be incorporated into systems used to treat and store runoff prior to discharging to ground. *NRA HD 118/15* has been aligned with *NRA HD 45* (and the groundwater protection response contained therein).



## 2.14 NRA HD 119/15 Grassed Surface Water Channels for Road Runoff

NRA HD 119/15 contains information on the hydraulic and structural design of grassed surface water channel for road drainage. The following points should be noted:

- lined GSWCs are **not** permitted;
- the NRA has more onerous requirements in relation to sub-soil in Series 500 of the Specification than the Highways Agency has;
- Grassed surface water channels may only be used in cuttings, and in embankments < 1.5m in height; and,
- the NRA requires 100mm of topsoil instead of 35-50mm required in the UK documents.

### 3 Notable Aspects of Changes to the NRA MCDRW

#### 3.1 Series 500 – Drainage and Service Ducts of Volume 1 – NRA Specification for Road Works

The revised Series 500 – Drainage and Service Ducts of *Volume 1 – NRA Specification for Roadworks* has the following notable aspects:

- Improved layout, organisation and cross-referencing;
- Increased range of materials (e.g. Clause 803) for filling of soft spots below excavations for pipes and chambers;
- Increased scope for use of light weight aggregates as bedding and filter material; and,
- Sumpless gullies not permitted.

#### 3.2 NG Series 500 – Drainage and Service Ducts of Volume 2 – NRA Notes for Guidance on the Specification for Road Works

The NG Series – Drainage and Service Ducts of *Volume 2 – NRA Notes for Guidance on the Specification for Road Works* have been subject to appropriate revision.

#### 3.3 Series 500 – Drainage and Service Ducts of Section 1 of Volume 3 – NRA Method of Measurements for Road Works

Series 500 – Drainage and Service Ducts of Section 1 of *Volume 3 – NRA Method of Measurement for Road Works* has been subject to appropriate revision.

#### 3.4 Series 500 – Drainage and Service Ducts of Section 2 of Volume 3 – Notes for Guidance on Method of Measurement for Road Works

Series 500 – Drainage and Service Ducts of Section 2 of *Volume 3 – Notes for Guidance on Method of Measurement for Road Works* has been subject to appropriate revision.

#### 3.5 Series 100 – Edge of Pavement Details within Volume 4 – Road Construction Details

A brand new Series 100 – Edge of Pavement Details has been created within *Volume 4 – Road Construction Details*.

### 3.6 Series 500 – Drainage and Ducts of Volume 4 – Road Construction Details

Series 500 – Drainage and Ducts of *Volume 4 – Road Construction Details* has been subject to significant revision. Notable changes include:

- A new RCD/500/50 illustrates ‘Rock Armour: Scour Protection’;
- A new RCD/500/53, which replaces RCD/500/19, 20 & 21, illustrates ‘G.A. of Formed Headwalls – 150 – 1800 Diameter Pipes’. With regard to this RCD the following are points worth noting:
  - Reinforced Concrete (insitu or pre-cast) headwalls are now required;
  - Rendered concrete blockwork headwalls (pipes <300mm) are the only exception; and,
  - Rock armour/gabions headwalls are prohibited.
- There have been significant changes to RCDs dealing with ‘Access Chambers’, including:
  - Reductions in plan areas;
  - Removal of steps, handholds and ladders to encourage:
    - working from surface; and,
    - entry in accordance with health and safety legislation, e.g. accompanied manhole entry *via* tripod and winch.
  - Concrete apron added around covers to prevent damage to landscape machinery during maintenance.

### 3.7 Other relevant RCDs

Other relevant RCDs have been amended: RCD/400/7 *Central Reserve Detail of Type 1 Dual Carriageway/Standard Motorway with In-situ Concrete Barrier*; RCD/1000/28 *Gullies in Continuously Reinforced Concrete Pavement or Reinforced Concrete Base*; and, RCD/700/6 *Access Road/Service Road*.

## **Annex B to NRA TB 13 (March 2015)**

### **Revised Road Drainage Standards**

#### **1 Reorganised Road Construction Details**

As part of the significant revisions to the NRA DMRB and MCDRW for drainage aspects of National Road schemes, a rationalisation of the Series 100 and Series 500 Road Construction Details (RCDs) was completed. This resulted in the relocation of details to different RCD reference numbers within the system. The new reference numbers are now implemented as listed within the NRA MCDRW.

#### **2 Access to Archived Road Construction Details**

In order to access archived RCDs in use prior to the March 2015 update, users should locate the page for current RCD of the same reference number on the NRA Standards website and the archive version is located as a link under the 'Download Earlier Versions' row. Please note the titles of the RCDs updated in March 2015 will generally be different to the archived versions. For clarity, the table below lists the RCD reference numbers and titles included in the March 2015 update, together with the corresponding previous details under the previous RCD reference numbers. Certain RCD reference numbers and certain RCD details have been fully withdrawn, as noted.

**Table of March 2015 Update RCDs and Corresponding Details in RCDs prior to March 2015**

<b>March 2015 RCD</b>	<b>RCD Title</b>	<b>RCD Prior to March 2015</b>	<b>RCD Title</b>	<b>Notes</b>
RCD/100/1	Carriageway in Cutting Nearside Verge Detail With Filter Drain	RCD/500/27	Standard Dual Carriageway in Cutting Nearside Verge Detail With Filter Drain	
RCD/100/2	Carriageway in Cutting Nearside Verge Detail Where Kerbed & With Closed Drainage System	RCD/500/25	Standard Dual Carriageway in Cutting Nearside Verge Detail Where Kerbed & With Closed Drainage System	
RCD/100/3	Cutting or on Embankment Nearside Verge Detail With Surface Water Channel	RCD/500/28	Standard Dual Carriageway in Cutting or on Embankment Nearside Verge Detail With Surface Water Channel	
RCD/100/4	Carriageway in Cutting or on Embankment Nearside Verge Detail With Grassed Surface Water Channel	N/A	N/A	
RCD/100/5	Carriageway on Embankment Nearside Verge Detail With Over the Edge Drainage Detail	RCD/500/29	Standard Dual Carriageway on Low Embankment (>1.5m <6.0m) Nearside Verge Detail Over the Edge Drainage Detail	
RCD/100/6	Carriageway on Embankment Nearside Verge Detail With Kerbing & Closed Drainage System	RCD/500/26	Standard Dual Carriageway on High Embankment (>6.0m) Nearside Verge Detail Where Kerbed & With Closed Drainage System	
RCD/100/7	Carriageway on Embankment Nearside Verge Detail with External Kerbs and Drainage Channel Blocks	N/A	N/A	
RCD/100/8	Carriageway in Cutting Nearside Verge Detail with Drainage Channel Blocks and Drains	N/A	N/A	
RCD/100/9	Combined Kerb and Drainage System	N/A	N/A	
RCD/100/10	Central Reserve Surface Water Channel for Flexible Carriageway	N/A	N/A	
RCD/100/11	Central Reserve Drainage Channel Blocks and Drains	N/A	N/A	
RCD/100/12	Central Reserve Detail of Superelevated Carriageways with Concrete Barrier Restraint	RCD/500/30	Central Reserve Detail of Standard Dual Carriageway Superelevated with Concrete Barrier Restraint	RCD/500/30 Withdrawn
RCD/500/1	Chamber Types	RCD/500/3	Manhole Types	

<b>March 2015 RCD</b>	<b>RCD Title</b>	<b>RCD Prior to March 2015</b>	<b>RCD Title</b>	<b>Notes</b>
RCD/500/2	Chamber Type A (Block or In-Situ Concrete Manhole)	RCD/500/4	Manhole Type A (Block or In-Situ Concrete)	
RCD/500/3	Chamber Type B (Block or In-Situ Concrete Manhole)	RCD/500/5	Manhole Type B (Block or In-Situ Concrete)	
RCD/500/4	Chamber Type C (Precast Concrete Manhole)	RCD/500/6	Manhole Type C (Precast Concrete Manhole)	
RCD/500/5	Chamber Type D (Precast Concrete Manhole)	RCD/500/8	Manhole Type E (Precast Concrete Manhole)	
RCD/500/6	Chamber Type E (Precast Concrete Manhole)	RCD/500/9	Manhole Type F (Precast Concrete Manhole)	
RCD/500/7	Chamber Type E Typical Hinged Grating Details	RCD/500/10	Manhole Type F (Typical Hinged Grating Details)	
RCD/500/8	Vertical Backdrop in Manholes	RCD/500/13	Vertical Backdrop in Manholes	
RCD/500/9	Chamber Type F (Precast Catchpit)	RCD/500/34	Catchpit G Alternative	RCD/500/34 Withdrawn
RCD/500/10	Precast Concrete Gully	RCD/500/14	Precast Concrete Gully	
RCD/500/11	In-Situ Concrete and Blockwork Gullies	RCD/500/15	In-Situ Concrete and Blockwork Gullies	RCD/500/15 Withdrawn
RCD/500/12	Gully Grating	RCD/500/16	Gully Grating	RCD/500/16 Withdrawn
RCD/500/13	Chamber Fittings - Ladder, Typical Arrangement Handhold and Safety Chain	RCD/500/11	Chamber Fittings - Typical Ladder Arrangement Handhold and Safety Chain	
RCD/500/14	Typical Chamber Details	N/A	N/A	
RCD/500/20	Filter Drains Trench and Bedding Details	RCD/500/1	Filter Drains Trench and Bedding Details	
RCD/500/21	Surface Water Drains Trench and Bedding Details	RCD/500/2	Surface Water Drains Trench and Bedding Details	
RCD/500/22	Cross Section of Concrete Surface Water Channel	N/A	N/A	
RCD/500/23	Drainage Channel Blocks Types A, B and C	RCD/500/17	Drainage Channel Blocks Types A, B and C	RCD/500/17 Withdrawn
RCD/500/24	Drainage Channel Blocks Types D, E, and F	N/A	N/A	
RCD/500/25	Typical Swale Detail	RCD/500/35	Typical Swale Detail	RCD/500/35 Withdrawn
RCD/500/26	In-line Outlet to Triangular Surface Water Channel	N/A	N/A	

<b>March 2015 RCD</b>	<b>RCD Title</b>	<b>RCD Prior to March 2015</b>	<b>RCD Title</b>	<b>Notes</b>
RCD/500/27	In-line Outlet to Trapezoidal Surface Water Channel	N/A	N/A	
RCD/500/28	Weir Outlet to Surface Water Channel	N/A	N/A	
RCD/500/29	Slope Drainage Herringbone Filter Drains	RCD/500/18	Herringbone Filter Drains	RCD/500/18 Withdrawn
RCD/500/40	Edge of Pavement Drains - Fin Drains and Narrow Filter Drains	RCD/500/31	Edge of Pavement Drains - Fin Drains and Narrow Filter Drains	RCD/500/31 Withdrawn
RCD/500/41	Edge of Pavement Drains - Installation of Fin Drains	RCD/500/32	Edge of Pavement Drains - Installation of Fin Drains	RCD/500/32 Withdrawn
RCD/500/42	Edge of Pavement Drains - Installation of Narrow Filter Drains	RCD/500/33	Edge of Pavement Drains - Installation of Narrow Filter Drains	RCD/500/33 Withdrawn
RCD/500/43	Edge of Pavement Drains - Under Channel Drainage Layers	N/A	N/A	
RCD/500/50	Rock Armour Scour Protection	N/A	N/A	
RCD/500/51	Self Clearing Inlet Grid Detail	RCD/500/22	Self Clearing Inlet Grid Detail	
RCD/500/52	Outlet Grid Detail	RCD/500/23	Outlet Grid Detail	
RCD/500/53	G.A. of Formed Headwalls 150-1800 Diameter Pipes	N/A	N/A	
RCD/500/60	Transverse Ducts	RCD/500/50	Transverse Ducts	
RCD/500/61	Trench Cross Sections Under Trafficked Areas	RCD/500/51	Trench Cross Sections Under Trafficked Areas	
RCD/500/62	Trench Cross Sections Under Non-Trafficked Areas	RCD/500/52	Trench Cross Sections Under Non-Trafficked Areas	
RCD/500/63	Duct Crossing Types	RCD/500/53	Duct Crossing Types	
RCD/500/64	Footway/Verge Draw Pit	RCD/500/54	Footway/Verge Draw Pit	RCD/500/54 Withdrawn
RCD/500/65	Carriageway Draw Pit Type A	RCD/500/55	Carriageway Draw Pit Type A	RCD/500/55 Withdrawn
RCD/500/66	Carriageway Draw Pit Type B	RCD/500/56	Carriageway Draw Pit Type B	RCD/500/56 Withdrawn
RCD/500/67	Duct Spacer and Strapping for Trenchless Construction	RCD/500/57	Duct Spacer and Strapping for Trenchless Construction	RCD/500/57 Withdrawn

<b>March 2015 RCD</b>	<b>RCD Title</b>	<b>RCD Prior to March 2015</b>	<b>RCD Title</b>	<b>Notes</b>
		RCD/500/12	Catchpit G	Detail Withdrawn
		RCD/500/19	G.A. of Small Headwalls (Interceptor Drains)	RCD/500/19 Withdrawn
		RCD/500/20	G.A. of Headwall (Culvert Drains)	Detail Withdrawn
		RCD/500/21	R.C. Details of Typical Headwall	Detail Withdrawn
		RCD/500/24	Diagramatic Layout at Headwalls	Detail Withdrawn