Chapter 17 Resource and Waste Management

17.1 Introduction

The Roads Act requires an Environmental Impact Statement to include a description of the likely significant effects on the environment resulting from the elimination of waste.

The NRA Guidelines for the Management of Waste from National Road Construction Projects provides the following description of waste which is a summary of Section 4(1)(a) of the Waste Management Acts 1996 – 2011::

"*'waste' means any substance or object ... which the holder discards or intends or is required to discard ...."*

The NRA Guideline 'Environmental Impact Assessment of National Road Schemes – a Practical Guide' (Rev 1 Nov 2008) highlights the difficulty of adequately addressing indirect impacts such as the disposal of waste which are the subject of separate statutory processes, in this instance the management of surplus material arising from a road construction site is regulated through the Waste Management Acts 1996 – 2008. The Guideline makes the following statements with regard to waste management and its consideration in an Environmental Impact Statement:

"For road schemes where significant material surpluses are anticipated it may be appropriate for the EIS to provide additional information, particularly in relation to potential sites and methods for the management / recovery of the material".

"In practice the management of surplus materials on a road scheme, in terms of the methods of disposal / recovery and the locations, remains a matter for the contractor in accordance with relevant statutory provisions (typically the Waste Management Regulations and the Planning Regulations). The extent to which this issue is addressed in the EIS will depend on the quantities and/or nature of the material involved. Where quantities and/or nature of material give rise to concerns in relation to potential significant environmental impacts more specific information should be provided".

This chapter provides a review of the potential impact of the proposed scheme under the heading of resource and waste management. It is based on the description of the scheme as described in Chapter 4 Description of the Proposed Road Development. The geotechnical characterisation of the project is addressed in Chapter 10 Soils and Geology.

17.2 Guidance

The following guidance documents on the management and minimisation of construction and demolition waste were reviewed:

- Best Practice Guidelines on the Preparation of Waste Management Plans for construction and Demolition Projects (Department of Environment, Heritage and Local Government, July 2006);
- CIRIA document 133 Waste Minimisation in Construction;
- NRA Guidelines for the Management of Waste from National Road Construction Projects, 2008.

All details presented are based on the current design formation at the date of production of this report. Any quantities presented are subject to further detailed design and should not be taken as definitive. To date no discussions have been held with waste disposal sites with regards to acceptance of waste arising from the project however final arrangement for the disposal sites with regard to acceptance of waste arising from the project will be subject to commercial consideration and the possession of each such site/facility of the necessary regulatory permission to accept that particular waste type.

17.3 Scheme Description

17.3.1 General

A description of the proposed development is included in Chapter 4. Waste will arise during the demolition, excavation, construction and operation of the proposed road development.

The main contractor will prepare the Construction and Demolition Waste Management Plan and the Environmental Operating Plan for the proposed development as part of their contractual obligations (refer Chapter 4, Section 4.4 for additional information).

17.3.2 Excavation and Disposal

As laid out in Chapter 4 Description of the Proposed Road Development, the M7 Naas to Newbridge Bypass Upgrade Scheme is primarily a widening of the existing motorway within the existing wide median which was been specifically reserved for that purpose. The required excavation and disposal of material is therefore not significant when compared to road schemes of a similar extent within a greenfield site. Chapter 4 provides the following approximate quantities of material which will require disposal off site.

Table 17.1: Material Quantities

	Section 1+ 2	Section 3 + 4	Section 5 + 6
Disposal			
Median excavation and disposal (m^3)	37498	58219	39110
Attenuation pond excavation and disposal (m^3)	11250	5625	5625
Drains (m)	36456	49000	38024
Hard shoulder blacktop (m^3)	4944		
Hard shoulder subbase (m^3)	14832		
Disposal Totals (m^3)	104980	112844	82759

The principal types of material to be disposed of are aggregate, blacktop, concrete and soil. It is not expected that any of this material will be contaminated.

A review of the Environmental Protection Agency website confirms that there are a number of suitable local landfill sites to which the material can be transported. These are listed below:

- Kerdiffstown, Naas, Co. Kildare;
- KTK Landfill Limited, Brownstown and Carnalway, Kilcullen, Co. Kildare;

- KTK Sand & Gravel Ltd, Kimmeens, Ballymore Eustace West and Coghlanstown East, County Kildare;
- Drehid Waste Management Facility, In the townlands of Parsonstown, Loughnacush, Kilkeaskin, Drumond, Timahoe West, Coolcarrigan, Killinagh Lower and Killinagh Upper, Carbury, County Kildare;
- Blackhall Soil Recovery Facility, Blackhall, Punchestown, Naas, County Kildare;
- Cemex (ROI) Limited, Walshestown, Blackhall, Tipperkevin and Bawnoge, Naas, Co. Kildare.

Based on a review of this list it is anticipated that there is significant available capacity within this existing waste management infrastructure to manage the waste from the M7 Naas to Newbridge Bypass Upgrade Scheme and it is considered that the potential effects on the environment of the appropriate disposal of this material to an authorised landfill are not significant.

17.3.3 Construction and Demolition Wastes

In addition to excavation material small quantities of other waste types will be generated during construction of the proposed development.

Quantities of general construction and demolition wastes are made up of waste such as wood, packaging, metals, plastics, bricks, blocks, canteen waste, some hazardous waste (e.g. oils, paints and adhesives), site clearance and residual waste which are generated during the construction phase.

A description of these wastes including their respective European Waste Catalogue (EWC) Codes (EPA, 2002), are outlined in Table 17.2.

Table 17.2: Typical Construction Waste EWC Codes and Corresponding Waste Descriptions (EPA, 2002b)

EWC Code	Waste Category
17 01	Concrete, bricks, tiles and ceramics
17 02	Wood, Glass and Plastic
17 03	Bituminous mixtures, coal tar and tarred products
17 04	Metals
17 05	Soil (incl. excavated soil from contaminated sites) , stones and dredging spoil
17 06	Insulation materials and asbestos containing construction materials
17 08	Gypsum-based construction materials
17 09	Other Construction and Demolition Waste
16 02	WEEE
16 06	Batteries
03 02	Wood Preservatives
13 07	Liquid Fuels

17.3.4 Operation

It is expected that there will be negligible waste generation on completion of the proposed road development. Wastes generated from maintenance of the road will be removed and managed by local authority staff and any contractors undertaking the work.

17.4 Mitigation Measures - Proposals for Minimisation, Reuse, Recycling and Management Waste

17.4.1 Waste Management

The management of C&D waste will reflect the waste management hierarchy, with waste prevention and minimisation being the first priority succeeded by reuse and recycling. During site clearance and construction works, there are numerous opportunities for the beneficial reuse and recycling of materials. The subsequent use of recycled materials in reconstruction works also reduces the quantities of waste which ultimately needs to be consigned to landfill sites.

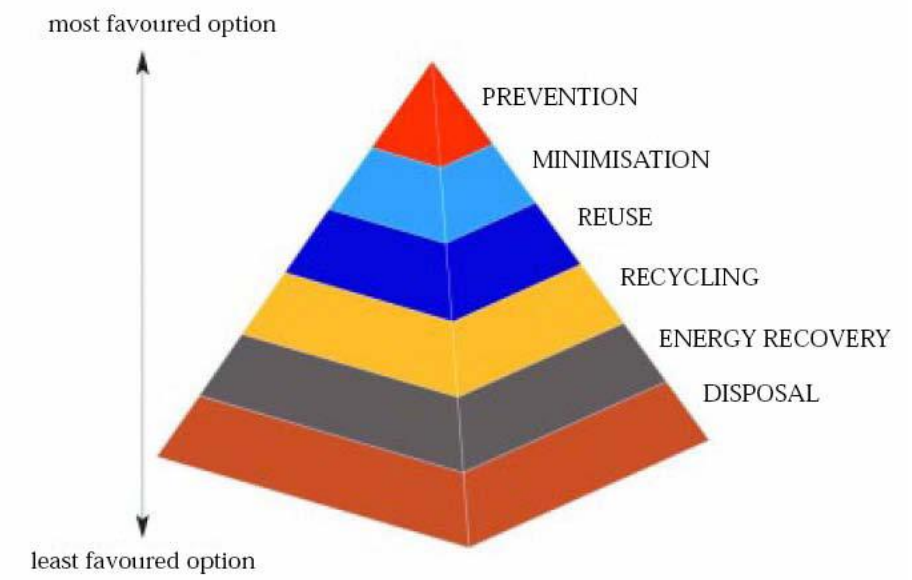

Plate 17.1: Waste Management Hierarchy Source: Changing Our Ways, Department of the Environment, Heritage and Local Government, 1998.

Waste Management Plan

Construction and Demolition Waste Management Plan which meets the requirements of the DoEHLG Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects (DoEHLG, 2006) will be implemented. This document is an integral element of the Environmental Operating Plan (refer Chapter 4, Section 4.4.5 for additional information).

Where waste generation cannot be avoided this will maximise the quantity and quality of waste delivered for recycling and facilitate its movement up the waste hierarchy away from landfill disposal and thereby reduce its environmental impact.

Source Segregation

Waste generated on the construction site will be identified and segregated according to their category as described by the European Waste Catalogue (EWC). Where possible metal, timber, glass and other recyclable material will be segregated and removed off site to a permitted/licensed facility for recycling.

In order to achieve this, designated Waste Storage Areas (WSA's) will be created at construction compounds or other suitable locations for the storage of segregated wastes prior to transport for recovery/disposal at suitably licensed /permitted facilities. Suitably sized containers for each waste stream will be provided within the

WSA and will be supervised by a Waste Management Co-ordinator (WMC) who will be appointed by the contractor. This will be the person responsible for the management of waste during the entire project. The number and sizing of containers will be agreed with Waste Contractors in advance of the commencement of the proposed project. Source segregation of waste will result in cost savings to the project as well as providing an environmentally sound route for the management of all C&D wastes.

Re-use

Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed works the Contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable. The contractor will ensure that any off-site interim storage facilities for excavated material have the appropriate waste licences or waste facility permits in place.

Material Management

In order to prevent and minimise the generation of waste, the contractor will be required to ensure that raw materials are ordered so that the timing of delivery, the **quantity delivered and the storage is not conductive to the creation of unnecessary** waste. The contractor will be required to develop a programme in conjunction with the material suppliers showing the estimated delivery dates and quantities for each specific material associated with each element of work. Following a "just in time" approach improves cash flow, utilises storage space better and reduces potential loss to theft and accidental damage as well as making the site safer.

It is essential that construction works planning is carried out closely with the waste management contractors, in order to determine the best techniques for managing waste and ensure a high level of recovery of materials for recycling. The contractor will be required to continuously seek to improve the waste management process on site during all stages of construction and maximise opportunities for reuse or recycling where they exist. For example in relation to waste packaging, the contractor will seek to negotiate take back of as much packaging waste as possible at source to ensure maximum recycling. The Construction Waste Management Plan (CWMP) will be included as an agenda item at the weekly construction meetings. In addition, the plan will be communicated to the whole team (including the client) at the monthly meetings. This will include any updates for earlier revisions to the document.

Waste Auditing

The Contractor will record the quantity in tonnes and types of waste and materials leaving the development site during the construction phase. The name, address and authorisation details of all facilities and locations to which waste and materials from the construction phase are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered and disposed of.

17.4.2 Primary Waste Streams

An overview of the methods to manage the primary waste streams expected is presented below.

Excavated clay, soil, and stones

Excavated soils, clay peat and rock will be loaded directly to vehicles for use within the project as appropriate (e.g. as fill material). Intermediate storage of material is not anticipated. Where short term temporary storage is unavoidable, the method of storage of such material will be key to its potential use as certain types of soils and clays are likely to degrade if left uncovered in wet weather due to its low plasticity and silty nature. Topsoil will be stored separately from other soil types and where possible clay mounds will not be more than two metres in height as they may damage the soil structures and limit its future use.

Concrete

Waste concrete is likely to arise during the construction phase of the project. It is proposed that where possible waste concrete generated will be returned to the supplier for reuse. Where this cannot be achieved the concrete may be crushed and screened out and used within the project where appropriate to do so, such as in sub base etc. The necessary permission for any crushing and screening activities required will be discussed with the environmental department of the local authority prior to any works being undertaken.

For every tonne of concrete waste that is recycled for aggregate in new concrete, significant savings are made in energy and carbon dioxide emissions. It also saves money by avoiding disposal costs which continue to increase. Residual concrete waste will be source segregated and stored in designated containers at the Waste Storage Area (WSA) for subsequent separation and recovery at a remote facility.

Metals

Metal waste has a significant scrap value. Although it is now common practice for sites to segregate metals for reuse and recycling, there are still sites where metal is thrown away with general rubbish. One of the primary sources of metal waste is rebar. Wastage of rebar will be reduced by ordering made to measure rebar from the manufacturer and detailed scheduling of all Reinforced Concrete (RC) structural elements.

Skip hire companies may provide free skips for the storage of scrap metal on sites and this will be investigated prior to construction commencing. When metal storage containers are full they will be removed by the waste storage contractor and sent to a metals recycling facility.

Timber

Timber waste will be stored separately as it is readily contaminated by other wastes and if it is allowed to rot will reduce the recyclability of other stored wastes. Any pallets will be returned to the supplier for reuse. Off cuts and trimmings will be used in formwork where at all possible. A container for waste wood will be covered where possible and will be placed in the WSA. The waste wood will be collected by a waste contractor who will forward it to a wood recycling facility for chipping.

Treatment of timber with chemicals and the overuse of nails will be minimised and avoided as this will make it difficult to reuse/recycle the timber afterwards. The utilisation of reclaimed timber products will also be investigated.

Packaging and Plastic

Packaging waste can become a major problem on a construction sites. Double handling will be avoided by segregating packaging wastes immediately after

unwrapping. Many suppliers are now prepared to collect their own packaging for recycling, and this will also be investigated prior to works commencing. It is intended that where possible materials with recycled packaging will be purchased. Waste packaging will be segregated and stored in separate containers, preferably covered, in the WSA for collection by the contractor and distribution to packaging recycling facilities.

Blocks, Bricks and Tiles

The careful storage of these raw materials will significantly reduce the volume of these wastes arising on site. The most likely wastes produced will be off-cuts, trimmings and waste arising from breakages. Every effort will be made to use broken bricks and off cuts. Final quantities of these wastes generated will be stockpiled (possibly crushed and/or screened) and used at the site as sub base material for roads, hardstand etc.

Hazardous Wastes

Prior to being removed from the site, any hazardous waste identified will undergo a comprehensive waste assessment and classification, by a suitably qualified person, in accordance with the European Waste Catalogue (EWC) and Hazardous Waste List. It should be noted that if non-hazardous waste becomes contaminated with hazardous waste the entire load will be considered hazardous. It is therefore critical to ensure that waste segregation areas are provided and are used properly to separate out hazardous, non-hazardous and inert waste arising. Hazardous wastes will be identified, removed and kept separate from other construction and demolition waste materials in order to avoid cross contamination. Specific method statements detailing the necessary mitigation measures required during excavation, handling transportation and disposal of hazardous wastes encountered on the site will be prepared as required.

The likely disposal/treatment options for any hazardous wastes available to the Contractor will depend on the nature of the hazardous material and the concentration of parameters of concern. The costs associated with treatment and disposal will equally vary depending on the concentration of parameters of concern and on the tonnage involved. There are several operators / facilities in operation within Ireland that could potentially accept the contaminated material depending upon the results of the Waste Acceptance Criteria testing (WAC) or assist in the export of the material abroad for special treatment where required. Full details of the disposal route for Hazardous Wastes will be provided in the Detailed Waste Management Plan following the appointment of the contract and completion of the further investigations required.

Hazardous Liquids (Oils, Paints, Chemicals)

Hazardous liquid waste arising from the construction process will require careful handling. Oils, paints, bitumen, adhesives and chemicals will be kept in a separate contained storage area which will be locked when not in use. Lids will be kept on containers in order to avoid spillage or waste by evaporation. Waste oils, paints and chemicals, including the containers, will require careful handling and disposal. These will be stored in a containment tray with a capacity to contain 110% of the volume of the largest container.

Fuels and chemical will be stored in double skinned containers or within a bund i.e. an impervious structure with the capacity to contain 110% of the volume of the largest tank stored within it. All containers will be carefully labelled.

Canteen Wastes

Staff canteens have the potential to generate food waste and packaging waste. Designated receptacles will be provided at the canteen to allow for the segregation and storage of individual waste streams. These will include receptacles for food waste (e.g. brown bin for waste foods, peelings etc,) dry recyclables (e.g. green bin for packaging, plastics, metals, wood, paper, cardboard, tetrapack, etc) and residual bin (e.g. black bin for mixed food and packaging waste). Separate receptacles for the recyclable fractions may be provided such as plastics, metals, glass and this will be designed and detailed by the WMC in consultation with the selected waste management contractor.

Other Wastes (Residual)

Waste material other than those outlined above can constitute a significant proportion of the total waste generated by a construction sites. This waste is normally made up of residual non recyclable waste such as soiled paper, cloth, cardboard or plastics as well as canteen waste to include food as above and general waste found on the sites including plastic bottles, bags, cans etc. Given the heterogeneous nature of this material it is most important that residual waste is kept separate from the other waste streams to avoid contamination. This material will be stored in a dedicated container in the WSA. Container size and collection frequency will be assessed with waste management contractors as works proceed. All residual wastes will be dispatched to a suitably licensed facility for disposal. Other construction and demolition waste material will be collected in receptacles with mixed construction and demolition waste materials for subsequent separation and disposal at a segregation facility.

17.5 Assignment of Responsibilities

A waste management co-ordinator (WMC) will be appointed who will have overall responsibility for waste management on the site. The Employer (Kildare County Council) will receive summaries of any audit reports which will be completed within three months of the end of each calendar year. The effectiveness and accuracy of the documentation may also be monitored on a regular basis via routine site visits. Following appointment of the preferred contractor the Waste Management Plan will be updated in accordance with the final design scheme and copies of the plan will be distributed to the Employer, the Site Manager and the site subcontractors. The WMC appointed by the Contractor will be appropriately trained and experienced in all aspects of waste management. In addition he/she and the site crew must be in a position to:

- Distinguish reusable materials from material suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on best locations for stockpiling reusable material;
- Separate material or recovery; and
- Identify and liaise with operators of recovery outlets.

The WMC will be responsible for educating all site staff, sub contractors and suppliers about the available alternative to conventional waste disposal. Training will also be given to all site staff in materials management on sites. The WNC will continually identify waste minimization actions on sties and this will be updated in the plan.

17.6 Training

Copies of the WMP will be made available to all personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provision. This is traditionally carried out during the induction process for new staff members. Where source segregation and material reuse techniques apply, each member of staff will be given instructions on how to comply with the waste management plan. Site notices will be designed to reinforce the key messages within the Management Plan and will be displayed prominently for the benefit of staff.

17.7 Waste Records

When establishing the system for managing the details of all arisings, movement and treatment of C&D waste in the WMP, the use of electronic tools should be considered to provide for convenient recording of information in a useful format such as "Smart – waste".

The contractor will be required to arrange for full details of all arisings, movements and construction and demolition waste to be recorded during all stages of the project. Each consignment of C&D waste removed from the site will be documented in the form of a Waste Movement Record form which will ensure full traceability of the material to its final destination. Separate record forms will be completed in respect to each waste transfer that takes place. The contractor will also receive printed documents/records from waste disposal companies employed during quantifying the exact amount of waste material removed from site. The sheet from the disposal company also identifies how much material went to landfill and how much went for recycling. All such records will be retained in a designated location and made available for auditing of the waste management plan.

17.8 C&D Waste Plan Summary

Waste will inevitably be generated during the construction and demolition phase of the proposed project. It is intended that all waste soils, rock and concrete will be used within the project area where possible for infilling or landscaping. At this preliminary stage it is anticipated that the bulk of surplus excavation arisings will be used on site. It is anticipated that a certain (relatively low) percentage of the surplus will not be suitable for use on site. These materials will be recovered or disposed of at appropriately licensed facilities.

Other than spoil material from excavations, waste arisings during the construction phase will be minimised by the purchasing manager by timing the ordering of materials for the site in a manner which reduced the likelihood of over purchase or damage during storage. C&D waste fractions will be segregated and stored on site in designated areas or containers in the WSA prior to transport by licensed hauliers to facilities for segregation recycling and disposal.

A WMC will be appointed to ensure the WMP is followed. Training will be given to all staff so that they are aware of the WMP and know their responsibilities.

Records will be kept to trace the inputs and outputs of the construction works at the site and this should allow the Employer to make informed decisions regarding waste management in the future. These records will be made available to the relevant local authorities and the EPA should it be required.

The design and implementation of the detailed CWMP in conjunction with the EOP for the scheme will provide for the optimum planning/management and handling of waste generated by the project and will ensure that there will be no worse than a neutral imperceptible impact from waste management practices during construction.