11. MONITORING PROGRAMME

11.1. Introduction

Under Article 10 of the SEA Directive, monitoring is required in order to identify at an early stage any unforeseen adverse effects due to implementation of the LAP, and to be able to take remedial action. Monitoring allows the actual impacts of the LAP to be tested against those that were predicted. It allows major problems to be identified and dealt with in a timely fashion, and environmental baseline information to be gathered for future Plan reviews. It also ensures that proposed mitigation measures are carried out and that no unforeseen impacts occur (Therivel, 2004).

The methodology used in the development of this monitoring programme is based on the use of indicators and targets, assignment of responsibilities, setting of appropriate time lines and intervention in the event of an unforeseen occurrence.

Monitoring is carried out by reporting on the set of indicators and targets drawn up previously (Chapter 7) and used to describe future trends in the baseline, which enable positive and negative impacts on the environment to be measured. The indicators that are used show changes that would be attributable to implementation of the LAP. In particular, the indicators can also in certain circumstances act as an early warning system should unforeseen impacts occur or conditions deteriorate further or faster than anticipated. For example, water quality indicators describe trends in both improvements and deterioration in water quality. If quality targets are not being reached and water is seen to be unexpectedly deteriorating immediate intervention will be required.

11.2. Responsibilities

Carlow County Council will be responsible for the implementation of the monitoring programme in relation to the LAP.

11.3. Sources of information

Monitoring will focus on aspects of the environment that are likely to be significantly impacted by the LAP. Indicators and targets have been identified for the main environmental issues in the study area, namely water, biodiversity, cultural heritage and landscape (Chapter 7). The indicators chosen are at a level, which is relevant to the LAP, and are collated and reported on by a variety of Government Agencies, such as EPA, OPW, National Parks and Wildlife Services and different sections within Carlow County Council.

In Table 11.1 to 11.8 the format for the monitoring programme for this LAP is detailed in relation to relevant indicators, targets and frequency of monitoring, point at which additional action may be required and what type of intervention is required if a problem is identified.

Based on the information above it can be seen that all of the indicator information required is already being actively collected and reported at a level sufficient to meet the needs of this LAP. The frequency of monitoring is set, the point at which additional action and its form are also detailed.

11.4. Frequency of Reporting

The minimum requirement for overall SEA reporting would be every 2 years, in parallel with the review period of the LAP. However it is recommended that the Carlow County Council carry out a mid-term review of performance against SEA Objectives. This would occur in 2009 and would use information in the most recent information from the EPA State of the Environment Report. It is further recommended that reporting on the overall monitoring of the Plan is made to the EPA SEA Section.

11.5. Identification of significant gaps in environmental information

During the preparation of this Environmental Report a number of gaps in environmental information have been identified.

- Biodiversity – No biodiversity plan or study for the area was available for review. However Carlow County Council (CCC) is committed to completing a county-wide biodiversity plan during the County Development Plan (CDP) process.
- Landscape – There has been no Landscape Character Assessment (LCA) completed to date. CCC is committed to undertaking a county-wide LCA in preparation for the CDP process.

Table 11-1: Water Indicator Monitoring

WATER						
Environmental Objectives		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
WO1.1	Maintain or improve the quality of surface water to status objectives as set out in the Water Framework Directive (WFD)	Changes in receiving water quality as identified during water quality monitoring for the WFD conducted by CCC and the EPA	CCC EPA	As per monitoring cycle in accordance with the WFD Monitoring Programme	Achieve good status of surface waters in accordance with WFD by 2015	Investigate source of problem and remedy accordingly
WO1.2	Maintain or improve the Biotic Quality Rating (Q Value) of surface waters	Biotic quality rating of river waters at EPA monitoring locations	EPA	As per monitoring cycle in accordance with EPA monitoring programme	Improvement or at least no deterioration in surface water quality by 2015	Investigate source of problem and remedy accordingly
WO1.3	Implement SUDS across study area	Provision of SUDS compliant drainage plans for proposed developments in study area	CCC	SUDS compliant drainage plans to be provided with all proposed developments	100% compliance with SUDS drainage plans supplied with planning requests	Planning application not to be considered for planning assessment unless necessary drainage plans are also submitted
WO1.4	Knowledge of developments contributions to surface water quantities	Quantified surface water flows from proposed developments as part of planning process Measured river levels	CCC EPA	Hydrological assessments including quantified surface water contribution to be supplied with planning applications River levels logged as per EPA's logging cycle	100% compliance with hydrological assessments supplied with planning requests River levels to remain at current percentiles as per OPW hydrological data	Planning application not to be considered for planning assessment unless necessary hydrological assessments are also submitted

WATER						
Environmental Objectives		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
WO2.1	Prevent pollution of groundwater by adhering to aquifer protection plans	Changes in groundwater quality as identified in monitoring programmes conducted by CCC and the EPA under the WFD	CCC WFD	As per monitoring cycle in accordance with the WFD Monitoring Programme	Achieve good status of groundwaters in accordance with WFD by 2015	Investigate source of problem and remedy accordingly
WO3.1	Maintain and improve the quality of drinking water supplies	Drinking water quality and bacterial counts and frequency of 'boil water' notices	CCC	As required by the population served in the study area and by the requirements of the Drinking Water Regulations	No 'water boil' notices issued	Investigate source of problem and remedy accordingly
WO4.1	Promote sustainable water use based on long term protection of resources	Frequency of 'water shortage' notices	CCC	-	Decrease in the number of water shortage notices issued	Investigate source of problem and remedy accordingly
WO4.2	Upgrade infrastructure to meet future water supply needs	Frequency of 'water shortage' notices	CCC	-	-	-
WO5.1	Mitigate the effect of flood through avoidance of development in flood plains	No. and type of developments in the recognised flooding area	CCC	-	Decrease in the number of properties flooded. Adherence to the guidelines given in the OPW's Guidelines on Flood Risk (2005	Investigate source of problem and remedy accordingly

WATER						
Environmental Objectives		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
WO5.2	Provision of flood relief through management of flood risk and living with floods rather than engineered flood solutions	Provision of flood risk evaluations with proposed developments/ changes to land zoning with emphasis on flood risk management	CCC	-	Mitigation of flood risk and damage to properties caused by flooding	Planning application not to be considered for planning assessment unless necessary assessments are also submitted in areas of known flooding or drainage district benefiting areas with planning applications
WO6.1	Prevention of interference with inland water morphology by developments/ land use changes in the study area	No. of proposed surface water diversions supplied with hydrological assessments	CCC	-	Mitigate against changes to surface water morphology and risk of new flooding areas	Planning application not to be considered for planning assessment unless necessary hydrological assessments are also submitted

Table 11-2: Biodiversity Indicator Monitoring Programme

BIODIVERSITY						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
BO1.1	Conserve protected habitats and species	Percentage of unique habitats and species lost in designated sites through trending of annual/ bi-annual habitat surveys.	CCC DoEHLG	-	No loss of protected habitats and/or species within the lifetime of the LAP. Carry out biodiversity study incorporating study area to identify significant local habitats, prioritising Annex 1 species as per the Habitats Directive.	-
BO1.2	Protect Natura 2000 (SAC) sites in planning process using Habitats Directive Article 6 assessment methodology	Provision of Article 6 assessments with developments proposed for sites overlying or potentially impacting Natura 2000 sites in study area.	CCC DoEHLG	-	Natura 2000 sites to be considered at all stages of planning applications	Planning application not to be considered for planning assessment unless necessary Article 6 assessments are also submitted

BIODIVERSITY						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
BO2.1	Conserve the diversity of habitats and species in non-designated sites	Percentage of unique habitats and species lost in non-designated sites through trending of annual/ bi-annual habitat surveys.	CCC	-	No loss of significant hedgerows such as Townland Boundary Hedges. No significant loss of roadside hedgerows. The overall target is to have no net loss of hedgerow resources within the study area. Operators who conduct mechanical hedge cutting should have achieved the Teagasc proficiency standard MT 1302 – Mechanical Hedge Trimming. Development of identified non-designated habitats as green belt.	Investigate source of problem and remedy accordingly Requirement in planning permissions.
BO2.2	Conserve non-designated sites	No. of bio-diversity plans submitted with planning applications	CCC DoEHLG	-	Development of identified non-designated habitats.	Requirement for provision of bio-diversity plans with planning application where decided by CCC Environment Section.

BIODIVERSITY						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
BO3.1	Protect aquatic and terrestrial habitats from invasive species.	Number and types of invasive species identified during the lifetime of the LAP in the study area.	CCC SERBD DoEHLG	Identify the presence and location of invasive species in study area catchments.	Under CCC remit as lead authority in SERDB, develop SERDB initiatives to monitor and control invasive species. Support initiatives which reduce the likelihood of invasions. Help control and manage new invasive species. Raise public awareness of invasive species and address international obligations. No movement of earth from areas infested with invasive species.	Investigate source of problem and remedy accordingly

Table 11-3: Cultural Heritage Indicator Monitoring Programme

CULTURAL HERITAGE						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
CHO1.1	Promote best practice in heritage conversation and management as per DoEHLG Guidelines	Number of unauthorised developments over the lifetime of the Plan which result in the loss or partial loss of protected structures and sites of important archaeological status	CCC DoEHLG	Review the County Heritage Plan mid term.	No unauthorised developments over the lifetime of the LAP which will result in the loss or partial loss of protected structures or sites of important archaeological status. Ensure all planning applications that might have an impact on heritage are referred to the DoEHLG for comment and that their recommendations are adhered to.	Investigate source of problem and remedy accordingly
CHO2.1	Identification and protection of designated industrial heritage sites	Number of designated industrial heritage sites listed during the lifetime of the LAP.	CCC DoEHLG	-	No unauthorised developments permitted over the lifetime of the LAP which will result in the loss or partial loss of protected structures. Ensure all planning applications that might have an impact on heritage are referred to the DoEHLG for comment and that their recommendations are adhered to.	Investigate source of problem and remedy accordingly

CULTURAL HERITAGE						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
CHO2.2	Promotion of designated industrial heritage sites	Schemes to promote County Carlow industrial heritage history.	CCC DoEHLG	-	Number of initiatives developed to promote industrial heritage.	-
CHO3.1	Protection of individual sites and complexes	Number of unauthorised developments over the lifetime of the LAP which result in the loss of individual sites or complexes	CCC	-	No unauthorised developments	-
CHO4.1	Identification and protection of archaeological features	Number of unauthorised developments which result in the loss or damage to archaeological features	CCC DoEHLG	-	No unauthorised development during the lifetime of the Plan which could result in damage to archaeological features	-

Table 11-4: Landscape Indicator Monitoring Programme

LANDSCAPE						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
LO1.1	Designate and protect views and prospects within the study area such as panoramic view from Brownhill.	Number and type of developments in designated views and prospects	CCC	Review each planning application as submitted.	No significant disruption of views or prospects	--
LO2.1	Designate and protect urban and industrial views and prospects.	Number and type of developments in designated views and prospects	CCC	Review each planning application as submitted.	No significant disruption of views or prospects	-

Table 11-5: Population and Human Health Indicator Monitoring Programme

POPULATION AND HUMAN HEALTH						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
PO1.1	Improve people's quality of life based on high quality residential, working and recreational life	Increases in the number of green spaces available to the public.	CCC	Review during the lifetime of the LAP.	Increase in the number of green spaces available to the public.	Investigate source of problem.
PO1.2	Implementation of the County Litter Management Plan 2005 and any subsequent plans	Implementation of County Litter Management Plan 2005.	CCC	Review during the lifetime of the Plan	Maintain litter free status and endeavour to improve	Investigate and remedy problems
PO2.1	Adhere to current County Emergency Plan and other objectives of relevance to human health.	Drinking water quality Maintaining or improving air quality in study area Availability of public transport Provision of civic amenity sites	CCC	-	No 'boil water' notices Maintain or improve levels of ambient SO_2, NO_x, and particulate matter as conducted by EPA monitoring Increased public amenities Number of new civic amenity sites provided during the lifetime of the LAP.	-

Table 11-6: Soils and Geology Indicator Monitoring Programme

SOILS AND GEOLOGY						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
SGO1.1	Maximise the use of brownfield sites and maximise the use of the existing built environment	Number of new developments on brownfield sites	CCC	Review when planning application is submitted.	Specified percentage of new applications granted to be on brownfield sites	-
SGO2.1	Identify any unregulated landfill sites in the study area	Number of unregulated sites remediated	CCC	Commence investigation in 2009.	At least one unregulated site to be remediated during the lifetime of the LAP	-
SGO3.1	Design and Implement Aquifer Protection Plan	Aquifer protection plan prepared during lifetime of plan	CCC	Complete survey and report by end of LAP.	Completed Aquifer Protection Plan by end of LAP	-

Table 11-7: Material Assets Indicator Monitoring Programme

MATERIAL ASSETS						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
MAO1.1	Development of a sustainable transportation infrastructure which reduces the need for travel and journey length	An Integrated Land Use and Transportation Plan	CCC	Review during the lifetime of the LAP.	Increased use in public transport.	-
MAO2.1	Minimise waste production and introduce sustainable waste management practices	Quantity of household waste sent to landfill Quantity of household waste sent for recycling Number of bring banks provided for the population in the study area	CCC	Review during the lifetime of the LAP.	Reduction in the quantities of waste sent to landfill. Increase in the quantities of waste sent for recycling. Increase in the number of bring banks provided for the population in the study area	-
MAO3.1	Upgrade of existing wastewater treatment plant	Number of upgrades and/or construction of new wastewater treatment plant	CCC	Review during the lifetime of the LAP.	Increase in the number of upgrades and/or new wastewater treatment plant	-

Table 11-8: Air & Climate Indicator Monitoring Programme

AIR AND CLIMATE						
Environmental Objective		**Indicator**	**Responsible Authority**	**Frequency**	**Target**	**Type of Intervention required**
ACO1.1	Minimise greenhouse gas emissions to meet National and International Standards	Use of public transport Provision of cycle lanes and walking routes Number of permissions granted for renewable energy projects	CCC	Review every 2.5 years.	Increased use of public transport Increased numbers of cycle lanes and pedestrian routes in the study area Increased number of permissions granted for renewable energy projects	-
ACO1.2	Compliance with Building Energy Regulations	Provision of new homes to meet energy regulation requirements	CCC	Review every 2.5 years.	Increased number of energy audits conducted on existing facilities and new homes	-
ACO2.1	Ambient air quality	Ambient air quality concentrations	CCC	Review every 2.5 years.	Maintain or better existing ambient air emission concentrations.	-