



ENVIRONMENTAL REPORT

relating to the

Strategic Environmental Assessment

of the

Proposed National Hazardous Waste Management Plan 2008 – 2012

NATIONAL WASTE PREVENTION PROGRAMME



Environmental Report

relating to the

Strategic Environmental Assessment

of the

**Proposed National Hazardous Waste
Management Plan
2008 – 2012**

ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil

PO Box 3000, Johnstown Castle, Co. Wexford, Ireland

Telephone: +353 53 9160600 Fax: +353 53 9160699

Email: info@epa.ie Website: www.epa.ie

Lo Call 1890 33 55 99

© Environmental Protection Agency 2007

All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

Environmental Report
relating to the
Strategic Environmental Assessment
of the
Proposed National Hazardous Waste Management Plan 2008-2012

Published by the Environmental Protection Agency, Ireland

This document does not purport to be and should not be considered a legal interpretation of the legislation referred to herein.

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. Neither the Environmental Protection Agency nor the author accepts any responsibility whatsoever for loss or damage occasioned, or claimed to have been occasioned, in part or in full as a consequence of any person acting or refraining from acting, as a result of a matter contained in this publication. All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

TABLE OF CONTENTS

NON-TECHNICAL SUMMARY	i
1 INTRODUCTION	i
2 METHODOLOGY	ii
3 OVERVIEW OF THE CONTENTS AND MAIN OBJECTIVES OF THE PLAN	vi
4 RELEVANT ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT INCLUDING EXISTING PROBLEMS	viii
5 ENVIRONMENTAL PROBLEMS	xii
6 ASSESSING THE ALTERNATIVE OPTIONS FOR HAZARDOUS WASTE	xiii
7 PREFERRED STRATEGY AND REASONS FOR SELECTING THE ALTERNATIVES	xiv
8 MITIGATION PROPOSED	xvii
9 MONITORING ENVIRONMENTAL IMPACTS OF THE PLAN	xvii
10 NEXT STEPS	xvii
1 INTRODUCTION	1
1.1 BACKGROUND	1
1.2 STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)	1
1.2.1 Purpose of SEA	1
1.2.2 SEA Process	2
1.3 PROJECT TEAM	2
2 METHODOLOGY	4
2.1 LEGISLATION AND GUIDANCE	4
2.2 INTEGRATION OF PROPOSED PLAN AND STRATEGIC ENVIRONMENTAL ASSESSMENT	4
2.3 KEY STAGES IN STRATEGIC ENVIRONMENTAL ASSESSMENT	5
2.4 ASSESSMENT PARAMETERS	6
2.5 DIFFICULTIES AND DATA GAPS	6
3 NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN	8
3.1 WHAT IS HAZARDOUS WASTE?	8
3.2 THE NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN	8
3.3 CURRENT SITUATION WITH HAZARDOUS WASTE	10
3.4 PRIORITIES OF THE PROPOSED NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN	14
4 REVIEW OF RELEVANT PLANS AND PROGRAMMES	15
4.1 OVERVIEW	15
4.2 FUNDAMENTAL WASTE MANAGEMENT PRINCIPLES	15
4.3 NATIONAL WASTE MANAGEMENT POLICIES AND PROGRAMMES	17
4.4 NATIONAL PLANNING POLICY AND LEGISLATION	18
5 BASELINE ENVIRONMENT	28
5.1 INTRODUCTION	28
5.2 CURRENT STATE OF THE ENVIRONMENT	28
5.3 BASELINE AND RELEVANT ENVIRONMENTAL PROBLEMS	29
5.3.1 Water: Surface Waters	29
5.3.2 Water: Groundwater	31

	5.3.3	Water: Coastal and Marine	33
	5.3.4	Air	34
	5.3.5	Climate	36
	5.3.6	Soil	38
	5.3.7	Material Assets.....	40
	5.3.8	Biodiversity, Flora and Fauna	41
	5.3.9	Human Health & Population.....	43
	5.3.10	Inter-Relationships	45
	5.3.11	Evolution of the Environment in the Absence of the Plan	46
6		SCOPING AND CONSULTATION PROCESS.....	48
	6.1	OVERVIEW OF SCOPING	48
	6.2	FORMAL SCOPING EXERCISE.....	48
	6.2.1	Initial Transboundary Scoping Consultation	49
	6.2.2	Initial Public Scoping Consultation.....	50
	6.3	DEFINING THE SCOPE.....	51
	6.3.1	Geographic Scope	51
	6.3.2	Temporal Scope	51
	6.3.3	Level of Detail of the Environmental Report	51
	6.3.4	Level of Detail of Assessment.....	52
	6.3.5	Key Environmental Criteria	52
	6.4	SCOPING DOCUMENT	54
7		STRATEGIC ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS	55
	7.1	INTRODUCTION.....	55
	7.2	DEVELOPMENT OF STRATEGIC ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS	55
	7.2.1	Approach.....	57
	7.2.2	Targets and Indicators	57
	7.2.3	Monitoring	57
8		EVALUATION AND ASSESSMENT OF ALTERNATIVE OPTIONS.....	59
	8.1	INTRODUCTION.....	59
	8.1.1	Development and Identification of Policy Objectives	59
	8.1.2	Option Selection.....	60
	8.1.3	Broad Option Assessment	61
	8.1.4	Assessment Approach	62
	8.1.5	Assessment Parameters.....	62
	8.2	QUALITATIVE ASSESSMENT OF OPTIONS	63
	8.2.1	Qualitative Assessment – Prevention	63
	8.2.2	Qualitative Assessment – Collection.....	64
	8.2.3	Qualitative Assessment – Treatment and Recovery.....	66
	8.2.4	Qualitative Assessment – Disposal (landfill)	67
	8.3	QUANTITATIVE ASSESSMENT OF OPTIONS	69
	8.3.1	Quantitative Assessment – Air	71

8.3.2	Quantitative Assessment – Climate	74
8.3.3	Quantitative Assessment – Material Assets (Land use)	83
8.3.4	Quantitative Assessment – Ash Generation from hazardous waste incineration	85
8.4	DETAILED ASSESSMENT OF OPTIONS.....	86
8.4.1	Key to Assessment of Options.....	86
8.5	CUMULATIVE AND SECONDARY EFFECTS.....	104
8.6	SUMMARY.....	106
8.6.1	Summary of Preferred Scenario	106
8.6.2	Reasons for Selecting the Alternatives	106
9	MONITORING AND MITIGATION.....	111
9.1	INTRODUCTION.....	111
9.2	RESPONSIBILITY	111
9.2.1	Sources of Information for Monitoring.....	111
9.3	FREQUENCY OF REPORTING	113
9.4	MITIGATION (RECOMMENDATIONS FROM THE SEA TO FEED INTO THE PLAN).....	113
9.4.1	Hazardous Waste Prevention	113
9.4.2	Unreported Hazardous Waste	113
9.4.3	Move Towards Self-sufficiency	113
9.4.4	Contaminated Sites.....	114
9.4.5	Local Issues	114
9.4.6	Transport – Climate Interface	114
9.5	SUMMARY OF MONITORING AND MITIGATION	114

LIST OF FIGURES

Figure 1	Summary of SEA stages.....	ii
Figure 2	Building Blocks of the National Hazardous Waste Management Plan and the Strategic Environmental Assessment	iv
Figure 3	Scoping Process.....	v
Figure 4	Planning Hierarchy and National Hazardous Waste Management Plan.....	vii
Figure 1.1	Overview of SEA Process.....	2
Figure 2.1	Building Blocks of the National Hazardous Waste Management Plan and Strategic Environmental Assessment	5
Figure 3.1	The location of hazardous waste treatment 1996-2006 (Tonnes).....	12
Figure 3.2	Sources of Hazardous Waste (Excluding Contaminated Soil) in 2004	12

Figure 4.1	European Waste Hierarchy.....	16
Figure 4.2	European Union Waste Prevention and Recycling Strategy	17
Figure 4.3	Overview of Hazardous Waste Policy Development in Ireland	18
Figure 4.4	Planning Hierarchy and National Hazardous Waste Management Plan.....	19
Figure 5.1	Water Quality in Irish Rivers and Streams 2003-2005, (EPA, 2005).....	30
Figure 5.2	Estimated Dioxin Emissions (g/annum) to Air in Ireland for 2000 and Percentage of Total Emissions Attributable to Each Sector (Source EPA 2002).	35
Figure 5.3	Relative Contributions to Greenhouse Gases by Sector (EPA 2007)	37
Figure 5.4	Electricity Mix in Ireland in 2006 (CER 2006)	40
Figure 6.1	Overview of the Scoping Process.....	48
Figure 6.2	Elements of the Consultation Process.....	50
Figure 6.3	Position of the Plan in the Decision Making Process	52
Figure 8.1	Integration of SEA into Technical and Policy Options Assessment	61
Figure 8.2	Projected Hazardous Waste Flows for 2016	71
Figure 8.3	Dioxins emissions to air from Incineration of Irish Hazardous Waste	72
Figure 8.4	Sources of dioxins for 2000, 2010 and 2016 with Plan implementation (includes reduction in dioxins from the burning of unreported wastes)	73
Figure 8.5	Sources of dioxins for 2000, 2010 and 2016 (excluding uncontrolled combustion)	74
Figure 8.6	Estimated GHG from the shipping of 100,000 tonnes mixed solvent wastes in 2004 (tonnes CO ₂ equivalent).....	75
Figure 8.7	Comparison of GHG emission from transport if waste solvents exported in 2004 were treated at a cement kiln in Co. Westmeath.....	76
Figure 8.8	Estimated GHG per tonne of solvent waste delivered from Transfer Station to treatment facilities in Ireland and Abroad.....	77
Figure 8.9	CO ₂ from incineration of waste without energy recovery – 2004 and 2016 (with and without the Plan)	78
Figure 8.10	Ash Generation from hazardous and municipal waste incineration.....	85

LIST OF TABLES

Table 1	Key requirements of SEA Directive	iii
Table 2	Scoping of Relevant Environmental Aspects.....	v
Table 3	Characteristics of the Environment and Environmental Problems	ix
Table 4	Potential Significant Interrelationships Between Environmental Issues	xii
Table 5	Summary of Preferred Strategy	xiv
Table 6	Summary of Assessment for Preferred Option.....	xv
Table 7	Summary of Quantitative Assessment of Preferred Strategy	xvi
Table 1.1	National Waste Prevention Committee Membership.....	3
Table 2.1	Key SEA Elements	6
Table 3.1	Summary of Progress in Meeting Priorities of the 2001 National Hazardous Waste Management Plan.....	10
Table 3.2	Characteristics of Unreported Waste Streams	13
Table 4.1	Review of International Level Legislation, Plans, Policies and Programmes.....	20
Table 4.2	Review of European Level Legislation, Plans, Policies and Programmes	21
Table 4.3	Review of National Legislation, Plans, Policies and Programmes	25
Table 5.1	Levels of Dioxins in Milk Fat (pg I-TEQ/g)	35
Table 5.2	Estimated Emissions of Dioxins to Air for Certain Sources 2000 and 2010.....	35
Table 5.3	Estimated dioxin emissions from burning of unreported hazardous waste	36
Table 5.4	Greenhouse Gas Emissions 1990 – 2005 (EPA 2007)	37
Table 5.5	Potential Significant Interrelationships Between Environmental Issues.....	45
Table 6.1	Summary of Formal Scoping	49
Table 6.2	Potential Receptors and Level of Assessment.....	53

Table 7.1	Compatibility Matrix for Environmental Objectives with Plan Objectives.....	56
Table 7.2	Strategic Environmental Objectives, Targets and Indicators.....	58
Table 8.1	Prevention Scenarios/Alternatives.....	64
Table 8.2	Collection Scenarios/Alternatives	65
Table 8.3	Treatment Scenarios/Alternatives.....	67
Table 8.4	Disposal Scenarios/Alternatives	68
Table 8.5	Potential for Quantitative Analysis	69
Table 8.6	2004 baseline and predicted waste flows for 2016 (with and without implementation of preferred option proposed by Plan) in tonnes *	70
Table 8.7	Estimated dioxin emissions from burning of unreported wastes	71
Table 8.8	Estimated Climate impacts from the export of mixed solvent wastes from Ireland in 2004	75
Table 8.9	Potential GHG emissions for transport and export of hazardous waste in tonnes	77
Table 8.10	Potential energy recovery from the thermal treatment of 50,000 tonnes of hazardous wastes	79
Table 8.11	Properties of Selected Waste Solvents.	80
Table 8.12	Potential Displacement of Furnace Fuel.....	81
Table 8.13	Summary of climate change assessment.....	82
Table 8.14	Estimated Land Required to provide new Infrastructure	83
Table 8.15	Estimated land area of contaminated sites.....	84
Table 8.16	Key to Assessment of Scenarios	86
Table 8.17	Detailed Assessment – Prevention.....	87
Table 8.18	Detailed Assessment – Collection	89
Table 8.19	Detailed Assessment – Treatment/Recovery (the table below should be read in conjunction with Appendix C & D).....	91
Table 8.20	Detailed Assessment - Disposal	97

Table 8.21	Detailed Assessment – Legacy Hazardous Waste Sites/ Contaminated Land.....	100
Table 8.22	Detailed Assessment – Contaminated Soil Treatment.....	102
Table 8.23	Cumulative Effects of the Preferred Strategy	104
Table 8.24	Summary of Secondary Effects	105
Table 8.25	Preferred Strategy	106
Table 8.26	Quantitative comparison of baseline (2004) versus Preferred Strategy (2016) (excl. contaminated soil).....	107
Table 8.27	Summary of Assessment for Preferred Option.....	109
Table 9.1	Environmental Monitoring Programme	112

NON-TECHNICAL SUMMARY

1 INTRODUCTION

The EPA has a lead role of planning for the management of hazardous waste in the Republic of Ireland. Unless it is managed properly, hazardous wastes have the potential to create adverse impacts on the environment and human health. Ireland generated approximately 560,000 tonnes of hazardous waste in 2004, including contaminated soil. This waste comprises a wide range of wastes from industrial solvents down to small batteries and fluorescent lamps. The largest generators of hazardous waste are the construction industry and industrial facilities, but other sectors such as healthcare, small businesses, farmers and householders all contribute.

The National Hazardous Waste Management Plan, hereafter referred to as the Plan, is a statutory document, which was first published by the Environmental Protection Agency (EPA) in 2001. The First Plan is now due for review and, in accordance with national and EU legislation, a Strategic Environmental Assessment (SEA) must be carried out before a revised Plan is adopted. SEA is a systematic method of considering the likely significant environmental effects of certain plans and programmes. SEA aims to

- Integrate environmental factors into the development of a Plan or Programme and related decision making;
- Improve environmental protection objectives of a Plan or Programme;
- Increase public participation in decision making; and
- Facilitate openness and transparency in decision making.

The purpose of the Environmental Report is to

- Inform the development of the second National Hazardous Waste Management Plan
- Identify, describe and evaluate the likely significant effects of the Plan and its reasonable alternatives; and,
- Provide an early opportunity for the statutory environmental authorities and the public to offer views on any aspect of this Environmental Report, through consultation.

The Plan addresses the requirement for prevention, collection, recovery and disposal of hazardous waste in Ireland, and the requirements for dealing with sites where hazardous waste disposal took place in the past. While the implementation of the Plan will be led by the Department of the Environment, Heritage and Local Government and overseen by the Environmental Protection Agency, reporting to the National Waste Prevention Committee, various other bodies will be responsible for implementing specific aspects of the Plan. These are outlined in Chapter 8 of the Proposed Plan. Issues to which the Plan will respond include:

- Prevention programme: an analysis of where to target resources, and the required scale of resources, is needed,
- Infrastructure deficiencies: barriers to developing indigenous treatment capacity need to be addressed,
- Self-sufficiency: the reliance on export has increased. Whether this is a strategic or sustainable approach in the long term needs to be considered,

- Access to collection services: poor availability or high cost of hazardous waste collection for various small-scale producers needs to be further addressed,
- Regulatory environment: improvements can be made, leading to a more efficient and streamlined system of controls and reporting, and
- Legacy issues: investigation and remediation of former landfills and industrial contaminated sites needs to become more comprehensive and pro-active, rather than reactive.

The key facts relating to the Proposed Plan are set out below.

Name of Plan Making Authority	Environmental Protection Agency
Title of the Plan	Proposed (Second) National Hazardous Waste Management Plan
What Prompted the Review of the Plan	The National Hazardous Waste Management Plan is a statutory plan under Section 26 of the Waste Management Act 1996
Subject	Hazardous Waste Management
Period Covered by the Plan:	2008-2012
Frequency of Updates	Every five years
Area Covered by the Plan	Republic of Ireland
Purpose and Objectives of the Plan	The National Hazardous Waste Management Plan addresses the requirement for prevention, collection, recovery and disposal of hazardous waste in Ireland, and the requirements for dealing with sites where hazardous waste disposal took place in the past.
Contact Point	Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, Co. Wexford, Ireland

2 METHODOLOGY

This Environmental Report contains the findings of the assessment of the likely significant effects on the environment, of implementing the Proposed Plan. It reflects the requirements of SEA Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment and also the relevant national Regulations (S.I. No. 435 of 2004). The project team drew on relevant guidance and previous SEAs completed in Ireland and other countries. The stages followed in the SEA are summarised in Figure 1 below.

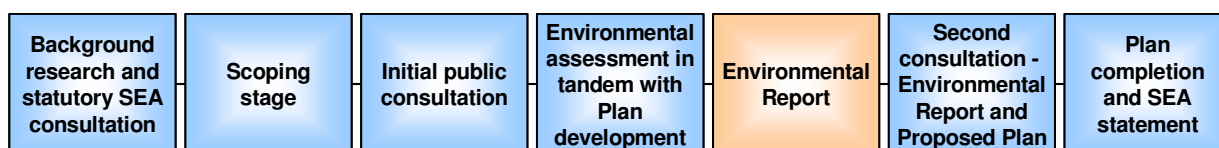


Figure 1 Summary of SEA stages

Integration of the SEA and the development of the Plan was achieved through close involvement of relevant team members in all stages of the project, including literature review, SEA scoping, public consultation, the review of the existing situation and the assessment of technical and policy options. The project team also participated in a number of workshops organised by the EPA in relation to capacity building for SEA in Ireland. The development of both the Plan and SEA was progressed in consultation with the National Waste Prevention Committee. Based on the requirements of legislation and guidance, the following information is provided in the Environmental Report (Table 1).

Table 1 Key requirements of SEA Directive

Requirement of SEA Directive (Article 5(1), Annex I)	Chapter of Environmental Report
((a) an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans or programmes).	Chapter 3 and Chapter 4
((b) the relevant aspects of the current state of the environment and the likely evolution thereof without the implementation of the plan or programme).	Chapter 5
((c) the environmental characteristics of areas likely to be significantly affected).	Chapter 5
((d) any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC.	Chapter 5
((e) the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.	Chapter 4
((f) the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, water air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage landscape and the interrelationship between the above factors.	Chapter 8
((g) the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects strategy on the environment of implementing the plan or programme)	Chapter 9
((h) an outline of the reasons for selecting the alternatives dealt with and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Chapter 8
((i) a description of the measures envisaged concerning monitoring in accordance with Article 10)	Chapter 9

Integration of the strategic environmental assessment and the development of the Plan was achieved through close involvement of relevant team members in all stages of the project, including literature review, SEA scoping, public consultation, the review of the existing situation and the assessment of technical and policy options. This is illustrated in Figure 2. The project team also participated in a number of workshops organised by the EPA in relation to capacity building for SEA in Ireland. During the strategic environmental assessment consideration was given to the following potential significant environmental effects of the Plan: short, medium and long-term; temporary and permanent; direct and indirect; and, cumulative.

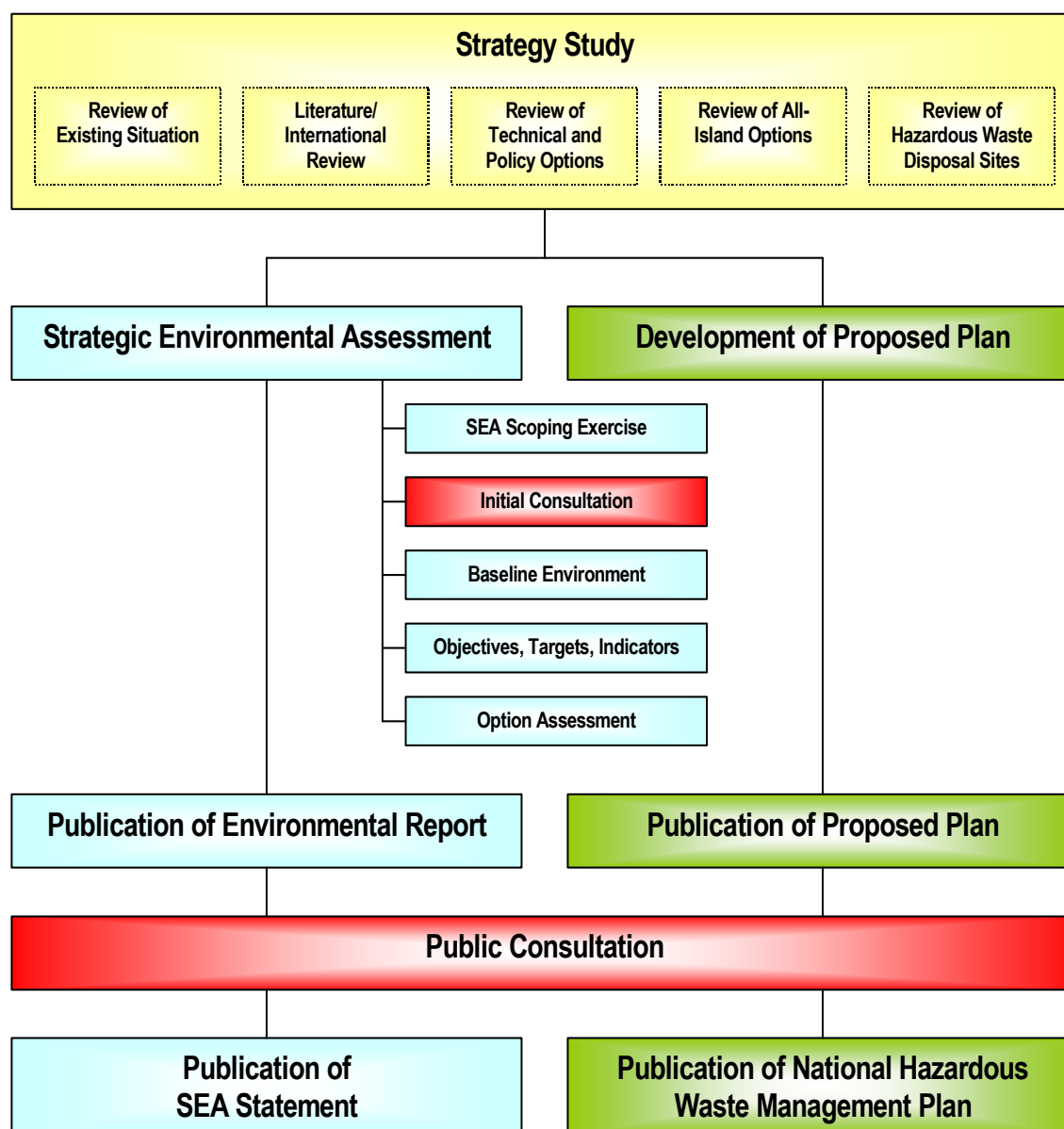


Figure 2 Building Blocks of the National Hazardous Waste Management Plan and the Strategic Environmental Assessment

Scoping

Initial consultation was carried out during the scoping phase and during compilation of the Environmental Report with the environmental authorities, which are statutory consultees under the legislation on SEA. The environmental authorities are:

- Department of the Environment, Heritage and Local Government;
- Department of Communications, Marine and Natural Resources¹; and,

¹ This is now the Department of Communications, Energy and Natural Resources

- Environmental Protection Agency.

This initial consultation also included the public and other stakeholders including relevant authorities in other Member States. Taking into consideration feedback from consultees, a broad assessment of the potential for the Plan to impact on the environment was carried out. The SEA scope is limited to the geographical area of Ireland, and the time perspective is up to 2016. The SEA does not deal with site-specific effects due to waste infrastructure, since that is outside the scope of a national plan. Lower decision-making levels where more local or site-specific impacts can be considered include Regional Waste Management Plans (for which separate strategic environmental assessments will be undertaken when next reviewed) and planning/licence applications for individual waste management facilities, which must include an Environmental Impact Statement (EIS).

For the most part, the impacts of implementing the Plan – e.g. in terms of emissions of greenhouse gases, or the uptake of greenfield land - do not register as nationally significant in the quantitative sense. The majority of hazardous waste is managed at licensed facilities at which environmental controls are in place to manage emissions. However for unreported hazardous waste, and for former hazardous waste disposal sites, there is a greater possibility of significant environmental impacts. For example, the suspected emission of dioxins from uncontrolled burning of hazardous waste is likely to make a substantial contribution to the overall national emissions, and the land area affected by industrial or waste contamination could cover as much as 3,500 hectares.

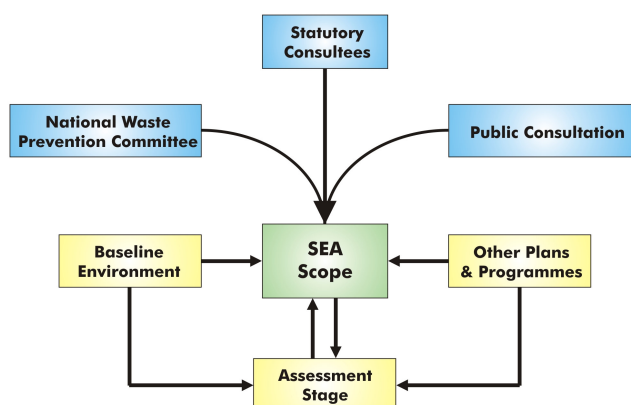


Figure 3 Scoping Process

Table 2 Scoping of Relevant Environmental Aspects

Environmental Receptors	Level of Assessment
Water, Air, Climate, Soil, Human Health, Material Assets (incl. Transport, Energy and Land take), Biodiversity, Flora and Fauna.	Environmental Receptors will potentially be impacted (positively or negatively) by the Plan and therefore impacts will be assessed at strategic /SEA level.
Cultural Heritage including Architectural and Archaeological Heritage, Landscape	Not considered to be significantly impacted at strategic level, as the Plan will not determine site-specific locations for facilities. Would be assessed at EIS/project stage.

3 OVERVIEW OF THE CONTENTS AND MAIN OBJECTIVES OF THE PLAN

Section 26 of the Waste Management Acts, 1996 to 2005, sets out the overarching objectives for the National Hazardous Waste Management Plan as follows:

Prevention: To prevent hazardous waste, i.e. to reduce its gross generation

Collection: To improve collection

Treatment: To improve treatment and recovery capacity, i.e. national self-sufficiency

Disposal: To provide for adequate disposal particularly with regard to historical disposal sites.

Having regard to those objectives, the following objectives are proposed as priorities for the Plan for the period 2008-2012.

1. To reduce the generation of hazardous waste by industry and society, generally.
2. To minimise unreported hazardous waste with a view to reducing the environmental impact of this unregulated waste stream.
3. To strive for greater self-sufficiency in the management of hazardous waste and to reduce hazardous waste export.
4. To minimise the environmental, social and economic impacts of hazardous waste generation and management.

Relationship with Other Plans, Programmes and Environmental Protection Objectives

The Plan is primarily incorporated into planning and development by means of the regional waste management plans. Figure 4 illustrates the planning hierarchy and the National Hazardous Waste Management Plan.

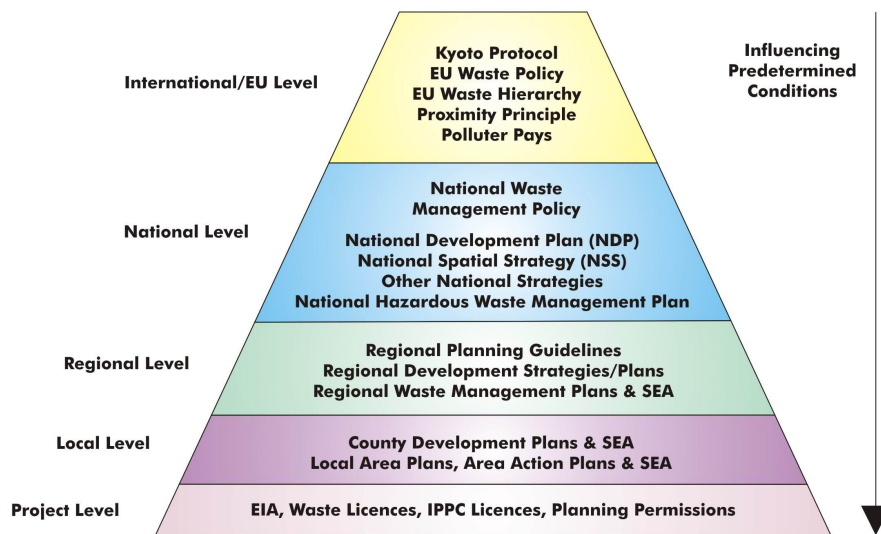


Figure 4 Planning Hierarchy and National Hazardous Waste Management Plan

A review of the plans, policies and programmes relevant to the Plan was carried out. The review focussed primarily on national, European and international plans, policies and programmes. In reviewing other plans, the following questions were asked:

Does the Plan contribute to the fulfilment of the objectives and goals set in other plans?

To what degree are the goals and objectives set in other plans and programmes impacted by the Plan?

The findings of the review helped define the objectives for the SEA and informed the assessment of alternative options.

Some key plans, programmes and policies include:

- The SEA Directive
- The Water Framework Directive
- The Kyoto Protocol
- The Air Framework Directive
- EU Habitats Directive and Birds Directive
- Waste Management Act
- National Waste Prevention Programme

4 RELEVANT ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT INCLUDING EXISTING PROBLEMS

The third EPA state of the environment report, *Ireland's Environment 2004* (EPA, 2004), identified five overall environmental priorities for the country. One of these was the thematic challenge of improving waste management. A review was carried out of the current state of the Irish Environment, with a particular focus on aspects that might be impacted by hazardous waste now or in the future. In general, the Irish environment is of good quality, and few directly measurable impacts are reported from hazardous waste on a national level. Table 3 sets out the relationships identified between hazardous waste management and environmental receptors.

The baseline examination included the relevant aspects of the current state of the Irish environment in relation to water, air, climate, soil, material assets (including energy), biodiversity, fauna, flora, human health, population and the interrelationship between these factors.

The main sources of data used in the compilation of this baseline were (amongst others):

- *Ireland's Environment 2004* (EPA, 2004), which reports on the state of the environment and general trends;
- *National Waste Report 2004* (EPA, 2005), which includes up to date dataset of hazardous waste arisings and management;
- Scoping Responses from the Environmental Authorities; and,
- Environmental Protection Agency enforcement database for waste and IPPC licensed activities – the EPA's Office of Environmental Enforcement was consulted as to whether any incidents of pollution had been recorded by hazardous waste facility monitoring activities.

Table 3 Characteristics of the Environment and Environmental Problems

Aspect	Current Impact from Hazardous Waste	Environmental Characteristics	Environmental Problems
Surface Water	Slight	Ireland has an abundant supply of surface water (rivers and lakes), constituting a key resource in economic, amenity and aesthetic terms. Much of our surface water includes wildlife conservation areas recognised at national and European level. Whilst water quality in Ireland compares well with most other EU countries, there is continuing evidence of slight or moderate pollution in certain rivers and lakes.	Risks are posed by active facilities (some emission breaches noted) former disposal sites, and unreported hazardous wastes.
Groundwater	Slight	In Ireland, the main concern regarding groundwater is its suitability as a source of drinking water. There is an increasing trend in the number of groundwater samples showing zero contamination. However, 52 per cent of all EPA groundwater-monitoring locations showed bacteriological contamination at least once between 2003 and 2005. The compliance of public water supplies with the microbiological parameter, <i>E. coli</i> , remains high at 98.9 per cent in 2005. However, group water compliance rate continued to lag behind.	Pollution may occur from former disposal sites, illegal dumping, inappropriate disposal of unreported hazardous wastes and other activities such as diesel laundering.
Marine	Slight/Not known	The quality of Ireland's coastal/marine waters is determined largely by the quality of the waters of the North-East Atlantic and the degree to which this is altered by inputs of organic matter, nutrients and other materials from the land, from rivers and from the atmosphere. The Quality of Bathing Water in Ireland 2005 (EPA, 2006) shows that 96% of sites (126 of 131 sites) were in compliance for coliforms, mineral oils, surface-active substances and phenol. The quality of shellfish waters improved in 2005 with a notable increase in waters assessed to be of highest quality for shellfish production and an elimination of those of lowest quality (EPA, 2006).	Hazardous residues have been identified in some port sediments, probably related to historical activity. Risks arise from Marine transport and export of wastes, via accidents, spillages or general handling.
Air	Slight	Air quality in Ireland is generally good. Ireland is not heavily industrialised and as a small island with frequent wind and a mild climate, pollutant dispersion is relatively good. Nitrogen dioxide (NO ₂) and fine particulate matter (PM ₁₀) are now the primary threat to the quality of air in Ireland, (EPA SoE, 2005a). One pollutant that is of particular interest in terms of hazardous waste management are dioxins. Dioxins are formed as by-products of incomplete combustion and are primarily released into the environment through air emissions. Since 1995 the EPA have surveyed dioxin levels in cow's milk every 4–5 years. Results from the 2004 survey confirmed uniformly low levels of dioxins and polychlorinated biphenyls (PCBs).	Risks from possible combustion of unreported wastes, and emissions from authorised hazardous waste facilities.
Climate	Slight	The six primary greenhouse gases covered by legislation include carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF ₆). Ireland's greenhouse gas emissions (per capita) are among the highest in Europe. The agriculture, energy industries, and transport sectors remain the principal sources of GHG emissions, together accounting for just over 70% of total national emissions.	The main emissions are from transport of hazardous waste, in particular exported wastes. Road transport is far more damaging than the shipping. Unlike municipal waste, generation of methane is not a problem.
Soil	Slight/Moderate	Irish soils can be grouped into nine major classes referred to as great soil groups as listed below.. Gleys, the most common mineral soil type in Ireland, are slow draining soils, commonly not suitable for cultivation unless drained (Meehan 2003).	National soil quality is not significantly impacted, but former hazardous waste disposal sites, and inappropriate disposal of unreported wastes, can have a significant negative impact on soil. A larger volume of contaminated soil is currently being exported.

Aspect	Current Impact from Hazardous Waste	Environmental Characteristics	Environmental Problems
Material Assets	Slight/ Moderate	Energy in Ireland is largely derived from non-renewable fossil fuel sources and almost 90% of energy supply is imported. In 2004 fossil fuels (coal and peat) represented approximately 26% of total energy production in Ireland with 50% gas. The contribution of renewable energy to primary energy supply is set to increase significantly in the next couple of years (CSO 2006).	Current impacts on transport and energy are noted, as is the infrastructure deficit in hazardous waste treatment in Ireland.
Biodiversity	Slight	As an island, Ireland, compared with most other European countries, has relatively reduced biodiversity in terms of species numbers and richness. This can be accounted for by its size, island status, position at the edge of a European archipelago and glacial history (Mitchell, 2002). The main habitat types in Ireland are freshwater habitats, peatlands, grasslands, native woodlands, freshwater habitats, rocky habitats, and artificial habitats. There are 60 habitat types and 25 species in Ireland that are recognised in the Habitats Directive and more recently the European Commission as being in need of special protection. These species and habitats are afforded protection in Ireland under the designations SAC, SPA and NHA. In addition there are Ramsar sites, national parks and wildlife refuges in Ireland which protect rare and threatened species of flora and fauna.	Indirect impacts may be felt via air or water emissions from hazardous waste facilities. Former waste disposal sites may also be creating negative impacts. Direct impacts could occur if facilities are sited near protected habitats.
Human Health	Slight/Not Known	In a recent EPA survey <i>'Public Perception, Attitudes and Values on the Environment'</i> (2006) almost half of Irish adults consider waste management the most important issues facing Ireland today. A major report on the effects of various forms of waste disposal commissioned by the Health Research board in 2003 concluded that Ireland has insufficient resources to carry out adequate risk assessments for proposed waste management facilities. In relation to the detection and monitoring of the environmental impact of waste facilities, the report concluded that there is a serious deficiency of baseline environmental information in Ireland and went on to recommend that this deficiency should be remedied.	The biggest impacts on health are likely to arise from inappropriate disposal of hazardous wastes and illegal hazardous wastes activities. Possible impacts on a domestic/ occupational level through accidents are also recognised. If more self-sufficiency is achieved more waste facilities and an increase of air emissions are projected.

Evolution of the Environment in the Absence of the Plan

In the absence of the Proposed Plan it is considered that the likely future changes to the environment can be described as follows:

Water: There would be an on-going low level risk to water quality (marine, freshwater, groundwater) in the absence of the Plan as a result of continued export of hazardous waste abroad with the potential to cause environmental pollution due to risks of accidents, spillages and handling. Accidental release of hazardous waste to water due to transport by sea may result in more severe impacts than from other transport due to the quantity on board.

Air: Air emissions would continue as a result of both transport and processing of hazardous waste material generated in Ireland. In the absence of the Plan, waste would continue to be exported, possibly at higher volumes and this would result in transport related emissions from road and shipping. Process emissions would continue to be in the destination country. Therefore, local air quality would not be affected.

Climate: in the absence of the Plan, there would be continued potential for emission of greenhouse gases (GHG) associated with the transport of hazardous waste abroad for treatment. The majority of the GHG emissions from transport are due to maritime transport. Road transport has limited GHG emissions when compared with maritime transport (as smaller distances are travelled) but is still of concern.

Soil: If waste is treated and disposed of abroad no impacts to the soil environment are anticipated for Ireland in the absence of the Plan. However, there would be the loss of soil as a resource.

Material Assets: In the absence of the Plan it is likely that progress towards self-sufficiency in Ireland's hazardous waste sector would not occur as inadequate infrastructural provisions would remain a major limiting factor. Ireland would continue to export significant quantities of waste for treatment and disposal, thereby reducing the potential to recover energy or reuse material in Ireland. In the absence of the Plan, there would be a slower restoration of land to beneficial use. However, some negative impacts from non-remediated sites would be expected.

Biodiversity: Generally there would be a continued risk to biodiversity from pollutants such as heavy metals and other dangerous chemical substances if it was not handled correctly in the absence of the Plan. Transport of hazardous waste outside the state would continue to pose a risk to marine biodiversity and this risk would be likely to increase as trends suggest increased hazardous waste generation in Ireland.

Human Health and Population: People interact with their environment and as such have the potential to be indirectly impacted by air quality, water quality and soil. In the absence of the Plan there would be a risk to human health through potential negative impacts on water, air, and soil quality arising from illegal or inappropriate disposal of unreported hazardous waste. As Ireland exports its hazardous waste, potential negative health impacts arising from treatment processes and similarly from disposal options do not arise in Ireland. Therefore, no health impacts are anticipated for Ireland in the absence of the Plan.

Interactions

The SEA Directive requires that the interrelationship between the SEA environmental issues must be taken into account. Table 4 highlights the key interrelationships identified in this strategic environmental assessment.

To illustrate what is meant by an interrelationship or interaction between environmental issues an example is provided. The air quality of an area has wide implications for the environment as it interacts to some degree with most living organisms. In the immediate environment and on a more global scale air quality can impact on, human beings living and working in an area, terrestrial, aquatic flora and fauna, climate, soil and material assets.

Table 4 Potential Significant Interrelationships Between Environmental Issues

Surface Water										
Groundwater	✓									
Marine	✓	✓								
Air	X	X	X							
Climate	X	X	X	✓						
Soil	✓	✓	X	✓	✓					
Human Health	✓	✓	✓	✓	✓	✓	✓			
Material Assets	✓	✓	✓	✓	✓	✓	✓	X		
Biodiversity	✓	✓	✓	✓	✓	✓	✓	X	X	
	Surface Water	Groundwater	Marine	Air	Climate	Soil	Human Health	Material Assets	Biodiversity	

✓ = interrelationship anticipated

X = no interrelationship anticipated

5 ENVIRONMENTAL PROBLEMS

SEA objectives are separate to the Plan objectives and provide a statement of what is intended from an environmental perspective, giving a desired direction of change. The SEA objectives reflect the existing environmental concerns in Ireland relevant to hazardous waste, and take account of the scoping and consultation feedback. These objectives will be used as a framework for assessing the environmental impacts associated with implementation of the Plan. The selected objectives for this SEA are listed below in Box 1.

Box 1: SEA Objectives Selected

1. **Water:** To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste
2. **Air:** To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health
3. **Climate:** To minimise greenhouse gas emissions associated with hazardous waste management (including transport)
4. **Soil:** To safeguard soil quality and quantity from hazardous waste and reduce soil contamination
5. **Material Assets:** To maximise use of the built environment, energy and raw materials.
6. **Transport:** To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation
7. **Biodiversity:** To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan
8. **Human Health/Population:** To protect human health from hazardous waste

6 ASSESSING THE ALTERNATIVE OPTIONS FOR HAZARDOUS WASTE

Prevention

A 'business as usual' approach was compared with an approach of prioritising prevention and undertaking a comprehensive range of sectoral initiatives. The latter will achieve greater levels of prevention and as such has a positive environmental impact across all relevant receptors.

Collection

The current collection system for small-scale hazardous waste mainly revolves around a disjointed network of drop-off points. This was compared with the alternative of an 'integrated system' which will include improved drop-off (or mobile collection) facilities and increased take-back of suitable small scale hazardous waste by retailers and producers at the point of sale. The integrated approach offers greater environmental benefit, since it is likely to provide a system that will ultimately collect greater quantities of unreported waste, and can take advantage of more efficient transport methods.

Treatment and Recovery

A series of alternatives were considered for the treatment and recovery of hazardous waste. The 'business as usual' scenario – with hazardous waste being largely exported – has a relatively low impact on Irish soil, groundwater, or air quality, but it requires greater use of transport and energy (with associated implications for greenhouse gas emissions), and creates greater potential risks for the marine environment. Alternatives considered included:

- Large scale solvent recovery;
- Hazardous waste incineration;
- Co-incineration in cement kilns;
- A centralised hazardous waste treatment facility; and,
- An integrated approach with solvent recovery, co-incineration, and incineration.

With all of these options, transport emissions and marine environment risks were reduced, and energy recovery improved. However, there is the potential for some increased air emissions or emissions to water in Ireland in the event of hazardous waste treatment facilities being developed. Solvent recovery has some advantages in terms of air emissions, and a centralised treatment facility would use less land and reduce transport emissions. As the bulk of Irish hazardous waste is currently treated abroad, any resulting emissions from treatment occur in the destination countries; greater self-sufficiency would result in those emissions occurring in Ireland, but with reduced impacts from transport-related emissions.

Disposal

The 'business as usual' approach involves export of hazardous waste for disposal. The alternatives considered included the development of a standalone hazardous waste landfill in Ireland, or the development of standalone hazardous waste cells at non hazardous landfill. As with recovery/treatment, developing disposal capacity here would bring some emissions locally (e.g. landtake and resources/energy) but there would be a reduction in transport and transport-related greenhouse gas emissions.

Former Hazardous Waste Disposal Sites

The environmental benefit of carrying out a rigorous and comprehensive programme of site identification, risk assessment and remediation was assessed, compared with the 'business as usual' scenario which is the piecemeal redevelopment of property based on commercial value of the site. A more coherent programme, with prioritisation of remediation efforts, will bring greater benefit to water, soil and biodiversity.

Contaminated Soil Management

The 'business as usual' approach entails a significant amount of off-site treatment, mainly at overseas facilities. The alternative examined was increased on-site remediation (using mobile plant) and a greater level of self-sufficiency in off-site soil treatment capacity in Ireland. The latter reduces transportation impacts but potentially increases local emissions to air or water during the remediation process.

7 PREFERRED STRATEGY AND REASONS FOR SELECTING THE ALTERNATIVES

A preferred strategy was developed based on a range of considerations, including technical, economic and strategic considerations and the relative environmental merits of scenarios.

Table 5 Summary of Preferred Strategy

Prevention	Target the priority hazardous waste generating sectors including development of sector specific waste management plans, prevention initiatives, training and financial support, within the framework of the National Waste Prevention Programme.
Collection	The drop-off based system will be improved with the further development of civic amenity sites and implementation of retail take back for appropriate materials. Mobile collection to be provided in a limited way for specific waste stream (farm waste and some household hazardous).
Treatment	There will be a modest increase in off-site solvent recovery (2,000 tonnes per annum), cement plants to employ 50,000 tonnes per annum blended solvent fuel, waste to energy capacity of 50,000 tonnes per annum to thermally treat remaining waste suitable streams and some export of hazardous waste for recovery may continue.
Disposal	Develop hazardous waste disposal capacity (co-located with existing or planned landfill facilities) in Ireland

At the broad level, implementation of the Plan is expected to bring environmental improvements, since it revolves around the reduction in generation of hazardous waste and improvements in the management of hazardous waste that is generated. However, there are some emissions associated with the treatment and disposal of hazardous waste. In a number of cases, the Plan is likely to bring a geographical shift emissions back to Ireland, and may result in some increase in emissions at the local level in the move towards self-sufficiency and a more sustainable national position.

The strategic environmental assessment has identified areas where mitigation of impacts can be achieved including ensuring that monitoring and regulation of treatment facilities is adequate, and encouraging a coherent approach to the identification and remediation of historically contaminated sites. The assessment is summarised in Table 6.

Table 6 Summary of Assessment for Preferred Option

	Water	Air	Climate	Soil	Material Assets	Transport	Biodiversity	Human Health	Comments and Proposed Mitigation Measures
Prevention Programme of prevention including producer responsibility initiatives, preparation of waste management plans, once-off best performance studies, financial support and promotion.	+	+	+	+	+	+	+	+	No significant negative impacts are anticipated from implementation of the preferred option. The Prevention Programme will have a net positive impact through reduction in the generation of hazardous waste overall. The business as usual option would result in negative impacts through continued increases in hazardous waste generation. The pace of implementation of the Plan will be important in the success of this strategy. No further mitigation is required.
Collection Integrated Approach combination of Drop-Off and Producer/ Supplier Take back.	+	+	Ø	+	+	-	+	+	A potentially significant negative impact from the preferred collection scenario has been identified i.e. increased transport and transport-related emissions from the increased collection of hazardous waste. This can be mitigated by provision of treatment facilities in Ireland so that transport overall is minimised (i.e. reduced export). The business as usual option would result in continued (unknown) risks from unreported hazardous waste. The pace of implementation of the Plan will be important in the success of this strategy.
Treatment Integrated Recovery Option with combination of WTE facility, solvents treated at cement kilns and export.	+	+	+	0	+	+	+/-	0	Provision of treatment facilities in Ireland will have an overall positive impact on the environment. The impact on biodiversity could potentially be negative if designated sites are included. This can be mitigated by avoiding designated sites. The business as usual option would result in continued reliance on export market for hazardous waste treatment and associated transport-related impacts. The pace of implementation will be important in the success of this strategy.
Disposal Co-located hazardous waste disposal cells	0	0	+	0	+	+	+/-	0	Provision of disposal facilities in Ireland is not anticipated to cause negative impacts on the environment. The impact on biodiversity could potentially be negative if designated sites are included. This can be mitigated by avoiding designated sites when siting facilities. The business as usual option would result in continued reliance on export market for hazardous waste disposal and associated transport-related impacts. The pace of implementation will be important in the success of this strategy. Improvements to the C1 system are also proposed as mitigation to ensure traceability of hazardous waste.

KEY:**Assessment Symbol****Explanation of Symbol****Description of Impact**

-

Potential Significant Negative Impact

The impacts from hazardous waste activity on the receiving environment are likely to be negative (detrimental)*.

+

Potential Positive Impact

The impacts from hazardous waste activity on the receiving environment are likely to be positive (beneficial).

Ø

No Change

No change from the current situation, i.e. baseline.

+/-

May be a Positive or Negative Impact

The impacts from hazardous waste activity on the receiving environment may be positive or negative (detrimental or beneficial)

0

Neutral

No impacts are anticipated

Table 7 below presents some of the key findings in terms of quantified impacts. Despite the total hazardous waste generation growing, the impacts due to Plan implementation are mostly positive (i.e. reduced emissions).

Table 7 Summary of Quantitative Assessment of Preferred Strategy

Total	2004 Baseline	2016 with Plan	Difference
Hazardous waste generation (tonnes)	354,418	405,481	+51,063
Unreported hazardous waste (tonnes)	47,011	24,215	-22,796
Unreported hazardous waste (% of total arisings)	13%	6%	-7%
Hazardous waste export (tonnes)	165,128	100,079	-65,049
Hazardous waste export (% of total arisings)	47%	25%	-22%
Greenhouse gas emissions from solvent export (tonnes)	3,768	467	-3,302
Distance travelled from solvent Export (Km)	1,235,489	588,315	-647,174
Carbon Dioxide emissions (CO ₂) from the thermal treatment of Irish hazardous wastes (tonnes)	150,672	171,636	20,965
Dioxins release to air from the incineration of Irish hazardous waste (grams per annum)	0.101	0.115	0.014
Dioxin release to air (uncontrolled and controlled) in Ireland (grams per annum)	34.03	28.06	-5.97
Fossil fuel displacement by co-incineration (tonnes of oil equivalent)	0	37,062	37,062
Energy recovery from hazardous waste in Ireland	0	3.6 to 4.5 MW _e 9 to 11 MW _{th}	+3.6 to 4.5 MW _e + 9 to 11 MW _{th}
Land area consumed (ha)	-	84	+84
Land area remediated (ha)	N/a	-700	-700
Hazardous ash from WTE (tonnes)	0	1,250	+1,250

8 MITIGATION PROPOSED

A potentially significant negative impact from the preferred collection scenario has been identified. This relates to increased export and associated transport arising from the increased collection of hazardous waste. This can be mitigated by provision of treatment facilities in Ireland and moving towards self-sufficiency i.e. implementation of the treatment and recovery options of the strategy.

Provision of treatment and disposal facilities in Ireland is not anticipated to cause negative impacts on the environment at a national level. The impact on biodiversity could potentially be negative only if designated sites are included. This can be mitigated by ensuring that the appropriate assessment and approval processes are followed when proposed infrastructure developments are being considered.

9 MONITORING ENVIRONMENTAL IMPACTS OF THE PLAN

The EPA will be responsible for monitoring the implementation of the Plan. A series of indicators have been selected for the purpose of monitoring progress towards achieving the strategic environmental objectives and targets. A report will be presented periodically to the National Waste Prevention Committee. Therefore, monitoring will be ongoing throughout the period of the Plan, ultimately feeding into the review of the Plan after 2012.

10 NEXT STEPS

This Environmental Report accompanies the Proposed Plan for the purpose of public consultation. Following the period of public consultation, the Plan will be finalised and adopted and an SEA Statement will be published.

The minimum requirement for SEA reporting would be every five years, given that the Plan must be reviewed at this frequency. However, as the Plan is being implemented, the EPA will prepare an annual implementation report, which will be submitted to the National Waste Prevention Committee prior to publication. Reports from all relevant implementation bodies will be sought for incorporation into the implementation report. The implementation report will incorporate environmental reporting against the strategic environmental objectives, targets and indicators presented in this Environmental Report. The first implementation report will be prepared in respect of the calendar year 2008 and will be published by June 2009.

The monitoring programme will be kept under review as implementation of the Plan progresses. Targets and indicators may be adjusted or amended as appropriate during the period of the Plan, depending on the results of early monitoring. This will ensure the continued effectiveness of the monitoring programme in the interest of optimal environmental protection. The next full review of the Plan will commence in 2012.

1 INTRODUCTION

1.1 BACKGROUND

Ireland produces up to 700,000 tonnes of hazardous waste annually, including contaminated soil. This comprises a wide range of wastes from industrial solvents down to small batteries and fluorescent lamps. Hazardous waste is generated in a variety of different sectors of society. The largest generators are the construction industry and industrial facilities, but other sectors such as healthcare, small businesses, farmers and householders all generate hazardous wastes. If not managed properly, hazardous waste has the potential to create adverse impacts on the environment and human health. The EPA has the lead role of planning for the management of hazardous waste in Ireland.

The National Hazardous Waste Management Plan (the Plan) is a statutory document, which was first published by the Environmental Protection Agency (EPA) in 2001, in accordance with Section 26 of the Waste Management Act, 1996. RPS were engaged to carry out a strategy study and Strategic Environmental Assessment during the development of the Proposed National Hazardous Waste Management Plan. The Plan, which is intended for all organizations involved in the generation, management or regulation of hazardous waste, deals with:

- the prevention of hazardous waste and the setting of targets towards this goal;

- the collection and movement of hazardous waste;

- the recovery and disposal of hazardous waste that cannot be prevented; and

- the management of historical hazardous waste disposal sites.

This first National Hazardous Waste Management Plan is now due for review and, in accordance with national and EU legislation, a Strategic Environmental Assessment (SEA) must be carried out before the Plan may be adopted.

1.2 STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

1.2.1 Purpose of SEA

SEA is a process for evaluating, at the earliest appropriate stage, the environmental effects of plans or programmes before they are adopted. It also gives the public and other interested parties an opportunity to comment and to be kept informed of decisions and how they were made. An early consideration of environmental concerns in the planning process creates an opportunity for environmental factors to be considered explicitly alongside other factors such as social, technical or economic aspects.

The European Directive on SEA (2001/42/EC) is commonly referred to as the SEA Directive. The Directive was adopted into Irish legislation on the 21st of July 2004 under two pieces of legislation;

- European Communities (Environmental Assessment Of Certain Plans And Programmes) Regulations 2004 (S.I. No. 435 of 2004), and

- Planning and Development (Strategic Environmental Assessment) Regulations 2004 (S.I. No. 436 of 2004).

The National Hazardous Waste Management Plans falls under the remit of S.I. No. 435 of 2004 and it is under that legislation that this SEA has been undertaken.

1.2.2 SEA Process

Figure 1.1 shows an overview of the SEA Process. SEA comprises the following principle stages:

Screening: certain plans and programmes prepared by statutory bodies, and which are likely to have a significant impact on the environment, will now require an SEA to be carried out. As a National Hazardous Waste Plan must be subjected to the SEA procedure no formal screening step is required in this case.

Scoping: the objective of scoping is to identify key issues of concern that should be addressed in the environmental assessment of the Plan so that they can be considered in appropriate detail.

An Environmental Report: which contains the findings of the assessment on the likely significant effects on the environment of implementing the Plan;

Consultation on the Proposed Plan and the Environmental Report;

An SEA Statement: which identifies how environmental considerations and consultations have been integrated into the Final Plan.



Figure 1.1 Overview of SEA Process

1.3 PROJECT TEAM

Assistance was provided by RPS Consulting Engineers in the preparation of this Environmental Report, while the Proposed Plan was being developed by the EPA. COWI (Denmark), the Clean Technology Centre and Professor David C. Wilson also assisted with the strategic environmental assessment.

The Steering Committee responsible for overseeing the project in an advisory capacity comprised members of the National Waste Prevention Committee (NWPC). This Committee, which was convened in 2004 to advise on the implementation of the National Waste Prevention Programme, is represented by a cross-section of interests including Government Departments, environmental organisations, the waste industry, business, NGOs and agriculture. Workshops were held with the NWPC in March 2006 and July 2006 enabling interaction between the EPA, the Project Team, and the Committee on the emerging findings of the project. The organisations represented on the Committee are listed in Table 1.1.

Table 1.1 National Waste Prevention Committee Membership

National Waste Prevention Committee Representatives	
Environmental Protection Agency (EPA)	
Department of Environment Heritage & Local Government (DEHLG)	
Department of Agriculture & Food (DAF)	
Department of Enterprise, Trade & Employment (DETE)	
Irish Business & Employers Confederation (IBEC)	
Irish Waste Management Association (IWMA)	
Chartered Institute of Waste Management (CIWM)	
Irish Pharmaceutical & Chemical Manufacturers Federation (IPCMF)	
Small Firms Association (SFA)	
Irish Small and Medium Enterprises (ISME)	
Irish Farmers Association (IFA)	
Irish Creamery Milk Suppliers Association (ICMSA)	
Chambers of Commerce (CoC)	
Enterprise Ireland (EI)	
Comhar (Sustainable Development Council)	
Clean Technology Centre (CTC)	
Environmental NGO's Core	

2 METHODOLOGY

2.1 LEGISLATION AND GUIDANCE

This Environmental Report contains the findings of the assessment of the likely significant effects on the environment, of implementing the Proposed National Hazardous Waste Management Plan. It reflects the requirements of SEA Directive (2001/42/EC) on the assessment of the effects of certain plans and programmes on the environment and also the transposed Irish Regulations (S.I. No. 435 of 2004).

The following sources of guidance have been used during the overall SEA process and preparation of the Environmental Report.

Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland, Synthesis Report. Environmental Protection Agency (2003).

Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment – Guidelines for Regional Authorities and Planning Authorities. Department of Environment Heritage and Local Government Guidelines (2004)

A Practical Guide to the Strategic Environmental Assessment Directive. Office of the Deputy Prime Minister (2005).

Experience drawn from other SEA's carried out in Ireland and the UK – this includes the pilot SEA for the Replacement Waste Management Plan for the Midlands Region (2005), which was the first SEA for a waste management plan carried out in Ireland, on a pilot basis before the formal introduction of SEA legislation.

2.2 INTEGRATION OF PROPOSED PLAN AND STRATEGIC ENVIRONMENTAL ASSESSMENT

This Environmental Report was developed in parallel with the development of the Proposed Plan. Background information was presented in a Strategy Study in advance of the Plan development. (Figure 2.1).

Integration of the SEA and the development of the Plan was achieved through close involvement of relevant team members in all stages of the project, including literature review, the review of the existing situation and the review of technical and policy options, SEA scoping, public consultation, review of baseline environment and option assessment. The project team also participated in a number of workshops organised by the EPA in relation to capacity building for SEA in Ireland. The preparation of the Strategy Study and the development of the Plan and the strategic environmental assessment was progressed in consultation with the National Waste Prevention Committee.

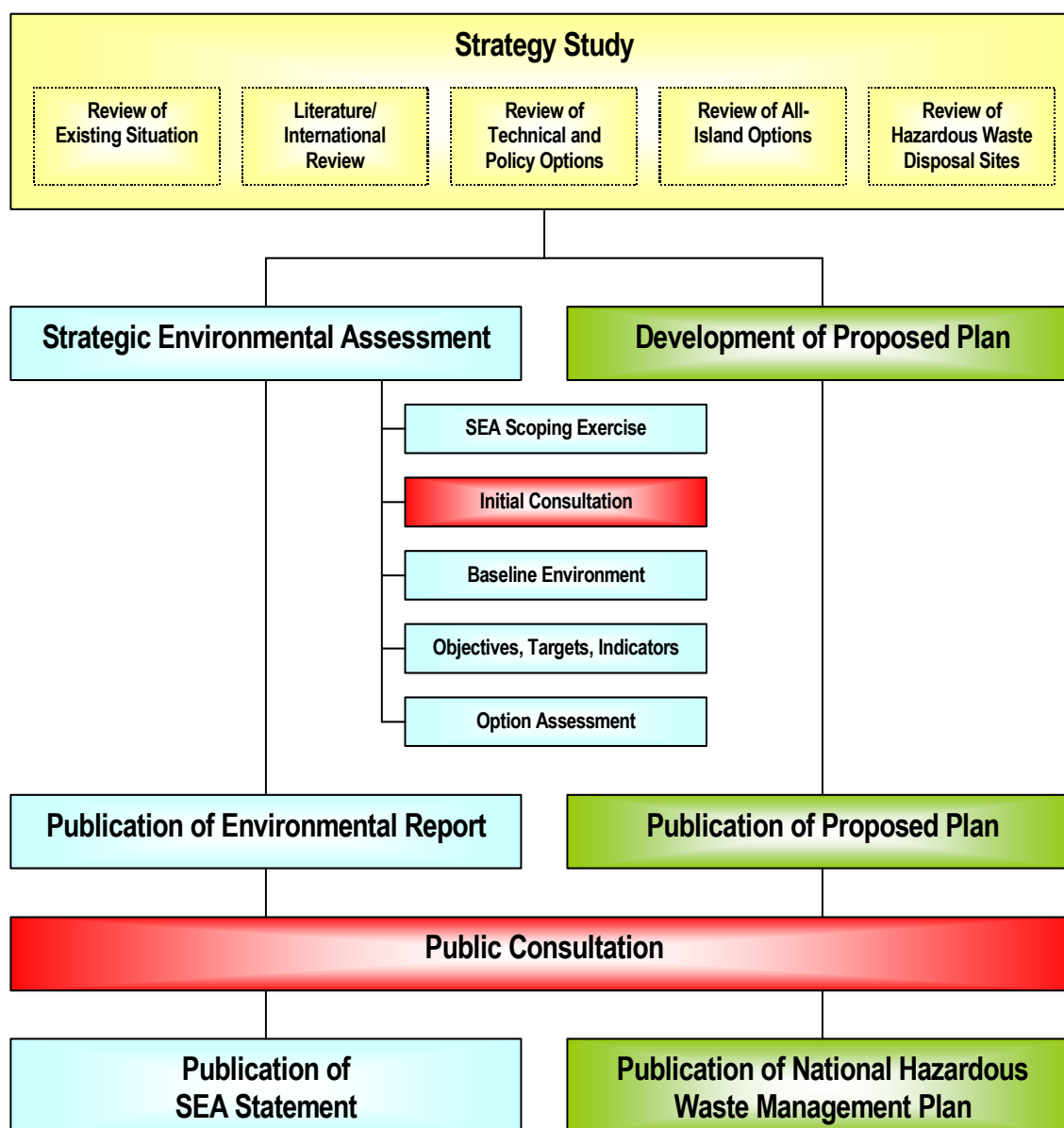


Figure 2.1 Building Blocks of the National Hazardous Waste Management Plan and Strategic Environmental Assessment

2.3 KEY STAGES IN STRATEGIC ENVIRONMENTAL ASSESSMENT

Based on the requirements of legislation and guidance, the SEA has been carried out in the steps outlined in Table 2.1. This Environmental Report is an intermediary step in the SEA process; following consultation on the Proposed Plan and Environmental Report, the revised Plan and SEA Statement will be published

The methodology and sources used to gather baseline information to develop strategic environmental objectives, targets and indicators and to complete the environmental assessment are detailed at the beginning of the relevant chapters throughout this report. In addition Chapter 6 of this Environmental Report summarises the scoping and initial public consultation processes.

Table 2.1 Key SEA Elements

Requirement of SEA Directive (Article 5(1), Annex I)	Section of Environmental Report
((a) an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans or programmes).	Chapter 3 and Chapter 4
((b) the relevant aspects of the current state of the environment and the likely evolution thereof without the implementation of the plan or programme).	Chapter 5
((c) the environmental characteristics of areas likely to be significantly affected).	Chapter 5
((d) any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC.	Chapter 5
((e) the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.	Chapter 4
((f) the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, water air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage landscape and the interrelationship between the above factors.	Chapter 8
((g) the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects strategy on the environment of implementing the plan or programme)	Chapter 9
((h) an outline of the reasons for selecting the alternatives dealt with and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Chapter 8
((i) a description of the measures envisaged concerning monitoring in accordance with Article 10)	Chapter 9

2.4 ASSESSMENT PARAMETERS

In line with requirements of the legislation the likely significant effects on the environment of implementing the Proposed Plan have been assessed. This has included reference to secondary, cumulative, synergistic, short, medium and long term, permanent and temporary, positive and negative effects.

2.5 DIFFICULTIES AND DATA GAPS

The main difficulties encountered in carrying out the Strategic Environmental Assessment were:

- Environmental datasets are held by a variety of bodies. For example there are currently a number of bodies which are involved in monitoring various aspects of marine pollution e.g. Marine Institute, EPA, Department of Communication Marine and Natural Resources, the

Department of Transport, local authorities. However there is currently no central body fulfilling this task.

- The collection of hazardous waste in Ireland is recorded through the C1 form. However, this information is not compiled or centralized in a database and is not useable in its current forms for statistical purposes. Such a database, were it available, would be useful to map the county of origin of hazardous waste and refine further the assessment of emissions from transport.
- The information on the implications of climate change in Ireland is limited (e.g. “flooding”, severe weather conditions, the possible implications of the risk of accidental spillages during the transport of hazardous waste, particularly by sea, and sea level rise on harbour based infrastructures for the storage and movement of hazardous waste loads).

3 NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN

3.1 WHAT IS HAZARDOUS WASTE?

Hazardous waste is generated by all sectors of society, including construction (land remediation), industry, agriculture, healthcare, transport, households and other activities. Table 3 and Table 4 of the Proposed Plan provide information on the types, quantities and destinations of hazardous waste generated in Ireland in 2004 and 2006, respectively.

Hazardous waste is broadly defined in Section 4 (2) of the Waste Management Act, 1996. The list of wastes which are defined as hazardous has expanded due to changes in EU legislation, most recently the amendment to the European Waste Catalogue, introduced in January 2004.

The Hazardous Waste Directive (91/689/EEC) applies to all wastes featured on the list of hazardous waste including inorganic waste. These are wastes, which have a number of properties listed in Annex III to the Directive including:

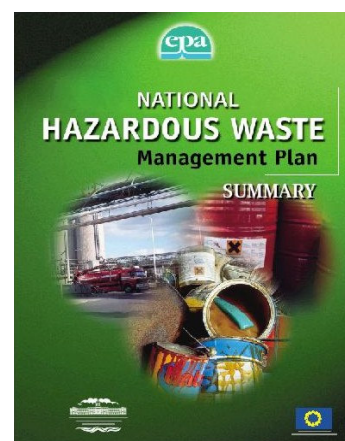
- Explosive,
- Oxidizing,
- Highly Flammable,
- Flammable
- Irritant,
- Infectious,
- Corrosive,
- Teratogenic,
- Carcinogenic,
- Toxic,
- Harmful,
- Mutagenic.

Also included are substances and preparations, which release toxic gases on contact with water, air or acid as well as substances and preparations capable by any means, after disposal, of yielding another substance, e.g. solvents, which possesses any of the characteristics listed above.

3.2 THE NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN

Ireland began to address hazardous waste management in a comprehensive manner in 1996, following adoption of the Waste Management Act 1996. The first National Hazardous Waste Management Plan (NHWMP) was published by the Environmental Protection Agency in 2001. The Plan is a statutory document published by the EPA, in accordance with Section 26 of the Waste Management Act. The EPA is also a designated environmental authority for strategic environmental assessment, under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations, (S.I. No 435 of 2004).

The first Plan was adopted in 2001 following extensive consultation. It contained proposals for hazardous waste prevention, improved collection, and new infrastructure to move towards national self-sufficiency in recovery and disposal of hazardous waste. It also addressed issues such as former waste disposal sites.

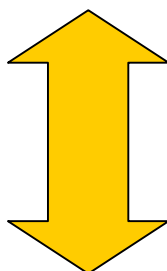


The statutory requirements of the Plan are summarised in Box 3.1. Based on these requirements, four key objectives (the Objectives of the Plan) have been identified and are summarised in Box 3.2. These Plan objectives are separate from the environmental objectives (provided in Box 7.1). The

compatibility of the SEA objectives and the Plan objectives has been reviewed and this is reported in Table 7.1.

Box 3.1 Statutory Requirements of the National Hazardous Waste Management Plan

- a) To describe and predict the type, quantity and origin of hazardous waste, its movement within, into and out of the country and facilities available for the collection, recovery and disposal of the waste.
- b) To specify objectives and, where appropriate, targets in relation to the prevention and minimisation of the production of hazardous waste, the minimisation of the harmful nature of such waste and the recovery or disposal of such waste.
- c) To provide for, as appropriate, the identification of sites at which waste disposal activities that to a significant extent involved hazardous waste have been carried on, the assessment of any risk of environmental pollution and the recommending of measures to prevent or limit such pollution and to identify remedial measures.
- d) To have regard to the need to give effect to the polluter pays principle.
- e) To have regard to the precautionary principle in relation to the potentially harmful effects of emissions and the risk of environmental pollution.
- f) To make recommendations, with respect to the management of hazardous waste, regarding:
 - Priorities, measures and programmes which could be pursued,
 - Infrastructure, facilities or other physical resources considered to be necessary,
 - The functions of any relevant public authorities.
 - To specify policies which the agency proposes to pursue.



Box 3.2 Overall Objectives of the National Hazardous Waste Management Plan

Prevention: To reduce the generation of hazardous waste by industry and society generally.

Collection: To minimise unreported hazardous waste with a view to reducing the environmental impact of this unregulated waste stream.

Treatment and Disposal: To aim for self-sufficiency in the management of hazardous waste and to reduce hazardous waste export.

Environmental: To minimise the environmental, social and economic impacts of hazardous waste generation and management.

3.3 CURRENT SITUATION WITH HAZARDOUS WASTE

In Table 3.1, progress is compared with the priorities of the first Plan which was published in 2001.

Key changes that have occurred since the adoption of the first Plan in 2001 include:

- Hazardous waste quantities have grown, albeit far less than originally predicted, and more slowly than our economic or industrial growth;
- The hazardous waste collection and treatment industry has matured and consolidated to a certain extent;
- Our reliance on foreign treatment facilities for hazardous waste has increased;
- The quantities of contaminated soil arising have increased substantially due to redevelopment of brownfield urban sites;
- The National Waste Prevention Programme has been established
- There have been considerable developments in drop off facilities provided by local authorities for household hazardous waste, mobile collection services and, in some instances, commercial hazardous waste services;
- At least two local authority Green Business Officers are in place and many more Environmental Awareness (Education) Officers are actively engaging with householders and business on waste recycling/prevention;
- The hazardous waste management industry has increased its capacity and some companies are actively seeking and evaluating new opportunities.

In the absence of the Proposed Plan, these trends could be expected to continue in the future.

Table 3.1 Summary of Progress in Meeting Priorities of the 2001 National Hazardous Waste Management Plan

	Priority	Progress reported in August 2004	Update to November 2007
1	The establishment of an Implementation Committee.	Established July 2003. Replaced by the National Waste Prevention Committee in April 2004.	The National Waste Prevention Committee has met nine times since April 2004.
2	The establishment of a Prevention Team to implement the Prevention Programme.	A National Waste Prevention Programme was launched in April 2004 and will be implemented by a Core Prevention Team within the Environmental Protection Agency.	Implementation is ongoing. A local authority prevention demonstration programme was launched in 2006. A green business initiative is in preparation. A Packaging Prevention Programme has started.
3	The identification and elimination of unreported hazardous waste.	Reduced by 51% between 1996 and 2001 to 48,402 tonnes	The National Waste Report 2004 estimates that 47,011 tonnes of hazardous waste were unreported. An estimated 29,888 tonnes were unreported in 2006.
4	The identification and assessment of hazardous waste disposal sites.	Progress is slow and unsystematic. Only one local authority has systematically carried out this recommendation.	The EPA prepared a Code of Practice for Environmental Risk Assessment for Unregulated Waste Disposal Sites ² in 2007.

² <http://www.epa.ie/whatwedo/advice/waste>

	Priority	Progress reported in August 2004	Update to November 2007
5	Establishment of an improved collection infrastructure for hazardous household, agricultural and SME wastes.	Civic waste facilities are increasing and all now accept small-scale hazardous waste to a greater or lesser extent. A mobile collection service was used by 18 local authorities in 2003.	Further progress is evident on the range of wastes accepted at civic amenity sites and a full service is provided in many areas. A mobile collection service was used by 15 local authorities in 2006. Few civic amenity sites are available to business users.
6	The allocation of financial and technical assistance for the development of hazardous waste recovery and disposal facilities.	No grant aid has been provided to the private sector for the recovery and disposal of hazardous waste since the 1997 grant-aid applications round.	No further financial assistance programmes were put in place.
7	The development of hazardous waste landfill and thermal treatment capacity for hazardous wastes requiring disposal to achieve self-sufficiency.	No hazardous waste landfill has been proposed. One proposal has been made for a hazardous waste incinerator.	No hazardous waste landfill has been proposed. A proposal by Indaver Ireland for a hazardous waste incinerator in Ringaskiddy has been granted planning permission and an EPA licence.
8	Improved public awareness of the impacts of hazardous wastes.	It is difficult to quantify progress on this recommendation. The quantity of unreported hazardous waste has decreased, indicating increased compliance with regulations. The Race Against Waste campaign has raised public awareness of the waste issue in general.	The Race Against Waste campaign has been completed. The roll-out of National Waste Prevention Programme projects including Hazred, Solvents, Deco Paints, RoHS etc. should raise awareness of hazardous waste.
9	Build on on-going prevention, research and demonstration initiatives.	Examples of ongoing initiatives include: Cleaner Greener Production Programme (EPA) Environmentally Superior Products Programme (Enterprise Ireland) Environmental Management Systems Grants (Enterprise Ireland)	The initiatives to the left are still in place. A third phase of the Cleaner Greener Production Programme was launched under the Environmental Technologies Action Programme. A case studies initiative was commenced in 2007 under the National Waste Prevention Programme to generate and disseminate prevention case studies.
Long-term priorities:			
10	The achievement of self-sufficiency in hazardous waste management.	Recovery: adequate domestic capacity exists for many hazardous waste streams. Technical feasibility is not generally a barrier. Private sector economic considerations, coupled, potentially, with grant support, will drive the development of new or expanded facilities. Disposal: inadequate domestic capacity exists for the disposal of hazardous waste by thermal treatment and landfill. Only one proposal (for a hazardous waste incinerator) has been made.	Export volumes remain high as a proportion of total generation of hazardous waste.
11	No increase in hazardous waste disposed of over 1996 quantities.	Hazardous waste disposal increased to 125,629 tonnes in 2001. The recommended target is 86,754 tonnes.	Hazardous waste disposal was 161,430 tonnes in 2004 and 149,063 tonnes in 2006.
12	The qualitative reduction (i.e. reduction in the degree of hazard) of hazardous waste.	This is difficult to measure and has as much to do with product design and manufacture as with waste. No indicators for progress are readily available.	The ROHS ³ , WEEE ⁴ , ELV ⁵ , deco-paints ⁶ and packaging ⁷ directives restrict the use of certain hazardous substances in electrical and electronic equipment, vehicles, paints and packaging.

³ Directive on restriction on hazardous substances – see Chapter 2 of Proposed Plan for more details.

⁴ Directive on waste electrical and electronic equipment – see Chapter 2 of Proposed Plan for more details.

⁵ Directive on end-of-life vehicles – see Chapter 2 of Proposed Plan for more details.

⁶ Directive 2004/42/CE of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC.

⁷ European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

There has been an increase in hazardous waste generation between 1996 and 2006. Figure 3.1 illustrates the trend in hazardous waste generation and location of treatment between 1996 and 2006. The quantity of hazardous waste managed increased from 307,778 tonnes in 2004 to 284,184 tonnes in 2006.

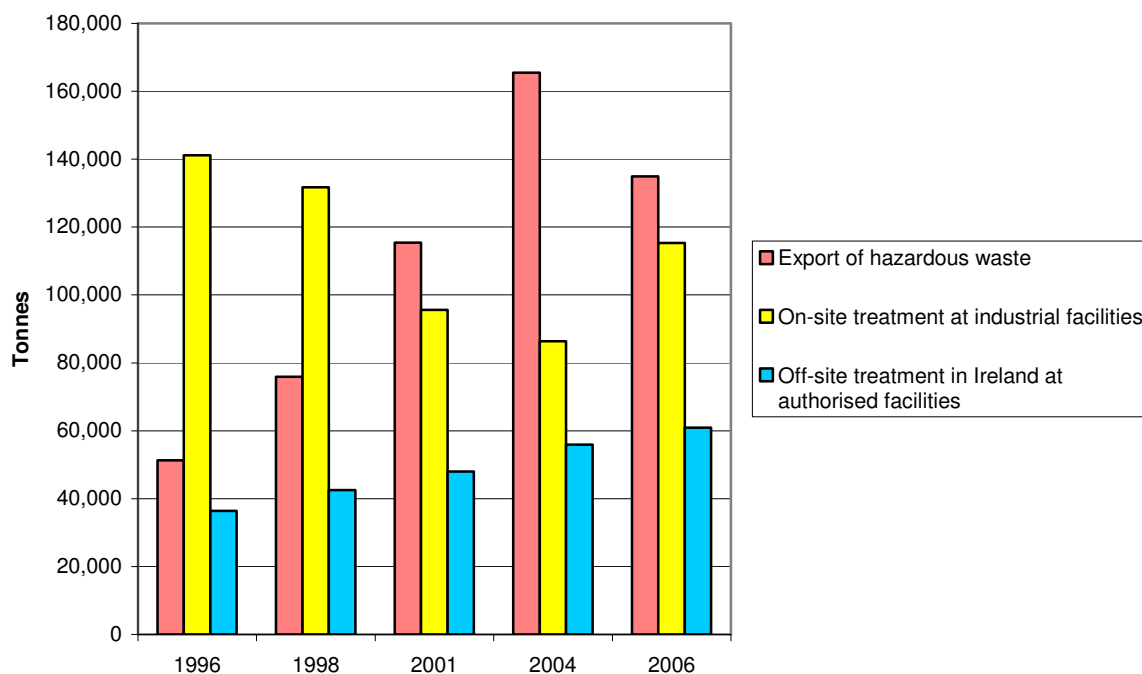


Figure 3.1 The location of hazardous waste treatment 1996-2006 (Tonnes)

Redevelopment activities generate 48% of total hazardous waste arisings in the form of contaminated soil. The sectors creating other hazardous waste are set out in Figure 3.2 below. IPPC sector industries account 57% of this waste, and within the IPPC sector chemical and pharmaceutical companies account for 60% of the hazardous waste. The remainder is generated in commercial activities, non-IPPC sector industries, agriculture, and in households.

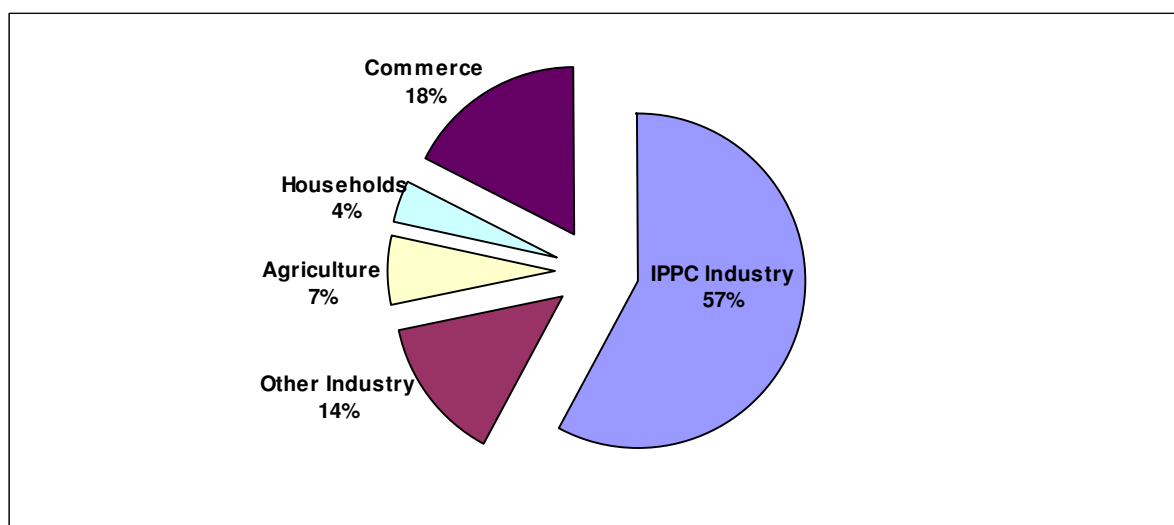


Figure 3.2 Sources of Hazardous Waste (Excluding Contaminated Soil) in 2004

Following the approach of the first National Hazardous Waste Management Plan, hazardous wastes are described as “reported” (or managed) and “unreported” (or uncollected) waste. Reported waste is waste that is actively managed and for which there is a verifiable information source. Unreported waste is that for which there is no clearly defined source of information and arisings are estimated. A particular concern with unreported waste is that it is more likely to cause pollution than waste collected and managed at authorised facilities. The characteristics of these unreported wastes are set out in Table 3.2. Unreported waste has shown an overall decline since the first Plan was drawn up due to improvement in collection systems (e.g. WEEE Producer Responsibility Scheme), based on best estimates available, but an estimated 47,000 tonnes was generated in 2004.

Table 3.2 Characteristics of Unreported Waste Streams

Unreported Waste Stream	Characteristics	Estd. Tonnage Unreported in 2004
Waste Oils	Generated when engine oils, or other oils (lubricants, braking systems etc.) are replaced. Sectors for which the management methods are not well known include DIY motor mechanics, small garages, small industries/ workshops, agriculture and haulage. Also characterised by oily residues from interceptors and storage tanks. Also includes vehicle oil filters.	0-2,000 (waste oils) 2,266 (oily sludges) 1,327 (oil filters)
Lead-acid batteries	Mainly arise from transportation and industrial sectors. Sectors of interest as for waste oils. In some cases the batteries may be illegally smashed open to recover the lead content, in which case the acid can cause pollution.	3,330
Small Batteries	Generated in household, and to a lesser extent in commerce, industry etc. Category includes batteries from watches, mobile phones, torches, personal stereos etc. Most likely that batteries end up in municipal waste stream and are landfilled along with mixed municipal waste.	3,279
Paint & Ink Packaging	Comprises packaging with small quantities of hazardous material such as paint, ink etc. – such as leftover paint from household DIY. Generated in household, commercial and industrial sectors, including printing and publishing sector.	4,111
Agriculture	The hazardous agricultural waste stream consists of four main streams – sheep dip, pesticides, waste oil and medicines. Sheep dip is currently disposed by spreading on land in accordance with Department of Agriculture codes of practice, but the activity is unregulated and data is estimated. Pesticides, and residues in containers arise mainly on tillage farms. Leftover medicines and animal remedies may also be hazardous. How these materials are managed remains unclear, but effective collection systems are not well developed.	22,053 (sheep dip) 1,174 (other)
Other Household Hazardous waste	Household items such as aerosols, solvents, detergents etc are currently believed to be disposed of with residual waste or down drains. The paints, batteries and small electronic items also arise in the household stream but they are accounted for elsewhere.	8,765
Fluorescent Lamps	Tubes and compact fluorescent lamps (CFLs – low energy bulbs) are currently believed to be disposed of with residual waste.	454
Photographic chemical waste	From small scale commercial users and DIY are currently believed to be disposed of with residual waste or down drains.	2.2
Offices	Data on hazardous office waste is scant, but it is suspected that not all materials are properly managed. Examples of office hazardous waste include fluorescent tubes, printer inks, cleaning agents, and other materials similar to household hazardous waste.	224
Asbestos	It is likely that some asbestos is not managed properly. It may not be properly identified, e.g. in DIY projects, or else not separated from other demolition waste. No data is available on ‘unreported’ amounts.	No means of estimation for 2004
WEEE	WEEE has certain hazardous components. Recently collection systems have improved, so the amount of WEEE illegally dumped or thrown in the municipal waste stream will be declining.	No means of estimation for 2004
Total	(not counting upper range of waste oils)	47,011

On-site Treatment

With reference to Figure 3.1 above, on site treatment, and particularly on-site recovery, is decreasing. On-site disposal remains steady. Thermal treatment is carried out at six facilities licensed to treat waste generated on site. This is the main on-site hazardous waste treatment accounting for 39,692 tonnes in 2004. Waste disposed by on-site incineration includes solvents, wastewater treatment sludges and a small quantity of solid waste. One industry landfilled 13,655 tonnes of salts and saltcake on-site. Apart from this no other on-site land filling of hazardous waste is occurring.

Export

Ireland currently depends on other countries to manage its hazardous waste. A total of 371,797 tonnes of reported hazardous waste (including contaminated soil) were exported in 2004. The proportion of Ireland's hazardous waste now treated abroad has risen from 36% in 1998 to 75% in 2004. Export is carried out by road and sea, primarily in containerised loads. Export for disposal to the UK is permitted for high temperature incineration only.

Export of waste for recovery has decreased between 2001 and 2004. This is due to a reclassification of Recovery/Disposal codes from R5 to D9 for the facilities treating contaminated soil.

Treatment within Ireland

There are 20 authorised hazardous waste treatment facilities in operation in Ireland, which manage c. 70,000 tonnes per annum of hazardous waste. There has been a gradual development of the industry since 2001, with new and improved treatment and transfer facilities being privately developed. Some market consolidation is also occurring. The introduction of WEEE and ELV Directives is creating an incentive for new facilities for these wastes. Facilities to pre-treat (blend) solvents for use as fuel have also been developed. A number of proposed facilities are also being advanced, including a facility to incinerate up to 50,000 tonnes per annum of hazardous waste.

3.4 PRIORITIES OF THE PROPOSED NATIONAL HAZARDOUS WASTE MANAGEMENT PLAN

The following issues are addressed by the Proposed Plan:

- **Prevention programme:** a coherent framework is now in place to deliver programmes and projects. An ongoing analysis of where to target resources, and the required scale of effort required, is underway.
- **Infrastructure deficiencies:** the objective to increase capacity to manage hazardous waste in Ireland has not been achieved, as our arisings continue to increase. Barriers to developing indigenous treatment capacity need to be addressed.
- **Self-sufficiency:** the reliance on export has increased. Based on the economics of treatment costs for the waste holder, this appears a reasonable solution. Whether it is a strategic or sustainable approach in the long term needs to be considered.
- **Access to collection services:** poor availability and/or the high cost of hazardous waste collection for small-scale producers needs to be further addressed. Improved collection systems in tandem with awareness measures are necessary.
- **Regulatory environment:** a more mature environment now exists controlling collection and movement of waste but improvements can be made, leading to a more efficient and streamlined system of controls and reporting.
- **Legacy issues:** investigation and remediation of former landfills and contaminated sites needs to become more comprehensive and pro-active, rather than reactive.

4 REVIEW OF RELEVANT PLANS AND PROGRAMMES

4.1 OVERVIEW

The objective of the SEA Directive is “ *to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations in the preparation and adoption of plans and programme with a view to promoting sustainable development* ”.

In order to meet the requirements of the Directive in this respect, the Directive requires that the SEA identify the *environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation*;

The purpose of this review is to take into consideration the policy and legislative framework within which the National Hazardous Waste Management Plan is being developed. The Plan must, at a minimum, fulfil the environmental requirements and meet the targets of these other plans and policies and must not be in conflict with them. A review of the plans, policies and programmes relevant to the Plan was carried out. As the scope of the Plan has been set at a national level the review is focussed primarily on national, European and International plans and programmes. In reviewing other plans, the following questions were asked:

Does the Plan contribute to the fulfilment of objectives and goals set in other plans?

To what degree are the goals and objectives set in other plans and programmes impacted by the Plan?

Tables 4.1 to 4.3 below summarise the outcome of the exercise.

Table 4.1 outlines the international legislation, plans and programmes of relevance.

Table 4.2 includes European legislation, plans and programmes covering all relevant aspects of environmental protection.

Table 4.3 presents the relevant Irish legislation, plans and programmes; these overlap somewhat with the European level plans and programmes.

Further details are included in Appendix B, which includes brief summaries of the documents reviewed with reference to objectives and possible implications for the Plan, and links to online resources.

4.2 FUNDAMENTAL WASTE MANAGEMENT PRINCIPLES

The 1975 European Council Waste Framework Directive (75/442/EEC) created the foundation for the European and Irish approach to waste management, and heavily influences Irish waste management legislation.

The Waste Framework Directive sets out the objectives to eliminate or reduce the environmental consequences associated with waste generation, recovery and disposal. It incorporates the principles of clean technology and waste prevention, waste recovery and energy recovery from waste, otherwise known as the *Waste Hierarchy* (Figure 4.1).

Among the fundamental principles enshrined in the policy are that Member States should strive for EU and national *self-sufficiency* while taking into account geographical circumstances of the need for specialised installations for certain types of waste, thus implementing the *Proximity Principle*. The Directive stipulates to whom the *Polluter Pays Principle* should apply.

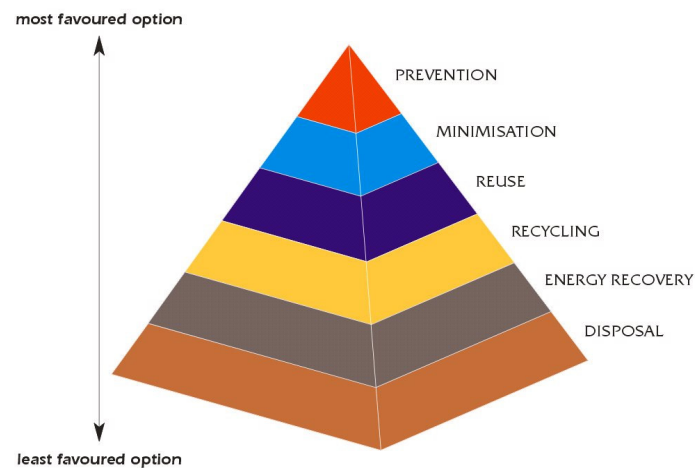


Figure 4.1 European Waste Hierarchy

A review of the Waste Framework Directive is currently underway at European Level. The *Thematic Strategy on the Prevention and Recycling of Waste* aims to develop a 'life-cycle' approach to waste in Europe to reduce the environmental impacts of resource use and provide a yardstick to assess policy effectiveness. The strategy also aims to stimulate action at a local level and to assist life-cycle thinking through guidance, information and further research. Figure 4.2 outlines the elements included in the scope of the EU prevention and recycling strategy⁸.

In order to support this policy, the EU has recommended a framework approach based on subsidiarity, with action at national and probably sub-national levels, agreeing on a list of actions to be considered by Member States with targets and indicators at the appropriate level. It is also felt that an improvement in science and knowledge is necessary for waste prevention.

⁸ Taken from Stakeholder Information Meeting Presentation, Thematic Strategies on the Sustainable Use of Resources and the Prevention and Recycling of Waste. Brussels, 2006
http://ec.europa.eu/environment/waste/pdf/slides_stakeholder_meeting_0601.pdf



Figure 4.2 European Union Waste Prevention and Recycling Strategy

4.3 NATIONAL WASTE MANAGEMENT POLICIES AND PROGRAMMES

Irish Waste Management Policy has been set out in a series of Policy Statements, starting with 'Changing Our Ways' in 1998, which has been expanded and updated by 'Delivering Change' (2002) and 'Taking Stock and Moving Forward' (2004). These policies provide the overall waste planning framework, supporting the regional waste management approach and Plan, and other key concepts such as implementation of the 'polluter pays principle' and the 'producer responsibility' framework for several key waste streams.

At a national level, the Plan is governed by provisions of the Waste Management Act, 1996. The Act also requires waste planning by local authorities on a regional (or county) level. These regional plans address all aspects of the prevention, minimisation, collection, recovery and disposal of non-hazardous waste and are reviewed on a five-year basis. Local authorities are obliged to incorporate the recommendations of the Plan into these Regional Waste Management Plans. A total of eight regional plans and three county plans have been prepared and each has been subject to recent review during 2004-2006.

A new initiative stemming from the first Plan was the formation of a national advisory committee for the implementation of the Plan. In 2004, the Government formed the National Waste Prevention Programme, and established the National Waste Prevention Committee, which now plays an advisory role in relation to the preparation and implementation of the Plan.

Figure 4.3 presents an overview of the timeline for the preparation of the National Hazardous Waste Management Plan in relation to national and regional waste policies and plans.

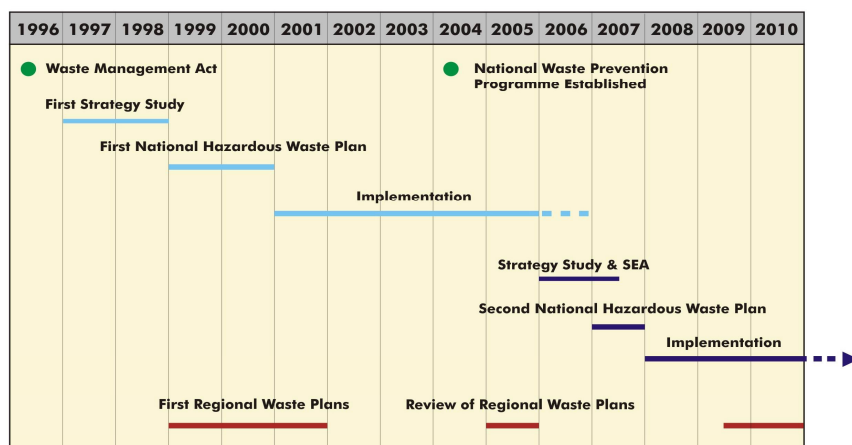


Figure 4.3 Overview of Hazardous Waste Policy Development in Ireland

4.4 NATIONAL PLANNING POLICY AND LEGISLATION

Development Plans are prepared by each local authority under the Planning and Development Act 2000 and include provisions for waste management within the County. Following the adoption of the SEA Directive, all Development Plans are now subject to SEA.

The Planning and Development Act, 2000 has established a hierarchy in relation to planning as follows:

- National Development Plan (NDP)
- National Spatial Strategy (NSS)
- Regional Planning Guidelines
- County, Borough and Urban District Development Plans
- Local Area Plans, Integrated Area Plans, Action Area Plans

This hierarchy dictates the consideration of infrastructure requirements and associated impacts from the NDP down to subsequent levels in the planning hierarchy so as to ensure that a set of founding assumptions based on sustainable principles are adhered to. The NDP deals with growth, economic and social development including development of public infrastructure including waste management. The NSS provides a spatial framework for future balanced regional development in Ireland over the next two decades. It is envisaged that the strategy will guide future infrastructure, industrial, residential and rural development while providing protection for Ireland's cultural, natural and environmental heritage, promoting social inclusion and enhancing quality of life.

The Plan is primarily incorporated into planning and development by means of the regional or county waste management plans. These Plans form an element of the County Development Plan of any county, meaning regional and county level waste facilities can be considered. The primary emphasis of the regional waste plans is on non hazardous waste. Figure 4.4 illustrates the planning hierarchy and the Plan.

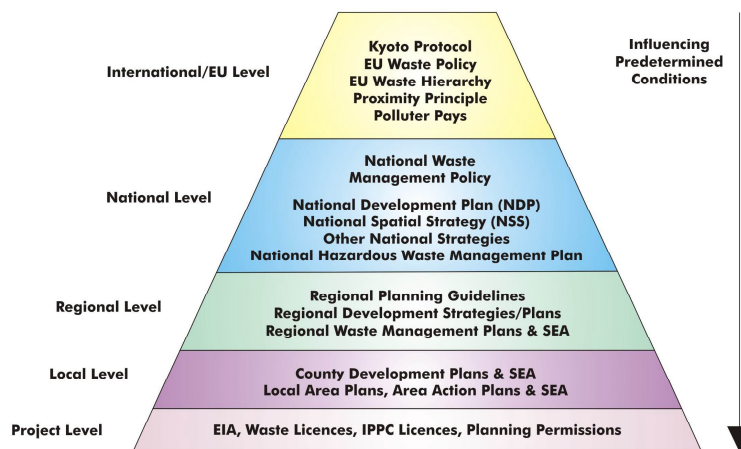


Figure 4.4 Planning Hierarchy and National Hazardous Waste Management Plan

Table 4.1 Review of International Level Legislation, Plans, Policies and Programmes

Topic	Description	Links to Plan and Implications for Plan/SEA	Comments
Biodiversity	<i>"UN Convention on Biological Diversity (1992) "</i>	Objectives include the maintenance and enhancement of Biodiversity. The formulation of the Plan should have regard to these objectives where possible.	The Plan should aim to minimise impacts on biodiversity. However impacts of the Plan on biodiversity would primarily be at a site level (i.e. the location of a particular waste facility etc), the favouring of waste facilities that carry a lower risk of damage to biodiversity could however be emphasised in the Plan.
Climate	<i>"UN Kyoto Protocol"</i> The United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol 1997	Objectives seek to alleviate the impacts of climate change and reduce global emissions of GHGs. The formulation of the Plan should give regard to the objectives and targets of Kyoto.	The Plan should aim to reduce GHG emissions from the management of hazardous wastes, possibly through reductions in the domestic transport or overseas export of wastes or through reductions in the emissions from the treatment and disposal of wastes (Landfill gas and incineration flue gas emissions). Harnessing energy from waste could be considered to reduce overall GHG emissions.
Environment	<i>"The MARPOL Convention"</i> International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).	Objectives include for the protection of the marine environment. The formulation of the Plan should have regard to these objectives.	The Plan should aim to prevent such pollution where possible through the improved management of such wastes or the reduction in marine handling and export of these wastes. The remediation of historical contamination of the marine environment could also be considered.
	<i>"The OSPAR Convention"</i> The Convention for the Protection of the Marine Environment of the North-East Atlantic (22 September 1992).	Objectives include the protection of the marine environment. The formulation of the Plan should have regard to these objectives.	Aim to reduce marine handling and export of wastes so as to preserve the marine environment. The remediation of historical contamination of the marine environment could also be considered.
	<i>"The Basel Convention"</i> on the control of transboundary movements of hazardous wastes and their disposal	Objectives are to minimise the transport of hazardous wastes so as to protect human health and the environment, the formulation of the Plan should have regard to these objectives where possible.	This should be a strong component of the Plan, it should aim for more self-sufficient management of hazardous wastes, and review the regulation of such movement.
	Strategic Approach to International chemicals Management (SAICM)	SAICM supports the achievement of the goal agreed at the 2002 Johannesburg World Summit on Sustainable Development of ensuring that, by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.	May aid in the correct management of certain hazardous chemicals throughout their life cycle.
	The Rotterdam Convention 2004	Objective is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm.	May aid in the correct management of certain hazardous chemicals throughout their life cycle.
Human Health/Air	World Health Organisation (WHO) Air Quality Guidelines (1999) and Guidelines for Europe (1987) Non Statutory	Objectives seek for the elimination or minimization of certain airborne pollutants for the protection of human health. The formulation of the Plan should have regard to these objectives.	The Plan should aim to prevent such pollution and where possible, the detrimental impacts on human health associated with the management of Hazardous wastes should be minimised. The Plan should also prevent the endangerment of human health and environment as a result of the transboundary movement of such wastes.

Table 4.2 Review of European Level Legislation, Plans, Policies and Programmes

Topic	Description	Links to Plan and Implications for Plan/SEA	Comments
Air	"The VOC Directive" Council Directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations	Objectives include the prevention and/or reduction of VOCs from certain activities for the protection of human health and environment. The formulation of the Plan should have regard to these objectives	The Plan should aim to prevent pollution from such compounds. Solvents constitute one the biggest exports of hazardous waste in Ireland, more effective management of such wastes (particularly minimisation and prevention measures) may help to reduce any environmental impacts from the management of these.
	"The Air Framework Directive" Directive on Air Quality Assessment and Management (Framework Directive) (1996/62/EC)	Objectives include the prevention and/or reduction of airborne pollutants for the protection of human health and environment. The formulation of the Plan should have regard to these objectives.	The Plan should aim to prevent such pollution and promote a scenario that would minimise the emission of the pollutants regulated under the directive(s).
	Directive on national emission ceilings for certain atmospheric pollutants (2001/81/EC)	Objectives seek to limit the national emissions of certain airborne pollutants for the protection of human health and the environment. The formulation of the Plan should give regard to these objectives.	The Plan should aim to prevent such pollution and promote a hazardous waste management scenario that would minimise the emission of the pollutants regulated under the directive(s) so as to ensure national compliance.
Biodiversity	"The EU Biodiversity Strategy" Communication on a European Community Biodiversity Strategy [Com (98) 42]	Objectives seek to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity. The formulation of the Plan should have regard to these objectives.	Although the principal impacts of the EU nature conservation strategy and its founding legislation (see below) will primarily be at a site level, the favouring of waste facilities that carry a lower risk of damage to biodiversity could be emphasised in the Plan. Remediation of old waste facilities may also enhance habitats.
	"The EU Habitats Directive" (92/43/EEC)	Objectives seek to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity. The formulation of the Plan should give regard to these objectives.	
	"The EU Birds Directive" (79/409/EEC)	Objectives seek to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity. The formulation of the Plan should give regard to these objectives.	
Climate	White Paper on 'European transport policy for 2010', [COM (2001) 370]	Objectives seek to (amongst others) to develop a modern sustainable transport system. The formulation of the Plan should have regard to these objectives.	The Plan should aim to eliminate any negative environmental impacts that hazardous waste management may have on such a system. The Plan might suggest minimising (where possible) road-based transport when locating hazardous waste infrastructure, or siting waste infrastructure along major rail routes, so as to utilise the least carbon intensive mode of transport. Higher levels of self-sufficiency in hazardous waste management and the minimisation of hazardous wastes might also positively impact on such a system through reductions in overseas export.
	Second European Climate Change Programme (ECCP II) 2005.	The objectives seek to develop the necessary elements of a strategy to implement the Kyoto protocol. The formulation of the Plan should have regard to these objectives.	See UN Kyoto protocol (appendix table 2B)
	"The ODS Regulations" Council regulations 2037/2000 on substances that deplete the Ozone Layer	Objectives seek to limit the emission of ODSs for the protection of the environment. The formulation of the Plan should have regard to these objectives.	Plan should aim to limit the emission of ODSs. The Plan could promote HCFC minimisation measures within industry in order to comply with directive. The Plan should seek to put in place adequate infrastructure for collection and recovery of ODSs.

Topic	Description	Links to Plan and Implications for Plan/SEA	Comments
Environment	"The IPPC Directive" Directive 96/61/EC concerning integrated pollution prevention and control	The objectives seek to minimise pollution and maximise resource efficiency in industry through licensing and guidance. The formulation of the Plan should have regard to these objectives.	Requires that companies use Best Available Technology (BAT) which may help reduce the Qty of HW production through waste minimisation, emissions reductions etc.
Human Health /Air	The EU CAFÉ Programme Commission communication of 4 May 2001 "The Clean Air for Europe (CAFE) Programme: Towards a Thematic Strategy for Air Quality".	Objectives seek to prevent and reduce air pollution and impacts on human health from air pollution. The formulation of the Plan should have regard to these objectives.	See Air framework Directive (above)
	Communication of 24 October 2001 on a Community strategy for dioxins, furans and polychlorinated biphenyls [COM(2001)593 final]	Objectives seek to reduce human exposure to dioxins, furans and polychlorinated biphenyls (PCBs) in order to preserve human health. The formulation of the Plan should have regard to these objectives.	Consideration of emissions from both unreported and reported wastes should be considered in the Plan.
	Persistent Organic Pollutants (POPs) Regulations 850/2004	Objectives seek to limit pollution from certain persistent organic pollutants in order to preserve human health and the environment. The formulation of the Plan should have regard to these objectives.	The "safe elimination" of these substances will require the development of appropriate infrastructure. Reductions in their "production and use" might require the promotion of waste minimisation measures amongst industry.
Human Health	The EU Environment and Health Strategy 2004-2010 (first period)	Objectives seek to prevent and reduce the impacts of pollution on human health. The formulation of the Plan should have regard to these objectives.	Elements of the Plan that could create direct or indirect health impacts should be included in the assessment.
	The EU REACH Initiative Registration, Evaluation and Authorisation of Chemicals (REACH)	Objectives seek to limit the harmful effects to the environment and human health from certain chemicals through improved analysis and data collection. The formulation of the Plan should have regard to these objectives.	This legislation will impact at the top of the production chain, therefore the Plan should consider communication of REACH to industrial producers and IPPC sector companies.
Noise	"The Environmental Noise Directive" (END) (2002/49/EC)	Objectives seek to limit the harmful effects to human health from environmental noise. The formulation of the Plan should have regard to these objectives.	Noise is another aspect that may not be directly influenced by the Plan in that it is a site-specific issue and would be covered by an EIS at that level.
Sustainable Development	"The Gothenburg Strategy" Communication from the Commission on "a Sustainable Europe for a Better World" 2001	Objectives seek to make the future development of the EU more sustainable. The formulation of the Plan should have regard to these objectives.	Informs the 6 th EAP and the Irish sustainable development strategy.
	The Sixth Environmental Action Programme (EAP) of the European Community 2002- 2012 Statutory	Objectives seek to make the future development of the EU more sustainable. The formulation of the Plan should have regard to these objectives.	Establishes the key EU "thematic strategies" (see EU waste strategy environment and health strategy and biodiversity strategy)
	"The SEA Directive" (2001/42/EC)	Under the SEA Directive, the Plan requires an SEA. The SEA Directive was transposed onto Irish law under S.I 436 of 2004 (See Table 4.3).	The Plan must take into account protection of the environment and integration of the Plan into the sustainable planning of the country as a whole.

Topic	Description	Links to Plan and Implications for Plan/SEA	Comments
Water	"The Water Framework Directive" EU Water Framework Directive (2000/60/EC)	Objectives seek to maintain and enhance the quality of all surface waters in the EU. The formulation of the Plan should have regard to these objectives where possible.	The assessment of potential impacts on water and groundwater quality from both reported and unreported wastes needs to be considered.
	"The Groundwater Directive" (1980/68/EC) Statutory	Objectives seek to maintain and enhance the quality of all groundwaters in the EU. The formulation of the Plan should have regard to these objectives where possible.	
	EU draft Floods Directive	The draft Floods Directive applies to river basins and coastal areas at risk of flooding. With trends such as climate change and increased domestic and economic development in flood risk zones, this poses a threat of flooding in coastal and river basin areas. This could have implications for siting of treatment and disposal facilities for hazardous waste.	Siting guidelines may be required with regard to hazardous waste management facilities and they should have regard to limits in the Directive and subsequent recommendations at a national level if applicable.
Waste	"The EU Waste Strategy" Commission Communication of 21 December 2005 "Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste" [COM(2005) 666]	Objectives seek to (amongst others) reduce the negative impact of waste and identify waste as a resource. The formulation of the Plan should have regard to these objectives where possible.	Promotion of LCA on hazardous waste materials and the development of further waste prevention programmes should be considered. Plan should promote opportunities to prevent, minimise, reuse and recycle hazardous waste streams.
	"The Waste Framework Directive" Council Directive 75/442/EEC of 15 July 1975 on waste "the Waste Framework Directive" and amending acts. Revision to Waste Framework is being negotiated.	Objectives seek to (amongst others) minimise the quantities of waste production in the EU, reduce the environmental impacts from the management of these wastes and defines what constitutes a waste or hazardous waste, the formulation of the Plan should have regard to these objectives.	This is the underlying policy guiding the Plan and the Irish WMP act and is highly relevant to the Plan.
	"The Landfill Directive" Council Directive 99/31/EC of 26 April 1999 on the landfill of waste	Objectives seek to (amongst others) reduce the environmental impact from the land filling of waste and divert certain quantities and types of waste from European landfills; the formulation of the Plan should have regard to these objectives where possible.	Any assessment of landfill requirement should take the directive requirements into account.
	"The Hazardous waste Directive" Council Directive 91/689/EEC of 12 December 1991 on hazardous waste	Objectives seek to (amongst others) reduce the environmental impact from the management of hazardous wastes; the formulation of the Plan should have regard to these objectives where possible.	
	"The Incineration Directive" Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on "the incineration of waste" (including co-incineration)	Objectives seek to (amongst others) reduce the environmental impact from the management of wastes (including hazardous wastes) by incineration; the formulation of the Plan should have regard to these objectives where possible.	Any assessment of incineration should take the directive requirements into account.
	"The Waste Oil Directive" Council Directive 75/439/EEC of 16 June 1975 on the disposal of waste oil Amended by 2000/76/EC	Objectives seek for the more environmentally sensitive management of waste oils, the formulation of the Plan should have regard to these objectives where possible.	Adequacy of collection and management systems should be considered.

Topic	Description	Links to Plan and Implications for Plan/SEA	Comments
	"The ELV Directive" Directive 2000/53/EC	Objectives seek for the more environmentally sensitive management of end of life vehicles, the formulation of the Plan should have regard to these objectives where possible.	The ability of Ireland to meet the ELV directive requirements should be assessed.
	"The RoHS Directive" Directive 2002/95/EC of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment	Objectives seek for the more environmentally sensitive management of end of life vehicles, the formulation of the Plan should have regard to these objectives.	Plan should encourage the use of IPP (see below), ecodesign and LCA in reducing the quantities of hazardous wastes produced by such products.
	"The WEEE Directive" Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment	Objectives seek for the more environmentally sensitive management of waste electric and electronic equipment, the formulation of the Plan should have regard to these objectives where possible.	Take back schemes have increased the need for domestic infrastructure to treat or dispose of this waste, the Plan could site this directive as a strong impetus to develop such infrastructure.
	Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCBs/PCTs)	Objectives seek for more environmentally sensitive management of certain end of life chemicals, the formulation of the Plan should have regard to these objectives where possible.	The Plan should promote minimisation measures (see Stockholm Convention).
	"The EU Waste Shipment Regulations" Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the EC	Objectives seek to more effectively regulate the transport of wastes within the EU, the formulation of the Plan should have regard to these objectives where possible.	Plan might make reference to this regulation with regard to the illegal export of hazardous wastes or the improved accuracy in future estimates on HW quantities arising.
	"The Batteries Directive" Proposal for a Directive on batteries and accumulators and spent batteries and accumulators [COM (2003) 723 Final]	Objectives include for more environmentally sensitive management of end of life batteries, the formulation of the Plan should have regard to these objectives where possible.	Important with regard to reducing the volumes of unreported and illegally disposed hazardous wastes. The increased collection, recovery and treatment of such wastes is essential to ensure that more harmful pollution does not occur from the incineration of these wastes when municipal thermal treatment facilities are operating.
	Green Paper on Integrated Product Policy [COM (2001) 68]	Objectives seek to improve the environmental performance of a broad range of products throughout their life cycle, the formulation of the Plan should have regard to these objectives where possible.	May aid the minimisation of certain wastes through the use of less hazardous materials. EU Integrated Product Policy will also be an important driver of change in promoting eco-design and cleaner production, resulting in cleaner consumption (and reduced volumes of HW), the Plan could promote the development of such measures.
	Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics.	Objectives seek to improve the collection and availability of data on waste management, the formulation of the Plan should have regard to these objectives where possible.	Plan should reiterate the importance of an adequate monitoring and recording system for hazardous waste (so as to ensure all wastes are accounted for and future estimates for wastes arising are more accurate).
	The EU HAZRED Initiative	Objectives seek to demonstrate the advantages of more environmentally sensitive management of hazardous wastes, the formulation of the Plan should have regard to these objectives where possible.	A number of Irish companies are/have participated in the programme under EPA encouragement. "Ultimately, the best practice guidance and audit/monitoring approach could be incorporated into sector waste prevention nationally." <i>National Waste Prevention Programme, Annual Report 2004/05</i>

Table 4.3 Review of National Legislation, Plans, Policies and Programmes

Topic	Description	Links to Plan and implications for Plan/SEA	Comments
Air	Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002)	Objectives include the reduction of certain airborne pollutants for the protection of human health and the environment; the Plan should have regard to these objectives.	See Air Framework Directive (Appendix Table B2)
	Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004).	Objectives include the reduction of certain airborne pollutants for the protection of human health and the environment; the Plan should have regard to these objectives.	
	The Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999	Objectives include the reduction of certain airborne pollutants for the protection of human health and the environment; the Plan should have regard to these objectives.	
	Air pollution act 1987	Deals mainly with ambient air quality issues from traffic etc whereas the treatment and disposal of hazardous wastes would in fact be covered by IPPC and waste licensing under the environmental protection agency act 1992.	
Biodiversity	The National Biodiversity Plan (2002)	Objectives include the enhancement and conservation of biodiversity. Although such issues would be dealt with at local or site level the Plan should have regard to these objectives and promote such objectives where possible.	The Plan should aim to minimise impacts on biodiversity. However impacts of the Plan on biodiversity would be primarily at a site level (i.e. the location of a particular waste facility etc), the favoring of waste facilities that carry a lower risk of damage to biodiversity, or the appropriate siting of facilities, could however be emphasised in the Plan.
Climate	Department of Transport, 2003: 'Statement of Strategy: 2003-2005'	Objectives include the reduction of environmental impacts of transport (in particular the climate impacts), the Plan should have regard to these objectives.	The Plan should aim to reduce GHG emissions from the management of hazardous wastes, possibly through reductions in the domestic transport or overseas export of wastes or through reductions in the emissions from the treatment and disposal of wastes (Landfill gas and incineration flue gas emissions). The Plan might suggest minimising (where possible) road-based transport when locating hazardous waste infrastructure, or employing rail based transport. The minimisation of hazardous wastes might also make a positive impact in terms of reducing GHG emissions. Recovery of Energy from hazardous waste could also be considered by the Plan.
	National Climate Change Strategy (2000) and National Climate Change Strategy 2007-2012	Objectives include the reduction of national GHG emissions (including those from the waste sector), the Plan should give regard to these objectives and targets (for reductions in CO ₂ equivalents from the waste sector). Reduced GHG emissions from waste will come through reduced landfill gas generation and new biological and thermal treatment facilities. This should impact heavily on the choice of management options for hazardous wastes.	

Topic	Description	Links to Plan and implications for Plan/SEA	Comments
Energy	Green Paper on Sustainable Energy (1999)	Objectives include the increased utilisation and development of renewable energies to meet EU targets; the Plan should however have regard to these objectives where possible.	The paper identifies that the use of wastes for the purposes of power generation must be considered in the context of a waste management strategy, which adheres to the waste hierarchy. The proposed replacement waste framework directive identifies that the term 'energy recovery' would only be applied to activities that have a certain combustion efficiency. The Plan should have regard for opportunities for energy recovery after prevention, materials recovery have been addressed.
	Green Paper – Towards a Sustainable Energy Future for Ireland (DCMNR 2006)		
	White Paper – Delivering a Sustainable Energy Future for Ireland (DCMNR 2007)	The White Paper describes the actions and target for the energy policy framework out to 2020, to support economic growth and meet the needs of all consumers	
Planning	National Spatial Strategy 2002-2020 (2002)	Objectives of the NSS are to achieve a better balance of social, economic and physical development across Ireland, supported by more effective Planning. The Plan should, where possible, have regard to the objectives of the NSS.	Ever increasing waste disposal and energy costs means that adequate accessible and cost effective waste infrastructure is now regarded as a necessity for certain development (industry in particular). The strategic development of such infrastructure could therefore aid the objectives of the NSS and NDP and act as an incentive for companies to develop outside of Dublin. The Plan needs to consider the adequacy of existing infrastructure to accommodate the proposed level of economic growth.
	National Development Plan from 2007 to 2013.	Objectives of the NDP are to promote more balanced spatial and economic development. The Plan should, where possible, have regard to these objectives.	
Sustainable Development	Sustainable Development: A Strategy for Ireland (1997) (Department of the Environment & Local Government)	Objectives are to ensure that future development in Ireland occurs in a sustainable manner, the formulation of the Plan should have regard to these objectives where possible.	This is informed primarily by the EU Gothenburg strategy (see appendix 2B)
	Planning and Development (SEA) Regulations 2004 S.I. 436 of 2004	The EU SEA Directive was transposed into Irish Law under S.I. 436 in 2004. These regulations require the a national waste management Plan undergo SEA.	The Plan must take into account protection of the environment and integration of the Plan into the sustainable planning of the country as a whole.
Waste	The Environmental protection agency Act 1992	Objectives include the better protection of the environment and the control of pollution through improved licensing and monitoring. The formulation of the Plan should have regard to this where possible.	The Plan should consider where relevant the success and efficiency of existing environmental management systems and legislation, including the IPPC licensing and waste licensing regimes, and monitoring/reporting systems.

Topic	Description	Links to Plan and implications for Plan/SEA	Comments
	The Protection of the Environment Act 2003	Objectives include for better protection of the environment and the control of pollution through improved licensing and monitoring. The formulation of the Plan should have regard to this where possible.	
	The Waste Management Act 1996 and amendments	Objectives include (amongst others) the more effective and environmentally sensitive management of wastes in Ireland, the formulation of the Plan should have regard to this. Includes a requirement for the formulation of a national Plan with regard to: <ul style="list-style-type: none"> • The prevention and minimisation of hazardous waste. • The recovery of hazardous waste. • The collection and movement of hazardous wastes. • The disposal of hazardous wastes that cannot be prevented or recovered. 	The Plan needs to comply with the Act requirements, and should also have regard to the Regional Waste Management Planning framework.
	National Waste Prevention Programme	Objectives seek to decouple waste generation from economic activity in Ireland, the formulation of the Plan should have regard to this.	Plan can review relevant activities under the NWPP, especially in relation to hazardous wastes. Opportunities for synergy between the Plan and NWPP can be identified.
	Changing our Ways (1998)	Objectives include better waste management in Ireland including improved infrastructure, higher recycling rates and diversion of waste from landfill. The formulation of the Plan should have regard to this where possible.	The Plan needs to respond to all national policy objectives, and implementation mechanisms as set out in these documents.
	Delivering Change - Recycling and Preventing Waste (2002)	Objectives include for better waste management in Ireland including improved infrastructure, higher recycling rates and diversion of waste from landfill as part of an integrated waste management system. The formulation of the Plan should have regard to this where possible.	
	Taking Stock and Moving Forward (2004)	The formulation of the Plan should have regard to this where possible.	

5 BASELINE ENVIRONMENT

5.1 INTRODUCTION

This section examines the relevant aspects of the current state of the Irish environment in relation to biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, and material assets (including energy) and the interrelationship between the above factors. Cultural heritage and landscape were scoped out of the assessment at an early stage (see Chapter 6 for information on the scoping process) as the National Hazardous Waste Management Plan does not deal with specific site issues. Assessment of those issues would form part of any future EIA process relating to the development of specific facilities.

As a requirement under Annex I of the SEA Directive (2001/42/EC) this section should illustrate:

- The current state of the environment;
- The likely evolution of the environment without implementation of the Plan;
- The characteristics of environment likely to be significantly affected by the Plan;
- Likely evolution of the environment in the absence of the Plan;
- The primary environmental issues/problems, which will be relevant to the Plan (and any apparent connection between these issues and hazardous wastes management).

As strategic environmental assessment deals with a national plan, the baseline data is focused at a national level. The baseline has been compiled using all available datasets and any indicators suggested during scoping. The main sources of data used in the compilation of this baseline were (amongst others):

- *Ireland's Environment 2004* (EPA, 2004), which reports on the state of the national environment and general trends;
- *National Waste Report 2004* (EPA, 2005), which includes up to date dataset of hazardous waste arisings and management;
- Scoping Responses from the Environmental Authorities;
- Environmental Protection Agency Enforcement database for waste and IPPC licensed activities – the EPA enforcement staff were consulted as to whether any incidents of pollution had been recorded by hazardous waste facility monitoring activities.

5.2 CURRENT STATE OF THE ENVIRONMENT

EU environmental legislation is currently grounded in the EU's Sixth Environmental Action Programme (EAP). The 6th EAP provides a strategic framework for EU environmental policy up to 2012. It identifies four key environmental priorities: climate change, nature and biodiversity, environment and health, and natural resources and waste. There is a focus on seven thematic strategies to be adopted relating to air, soil, the marine environment, the urban environment, natural resources, waste and pesticides. A mid-term review in 2007 noted that it is as yet too early to see significant results arising from adoption of the 6th EAP. However, three specific problems were identified which could hamper efficient and effective progress towards 6th EAP objectives including: poor integration of policies; the existing implementation gap; and insufficient international co-operation. According to recent EPA publications, Ireland's natural environment, although under increasing pressure, generally remains of good quality and represents one of our most essential national assets. In the EPA's *2020 Vision* –

Protecting the Irish Environment document it is noted that pressures on the environment have increased significantly. As Ireland's economy has grown and in the past 10 years these pressures have accelerated at a rate that far exceeds that observed in other EU countries.

The third EPA *State of the Environment* Report (2004) (the most recent such assessment carried out by the EPA) identified five overall environmental priorities which, if addressed successfully they should benefit the present and future quality of Ireland's environment, these comprise three *thematic* challenges and two *general* challenges for environmental protection. The challenges identified are summarised as follows:

Thematic Challenges:	Meet international commitments on air emissions
	Prevent and control eutrophication
	Improve waste management
General Challenges:	Improve integration of environmental and natural resource considerations into policies, plans and actions of economic sectors
	Improve enforcement of environmental legislation

In *2020 Vision – Protecting the Irish Environment* (EPA, 2007) the EPA outlines six environmental goals which reflect on the main challenges identified in the State of the Environment reports as well as key issues at the global and EU levels as reflected in the 6th EAP. These goals are:

- Limiting and adapting to climate change
- Clean air
- Protected waters
- Protected soil and biodiversity
- Sustainable use of natural resources
- Integration and enforcement.

These goals are identified as a means of realising the vision of protecting and improving Ireland's environment.

5.3 BASELINE AND RELEVANT ENVIRONMENTAL PROBLEMS

5.3.1 Water: Surface Waters

General Status and Characteristics

Ireland has an abundant supply of surface water (rivers and lakes), constituting a key resource in economic, amenity and aesthetic terms. Much of our surface water includes wildlife conservation areas recognised at national and European level. Whilst water quality in Ireland compares well with

most other EU countries, there is continuing evidence of slight or moderate pollution in certain rivers and lakes.

The results for 2003-2005 of 13,200 km of river and stream channel surveyed by the EPA are presented in Figure 5.1. This represents an improvement of 1% in the unpolluted category since the previous assessment period (2001-2003). Less than 1% (0.6%), the same as last period, was classed as seriously polluted.

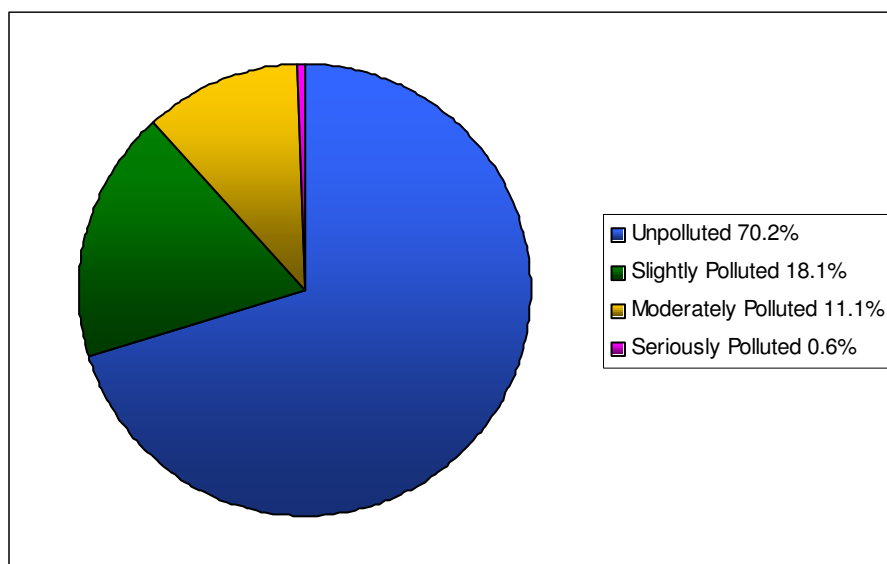


Figure 5.1 Water Quality in Irish Rivers and Streams 2003-2005, (EPA, 2005)

Of the 421 lakes assessed in 2005, water quality for 68 was less than satisfactory, with 13 lakes being highly polluted. The main causes were agricultural and municipal discharges (Water Quality in Ireland 2005 - Key Indicators of the Aquatic Environment, EPA, 2006).

In 2005, 45 fish kills were recorded due to agriculture, industry and local authority services.

The EU Water Framework Directive (WFD) has set a minimum target of good quality for all Irish waters by the year 2015. The quality target includes the sustainable use of water resources and the elimination of the discharge of hazardous substances. It is expected that trends in water quality will improve towards 2015 with the implementation of measures proposed in the River Basin Management Plans.

As part of the WFD (Article 5), Ireland has produced summary characterization reports for water bodies in their jurisdiction. Published in 2005, these reports identified that under the *Rivers* category 29% of water bodies (by number) are **at risk/impacted** from diffuse source pollution and morphological alterations. A further 35% of water bodies are **probably at risk** from the same pressures. Under the *Lake* category 18% of water bodies (by number) were classified as **at risk/impacted** mainly from abstractions and diffuse source pollution. A further 20% of water bodies are **probably at risk** from abstraction and diffuse source pollution.

Environmental Problems Relevant to the Plan

Waste facilities can impact on surface waters if emissions are not controlled adequately. Two licensed hazardous treatment facilities had a number of breaches in emissions to surface waters from 2003-2005 according to EPA enforcement data.

If potentially toxic and bio-accumulative substances in hazardous waste are released into the aquatic environment, this could create a risk for animal and plant life and human health. Such substances include pesticides, heavy metals and other chemical substances, which can disrupt aquatic ecosystems in particular and reduce biodiversity. The WFD will set limits for 41 substances or groups of substances. Of these 13 are specified as 'priority hazardous substances' as they are toxic, persistent in the food chain and bioaccumulate.

However, widespread pollution from these priority substances in freshwaters is not a problem in Ireland. This was shown in a 2001 survey of 80 dangerous substances including pesticides, metals and VOCs. However, other studies found that wild and farmed salmon and trout contained low levels of PCB's and dioxins, these were within EU limits for dioxins (FSAI, 2002).

Of 49 river locations seriously polluted in 2001-2003, these included e.g. oil pollution and leachate from a closed landfill. The total numbers of reported fish-kills in freshwaters (rivers and lakes) in the period 2001 – 2003 was 147 with agriculture as one of the primary causes of fish kills, along with industry and sewage (EPA 2005).

Pollution incidents involving sheep dip compounds (an unreported waste) have been recorded in Irish rivers (Clabby *et al*, 2001). Incidents are rare but can cause toxic pollution e.g. to important salmonid rivers.

Illegal waste activity is a key issue for waste management. It covers activities such as illegal dumping of waste, unlicensed landfills, and illegal movement of waste all of which result in considerable costs to society arising from significant pollution remediation and enforcement costs (EPA, 2006). The dumping of clinical waste was reported at an illegal disposal site and was removed in 2005 under the terms of an EPA licence. In border counties, the creation of significant quantities of diesel laundering residues have also been reported as a periodic problem.

Summary: Surface Water

With the exception of illegal waste activities and inappropriate disposal, hazardous waste and hazardous waste management are currently having a low level of impact on surface water quality,

Surface waters can be directly impacted by hazardous waste management activities on active or former waste disposal facilities. There are also risks from the unreported waste streams such as sheep dip. Some incidents of pollution from authorized waste facilities are noted. Baseline monitoring of surface water quality on a national level does not identify any direct links with hazardous waste management.

The move towards self-sufficiency in hazardous waste management in Ireland will result in more treatment & disposal facilities here, and hence increased risks of emissions, but these can be controlled via the facility licence. Overall however, these impacts would be planned for and mitigated against at a lower decision making level (i.e. through EIA).

5.3.2 Water: Groundwater

General Status and Characteristics

Two criteria are important in considering the groundwater resource of an aquifer: the scale of the aquifer (whether it can yield water on a local or regional level) and the vulnerability of the aquifer to pollution (how well the overlying soil protects the aquifer from pollution spills). Geological Survey of Ireland (GSI) provides mapping capabilities for both these criteria countrywide although data is more

detailed in some counties than others. These maps can be accessed on the GSI website (www.gsi.ie). In Ireland, the main concern regarding groundwater is its suitability as a source of drinking water. Aquifers are underground layers of rock which contain water and which are capable of yielding it to surface waters such as streams and rivers. The EPA, DEHLG and GSI have produced Groundwater Protection Responses for a number of waste activities. The Groundwater Protection Responses classify sites as R1 (acceptable for the activity) to R4 (not acceptable for the activity).

According to the EPA (Lucey et al., 1999; Mc Garrigle et al., 2002) the main quality problems with groundwater are associated with microbiological contamination from landfill sites, septic tanks and agricultural waste. A survey in 2003-2005 found that approximately 30% of groundwater samples showed bacteriological (faecal coliform) contamination.

However, there is an increasing trend in the number of groundwater samples showing no contamination. On the other hand, 52 per cent of all EPA groundwater-monitoring locations showed bacteriological contamination at least once between 2003 and 2005. The compliance of public water supplies with the microbiological parameter, *E. coli*, remains high at 98.9 per cent in 2005 however group water compliance rate continued to lag behind.

Environmental Problems Relevant to the Plan

Hazardous waste facilities can impact on groundwater if emissions are not controlled adequately. One licensed facility for treatment of waste oil had a number of breaches in emissions to ground and surface waters from 2003-2005 according to EPA enforcement data. However, authorised waste facilities are subject to controls aimed at preventing spills or accidental discharge to soil or groundwater and in any case, biological contamination is not a risk from hazardous waste facilities in Ireland.

Only one Irish landfill has been licensed to dispose of hazardous wastes and so far no groundwater pollution has arisen from the disposal of these wastes to date.

Former waste disposal sites can also present a risk to water and groundwater. For example an unlined landfill could release leachate into groundwater. Other forms of contaminated land – for example gasworks sites, or petroleum storage depots – could also release pollutants to groundwater from spills or leaks. Diesel laundering is also a consideration, especially for some border counties where “unmarked gas oil” is illegally processed using addition of sulphuric acid or filtering the fuel. The acid residue and filter material left after the illegal process are extremely hazardous and are often dumped at locations throughout the border counties (Louth County Council, 2006).

For unreported wastes, such as some agricultural wastes, or materials such as waste oil or batteries, improper disposal could conceivably create localised groundwater pollution.

Summary: Groundwater

Hazardous waste and hazardous waste management are currently having a relatively low level of impact on groundwater quality.

Hazardous waste management may impact directly on groundwater quality through active facilities or closed waste disposal facilities. Pollution may also occur from unauthorized waste sites, illegal dumping, inappropriate disposal of hazardous wastes and other activities such as diesel laundering wastes. Implementation of the Plan could have positive impacts by addressing these concerns.

5.3.3 Water: Coastal and Marine

General Status and Characteristics

The quality of Ireland's coastal/marine waters is determined largely by the quality of the waters of the North-East Atlantic and the degree to which this is altered by inputs of organic matter, nutrients and other materials from the land, from rivers and from the atmosphere. Local impacts however may also arise from marine-based activities associated with ports and harbours, dredging, and other coastal development pressures. Water quality in most estuaries and bays remains high and there are also conservation areas considered important on a European as well as national level.

In the period 1999-2003 26 (38%) out of a total of 69 coastal and estuarine sites were unpolluted, 28 were of intermediate status, 3 were potentially eutrophic and 12 were eutrophic (EPA, 2005). The situation improved in 2005 where the number of eutrophic water bodies reduced from 12 to 10 (EPA, 2006).

The Quality of Bathing Water in Ireland 2005 (EPA, 2006) shows that 96% of sites (126 of 131 sites) were in compliance for coliforms, mineral oils, surface-active substances and phenol.

The quality of shellfish waters improved in 2005 with a notable increase in waters assessed to be of highest quality for shellfish production and an elimination of those of lowest quality (EPA, 2006).

In relation to coastal waters the Irish Coast Guard received 148 coastal pollution reports in 2001-2003. The majority of incidents occurred in the main harbours and surrounding areas with 10-20% in open sea. Anti-pollution measures were also employed for 8 major incidents, mainly vessels running aground. In 2005 the number of reported pollution at sea incidents decreased from 59 to 46 in 2004 with 72% relating to oil spillages (EPA, 2006).

The Marine Institute monitors levels of potentially toxic and bioaccumulative substances in tidal waters in fish and shellfish tissue. Trends in 2001-2003 continued to show relatively low levels within standards set for consumer protection. In 2001 finfish from five major fishing ports were surveyed for mercury and trace metals including cadmium, lead and chlorinated hydrocarbons and concluded that levels were within acceptable limits.

Environmental Problems Relevant to the Plan

Although contaminants such as toxaphene and tributyltin have been identified in some Irish ports, it is highly unlikely that hazardous waste management activities are responsible for such pollution. There is however the issue of inappropriate disposal of such substances by mariners, whether unintentionally through a lack of knowledge about the nature of the substances or simply through a lack of facilities in such areas. Waste management in harbours and ports may therefore be one issue the Plan could address. This issue is also highlighted by the incidence of hydrocarbon pollution in such areas.

Ireland also exports 84% of its hazardous wastes, the vast majority of which leaves Irish ports for mainland Europe. Although the extent to which hazardous waste management activities or the transport of hazardous waste is directly responsible for marine pollution is impossible to quantify, the risks of such pollution from the direct handling of such wastes or marine transport activities in general are greatly increased. Currently a number of bodies are involved in monitoring various aspects of the marine environment e.g. Marine Institute, EPA, Department of Communication Marine and Natural Resources, the Department of Transport, local authorities, however there is currently no central body fulfilling this task. The EPA and the Marine Institute are collaborating on a number of projects, which would see alerts on pollution incidents, falling water quality levels and plankton blooms in bays, rivers and lakes delivered direct to the public via the internet.

Summary: Marine Environment

Currently the impacts of hazardous waste management on the marine environment cannot be quantified. The temporary storage of hazardous wastes at ports is a concern as currently ports are exempt from licensing. The potential risk of accidental spillage is also an important consideration.

Another potential impact of hazardous waste management on the marine environment is directly through the transport and export of wastes, whereby spillages or general handling may result in pollution. Similarly, general shipping activities may result in certain levels of pollution and the management of hazardous waste may therefore be an indirect cause of this (through persisting in the export of wastes, rather than moving towards self-sufficiency).

The Plan therefore aims to minimise the marine transport of wastes, either directly through the minimisation of waste or indirectly through the development of domestic treatment and disposal infrastructure (i.e. move towards self-sufficiency waste management).

5.3.4 Air

General Status and Characteristics

Air quality in Ireland is generally good. Ireland is not heavily industrialised and as a small island with frequent westerly wind and a mild climate, pollutant dispersion is relatively good. Nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀) are now the primary threat to the quality of air in Ireland (EPA, 2004).

A major source of these pollutants is transport, however the relative contribution of transporting hazardous waste is not known but Heavy Goods Vehicles (HGVs) contribute to ambient NO_x concentrations through exhaust emissions and PM₁₀ concentrations through both exhaust emissions, regular wear and tear (of brake and tyre matter) and from the re-suspension of dust on roads. Even though this is a growing problem, mean concentrations of PM₁₀ and NO₂ at EPA stations in 2004 (EPA 2006) were still below emission limit values set out for ambient air quality in Directive 1999/30/EC (CEC 1996).

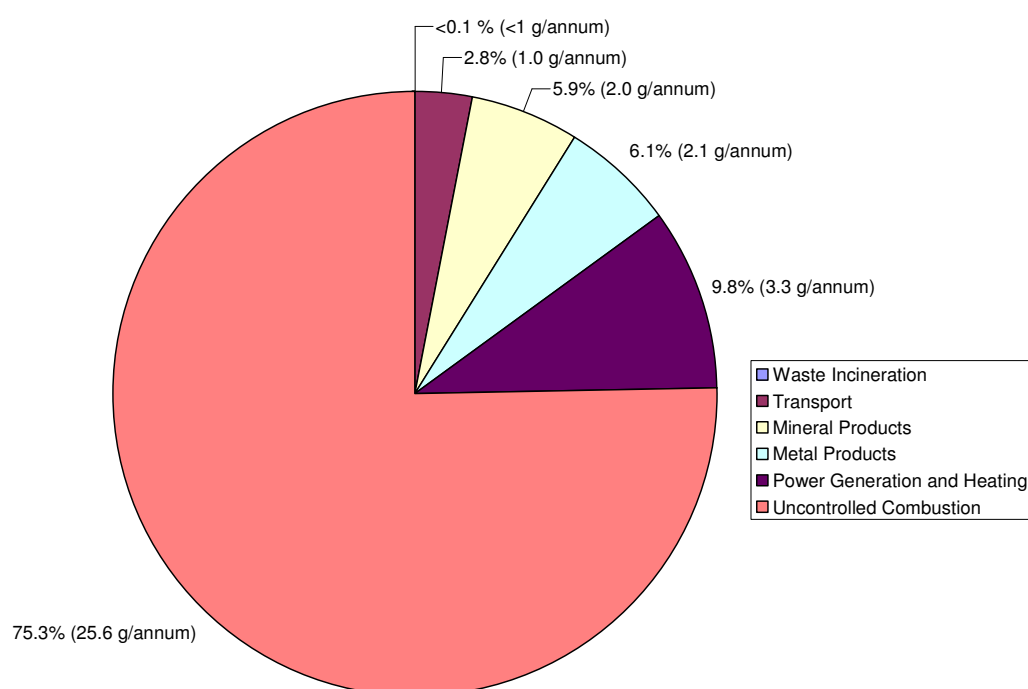
The EU Air Quality Framework Directive and its associated Daughter Directives set limit values for the key air pollutants of concern across Europe. Irish compliance with the relevant emission limit values (ELVs) laid out in these directives has been extremely good over recent years, other airborne pollutants monitored covered by include PM10, Sulphur dioxide, nitrogen dioxide, ozone, lead, carbon monoxide and benzene, all of which were within the required limits for ambient air set down in the directives (*Source: Air Quality in Ireland, EPA 2005*).

One pollutant that is of particular interest in terms hazardous waste management are dioxins. Dioxins are formed as by-products of incomplete combustion and are primarily released into the environment through air emissions. Since 1995 the EPA have surveyed dioxin levels in cow's milk every 4–5 years, with results from the 2004 survey confirmed uniformly low levels of dioxins and polychlorinated biphenyls (PCBs). The study revealed that dioxin levels have decreased by 33% in 2004 compared to 1995 (Table 5.1). Such a reduction can be attributed to regulatory measures, improvements in combustion technology, the ban on leaded petrol, and the improved control of hospital incinerators. A similar trend has occurred throughout Europe. The levels for dioxin like PCB accounted for around half the total dioxin figure.

Table 5.1 Levels of Dioxins in Milk Fat (pg I-TEQ/g)

Year	1995	2000	2004	EU Limit
Mean value of dioxins	0.24	0.20	0.16	3.0

The EPA have estimated that in 2000, dioxin emissions to air were dominated by uncontrolled combustion processes (accidental fires, backyard burning of rubbish or leaf litter, forest fires, heather management etc) whilst other activities such as power generation, metal production, mineral production and transport contributed the rest, waste incineration activities contributed the least (see Figure 5.2).

**Figure 5.2 Estimated Dioxin Emissions (g/annum) to Air in Ireland for 2000 and Percentage of Total Emissions Attributable to Each Sector (Source EPA 2002).****Table 5.2 Estimated Emissions of Dioxins to Air for Certain Sources 2000 and 2010**

Year	2000		2010	
	Best Estimate g/annum	% Contribution of total dioxin to Air emissions	Best Estimate g/annum	% Contribution of total dioxin to Air emissions
Waste Incineration	0.0068	0.02%	0.5494	1.81%
Uncontrolled Combustion	25.6363	75.34%	25.4898	84.13%

Environmental Problems Relevant to the Plan

All hazardous waste management activities have some potential to impact on local or regional air quality. Emissions can occur during collection, storage, recovery/ treatment and disposal. These impacts generally decrease with distance from the hazardous waste management activity.

Emissions of NO_x, PM₁₀ and other pollutants from waste incineration are relatively small. The most prominent pollutants from thermal treatment in the public consciousness are dioxins and furans, which are extremely harmful to human health. As can be seen in Figure 5.2, nearly 75% of dioxins released into the air in Ireland were estimated to originate from uncontrolled/backyard burning of waste, whilst actual waste incineration activities accounted for only 0.02% of total emissions. A reduction in unreported hazardous waste (an objective of the Plan) has the potential to result in reduced dioxin emissions as illustrated in Table 5.3.

Table 5.3 Estimated dioxin emissions from burning of unreported hazardous waste

	Unreported hazardous waste tonnages	Potentially being burned illegally (10%)	Estimated Annual emission (grams)*
2004 (Baseline estimate)	47,011 ⁹	4,701	4.701
2016 (Business as usual)**	54,707	5,471	5.471
2016 (With implementation of Preferred Strategy)	24,215	2,422	2.422
Potential Reduction in Dioxin emissions from Strategy implementation			2.280
*(Emission factor = 1000ug/TEQ per tonne of waste)			
**Same percentage of unreported hazardous waste as in 2004			

During 2000, six sites in the chemicals/pharmaceuticals sector, operated licensed hazardous waste incineration facilities. Currently there are nine individual incinerators operating in Ireland, seven of these are licensed to incinerate liquid wastes only while two units are licensed to incinerate solid waste. All are equipped with flue gas treatment systems and are regularly monitored for combustion performance and emissions to air, which are subject strict emission limit values under IPPC licence regime.

Summary: Air

Ambient air quality is generally good with the exception of NO_x and PM10 in urban areas which are growing problems due to increased traffic congestion. Dioxins levels are decreasing, uncontrolled combustion accounts for the vast majority of current emission sources, waste incineration the least.

5.3.5 Climate

General Status and Characteristics

The six primary greenhouse gases covered by legislation include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). Ireland's greenhouse gas emissions (per capita) are among the highest in Europe (after Luxembourg) (EEA, 2007) and a major effort will be required to meet the agreed national Kyoto Protocol target of 13% above 1990 levels for the period 2008-2012. Ireland's total allocation is 314.18

⁹ The most recent estimate for unreported hazardous waste is 46,288 tonnes in 2006, as presented in the Proposed Plan.

Mt CO₂ equivalent for 2008-2012. Data for 2005 shows that Irish emissions of greenhouse gases were around 69.9 million tonnes (CO₂ equivalent) (EPA, 2007) (Table 5.4 and Figure 5.3). The agriculture, energy industries, and transport sectors remain the principal sources of GHG emissions, together accounting for just over 70% of total national emissions.

Table 5.4 Greenhouse Gas Emissions 1990 – 2005 (EPA 2007)

Kilotonnes CO ₂ eq.	1990	1997	1998	1999	2000	2001	2002	2003	2004	2005
Carbon Dioxide (CO ₂)	32,553	38,623	40,688	42,289	44,884	47,343	45,903	45,146	45,747	47,292
Methane (CH ₄)	13,287	14,103	14,332	13,920	13,438	13,261	13,268	13,881	13,338	13,102
Nitrous Oxide (N ₂ O)	9,499	9,937	10,560	10,648	10,214	9,702	9,240	9,083	8,936	8,850
HFCs	1	132	189	195	229	252	277	350	384	431
PFCs	0	131	62	196	305	296	212	229	187	174
SF ₆	35	132	94	69	56	69	70	119	67	96
Total	55,374	63,057	65,925	67,317	69,127	70,923	68,971	68,808	68,659	69,945

The waste sector contributed 2.7% of greenhouse emissions in 2004, an increase of 25% from 1990 (1.46Mt in 1990 to 1.83 Mt in 2004) (Source: EPA, 2006). The emission of methane gas from landfills was the biggest constituent (90%) of this figure (EPA, 2006). The contribution of waste incineration is not clear as currently the data for emissions attributable to hazardous waste management is not separately reported. The most recent IPCC Report (2007) into mitigation strategies has published in May 2007. The report highlights a number of policies, measures and instruments shown to be environmentally effective. Among those cited for the waste sector were financial incentives to stimulate technology diffusion, renewable energy incentives or obligations and regulations applied at national level via enforcement strategies.

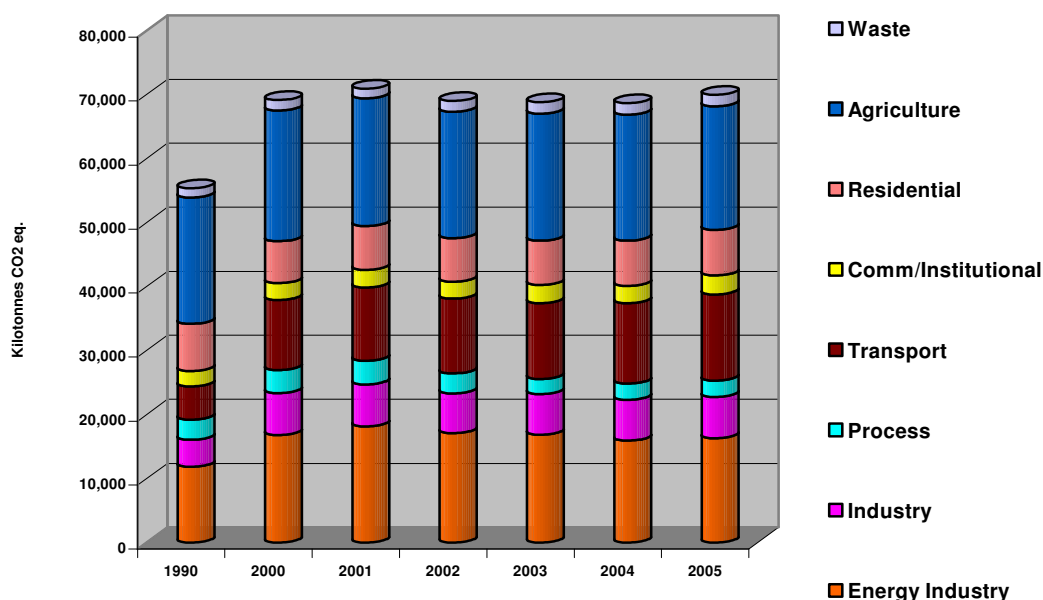


Figure 5.3 Relative Contributions to Greenhouse Gases by Sector (EPA 2007)

Environmental Problems Relevant to the Plan

There are no figures for the precise contribution of existing hazardous waste management activities to the national greenhouse gas emissions. It would be unwise to make estimates based on current GHG emissions from non-hazardous waste management activities due to the extreme contrast in both quantities and nature of waste but also the appropriate methods of disposal and treatment.

All hazardous waste transport within Ireland is by road. Currently transfrontier shipment (TFS) data records information on county of origin and destination ports, however, in many cases the county of origin refers to the location of the transfer station and not the actual source of material. It is therefore difficult to quantify GHG emissions accurately from the available data. Section 8.4.2 of the report endeavours to estimate the climate impacts from the export of mixed solvent waste from Ireland.

Since 2001, approximately half of the hazardous waste generated in Ireland each year is exported for treatment. The rate of export increased from 22% in 1996 to 50% in 2006. The principal destination is Great Britain, followed in descending order by Germany, Belgium and Denmark. Section 8.4.2 of this report estimates that the export of 100,000 tonnes of this waste (i.e. the solvents) is resulting in the generation of 3,768 tonnes of GHG. Given that this estimation only accounted for CO₂ and did not include other wastes, it could be presumed that the actual figure for CO₂ equivalent emissions from such export may be three to four times higher. Further information on the export of specific hazardous waste streams is presented in Chapter 5 and Appendix E of the Proposed Plan.

Summary: Climate

Current hazardous waste management activities are resulting in a relatively small impact on climate change, primarily due to the transport emissions from the export of such wastes. Although quantities of GHG emissions from the domestic transport and management of waste are unavailable, estimates can be made for emissions from export of these wastes and it is clear from these estimates that current hazardous waste management activities are resulting in considerable marine and terrestrial transport, which in turn is resulting the emission of greenhouse gases.

Climate change may also have implications for the siting and design of NHWM facilities and for future transport scenarios, especially Marine transport as increased flooding and severe weather conditions become apparent.

5.3.6 Soil

General Status and Characteristic

Irish soils can be grouped into nine major classes referred to as great soil groups as listed below. Gleys, the most common mineral soil type in Ireland, are slow draining soils, commonly not suitable for cultivation unless drained (Meehan 2003).

Podzols	Acid Brown Earths	Rendzinas and Lithosols
Brown Podzols	Gleys	Basin Peats
Grey Brown Podzols	Shallow Brown Earths	Blanket Peats

Overall the quality of soils in Ireland is good (Brogan *et al.*, 2002). However, there is increasing pressure on soils resulting in the their physical, biological or chemical degradation.

Environmental Problems Relevant to the Plan

The primary soil quality issues related to hazardous waste and hazardous waste management include:

Illegal disposal sites – That may contain washed residues from illegal diesel smuggling/laundrying operations, other hydrocarbon wastes and asbestos waste amongst others;

Inappropriate disposal of certain hazardous wastes – The disposal of batteries in a normal municipal (household) waste for instance, which upon deposit in a non-hazardous landfill may result in contaminated leachate and therefore present an even higher risk to local soil quality;

Soil from contaminated sites – which can contain a range of hazardous wastes. Potential pathways for soil contamination relating to hazardous waste include direct deposition of air emissions, leachate and groundwater discharges. Contaminated soil must be appropriately treated and disposed of at licensed facilities. Currently there is insufficient capacity for the treatment of such wastes, resulting in the export of the majority of this waste.

Contaminated soil was the largest single hazardous waste type generated in 2004, accounting for 45.6 per cent of total reported hazardous waste. The continuous increase in the quantity of contaminated soil reflects the scale of redevelopment of brownfield sites (EPA 2006).

Old Landfill Sites

The EPA's Office of Environmental Enforcement published a guidance document on the *Environmental Risk Assessment for Unregulated Disposal Sites* in 2006. The guidance sets out a risk based assessment procedure that allows all historic unregulated waste disposal sites to be identified; the potential risks to be assessed and then the appropriate remedial measures or corrective actions to be put in place. As a starting point, it is proposed that all local authorities identify possible sites by applying the EPA's guidance *Methodology for the Identification of Waste Disposal or Recovery Sites in Ireland (2006)*.

Although land take is another issue affected by hazardous waste management, currently only one landfill is licensed to accept hazardous materials and the land take of this is small. The land area occupied by landfills (an artificial surface) according to the CORINE Landcover database was 3.48km² in 1990 and 3.43km² in 2000. Modern landfills have greater landtake than older facilities. All of these issues require attention by the Plan with regard to formulating measures to minimise such pollution and deal adequately with such wastes through the development of infrastructure.

Summary: Soil

Currently hazardous waste management is having low impacts on national soil quality. However certain hazardous waste activities have a relatively high impact in some local areas, such activities include inappropriate disposal of certain hazardous wastes and Illegal disposal activities.

A substantial volume of contaminated soil is remediated, either in Ireland or abroad, with local significance for soil quality. These issues should be addressed in the National Hazardous Waste Management Plan with regard to formulating measures to minimise such pollution and to develop appropriate infrastructure.

5.3.7 Material Assets

General Status and Characteristics

Material assets primarily relate to the infrastructural assets that enable a settlement to function as a place to live and work and can be taken to be infrastructure including settlements (towns and villages etc.), transport and utilities (including waste facilities).

Energy in Ireland is largely derived from non-renewable fossil fuel sources and almost 90% of the energy supply is imported. In 2004, fossil fuels (coal and peat) represented approximately 26% of total energy production in Ireland with 50% gas (Figure 5.4). The contribution of renewable energy to primary energy supply is set to increase significantly in the next couple of years (CSO 2006). Figures from Commission for Energy Regulation (CER) suggest the percentage of electricity generated from renewable sources reached 11% in 2006. This is up from 9% in 2005.

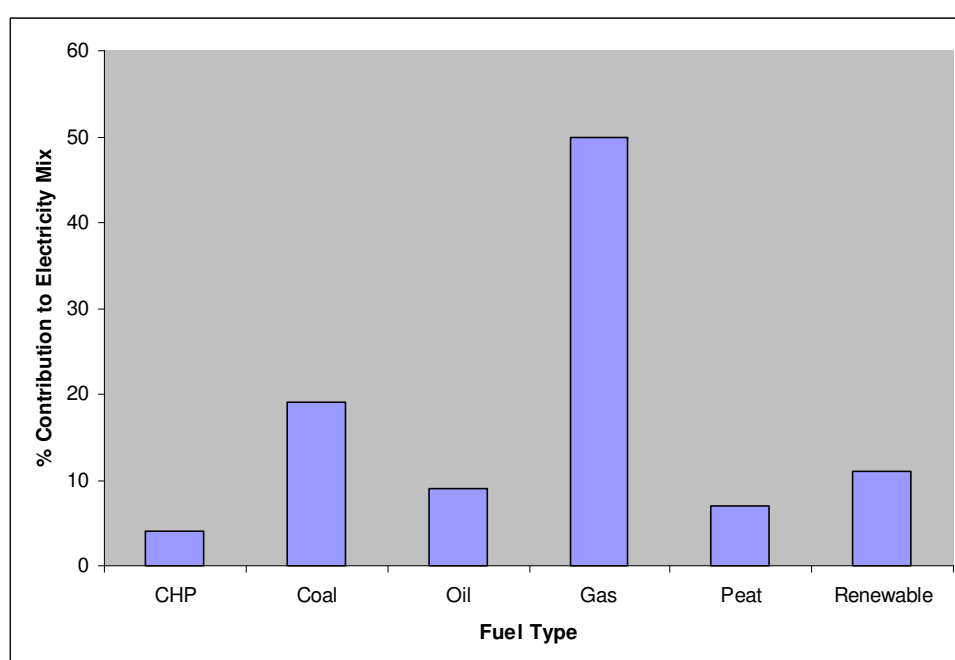


Figure 5.4 Electricity Mix in Ireland in 2006 (CER 2006)

Forfas (2007) has stated that Ireland's comparatively poor performance on key benchmarking indicators such as costs and capacity can be traced back to the failure to deliver key waste management infrastructure in recent years. Specific infrastructures identified include:

Thermal treatment capacity to recover energy from municipal and industrial waste; and,

Thermal treatment or landfill capacity for hazardous waste;

Environmental Problems Relevant to the Plan

Waste infrastructure is also considered to be a material asset. Currently there is a deficit of major hazardous waste infrastructure and an over reliance on export. This export not only results in emissions of greenhouse gases and a higher risk of marine pollution but also has implications for transport costs.

Hazardous waste management practices involves the consumption of energy and production of greenhouse gases at various stages, indirectly in the production of raw materials, but directly through the transport, treatment and disposal of these hazardous wastes (EPA, 2006). However, it must be noted that energy can also be recovered from waste through incineration or co-incineration where the energy generated can be used for heat or power (see Appendix C for Fact Sheet on co-incineration of waste solvents in cement kilns). The energy recovery potential of hazardous waste and the use of certain wastes as fuels in power plants or certain industrial operations may present a number of benefits. One of which is the potential to reduce Irelands dependency on imported fossil fuels which should also reduce the costs to waste producers and receiving parties due to ever increasing fossil fuel costs. For instance, the use of waste as fuel in cement kilns and the replacement of conventional coal with 100,000 tonnes of blended solvents of 22Mj/Kg calorific value could save 75,000 tonnes of coal (based on coal with calorific value of 29Mj/Kg). Further information on use of fuel in cement kilns is provide in the Fact Sheets in Appendix C.

Forfás considers self-sufficiency as a key waste management issue. It is noted that Irelands lack of self-sufficiency for the treatment and disposal of hazardous waste may prove to be a deterrent for future investment in this country, and expansion capital may be diverted to countries with a fully integrated approach to waste management.

Summary: Material Assets

Current hazardous waste management practices are having a significant effect on material assets.

In order to alleviate these impacts, the Plan emphasises the importance and benefits of striving for more self-sufficiency in hazardous waste management and outlines the measuers/infrastructure necessary to do this.

5.3.8 Biodiversity, Flora and Fauna

General Status and Characteristics

Ireland, compared with most other European countries, has relatively reduced biodiversity in terms of species numbers and richness. This can be accounted for by it size, island status, position at the edge of a European archipelago and glacial history (Mitchell, 2002). The main habitat types in Ireland are freshwater habitats, peatlands, grasslands, native woodlands, freshwater habitats, rocky habitats, and artificial habitats.

There are 60 habitat types and 25 species in Ireland that are recognised in the Habitats Directive and more recently the European Commission as being in need of special protection.

- Special Areas of Conservation (SACs) are recognised at a European and Irish level. Their legal basis is the EU Habitats Directive. Approximately 10,900 square kilometres of land in Ireland is designated as SAC. Approximately 67% of this is land with the majority of the remainder made up of marine and surface water.
- Special Protection Areas (SPA's) are also recognised at a European and Irish level. They are habitats designated under the European Birds Directive. 120 SPAs have been designated since 1985 with a further 17 advertised. SPA's often overlap with SAC's.

- **Natural Heritage Areas (NHA's)** These are habitats of national importance. To date, 75 raised bogs have been designated covering some 23,000 hectares. A further 73 blanket bogs, covering 37,000ha, are also designated as NHAs. In addition, there are 630 proposed NHAs (pNHAs). The pNHAs cover approximately 65,000ha and designation will proceed on a phased basis over the coming years.
- **Ramsar Sites:** These sites are designated internationally for the conservation of wetlands, particularly those of importance to waterfowl under The Convention on Wetlands of International Importance especially as Waterfowl Habitat, the so-called Ramsar Convention. There are currently 45 such sites in Ireland covering an area of approximately 67,000 ha.

Environmental Problems Relevant to the Plan

Impacts to Irish biodiversity in recent years have occurred primarily as a result of habitat degradation or destruction due to anthropogenic affects including agriculture, forestry, land reclamation, urban sprawl, road construction, water pollution and climate change. A number of EU directives (e.g. the Habitats Directive, the Birds Directive, the Water Framework Directive) have now been transposed into Irish law for the protection and enhancement of the biodiversity.

It is unlikely that the implementation plan will have significant impacts on the conservation objectives of Natura 2000/ European sites. The potential for impacts on these sites may arise at regional waste management plan level or individual project level for proposals relating to hazardous waste management. At these levels in the waste management hierarchy, the requirement for an Appropriate Assessment¹⁰ under Article 6 of the Habitats Directive would be determined in accordance with the "EU Methodological Guidance on the Assessment of plans and projects significantly affecting Natura 2000 sites", other relevant guidance and in consultation with the Department of Environment Heritage and Local Government. Impacts on locally important sites would be avoided, minimised and/or mitigated at a lower level (i.e. EIA).

One potential interaction between hazardous waste management and biodiversity is the potential impact of certain pollutants (e.g. endocrine disrupting substances) on species and habitats. Although previous concentrations of such pollutants (that may include potentially toxic and bio-accumulative substances) have been shown to be relatively low, they are still a threat as they present potential risks for animal and plant life as well as human health. Such substances include pesticides, heavy metals and other dangerous chemical substances, which can disrupt aquatic ecosystems in particular and impact on biodiversity through toxicity to reproduction. A number of international agreements and EU directives are intended to not only reduce these substances but eventually eliminate them altogether (see Chapter 4 and Appendix B of this Environmental Report). Nevertheless, there is still a risk of pollution from hazardous waste management and the Plan should have regard to this when considering waste minimisation measures as well as improving waste collection and recovery. One area that is now receiving attention in this regard are Pharmaceuticals and Personal Care Products (PPCPs), which contain a number of potentially toxic elements. These may not be removed by wastewater treatment plants, may accumulate in the aquatic environment and cause problems in the future for biodiversity.

There is significant interrelationship between *Biodiversity, Flora and Fauna* and the *Water* and the requirements of the Water Framework Directive to achieve good ecological status by 2015 will apply to Biodiversity, flora and fauna considerations also.

There may be a potential risk of hazardous waste and leachate arising from historical hazardous waste to impact particularly on aquatic habitats and associated species.

¹⁰ European Commission (2001). Assessment of plans and projects significantly affecting Natura 200 sites- Methodological Guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC

Summary: Biodiversity, Flora and Fauna

Currently hazardous waste management is resulting in a low level of impact on biodiversity.

The National Hazardous Waste Management Plan should have minimal impacts on biodiversity, and any impacts hazardous waste management may have, can be eliminated or mitigated against at a lower decision-making level, i.e. through EIA.

Another factor is the threat of certain hazardous materials in products on biodiversity, the elimination or minimisation of these chemicals should also be pursued.

5.3.9 Human Health & Population

General Status and Characteristic

In a recent EPA survey '*Public Perception, Attitudes and Values on the Environment* (2006) almost half of Irish adults consider waste management to be the most important issue facing Ireland today.

A major report on the effects of various forms of waste disposal commissioned by the Health Research Board in 2003 concluded that Ireland has insufficient resources to carry out adequate risk assessments for proposed waste management facilities. In relation to the detection and monitoring of the environmental impact of waste facilities, the report concluded that there is a serious deficiency of baseline environmental information in Ireland and went on to recommend that this deficiency should be remedied.

Environmental Problems Relevant to the Plan

The perceived impact of waste facilities and hazardous waste management in general on human health is of public concern. Any specific health impacts of the sector on the Irish population is difficult to quantify. In most cases it is impossible to establish causal links between clear epidemiological evidence and what might seem to be obvious sources of pollution. This is largely related to the absence of population health statistics. Nevertheless some studies have identified that certain health impacts have been attributable to hazardous waste facilities particularly older thermal treatment plants and hazardous waste landfills (e.g. Thompson J. and Anthony H. 2005). Waste facilities that are not properly managed can also be a cause of nuisance (odour, dust, litter, noise) to local residence and communities.

Current hazardous waste management practices in Ireland appear to have limited impacts on human health. However this is in the context of a limited number of hazardous waste treatment (particularly thermal treatment) and disposal facilities (and the high level of export of this waste) in Ireland currently.

Direct emissions to air and water arising from the handling and export of hazardous wastes and also potential emissions arising from accidental spillage, fires etc. during handling and export may impact on human health. However the most significant health impacts are more likely to be occurring as a result of:

The inappropriate disposal of unreported hazardous wastes – Such wastes can reach the environment from disposal in landfill (from both active and previously decommissioned landfill sites), wastewater treatment plants or septic tanks, unintentional release or during back yard burning.

Related to the above, there are possible occupational or domestic health and safety risks where individuals do not recognise that a waste is hazardous and accidents arise – e.g. failure to manage a damaged mercury thermometer, inadvertent inhalation of asbestos waste, risk of chemical burns from chemicals, pesticides etc.

Illegal hazardous wastes activities (backyard burning of wastes, illegal dumping of waste oils, asbestos, fridges etc).

The EPA are responsible for licensing and enforcement of waste facilities therefore any move toward greater self-sufficiency will be regulated under this regime. Licensing is done with reference to EU and national emission limits or, in the absence of statutory limit values, it is common practice to reference other suitable authorities such as the World Health Organisation (WHO). As such, limit values and guideline values have been developed primarily to take account protection of human health.

The relevant Irish ambient air standards have been adopted from the European Commission Directives 96/62/EC, 1999/30/EC and 2000/69/EC and are cited as the Air Quality Standards Regulations, which came into force in June 2002 (Irish Legislation S.I. No. 271 of 2002).

The Air Quality Standards Regulations specify limit values in ambient air for sulphur dioxide (SO₂), lead, benzene, particulate matter (PM₁₀) (Stage I) and carbon monoxide (CO), which came into effect on 1st January 2005. For nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x), particulate matter (PM₁₀) (Stage II) and benzene the effective date is 1st January 2010. There are no legislative limits for general particulates, hydrogen chloride or hydrogen fluoride in ambient air.

Summary: Human Health and Population

Currently hazardous waste management practices in Ireland involve a high percentage being exported which limits potential risk here as any risks are borne by the destination country and areas of transit.

There is significant interrelationship between *Human Health* and other environmental topics such as air and water. The quality of the receiving environment will impact directly and indirectly on human health and therefore the current state of the environment is relevant to this aspect of the baseline. As noted in the preceding sections, hazardous waste management is currently having a relatively low level of impact on air quality or the aquatic environment. However, it is recognized that there is little in the way of conclusive research on the potential specific health effects of hazardous or non-hazardous waste and this remains a gap in baseline data.

The biggest impacts to health are likely to be arising from inappropriate disposal of unreported hazardous wastes and illegal hazardous wastes activities. The possible human health impacts on a domestic/ occupational level through accidents is also recognised.

Greater self-sufficiency in hazardous waste management in Ireland will require more facilities in Ireland. Improved access to infrastructure together with better collection methods and enforcement can help minimise or eliminate the levels of inappropriate disposal of unreported hazardous wastes. Any risks associated with thermal treatment can be managed through the implementation and enforcement of appropriate license conditions. The EPA licenses most hazardous waste facilities, with the exception of a number of small facilities. Licenses are based on standards and emission limit values that are intended primarily to protect human health and the environment.

5.3.10 Inter-Relationships

In accordance with the SEA Directive, the interrelationship between the SEA environmental issues must be taken into account, along with the likely evolution of the environment in the absence of the Plan. Table 5.5 highlights the key interrelationships identified in this SEA. These potential interrelationships will be taken into account in the assessment of scenarios/alternatives.

Of particular note is the primary interrelationship between the various aquatic environments (marine, ground and surface waters) and their impact on biodiversity and human health. Flora and fauna rely directly on the aquatic environment as a habitat but the terrestrial environment can also be strongly impacted by the aquatic environment. Habitats such as callows and turloughs rely on the aquatic environment for their formation and terrestrial fauna and avifauna can rely on it as a source of food. Water quality is also of particular importance with regard to human health as it provides a source of drinking water, it yields foodstuffs and it is used for leisure purposes for community and tourist pursuits. Hazardous waste has the potential to impact on water quality directly through emissions, arising from hazardous waste disposal, potential spillages during transport and marine emissions during export.

Another key interrelationship is between air quality, climate and human health. Emissions from licensed hazardous waste management facilities are regulated and as such do not pose a significant threat to human health. However, unregulated disposal of unreported waste, e.g. illegal burning, has a much greater potential to impact on local air quality. The transport of hazardous waste and marine export also generates emissions that have the potential to impact on air quality and climate.

Table 5.5 Potential Significant Interrelationships Between Environmental Issues

Surface Water									
Groundwater	✓								
Marine	✓	✓							
Air	X	X	X						
Climate	X	X	X	✓					
Soil	✓	✓	X	✓	✓				
Human Health	✓	✓	✓	✓	✓	✓			
Material Assets	✓	✓	✓	✓	✓	✓	✓	X	
Biodiversity	✓	✓	✓	✓	✓	✓	✓	X	X
	Surface Water	Groundwater	Marine	Air	Climate	Soil	Human Health	Material Assets	Biodiversity

✓ = interrelationship anticipated

X = no interrelationship anticipated

5.3.11 Evolution of the Environment in the Absence of the Plan

Water: There would be an on-going risk to water quality (marine, freshwater, groundwater) in the absence of the Plan. Unreported hazardous waste (which can make its way into surface and groundwater leading to contamination) would continue, although trends have shown a reduction in the quantities of unreported hazardous waste generally.

In the absence of the Plan, Ireland's hazardous waste treatment/disposal requirements would continue and potentially increase. This material would require transport over long distances with the potential to cause environmental pollution due to risks of accidents, spillages and handling. Accidental release of hazardous waste to water due to transport by sea may result in more severe impacts than from other transport due to the quantity on board. Accidental release of hazardous waste may also occur at transfer/bulking/blending facilities, but are unlikely to be significant due to the controls exerted by IPPC/Waste licensing (bundling requirements).

Air: There is a long-term trend toward increased hazardous waste production. Therefore, without an active hazardous waste prevention programme, Ireland would continue to produce waste that has to be collected, treated and disposed. In the absence of the Plan and with increased trends in hazardous waste production there would be increased export of hazardous waste in the future. This would give rise to increased transport emissions due to delivery to facilities in Cork and Dublin for transfer/bulking and blending prior to shipping to facilities abroad and also shipping-related emissions. Further, treatment and disposal would not generate significant impacts for local air quality as waste materials would continue to be exported out of the country for treatment and any emissions associated with treatment would be borne by the destination country.

Climate: In the absence of the Plan, there would be continued potential for emission of greenhouse gases (GHG) associated with the transport of hazardous waste abroad for treatment. The majority of the GHG emissions from transport are due to maritime transport. Road transport has limited GHG emissions when compared with maritime transport but is still of concern.

Soil: The trend has been toward an overall decline in unreported waste and this may continue even in the absence of the Plan. However, unreported waste could potentially grow if the programme of waste prevention and improved collection schemes is not developed further. If waste is treated and disposed of abroad no impacts to the soil environment are anticipated for Ireland. Although in the absence of the Plan, some remediation of former sites can be expected, it is likely to be on a piecemeal basis and the threat to soil quality would remain for unremediated sites. This is, however, driven by development pressures in urban areas where key brownfield site locations with potential for the occurrence of contaminated materials have become prime sites for development.

Material Assets: Energy and resources are used in the generation of hazardous materials and the generation of hazardous wastes. With trends showing an overall increase in hazardous waste generation, it is likely that there would be increased pressure on energy and resource use in the absence of the Plan; that is, attempts towards efficiency in processes that might reduce the hazardous nature of the process and product waste or reduction in waste quantity would be limited. In addition, in the absence of the Plan it would be likely that a move toward self-sufficiency in Ireland's hazardous waste sector would not occur as insufficient infrastructural provisions would remain a major limiting factor.

If Ireland continues to export significant quantities of waste for treatment and disposal, there is reduced potential to recover energy or reuse materials in Ireland. There is also consumption of energy associated with the transport of hazardous waste abroad.

Biodiversity: In the absence of the Plan, the lack of an adequate prevention/collection programme would increase the risk from pollutants such as heavy metals and other dangerous chemical

substances, which can disrupt aquatic ecosystems in particular and impact on biodiversity through toxicity to reproduction if not handled correctly.

As trends indicate increases in hazardous waste, the risk to biodiversity (flora and fauna) from transport of hazardous waste outside the State would continue, particularly for marine biodiversity. Currently the majority of licensed disposal of hazardous material is carried out outside the State. Therefore, potential impacts to biodiversity within Ireland are not significant. This would remain the case in the absence of the Plan.

Although in the absence of the Plan, some remediation of former sites can be expected, it is likely to be on a piecemeal basis and threat to biodiversity would remain for unremediated sites.

Human Health - People interact with their environment and as such have the potential to be indirectly impacted by the quality of air, water and soil. In the absence of the Plan there would be a risk to human health through potential negative impacts on water, air, and soil quality arising from illegal or inappropriate disposal of unreported hazardous waste.

As Irelands exports its hazardous waste, potential negative health impacts arising from treatment processes and similarly from disposal options do not arise in Ireland therefore no health impacts are anticipated for Ireland in the absence of the Plan.

6 SCOPING AND CONSULTATION PROCESS

6.1 OVERVIEW OF SCOPING

The objective of scoping is to identify key environmental issues of concern that should be addressed in the environmental assessment of the National Hazardous Waste Management Plan so that they can be considered in appropriate detail. Scoping also helps determine the boundaries of the assessment in terms of geographical extent, and the time horizon for the assessment.

The scope was determined in consultation with a number of organisations, including the three environmental authorities, the National Waste Prevention Committee and the public. It was also shaped by the information emerging from the review of the baseline environment, and the review of other plans and programmes. Figure 6.1 below outlines how these elements combine to help shape the SEA and the Environmental Report.

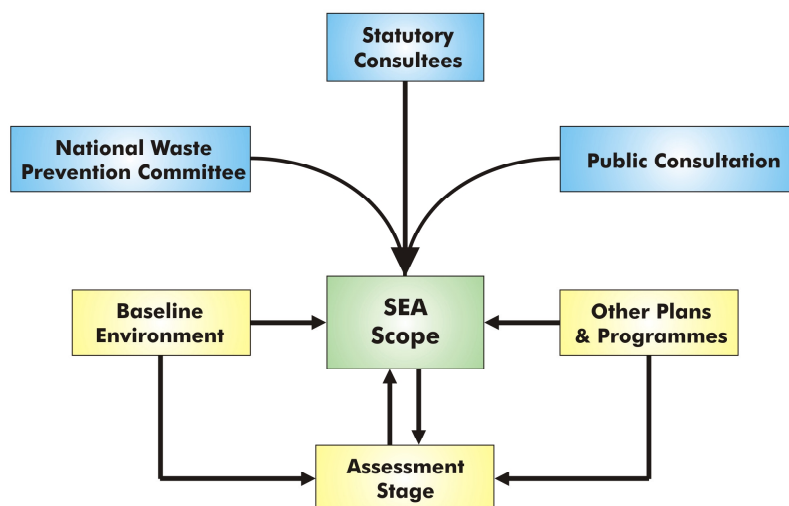


Figure 6.1 Overview of the Scoping Process

During the scoping stage, it emerged that a number of consultees did not necessarily distinguish between feedback on the development of the Plan, and on the strategic environmental assessment of the Plan. This is not surprising, given that SEA is a relatively new process in Ireland, and by its nature a waste management plan itself already deals to a large extent with issues of environmental protection and sustainability.

6.2 FORMAL SCOPING EXERCISE

Under the Irish Regulations (S.I. No. 435 of 2004) implementing the SEA Directive, designated environmental authorities must be consulted in relation to the scope and level of detail to be included in the Environmental Report. The three statutory bodies that must be consulted are the EPA, the Department of Communications, Marine and Natural Resources and the Department of the Environment, Heritage and Local Government.

Scoping for the Plan was carried out through a series of meetings and consultations with the statutory environmental authorities. These meetings considered key environmental issues, objectives, targets and indicators that would be relevant when assessing the impacts of the proposed policies and actions to be presented in the Plan. Although the EPA is charged with developing and publishing the National Hazardous Waste Management Plan, its remit of protecting the environment and extensive expertise it holds, especially with respect to air and water, means that a conflict of interest does not arise in fulfilling its role as environmental authority on strategic environmental assessment in Ireland.

A summary of the formal comments received from the environmental authorities in Ireland are outlined in Table 6.1:

Table 6.1 Summary of Formal Scoping

Aspect:	Water, Air	Marine Environment	Natural Heritage, Built Heritage, Biodiversity
Environmental Authority	Environmental Protection Agency	Department of Communications Marine and Natural Resources ¹¹	Department of Environment Heritage & Local Government
Scoping Exercise	A meeting was held in February 2006. The Agency combined the views of various consultees within the organisation in a written response.	A meeting was held in February 2006, and this was attended by representatives of the Marine Institute, and the Eastern Regional Fisheries Board. A brief written response was also received.	A meeting was held in February 2006
Topics	A comprehensive checklist of relevant considerations was forwarded by the Agency, including the content, format and assessment approach of the Environmental Report. This included references to water and air quality.	Issues raised included marine dredging residues, pollution from old/ illegal landfills, mines, inland water quality, transfrontier shipment of waste and appropriate indicators for marine environment.	Discussed relevant environmental aspects and how information would be presented to the public.

6.2.1 Initial Transboundary Scoping Consultation

Under S.I. No 435 of 2004 transboundary consultations are required where the Plan is likely to have significant environmental effects on other Member States. Countries receiving hazardous waste from Ireland were notified that preparation of the Plan and SEA is ongoing and submissions were requested. Transboundary consultation was sought from the following groups;

- Ministry for Housing, Spatial Planning and the Environment, The Netherlands;
- Royal Ministry of the Environment, Norway;
- Ministry of the Environment, Norway;
- Norwegian Pollution Control Authority, Norway;
- Walloon Authority, Direction générale des Ressources naturelles et de l'Environnement, Belgium;

¹¹ This is now the Department of Communications, Energy and Natural Resources

- Danish Forest and Nature Agency, Ministry of the Environment, Denmark;
- The Countryside Agency, England;
- Department for Environment, Food and Rural Affairs, England, Scotland and Wales;
- Countryside Council for Wales, Wales;
- Scottish Natural Heritage, Scotland;
- Historic Scotland, Scotland;
- Scottish EPA (SEPA), Scotland;
- Scottish Executive, Scotland

Responses were received from the Walloon Authority of Belgium; Ministry for Housing, Spatial Planning and the Environment (Netherlands); the Scottish Executive; Scottish Natural Heritage; Historic Scotland; Countryside Council for Wales; the Countryside Agency; Department for Environment, Food and Rural Affairs; Norwegian Ministry of the Environment; and, Norwegian Pollution Control Authority. No specific objections in relation to the import of waste from Ireland were raised, once carried out in accordance with existing Regulations. However, a number of concerns were raised in relation to environmental protection at a more local level in those countries receiving hazardous waste from Ireland and therefore not within the scope of this strategic environmental assessment.

6.2.2 Initial Public Scoping Consultation

During the development of the Plan, a comprehensive consultation process was undertaken by the project team. Consultation was proactively sought using a variety of methods including meetings, workshops and site visits. The approach to consultation is summarised in Figure 6.2 below. The Proposed Plan includes a summary of the submissions raised during the initial public consultation (Appendix A).



Figure 6.2 Elements of the Consultation Process

The public was invited to comment not only on the first Plan, but also on the scope of the SEA. Of the 32 written submissions, few of these made specific reference to the SEA process. Nevertheless the comments can be viewed as relevant to the environmental aspects of the Plan. Among the issues of specific environmental relevance were:

- Human Health – several submissions refer to the potential human health impacts of hazardous waste treatment. This includes references to hazardous waste incineration, air pollution, and the risks of hazardous ash residues. The pollution and health risks created by emissions of particulates was highlighted.
- Unreported wastes and problems for small-scale producers: the difficulties for farmers and other small scale producers (e.g. households, small business) in identifying hazardous waste and accessing appropriate treatment was identified in a number of submissions.
- The sustainability of exporting hazardous waste for treatment and disposal was debated with some favouring self-sufficiency, and others favouring continued export to existing facilities in Europe.

A summary of some of the key issues raised through Consultation, and a list of all those participating in the process, is contained in Appendix A of the Proposed Plan.

6.3 DEFINING THE SCOPE

6.3.1 Geographic Scope

The Plan is a national plan for the Republic of Ireland and as such the assessment is limited geographically to activities occurring within the functional area of the Plan. While recognition has been given in the Plan to the issue of hazardous waste generation and management in Northern Ireland, no separate assessment has been undertaken of that area in the SEA. Transboundary impacts associated with export of wastes to other EU Member States are assessed generally in terms of global impacts (including climate, energy, transport). The environmental impacts due to waste recovery and disposal operations in destination countries are not examined in detail.

6.3.2 Temporal Scope

For the SEA, the environmental impacts in 2011 (as a medium term horizon) and 2016 (as a medium to long term horizon) have been assessed. The review period for the Plan is every five years (2007-2012). However, the recommendations put forward in the Proposed Plan have a longer perspective, and will take a number of years to be implemented and take effect. In predicting future waste flows, the assessment took a 10 -year horizon to 2016 as a reasonable target. Short term assessment i.e. 1-2 years, was not undertaken as part of the SEA. It was recognised that following experiences of the previous Plan, progress in implementation can be slow and it was considered unlikely that the programmes and measures proposed within the Plan would be fully implemented in such a time frame. The result of such an assessment is likely to be similar to 'business as usual' scenario for the short term.

6.3.3 Level of Detail of the Environmental Report

The level of detail of the Environmental Report is determined by the content and level of detail of the Plan. As the Plan is on a national scale the majority of the data relates to overall national performance rather than on any individual region or facility. The Plan delivers general recommendations - including the general type of infrastructure needed for hazardous waste - that to a large extent are for implementation on the ground by other bodies (such as local authorities, Government departments, public private partnerships as appropriate). Waste prevention initiatives will be centrally co-ordinated under the National Waste Prevention Programme within the EPA.

6.3.4 Level of Detail of Assessment

One fundamental exercise is to assess the extent to which environmental aspects are impacted (or not) by the implementation of the National Hazardous Waste Management Plan and not by the implementation of other plans. This exercise is based on a broader judgement whether it may be appropriate for effects to be better assessed under lower level plans and/or programmes. The Plan, for example, does not examine site-specific impacts due to waste infrastructure. Lower levels of decision making where more local or site-specific impacts can be considered include:

- Regional Waste Management Plans, through which elements of the National Hazardous Waste Management Plan are to be implemented in Ireland. Regional and local environmental issues will also be examined through future SEAs on these regional plans.
- Planning applications for individual waste management facilities which must include an Environmental Impact Assessment (EIA) under the European Communities (Environmental Impact Assessment) Regulations, 1989-2001.
- Waste Licence applications to the EPA under the Waste Management Act.

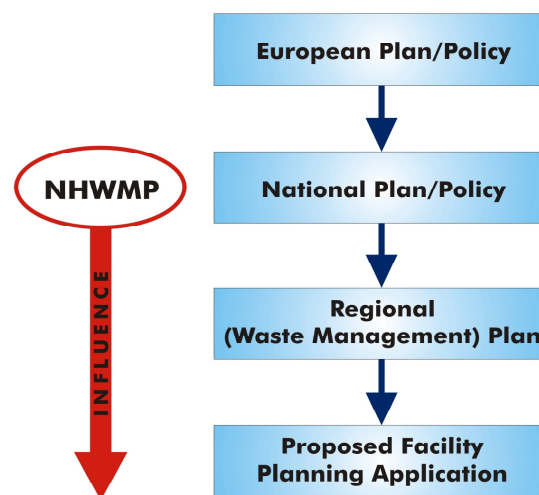


Figure 6.3 Position of the Plan in the Decision Making Process

As outlined in **Figure 6.3**, the Plan is positioned towards the top of the national planning decision-making hierarchy. As the Plan is on a national scale it is more likely to influence higher-level environmental issues such as climate change, resource flows, or possible transboundary impacts. A national plan should not necessarily deal with regional or local issues, such as the protection of specific amenities, resources, natural heritage, or site-specific concerns.

As aspects of the Plan are implemented through regional waste management plans or through infrastructure projects, the more local environmental concerns may be examined through SEAs on these plans or Environmental Impact Assessment at a project level. For most waste management facilities planning applications must include an EIS under the European Communities (Environmental Impact Assessment) Regulations, 1989-2001.

6.3.5 Key Environmental Criteria

The first stage in developing environmental objectives, targets and indicators requires the identification of the relevant environmental issues with regard to the Plan under assessment. Consultation meetings were held with the EPA and contact was also made with the Department of Environment, Heritage and

Local Government, and the Department of Communications, Marine and Natural Resources and the National Waste Prevention Committee to establish the scope of the SEA. Taking into consideration feedback from consultees, a broad assessment was carried of the potential for the Plan to impact on the environment. Table 6.2 summarises the results of this broad assessment outlining potential environmental receptors and the appropriate level of assessment. Environmental effects considered include those that may be secondary; cumulative; synergistic; short-, medium- or long-term; permanent or temporary; and, positive or negative.

Table 6.2 Potential Receptors and Level of Assessment

Environmental Receptors	Appropriate Level of Assessment
Water	Environmental Receptors will potentially be impacted (positively or negatively) by the Plan and therefore impacts were assessed at strategic /SEA level.
Air	
Climate	
Soil	
Material Assets	Material assets in terms of infrastructure, including settlements buildings and infrastructure are not considered to be significantly impacted at strategic level, as the Plan will not determine site-specific locations for facilities. This aspect would be assessed at EIA/project stage for individual waste facilities. However, transport, energy and land take are environmental aspects that will potentially be impacted (positively or negatively) by the Plan and have the potential to interact with other environmental receptors e.g. air quality, climate, biodiversity and therefore impacts on these were assessed at strategic/SEA level.
Biodiversity, Flora and Fauna	The impacts on biodiversity, flora and fauna will generally be on a site-specific level. Impacts on biodiversity, flora and fauna (due to habitat loss) or species due to new waste facilities will be determined at an EIA level. However, protected areas e.g. Special Areas of Conservation, Special Protection Areas etc. are designated on a Europe wide basis and the integrity of the network of these sites is a strategic consideration. Illegal dumping of hazardous waste and historical unlined landfills are also a threat to biodiversity, flora and fauna. POPs and PCBs are also a relevant risk to biodiversity. Therefore this environmental receptor were assessed at the SEA level. It is unlikely that the implementation plan will have significant impacts on the conservation objectives of Natura 2000/ European sites. The potential for impacts on these sites may arise at regional waste management plan level or individual project level for proposals relating to hazardous waste management. At these levels in the waste management hierarchy, the requirement for an Appropriate Assessment under Article 6 of the Habitats Directive would be determined in accordance with the "EU Methodological Guidance on the Assessment of plans and projects significantly affecting Natura 2000 sites" (European Commission, 2001), other relevant guidance and in consultation with the Department of Environment Heritage and Local Government. Impacts on locally important sites would be avoided, minimised and/or mitigated at a lower level (i.e. EIA).
Human Health and Population	Environmental Receptors will potentially be impacted (positively or negatively) by the Plan and therefore impacts will be assessed at strategic/SEA level.
Cultural Heritage including Architectural and Archaeological Heritage	Not considered to be significantly impacted at strategic level, as the Plan will not determine site-specific locations for facilities. Would be assessed at EIA/project stage for individual waste facilities. These environmental aspects have been scoped out.
Landscape	Not considered to be significantly impacted at strategic level, as the Plan will not determine site-specific locations for facilities. Remediation of former disposal sites could have beneficial landscape impacts, but this is not considered significant at a strategic level. Impacts would be assessed at EIA/project stage for individual waste facilities. This environmental aspect has been scoped out.

6.4 SCOPING DOCUMENT

A Scoping Report for the Plan SEA was compiled during the formal scoping period. The Scoping Report contained details of the comments received from the environmental authorities, the National Waste Prevention Committee and the public during the formal scoping process. The report also outlined the geographic and temporal scope of the Plan and provides information on the key environmental issues considered significant for the Environmental Report. The scoping document provided the building blocks for the Environmental Report and much of the information from the Scoping Report has shaped the chapters of this Environmental Report. Although not formally published the Scoping Report was provided to the environmental authorities and a copy of the document is provided in Appendix E.

7 STRATEGIC ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS

7.1 INTRODUCTION

The effect of implementation and achievement of the strategic environmental **objectives** and **targets** can be measured using **indicators**. The objectives, targets and indicators will be used to monitor impacts on the environment due to the Plan's implementation. This allows any negative effects to be identified at an early stage in the lifetime of the Plan and remedial action can be taken if required. The objectives, targets and indicators for this Environmental Report have been developed with reference to European and national guidance on SEA, as outlined in Section 2.1, and with reference to published indicators for Ireland (Climate change, rural, transport (EPA, 2006), marine environment (Marine Institute) and published examples of SEA (e.g. review of England's Waste Strategy. DEFRA, 2006).

7.2 DEVELOPMENT OF STRATEGIC ENVIRONMENTAL OBJECTIVES, TARGETS AND INDICATORS

The aspects of the environment, which should be considered as part of the SEA process, are broadly defined in the SEA Directive and Irish legislation and include: Water, Air, Climatic Factors, Biodiversity, Flora and Fauna, Soil, Cultural Heritage including Architectural and Archaeological Heritage, Population and Human Health. The scoping exercise was used to gain an understanding of which of the above aspects may potentially be affected by the Plan (refer to Chapter 6).

Stage I: Environmental Factors of Relevance to the National Hazardous Waste Management Plan

This was determined in the scoping exercise (See Section 6.4.5).

Stage II: Strategic Environmental Objectives

Strategic environmental objectives provide a benchmark 'intention' against which the environmental effects of implementing the Plan are measured. They are used to identify whether outcomes of implementing the Plan contribute to, or are in conflict with, environmental objectives. There are essentially three types of objectives that must be taken into account;

- **Plan Objectives**, as outlined in Chapter 3, Box 3.2. Although distinct from SEA objectives, the Plan objectives may overlap with some of the SEA objectives. However, development of SEA objectives may make the Plan objectives more sustainable.
- **Environmental Objectives**, as outlined in Table 7.2 below. Environmental objectives are devised to test the environmental effects of the Plan and to compare the effects of alternatives.
- **External Objectives**, arising from other relevant plans or programmes. These external objectives must be taken into account in the development of Plan objectives and environmental objectives (see the review of relevant plans and programmes set out in Chapter 4).

The environmental objectives reflect the existing environmental concerns in Ireland relevant to hazardous waste. They are focussed on protecting and enhancing the natural and human environment and on minimising negative effects including effects on human health. The objectives have been developed to be consistent with environmental protection objectives established by international, European and national environmental policies, objectives and standards (see Chapter 4).

In selecting the environmental objectives, regard was had to the indicative list of environmental protection objectives outlined in *Implementation of SEA Directive 2001/42/EC* (DEHLG, 2004). Selection was also based on consultation during the scoping stage. The selected objectives for this SEA are listed below.

Box 7.1: SEA Objectives Selected

1. **Water:** To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste
2. **Air:** To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health
3. **Climate:** To minimise greenhouse gas emissions associated with hazardous waste management (including transport)
4. **Soil:** To safeguard soil quality and quantity from hazardous waste and reduce soil contamination
5. **Material Assets:** To maximise use of the built environment, energy and raw materials
6. **Transport:** To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation
7. **Biodiversity:** To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan
8. **Human Health/Population:** To protect human health from hazardous waste

The internal compatibility of the environmental objectives has been examined to identify potential areas of conflict in relation to each objective so that subsequent decisions can be well based. In general the eight objectives above are compatible. For example the objective to protect air quality is consistent with conserving and enhancing biodiversity and protecting human health. In some cases, there is no obvious relationship between the objectives, e.g. no direct link between improving soil quality and influencing climate change. The only potential conflict arises for objective 6, to minimise export of waste and transport impacts. This is compatible on one level with protecting water quality, air quality and minimising climate change impacts. However by minimising export we would require more treatment facilities in Ireland, and this in turn could have some emissions to air and/or water. This is explored further in Chapter 8.

The compatibility of the environmental objectives (Box 7.1) and the Plan objectives (Box 3.2) was also examined and is presented in Table 7.1. It can be seen that the Plan objectives are broadly compatible with the environmental objectives. However, it is recognised that minimising export of hazardous waste will result in a geographical shift in the potential for negative impacts to air, water, human health etc. in Ireland.

Table 7.1 Compatibility Matrix for Environmental Objectives with Plan Objectives

	ENVIRONMENTAL OBJECTIVES								
		1 Water	2 Air	3 Climate	4 Soil	5 Material Assets	6 Transport	7 Bio- diversity	8 Human Health
PLAN OBJECTIVES	Prevent/minimize waste generation	Y	Y	Y	Y	Y	Y	Y	Y
	Improve collection infrastructure	Y	Y	0	Y	0	0	Y	Y
	Improve treatment and recovery capacity	Y/N	Y/N	Y/N	0	Y	Y	Y / N	Y/N
	Provide adequate and appropriate disposal	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y / N
KEY:	Y = Yes, Compatible	N = No, Not Compatible		Y/N = May be compatible depending on how it is implemented			0 = Neutral		

7.2.1 Approach

The overall purpose of environmental indicators is to monitor the impact, on the environment, of implementing the Plan. Environmental indicators are used to track the progress in achieving the relevant strategic environmental objectives and targets of the Plan.

- An iterative approach is required, such that the identified existing environmental problems inform the development of environmental objectives, indicators and targets
- Use of a limited number of objectives and indicators consistent with keeping assessment and monitoring manageable and strategic

7.2.2 Targets and Indicators

Targets were considered over the duration of the baseline data collection and assessment, and through the consultation process, in order to meet the strategic environmental objectives of the Plan. In each case, any target that is set must be attributable to the implementation of the Plan. The indicators have been selected bearing in mind the availability of data and the feasibility of making direct links between any changes in the environment and the implementation of the Plan. The objectives, targets and associated indicators are presented in Table 7.2.

7.2.3 Monitoring

The implementation of the Plan and its potential impact on the various environmental receptors, is monitored using the indicators presented in Table 7.2. The proposed monitoring programme is presented in detail in Chapter 9.

Table 7.2 Strategic Environmental Objectives, Targets and Indicators

Strategic Environmental Objectives			
Water – Objective 1: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste			
Air – Objective 2: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health			
Climate – Objective 3: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)			
Soil – Objective 4: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination			
Material Assets – Objective 5: To maximise use of the built environment, energy and raw materials			
Transport – Objective 6: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation			
Biodiversity – Objective 7: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan			
Human Health and Population – Objective 8: To protect human health from hazardous waste			
Target	Indicator		Data availability & Source
Reduce exceedences of emission limits to water and air from licensed hazardous waste facilities	Water Air	Number of hazardous waste facilities in breach of emission limits to surface water, groundwater and air	EPA – licence enforcement files
Legacy hazardous waste disposal sites to be managed in accordance with Code of Practice	Water Soil	Number of legacy disposal sites to which Code of Practice is applied	EPA – Code of Practice implementation records
No increases in dioxin levels in ambient environment in vicinity of hazardous waste incinerators	Air Human Health	Dioxin in cow's milk	EPA – monitoring of cow's milk
Contribute to generation of energy from renewable sources	Climate	Quantity of hazardous waste managed via energy recovery (R1)	EPA – national waste report
Reduce distance travelled by hazardous waste	Climate Transport	Tonne-kilometres travelled by road and sea	EPA – to be calculated from best available records (e.g. facility records, 'new C1', TFS) (data not currently collected)
Reduce export of hazardous waste and move towards self-sufficiency	Transport Material assets	Quantity of hazardous waste exported	EPA – national waste report
Reduce the generation of unreported hazardous waste	Human health Soil	Estimation of unreported hazardous waste	EPA - estimation will be made every two years for the national waste report
Increase the in situ treatment of contaminated soil	Soil	Quantity of contaminated soil treated <i>in situ</i> as a proportion of the total	EPA – licence enforcement files (data not currently collected)
Increase the treatment of contaminated soil in Ireland	Soil Material assets	Quantity of contaminated soil treated in Ireland as a proportion of the total	EPA – national waste report and licence enforcement files
Develop any new hazardous waste facilities on previously used land or brownfield sites	Material assets	Area of new hazardous waste facilities on greenfield and brownfield sites	EPA – licensing files (data not currently collected)
Avoid loss or damage to designated sites from siting of hazardous waste facilities	Bio-diversity	Area of designated sites used by or proposed for development of hazardous waste facilities	EPA – licensing files
Reduce major incidents of unauthorised disposal of hazardous waste	Human health	Reports of large scale illegal disposal involving hazardous waste (not including relatively small-scale fly-tipping)	EPA – unauthorised waste activities reports
Reduce complaints relating to hazardous waste facilities	Human health	Number of complaints received relating to hazardous waste facilities	EPA – licence enforcement files

8 EVALUATION AND ASSESSMENT OF ALTERNATIVE OPTIONS

8.1 INTRODUCTION

A key aspect of the SEA process is to identify and evaluate the environmental effects of plans and programmes. This is achieved by assessing the strategic alternatives that are considered to be realistic, reasonable and relevant.

Alternatives can be described as a range of options available to the plan makers for delivering the objectives of the Plan. The identification of alternatives enables more informed decision making and the assessment allows more sustainable options to be identified. The alternatives proposed should be realistic and should also be distinct to allow comparison at a strategic level. There are several approaches:

- **Need or Demand:** Is it possible to avoid or offset the generation of hazardous waste?
- **Mode or Process:** If the generation of hazardous waste is not avoidable, how may these wastes be managed? This involves assessing technology/policy options available vis-à-vis the environmental sustainability of proposed policies/actions.
- **General Location:** Where is the infrastructure going to be located – for example whether in Ireland or abroad - and what are the associated European, national and regional effects?
- **Timing and Implementation:** When and in what order are policies and actions to be implemented?

The broad environmental issues associated with waste generation and waste management, which are considered for the environmental assessment, can be subdivided into the:

- Wider global effects (climate change/ greenhouse gas emissions, other air emissions, ozone depletion, use of natural resources), and
- More local effects (landtake and air emissions, traffic/ transport, material assets and energy).

Alternatives considered were compared with the 'business as usual' option, which identifies what is likely to happen without implementation of new policies. In the case of the National Hazardous Waste Management Plan, it is noted that a do nothing option i.e. no Plan is not a realistic alternative as the Plan is a statutory document under the Waste Management Act 1996. The EPA is required to review the Plan on a five yearly basis. This SEA therefore uses a 'business as usual' scenario against which to compare alternatives. The 'business as usual' scenario represents a continuation of present trends in the absence of any policy changes or improvements to infrastructure.

8.1.1 Development and Identification of Policy Objectives

The policy alternatives have been developed based on the fundamentals of waste management principles as outlined in Section 4.2. In addition, Figure 4.4 illustrates how the Plan fits into the overall planning hierarchy. Based on review of the existing situation, the implementation of the first Plan and consultations, the project team considered alternative options available to meet the objectives of the second Plan, namely:

- To minimise unreported hazardous waste with a view to reducing the environmental impact of this unregulated waste stream.
- To reduce the generation of hazardous waste by industry and society.

- To aim for self-sufficiency in the management of hazardous waste and to reduce hazardous waste export.
- To minimise the environmental, social and economic impacts of hazardous waste generation and management.

The overall purpose was to identify, assess and recommend the optimal technical and policy solutions to achieve the objectives of waste policy and legislation for the second Plan. The process followed is summarised in Figure 8.1.

Initially the project team identified a number of strategic waste management options and carried out a broad assessment. A number of alternatives were identified at a strategic level in accordance with the four main themes of the Plan, namely prevention, collection and movement, treatment/recovery, and disposal of hazardous waste. The alternatives were based on knowledge and experience, international best practice on hazardous waste management and waste issues requiring further consideration in the Plan review.

8.1.2 Option Selection

For each of the main themes of concern, consideration was given to what alternative options were available to address the issue and improve hazardous waste management systems.

The inputs into the selection of options included:

- Existing policies as the starting point - alternatives to be considered against these;
- Additional options identified during Literature Review, Consultation, and Data Collection phases;
- Policy options introduced from international best practice.

Potential options also considered the success of prevention initiatives and potential changes in waste arisings, implications of forthcoming legislation etc.

Alternative options typically emanated from;

- The 'business as usual' scenario, whereby current policies and actions are continued,
- Alternative technical options were considered where relevant – for example what can be physically done with a specific hazardous waste stream to manage it appropriately
- Alternative policy options were considered where relevant – for example what legislative, awareness, regulatory or economic instruments could be employed to improve management of a particular waste stream.

The alternatives were initially assessed based on broad criteria as listed below;

- **environmental protection and improvement in environmental quality,**
- **use of natural and material resources,**
- **strategic need,**
- **economic feasibility, including economies of scale, and other economic considerations,**

- **technical feasibility and availability of technology or technique, practicality and ease of implementation.**

The alternatives were selected based on the knowledge and experience of the project team and took account of international best practice in hazardous waste management.

8.1.3 Broad Option Assessment

The likely effects of implementing the options have been assessed in this SEA against the 'business as usual' options for prevention, collection, treatment/recovery and disposal at a broad level.

For each of the options the likely significant environmental effects of that option, whether positive or negative will be predicted in the Detailed Assessment tables (Table 8.17 to Table 8.20). Figure 8.1 illustrates the interaction between SEA and the technical and policy option assessment.

Assessment of Technical and Policy Options for Management of Hazardous Waste

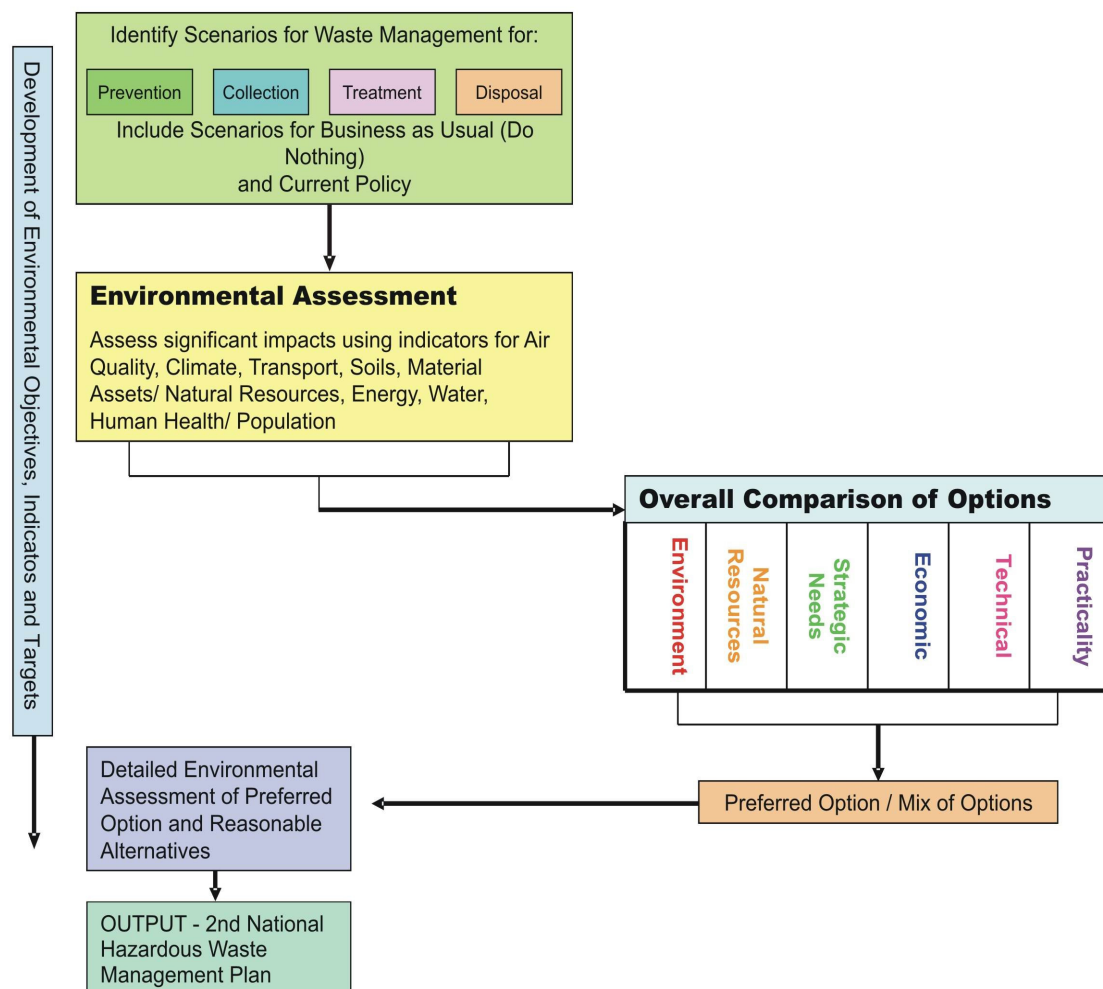


Figure 8.1 Integration of SEA into Technical and Policy Options Assessment

8.1.4 Assessment Approach

The SEA Directive requires the environmental assessment of options to inform the evolution of decision-making. This follows an iterative process as the assessment of technical and policy options is carried out and the Plan is developed.

The details of each scenario and integration of environmental considerations is iterative. The scenarios associated with Prevention, Collection, Treatment and Disposal are summarised below in Section 8.2. A set of alternative scenarios was compared to the 'business as usual' option and in each case (prevention, Collection, Treatment and Disposal) the Preferred Scenario is presented.

The environmental assessment included a combination of quantitative assessment, qualitative assessment, and expert judgement. Quantitative assessment was not possible for all environmental issues as some essential data is not available at a national level. Section 8.3 outlines where quantitative assessment has been carried out.

Predictions are based on:

- The types of facilities and numbers of facilities predicted as part of the waste management options;
- Typical impacts associated with these facility types (e.g. incinerator, cement kiln, hazardous landfill, waste transfer stations etc.).

The assessment is presented in the following three parts:

- Qualitative Assessment (Section 8.2)
- Quantitative Assessment (Section 8.3)
- Detailed Assessment (Section 8.4)

A Summary of the Assessment is presented in Section 8.6.

8.1.5 Assessment Parameters

In line with requirements of the relevant legislation, effects including cumulative/synergistic and secondary, permanent and temporary effects have been considered.

Permanent effects are addressed in Table 8.1 to Table 8.4 of this chapter. Within the current scope of this SEA, temporary impacts have not been assessed. Temporary impacts arising from the Plan and proposals contained therein would be associated with construction phase. However, no specific location or design parameters are addressed at this strategic level. It is therefore considered that the scope of the Plan does not lend itself to an assessment of such impacts; such impacts would be addressed at the project level in relation to project specific details.

Cumulative effects arise for instance where several developments may each have an insignificant effect but together have a significant effect or where several individual effects of the Plan have a combined effect. Synergistic effects interact to produce a total effect greater than the sum of the individual effects so that the nature of the final impact is different to the nature of the individual impact. Cumulative effects are outlined in Table 8.23.

Secondary effects are those that are not a direct result of the Plan, but occur away from the original effect. A summary of secondary effects is presented in Table 8.24.

In line with the legislation, short, medium and long-term impacts were considered during the assessment. However, short-term assessment i.e. 1-2 years, was not undertaken as part of the SEA. It is recognised that following experiences of the first Plan, progress in implementation can be slow and it was considered unlikely that the programmes and measures proposed within the Plan would be fully implemented in such a time frame. The result of such an assessment is likely to be similar to 'business as usual' scenario for the short-term. Assessments were made for 2012 (medium term horizon) and 2016 (as a medium to long term horizon) was taken as a reasonable target for waste projections.

In the medium term assessment (2012) it is considered likely that progress in implementation can be made in the prevention and collection elements of the Plan. However, a similar timeframe is unlikely to yield significant results in treatment and disposal as the planning and construction for such facilities could potentially have a long lead in time. Potential positive effects from the Plan are therefore likely to be seen from treatment and disposal in the medium to long term (2016) and beyond.

8.2 QUALITATIVE ASSESSMENT OF OPTIONS

8.2.1 Qualitative Assessment – Prevention

Policies that achieve improved prevention and minimisation of hazardous waste will result in less waste to be transported, treated or disposed, with consequent positive impacts on the environment. Prevention policy was as a central element of the previous Plan, as was the reduction of unreported waste, which can have potential negative effects on human health and the environment if not managed properly.

Through a prioritisation exercise based on hazardous waste generated, unreported hazardous waste, and scale of exports for disposal, the following sectors were proposed for intensive intervention to promote waste prevention and improve resource efficiency:

- **Pharmachem sector** - solvents, industrial hazardous waste;
- **Publishing and printing** – ink and varnish waste;
- **Healthcare** – dressings, contaminated medical products,
- **Transport** – waste mineral oil, oily sludge, lead-acid batteries
- **Agriculture** – sheep dip, veterinary medicines, pesticides,
- **Households** – paint, pharmaceuticals, pesticides, herbicides, batteries, bulbs.

Within each priority sector, the project team examined the possible prevention instruments that could be applied – e.g. awareness, training, fiscal incentives – and arrived at a preferred set of initiatives. For prevention there were two alternatives assessed as set out below. A Detailed Assessment of the two options is included in Table 8.17.

Option B is the preferred option as the Detailed Assessment shows that it results in decreased hazardous waste generation, which leads to a decrease in impacts on the environment. No significant negative impacts from the preferred option are anticipated.

Table 8.1 Prevention Scenarios/Alternatives

Business as Usual	
Option A Business as Usual	Continue with same levels of waste prevention initiatives as currently being employed.
Reasonable Alternative(s)	
Option B Prevention Initiatives	Prevention initiatives targeting the priority hazardous waste sectors including production of sector specific waste management plans, research and development programmes, prevention initiatives training and financial support.
Preferred Option	
Option B Prevention Initiatives	The development and implementation of targeted prevention initiatives is seen as the only feasible option to achieve hazardous waste prevention and will be flexible and adaptable throughout the period of the Plan.

8.2.2 Qualitative Assessment – Collection

The collection of waste from major producers is largely adequate. Attention was therefore focused on collection from small-scale producers such as households, Small/Medium Enterprises (SMEs) and agriculture (currently most likely unreported). Four alternative options were considered as set out below.

Preliminary assessment of the 'Reasonable Alternatives' indicates that they are broadly similar for environmental impacts and there is no significant difference between the options individually. As implementing these options individually or in isolation would not be feasible, the Detailed Assessment for Collection has been confined to Option A the 'business as usual' option and Option F, the Integrated Option. A Detailed Assessment of these two options is included in Table 8.18.

Option F is the preferred option as the Detailed Assessment indicates that it will result in a decrease in unreported hazardous waste. This would lead to a consequent decrease in risk to water quality, soil contamination, fauna and flora and human health. However, the implementation of Option F may result in some negative impact in terms of transport. In order to facilitate the drop-off and producer/supplier take back element of Option F, additional vehicle journeys would be required to get the hazardous materials to the drop off point or the original producer/supplier. However, this is not expected to be significant and if the preferred option for treatment/recovery is implemented, transport relating to export would be significantly reduced and this would offset any increase experienced with regard to collection.

Table 8.2 Collection Scenarios/Alternatives

Business as Usual	
Option A Business as Usual	<p>Continue with current type and level of collection through;</p> <ul style="list-style-type: none"> Commercial Hazardous Waste Collection (mainly industrial customers) Recycling Centres (drop-off by public and in some cases business). In 2006, a network of 86 facilities was operated by local authorities and the private sector, taking some quantities of hazardous waste. Mobile collection (serving householders in a number of counties) Retail take back (limited to selected waste types)
Reasonable Alternatives	
Option B Drop Off Based Approach	<p>Expand collection based on drop-off systems (civic amenity sites/recycling centres, private transfer stations etc.).</p> <p>Proposes that local authority civic amenity sites will accept the full range of household hazardous waste (batteries, paints, fluorescent tubes, WEEE, household chemicals, oil) – 100 sites nationally. Investment in staff training/ equipment.</p>
Option C Mobile Collection Approach	<p>Expand collection using mobile collection service approach.</p> <p>Proposes that local authorities will invest in mobile collection service. Collections at strategic locations and at a suitable frequency, with broad geographical coverage, and high profile marketing/ publicity.</p>
Option D Door-to-Door Collection	<p>Householders (or business) use a special dedicated container to store household hazardous waste and place this for collection on designated days.</p> <p>Proposes that householders and small business are provided with a small red box. Collection is alongside either residual or recycling collection (e.g. twice annually). Waste collection company sorts collected wastes and arranges treatment.</p>
Option E Producer/Supplier Take-Back	<p>Expand collection based on producer/ supplier take-back systems.</p> <p>Proposes that consumers (including Small Business) return hazardous wastes to the point of purchase. Waste streams: batteries, paint packaging, oils, medicines, veterinary products etc. Producers/ Supplier arrange for the recovery/disposal of the material.</p>
Preferred Option	
Option F Integrated Option	<p>Combination of Drop-Off (Option B) and Producer/ Supplier Take back (Option E) and limited Mobile Collection (Option C) – Proposes that the drop-off based system is improved with implementation of retail take back for appropriate materials. Mobile Collection (Option C) would be provided in a limited way for specific waste streams (farm waste and some household hazardous) and to plug geographical gaps in static facilities' service provision (e.g. remote local authority areas) and to collect seasonal wastes.</p> <p>There may be variations on these options that can also be considered. For example it may be possible to include some small scale materials such as batteries and mobile phones in a special bag in a household dry recyclables collection. Similarly a retail take back scheme might enable drop-off of waste paint to a single paint warehouse in a town rather than all retailers accepting it back directly.</p>

8.2.3 Qualitative Assessment – Treatment and Recovery

The treatment options deal with recovery of hazardous waste, and includes energy recovery and thermal treatment. The strategy study and the second Plan identified that there is a substantial volume of waste (in particular solvent waste) being exported for thermal treatment and considering solutions for this waste forms the main focus of the assessment.

Several alternatives to treat hazardous waste were considered. In developing these alternatives, consideration was given to the current European and Irish waste management policies, findings of the initial consultation and best international practices.

The assessment does not take into account the unreported hazardous waste fraction, which is presumably not properly managed. This is assessed in Section 8.2.2.

The alternative options all involve increased hazardous waste treatment within Ireland (WTE, solvent recovery, co-treatment). Any facility located within Ireland will have the potential for some emissions locally compared to where waste is exported. However, these impacts should not be significant as they will be controlled by the waste and IPPC licensing system. Any emissions would be within licensed emission levels that are based on standards intended to protect human health and the environment.

The emissions can relate to air emissions (Nitrogen oxides (NO_x), particulates (PM₁₀), Volatile Organic Compounds (VOC's), dioxins, odour, noise, traffic and water quality (surface or groundwater). Any facility with the potential for energy recovery will have environmental benefits by offsetting the use of other fossil fuels, which may in some cases be regarded as renewable energy. Fact Sheets for the four main Treatment/Recovery options are included in Appendix C. A Detailed Assessment of the six options is included in Table 8.19.

Overall **Option F** is the preferred option for recovery and treatment as the Detailed Assessment shows that it results in a major decrease of waste exports. The decrease in waste exports would reduce the potential negative impacts on air, water, climate associated with the transport of hazardous material abroad. No significant negative impact from the implementation of the preferred option is expected. With regard to soil, no significant negative or positive impacts are anticipated with any of the options. With regard to energy and resources it is not possible to determine which **Options B, C, D, E or F** is the preferred option as it will vary depending on the nature of hazardous waste treated.

Table 8.3 Treatment Scenarios/Alternatives

Business as Usual	
Option A Business as Usual Option	Continue to export hazardous waste for incineration or recovery to other countries (WTE plants, cement kilns etc.) Assumes no restriction on hazardous waste export to an 'open market' for recovery. Existing infrastructure for storage, blending and bulk transfer is adequate.
Reasonable Alternatives	
Option B Hazardous Waste Incineration Facility in Ireland	Develop a WTE facility for hazardous waste with a capacity of 50,000 tonnes per annum (and an additional 50,000 tonnes per annum non-hazardous waste). Ash produced will require disposal by landfill. Any remaining hazardous waste will have to be exported
Option C Solvent Recovery	Develop a large scale off-site solvent recovery facility (regeneration or distillation) Assumes new facility with capacity for 5,000 tonnes per annum solvents. Recovered solvent would be marketed to chemical industry in UK and Ireland. The remaining hazardous waste will have to be exported
Option D Co-treat with other energy facilities	Employ cement plants (or power station) in Ireland to recover energy from high calorific hazardous wastes. Assume capacity to use 50,000 tonnes non-chlorinated solvents as a replacement for coal. Any remaining hazardous waste will have to be exported
Option E Central Hazardous Waste Treatment Facility	Central hazardous waste treatment facility with recovery and disposal capacity co-located Assumes a central facility with treatment for various hazardous waste streams including thermal treatment (100,000 tonnes per annum) and a new landfill cell (25,000 tonnes per annum). Any remaining hazardous waste will have to be exported
Preferred Option	
Option F Integrated Recovery Option	Employs a combination of solvent recovery (Option C), co-treatment in cement kilns (Option D) and hazardous waste incineration capacity (Option E). Assumes a modest increase in off-site solvent recovery (2,000 tonnes per annum), cement plants to employ 50,000 tonnes per annum blended solvent fuel, waste to energy capacity of 50,000 tonnes per annum to thermally treat remaining waste suitable streams and some export of hazardous waste for recovery may continue.

8.2.4 Qualitative Assessment – Disposal (landfill)

The first Plan identified the need to develop two hazardous waste disposal cells in Ireland, to enable safe landfill disposal of hazardous residues generated in Ireland including asbestos, and residues from the treatment of other hazardous and non-hazardous waste streams. There is still no off-site hazardous waste landfill capacity in Ireland and there is limited disposal capacity for asbestos waste.

Thermal treatment facilities for municipal waste are proposed in several regions and these are expected to generate some hazardous fly ash and air pollution control residues once operational. The main treatment option for this waste stream is landfill disposal.

It is also possible that other waste streams requiring disposal will be generated in greater quantities in the coming years including treated wood and remediation of illegal landfills. A Detailed Assessment of three options is included in Table 8.20.

Overall **Option B** is the preferred option for disposal as it does not have significant negative impacts and results in potential greater positive impacts on climate and transport than **Option C**.

Option A has some impacts on water, climate and transport, with potential secondary impact on biodiversity flora and fauna.

Table 8.4 Disposal Scenarios/Alternatives

Business as Usual	
Option A Business as Usual	Continue to export hazardous waste for disposal in other countries (landfill cells, salt mines etc.) Assumes no restriction on the export of hazardous waste for disposal. No capital investment needed in Ireland.
Reasonable Alternatives	
Option B Co-Located Hazardous Waste Disposal Cells	Develop hazardous waste disposal cells (co-located with existing or planned landfill facilities) in Ireland Assumes two cells are developed alongside a non-hazardous landfill; one dealing with a broad range of hazardous waste and the other dealing with construction materials containing asbestos.
Option C Landfill facility for hazardous waste disposal	Develop a central hazardous waste landfill facility Assumes a single standalone hazardous waste landfill is developed, with the intention of serving all Irish requirements.
Preferred Option	
Option B Co-Located Hazardous Waste Disposal Cells	This is considered the preferred option as it makes the best use of existing infrastructure associated with existing or planned landfills and any non-hazardous landfill authorized to accept construction materials containing asbestos would ensure regional accessibility where the national facility is distant from a waste source.

8.3 QUANTITATIVE ASSESSMENT OF OPTIONS

The environmental aspects were examined to determine the level of quantitative analysis that could be carried out as part of the overall assessment of alternatives. **Table 8.5** summarises the scope of the quantitative assessment. The quantitative assessment is detailed further in Section 8.4.

Table 8.5 Potential for Quantitative Analysis

Environmental Receptors	Is it Quantifiable?
Water	The baseline impacts are mainly diffuse and not easily measured. The main changes from the Plan relate <i>on land</i> to issues such as unreported waste, unauthorised disposal, and legacy hazardous waste disposal sites, and <i>in the marine environment</i> to accidental discharges or accident risks. Changes due to Plan implementation are not readily quantifiable. Qualitative analysis carried out.
Air	While a complete inventory of air emissions under alternative options is not possible, some comparisons can be made for specific pollutants and treatment options. The typical emissions of certain pollutants from authorised hazardous waste facilities are measurable in some cases, e.g. the emission of CO ₂ and N ₂ O and methane from hazardous waste incineration plants. Emissions of dioxins to air from both authorised and unauthorised combustion are also available. Quantitative analysis carried out. Refer to Section 8.3.1.
Climate	The likely Greenhouse Gas (GHG) emissions from both waste transport and waste incineration/ co-incineration have been calculated for a number of options. Quantitative analysis carried out. Refer to Section 8.3.2.
Soil	The main changes from the first Plan relate to issues such as unreported waste, unauthorised disposal, and legacy hazardous waste disposal sites. There is no accurate register of contaminated sites from which quantities could be drawn. Data is available on the amount of contaminated soil generated annually, but this is mainly due to historic pollution rather than ongoing activities, so the quantity is not necessarily representative of Plan implementation. Qualitative analysis carried out.
Material Assets (Energy and Resources) and Transport	Material assets lend themselves to a certain amount of quantitative analysis, including: <ul style="list-style-type: none"> • Transport: assessing the waste export transportation requirements and total GHG emissions, under various options. At present there is no useable record of hazardous waste movements internally within Ireland, so this cannot be examined. • Assessing the energy yield from alternative waste treatment options • Assessing the likely uptake of land for waste infrastructure, and contaminated land that can be remediated. Quantitative analysis carried out. Refer to Section 8.3.3.
Biodiversity	While some quantitative indicators are suggested for this environmental aspect, there is no obvious way of examining alternatives quantitatively. Qualitative analysis carried out.
Human Health/Population	Health impacts would primarily be secondary via emissions to air, water, soil etc. or through accidental exposure to hazardous wastes. There is no quantitative baseline data which could be usefully examined vis-à-vis Plan policies. However reference to emissions under the other headings may be useful. Qualitative analysis carried out.
Cultural Heritage	Scoped Out (see Chapter 6). Potential impacts to cultural Heritage would best be dealt with at EIA level.
Landscape	Scoped Out (see Chapter 6). Potential impacts to cultural Heritage would best be dealt with at EIA level.

Quantitative assessment could only be carried out for air, climate and material assets. The basis for the quantitative assessment was a model of waste flows completed as part of the Strategy Study for the years 2004 (baseline) and 2016. The assessment, which follows, has been carried out on the preferred strategy for prevention, collection, treatment and disposal, as summarised in Section 8.2.3.

The total waste generation for years 2004-2016 was projected as part of the Strategy Study. This was carried out by examining each of the main waste streams (e.g. solvents, WEEE etc.) in terms of trends in arisings from 1996 to 2004, and likely future patterns based on knowledge of the particular sector and general patterns of growth predicted in the Irish economy. The year 2016 is approximately 10 years from the revision of the Plan, which gives a reasonable length of time to enable necessary infrastructure to be put in place. A summary of projected waste stream flows is given in Table 8.6 and Figure 8.2.

Table 8.6 2004 baseline and predicted waste flows for 2016 (with and without implementation of preferred option proposed by Plan) in tonnes *

		Recycled	Energy Recovery	Special Treatment	Incineration	Landfilling	Total Waste Treated	Not Managed	Total Generated
2004 (Baseline)	On-site	26,873	6,025	2,468	37,304	13,657	86,327		
	Off-site Ireland	24,446	0	28,397	0	3,109	55,952		
	Total Ireland	51,319	6,025	30,865	37,304	16,766	142,279		
	Total Exported	62,550	36,518	5,613	54,471	5,976	165,128		
	Total Wastes	113,869	42,543	36,478	91,775	22,742	307,407	47,011	354,418
2016 (Business as usual)	On-site	30,745	6,893	2,824	42,679	15,625	98,765		
	Off-site Ireland	27,968	0	32,488	0	3,557	64,013		
	Total Ireland	58,713	6,893	35,312	42,679	19,182	162,778		
	Total Exported	71,562	41,779	6,422	62,319	6,837	188,919		
	Total Wastes	130,275	48,672	41,734	104,997	26,019	351,697	54,707	405,481
2016 (preferred. Strategy)	On-site	32,998	8,684	2,605	29,525	13,026	86,838		
	Off-site Ireland	31,000	50,000	38,349	50,000	25,000	194,349		
	Total Ireland	63,998	58,684	40,954	79,525	38,026	281,187		
	Total Exported	69,055	1,001	5,004	25,020	0	100,079		
	Total Wastes	133,053	59,685	45,958	104,545	38,026	381,266	24,215	405,481

*The key assumptions in terms of hazardous waste infrastructure in Ireland are included in Appendix D1

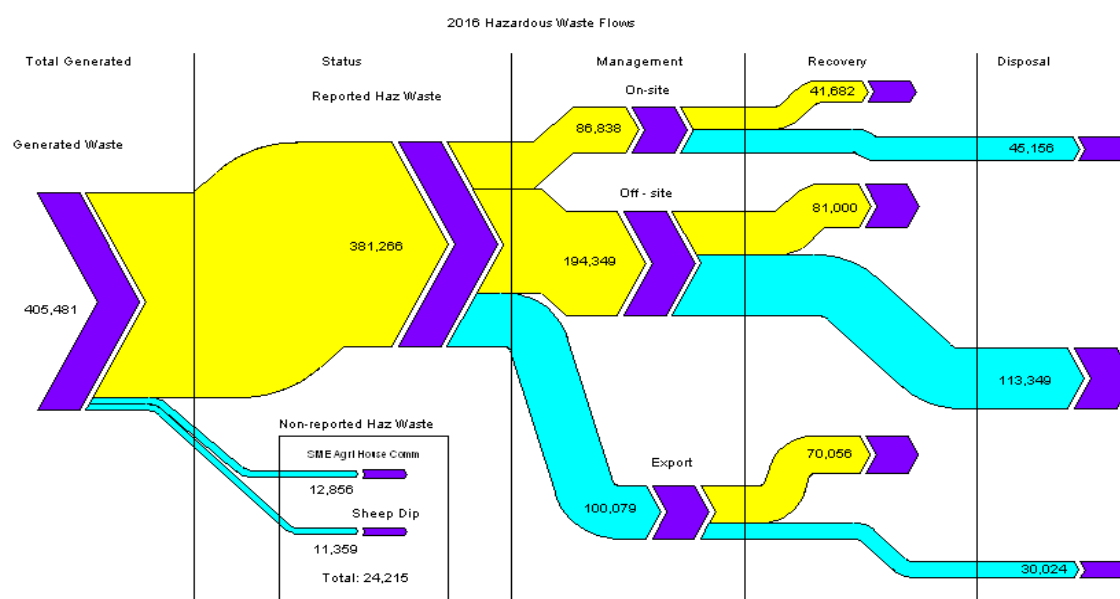


Figure 8.2 Projected Hazardous Waste Flows for 2016

The information provided is used to illustrate the scale of impacts from different options and to compare individual aspects of the alternatives. Quantitative findings are outlined in the following sections.

8.3.1 Quantitative Assessment – Air

8.3.1.1 Prevention and Collection Options

Dioxin emissions generated through the 'business as usual' option are compared with the 'Plan implementation' option in Table 8.7. This comparison is based on an assumption that a proportion of unreported hazardous waste (estimated at 10%) is illegally burned along with other municipal waste. This percentage is an estimate based on similar assumptions made by the EPA in its estimates of emissions of national dioxins and furans. Table 8.7 shows that overall dioxin emissions can be substantially reduced if the outcome of the Plan's aim of reducing unreported waste prove successful. The reduction of 2.28 grams annually would be significant on a national level, given that the total annual emissions to air were ~34.05 grams in 2000.

Table 8.7 Estimated dioxin emissions from burning of unreported wastes

	Unreported Waste tonnages	Potentially being burned illegally (10%)	Estimated annual dioxin emission (grams)*
2004 (Baseline estimate)**	47,011	4,701	4.701
2016 (Business as usual)***	54,707	5,471	5.471
2016 (With implementation of Preferred Strategy)	24,215	2,422	2.422
Potential Reduction in Dioxin emissions from Strategy implementation			2.280
*(Emission factor = 1000ug/TEQ per tonne of waste)			
** Waste Strategy Report Appendix D1			
*** Same percentage of unreported hazardous waste as in 2004			

8.3.1.2 Recovery and Treatment Options

The main recovery/treatment options in the Plan include incineration of hazardous waste and co-incineration of hazardous wastes solvent in cement kilns. The emissions of dioxins to air from incineration for the year 2016 with and without the implementation of the Plan are compared in Figure 8.3.

Figure 8.3 shows that with implementation of the preferred treatment/recovery option the level of dioxin emissions in Ireland will increase due to the development of a hazardous waste incinerator here. There will however be a consequent reduction in the emission of dioxins from the treatment/recovery of Irish hazardous waste in facilities abroad as Ireland moves away from export of such wastes to these countries reflecting the move toward self-sufficiency in management of its own hazardous waste. While the move toward self-sufficiency will see a shift in emission of dioxins from abroad to Ireland, this would not lead to a significant difference in the quantity of dioxins resulting from management of Irish hazardous waste.

A decline in dioxin emissions may have been anticipated with the preferred treatment/recovery option due to the increase in hazardous waste recycling rates thereby removing waste from the quantity destined for incineration. However, this is only marginal as most of this is negated by the increase in quantities of hazardous waste collected which require treatment¹². This is why the quantities of hazardous waste incinerated and therefore the dioxins emitted remain the same with 104,997 tonnes for the preferred treatment/recovery option and 104,545 tonnes for the 'business as usual' option.

Cement kilns can emit large volumes of dust, which in addition to being a respiratory hazard, can act as a medium for the transport of other air pollutants. It is noted that the emission limit value for dust from cement kilns co-incinerating waste is higher than for conventional incinerators. The dioxin emissions anticipated from co-incineration in cement kilns is related to the type of solvents used as fuels. While the process could potentially give rise to dioxins, proper screening to ensure only non-halogenated or low chlorine solvents are used in the process would provide limited scope as a source of dioxins. Appendix C provides further details of the co-incineration process.

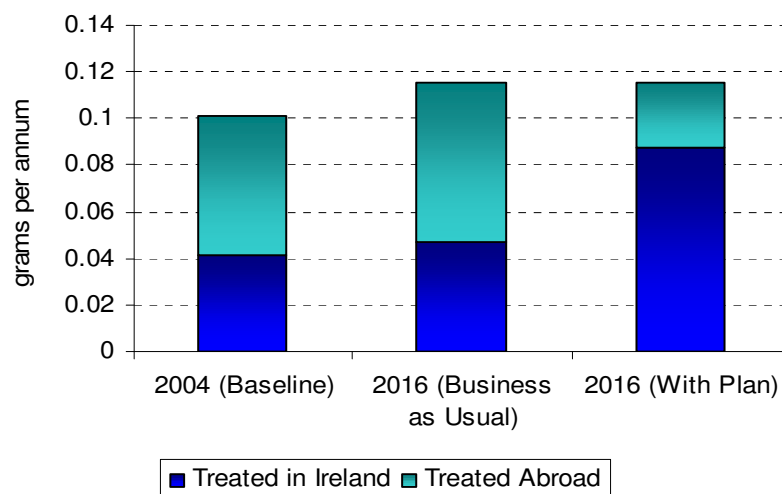


Figure 8.3 Dioxins emissions to air from Incineration of Irish Hazardous Waste

¹² 381,266 tonnes are treated in the Preferred Strategy versus 351,697 tonnes treated in the Business As Usual Option (See Table 8.8).

8.3.1.3 Overall

The estimated national emissions of dioxins to air in Ireland¹³ were examined with regard to the relative proportion contributed by hazardous waste treatment. Figure 8.4 demonstrates that the potential for emissions from burning of unreported hazardous waste is more significant than the contribution from authorised hazardous waste incinerators. The implementation of the Plan will result in an overall decrease of emissions of dioxins to air.

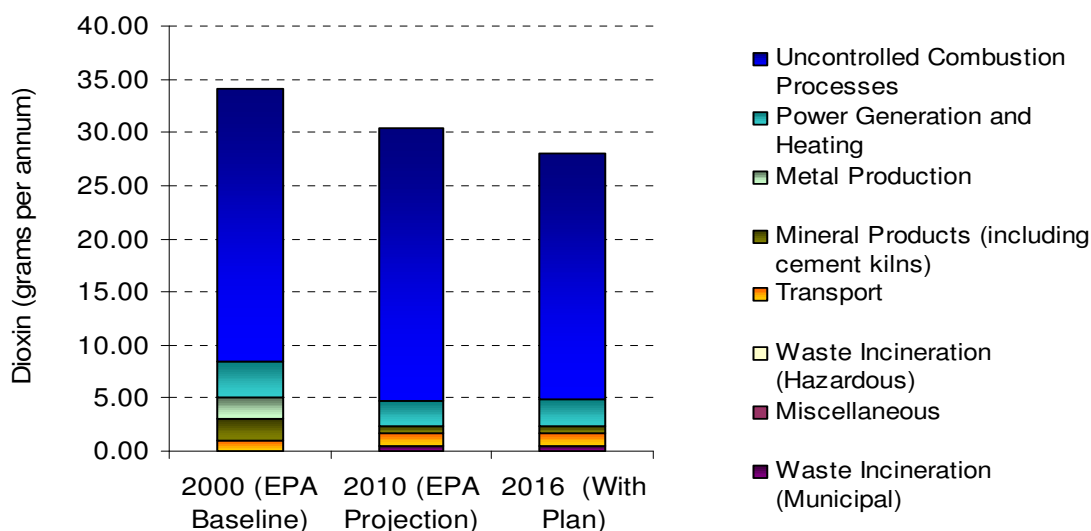


Figure 8.4 Sources of dioxins for 2000, 2010 and 2016 with Plan implementation (includes reduction in dioxins from the burning of unreported wastes)

If we exclude the burning of unreported waste, Figure 8.5 shows that the implementation of the Plan will result in only a slight increase of emissions of dioxins to air due to hazardous waste incineration. In 2016, the emissions of dioxins to air due to hazardous waste incineration will account for 0.3%.

¹³ "EPA Inventory of Dioxins and Furan Emissions to Air, Land and Water in Ireland for 2000 and 2010", EPA, 2000-DS-2-M1

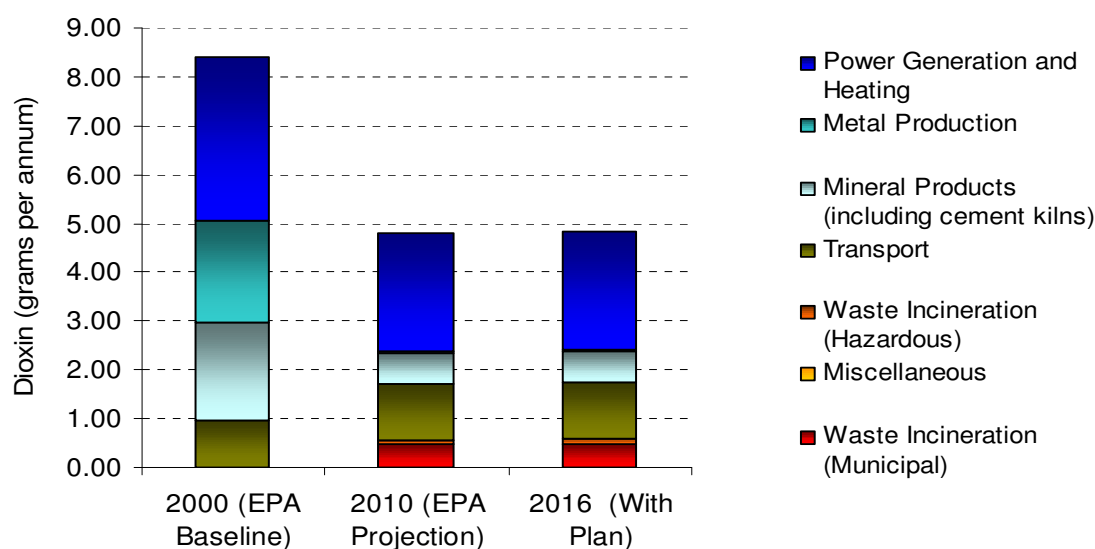


Figure 8.5 Sources of dioxins for 2000, 2010 and 2016 (excluding uncontrolled combustion)

8.3.2 Quantitative Assessment – Climate

Where possible, the impacts of the Plan on climate change were assessed on two fronts; firstly for the emission of greenhouse gases from the export of hazardous wastes abroad and secondly for the emissions arising from the specific disposal and treatment options.

8.3.2.1 Increase in Hazardous Waste Collection

The decrease in unreported waste in the preferred strategy would result in an increase in hazardous waste collected resulting in additional traffic and associated air emissions. The additional CO₂ emissions have been estimated in Appendix D6 to 361.7 tonnes for an additional 22,796 tonnes per annum collected in the preferred option.

8.3.2.2 Waste Exports

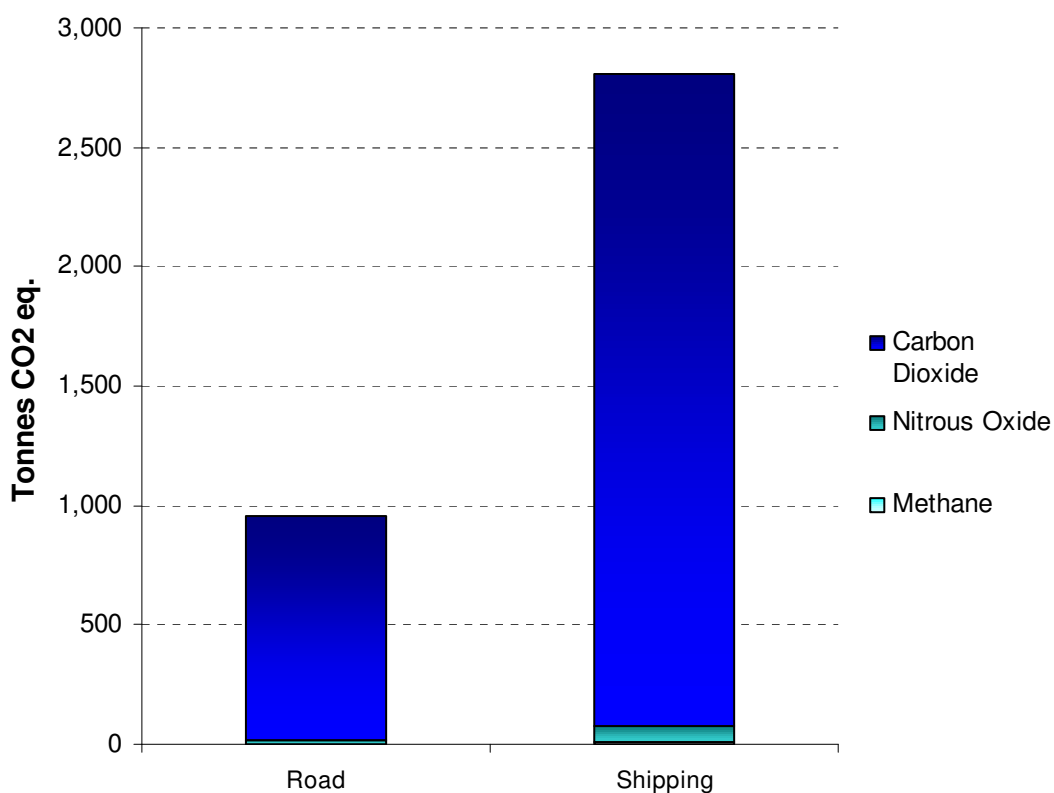
Currently the vast majority of Irish hazardous waste is exported for treatment and disposal abroad. As such the emissions from the transport of waste solvents from Ireland were assessed for three greenhouse gases (Carbon Dioxide (CO₂), Nitrous Oxide (N₂O) and Methane (CH₄)).

EPA databases and local authority trans-frontier shipment (TFS) records were used as the basis for this assessment. These records provided information on tonnages, destinations and average payloads. Typical emission rates from heavy goods vehicles (HGVs) and shipping were extracted from internationally recognised and verifiable sources. A copy of the main assumptions can be found in Appendix D5 and the assessment sheets can be found in Appendix D6.

Table 8.8 and Figure 8.6 show that the GHG emissions from marine shipping are greater than those arising from road transportation, with carbon dioxide (CO₂) as the primary greenhouse gas emitted.

Table 8.8 Estimated Climate impacts from the export of mixed solvent wastes from Ireland in 2004

		Unit	By Ship	By Road	Total
CO₂	Total CO ₂ Emissions	Tonnes	2,730	939	3,669
	Average CO ₂ Emissions per tonne of waste exported	Tonnes	-	-	0.037
GHG	Total Greenhouse Gas Emissions (CO ₂ , N ₂ O, CH ₄)	Tonnes CO ₂ equivalent	2,817	952	3,768
	Average GHG emissions (CO ₂ , N ₂ O, CH ₄) per tonne waste exported	Tonnes CO ₂ equivalent	-	-	0.038
Distance	Transport effort	Tonne.km	89,371,455	107,336,933	196,708,387
	Average Distance travelled (per shipment)	Km	1,071	239	1,310
Based on ~100,000 tonnes of solvents from TFS Records					
See Appendix D6 for further details on calculation					

**Figure 8.6 Estimated GHG from the shipping of 100,000 tonnes mixed solvent wastes in 2004 (tonnes CO₂ equivalent)**

In Figure 8.7 the estimated GHG emissions from shipping 100,000 tonnes of solvents abroad were compared with the potential GHG emissions if all these waste solvents were delivered to a cement kiln in Co. Westmeath and a hazardous waste incinerator in Cork. In both cases, export and treatment in Ireland, it was assumed that the waste would be leaving from transfer stations/solvent blending facilities in Cork and Dublin. Further details are provided in Appendix D6 – GHG emissions from transport.

Treatment of waste solvents in Ireland would result in a decrease of the total GHG by 88% from 3,768 tonnes of CO₂ eq. due to export to 467 tonnes of CO₂ eq. due to road transport in Ireland.

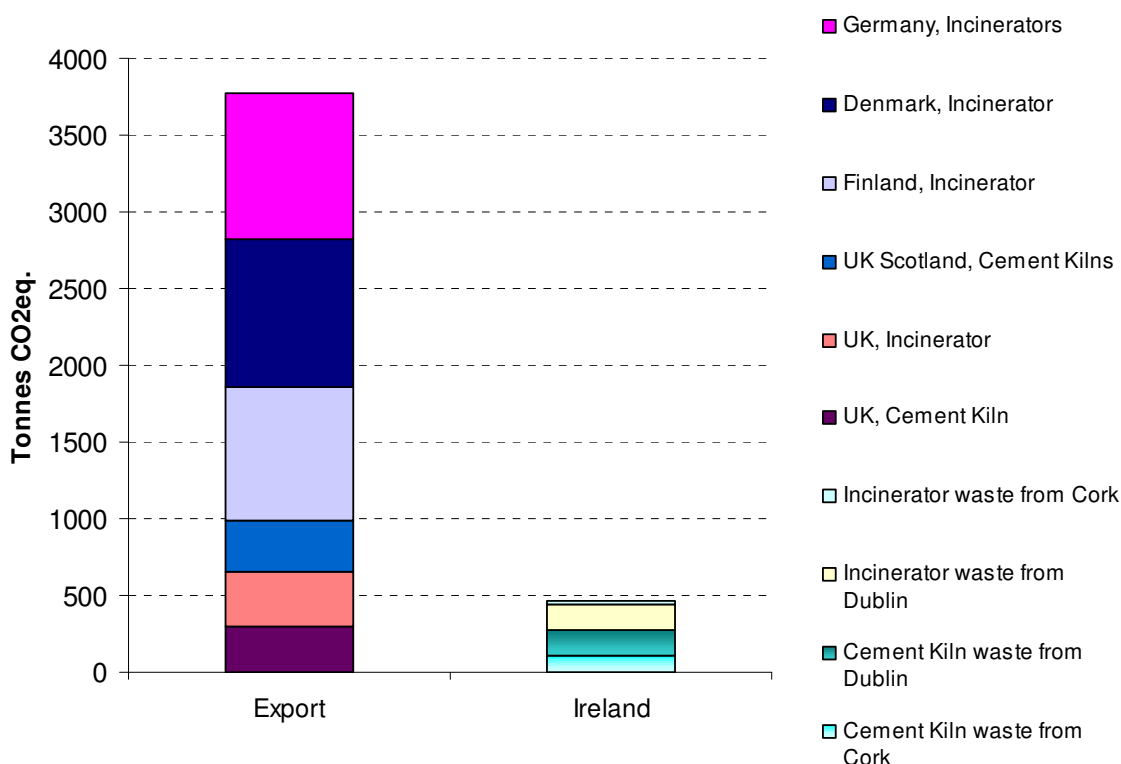


Figure 8.7 Comparison of GHG emission from transport if waste solvents exported in 2004 were treated at a cement kiln in Co. Westmeath

Figure 8.8 shows the estimated GHG emissions from delivering hazardous waste abroad and in Ireland.

For example, hazardous waste delivered to an incinerator in Finland from Dublin will travel 2,800 km by sea and 70 km by road. The average GHG emission per tonne of waste transported will be 0.003 tonnes due to road transport and 0.073 tonnes due to sea transport.

If the same hazardous waste delivered from Dublin to a cement kiln in Co. Westmeath, it will travel 90 km per road resulting in 0.004 tonnes of GHG emitted. This will increase to 0.008 tonnes if the waste was coming from Cork.

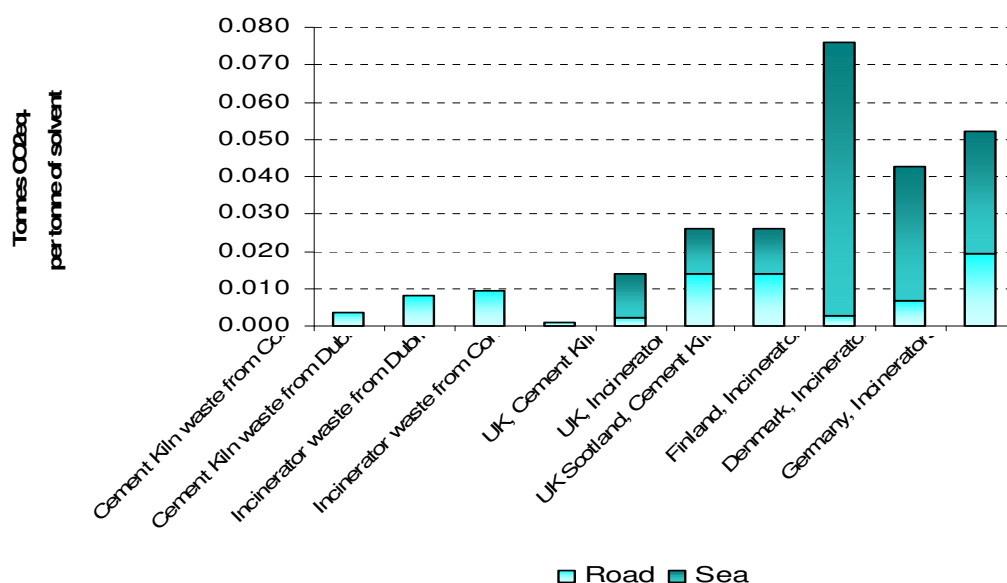


Figure 8.8 Estimated GHG per tonne of solvent waste delivered from Transfer Station to treatment facilities in Ireland and Abroad

Table 8.9 shows the potential GHG emissions of transport of hazardous waste for each option assuming 0.0376 tonnes of CO₂ eq. per tonne treated abroad) and 0.005 tonnes of CO₂ eq. per tonne treated in Ireland similar to solvent waste¹⁴ (calculations are shown in Appendix D6).

Table 8.9 Potential GHG emissions for transport and export of hazardous waste in tonnes

	Tonnes Exported (a)	Tonnes treated in Ireland (b)	Total treated in Tonnes	GHG emissions export (c)=(a)*0.41	GHG emissions Transport Ireland (d)=(b)*0.005	Total GHG Emissions Transport (e)=(c)+(d)
2004 (Baseline)	165,128*	142,279*	307,407	6,209	663	6,872
2016 (Business as usual)	188,919*	162,778*	351,697	7,104	758	7,862
2016 (Option B & D)	138,919	212,778	351,697	5,224	991	6,215
2016 (Option C)	183,919	167,778	351,697	6,916	781	7,697
2016 (Option E)	113,919	237,778	351,697	4,284	1,107	5,391
2016 (Option F Preferred Option)	100,079*	281,187*	381,266	3,763	1,309	5,073

* Source Table 8.6

¹⁴ Similar calculation shown in Appendix D6 for contaminated soil results in 0.0482 tonnes of CO₂ eq. per tonne of contaminated soil exported. GHG emission from transport to transfer and blending facilities prior to shipment abroad for hazardous waste treated abroad is not quantified.

8.3.2.3 GHG from Waste Treatments

GHG have global effects, which are not limited by the borders of a country, therefore, excluding GHG emissions from transport, one tonne of hazardous waste treated in Ireland has the same impact as one tonne treated abroad by the same process.

Hazardous waste incineration

Currently there are a number of hazardous waste incineration facilities operating in Ireland. The level of information already existing (from EPA databases primarily) permits the assessment of incineration in terms of greenhouse gas emissions. Figure 8.9 shows the total CO₂ emissions from hazardous waste incineration for 2004 and 2016 (for further details see Appendix D – Incineration CO₂ Model). While the implementation of the Plan (and consequently the development of 50,000 tonnes per annum capacity treatment) would mean an increase in CO₂ emissions from the incineration of hazardous waste in Ireland, the overall CO₂ emissions from the incineration of total Irish hazardous wastes (i.e. both quantities treated in Ireland and abroad) would reduce. This reduction would arise as a result of an increase in hazardous waste recycling rates and the use of alternative treatment for certain wastes (e.g. co-incineration of solvents in cement kilns).

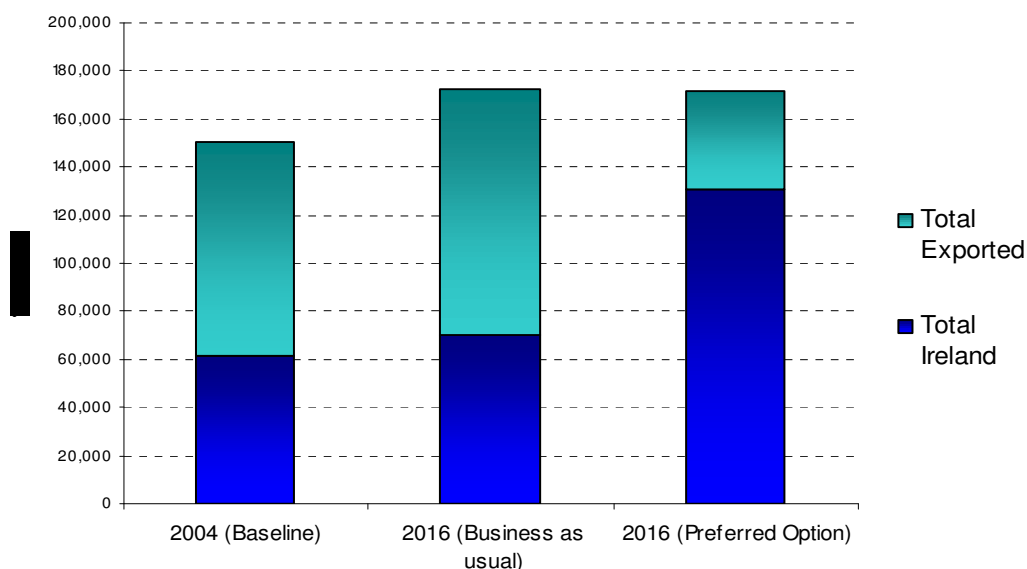


Figure 8.9 CO₂ from incineration of waste without energy recovery – 2004 and 2016 (with and without the Plan)

Table 8.10 outlines the potential energy recovery from the thermal treatment of 50,000 tonnes of hazardous wastes. The CO₂ emissions from thermal treatment of 50,000 tonnes would be in the order of 82,000t of CO₂. Estimates of the power and heat outputs are also shown.

It is recognised that a hazardous waste incinerator could supply power to the grid and heat to a district heating network thereby offsetting some of the CO₂ emissions associated with incineration. In 2005 the “average” dwelling consumed a total of 21,755 kWh of energy based on climate corrected data. This was comprised of 16,865 kWh (78%) in the form of direct fossil fuels and the remainder (4,890 kWh) as electricity¹⁵. Based on this, thermal treatment of 50,000 tonnes hazardous waste could

¹⁵ Energy in Ireland 1990 – 2005, SEI, 2006

potentially provide the heating requirements of approximately 4,300 homes and the power requirements of approximately 12,000 homes.

To put this CO₂ saving in context, an average domestic residence annually consumes electricity and heat that accounts for emissions of approximately 8 tonnes of CO₂ per annum. A total of 5 tonnes CO₂ (60%) was from direct fuel use and the remainder arising (3 tonnes) indirectly from electricity use (SEI, 2006). If we assume that each of the 4,300 homes noted above would emit 5 tonnes of CO₂ per annum from heating requirements and each of the 12,000 homes would emit 3 tonnes CO₂ per annum from power requirements, this gives a CO₂ emission of 57,500 tonnes CO₂ per annum. If we subtract that from the 82,000t CO₂ emitted from the thermal treatment of 50,000t hazardous waste (see Table 8.10), there is a deficit of approximately 24,500t of CO₂. This indicates that even with the CO₂ savings that would be associated with maximum potential energy recovery from a CHP plant (i.e. operating in full combined heat and power mode with maximum heat consumer up-take), the facility will still be a net emitter of approximately 25,000 tonnes¹⁶ of CO₂. However, the offset of 57,000 tonnes CO₂ per annum from home heating and power represents a significant CO₂ potential saving.

Table 8.10 Potential energy recovery from the thermal treatment of 50,000 tonnes of hazardous wastes

Thermal Treatment Energy Recovery	
Waste (tonnes)	50,000
Average Calorific Value (Mj/kg)	9.75
Gigajoules (Gj)	487,500
Joules (j)	4.875E+14
Mw	18.186
MW thermal output (conversion efficiency 50 - 60%)	9 - 11
MW electrical output (conversion efficiency 20 - 25%)	3.6 - 4.5
MWh thermal output (7,500 hours of operation)	67,041 – 81,906
MWh electrical output (7,500 hours of operation)	26,805 – 33,507
CO ₂ Emission (tonnes)	With Energy Recovery: 25,000 tonnes or 0.5 tonnes per tonne treated Without Energy Recovery: 82,000 tonnes or 1.64 tonnes per tonne treated
Tonnes of oil equivalent for electrical output (TOE)	2,304 – 2,881
Tonnes of oil equivalent for thermal output (TOE)	5,764 – 7,042
<i>Using BAT Ref (on waste incineration, p 82) net calorific value for hazardous wastes = 0.5-20 Gj/t (range) or 9.75Gj/t average.</i>	

¹⁶ 82,000 (table 8.12) – (4,300 homes *5 tonnes of CO₂ per annum +12,000 homes *3 tonnes of CO₂ per annum) = 25,000 tonnes

Using the quantity of hazardous waste sent for energy recovery in Table 8.6, the CO₂ emissions from incineration for each option would be:

- 2004 (Baseline): 45,888 to 150,672 tonnes of CO₂
- 2016 (Business as usual): 52,499 to 172,380 tonnes of CO₂
- 2016 (Option F Preferred Option): 52,272 to 171,636 tonnes of CO₂

Co-incineration

With regard to the GHG emissions from the co-incineration of solvents in cement kilns, the characteristics of the blended solvent and the environmental impacts of solvent production are the key consideration in determining whether there is a positive or negative impact on climate. The relevant characteristics are:

- **Calorific Value:** The energy produced by the combustion of solvents can be used to generate heat or electricity in an incinerator or it can replace fossil fuel in cement kiln. The higher the calorific value, the more energy is produced or fossil fuel displaced. The calorific value of a solvent is also directly linked to the carbon fraction (the higher the carbon fraction, the higher the calorific value).
- **Carbon Fraction:** Carbon fraction or carbon content is the mass of carbon atoms in a compound divided by molecular mass of compound. CO₂ emission from thermal treatment of solvent are directly linked to the carbon content of the molecule. High carbon content solvent will result in higher contribution of CO₂ emission from incineration to global warming.
- **Energy required for production:** Solvents require energy to be manufactured. As a rule of thumb, for solvent which requires high energy for production, it will be more sustainable to recycle than treat thermally. However, there may be technical difficulties to solvent recycling due to the presence of contaminants.

Currently the composition profile of Irish waste solvent is unknown. Table 8.13 illustrates some of the key characteristics of solvents. The solvents below were selected as they are the three most common solvents used in Switzerland¹⁷.

Table 8.11 Properties of Selected Waste Solvents.

Solvent	Carbon Fraction	CV (Mj/kg)	Energy Required for production ((Mj/kg)
Methanol	37%	19.9	40.9
Acetone	62%	28.6	70.5
Toluene	91%	40.5	72.6

The composition profile of Irish blended solvents is also unknown. However, consultation with the industry indicated that the calorific value of blended solvents used in cement kiln ranged from 21 to 29 Mj/kg, with the average likely to be close to 22-23 Mj/kg.

To illustrate the potential CO₂ savings from the use of blended solvents in cement kiln we used the example of a mixture of methanol and acetone which is substituted for coal. The fuels have the following characteristics:

¹⁷ Source: Environmental Assessment of Waste Solvent Treatment in the Swiss Chemical Industry, Capello, 2006.

- A mixture of methanol (65%) and acetone (35%) will produce a blended solvent with a calorific value of 22.9 MJ/kg and a carbon fraction of 46%. The combustion of one tonne of the mixture methanol/acetone will generate 1.7 tonnes of CO₂ (See Appendix D8 for further details).
- Coal has a calorific value of 29 MJ/kg and a carbon fraction of 80%. The combustion of one tonne of the mixture methanol/acetone will generate 2.6 tonnes of CO₂ See Appendix D8 for further details).

The co-incineration of 50,000 tonnes of the mixture of methanol and acetone will produce 1.1×10^6 GJ¹⁸ of energy input and replace the need to use 39,560 tonnes of coal¹⁹ as fuel.

This would ultimately reduce CO₂ emissions from cement production by 16,982²⁰ tonnes (See Appendix D8 for further details). Using the same assumptions as above and the quantity of hazardous waste sent for energy recovery in Table 8.6, the CO₂ emissions savings will be:

- 2004 (Baseline): 14,449 tonnes of CO₂
- 2016 (Business as usual): 16,531 tonnes of CO₂
- 2016 (Option F Preferred Option): 20,271 tonnes of CO₂

In 2004, 36,518 tonnes of non-halogenated solvents were exported for reuse as a fuel in a cement kiln. Assuming the same emissions factors and solvent mix as above, it resulted in a reduction in CO₂ emissions of 7,321 tonnes.

Further details can be found in Appendix D8 - Comparison of CO₂ emissions from coal and waste solvents as used as fuels in Cement Kilns.

In terms of resource efficiency, the treatment of 50,000 of solvent wastes in cement kilns may also result in reductions in consumption of fossil fuels of up to:

- 150 tonnes of diesel from road transport (equating to ~ 1000 barrels);
- 0.06 tonnes of fuel oil from shipping;
- And the potential displacement of furnace fuel depending on the calorific value of the solvent feedstock (Table 8.12).

Table 8.12 Potential Displacement of Furnace Fuel.

Calorific Value (MJ/kg)	Fuel Equivalent (tonnes)	Gigajoules (Gj)	Tonnes of oil equivalent (TOE)
20	34,483	689,660	16,472
25	43,103	1,077,575	25,737
26	44,828	1,165,528	27,838
27	46,552	1,256,904	30,021
28	48,276	1,351,728	32,285
29	50,000	1,450,000	34,633
30	51,724	1,551,720	37,062
Based on 29MJ/Kg Coal fuel and 50,000 tonnes solvent and conversion factor of 41.868 Gj per TOE			

¹⁸ 50,000 tonnes of solvent * 22.9 MJ/kg = 1.1×10^6 GJ

¹⁹ 1.1×10^6 GJ/29 MJ/kg = 39,560 tonnes of coal

²⁰ 39,560 tonnes of coal * 2.5 tonnes of CO₂/tonne of coal - 50,000 * 1.7 tonnes of CO₂/tonne of solvent = 16,982 tonnes of CO₂

Solvent Recycling

From an environmental point of view, solvent recycling such as distillation can result in even higher environmental benefits than co-incineration. This is particularly true for solvents, which require significant amount of energy to produce and have a relatively low calorific value. However, for this study it is difficult to assess which option to treat solvent waste is the best from a climate change point of view as the compositional mix of solvent waste in Ireland is unknown.

To follow on the previous example, if 50,000 tonnes blend of methanol (65%) and acetone (35%) were distilled, approximately 0.28×10^6 GJ of energy would be needed for the distillation. However, if we take into account the energy required for the solvent production it would save 1.8×10^6 GJ of energy input²¹. The net energy reduction would be 1.5×10^6 GJ. If gas was used to produce this energy, it would have generated 83,000 tonnes of CO₂.

It must be noted that although distillation shows a higher energy saving potential than co-incineration, there are waste solvent mixtures for which co-incineration leads to higher energy savings e.g. contaminated solvents.

Using the same assumptions as above and the quantity of hazardous waste sent for solvent recycling in Table 8.1, the CO₂ emissions savings will be:

- 2004 (Baseline): 1,000 tonnes recycled reducing CO₂ emissions by 1,700.
- 2016 (Business as usual): 1,000 tonnes recycled reducing CO₂ emissions by 1,700.

2016 (Option F Preferred Option): 2,000 tonnes recycled reducing CO₂ emissions by 3,400.

8.3.2.4 Summary of Climate Change Quantitative Assessment

The implementation of the preferred strategy will result in an overall decrease in CO₂ and GHG emission. This is summarised in Table 8.13 below.

Table 8.13 Summary of climate change assessment

Options	Transport Emission*	Process Emission Incineration	Process Emission Co-incineration	Process Emission Solvent Recycling	Total
2016 (Option A - Business as usual)	7,862	52,499 to 172,380	-16,531	- 1,700	42,129 to 162,010
2016 (Option F - Preferred Option)	5,073	52,272 to 171,636	-20,271	-3,400	33,674 to 153,0382
Difference	-2,789	-226 to -743	-3,740	- 1,700	-8,456 to -8,973

* (e) in Table 8.10

** See Section 8.3.2.3 (Hazardous waste incineration)

*** See Section 8.3.2.3 (Co-incineration)

**** 2,000 tonnes * 1.7 tonnes of CO₂ per tonne of solvent recycled

²¹ Based on the assumption of an average solvent recovery of 0.7 kg per kg of waste solvent (source Capella, 2006).

8.3.3 Quantitative Assessment – Material Assets (Land use)

The implementation of the Plan would require additional land for collection, treatment and disposal facilities. Table 8.15 below estimates the additional landtake required for new facilities. On a national level, these requirements are not considered to be significant.

Table 8.14 Estimated Land Required to provide new Infrastructure

Element	Infrastructure	Estd.Land Req. (ha)
Prevention	None	0
Collection	Assume additional drop-off collection points can be accommodated within existing facilities	0
Treatment/Recovery	WTE facility (facility proposed in Cork occupies 12 ha treating 50% hazardous waste)	6
	Cement Facility (assume no new Greenfield land required for storage or co-incineration equipment)	0
	Solvent Recovery facility: assume expansion at an existing hazardous waste location	2
	Authorised Treatment Facilities for ELVs (assume 10 new sites @ 2 Ha each in addition to upgrade of existing sites)	20
	Other Recovery Infrastructure: organic growth in existing treatment and transfer sites. Assume 10 facilities expand by 1 ha.	10
Disposal	Approximately 1.5 ha per annum within an existing licensed facility. 20-year period.	30
Contaminated Soil Treatment	Assume one new facility occupying 10 ha.	10
Total Required for Plan		84 ha
Ireland Total Land Area	Taken from www.teagasc.net	6.9 Million Ha
Expressed as % of Total Land Area		0.0012%

An estimate of the total area of former hazardous waste disposal sites has been made for illustrative purposes. This estimate is based on previous research into the total numbers of potentially contaminated sites in Ireland (Table 8.15). By assigning a typical land area to each facility type, an overall area of c3,500 hectares is estimated as being potentially contaminated (not all with hazardous waste or to hazardous levels). This excludes facilities regulated by the EPA. Some of these sites may not be contaminated, and others may already have been remediated. Nevertheless, the scale of land involved is significantly greater than the c.84 hectares required to provide new Plan infrastructure. As well as providing for the identification, risk assessment and remediation of these sites, the Plan can also consider opportunities for siting infrastructure on such sites ('brownfield development') in order to conserve Greenfield land.

Table 8.15 Estimated land area of contaminated sites

Industrial activities that may pose a risk to soil and groundwater ²²	Estimated numbers of activities	RPS Estd. Typical Area ha	Total Area Impacted (ha)	Comment
Historical Sites				
Disused Gasworks Sites	50 - 80	4	130	Assumed half already remediated
Closed non hazardous and hazardous waste disposal sites		5	1015	Recent data suggests there are in fact > 300 such sites
Pre-1984	58			
1984-1995	124			
1995-1998	21			
Closed mining sites	Not Included	Not Included	Not Included	Not Included
Fertiliser plants (manufacturing and blending)	4 - 6	10	50	Some already remediated?
Closed Tanneries	10 - 12	4	44	Some already remediated?
local authority Landfills which are unlined or partially lined under EPA Waste Licensing control.	74	Waste Licence	Waste Licence	Waste Licence
On-site landfill sites under IPC control	10			
Mining sites in operation	4	Not Included	Not Included	Not Included
Chemical Industry	150 - 160	IPPC	IPPC	IPPC Licensed
Petroleum Import Terminals (IPIA)	22	5	110	
Current operational sites				
Petroleum retail stations with underground storage tanks (USTs) (an average of 3 - 5 USTs per station)	900 - 1200	1	1050	
Tanneries	2	IPPC	IPPC	IPPC Licensed
Timber treatment yards	150	IPPC	IPPC	IPPC Licensed
Dockyards	14 - 16	20	300	
Military sites	1	Not Included	Not Included	Not Included
Railway depots (freight and passenger)	80 - 100	5	450	
Scrap yards and dismantlers	180 - 200	2	380	
Airports with maintenance facilities	2	10	20	
Seveso Sites	34*	Not included	Not included	Upper tier sites only
Total land area included			3,549 ha	
Expressed as % of total land area (based on 6.9m ha total land area)			0.05 %	

From www.hsa.ie

²² Based on *Brogan et al*, 1999

No targets have been set within the Plan for the number of sites that will be remediated in a given time frame. Limited remediation is ongoing, driven by land development pressures. If a conservative assumption is made that 20% of the above land will be assessed, and remediated if necessary, by 2016 this would return approximately 700 ha of brownfield land into beneficial use.

8.3.4 Quantitative Assessment – Ash Generation from hazardous waste incineration

Treating 50,000 tonnes per annum of hazardous waste in a WTE facility would generate c.1,250 tonnes of hazardous residues (requiring disposal). The total quantity of hazardous waste requiring disposal in 2004 is c. 9,500 tonnes comprising asbestos and a number of other residual materials. Municipal WTE facilities proposed, if developed, are expected to produce a further 40,750 tonnes of hazardous residues. This data is shown in Figure 8.10 and illustrates the significant increase in quantities that will occur if the municipal waste treatment thermal capacity proposed in the Regional Waste Management Plans is developed.

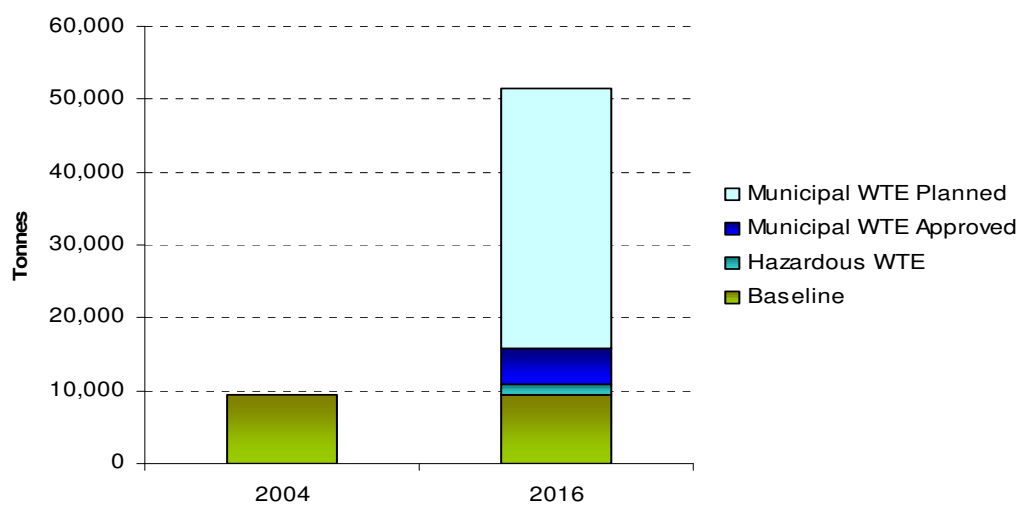


Figure 8.10 Ash Generation from hazardous and municipal waste incineration

8.4 DETAILED ASSESSMENT OF OPTIONS

The assessment of the prevention, collection, treatment and disposal options presented in Table 8.1 to Table 8.4 with further Detailed Assessment is presented in Table 8.17 to Table 8.20 below. In addition, Detailed Assessment of the options involving contaminated land and contaminated soil treatment have also been undertaken and this is presented in Table 8.21 and Table 8.22.

8.4.1 Key to Assessment of Options

The assessment has rated each option as having the following (Table 8.16) impacts relevant to the SEA objectives:

Table 8.16 Key to Assessment of Scenarios

Assessment Symbol	Explanation of Symbol	Description of Impact
-	Potential Significant Negative Impact	The impacts from hazardous waste activity on the receiving environment are likely to be negative (detrimental)*.
+	Potential Positive Impact	The impacts from hazardous waste activity on the receiving environment are likely to be positive (beneficial).
Ø	No Change	No change from the current situation, i.e. baseline.
+/-	May be a Positive or Negative Impact	The impacts from hazardous waste activity on the receiving environment may be positive or negative (detrimental or beneficial)
O	Neutral	No impacts are anticipated

Note, the impacts of emissions from Waste or IPPC licensed facilities are considered not significant since they are within the Emission Limit Values of the licence²³.

The following tables (Table 8.17 to Table 8.22) present the Detailed Assessment of the options considered. In each case the business as usual option and the Preferred Option, arising from the Qualitative Assessment in Section 8.2 are subjected to the Detailed Assessment. However, there are two exceptions to this as follows:

- Detailed Assessment has been carried out on all options considered under Treatment and Recovery (Table 8.19) because the Preferred Option emerging from the Qualitative Assessment indicated that a mix of the various options available would be preferable, particularly in the achieving the objective of moving towards self-sufficiency.
- Detailed Assessment has also been carried out and presented for Disposal (Table 8.20) because the Preferred Option emerging from the Qualitative Assessment indicated that the two available options may be suitable.

The information available from the Quantitative Assessment presented in Section 8.3 has been used in carrying out the Detailed Assessment below, where appropriate and applicable.

²³ The IPPC licensing regime aims to prevent, reduce, and as far as possible eliminate pollution by giving priority to intervention at source and ensuring prudent management of natural resources.

Table 8.17 Detailed Assessment – Prevention

Option A = Business as usual		Option B = Programme of prevention including producer responsibility initiatives, preparation of waste management plans, once-off best performance studies, financial support and promotion.			
Objective	Option A (Business as Usual)		Option B (Programme of Prevention)		Comment
	2011	2016	2011	2016	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	-	-	+	+	In the 'business as usual' Option A Ireland would continue to produce hazardous waste, which would be managed through regulated and unregulated means with consequent potential risks to water quality. However, through implementing a programme of hazardous waste prevention Option B , there would be a reduction in the quantity of hazardous waste requiring management either in Ireland or abroad. This would reduce the risk of water pollution to surface and ground waste from potential illegal disposal and also reduce impacts on the marine environment from shipping transport and potential spillages. Prevention will also reduce the quantity of hazardous waste that may be inappropriately disposed of with non-hazardous waste.
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health	-	-	+	+	In the 'business as usual' Option A Ireland would continue to produce hazardous waste, which would be collected, treated and disposed of through regulated and unregulated means. This would give rise to some air emissions in Ireland and abroad from transport during collection and export for treatment/disposal. The proposed prevention programme Option B would lead to a reduction in the quantity of waste requiring transport and management. It is therefore likely to have an indirect positive impact on air quality as less material will need to be treated (facility emissions) and exported (transport related air quality emissions).
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)	-	-	+	+	Increased prevention through implementing Option B would mean reduced need for waste processing and transport, thereby reducing transport-related CO ₂ emissions. Also, waste prevention achieved through efficiency in production process could potentially reduce energy usage.
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	-	-	+	+	Trends in waste statistics show an overall decline in unreported hazardous waste; this may or may not continue with the 'business as usual' Option A . However, the proposed prevention programme Option B has the potential to significantly reduce the quantity of unreported hazardous waste disposed of each year and the risk presented to soil quality through unknown disposal routed for unreported hazardous waste.

Objective	Option A (Business as Usual)		Option B (Programme of Prevention)		Comment
	2011	2016	2011	2016	
Material Assets: To maximise use of the built environment, energy and raw materials	-	-	+	+	Implementation of the proposed prevention programme Option B would have positive impacts on energy and resources through resource efficiency in production processes and the reduced quantity of hazardous waste requiring management.
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	-	-	+	+	Currently much of Ireland's hazardous waste is exported for treatment and disposal. This requires collection and transport nationally and internationally to facilities abroad by land and by sea. This transport causes potential direct and indirect impacts on water quality, air quality, climate, material assets and human health. The overall impact of the proposed prevention programme Option B is the reduction in the quantities of hazardous waste generated, with consequent reductions in the waste journeys, both in Ireland and internationally. In the 'business as usual' option, the transport of waste would remain the same or increase in the future, with consequent impacts on the receiving environment.
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan	-	-	+	+	In the 'business as usual' Option A , the potential for unreported hazardous waste in particular to impact on biodiversity remains. Implementation of the proposed prevention programme Option B has the potential for positive impacts on biodiversity and the receiving environment. (See also Air, Water and Soil benefits).
Human Health/Population: To protect human health from hazardous waste	-	-	+	+	In the 'business as usual' Option A , the unauthorized disposal of hazardous waste presents a risk to human health. Unauthorised disposal can include illegal dumping, uncontrolled burning and incorrect segregation of hazardous from non-hazardous waste streams e.g disposal of batteries in normal household waste. The proposed prevention programme Option B has the potential for positive impact on human health, through better knowledge of hazardous waste and reduction in the quantities requiring management.
SUMMARY	<p>There are no negative impacts anticipated with the implementation of Option B, a programme of waste prevention and is the preferred option as it results in a decrease in hazardous waste generation, with consequent positive impact on the environment. Prevention of hazardous waste generation effectively reduces consumption of raw materials and energy as well as emissions during product use and at end of life.</p> <p>Option A, 'business as usual' would be likely to have potential negative impacts on the environment, as trends in hazardous waste generate indicate continuous increase, in tandem with economic growth.</p>				
MITIGATION (See Section 9.4)	In implementing the programme of hazardous waste prevention, the preferred option, no negative impacts are anticipated. Therefore, no mitigation is proposed.				

Table 8.18 Detailed Assessment – Collection

Option A = Business as usual			Option F = Integrated Approach (combination of Drop-Off (Option B) and Producer/ Supplier Take back (Option E) and (limited) Mobile collection (Option C))		
Objective	Option A (Business as Usual)		Option F (Integrated Approach)		Comments
	2011	2016	2011	2016	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	-	-	+	+	In the 'business as usual' Option A , risk to water quality arising from unreported hazardous waste would continue. For example, there could be up to 24,000t of sheep dip that are not collected. This waste could potentially make its way into surface and groundwater leading to contamination. Option F involves a combination of drop-off and supplier take back and limited mobile collection. This is likely to improve the rate of collection of currently unreported hazardous waste, with consequent positive impacts on waste quality.
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health	-	-	+	+	The 'business as usual' Option A , presents a risk to air quality arising from unreported hazardous waste which could be burned or disposed of incorrectly with other wastes e.g. batteries in municipal waste and later incinerated. Option F is likely to improve the collection system both in terms of volumes of hazardous waste collected and correct segregation thus reducing the volume of waste currently unreported or disposed of incorrectly. This would have consequent positive impacts on to air quality (in particular dioxin emissions from uncontrolled burning as shown in Section 8.3.2.2 and Table 8.7).
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)	Ø	Ø	Ø	Ø	Increased collection rates for hazardous waste through developments under Option F would result in increased transport, with consequent increases in transport-related emissions e.g. NOx, CO2. However, It is not anticipated that transport-related CO2 emissions resulting from Option F implementation would have a significant impact on climate.
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	-	-	+	+	In the 'business as usual' Option A , risk to soil quality arising from unreported hazardous waste would continue, through inappropriate disposal of unreported hazardous waste. Imcreased collection rates through implementation of Option F and a reduction in unreported hazardous waste (batteries, oil etc.) would have positive impacts for the soil environment by reducing the risk of contamination through inappropriate disposal.

Objective	Option A (Business as Usual)		Option F (Integrated Approach)		Comments
	2011	2016	2011	2016	
Material Assets: To maximise use of the built environment, energy and raw materials.	Ø	Ø	+	+	With 'business as usual' Option A , a lack of infrastructure for management of hazardous waste would continue. With the developed as part of the preferred scenario, Option F , there would be improved collection infrastructure for hazardous waste, through additional civic amenity sites and take-back/mobile collections. See Section 8.3.3 for landuse assessment.
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	Ø	Ø	-	-	The collection system proposed in Option F would collect a greater volume of waste, which would need to be treated and/or disposed. This would result in increased waste-related transport, with potential transport-related emissions but nationally and internationally. However, improvements in the rate of hazardous waste collection cannot be achieved without engaging transport.
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan	-	-	+	+	In the 'business as usual' Option A , potential risk to biodiversity would continue as a result of unreported hazardous waste. Option F would result in increased collection of hazardous waste, with consequent positive impacts on biodiversity. (See also Air, Water and Soil benefits).
Human Health/Population: To protect human health from hazardous waste	-	-	+	+	People interact directly with their environment and as such have the potential to be indirectly impacted by air quality, water quality soils etc. In the 'business as usual' Option A , potential risk to human would continue as a result of unreported hazardous waste and its inappropriate. Option F tackles the correct collection of this unreported fraction and as such will have a positive impact on the environment and therefore human health. It would also reduce health and safety (accidental) risks at occupational and household level.
SUMMARY	<p>There has been a declining trend in unreported hazardous waste. However it could potentially grow again in the future under the 'business as usual' scenario (Option A), with associated risks to the environment from its inappropriate disposal.</p> <p>Option F is the preferred option as the Detailed Assessment shows that it results in a decrease in unreported hazardous waste, with consequent positive impacts on the all aspects of the environment. The only potential negative impact from increased collection is increased transport and transport-related emissions. However, increased collection cannot be achieved without increased transport.</p>				
MITIGATION (See Section 9.4)	<p>The mitigation proposed for the potential negative impacts from increased collection (increased transport and transport-related emissions) is the move towards self-sufficiency in hazardous waste management. This means that the journeys travelled by the waste is minimised insofar as possible. (See Detailed Assessment of Treatment/Recovery for more information).</p>				

Table 8.19 Detailed Assessment – Treatment/Recovery (the table below should be read in conjunction with Appendix C & D)

Option A = Business as Usual	Option C = Solvent Recovery (Develop a new solvent facility with capacity for 5,000 (solvent regeneration or distillation) Recovered solvent (50% of original volume) would be used in chemical industry in UK/Ireland.)	Option E = Central Hazardous Waste Treatment Facility (Combination of Incineration and hazardous waste landfill).
Option B = Hazardous Waste Incineration Facility in Ireland (Develop a new Waste to Energy Facility (100,000 capacity) for 50,000 tonnes per annum hazardous and 50,000 tonnes per annum non hazardous waste).	Option D = Co-treatment with other Energy Facilities (Employ cement plants (one or more) to recover energy from high calorific hazardous wastes (solvents). Assume capacity to use 50,000 tonnes non chlorinated solvents as a replacement for coal.)	Option F = Integrated Recovery Option (Combination of WTE facility, solvents treated at cement kilns and export).

OBJECTIVE	ASSESSMENT OF TREATMENT ALTERNATIVES											
WATER	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	-	-	0	0	0	0	0	0	0	0	+	+
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>Option A: With the 'business as usual' option the current reliance on export for Ireland's hazardous waste treatment/disposal requirements will result in continued transport of hazardous wastes over long distances with the potential impacts on water quality due to risks of accidents, spillages and handling. Accidental release of hazardous waste to water due to transport by sea may result in more severe impacts than from other transport due to the quantity on board (up to 3,000 tonnes per ship versus 20 tonnes for road tankers). The potential risk of accidental release of hazardous waste at transfer/bulking/blending facilities is low, due to controls in place under the waste licensing regime.</p> <p>Option B to F: Increased treatment of hazardous waste within Ireland has associated potential risks to surface and groundwater resources. However, controls in place under the IPPC/waste licensing regime mean that this risk is low as Emission Limit Values (ELVs) are set out in licences. The specific emissions for each option are described below:</p> <p>Option B: There can be some licensed process water emissions from Hazardous Waste Incineration (HWI) plants depending on the type of scrubbers used (wet or dry), within emission limit values set out in the licence. Flue Gas Treatment (FGT) from HWI generally emits between 0.15 - 0.2 M³ of highly alkaline wastewater per tonne of waste treated (BREF Waste Incineration). This is not significant as it would be mitigated/controlled by the licensing regime. Ash residue would still require disposal. However, the overall quantity of hazardous waste exported would decline compared to 'business as usual'.</p> <p>Option C: Overall licensed emissions to water from the process include cooling water from condensers, storage runoff and effluent from solvent pre-treatment and decantation, which have the potential to impact on surface water and groundwater locally. This is not significant as it will be mitigated/ controlled by the licensing regime. The market for recovered solvent is limited in Ireland. Therefore, it is likely to be exported to markets abroad. However, this would not constitute waste export.</p> <p>Option D: Cement plants have licensed emissions to water. No cement plants in Ireland are currently using solvents. Upgrading facilities is not likely to result in any increase in process emissions. Wastewater discharge is usually limited to surface run off and cooling water only and causes no substantial contribution to water pollution (European IPPC Bureau 2001). The storage and handling of fuels is however a potential source of contamination of soil and groundwater. This risk would increase greatly with the storage of alternative fuels such as solvents, which as well as being hazardous, are also flammable and liquid; characteristics which pose serious health and safety threats as well as an higher risk of pollution than solid fuels such as coal. Controls would be in place under the licensing regime. Overall, export of hazardous waste with this option would decline.</p> <p>Option E: Similar impacts to options B.</p> <p>Option F: Similar to B, C and D above. The emissions to water would not have a significant impact as it would be controlled under the licensing regime. This option would result in the greatest potential reduction in export of hazardous waste and therefore reduced risk to marine environment.</p>											
SUMMARY (Water)	Option F is presented as the preferred option as it allows for a mix of treatment options to be provided to meet the needs of hazardous waste generated in Ireland. In addition, it is anticipated that developments under Option F will have positive impacts on water quality as the quantity of waste exported would be reduced, thereby reducing the impact of hazardous waste export on the marine environment.											
MITIGATION (Water)	No negative impacts on water are anticipated with developments under Option F as all such developments would be in accordance with IPPC or Waste licensing controls, which ensure that there are no significant negative impacts on the environment.											

AIR	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health Quantitative assessment of dioxin emissions is provided in Section 8.3.1.2 and Appendix D3	-	-	0	0	0	0	0	0	0	0	+	+
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed. Transport-related air emissions would result from all Options presented here. However, this matter will be dealt with under 'Transport' below.</p> <p>Option A: Process emissions of volatile organic compounds (VOCs) can occur from the preparation, bulking and loading of solvent at transfer stations prior to export. Further treatment would not generate significant impacts for local air quality as waste material is exported out of the country for treatment and any emissions associated with treatment will be borne by the destination country. There will however be transport emissions due to delivery to facilities within Ireland for transfer/bulking and blending prior to shipping to facilities abroad and also shipping related emissions. The impact of Option A has been assessed as potentially negative due to the trends for increase in hazardous waste and therefore potentially increased export levels, and associated transport-related emissions to air.</p> <p>Option B: This option will contribute to local levels of NO_x, PM₁₀, VOC's, metals, dioxins and furans in the vicinity of a facility but these would be strictly controlled in line with waste licensing and BAT treatment. In 2000 the contribution of hazardous incineration to national dioxin levels to air was 0.0068 g/year (0.02% of total dioxins). In 2010 the contribution of hazardous incineration is estimated at 0.0494 g/year (1.63% of total dioxins). This includes a commercial facility (capacity of 50,000 tonnes/yr) as well as privately operated sites incinerating their own waste. The emission of dioxins to the atmosphere from well-managed facilities would be negligible, when operated in accordance within the emission limit values set out in the licence conditions. Emissions of NO_x and VOC's are strictly limited in accordance with license conditions. If the heat generated by the incineration of hazardous waste is supplied to a district heating network, it could result in a decrease in local air pollution caused by individual heating systems.</p> <p>Option C: The primary impacts to air from Option C would be the process emissions of volatile organic compounds (VOCs), which can occur during spillage and from loading solvent into the distillation equipment and operation of the distillation equipment. However, properly run facilities operating in accordance with emission limit values set out in licence conditions would emit negligible amounts of pollutants to the atmosphere.</p> <p>Option D: This option relies on co-treatment of hazardous waste with other existing energy facilities. Dioxin emissions resulting from the use of low chlorine fuel, high temperature and sufficient gas retention times in modern cement kilns are not considered to be a significant problem. Under the waste incineration directive, the daily emission limit value for dust from cement kilns co-incinerating waste is 30 mg/m³ as compared to 10 mg/m³ for conventional incinerators (hazardous and municipal). However, the use of solvents is not expected to generate more dust than the use of traditional fuel. The solvent waste used as a fuel will replace other fuels (e.g. coal), which would also have released pollutants to air. The use of solvents as fuel in Spain and Germany seems to indicate little or no increase of emissions to air. Assuming that the use of solvent as a fuel is following best practice for testing and monitoring, properly run facilities should result in negligible additional emissions to atmosphere, in accordance with strict limits on emissions included in the licence conditions. The diversion of waste from export for use in cement kilns in Ireland is likely to have a beneficial impact in terms of transport emissions. The transport of waste to the facility is not different from transfer of more traditional fuels to the facility and in many cases may be more beneficial where traditional fuels may have to be imported.</p> <p>Option E: See Options B, and C. This option may result in local risks to air quality from process emissions including odours, and fugitive VOC's. Dust nuisance may also be a factor locally. However, properly run facilities should result in negligible emissions to the atmosphere, in accordance with strict limits on emissions included in licence conditions. An integrated waste management facility would reduce transport related emissions from international transport.</p> <p>Option F: This option would combine the emissions of options B to D. Strict emission limit values from the waste and IPPC license would be in place to protect human health and the environment. Local air quality is not likely to be impacted significantly from the emissions from the various technologies employed, as the operation of all facilities will be in accordance with licensing requirements. This option would reduce transport related emissions as the integrated approach would result in less hazardous waste exported.</p>											
SUMMARY (Air)	In each of the alternatives, treatment of waste in Ireland will result in some process emissions. However, none of the options would result in significant impacts to air as they will be subject to emission limit values in Waste and IPPC Licences. The main impact on air quality is related to transport emissions. However, overall transport emissions would be reduced as less hazardous waste is exported through implementation of Option F .											
MITIGATION (Air)	No negative impacts on air are anticipated with developments under Option F as all such developments would be in accordance with IPPC or Waste licensing controls, which ensure that there are no significant negative impacts on the environment.											

CLIMATE	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport). See Section 8.3.2 for quantitative assessment of climate.	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	-	-	-	-	+	+	+	+	-	-	+	+
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>GHG emissions from hazardous waste recovery and treatment originate from the transport of hazardous waste to treatment facilities (shown in Table 8.9) and the processes at the treatment facilities (shown in Table 8.13). The impact of GHG on the environment is at the global rather than the local scale. Therefore, excluding GHG emissions from transport, one tonne of hazardous waste treated in Ireland has the same impact as one tonne treated abroad by the same process. Therefore, this assessment focuses on the differential resulting from transport-related GHG emissions.</p> <p>Option A: Option A will result in continued significant negative impacts associated with the transport of hazardous waste abroad for treatment. The overall transport emissions from this option is estimated to 7,862 tonne per annum. The majority of the GHG emissions from transport are due to maritime transport. Road transport has limited GHG emissions when compared with maritime transport but is still of concern. Emissions of GHG from road transport could be minimised by using rail transport for hazardous waste where possible. The 'business as usual' is considered to have potential negative impact on climate due to continued reliance on export and the associated transport-related emissions.</p> <p>Option B: Treatment of 50,000 tonnes/yr of hazardous waste in an incinerator in Ireland that is otherwise exported will potentially reduce Ireland's CO₂ transport emissions (estimated to 6,215 tonnes per annum) due to a reduction in the overall distance traveled by the waste. The incineration of hazardous waste will emit CO₂ (estimated to 82,000 tonnes per annum). This can be mitigated by energy recovery with production of electricity and heat, although the facility would still be a net emitter of CO₂ (estimated to 25,000 tonnes per annum in section 8.3.2.2).</p> <p>Option C: This option would lead to CO₂ transport emissions estimated at 7,697 tonnes per annum. Solvent recovery has a positive impact on climate by reducing CO₂ emissions compared to incineration as it reduces the CO₂ emission from solvent production (estimated to 8,300 tonnes per annum). Any unrecoverable solvent fraction exported would result in a negative impact on climate due to CO₂ emissions.</p> <p>Option D: This option would lead to CO₂ emissions due to transport similar to Option B (6,215 tonnes per annum). Blended solvents would replace quantities of fossil fuels (e.g. coal) in cement manufacture, reducing CO₂ process emissions. In the example used in Section 8.3.2.2, it would result in an estimated saving of 16,982 tonnes per annum.</p> <p>Option E: This option would lead to CO₂ transport emissions estimated at 5,391 tonnes per annum. This shows greater reduction in transport emissions than options B, C and D as increased quantities of hazardous wastes would be treated in Ireland.</p> <p>Option F: This option will lead to minimum export of hazardous waste and optimum decrease in GHG emissions from transport of hazardous waste (estimated to 5,073 tonnes per annum). In relation to CO₂ emissions from treatment:</p> <ul style="list-style-type: none"> The process emissions of the incineration of 50,000 tonnes/yr of hazardous waste will generate an estimated 25,000 to 82,000 tonnes per annum (depending on the potential for energy recovery), The process emissions of co-incineration of 50,000 tonnes/yr of solvent waste would reduce CO₂ emission by an estimated 16,982 tonnes of per annum. The process emissions of recycling of 2,000 tonnes per annum would reduce CO₂ emission by an estimated 3,400 tonnes of per annum 											
SUMMARY (Climate)	GHG emissions from transport and treatment can be significant contributors to CO ₂ emissions. However, with the implementation of the preferred Option, Option F , transport of hazardous waste is minimized by reducing quantities exported, thereby reducing transport-related GHG emissions. With regard to incineration, the potential for energy recovery can provide a significant reduction in net GHG emissions.											
MITIGATION (Climate)	Some negative impacts are anticipated with Option B and Option E, due to the CO ₂ emissions likely from hazardous waste incineration. However, this can be mitigated, at least partially, by energy recovery.											

SOIL	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	Ø	Ø	0	0	0	0	0	0	0	0	0	0
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>It is not anticipated that Option A would result in any impacts on soil.</p> <p>Option B: Hazardous and non-hazardous ash will be generated from hazardous waste incineration, which would require handling/transport and disposal. However, through hazardous waste incineration, there would be a reduction in the overall quantity of hazardous waste for disposal by approx. 90%. No impacts to soil are anticipated from implementation of Option B.</p> <p>Residues from Option C are not suitable for landfill due to the high organics as these could cause damage landfill lining with consequent potential risks of soil contamination. Consequently, no impacts on soil are anticipated as this consideration is not applicable to this option.</p> <p>With Option D no bottom ash would be produced. However, fly ash produced requiring handling/transport and disposal at a hazardous waste landfill off-site. No impacts to soil are anticipated where this material is disposed of in a hazardous waste landfill.</p> <p>Option E would have similar impacts to Options B and C.</p> <p>Option F would have similar impacts to Options B, C and D.</p>											
SUMMARY (Soil)	No preferred option is put forward as none of the options considered would lead to significant impacts on soil.											
MITIGATION (Soil)	As there are no negative impacts on material assets anticipated, mitigation measures are not necessary.											
MATERIAL ASSETS	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
To maximise use of the built environment, energy and raw materials. See Section 8.3.3 for landuse assessment	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	Ø	Ø	+	+	+	+	+	+	+	+	+	+
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>In the 'business as usual' Option A, where Ireland exports significant quantities of waste for treatment and disposal, the potential to recover energy or reuse materials in Ireland is less than that presented under other options. There is also consumption of energy associated with the transport of hazardous waste abroad. Option A requires no additional capital investment and would require no additional land take.</p> <p>With Options B, C, D, E and F there is potential to recover energy within Ireland. Options C and F also allow for materials reuse, which would result in additional positive impacts through resource efficiency, as the energy required for production of virgin materials would be reduced.</p> <p>Options B, C, E and F would all have some landtake requirements for storage, handling, process or disposal. However, it is unlikely to be significant at a national level. Provision of hazardous waste management facilities in Ireland will improve Ireland's waste infrastructure (a material asset). This will have a positive impact as Ireland is more self-sufficient and sustainable (re: natural resources) in the medium- to long-term. Also reduced consumption of non-renewable fuels.</p> <p>Option D and F would also maximize the use of the built environment by using existing cement kiln to treat waste solvents.</p>											
SUMMARY (Material Assets, Energy and Resources)	With the exception of the 'business as usual' Option A , all other options presented indicate positive impacts for the Material Assts. Therefore it is not possible to present a Preferred Option in this case and the choice will depend on the nature of the hazardous waste to be treated. Option F is likely to be realistic as it provides a combination of treatment type, which allows the hazardous waste to be sent to the best technical and environmental treatment option. Option F would also reduce the most energy consumption due to transport.											
MITIGATION (Material Assets, Energy and Resources)	As there are no negative impacts on material assets anticipated, mitigation measures are not necessary.											

TRANSPORT	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	-	-	+/-	+/-	+/-	+/-	+	+	+	+	+	+
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>Transport interacts with a number of environmental issues including water quality, air quality, climate and human health.</p> <p>With Option A (business as usual) Ireland would continue to export quantities of hazardous waste for treatment and disposal abroad resulting in a potential negative impact on water quality (emissions, spillages), air quality (NOx, particulates etc.), climate (CO₂ emissions) and human health. As trends in generation of hazardous waste show an increase, the 'business as usual' scenario may result in increased levels of transport, with associated negative effects.</p> <p>Options B, C, D, E and F would result in less export of waste internationally and therefore a reduction in the overall distance traveled per tonne of hazardous waste, transport to facilities within Ireland would still be a factor. However, the quantitative assessment demonstrates that the reduced distances traveled would have a positive effect on the environment, due to reduced emissions from transport.</p> <p>Option F provides the greatest range of treatment options in Ireland and would minimize distance traveled per tonne of hazardous waste.</p>											
SUMMARY (Transport)	Option F is the preferred option as it has the greatest potential to reduce export of waste abroad. Although some transport would be still required within Ireland it would be over much shorter distances than is currently incurred with export, with associated benefits through reduced transport emissions											
MITIGATION (Transport)	Any negative effects arising from transport can be mitigated, at least in part, by minimizing the distance traveled per tonne of hazardous waste and therefore minimizing transport-related emissions.											
BIODIVERSITY	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	-	-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>There is a potential interrelationship between biodiversity and air quality, water quality, and soil for all options.</p> <p>In the 'business as usual' option (Option A) there is potential for negative impacts to biodiversity (marine/coastal) arising from the transport of waste in Ireland and abroad. This has been assessed as negative as trends indicate increased volumes of hazardous waste which may result in increased export.</p> <p>In the case of Options B-F, there are benefits from reduced export of materials which would have a positive impact on the marine environment in particular. Landtake for facilities within Ireland would not be significant at a national scale. However, there is potential to impact on designated sites, flora or fauna unless care is taken in the siting of facilities.</p> <p>Options B, C, D and E would result in positive impacts on coastal/ marine biodiversity as reduced waste export and consequent risk of marine spillage, accidents, and reduced transport-related emissions. Option C would result in limited reduction in waste export.</p> <p>There would be potential local impacts on biodiversity with Option B but would be assessed and mitigated at EIA/planning stage. Land take for new WTE facility (typically 5-10 hectares) would not be significant nationally unless designated sites are involved.</p> <p>Option D could utilise existing facilities, and any necessary upgrades would not likely to be significant in comparison to a new facility.</p> <p>Land take for new disposal facilities for Option E (WTE facility, landfill and recovery facility) would not be significant if protected areas are avoided.</p> <p>Option F would have similar impacts on biodiversity as Option B, C and D. Land take for new facilities would not be significant if protected areas are avoided.</p>											
SUMMARY (Biodiversity)	There is no obviously preferred option between Options B-F. In all cases would be benefits from reduced export of materials which would have a positive impact on the marine environment in particular. Landtake for facilities within Ireland would not be significant at a national scale.											
MITIGATION (Biodiversity)	Any negative effects associated with developments taking place and consequent land take, would be mitigated by maximizing the use of existing facilities and infrastructure.											

HUMAN HEALTH/POPULATION	Option A (Business as Usual)		Option B (Haz Waste Incineration)		Option C (Solvent Recovery)		Option D (Co-incineration)		Option E (Central Facility)		Option F (Integrated Approach)	
Human Health/Population: To protect human health from hazardous waste	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
	Ø	Ø	0	0	0	0	0	0	0	0	0	0
	<p>In the medium term horizon (2012), significant effects from Options B-F are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>In the 'business as usual' option (Option A) Irelands exports its hazardous waste therefore potential negative health impacts arising from treatment processes do not arise in Ireland.</p> <p>Option B: There is generally a perception of negative impact on health and on quality of life in the vicinity of WTE facilities. Concerns raised generally include noise, traffic, odours, dust and facility emissions e.g. dioxins, furans, particulates. All waste management facilities must adhere to strict emission limit values as part of their licence conditions. These values are based on standards intended to protect human health and the environment. Air quality impacts are unlikely to have a negative impact nationally.</p> <p>Health related issues for Option C are associated with handling and storage of raw materials (solvents), which have the potential to cause pollution to surface/groundwater (see water objective) and emissions (VOC) associated with the process (see air quality objective).</p> <p>Option D: Cement plants are licensed under IPPC and as at this point, none is using waste as a substitute fuel. The use of substitute fuels in cement kilns has given rise to some public concern in the UK with complaints of odour and breaches of sulphur dioxide emission limits.</p> <p>A facility combining solvent recovery, incineration and landfill (Option E) is likely to have a perceived negative impact on health and on quality of life. Concerns generally include noise, odours, dust and facility emissions e.g. dioxins, furans, particulates. As noted under the air quality such facilities must adhere to strict emission limit value as part of their licence conditions. These values are set at levels for the protection of human health. Air quality impacts are unlikely to have a negative impact nationally.</p> <p>Option F will have similar impacts to B, C and D. By treating more waste in Ireland there will be a localised increased risk to human health which is currently borne by the destination country.</p>											
SUMMARY (Human Health/Population)	Currently Option A sees most of the potential risk to human health from hazardous waste management borne by the destination country. Therefore, no impacts are anticipated for the 'business as usual' scenario. Currently all licensed facilities (IPCC and waste licenses) in Ireland are strictly regulated by the EPA and other relevant agencies. Licenses contain emission limit values for air quality, surface water, groundwater, air etc. These legislative limits have been agreed at EU level and are intended to protect human health. Therefore, any developments taking place are not anticipated to have any effect on human health as the licensing process ensures this.											
MITIGATION (Human Health/Population)	Any potential negative impacts on human health will be mitigated by controls exercised as part of the license application and licence enforcement system.											

OVERALL SUMMARY OF TREATMENT OPTIONS	<p>Overall Option F is the preferred option for recovery and treatment as the Detailed Assessment shows that it results in a decrease in waste exports. The decrease in waste export leads to favourable outcomes with regard to air, water, climate and transport by either reducing existing negative impacts or ensuring positive impacts as a result of decreased exports of hazardous waste. No significant negative impact from the implementation of the preferred option is expected.</p> <p>With regard to soil, no option would have significant negative or positive impacts.</p> <p>With regard to energy and resources it is not possible to determine definitively which Options B, C, D E or F is the preferred option as it will vary depending on the nature of hazardous waste treated.</p> <p>Option A is the preferred option regarding human health, but the potential impacts of the other options are unlikely to be significant as they will be controlled and mitigated at individual facility level and associated authorisations and enforcement actions.</p>
MITIGATION (See Section 9.4)	<p>The preferred treatment option does not have any significant environmental effects that cannot be mitigated through established controls under the waste and IPPC licensing regime, as well as planning and environmental assessment at project level. It is an integrated approach that makes best use of existing resources and infrastructural developments where existing deficiencies have been identified.</p> <p>Positive environmental impacts will be experienced by the overall reduction in the distance traveled per tonne of hazardous waste.</p>

Table 8.20 Detailed Assessment - Disposal

Option A = Business as Usual (Export)		Option B = Co-located hazardous waste disposal cells				Option C = Central landfill facility for hazardous waste disposal	
Objective	Option A (Business as Usual)		Option B (Co-located Landfills)		Option C (Central Landfill)		Comments
	2011	2016	2011	2016	2011	2016	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	Ø	Ø	0	0	0	0	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>Option A has the potential to impact on marine/coastal waters through shipping and accidental spillage during transport.</p> <p>Options B and C would result in reduced risk to marine/coastal waters due to less transport. However, there is a potential risk to groundwater and surface water within Ireland arising from landfill disposal. However, this can be mitigated and managed under the licensing process and careful consideration of siting to ensure that designated/vulnerable sites are avoided.</p>
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health	Ø	Ø	0	0	0	0	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>No air quality impacts are anticipated for Ireland with Option A as waste is disposed of abroad.</p> <p>Options B and C present minimal risks to air quality as a result of facility emissions. However, this is unlikely to be significant as it can be mitigated and managed under the licensing process.</p>
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)	Ø	Ø	+	+	+	+	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>Option A has the potential to impact on climate through emissions related to continued transport of waste over considerable distances.</p> <p>Options B and C would both reduce transport emissions by reducing the need for export. Unlike municipal waste, a hazardous waste landfill (cell) is not expected to generate methane and therefore would not contribute to climate change.</p>

Objective	Option A (Business as Usual)		Option B (Co-located Landfills)		Option C (Central Landfill)		Comments
	2011	2016	2011	2016	2011	2016	
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	Ø	Ø	0	0	0	0	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>No impacts to the soil environment are anticipated for Ireland with Option A as waste is disposed of abroad.</p> <p>Options B and C would result in minimal risks to soil as a result of disposal to landfill. Any risks will be mitigated and managed under the licensing process.</p>
Material Assets: To maximise use of the built environment, energy and raw materials.	Ø	Ø	+	+	+	+	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>No impacts to energy/resources are anticipated for Ireland with Option A as waste is disposed of abroad.</p> <p>Options B and C would have limited negative impact as a result of landtake for new or extended facilities. This landtake would not be considered significant at a national level. These options both include provision of waste infrastructure to assist Ireland in achieving self-sufficiency. Either of Option B or C reduce the transport-related energy requirement.</p> <p>See Section 8.3.3 for landuse assessment</p>
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	Ø	Ø	+	+	+	+	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>Option A would require the continued export of materials for disposal.</p> <p>Options B and C would reduce export and provide waste disposal infrastructure in Ireland. Option B may reduce transportation within Ireland compared with Option C. Reduction in transport has consequent benefits for reduction in transport-related emissions.</p>

Objective	Option A (Business as Usual)		Option B (Co-located Landfills)		Option C (Central Landfill)		Comments
	2011	2016	2011	2016	2011	2016	
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan	Ø	Ø	+/-	+/-	+/-	+/-	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>No impacts to biodiversity are anticipated for Ireland with Option A as waste is disposed of abroad. However, there is minimal potential risk to marine/coastal biodiversity as a result of shipping and the potential for spillages.</p> <p>Options B and C require the provision of treatment facilities in Ireland. This would require landtake which could potentially impact on flora, fauna or habitats.</p> <p>Potential impacts to biodiversity as a result of the location of and emissions from disposal facilities would be mitigated and managed under the licensing process.</p>
Human Health/Population: To protect human health from hazardous waste	Ø	Ø	0	0	0	0	<p>In the medium term horizon (2012), significant effects from Options B and C are unlikely to be evident as the necessary infrastructure would require relevant authorisations before these options could be implemented. In the meantime, a 'business as usual' scenario is assumed.</p> <p>No health impacts are anticipated for Ireland with Option A as waste is disposed of abroad.</p> <p>Options B and C require the provision of treatment facilities in Ireland. However, these would be strictly controlled under the conditions of a waste license. Emission limit values in waste licenses are based on EU standards intended to protect human health and the environment. It is therefore not anticipated that significant health impacts would arise from Options B or C.</p>
SUMMARY	<p>Option A has potential negative impacts on Water, Climate, Transport and Biodiversity Flora and Fauna.</p> <p>The Detailed Assessment demonstrates that either Option B or Option C would not have significant effects on the environment. Option B has the advantage of utilizing existing infrastructure such as site roads, weighbridges and staff facilities, thereby saving energy and resources.</p>						
MITIGATION (See Section 9.4)	Any potential negative impact associated with the development of landfill disposal facilities will be mitigated by maximizing use of existing infrastructure and the strict controls in place through relevant authorisation processes.						

Table 8.21 Detailed Assessment – Legacy Hazardous Waste Sites/ Contaminated Land

Option A = Business as usual (piecemeal remediation of sites based on land development pressures)	Option B = Identify former hazardous waste disposal sites/ contaminated land, perform risk assessment, and remediate where necessary.
--	--

Objective	Option A (Business as Usual)		Option B (Risk Assessment)		Comments
	2011	2016	2011	2016	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	+/-	+/-	+	+	Some improvement expected with Option A , but difficult to measure or monitor. Some negative impacts from non-remediated sites are expected. Option B will provide a more coordinated targeted approach, which is likely to decrease the risk of groundwater or surface water pollution from such sites.
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health.	+/-	+/-	0	0	No information available on possible impacts on air from existing sites. With Option B , while there may be some localised impacts during remediation, these would be controlled by licence and planning conditions.
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)	0	0	0	0	No impacts anticipated.
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	+/-	+/-	+	+	Some improvement in soil quality expected with Option A , but difficult to measure or monitor. Some negative impacts from non-remediated sites are expected. Option B will provide a targeted approach, which is likely to address serious soil pollution as a priority and to gradually improve soil quality in general.
Material Assets: To maximise use of the built environment, energy and raw materials.	+/-	+/-	+	+	Option A would gradually restore limited amounts of land to beneficial use on a piecemeal basis. Some negative impacts from non-remediated sites are expected. Option B would address all sites and prioritise remediation, and is expected to deliver more land for beneficial use.
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	—	—	—	—	With both options contaminated soil may be generated, possibly requiring off site transport, and in some cases export, all of which leads to increased transport. Option B may create more transport than Option A .
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan	+/-	+/-	+	+	Similar to soil and water. Greater levels of targeted remediation (Option B) could be more beneficial for biodiversity.

Objective	Option A (Business as Usual)		Option B (Risk Assessment)		Comments
	2011	2016	2011	2016	
Human Health/Population: To protect human health from hazardous waste	+/-	+/-	0	0	There may be indirect health impacts via contaminated soil or water. Any site assessment and remediation is therefore beneficial. Risk assessment under Option B should prioritise the most potentially polluting sites.
SUMMARY	Option B is the preferred option as the targeted approach will ensure that former disposal sites are identified and remediated quickly. Impacts associated with Option A are uncertain in many cases.				
MITIGATION (See Section 9.4)	<p>On-site (in-situ) treatment of contaminated soil should be considered as a measure to mitigate negative transport-related impacts of contaminated soil treatment.</p> <p>Risk assessment of sites should be carried out to prioritize remediation.</p> <p>A coherent and comprehensive approach to addressing this issue, including the creation of a register/inventories of the baseline situation, is required.</p>				

Table 8.22 Detailed Assessment – Contaminated Soil Treatment

Option A = Business as usual (limited in-situ and ex-situ treatment in Ireland, majority of soil exported)	Option B = Increase the use of mobile plant on site, increase treatment capacity in Ireland, reduce export.
---	--

Objective	Option A (Business as Usual)		Option B (Increase capacity in Ireland)		Comments
	2011	2016	2011	2016	
Water: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste	-	-	0	0	With Option A , there is lower risk to ground and surface water in Ireland, but shipping increases the risk for the marine environment. With Option B , more treatment occurs on-site and off-site in Ireland, albeit at regulated operations. Marine risks are reduced.
Air: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health	-	-	0	0	With Option A transport-related emissions would continue. With Option B , export of contaminated soil is minimize, more treatment occurs on-site and off-site in Ireland, with possible air emissions such as dust/ particulates, although at regulated operations.
Climate: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)	-	-	0	0	With Option A , contaminated soil is still exported resulting in potential for transport-related GHG emissions. As the trends in contaminated soil show an increase, the amount of export is likely to increase also. Option B will see more treatment on-site and off-site in Ireland, at regulated operations, therefore no impacts are anticipated. Although energy would be required for transport, this would be minimized by minimizing export.
Soil: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination	+	+	+	+	Both options will improve soil quality by removing contaminants. Option A results in the soil being exported, whereas the soil remains in Ireland with Option B .
Material Assets: To maximise use of the built environment, energy and raw materials.	-	-	+	+	Both options require energy intensive processes (excavation, treatment and transport). Option B may consume fewer resources by means of mobile treatment plants remediating soil on the site it arises. In addition the use of mobile plant would remove the need to provide lands for treatment capacity in Ireland.

Objective	Option A (Business as Usual)		Option B (Increase capacity in Ireland)		Comments
	2011	2016	2011	2016	
Transport: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation	-	-	+	+	Option A involves both road and sea transport. Many of the European destinations for contaminated soil are close to ports, meaning road transport is minimised. Option B would enable some soil to be treated on site, which would reduce the overall transport requirement and associated transport-related emissions.
Biodiversity: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the Hazardous Waste Plan.	0	0	0	0	Both options will improve soil quality by removing contaminants. Neither treatment option is expected to impact significantly on biodiversity
Human Health/Population: To protect human health.	Ø	Ø	0	0	Under Option A , the majority of soil treatment occurs outside Ireland. With Option B there may be increased health concerns, via air or water pollution, due to greater quantities of soil being treated in Ireland. However, this is unlikely to be significant as it can be mitigated once processes are operated in accordance with licence conditions.
SUMMARY	Trends indicate that levels of contaminated soil have increased therefore under the 'business as usual' scenario there is potential for increased negative impacts associated primarily with transport. Option B is the preferred option as tackles the contaminated soil treatment on-site or off-site in Ireland thereby reducing the need for export and the associated transport emissions.				
MITIGATION	No mitigation required as there are no anticipated negative impact from the preferred option.				

8.5 CUMULATIVE AND SECONDARY EFFECTS

In line with requirements of the SEA Directive, cumulative and secondary effects have been considered. Cumulative effects can be additive (i.e. the sum of all the impacts), neutralizing (i.e. where impacts counteract each other) or synergistic (i.e. where impacts interact to produce an impact greater than the sum of the individual impacts). Table 8.23 identifies the cumulative impacts from the preferred strategy. It is recognised that there is uncertainty in identifying such impacts beyond additive at such a strategic stage. For example, effects on biodiversity will be greater in areas already under pressure from development or in areas of high conservation status and this will be more apparent at the project level. However, mitigation is suggested to pre-empt possible effects.

Table 8.23 Cumulative Effects of the Preferred Strategy

	Prevention	Collection	Treatment	Disposal	Potential Cumulative Impact
Water	+	+	+	0	Positive
Air	+	+	+	0	Positive
Climate	+	Ø	+	+	Positive
Soil	+	+	0	0	No effect
Material Assets	+	+	+	+	Positive
Transport	+	-	+	+	Positive
Biodiversity	+	+	+/-	+/-	Potential negative effect. Avoidance of such sites would be necessary in the first instance or Appropriate Assessment if no reasonable alternative available.
Human Health	+	+	0	0	No effect

It is important to remember that several of the environmental topics interact and have the potential to give rise to indirect impacts in other environmental receptors. Potential interrelationships are detailed in Section 5.3.10. Secondary or indirect effects have been taken into account in the overall assessment carried out for the Plan. Table 8.24 summarises the main issues from the Plan.

Table 8.24 Summary of Secondary Effects

Potential Receptors	Secondary Effects
Water Biodiversity Human Health Transport/ Material Assets	<p>The aquatic environment (marine, freshwater and groundwater) has the potential to interact with other environmental receptors principally biodiversity (flora and fauna) and human health. These two receptors can be indirectly impacted by the Plan through changes to water quality. Marine biodiversity in particular is at risk from transport emissions and potential for spillage while exporting hazardous waste for treatment and disposal. A reduction in quantities for export as a result of the various elements of the Plan will contribute to improved marine water quality and indirectly the quality of associated habitats, flora and fauna.</p> <p>Prevention and collection strategies also have the potential to improve surface and ground water quality. These strategies will improve collection of waste material and will also target generation of hazardous waste thereby potentially reducing process emissions to surface water and also emissions to ground water and surface water from unregulated disposal. Such improvements will have indirect impacts on aquatic habitats and associated flora and fauna.</p> <p>Water quality is also an important consideration for human health in terms of drinking and bathing water, aquifers etc. Transport associated with export of material, process emissions associated with production and contamination from unreported hazardous waste all present a risk to human health indirectly through water quality. Reduced export, prevention/education programmes and better collection of hazardous waste material will lead to a decreased risk to water quality and in turn human health. Increased treatment of hazardous waste within Ireland will increase the risk to surface and groundwater resources but not significantly as wastewater emissions would be subject to Emission Limit Values (ELVs), based on standards intended to protect human health and the environment, set out in IPPC and/or Waste licence.</p>
Air Climate Human Health	<p>Air quality has the potential to interact with other environmental receptors principally human health and climate. Increased treatment of hazardous waste within Ireland could potentially increase emissions from treatment and disposal facilities locally e.g. dioxins from incineration. However, air quality emissions would be subject to Emission Limit Values (ELVs) based on standards intended to protect human health and the environment, set out in IPPC and/or Waste licence.</p> <p>Emissions to air from transport and treatment of hazardous waste also have the potential to impact on air quality and indirectly impact on climate through release of GHG. Treatment emissions are likely whether the waste is treated in Ireland or abroad. However, more treatment and disposal within Ireland would result in less transport related emissions from shipping (See Section 8.3.2).</p>
Soil Biodiversity Water Human Health	<p>Direct impacts (positive) to soil quality are anticipated from improved identification and remediation of former hazardous waste sites and contaminated land. Improvements in soil quality as a result of the Plan will in turn have a positive effect on biodiversity and water quality.</p> <p>Habitats are vulnerable to soil contamination from former disposal sites and from illegal disposal of waste. Flora and fauna depending on these habitats could be adversely impacted. Similarly, contaminated soils could adversely affect aquatic habitats and the associated biodiversity, potentially affecting human health.</p>

8.6 SUMMARY

8.6.1 Summary of Preferred Scenario

The preferred strategy is summarised in Table 8.25.

Table 8.25 Preferred Strategy

Prevention	Target the priority hazardous waste sectors including production of sector specific waste management plans, prevention initiatives training and financial support, within the framework of the National Waste Prevention Programme.
Collection	The drop-off based system will be improved with the further development of civic amenity sites and implementation of retail take back for appropriate materials. Mobile Collection will be provided in a limited way for specific waste stream (farm waste and some household hazardous).
Treatment	There will be a modest increase in off-site solvent recovery (2,000 tonnes per annum), cement plants to employ 50,000 tonnes per annum blended solvent fuel, waste to energy capacity of 50,000 tonnes per annum to thermally treat remaining waste suitable streams and some export of hazardous waste for recover may continue.
Disposal	Develop hazardous waste disposal capacity (co-located with existing or planned landfill facilities) in Ireland

8.6.2 Reasons for Selecting the Alternatives

The implementation of the Plan will result in:

- A reduction of the quantity of hazardous waste generated, which will lead to an overall decrease in risks to the environment.
- Increased self-sufficiency in management of Ireland's hazardous waste
- A reduction of the quantity of unreported hazardous waste which will lead to a decrease in risks to water, air, soil, biodiversity and human health/population
- A reduction in the potential for negative impacts to biodiversity, air and climate as a result of reduced export of hazardous waste abroad
- An increase in the overall quantities of hazardous waste requiring transport due to an increase in the quantities of hazardous waste and contaminated soil collected. This will be mitigated by the minimisation of transport, such as through treatment of hazardous waste at facilities in Ireland rather than abroad
- Transfer of some emissions from hazardous waste facilities, from other countries to Ireland, as a result of reduced export of hazardous waste. All hazardous waste facilities in Ireland would be subject to planning, EIA and EPA licensing, as appropriate

No significant adverse impacts are anticipated from implementation of the Plan. Existing systems authorisation through planning and licensing will ensure that environmental pollution does not occur from any facilities in operation for the handling and treatment of hazardous waste. All licences issued are actively enforced by the EPA's Office of Environmental Enforcement. Where potential negative impacts have been identified at this strategic stage, mitigation measures have been proposed in Section 9.4. It is noted that individual facilities will be subject to planning and also to licensing and it is likely that additional, more specific mitigation, relevant to the local receiving environment will be recommended at project level EIA.

The objective of strategic environmental assessment is to ensure that the principles of environmental protection and sustainable development/ sustainable management of hazardous waste are taken into account in the preparation of the Plan. Table 8.26 provides a quantitative comparison of the quantifiable elements for the environmental assessment for baseline (2004) versus Preferred Strategy (2016). Table 8.27 provides a summary of the impact assessment results from Table 8.17 to Table 8.22.

Table 8.26 Quantitative comparison of baseline (2004) versus Preferred Strategy (2016) (excl. contaminated soil)

Total	2004 Baseline	2016 with Plan	Difference	Source
Hazardous waste generation (tonnes)	354,418	405,481	+51,063	Table 8.6
Unreported hazardous waste (tonnes)	47,011	24,215	-22,796	Table 8.6
Unreported hazardous waste (% of total arisings)	13%	6%	-7%	See above
Hazardous waste export (tonnes)	165,128	100,079	-65,049	Table 8.6
Hazardous waste export (% of total arisings)	47%	25%	-22%	See above
Greenhouse gas emissions from solvent export (tonnes)	3,768	467	-3,302	Table 8.9 Appendix D6
Transport effort from solvent Export (tonne.km)	196,708,387	11,766,300	-184,942,087	Appendix D6
Carbon Dioxide emissions (CO ₂) from the thermal treatment of Irish hazardous wastes (tonnes)	150,672	171,636	20,965	Appendix D7
Dioxins release to air from the incineration of Irish hazardous waste (grams per annum)	0.101	0.115	+0.014	Appendix D3
Dioxin release to air (uncontrolled and controlled) in Ireland (grams per annum)	34.03	28.06	-5.97	Appendix D2
Fossil fuel displacement by co-incineration (tonnes of oil equivalent)	0	39,560	-39,560	Appendix D8
Energy recovery from hazardous waste in Ireland	0	3.6 to 4.5 MW _e 9 to 11 MW _{th}	+3.6 to 4.5 MW_e + 9 to 11 MW_{th}	Table 8.10
Land area consumed (ha)	-	84	+84	Table 8.14
Land area remediated (ha)	N/a	-700	-700	Section 8.3.3
Hazardous ash from WTE (tonnes)	0	1,250	+1,250	Section 8.3.4

Table 8.27 Summary of Assessment for Preferred Option

	Water		Air		Climate		Soil		Material Assets		Transport		Biodiversity		Human Health		Mitigation Required
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	
Prevention Programme of prevention including producer responsibility initiatives, preparation of waste management plans, once-off best performance studies, financial support and promotion.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	No significant negative impacts are anticipated from implementation of the preferred option. The Prevention Programme will have a net positive impact through reduction in the generation of hazardous waste overall. The business as usual option would result in negative impacts through continued increases in hazardous waste generation. The pace of implementation of the Plan will be important in the success of this strategy. No further mitigation is required.
Collection Integrated Approach combination of Drop-Off and Producer/ Supplier Take back.	+	+	+	+	Ø	Ø	+	+	+	+	-	-	+	+	+	+	A potentially significant negative impact from the preferred collection scenario has been identified i.e. increased transport and transport-related emissions from the increased collection of hazardous waste. This can be mitigated by provision of treatment facilities in Ireland so that transport overall is minimised (i.e. reduced export). The business as usual option would result in continued (unknown) risks from unreported hazardous waste. The pace of implementation of the Plan will be important in the success of this strategy.
Treatment Integrated Recovery Option with combination of WTE facility, solvents treated at cement kilns and export.	+	+	+	+	+	+	0	0	+	+	+	+	+/-	+/-	0	0	Provision of treatment facilities in Ireland will have an overall positive impact on the environment. The impact on biodiversity could potentially be negative if designated sites are included. This can be mitigated by avoiding designated sites. The business as usual option would result in continued reliance on export market for hazardous waste treatment and associated transport-related impacts. The pace of implementation will be important in the success of this strategy.

	Water		Air		Climate		Soil		Material Assets		Transport		Biodiversity		Human Health		Mitigation Required
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	
Disposal Co-located hazardous waste disposal cells	0	0	0	0	+	+	0	0	+	+	+	+	+/-	+/-	0	0	Provision of disposal facilities in Ireland is not anticipated to cause negative impacts on the environment. The impact on biodiversity could potentially be negative if designated sites are included. This can be mitigated by avoiding designated sites when siting facilities. The business as usual option would result in continued reliance on export market for hazardous waste disposal and associated transport-related impacts. The pace of implementation will be important in the success of this strategy. Improvements to the C1 system are also proposed as mitigation to ensure traceability of hazardous material is improved.
Contaminated Soil Treatment Increase the use of mobile plant on site, increase treatment capacity in Ireland, reduce export.	0	0	0	0	0	0	+	+	+	+	+	+	0	0	0	0	Provision of mobile plant could enable the contaminated soil to be treated on-site or off-site in Ireland thereby reducing the need for export and the associated transport emissions. No negative impact is expected. However some general mitigation is proposed. It is proposed that on-site treatment of contaminated soil should be considered as a measure to mitigate transport related impacts. In addition, a risk assessment of sites should be carried out to prioritize remediation and ensure this issue is addressed quickly. A coherent and comprehensive approach, including the creation of a register/ inventories of the baseline situation, is required.

9 MONITORING AND MITIGATION

9.1 INTRODUCTION

Article 10 of the SEA Directive requires that monitoring should be carried out in order to identify at an early stage any unforeseen adverse effects due to implementation of the Plan, with the view to taking remedial action where adverse effects are identified through monitoring. A monitoring programme is developed based on the indicators selected to track progress towards achieving strategic environmental objectives and reaching targets, enabling positive and negative impacts on the environment to be measured. The environmental indicators have been developed to show changes that would be attributable to implementation of the Plan. See Section 7.2.2 for targets and indicators.

9.2 RESPONSIBILITY

The EPA will monitor the implementation of the Plan and report annually to the National Waste Prevention Committee (NWPC). Monitoring will be undertaken in association with the relevant Regional Waste Management Authorities as appropriate. Monitoring of environmental indicators will be coordinated with monitoring the overall implementation of the Plan; that is, monitoring the Plan indicators presented in Table 22 of the Proposed Plan.

9.2.1 Sources of Information for Monitoring

Monitoring will focus on aspects of the environment that are likely to be significantly impacted by the Plan. Where possible indicators have been chosen based on the availability of the necessary information and the degree to which the data will allow the target to be linked directly with the implementation of the Plan. Table 9.1 presents the Environmental Monitoring Programme to track progress towards achieving strategic environmental objectives and reaching targets, and includes sources of relevant information. This follows on from the objectives, targets and indicators presented in Table 7.2.

From Table 9.1, it can be seen that the majority of information required is already being actively collected, but not all of this is being gathered and reported on at a national level. The following changes would be required to enable effective SEA monitoring:

- EPA OEE – a summary of annual emission compliance or breaches at licensed hazardous waste facilities would be required. This information will be obtained from Annual Environmental Reports and enforcement files pertaining to the relevant facilities.
- Local authorities and EPA OEE – the identification of former waste disposal sites and the rate of implementation of risk assessment and remediation needs to be improved and formalised. Reporting could be incorporated into the *National Waste Report*. This information will be obtained through implementation by the local authorities of the EPA's Code of Practice for Environmental Risk Assessment for Unregulated Waste Disposal Sites.

Table 9.1 Environmental Monitoring Programme

Strategic Environmental Objectives				
Water – Objective 1: To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste				
Air – Objective 2: To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health				
Climate – Objective 3: To minimise greenhouse gas emissions associated with hazardous waste management (including transport)				
Soil – Objective 4: To safeguard soil quality and quantity from hazardous waste and reduce soil contamination				
Material Assets – Objective 5: To maximise use of the built environment, energy and raw materials				
Transport – Objective 6: To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation				
Biodiversity – Objective 7: To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations wherever possible into the National Hazardous Waste Management Plan				
Human Health and Population – Objective 8: To protect human health from hazardous waste				
Target	Environ. Objective	Indicator	Data availability & Source	Frequency of Monitoring
Reduce exceedences of emission limits to water and air from licensed hazardous waste facilities	Water Air	Number of hazardous waste facilities in breach of emission limits to surface water, groundwater and air	EPA – licence enforcement files	Every 2 years
Legacy hazardous waste disposal sites to be managed in accordance with Code of Practice	Water Soil	Number of legacy disposal sites to which Code of Practice is applied	EPA – Code of Practice implementation records	Every 2 years
No increases in dioxin levels in ambient environment in vicinity of hazardous waste incinerators	Air Human Health	Dioxin in cow's milk	EPA – monitoring of cow's milk	When available
Contribute to generation of energy from renewable sources	Climate	Quantity of hazardous waste managed via energy recovery (R1)	EPA – national waste report	Annual
Reduce distance travelled by hazardous waste	Climate Transport	Tonne-kilometres travelled by road and sea	EPA – to be calculated from best available records (e.g. facility records, 'new C1', TFS) (data not currently collected)	Every 2 years
Reduce export of hazardous waste and move towards self-sufficiency	Transport Material assets	Quantity of hazardous waste exported	EPA – national waste report	Annual
Reduce the generation of unreported hazardous waste	Human health Soil	Estimation of unreported hazardous waste	EPA - estimation will be made every two years for the national waste report	Every 2 years
Increase the in situ treatment of contaminated soil	Soil	Quantity of contaminated soil treated <i>in situ</i> as a proportion of the total	EPA – licence enforcement files (data not currently collected)	Every 2 years
Increase the treatment of contaminated soil in Ireland	Soil Material assets	Quantity of contaminated soil treated in Ireland as a proportion of the total	EPA – national waste report and licence enforcement files	Every 2 years
Develop any new hazardous waste facilities on previously used land or brownfield sites	Material assets	Area of new hazardous waste facilities on greenfield and brownfield sites	EPA – licensing files (data not currently collected)	Every 2 years
Avoid loss or damage to designated sites from siting of hazardous waste facilities	Bio-diversity	Area of designated sites used by or proposed for development of hazardous waste facilities	EPA – licensing files	Every 2 years
Reduce major incidents of unauthorised disposal of hazardous waste	Human health	Reports of large scale illegal disposal involving hazardous waste (not including relatively small-scale fly-tipping)	EPA – unauthorised waste activities reports	Every 2 years
Reduce complaints relating to hazardous waste facilities	Human health	Number of complaints received relating to hazardous waste facilities	EPA – licence enforcement files	Every 2 years

9.3 FREQUENCY OF REPORTING

The minimum requirement for SEA reporting would be every five years, given that the Plan must be reviewed at this frequency. However, as the Plan is implemented, the EPA will prepare an annual implementation report, which will be submitted to the National Waste Prevention Committee prior to publication. Reports from implementation bodies will be sought for incorporation into the implementation report. The implementation report will incorporate environmental reporting against the strategic environmental objectives, targets and indicators presented in this Environmental Report. The first implementation report will be prepared in respect of the calendar year 2008 and will be published by June 2009.

The monitoring programme will be kept under review as implementation of the Plan progresses. The programme should be sufficiently flexible to adapt (in terms of parameters and frequency) to any significant issues, which may arise during the course of the implementation of the Plan. During the first phase of monitoring, in consultation with the relevant statutory authorities, arrangements will be made for trigger mechanisms for remedial action, to ensure the effectiveness of the monitoring programme.

Targets and indicators may be adjusted or amended as appropriate during the period of the Plan, depending on the results of early monitoring. The next full review of the Plan will commence in 2012.

9.4 MITIGATION (RECOMMENDATIONS FROM THE SEA TO FEED INTO THE PLAN)

The Environmental Report has highlighted the more significant potential environmental impacts from the management of hazardous waste, as presented in the Proposed Plan. In the mitigation of potential significant environmental impacts, a number of issues have been highlighted and described below.

9.4.1 Hazardous Waste Prevention

The success of prevention and the speed at which the recommended actions are rolled out, will impact on overall waste generation/growth and resource efficiency. Experience from the first Plan suggests that prevention initiatives need considerable time to be introduced and developed; however, the long term benefits to be gained from a programme of waste prevention initiatives have been outlined in this Environmental Report. Therefore, the hazardous waste prevention programme as presented in the Proposed Plan should be sufficiently supported and afforded the necessary prioritisation in the implementation of the Plan.

9.4.2 Unreported Hazardous Waste

As pointed out in the Environmental Report, the environmental impact of unreported hazardous waste is largely unknown. Therefore, it is essential that this issue is also afforded the necessary priority and expediency in the implementation of the Plan. This is crucial for the overall success in meeting the strategic environmental objectives and the Plan objectives.

9.4.3 Move Towards Self-sufficiency

The Environmental Report has demonstrated that there is more environmental benefit to be gained in a move towards self-sufficiency in hazardous waste management than keeping the status quo, with a considerable dependence on export. Therefore, in implementing the Plan, there must be a focus on addressing infrastructure deficiencies in a timely manner in order to drive the move towards self-sufficiency.

9.4.4 Contaminated Sites

The relative lack of information on the presence or otherwise of hazardous waste, and the extent and severity of contamination, at legacy waste disposal sites and industrially contaminated land presents a challenge for SEA. Nevertheless, there could potentially be a significant amount of land involved, with consequent potential risk of pollution to water, soil and air (and associated indirect impacts on human health and biodiversity). It is essential therefore, that this knowledge gap is addressed, including the creation of a register/inventories of the baseline situation. This is necessary so that a benchmark is available against which future progress can be monitored. Therefore, the application of the Code of Practice for Environmental Risk Assessment for Unregulated Waste Disposal Sites by local authorities, with the cooperation of the EPA is essential.

9.4.5 Local Issues

The National Hazardous Waste Management Plan is a strategic, high-level document. Therefore, environmental quality at the local level cannot be specifically considered in the development of the Plan and in the SEA, other than at a strategic level. However, any infrastructural developments taking place as a result of recommendations put forward in the Plan, will be subject to the necessary approval and assessment processes, including waste/IPPC licensing, planning approval and environmental impact assessment, as appropriate.

9.4.6 Transport – Climate Interface

This potential impact on climate of activities in all sectors of the economy is the focus of considerable attention at present. Climate change, being a global concern, must be considered by activities carried out on any level. Therefore, the Plan should aim to reduce GHG emissions from the management of hazardous wastes, including associated transport. This may be possible through reductions in the transport of hazardous waste (within Ireland and abroad), or through reductions in the emissions from the treatment and disposal of wastes (Landfill gas, and incineration flue gas emissions). However, the single biggest impact the Plan addresses is the export of hazardous wastes through the development of domestic treatment and disposal infrastructure and the move towards self-sufficiency.

Using available data on hazardous waste export, the transport-related emissions have been quantified. However, because the current 'C1' system for tracking hazardous waste movement within Ireland cannot provide statistical information, this presents a gap which needs to be addressed. Reform of the C1 system should enable all waste movements data to be reported in electronic format, and establish a database system which could query total movement distances and tonnages. This will benefit future SEA monitoring.

9.5 SUMMARY OF MONITORING AND MITIGATION

The Strategic Environmental Assessment carried out on the Proposed Plan has ensured that any potential significant environmental impacts of the Plan have been identified and given due consideration, and taken into account in the development of the Plan. The SEA process will remain a live process during the period of the Plan. That is, the monitoring programme will be carried out as implementation of the Plan progresses and, depending on monitoring results, adjustments to targets and indicators may be made to ensure the continued effectiveness of the monitoring programme in the interest of optimal environmental protection. The EPA will report annually to the National Waste Prevention Committee on progress in achieving the objectives of the Plan and the strategic environmental objectives presented in the Environmental Report.

