Sustainable Construction, Maintenance and Operations

Review of DMRB Volume 10

By

C4S at TRL Limited and Halcrow

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By C4S at TRL Limited and Halcrow

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Client: Highway Agency Division, (Matthew Winter)

	Approvals
Project Manager	Rubina Greenwood
Quality Reviewed	Dehlia Farrow

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Executive summary

The Highways Agency has the overarching responsibility for the management and operation of the strategic trunk road network. To guide the design and management of the trunk road network the Agency has published the Design Manual for Roads and Bridges (DMRB). Volume 10 of the manual provides guidance to Service Providers on the environmental design, implementation and management of the strategic trunk road network.

This report provides a review of current DMRB Volume 10 advice within the context of relevant legislation, policy and best practice, and makes recommendations for future advice to support and complement DMRB Volume 10 in relation to sustainable development in the context of waste, material use and energy.

The review identified that little guidance is currently provided in DMRB Volume 10. Some guidance is provided in an Interim Advice Note Environmental Information System (IAN 84/07) although providing a waste and resource use database, currently provides no advice to guide waste minimisation and reduction, resource or energy use supporting the principles of sustainable development.

A review of legislation, policy and best practice identified that the Agency has commitments to:

- Respond to new energy technologies to protect the environment,
- Reduce carbon emissions,
- Reduce waste production through improved waste management practices,
- Reduce waste to landfill,
- Manage abstraction ensuring sustainable use and protection of water resources,
- Performance Measurement,
- Implement Sustainable Development Best Practice (Sustainable Consumption and Production, Climate Change, Natural Resource Protection, Sustainable Communities), and
- Implement design standards for waste relating to resource efficiency.

The modernisation review of DMRB Volume 10 undertook stakeholder consultation. Respondents working as Service Providers, Consultants and from within the Agency felt that the current Volume 10 is missing guidance and advice on sustainability, climate change, waste, resource use and energy and requires review and alignment with developments in legislation, policy and best practices on issues including waste, resources use and energy. The modernisation review has identified a new structure for DMRB Volume 10. Amongst other sections the proposed structure creates a DMRB Volume 10 Section 8 Materials and Waste.

There is a clear need to provide advice and guidance pertaining to these key issues in relation to the environmental design of road improvements and its subsequent management to respond to commitments required by legislation and policy. It is therefore instrumental that legislation and policy complemented by current best practice form the blue print for the identified future DMRB Volume 10 Section 8 Materials and Waste advice.

It is recommended to:

- Progress and escalate discussions with the EnvIS project owner pertaining to the issue of undertaking the minor amendments to EnvIS to ensure compliance with the SWMP Regulations 2008,
- Review the need to combine sustainability guidance located in DMRB Volume 7 with the future modernised DMRB Volume 10, and
- Consider proposals outlining a structure of future advice specifically addressing waste, resource use and energy advice issues in a future DMRB Volume 10 Section 8 consisting of the following four parts:
    - Part 1 Introduction to materials, waste and energy design and management,
    - Part 2 Waste Management,
    - Part 3 Resource Use, and
    - Part 4 Energy.

Abbreviations

CEEQUAL	Civil Engineering Environmental Quality Assessment and Award
DMRB	Design Manual for Roads and Bridges
EnvIS	Environmental Information System
ESDG	Environment and Sustainable Development Group,
HA	Highways Agency
SP	Service Providers
SWMP	Site Waste Management Plan
TOD	Traffic Operations Directorate
WFD	Water Framework Directive
WRAP	Waste & Resources Action Programme
EWC	European Waste Catalogue
SHW	Specification of Highways Work
MCHW	Model Contract for Highways Works
EMP	Environmental Management Plan

1 Introduction

In the 1980s, increasing concern about the effects of economic development on health, natural resources and the environment led the United Nations to publish the Brundtland Report, Our Common Future (1987). This defined Sustainable Development as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”.

The report put Sustainable Development on the political agenda and provided a catalyst for legislation and regulation surrounding the environment. A further catalyst was the Kyoto Protocol which had the primary aim of reducing the greenhouse gases attributable as potential causes of climate change[1]. The protocol requires developed countries to reduce greenhouse gas emissions. These targets have been incorporated into Directives, Legislation, Regulations, Policy and Guidance which are shaping the environmental management regime within the UK.

Applying these principles of sustainable development to the highway sector encourages the conservation and preservation of natural resources, the management of energy and waste within design, construction, maintenance and operation activities of the highway network.

To guide the design and management of the trunk road network the Agency has published the Design Manual for Roads and Bridges (DMRB). Volume 10 of the manual provides guidance to Service Providers (SP) on the environmental design, implementation and management of the strategic trunk road network. DMRB Volume 10 was first published in 1992 and since then, the Volume has evolved incrementally, principally focussing on landscape and nature conservation issues. Its development into new areas has been largely a reflection of legislation, policy and operational need.

This report provides a review of current DMRB Volume 10 advice within the context of relevant legislation, policy and best practice, and makes recommendations for future advice to support and complement DMRB Volume 10 in relation to sustainable development in the context of waste, resource use and energy.

1.1 What are the objectives of this review

The objectives of this report are to:

- Identify current guidance pertaining to waste, material resource use and energy supported within the DMRB Volume 10,
- Identify stakeholder views pertaining to the usability and appropriateness of current DMRB Volume 10 advice pertaining to waste resource use and energy,
- Identify key legislation, policy and best practice to which the HA are required to respond by the provision of guidance and advice to ensure the HA is meeting legislative and corporate responsibilities, and
- Identify, outline and programme potential issues for inclusion in the modernisation of DMRB Volume 10 as future guidance pertaining to waste, resource use and energy.

1.2 Review Scope

In order to ensure that the objectives of this report were met the research was undertaken in four discrete stages. The actions undertaken within each stage are outlined below.

Stage 1 comprises a desk based review of current HA Volume 10 guidance documents to identify and evaluate advice provided in relation to waste, resource use and energy. In addition, a review of HA guidance sitting outside of DMRB Volume 10 and relating to Sustainable Construction was undertaken,

[1] http://unfccc.int/kyoto_protocol/items/2830.php

Stage 2 reviewed the findings from Environmental Support Services (West Task) Modernisation of Volume delivered by Halcrow in relation to resource use, waste production and energy use. The purpose of this consultation was to understand usability and appropriateness of advice,

Stage 3 reviewed legislation and policy drivers which require/will require the HA to respond and where guidance may be required to assist in demonstrating the HA's response, and

Stage 4 developed an outline of topics to be considered for inclusion in the modernisation of Volume 10. Recommendations include a brief description, guidance objectives, drivers and development timetable.

Section 2 of this report outlines the review of DMRB advice. Section 3 outlines consultation undertaken as a part of modernisation of DMRB Volume 10. Section 4 provides a review of the legislative and policy frameworks impacting on waste, resource use and energy issues in relation to the management and operation of the trunk road network, the HA core business. Section 5 explores potential future research and development needs for DMRB Volume 10. Section 6 presents the review conclusions and recommendations.

2 Review of Design Manual for Roads and Bridges Volume 10

This section explores issues contained within DMRB Volume 10 providing guidance with relevance to waste, resource use and energy. The section includes a review of current and forthcoming advice and how that advice aligns to the requirements of Site Waste Management Plans (SWMP) Regulations 2008.

2.1 DMRB Volume 10 current and forthcoming advice provision

DMRB is currently undergoing modernisation driven primarily by the needs to ensure consistency and alignment with DMRB Volume 11 and other HA guidance and policy and the need to update advice and guidance to align with new technologies, design issues and service provider needs.

The existing structure of DMRB Volume 10 is divided into seven sections with each section then further divided into a number of parts. DMRB Volume 10 is currently subject to significant update. The current form of advice and guidance specifically relating to waste, resource use and energy is outlined below.

2.1.1 Section 0 Environmental Information System

Volume 10 Section 0 was revised and republished as Environmental Information System (EnvIS) Interim Advice Note (IAN 84/07). The EnvIS Interim Advice Note replaces the existing Section 0 Parts 1- 7 relating to the Environmental Database. EnvIS describes the Geographical Information System (GIS) based approach to recording environment assets located within and adjacent to the highways estate. The advice relates to seven key data sets including waste and natural resources.

Data recorded in relation to waste includes:

- European Waste Catalogue (EWC) code – the relevant EWC code aligned to the type of waste,
- Description – a detailed description of the waste, e.g. 'planings arising from refurbishment of the M4',
- Specification of Highways Work (SHW) series - a record of waste against categories of waste aligned to the HA Specification for Highway Works. Two bespoke series have been developed. Series 6000 has been introduced which covers materials that arise as waste during construction but it has not been possible to identify where they have arisen from or are not covered by other SHW series e.g. timber, ferrous/non ferrous metals and plastic. Series 700 wastes arising during routine maintenance including timber, tyres, road sweepings and green waste,
- Waste class – classification as inert, non-hazardous or hazardous,

- Quantity – volume of waste expressed as tonnes, and
- Destination - Aligned to SWMP including reused on site, reused off site, recycled on site, waste transfer station, waste management licence exempt site, landfill site, treatment centre and energy from waste facility.

Data recorded in relation to material resources includes:

- Description - a detailed description of the material (e.g. reuse of planings as road sub base),
- SHW series – a record of materials against categories of materials aligned to the HA Specification for Highway Works. Two bespoke series have been developed. Series 6100 – Undifferentiated Total – Scheme – is used where material is used for a number of different applications but only the total amount delivered to the site is known. Series 7100 – Undifferentiated Total – Maintenance and Operation – covers materials purchased for a number of applications but only the total delivered to the site is known,
- Material class - Categorises type of materials as primary, recycled and reused,
- Quantity - Quantity of material expressed as tonnes is recorded, and
- Origin - The origin of the material is recorded as on site, other site, or recycling centre.

EnvIS is currently published as an interim advice note while the system and the guidance note are being tested. Once the period of testing is completed (anticipated timeframe is approximately 18 months) the advice will be published as DMRB advice note and the existing Section 0 Volume 10 will be archived. The scope of amendments to be made to EnvIS is outside the scope of this project. This project has identified operational information gaps currently supported within the Highways Agency data collection methods and has identified EnvIS to be the most appropriate data collection method to be further developed to respond to information shortfalls.

EnvIS provides a database framework for baseline information on waste and resource use. However, no advice is provided in relation to energy.

2.1.2 Section 1 New Roads

Section 1 provides information to assist the design of new roads. The section consists of five parts outlining advice pertaining to landform, alignment, landscape management, heritage, materials and structures.

No advice relating to waste, resource use and energy is contained within Section 1.

2.1.3 Section 2 Improving Existing Roads

Section 2 provides advice in relation to the improvement of the existing road network. It consists of two parts providing advice on the improvement of road sections by limiting land take and through the enhancement of landscape techniques.

No advice relating to waste, resource use and energy is contained within Section 2.

2.1.4 Section 3 Landscape Management

Section 3 provides advice relating to the landscape management techniques. The section consists of three parts, the Wildflower Handbook, the Landscape Management Handbook and the advice relating to the establishment of herbaceous plants.

There are an additional three forthcoming advice notes which will provide advice on design and management techniques pertaining to landscape management.

No advice relating to waste, resource use and energy is contained within Section 3.

2.1.5 Section 4 Nature Conservation

Section 4 provides advice in relation to Nature Conservation. Currently consisting of seven parts, some of which have been updated, the advice guides the mitigation and management of specific species.

There is an additional 16 forthcoming advice notes which will provide species specific advice.

No advice relating to waste, resource use and energy is contained within Section 4.

2.1.6 Section 5 Environmental Barriers

Section 5 comprises two parts providing advice on the design and technical requirements of environmental barriers.

No advice relating to waste, resource use and energy is contained within Section 5.

2.1.7 Section 6 Archaeology

Section 6 currently comprises one part providing advice on archaeological mitigation measures. An additional part is forthcoming providing advice on Cultural Heritage Asset Management Plans.

No advice relating to waste, resource use and energy is contained within Section 6.

2.1.8 Section 7 Guidance Documents

Section 7 provides advice on the policy, statutory requirements and guidance documents relating to environmental design and management.

No advice relating to waste, resource use and energy is contained within Section 7.

2.2 DMRB Volumes 1-9 & 11-15

A review of the DMRB has been undertaken to identify other advice specifically relating to waste, resource use and energy. DMRB consists of the following volumes:

Volume 1 Highways Structures: Approval procedures and General Design
Volume 2 Highways Structures: Design (Substructures and Special Substructures), Materials
Volume 3 Highways Structures: Inspection and Maintenance
Volume 4 Geotechnics and Drainage
Volume 5 Assessment and Preparation of Road Schemes
Volume 6 Road Geometry
Volume 7 Pavement Design and Maintenance
Volume 8 Traffic Signs and Lighting
Volume 9 Traffic Control and Communications
Volume 10 Environmental Design
Volume 11 Environmental Assessment
Volume 12 Traffic Appraisal of Road Schemes
Volume 13 Economic Assessment of Road Schemes
Volume 14 Economic Assessment of Road Maintenance
Volume 15 Economic Assessment of Road Schemes in Scotland

There is little advice contained specifically relating to waste, resource use and energy however Volume 7 and Volume 2 provide advice and guidance generally related to the principles of resource use as outlined below.

DMRB Volume 2, providing advice on highways structures, includes Section 3 Part 9 BA92/07 titled 'The use of recycled concrete aggregate in structural concrete'. This part provides information on the use of recycled concrete aggregate (RCA) as a replacement for coarse natural aggregate in structural grade concrete.

DMRB Volume 7, providing advice on pavement design and maintenance, includes Section 1 Part 2 HD 35/04 titled the 'Conservation and the use of secondary and recycled materials'. This part provides advice on the conservation and use of reclaimed materials in road construction and maintenance. It is driven by government policy to encourage conservation and facilitate the use of reclaimed and marginal materials wherever possible. The advice is provided to obtain environmental benefits and reduce the pressure on natural reserves of primary aggregate.

2.3 Alignment of HA Environmental Information System (EnvIS) and Site Waste Management Plan (SWMP)

The implementation of the Site Waste Management Plan (SWMP) Regulations (2008), a review of EnvIS and the regulations has been undertaken to determine the potential implications on EnvIS.

The data categories recorded within EnvIS were based on SWMP guidance within industry prior to July 2007. Since this time, industry guidance relating to site waste management and best practice has significantly progressed; SWMP Regulations 2008 reflects these developments.

The requirements within the SWMP Regulations require different and additional information to that included within EnvIS. In particular, for projects exceeding £300,000 but less than £500,000 the regulations require the identification of the:

- Client, Principal Contractor and person responsible for drafting the SWMP,
- Type and quantity of waste planning to be produced from the project,
- Planning of waste management and minimisation actions identified prior to construction, and
- Actual waste management actions implemented including the type and quantity of waste reused (on/off site), recycled (on/off site), recovered (on/off site), sends to landfill or otherwise disposed of.

In addition to the above, the SWMP Regulations require projects exceeding £500,000 meet the following requirements to:

- Record waste carriers licences, transfer notes, and identity of people removing wastes from site and the destination and permit or exemption of where site wastes are removed to,
- Record the comparison of planned and actual waste quantities by type, and
- Record an estimation of cost saving made through the implementation of the SWMP.

EnvIS is well aligned to the above requirements included within the SWMP Regulations 2008. Waste management planning and implementation is recorded with appropriate referencing to relevant standards. However the following could be included within EnvIS to ensure complete compliance.

- Waste management actions categories are “otherwise disposed of” and “sent for another form of recovery”
- Legal compliance information e.g. Waste Transfer Note records and Waste Management Licence numbers. If legal compliance information is to be included, due regard should be made to the new Environmental Permitting Regulations which come into force on 6th April 2008.

2.4 Modernisation of DMRB Volume 10

Work is currently underway to modernise DMRB Volume 10. The modernisation review is intended to meet the following aims:

- To re-examine the purpose and justification of DMRB Volume 10 in the light of current and projected business needs;
- To review the validity of existing guidance in the light of those needs;
- To identify those areas where new guidance is required and can be supported by business need;
- To devise a structure which better complements DMRB Volume 11 and Manual of Contract Documents for Highways Works (MCHW); and
- To provide a prioritised programme for both structural and detailed content changes with an assessment of resource requirements and review intervals.

At this stage a new structure for DMRB Volume 10 has been identified which was subject to agreement in principle with the Highways Agency Technical Project Board on Tuesday 4th March 2008. Amongst other sections the proposed structure creates a DMRB Volume 10 Section 8

Materials and Waste. At present there is no confirmed structure of Section 8. However it is proposed the draft advice relating to SWMP will be contained within this section.

The proposed structure as agreed with the HA Technical Project Board is contained within Appendix A.

It is envisaged that a new structure for Volume 10 will be implemented with all the existing advice notes relocated and a new introduction Part 1 published towards the close of the 2008/2009 financial year. To support this re-structure it is envisaged that a training and promotion strategy will be developed to assist and inform users of the new Volume 10 approach. Following this, it is anticipated that a four year programme of reviewing and updating existing notes and the production of new advice notes will be undertaken.

2.5 Summary of DMRB Volume 10 Waste, Resource Use and Energy Advice

No advice is currently provided within Volume 10 to guide waste minimisation and reduction, resource or energy use to support the principles of sustainable development. Although these issues are covered in other parts of the HA policies, there is no reinforcement of these objectives within DMRB Volume 10. EnvIS does however provide a mechanism to record information pertaining to the use of waste and resources within the trunk road network on a geographical information system. The technical performance information recorded within EnvIS is well aligned with the SWMP Regulations 2008, with only two key issues requiring resolution.

The DMRB Volume 7 provides advice pertaining to the conservation and use of secondary and recycled materials.

3 DMRB Volume 10 Modernisation Review Consultation

This section discusses actions undertaken as part of the Modernisation Review of DMRB Volume 10, a project currently being undertaken within the HA parallel to this task. The section explores two key elements as a part of this project, firstly the outcome of stakeholder consultation on DMRB Volume 10 and secondly a proposed new structure.

DMRB Volume 10 is seen as having the primary purpose of providing advice on the environmental design of road improvements and the subsequent management of the trunk road network.

In 2007, the HA agreed a planned review and update of DMRB Volume 10 would be undertaken to ensure the provision of a comprehensive resource for the environmental design and management of all environmental aspects of trunk road management. As part of this action, stakeholder consultation was undertaken to establish both internal and external stakeholder views in relation to the application, value of advice, gaps in advice and updates which could be made therein.

A written questionnaire requesting feedback in relation to 16 questions was circulated to over 200 consultees within the HA, overseeing organisations, service providers and stakeholders in October 2007. The questionnaire is presented in Appendix B and the consultees are presented in Appendix C.

3.1 Consultation Responses

A total of 78 responses were received, with the majority of responses received from consultants (65%). Internal HA consultees made up 18% of responses, with ESDG providing 6% and Traffic Operations Directorate (TOD) providing 9%. The remaining respondents were from Transport Wales, local highways authorities, key consultees and one response from a professional body.

A total of 12 of the 78 (15%) responses outlined issues specifically related to waste, resource use or energy. Of the 12 responses relating to waste, resource use or energy, three responses were

from Network Management Agents, seven were from consultants and two were from within the HA itself.

The following outlines the issues raised in response to consultation specifically relating to waste, resource use and energy:

- Only 87% of respondents stated that they used the DMRB. The main reason for not using it is because it is not relevant to their role. A further reason was that it did not offer any relevant guidance, especially in areas such as waste management, recycling or energy efficiency,
- Information that is considered to be missing from Volume 10 includes:
    - Sustainability and sustainable development,
    - Waste and material resources,
    - Climate Change,
    - Best practice examples,
    - Information on smaller schemes, technology projects and maintenance activities,
    - A high level document tying topic areas together and placing DMRB Volume 10 in the context of DMRB Volume 11, other parts of DMRB and other HA guidance documents, and
    - An overarching Environmental Management Plan (EMP) guidance.
- Legislation, terminology, advice, referencing and contract requirements are all considered to be out of date and require review to align current best value approach with good practice, and
- An update of DMRB Volume 10 must cover issues such as sustainability and climate change promoting realistic methods of implementation and long term management which are capable of being applied to varying economic and political climates and reflect the current HA philosophy on new and improved road infrastructure

3.2 Conclusions from DMRB Modernisation Consultation Responses

It is evident from the above consultation that a cross section of respondents working as Service Providers, consultants and from within the HA identified the following key issues pertaining to DMRB Volume 10:

- DMRB Volume 10 is missing guidance and advice on sustainability, climate change, waste, resource use and energy, and
- Existing guidance requires review and alignment with developments in legislation, policy and best practices on issues including waste, resources use and energy.

4 Legislation, Policy and Best Practice

This section explores the framework of legislation and policy defining the regulation and management of waste, resource use and energy within England. The section identifies those overarching objectives, targets and fiscal drivers presented by that framework.

Waste, resource use and energy are seen to be closely aligned with the principles of sustainable development. Legislative and regulatory reforms and policies have facilitated the implementation of sustainable development within industry. This framework of reforms has clear implications on the operation of the trunk road network and therefore the working practices of the HA and its SP. This section identifies legislation, policy and best practice drivers which require the HA to respond by the provision of guidance to aid the interpretation and implementation of issues concerning waste, resource use and energy.

4.1 Overarching Legislative Framework

The Government has implemented Legislative and Regulatory Reforms impacting upon waste, resource use and energy. A resultant number of Bills, Acts and Directives enact targets and actions.

The following outlines the key legislative instruments creating a framework which impacts on the waste, resource use and energy arena with respect to the operation of the HA.

Bills and EU Strategy
- The Energy Bill 2007 -2008
- The Climate Change Bill 2007

Directives
- Waste Framework Directive (2006/12/EC)
- Landfill Directive (1999/31/EC)
- Hazardous Waste Directive (91/689/EC)
- Integrated Pollution Prevention Control (IPPC) Directive (2008/1/EC)
- Water Framework Directive (2000/60/EC)

Act
- Environmental Protection Act (as amended) 1990
- Clean Neighbourhoods and Environment Act 2005
- Control of Pollution (amendment) Act 1989 c.14
- Water Act 2003

Regulations
- Waste Management Licensing Regulations (as amended) 1994
- Pollution Prevention Control (England and Wales) Regulations 2000
- Landfill Regulations (England and Wales) 2000
- Hazardous Waste Regulations (England and Wales) 2005
- Environmental Protection (Duty of Care Regulations) 1994
- The Lists of Wastes (England) Regulations 2005
- The Water Resources (Abstraction and Impounding) Regulations 2006
- The Site Waste Management Plans Regulations 2008

The above legislative framework is explored and summarised by issue below.

4.1.1 Energy

The Energy Bill 2007-2008 was introduced on the 10th of January 2008 with the aim to implement the legislative aspects of the Energy White Paper, 'Meeting the Energy Challenge'[2]. The Bill provides a legislative framework by putting in place new legislation to:

1) Reflect the availability of new technologies such as Carbon Capture and Storage (CCS) and emerging renewable technologies,
2) Correspond with the changing requirements for security of supply infrastructure, and
3) To ensure adequate protection for the environment and the tax payer as our energy market changes[3].

4.1.2 Climate Change

The Climate Change Bill sets out clear targets including a UK target for a 60% reduction of carbon emissions by 2050 (on 1990 levels). It also looks to make a 26% to 32% target reduction by 2020 legally binding[4]. The Government will be asking The Committee on Climate Change to increase the 60% reduction to 80%[5]. The Bill looks to give a clear, credible, long-term framework for the UK to achieve reducing carbon dioxide emissions. The implementation proposals to enact these changes would be required to contribute to sustainable development.

[2] http://www.berr.gov.uk/energy/whitepaper/page39534.html
[3] The Energy Bill 2007-2008 http://www.berr.gov.uk/energy/bill/page40931.html
[4] The Climate Change Bill http://www.defra.gov.uk/news/latest/2007/climate-0313.htm
[5] The Climate Change Bill http://www.defra.gov.uk/environment/climatechange/uk/legislation/pdf/govt-amendment-package.pdf

4.1.3 Waste

The Waste Framework Directive (WFD) (Council Directive 2006/12/EC) establishes a European definition of waste. The WFD provides a framework for Member States to provide a high level of protection and to take responsible action when dealing with the disposal and recovery of waste whilst reducing the need for movements of waste produced. The WFD has been encompassed into legislation through the Environmental Protection Act 1990; the Clean Neighbourhoods Act 2005 and the Control of Pollution (amendment) Act 1989. It is then further enacted through the Waste Management Licensing Regulations 1994 and the Pollution Prevention Control Regulations (England and Wales) 2000; the Landfill Regulations (England and Wales) 2002; The Hazardous Waste Regulations (England and Wales) 2005 and the Environmental Protection (Duty of Care Regulations) 1994. Through these regulations a framework is developed which allows for the effective management of the waste industry.

4.1.4 Site Waste Management Plans

The Government has introduced the Site Waste Management Plans (SWMP) Regulations 2008 which come into force on 6th April 2008 and are a key mechanism for reducing the amount of waste on site and ensuring good resource management. SWMP have been in force since 2004 but have been voluntary. From 6th April 2008 it will be a legal requirement on projects over £300,000 net value. The SWMP Regulations 2008 requires pre-planning which will reduce costs on site (in regard to waste management) and reduce waste arisings. There will also be an increase in re-use and recycling through effective forecasting. The SWMP Regulations 2008 manages how waste is managed on site by looking at how the building materials can be managed[6] to reduce the amount of waste being produced.

4.1.5 Landfill

The Landfill Directive (Council Directive 1999/31/EC) states that the 'prevention, recycling and recovery of waste should be encouraged as should the use of recovered materials and energy so as to safeguard natural resources and obviate wasteful use of land.'[7] This Directive clearly puts prevention, recycling and recovery of waste at the top of its agenda. It also calls for the quantity and hazardous nature of waste for landfill to be reduced and to improve the handling of waste so that its recovery can be enhanced thus again reducing waste to landfill. The Directive also calls for waste to be classified as hazardous, non-hazardous and inert to further reduce the harmful effect of waste on the environment. This Directive is enacted through a number of key pieces of environmental legislation. The Landfill Regulations (England and Wales) 2002 is one of the key regulatory provisions to enable this Directive. Other pieces of legislation include the Lists of Waste (England) Regulations 2005, the Waste Management Licensing Regulations (as amended) 1994 and the Pollution Prevention Control Regulations (as amended) 1994.

4.1.6 Hazardous Waste

The Hazardous Waste Directive (Council Directive 91/689/EC) identifies the hazardous wastes that are listed in the List of Waste Regulations (England) 2005 and is further enacted through the Hazardous Waste (England and Wales) Regulations 2005. The List of Waste Regulations (England) 2005 provide a comprehensive list of all waste types and clearly states which waste types are hazardous. To aid the proper identification of waste and reduce the amount of hazardous waste going to landfill the Hazardous Waste Regulations stipulate that hazardous waste is properly identified and managed. Producers of hazardous waste are required to register with the Environment Agency and produce a consignment note which states the hazardous nature and the volume of the waste produced as well as its final disposal point.

4.1.7 Integrated Pollution Prevention and Control

The Integrated Pollution Prevention and Control Directive (Council Directive 2008/1/EC) (IPPC) has the primary aim to prevent, reduce and eliminate pollution at source through the efficient use of natural resources and taking account of the environment as a whole[8]. The Directive refers to

[6] http://www.environment-agency.gov.uk/business/444304/502508/1952646/
[7] The Landfill Directive (Council Directive 1999/31/EC)
[8] http://ec.europa.eu/environment/ippc/index.htm

the objectives and principles of the EC's environmental policy which looks at 'giving priority to intervention at source and ensuring the prudent management of natural resources.[9]' The IPPC Directive has been enacted through the Pollution Prevention Control Regulations (England and Wales) 2000 which gives regulatory bodies the power to enforce the IPPC Directive. In response to the IPPC Directive, complex waste installations are required to apply for a PPC permit and surrender the older Waste Management Licence.

4.1.8 Regulatory Framework for Soils

The EU Soil Framework Directive was proposed on the 22nd of October 2006[10]. However the Environment Minister has failed to reach a political agreement on EC proposal for the directive. As a result, it is not yet known how this will be taken forward. The Soil Thematic Strategy has the overall objective of the protection and sustainable use of soil. There are two principles to guide this. These are: 1) preventing further soil degradation and preserving its functions and 2) restoring degrading soils to a level of functionality consistent at least with current and indented use. This will also consider the cost implication of the restoration of soil.[11]

4.1.9 Water Resources

The Water Bill was published on the 20th of February 2003[12]. The Water Framework Directive (2000/60/EC) has the primary aim to set the objectives for the protection of water. Some of the most important key aims of the Water Framework Directive are; to expand the scope of water protection to all waters, surface waters and groundwater, introduce a 'combine approach' of emission limit values and quality standards and the streamlining of legislation. This Directive should provide a basis for continued dialogue and for the development of strategies towards a further integration of policy areas'[13]. This Directive is enacted through the Water Act 2003 and prior to this it was enacted thorough the Water Resources Act 1991.

4.2 Policy and Best Practice

With the increased profile of sustainable development and in response to international policy responding to environmental issues the UK government has formulated a number of polices to embrace new environmental targets and assist with the implementation of sustainable practices. The following policy documents are specifically relevant to the issue of waste, resource use and energy and act as drivers for policy change for the Highways Agency:

- National Waste Strategy 2007
- Securing the Future – UK Government Sustainable Development Strategy (7th of March 2005)
- The Highways Agency (June 2007), 'Achieving Sustainability, The Highways Sustainable Development Action Plan 2007 – 2008.'
- The Highways Agency (2003), 'Building Better Roads: Towards Sustainable Construction'
- The Highways Agency Procurement Strategy (2001)
- The Highways Agency Business Plan (2007/8)
- Civil Engineering Environmental Quality Assessment and Award Scheme (CEEQUAL)
- WRAP (2007) Achieving Good Practice Waste Minimisation and Management.
- Aggregate Standards and Aggregate Quality Protocol

4.2.1 National Waste Strategy 2007

The National Waste Strategy 2007[14] produced by the Department for Environment Food and Rural Affairs (DEFRA), builds upon the work from the National Waste Strategy that was completed in 2001. The National Waste Strategy 2007 is a governmental report which states targets to reduce

[9] Integrated Pollution Prevention Control (IPPC) Directive (2008/1/EC)
[10] http://www.defra.gov.uk/ENVIRONMENT/land/soil/europe/index.htm#intro
[11] http://www.defra.gov.uk/ENVIRONMENT/land/soil/europe/index.htm#intro
[12] http://www.defra.gov.uk/environment/water/legislation/default.htm
[13] The Water Framework Directive (2000/60/EC)
[14] The National Waste Strategy 2007 For England 2007, DEFRA Publication Cm7086 May 2007, Annex C3: Construction, Demolition and Excavation Waste

the amount of construction waste currently going to landfill. The strategy proposes an encompassing target of reducing the amount of waste going to landfill from 22.3 million tonnes in 2000 to 12.2 million tonnes in 2020 with an intermediary target of 15.9 million tonnes by 2010. The strategy also places a reduction in the amount of municipal waste going to landfill with a target of 1) 2010 to reduce to 75% of 1995 level, 2) 2013 to reduce to 50% of 1995 level 3) 2020 reduce to 35% of 1995 level[15]. Targets from commercial waste are not yet published but the policies required to meet the expected targets are already in place. During the period 2004 – 2010, a 20% drop is anticipated due to the policies already in place[16].

The report proposes that the volume of construction waste going to landfill needs to reduce by half, by 2012 (potentially against 2005 figures) and this will be done by waste reduction, re-use and recycling.[17]The final figures and targets for the reduction will be by the end of 2008. The Government is also proposing an interim objective of zero net waste (at construction site level) by 2015 leading to zero waste to landfill by 2020.

To facilitate these targets being met, fiscal and policy measures have been instigated. There will be an increase in Landfill Tax for waste going to landfill. Currently the standard rate of tax is £24 tonne for non-hazardous and non inert wastes. From the 1st of April 2008 and until at least 2010-11 the standard rate of Landfill Tax will increase by £8 per tonne each year and a lower rate of £2 per tonne will apply to inert wastes listed in the Landfill Tax (Qualifying Material) Order 1996. However, from the 1st of April 2008 this will increase to £2.50 per tonne. A further fiscal measure was introduced in 2002. The Aggregates Levy looks to ensure that the environmental impact in extracting a primary aggregate is reflected in the price and as a result there will be an increase in the price of virgin aggregate from £1.60 per tonne to £1.95 per tonne from the 1st of April 2008.

4.2.3 Securing the future, Delivering UK Sustainable Development Strategy

The main purpose of this strategy is to outline a set of shared UK principles to assist in achieving sustainable development.

In this report the Government declared it would lead by example in all aspects of sustainable development. As a result, HA as a government agency is required to demonstrate best practice across the entire field of environmental issues.

The strategy focuses upon four agreed priorities, these are; 1) Sustainable Consumption and production, 2) Climate Change, 3) Natural Resource Protection 4) Sustainable Communities[18]. The document sets out how the Government aims to meet these priorities, the guiding principles and the indicators to allow an overview of sustainable development[19]. The Department for Business Enterprise and Regulatory Reform (BERR) formerly the Department for Trade and Industry (DTI) produced, 'Sustainable Construction Strategy' (2006) which highlights the progress made in the last five years. This report is currently in draft and the findings have not yet been finalised.

4.2.4 The Highways Sustainable Development Action Plan 2007-2008

The Highways Agency has produced, 'Achieving Sustainability, The Highways Sustainable Development Action Plan 2007-2008'[20]. Within this document are a number of key priorities including the investigation of the HA GHG/carbon footprint from construction, maintenance and network operations and identify future actions for reduction[21]. A further target is to develop a waste resource use and recycling strategy for construction and maintenance work to allow for the identification of benchmarks for future target setting. An energy efficiency strategy for road lighting with the aim to reduce carbon emissions has also been identified as an area for development.

[15] http://www.defra.gov.uk/environment/waste/strategy/factsheets/targets.htm
[16] Ibid.
[17] ibid
[18] Ibid.
[19] Ibid p21.
[20] The Highways Agency (2007) 'Achieving Sustainability, The Highways Sustainable Development Action Plan 2007-2008.'
[21] Ibid.

The HA have also detailed 39 'actions' which the HA have identified as a means to meet the required plan to fully implement sustainable development, these have been grouped into three strands; policy, operations and corporate as shown in Figure 4.3.

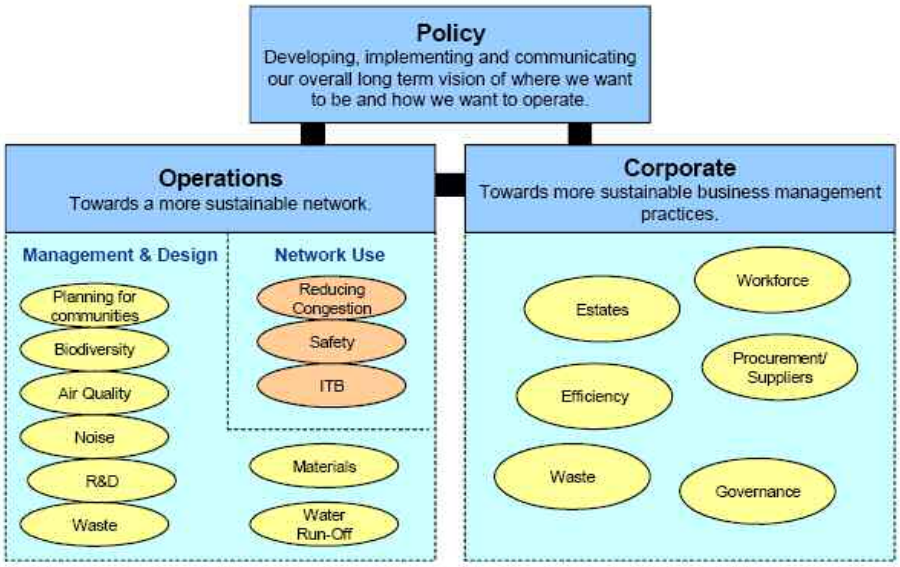

Figure 4.3: HA Sustainability Action Plan Themes

4.2.5 Building Better Roads: Towards Sustainable Construction

The HA 2003 'Building Better Roads: Towards Sustainable Construction' which details the HA approach to sustainability as well as its expectations for suppliers and information for stakeholders. The report looks at the management of natural resources and states that 'between 20,000 and 60,000 tonnes of aggregate is used to construct a mile of motorway'[22]. The report also states that there is 70 million tonnes of construction products and demolition arisings wasted and 13 million tonnes of this is material which is delivered to sites and thrown away unused[23]. The HA wants to address this issue and would like to implement a design for minimum waste relating to residual and recyclable material.

4.2.6 Highways Agency Procurement Strategy (2001)

The HA Procurement Strategy (2001), as reviewed by the HA in 2005, sets out ten procurement principles that provide incentives to deliver continual improvement over long-term periods. The principles aim to provide:

- Early creation of the delivery teams,
- An integrated and incentivised supply chain,
- A competitive and sustainable supply chain,
- Clear points of responsibility and no unnecessary layers of supervision,
- E-procurement systems,
- Election of suppliers on the basis of best value,
- Fair allocation of risks,
- High quality design,
- Partnership approach based on long-term relationships, and
- Performance measurement with continual improvement targets.

4.2.7 Business Plan (2007/08)

According to the HA Business Plan (2007/08), HA is committed to continuous improvement of the procurement processes which will help the Agency to deliver better service and increase efficiency. These procurement principles cover all aspects of the Agency's work and are designed to achieve 'best value' which is one of the HA targets within the 2007/08 business plan to 'deliver

[22] The Highways Agency 'Building Better Roads: Towards Sustainable Construction.'
[23] Ibid.

efficiency improvements in roads procurement through adding value to service delivery of £200m'.

4.2.8 CEEQUAL

CEEQUAL is an award scheme assessing the environmental quality of civil engineering projects. Its objective is to encourage the attainment of environmental excellence in civil engineering projects, and thus to deliver improved environmental performance in project specification, design and construction. A key component of the assessment is waste and resource use.

4.2.9 WRAP, Achieving Good Practice Waste Minimisation and Management

Published prior to the SWMP Regulations 2008, the Waste and Resource Action Programme (WRAP) guidance Achieving Good Practice Waste Minimisation and Management guides industry to implement good and best practice site waste management plans.

4.2.10 Aggregate Standards and Aggregate Quality Protocol

Aggregate standards and quality protocols are fundamental to ensuring the use of secondary and recycled aggregates within new builds while reducing the need for importation of virgin materials. European standards for aggregates came into force in June 2004. The introduction of these standards has meant that secondary and recycled aggregates can be used in a broad range of applications, thereby reducing the need to draw upon natural resource reserves.

4.3 Summary of Legislative, Policy and Best Practice Issues and Targets

The legislative and policy framework facilitates the improved management of waste, resource use and energy through the implementation of key objectives, target and drivers. These are seen to be closely aligned with the principles of sustainable development and assist industry in enacting sustainable development techniques.

This framework of objectives, target and drivers has clear implications on the operation of the trunk road network and therefore the working practices of the HA and its SP. Table 4.1 below summarises the key management objectives of the legislative framework. Table 4.2 identifies the key targets and table 4.3 identifies key fiscal drivers introduced through policy.

Table 4.1: Legislative Objectives and Targets Summary

Objective/Target	Directive/International Agreement/Bill/Act/Regulation/Policy
Objective 1 - To provide energy in a manner reflecting new technologies to protect the environment (carbon reduction) and tax payer as market evolves.	• Kyoto Protocol • Energy Bill
Objective 2 - UK target for a 60% reduction of Carbon emissions by 2050 (on 1990 levels) and a 26% to 32% reduction by 2020 legally binding	• Kyoto Protocol • Climate Change Bill
Objective 3 - To reduce the production of waste through improved waste classification, treatment, recovery and re-use.	• The Waste Directive • Waste Management Licensing Regulations (as amended) 1994 • Landfill Regulations (England and Wales) 2002 • The Hazardous Waste Regulations (England and Wales) 2005 • Environmental Protection (Duty of Care) Regulations 1994 • Site Waste Management Plans (England and Wales) Regulations 2008
Objective 4 - To reduce the volume and type of waste going to landfill. To encourage the reuse and treatment of waste to prevent waste going to	• Landfill Directive • Landfill (England and Wales) Regulations 2002

Objective/Target	Directive/International Agreement/Bill/Act/Regulation/Policy
landfill.	
Objective 5 - To reduce the volume of hazardous waste going to landfill and allow for greater environmental control at disposal facilities allowing hazardous waste.	• The Hazardous Waste Directive (91/689/EEC) • The Hazardous Waste Regulations (England and Wales) 2005 • The Lists of Waste (England) Regulations 2005
Objective 6 - To enact tighter controls on complex waste management facilities to allow for greater environmental control.	• The Integrated Pollution Prevention Control Directive (96/61/EC) • The Pollution Prevention Control (England and Wales) Regulations 2000
Objective 7 - To protect and ensure the sustainable use of soils	• The Soil Framework Directive (COM(2006) 232)
Objective 8 - To manage and regulate abstraction ensuring sustainable use and protection of water resources.	• The Water Framework Directive (2000/60/EC) • The Water Act 2003 • The Water Resources (Abstraction and Impounding) Regulations 2006
Target 1 - Target to reduce the amount of waste going to landfill – 1) 22.3 million tonnes in 2000 to 12.2 million tonnes in 2020. Intermediary target of 15.9 million tonnes by 2010.	• National Waste Strategy 2007
Target 2 - Proposed target of halving the amount of waste going to landfill by 2012 (potentially against 2005 figures)	
Target 3 - Proposed target of zero net waste (at construction site level) by 2015.	
Target 4 - Proposed target of zero waste (from construction) to landfill by 2020	
Target 5 - Demonstrates best practice across field of environment issues including 1) Sustainable consumption and production 2) Climate Change 3) Natural Resource Protection 4) Sustainable Communities.	• Securing the future Delivering UK Sustainable Development Strategy
Target 6 - Implement a design for minimum waste relating to residual material and recyclable material.	• Highways Agency Sustainable Development Action Plan (2008-2008) • Building Better Roads: Towards Sustainable Construction (2003)
Target 7 - Implement an energy efficiency strategy for road lighting	
Target 8 - HA to establish a programme of improvement and measuring its performance	• Highways Agency Procurement Strategy (2001) • Highways Agency Business Plan (2007/08)

5 Future Research Needs and Conclusions

This section explores future research and development needs of DMRB Volume 10. To undertake this task consideration is given to the current advice provided within DMRB Volume 10 and the legislative and policy framework in which the HA operates the strategic trunk road network.

5.1 Current DMRB Volume 10 Advice Provision

No advice is currently provided within DMRB Volume 10 to guide waste minimisation and reduction, resource or energy use to support the principles of sustainable development. Although these issues are covered in other parts of the HA policies, there is no reinforcement of these objectives within DMRB Volume 10. The provision of advice and guidance to Service Providers pertaining to the management and operation of the Highway estate in relation to waste minimisation and reduction, resource or energy use is a key mechanism by which highways Agency is able to deliver its policy objectives enabling the Agency to respond to its legislative and policy obligations.

The table 5.1 below presents advice and guidance provided in Volume 10 against legislative objectives and targets identified in Section 4.

Table 5.1 Current Volume 10 Advice

Objective/ Target	Outline Issue	Current Volume 10 Guidance Provision Key - Full Provision Partial Provision No Provision	Comment on Provision
Objective 1	Energy Technologies support	No Provision	Issue not addressed
Objective 2	Carbon Reduction Target	No Provision	Issue not addressed
Objective 3	Waste Reduction	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Objective 4	Reduce Waste to Landfill	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Objective 5	Reduce Hazardous waste to Landfill	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Objective 6	Controls on complex waste management facilities.	No Provision	Issue not addressed
Objective 7	Sustainable soil use	No Provision	Issue not addressed
Objective 8	Sustainable water use	No Provision	Issue not addressed
Target 1	Reduction in Waste to Landfill by 2010 and 2020.	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Target 2	Half Waste to Landfill 2012	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Target 3	Zero Net Construction Waste 2015	Partial Provision	EnvIS enables performance record, no technical guidance is provided
Target 4	Zero construction waste to landfill 2020	No Provision	Issue not addressed
Target 5	Demonstrates best practice on sustainability issues	No Provision	Issue not addressed
Target 6	Minimum Waste Design	No Provision	Issue not addressed
Target 7	HA Road Lighting energy efficiency strategy	No Provision	Issue not addressed
Target 8	HA programme of performance improvement	No Provision	Issue not addressed

EnvIS does however provide a mechanism to record information pertaining to the use of waste and resources within the trunk road network on a geographical information system. The technical performance information recorded within DMRB Volume 10 is well aligned with the SWMP Regulations 2008, with only two key issues requiring resolution.

The DMRB Volume 2 and 7 sitting adjacent to volume 10 provide advice on the use of recycled concrete aggregate as a replacement for coarse natural aggregate in structural grade concrete and the conservation and use of secondary and recycled materials respectively.

5.2 Management, Operation and Consultation Issues

The HA has the responsibility for the management and operation of England's trunk road network. The aspects of how this is undertaken and the efficiency to which it is undertaken is prescribed by a framework of legislation and policy.

From the review of over 30 legislation, policy and best practice documents undertaken in Section 4 of this report, it is evident that the HA has a commitment to respond to the following overarching key issues:

- Respond to new energy technologies to protect the environment,
- Reduce carbon emissions,
- Reduce waste production through improved waste management practices
- Reduce waste to landfill,
- Manage abstraction ensuring sustainable use and protection of water resources,
- Performance Measurement ,
- Implement Sustainable Development Best Practice (Sustainable Consumption and Production, Climate Change, Natural Resource Protection, Sustainable Communities), and
- Implement design standards for waste relating resource efficiency.

Consultation as a part of the Modernisation review of DMRB Volume 10 identified a cross section of respondents working as SP, consultants and from within the HA identified the following key issues pertaining to DMRB Volume 10:

- DMRB Volume 10 is missing guidance and advice on sustainability, climate change, waste, resource use and energy, and
- Existing guidance requires review and alignment with developments in legislation, policy and best practices on issues including waste, resources use and energy.

It should be noted that no comments were made by stakeholders, as part of the modernisation consultation exercise, as to how advice should be structured. In addition, the consultation findings has made no recommendations as to how emerging Volume 10 waste, materials and energy advice will relate to advice already contained in DMRB Volumes 2 and 7 and indeed other HA guidance such as the Network Management Manual (NMM).

6 DMRB Volume 10 Future Advice Proposal

DMRB Volume 10 provides advice and guidance on the environmental design of road improvements and the subsequent management of that mitigation.

A key component of the legislative and policy framework pertaining to waste, resource use and energy is the requirement to measure the implementation of the sustainable development agenda against identified targets. In the context of sustainable development waste, resource use and energy are intrinsically linked by the principles of conservation and reduction to facilitate a sustained environment. In order to successfully implement measures responding to environmental issues pertaining to waste, resource use and energy it is important that these environmental issues are integrated with the design processes In recognition of these fundamental issues of sustainability it is evident that the advice relating to the context and application of waste, resource use and energy is highly complementary. The DMRB guides the design and management of the road network. Consisting of 15 Volumes, Volume 10 provides guidance on issues specifically relating to environmental design. It is therefore considered advantageous to present waste, resource use and energy within a consistent advice framework, logically located within the same DMRB Volume 10 Section.

The Highways Agency published the Draft Climate Change Adaptation and Mitigation Strategy (March 2008) and Carbon Tool Calculator was submitted to the Highways Agency Research Board for wider consultation. The objective of the work is to outline a strategy on how highway

network will be managed to respond to the issues in connection with climate change and how the effects of extreme weather conditions will be mitigated within highway design and management.

As outlined above the current DMRB Volume 10 provides no advice to guide waste minimisation and reduction, resource or energy use supporting the principles of sustainable development including the overarching key issues outlined above. Therefore there is a clear and defined need to provide advice and guidance pertaining to these overarching key issues in relation to the environmental design of road improvements and the subsequent management of that mitigation to facilitate sustainable development and respond to commitment required by legislation and policy.

The crucial function of future advice will be to guide the interpretation and application of legislation and policy by SP managing the highway network on behalf of the HA. A co-ordinated and informed response to legislation and policy commitments will facilitate the ability for the HA to implement best practice and performance measurement in waste, resource use and energy operational issues.

It is therefore instrumental that legislation and policy complimented by current best practice form the blueprint for the identified future DMRB Volume 0 Section 8 Materials and Waste advice. This will ensure the Agency can demonstrate compliance to legislative requirements, but can further demonstrate successful performance against identified targets and the implementation of vital sustainable development actions.

The ability for the Agency to respond to these issues in a co-ordinated and effective manner is of paramount importance to ensure sustainable development outcomes and manage future corporate risks.

Considering the current advice within DMRB Volume 10 and the framework of objectives, targets and drivers defining the manner in which the HA is required to carry out its management and operational role, the following key aspects of advice is regarded to be missing from DMRB Volume 10:

- Context of waste, material resources and energy in sustainable development
- Measuring environmental, social and economic performance against targets and objectives
- Principles and application of waste management techniques in highway design, construction and operation such as ‘designing out waste’
- Principles and application of material resource efficiencies in highway design, construction and operation
- Principles and application of energy with highway design, construction and operation

Due regard is required to be given to the legislation and policy drivers which are currently in place or are scheduled to take effect in the future. With respect to targets although the measurable action is in the medium to long term many will take significant operational shifts from current practices in order to meet. An implementation plan needs to recognise advice requirements evolving around the following issues:

- Advice to ensure current operational compliance to legislation
- Advice providing best practice techniques to implement quick wins
- Advice in relation to well informed issues and conversely developing issues
- Advice to guide the strategic direction of sustainable development
- Advice to guide environmental performance measurement against targets

The following table (5.1) identifies a summarised structured outline of advice specifically addressing waste, resource use and energy advice issues not supported within the existing DMRB Volume 10. The outline identifies a proposal for a future structure and content. A full structure is

presented in Appendix D including the legislative, policy and best practice requirements considered instrumental in forming the blueprint of future DMRB Volume 10 advice, key objectives, targets and drivers as identified in tables 4.1, 4.2 and 4.3 in section 4 of the report are provided. This demonstrates the necessity and assists in defining the timetable for advice implementation. Implementation priorities are defined with supporting justification.

Table 5.1: Proposed summarised structure and Objectives of future DMRB Volume 10 Section 8

DMRB Volume 10 Section 8 Materials, Waste and Energy	
Priority	Part Objectives
Priority One	Part 1 – Introduction to Materials, Waste and Energy Design and Management • To introduce the concept of sustainable development in the context of materials and waste. • Define overarching sustainability objectives in relation to materials, waste and energy. • Define framework for performance measurement in the context of materials, waste and energy. • Define framework for sustainable procurement in the context of materials, waste and energy.
Priority One	Part 2 – Waste Management Objectives • To define strategy and principles of waste management and minimisation • Define standard of waste management and minimisation to be implemented during construction, maintenance and operation
Priority Two	Part 3 – Resource Use Objectives • To define strategy and principles of resource use/efficiency • To define framework for resource efficiency in design and construction • To define framework for sustainable procurement through resource provision • To guide implementation techniques to maximise resource use
Priority Three	Part 4 – Energy Objectives • Define energy in the context of Sustainable Development • Define aims and objectives of energy management • Reduce requirement of energy through design, construction, operation and maintenance • Define the measurement of energy • Define strategy for managing lighting on the network.

7 Recommendations

The outcome of this report is to make recommendations for the inclusion of future advice within DMRB Volume 10 on waste, resource use and energy.

This report undertakes a review of existing DMRB Volume 10 advice and commitments set within a framework of legislation, policy and best practice relating to waste, resource use and energy. A number of conclusions are made from the review which are addressed in section 5 of this report and inform the following recommendations.

1. A review of Environmental Information System (EnvIS) Interim Advice Note (IAN 84/07) identified a close alignment to the requirements included within the SWMP Regulations 2008. However the following could be included within EnvIS to ensure complete compliance.
    - Waste management actions categories are “otherwise disposed of” and “sent for another form of recovery”, and
    - Legal compliance information.

In recognition of the existing information gap it is recommended to escalate identified information gap to the EnvIS project owner for further consideration.

2. Review of DMRB identified advice relating to the conservation and use of secondary and recycled within DMRB Volume 7. It is recommended discussions are undertaken with the Volume 10 managing editor to give consideration to combining the DMRB Volume 7 advice with the future DMRB Volume 10 advice due to alignment with materials and resource use.

3. A review of the legislative, policy and best practice framework in the area of waste, resource use and energy has identified the HA has a commitment to respond to the following overarching key issues:

   - Respond to new energy technologies to protect the environment,
   - Reduce carbon emissions,
   - Reduce waste production through improved waste management practices,
   - Reduce waste to landfill,
   - Manage abstraction ensuring sustainable use and protection of water resources,
   - Performance Measurement,
   - Implement Sustainable Development Best Practice (Sustainable Consumption and Production, Climate Change, Natural resource Protection, Sustainable Communities), and
   - Implement design standards for waste relating resource efficiency.

   This presents a clear and defined need to provide advice and guidance to assist the HA undertake its operations in a sustainable manner. As such the following recommendations are made to outline future advice to be provided in DMRB Volume 10.

   Part 1 – Introduction to Materials, Waste and Energy Design and Management
   Part 1 is proposed to provide advice relating to the overarching principles and guidance in relation to sustainable construction and address a framework for performance measurement including targets, procurement and supply chain management

   Part 2 – Waste Management
   Part 2 is proposed to provide advice relating to the principles of waste management and minimisation based on the waste hierarchy and address waste management at design, construction and operation.

   Part 3 – Resource Use
   Part 3 is proposed to provide advice relating to the principles of material use and resource efficiency and maximisation at design, construction and operation including whole life assessment and sustainable procurement. Focus should be given to the implementation of design approaches in terms of sustainable consumption and production.

   Part 4 – Energy
   Part 4 is proposed to provide definitions and the principles of energy within the context of sustainable development. The part should include advice addressing the use at design, construction and operation, the minimising consumption of energy, estimation of carbon emissions, lighting (vehicular and design) and energy management on site.

4. Considering the legislation, policy framework presenting performance targets and compliance needs together with the technical development of the waste, resource use and energy disciplines the following timetable for the implementation priorities is recommended.

   Priority One
   - Part 1 – Introduction to Materials, Waste and Energy Design and Management
   - Part 2 – Waste Management

Priority Two
- Part 2 – Resource Use

Priority Three
- Part 4 - Energy

It is therefore instrumental that legislation and policy complimented by current best practice form the blue print for the identified future DMRB Volume 0 Section 8 Materials and Waste advice.

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Appendix A. DMRB Volume 10 Section 0 Modernisation Proposed Structure

SECTION 1	Introduction
Part1	Introduction
SECTION 2	The General Principles of Environmental Design and Management
Part 1	The Aims and Objectives of Environmental Design and Management
Part 2	Setting Environmental Objectives
Part 3	New Roads
Part 4	Improving Existing Roads (including advice on widening and major schemes, LNMS etc)
Part 5	Technology Schemes (including advice on ATM schemes, MIDAS schemes etc)
Part 6	Maintenance Activities
Part 7	Overview of Climate Change Issues
Part 8	Overview of Sustainable Development Issues
Part 9	Environmental Management Plans (EMP)
SECTION 3	Environmental Information System (EnvIS)
Part 1	Introduction
Part 2	Environmental Inventory
Part 3	Environmental Management Information
Part 4	Data Management
SECTION 4	Air Quality
Part 1	introduction to Air Quality Design and Management
Part 2	Factors Affection Air Quality
Part 3	Mitigation measures
SECTION 5	Cultural Heritage
Part 1	Cultural Heritage Design and Management Principles and Requirements
Part 2	Sources of Impacts (including New Road Construction, Improving Existing Roads, Technology Schemes
Part 3	Archaeological Remains Design and Management
Part 4	Historic Buildings Design and Management
Part 5	Historic Landscape Character Design and Management
Part 6	Cultural Heritage Asset Management Plans (CHAMP)
SECTION 6	Landscape and Townscape
Part 1	Introduction to landscape and townscape design and management
Part 2	Landform and Alignment
Part 3	Planting Vegetation and Soils (including Woodland development in transport corridors)
Part 4	Integration with Rural landscapes
Part 5	The Road Corridor
Part 6	Road Improvement within Limited Land take
Part 7	Improvement techniques
Part 8	landscape Management Handbook (including Tree and Shrub planting, Tree Assessment Methodology)
Part 9	Advice in relation to Severance and Fragmentation “Green Bridge Solutions”
Part 10	Townscape
SECTION 7	Nature Conservation
Part 1	Introduction to Nature Conservation and Biodiversity Design and Management
Part 2	Nature Conservation Advice in relation to Mammals (including advice on Badgers, Bats, Otters, Dormice, Deer, Red Squirrels, Water Voles and Rabbits)
Part 3	Nature Conservation in relation to Amphibians (including advice on Great Crested Newts)
Part 4	Nature Conservation in relation to Reptiles and Roads
Part 5	Nature Conservation in relation to Habitats, Plants and Fungi (including Guide to Habitat Translocation, The Wildflower Handbook, the Establishment of an Herbaceous Plant Layer in roadside Woodland)

Part 6 Nature Conservation in relation to Invertebrates (including advice on White-Clawed Crayfish, Southern Damselfly, Butterflies)
Part 7 Nature Conservation in relation to birds (including on Barn Owls/Raptors)

SECTION 8 Materials and Waste
Part 1 Introduction to Materials and Waste (additional Parts and contents to be confirmed)

SECTION 9 Noise
Part 1 Introduction to Noise Design and Management
Part 2 Design Guide for Environmental Barriers
Part 3 Environmental Barriers: Technical requirements

SECTION 10 All Travellers
Part 1 Introduction to All Travellers Design and Management (additional Parts and contents to be confirmed)

SECTION 11 Community and Private Assets
Part 1 Introduction to Community and Private Assets Deign and Management (additional Parts and contents to be confirmed)

SECTION 12 Road Drainage and the Water Environment
Part 1 Introduction to Road Drainage and the Water Environment Design and Management (additional Parts and contents to be confirmed)

Appendix B DMRB Volume 10 Section 0 Modernisation Review Consultation Questionnaire

Safe roads, Reliable journeys, Informed travellers

HIGHWAYS AGENCY

Design Manual for Roads and Bridges
Volume 10 – Environmental Design and Management
User Survey

Please complete the user survey using the check boxes and entering your comments as appropriate. After answering each question, checking only one box per question, please follow directions to the next question. Please email the completed user survey to lorna.wood@highways.gsi.gov.uk before **15/10/2007**.

It is appreciated that different individuals will 'use' DMRB and Volume 10 in different ways, for example as a source of guidance when undertaking design and management activities or as a more general reference source. Please complete this questionnaire to reflect your opinions of DMRB Volume 10, considering the way that you use it.

Name	
Organisation	
Role	

1	Do you use DMRB?		
	Yes	☐	Go to Q2
	No	☐	Go to Q1a

1a	Why don't you use DMRB?	
		Go to Q1b

1b	What would need to be changed to encourage you to use it?	
		End

2	Please describe how you use DMRB and Volume 10	
		Go to Q3

3	How regularly do you use Volume 10?		
	1 = Every day	☐	Go to Q4
	2 = Weekly	☐	
	3 = Monthly	☐	
	4 = 6 monthly	☐	
	5 = Yearly	☐	
	Any further comments…		

4	Which sections do you use and how regularly? (numbering as Q2)		
	Section 0 – Environmental Objectives	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	Go to Q5
	Section 1 – New Roads	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 2 – Improving Existing Roads	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 3 – Landscape Management	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 4 – Nature Conservation	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 5 – Environmental Barriers	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 6 – Archaeology	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Section 7 – Guidance Documents	1☐ 2☐ 3☐ 4☐ 5☐ Never ☐	
	Any further comments…		

5	How useful do you find the advice in DMRB Volume 10?		
	Very Useful	☐	Go to Q6
	Useful	☐	
	Useful in parts	☐	
	Not at all useful	☐ Please explain why, below.	
	Any further comments…		

6	Is the structure of DMRB Volume 10 easy to use?	
	Yes ☐	Go to Q7
	No ☐	Go to Q6a

6a	How could it be made easier?	
		Go to Q7

7	Is DMRB Volume 10 your primary source of guidance for environmental design and management?	
	Yes ☐	Go to Q8
	No ☐	Go to Q7a

7a	What is your primary source of guidance?	
		Go to Q8

8	Is the advice contained in DMRB Volume 10 sufficient for your needs?	
	Yes ☐	Go to Q8a
	No ☐	

8a	Where do you find additional advice?	
		Go to Q9

9	Who should DMRB Volume 10 be aimed at?	
		Go to Q9a

9a	In your opinion, is it aimed at this audience at present?	
	Yes ☐	Go to Q10
	No ☐	Go to Q9b

9b	What should be changed to meet the needs of this audience?	
		Go to Q10

10	What, if anything, is missing from DMRB Volume 10?	
		Go to Q11

11	What, if anything, is no longer relevant in DMRB Volume 10?	
		Go to Q12

12	Do you feel that DMRB Volume 10 is sufficiently up-to-date?	
	Yes ☐	Go to Q13
	No ☐	
	Any further comments…	

13	How often do you feel that the advice should be reviewed and updated?	
		Go to Q14

14	How do you find out about updates to DMRB?	
		Go to Q15

15	How should new advice notes be promoted?	
		Go to Q16

16	If there was training for new advice notes, would you attend?	
	Yes ☐	End
	No ☐	
	Any further comments…	

Additional Comments…

Appendix C DMRB Volume 10 Section 0 Modernisation Review Consultation Consultees

- Regional Environmental Advisors (REAs)
- Focal Point Advisors (FPAs)
- Consultant support within the Highways Agency Environmental Sustainable Development Group (ESDG)
- Specific users within:
    - SSR
    - Traffic Operations Directorate
    - Major Projects Directorate
    - Information Directorate
- Service Providers including:
    - Target Performance Improvement projects
    - Managing Agent Contractors
    - Design Build Finance Operate project DBFO's
- Key contacts within the following other government departments, agencies, statutory bodies and devolved administrations including:
    - Department for Transport
    - Natural England
    - English Heritage
    - Environment Agency
    - National Trust
    - Welsh Assembly Government
    - Scottish Executive
    - Northern Ireland
    - Transport for London
    - Local Authorities
- Other relevant professional bodies including:
    - Landscape Institute
    - Institute for environment Management and Assessment
    - Institute of Ecology and Environmental Management
    - Chartered Institute Water and Environmental Management
    - Institute of Field archaeologists
    - Council for British Archaeology
    - Association of Local government Archaeological Officers
    - Institute of Waste Management
    - institute of Acoustics
    - Institute of Highways and Transportation
    - institute of Highways Engineers
    - Institution of Civil Engineers

Appendix D DMRB Volume 10 Section 8 Proposed Structure

DMRB Volume 10 Section 8 Materials, Waste and Energy			
Priority	Outline Content	Objective, Target, Driver	Priority and Implementation Issues
Priority One	Part 1 – Introduction to Materials, Waste and Energy Design and Management Objectives • To introduce the concept of sustainable development in the context of materials and waste. • Define overarching sustainability objectives in relation to materials, waste and energy. • Define framework for performance measurement in the context of materials, waste and energy. • Define framework for sustainable procurement in the context of materials, waste and energy.		
Principles and guidance • Sustainable Development • Application • Aims & Objectives		• Objectives 1-7 • Target 5	Quick Win - Strategic issues well developed and defined. Immediate implementation provides early strategic direction to assist SP's response.
Performance • Targets, application, • performance measurement • SDAP & Government targets framework • Sustainable procurement and implementation • Supply chain management		• Objective 2-4 • Target 1-4 • Target 8	
Priority One	Part 2 – Waste Management Objectives • To define strategy and principles of waste management and minimisation • Define standard of waste management and minimisation to be implemented during construction, maintenance and operation •		
Principles and guidance • Waste hierarchy • Application to design and management • Waste streams (solid and liquid)		• Objective 2-6 • Target 1-5	Quick Win – Best practice issues well developed and defined. Directly responds to current legislative requirement and key government targets Immediate implementation manages corporate risk to the HA
Waste Management and Minimisation • Design to minimise construction waste • Design to minimise operational waste • Waste stream re-use, reduce, recycle, disposal • Site Waste Management Plans for design and construction		• Objective 3-6 • Target 1-6 • Drivers 1-3	
Priority Two	Part 3 – Resource Use Objectives • To define strategy and principles of resource use/efficiency • To define framework for resource efficiency in design and construction • To define framework for sustainable procurement through resource provision • To guide implementation techniques to maximise resource use		
Principles and guidance • Resource use (materials) • Material types/definition/impacts • Sustainable sourcing and local sourcing • Material supply • Whole life assessment		• Objective 2, 3, 7 & 8 • Target 1-6	Technical framework established but still rapidly developing. Areas of technical application of resources use well established i.e.
Design and Construction		• Objective 2-4	

DMRB Volume 10 Section 8 Materials, Waste and Energy			
Priority	Outline Content	Objective, Target, Driver	Priority and Implementation Issues
• Sustainable material design • Design to minimise resource use • Facilitation sustainable design and construction through Site Waste Management Plans		• Target 1-6 • Drivers 1-3	aggregates Responds to current legislative requirement and key government targets
Procurement and Supply • Procuring to minimise resource use		• Objective 2 • Target 1-5 • Drivers 1-3	
Maximising Resources • Identifying resource use • Identifying material re-use, recycling and recovery		• Objective 3 & 4 • Target 1-6 • Drivers 1-3	
Priority Three	Part 4 – Energy Objectives • Define energy in the context of Sustainable Development • Define aims and objectives of energy management • Reduce requirement of energy through design, construction, operation and maintenance • Define the measurement of energy • Define strategy for managing lighting on the network.		
Principles and guidance • Definition of Energy • Aims of Objectives • Energy on the network • Reducing energy through design • Reducing energy through construction • Reducing energy through operation and maintenance • Calculating carbon • Lighting (vehicular and design) • Energy management (service providers and Agency emissions)		• Objective 1 & 2 • Target 5 &7	Technical framework is not well established Responds to current and future government targets