STRATEGIC ENVIRONMENTAL ASSESSMENT
ENVIRONMENTAL REPORT

FOR THE

INTEGRATED IMPLEMENTATION PLAN
2019-2024

for: **National Transport Authority**
Dún Scéine
Iveagh Court
Harcourt Lane
Dublin 2

by: **CAAS Ltd.**
1st Floor
24-26 Ormond Quay Upper
Dublin 7

MARCH 2019

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AA	Appropriate Assessment
ACA	Architectural Conservation Area
BRT	Bus Rapid Transport
CFRAM	Catchment Flood Risk Assessment and Management
CBC	Core Bus Corridor
CGS	County Geological Sites
CSO	Central Statistics Office
DAFM	Department of Agriculture, Food and Marine
DCHG	Department of Culture, Heritage and the Gaeltacht
DCCAE	Department of Communication, Climate Action and Environment
DHPLG	Department of Housing, Planning and Local Government
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EU	European Union
GSI	Geological Survey of Ireland
NHA	Natural Heritage Area
NTA	National Transport Authority
NPF	National Planning Framework
OPW	Office of Public Works
RAL	Remedial Action List
RBD	River Basin District
RMP	Record of Monuments and Places
RPA	Register of Protected Areas
RPS	Record of Protected Structures
RPGs	Regional Planning Guidelines
RBMP	River Basin Management Plan
RSES	Regional Spatial and Economic Strategy
SAAO	Special Amenity Area Order
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEO	Strategic Environmental Objective
SFRA	Strategic Flood Risk Assessment
SI No.	Statutory Instrument Number
SPA	Special Protection Area
WFD	Water Framework Directive
WHO	World Health Organisation
WMU	Water Management Unit

Glossary

Appropriate Assessment

The obligation to undertake Appropriate Assessment derives from Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. AA is a focused and detailed impact assessment of the implications of a strategic action (such as a plan or programme) or project, alone and in combination with other strategic actions and projects, on the integrity of a European Site in view of its conservation objectives.

Biodiversity and Flora and Fauna

Biodiversity is the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems' (United Nations Convention on Biological Diversity 1992).

Flora is all of the plants found in a given area.

Fauna is all of the animals found in a given area.

Environmental Problems

Annex I of Directive 2001/42/EC of the European Parliament and of the Council of Ministers, of 27th June 2001, on the assessment of the effects of certain Plans and programmes on the environment (the Strategic Environmental Assessment Directive) requires that information is provided on 'any existing environmental problems which are relevant to the plan or programme', thus, helping to ensure that the proposed strategic action does not make existing environmental problems worse.

Environmental problems arise where there is a conflict between current environmental conditions and ideal targets. If environmental problems are identified at the outset they can help focus attention on important issues and geographical areas where environmental effects of the plan or programme may be likely.

Environmental Vectors

Environmental vectors are environmental components, such as air, water or soil, through which contaminants or pollutants, which have the potential to cause harm, can be transported so that they come into contact with human beings.

Mitigate

To make or become less severe or harsh.

Mitigation Measures

Mitigation measures are measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse impacts on the environment of implementing a human action, be it a plan, programme or project. Mitigation involves ameliorating significant negative effects. Where there are significant negative effects, consideration should be given in the first instance to preventing such effects or, where this is not possible, to lessening or offsetting those effects. Mitigation measures can be roughly divided into those that: avoid effects; reduce the magnitude or extent, probability and/or severity of effects; repair effects after they have occurred; and compensate for effects, balancing out negative impacts with other positive ones.

Protected Structure

Protected Structure is the term used in the Planning and Development Act and Regulations (as amended) to define a structure included by a planning authority in its Record of Protected Structures. Such a structure shall not be altered or demolished in whole or part without obtaining planning permission or confirmation from the planning authority that the part of the structure to be altered is not protected.

Recorded Monument

A monument included in the list and marked on the map which comprises the Record of Monuments and Places that is set out county by county under Section 12 of the National Monuments (Amendment) Act, 1994 by the Archaeological Survey of Ireland. The definition includes Zones of Archaeological Potential in towns and all other monuments of archaeological interest which have so far been identified. Any works at or in relation to a recorded monument requires two months' notice to the former Department of the Environment, Heritage and Local Government (now Department of Culture, Heritage and the Gaeltacht) under Section 12 of the National Monuments (Amendment) Act, 1994.

Scoping

Scoping is the process of determining what issues are to be addressed, and setting out a methodology in which to address them in a structured manner appropriate to the plan or programme. Scoping is carried out in consultation with appropriate environmental authorities.

Strategic Actions

Strategic actions include: *Policies/Strategies,* which may be considered as inspiration and guidance for action and which set the framework for Plans and programmes; *Plans*, sets of co-ordinated and timed objectives for the implementation of the policy; and *Programmes*, sets of projects in a particular area.

Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is the formal, systematic evaluation of the likely significant environmental effects of implementing a plan or programme before a decision is made to adopt it.

Strategic Environmental Objective (SEO)

Strategic Environmental Objectives (SEOs) are methodological measures developed from policies which generally govern environmental protection objectives established at international, Community or Member State level and are used as standards against which the provisions of the Plan and the alternatives can be evaluated in order to help identify which provisions would be likely to result in significant environmental effects and where such effects would be likely to occur, if - in the case of adverse effects - unmitigated.

Section 1 SEA Introduction and Background

1.1 Introduction and Terms of Reference

This is the Strategic Environmental Assessment (SEA) Environmental Report for the Integrated Implementation Plan 2019-2024 (hereafter referred to as "Plan"). It has been undertaken by CAAS Ltd. on behalf of the National Transport Authority.

The purpose of this report is to provide a clear understanding of the likely environmental consequences of decisions regarding the adoption and implementation of the Plan. The SEA is carried out in order to comply with the provisions of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (Statutory Instrument Number (SI No. 435 of 2004) as amended. This report should be read in conjunction with the Plan.

1.2 SEA Definition

Environmental assessment is a procedure that ensures that the environmental implications of decisions are taken into account before such decisions are made. *Environmental Impact Assessment*, or EIA, is generally used for describing the process of environmental assessment for individual projects, while *Strategic Environmental Assessment* or SEA is the term which has been given to the environmental assessment of plans and programmes, which help determine the nature and location of individual projects taking place. SEA is a systematic process of predicting and evaluating the likely significant environmental effects of implementing a proposed plan or programme, in order to insure that these effects are adequately addressed at the earliest appropriate stages of decision-making in tandem with economic, social and other considerations.

1.3 SEA Directive and its transposition into Irish Law

Directive 2001/42/EC of the European Parliament and of the Council of Ministers, of 27th June 2001, on the Assessment of the Effects of Certain Plans and Programmes on the Environment, referred to hereafter as the SEA Directive, introduced the requirement that SEA be carried out on plans and programmes which are prepared for a number of sectors, including transport.

The SEA Directive was transposed into Irish Law through the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (Statutory Instrument Number (SI No. 435 of 2004) and the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004). Both sets of Regulations became operational on 21st July 2004. The Regulations have been amended by the European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011 (SI No. 200 of 2011) and the Planning and Development (Strategic Environmental Assessment) (Amendment) Regulations 2011 (SI No. 201 of 2011).

1.4 Implications for the Plan

Article 9 of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004, as amended, sets out criteria for determining whether SEA should be undertaken on certain types of plans. Considering these criteria, the National Transport Authority concluded that an SEA was required for the Plan, as it comprises a 'plan or programme' as defined by the SEA Directive which is likely to have significant environmental effects. The findings of the SEA are expressed in this Environmental Report, an earlier version of which accompanied the Draft Plan on public display and was altered in order to take account of recommendations contained in submissions and in order to take account of changes that were made to the Draft Plan on foot of submissions. The findings of this report and other related SEA output is taken into account during the consideration of the Plan and before it is finalised. On finalisation of the Plan, an SEA Statement is prepared which summarises, inter alia, how environmental considerations have been integrated into the Plan.

Section 2 The Plan

2.1 Requirement for an Integrated Implementation Plan

The Minister for Transport, Tourism and Sport approved the Greater Dublin Area Transport Strategy 2016-2035 on 24th February 2016.

Under Section 13 of the Dublin Transport Authority Act 2008, the Authority is required, within nine months of that approval date, to make an Integrated Implementation Plan ("Plan") covering the first six year period of the Transport Strategy. However, because the Government decided to undertake a review of capital spending in 2016, and because the legislation does not permit any amendments to an adopted Plan until a new Transport Strategy is approved by the Minister, it was agreed to postpone the development of the Plan until the Government's review concluded.

Earlier this year the Government published its National Development Plan 2018-2027. This publication has enabled the Integrated Implementation Plan to be prepared.

2.2 Geographical Scope and Required Content for the Implementation Plan

While the initial legislation governing the Plan was more clearly limited to the delivery of the Transport Strategy for the Greater Dublin Area, subsequent amendments have somewhat diluted this position. While the bulk of the Plan relates solely to the Greater Dublin Area, certain areas such as public transport services and activities related to small public service vehicles will be dealt with on a national basis.

Section 13 of the Dublin Transport Authority Act 2008 (the "Act") sets out the required contents of an integrated implementation plan ("Plan"). A Plan is required to comprise the following:

- an infrastructure investment programme, identifying the key objectives and outputs to be pursued by the Authority over the period of the Plan;
- the actions to be taken by the Authority to ensure the effective integration of public transport infrastructure over the period of the Plan;
- an integrated service plan, identifying the key objectives and outputs to be pursued by the Authority in relation to the procurement of public passenger transport services over the period of the Plan;
- the actions to be taken by the Authority in relation to small public service vehicles,
- the actions to be taken by the Authority to ensure the effective integration of public passenger transport services over the period of the Plan; and
- such other matters as the Authority considers appropriate or as may be prescribed by the Minister for Transport, Tourism and Sport ("the Minister").

2.3 Plan Informants for and Content of the Integrated Implementation Plan

The emergence of increasing road congestion in recent years has underlined the need to deliver an enhanced level of public transport to provide an alternative to car-based commuting. Congestion is a challenge that must be addressed by the transport system in a context where significant population growth, and associated economic, social, cultural and recreational activity is being planned for.

The significance of the need for action to reduce the use of fossil fuels and diminish the generation of greenhouse gases is recognised and required by legislation.

The National Transport Authority is required to adhere to the National Climate Change Adaptation Framework, which was published by the Minister for Communications, Climate Action and Environment in 2018, and the

Department of Transport, Tourism and Sport's Sectoral Adaptation Plan, published in 2017.

The Transport Strategy for the Greater Dublin Area 2016-2035, which established an overall framework for transport investment over the next two decades and was subject to full SEA and Stage 2 AA, is a key policy shaping the six-year Integrated Infrastructure Plan. The priorities in the Integrated Infrastructure Plan align with the objectives and priorities set out in the Transport Strategy, focused on improving public and sustainable transport across the Greater Dublin Area.

Taking all of the above into account, the Authority has focused on improving public and sustainable transport across the Greater Dublin Area while seeking to ensure primacy for transport options that provide for unit reductions in carbon emissions. This can most effectively be done by promoting public transport, walking and cycling, and by actively seeking to reduce car use in circumstances where alternative options are available. In addition, transitioning to lower emission vehicles for transport use is also fundamental to reducing transport related carbon emissions.

To date the Authority has focused significant levels of investment in these sustainable modes, including the reopening of the Phoenix Park Tunnel and the delivery of Luas Cross City. It is intended that this will continue under the Implementation Plan.

The Implementation Plan identifies investment proposals for a number of areas including:

- Bus;
- Light Rail;
- Heavy Rai;
- Integration Measures and Sustainable Transport Investment;
- Integrated Service Plan; and
- Integration and Accessibility.

Most proposals included within the Plan have been already included within plans that have already been subject to SEA including the Transportation Strategy for the Greater Dublin Area 2016-2035, Project Ireland 2040 (including the National Planning Framework 2018) and the Greater Dublin Area Cycle Network Plan 2016.

2.4 Relationship with other Relevant Plans and Programmes

The Plan sits within a hierarchy of strategic actions such as plans and programmes, including those listed and detailed in Appendix I [1] (see also Section 3.2, Section 4, Section 5 and Section 9). The Plan must comply with relevant higher level strategic actions and may, in turn, guide lower level strategic actions.

The Plan is subject to a number of high level environmental protection policies and objectives with which it must comply, including those which have been identified as Strategic Environmental Objectives in Section 5. Examples of Environmental Protection Objectives include the aim of the EU Habitats Directive - which is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of Member States - and the purpose of the Water Framework Directive - which is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which, among other things, prevents deterioration in the status of all water bodies and protects, enhances and restores all waters with the aim of achieving good status.

[1] Appendix I is not intended to be a full and comprehensive review of EU Directives, the transposing regulations or the regulatory framework for environmental protection and management. The information is not exhaustive and it is recommended to consult the Directive, Regulation, Plan or Programme to become familiar with the full details of each.

Section 3 SEA Methodology

3.1 Introduction to the Iterative Approach

Figure 3.1 provides an overview of the iterative Plan preparation, SEA and AA processes. The preparation of the Plan, SEA and AA has takien place concurrently and the findings of the SEA and AA have informed the Plan. The process is currently at a stage where this SEA Environmental Report has been prepared.

Taking into account the content of SEA scoping submissions from environmental authorities and continuous scoping of the SEA, environmental impacts have been predicted, evaluated and mitigated. The findings of the assessment are presented in this SEA Environmental Report, an earlier version of which accompanied the Draft Plan on public display as part of the required statutory public consultation.

A Stage 2 Appropriate Assessment (AA) Natura Impact Report (also referred to as Natura Impact Statement) also accompanies the Plan. The Plan and associated SEA and AA documents were prepared in an iterative manner whereby multiple revisions of each document were prepared, each informing subsequent iterations of the others. Submissions made on the Plan were responded to and the Plan has been updated as appropriate. On finalisation of the Plan, an SEA Statement, which will include information on how environmental considerations were integrated into the Plan, is prepared. The Plan will be implemented and environmental monitoring – as well as lower tiers of environmental assessment – will be undertaken.

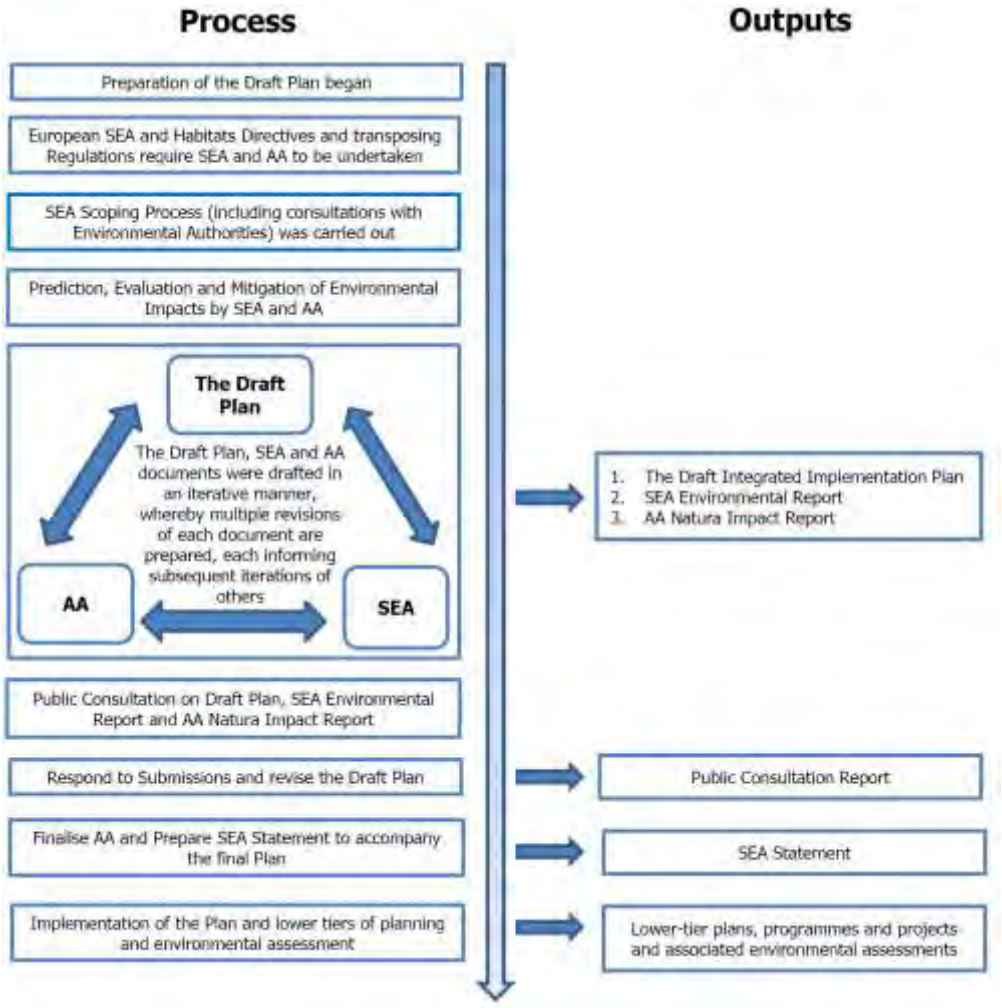

Figure 3.1 Overview of the Plan, SEA and AA Process

3.2 Hierarchy of Planning and Environmental Assessment

The hierarchy of planning and environmental assessment in which the Integrated Implementation Plan is situated is detailed on Figure 3.2 below.

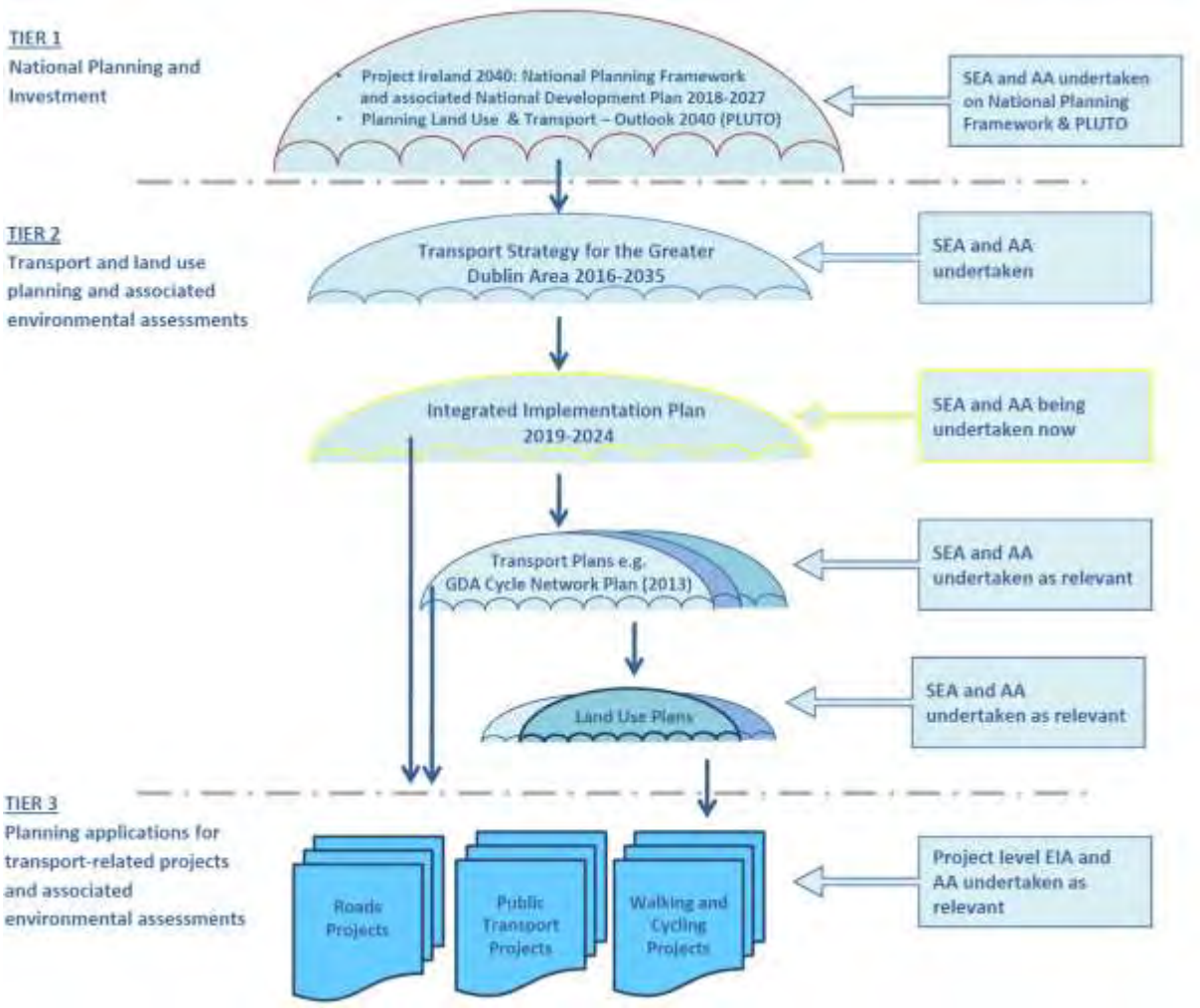

Figure 3.2 Hierarchy of Planning and Environmental Assessment

In order to develop a coherent spatial planning hierarchy, and as a means of addressing imbalances between spatial planning trends and the provision of services the Government published the National Planning Framework (NPF) as part of Project Ireland 2040 in February 2018. It places a strong emphasis on the role of the five cities in accommodating population growth and growth in all associated activities within and adjacent to their existing built-up areas, as a means of facilitating sustainable travel. In each city, transport infrastructure and services are seen as key future growth enablers, with focus paid in particular to bus enhancement, MetroLink, expansion of DART and the Cycle Network in Dublin, and much enhanced Citywide public transport networks in the other cities. The NPF was subject to full SEA and Stage 2 AA.

The NPF is given regional expression through land use plans including the Regional Spatial and Economic Strategies (RSES), which are being subject to SEA and AA. Within the Greater Dublin Area, each local authority will continue to ensure their City and County Development Plans, and their local plans, are consistent with the Authority's Transport Strategy for the Greater Dublin Area in accordance with legislation. The Transport Strategy has been subject to SEA and AA and SEA and AA requirements apply to City and County Development Plans and Local Area Plans. The Transport Strategy for the Greater Dublin Area 2016-2035, which established an overall framework for transport investment over the next two decades, is a key policy shaping the six-year Integrated Infrastructure Plan. The priorities in the Integrated Infrastructure Plan align with the objectives and priorities set out in the Transport Strategy, focused on improving public and sustainable transport across the Greater Dublin Area.

It is anticipated that, during the lifetime of the Integrated Implementation Plan, the transport planning functions of the National Transport Authority, and their engagement with land use planning, will be extended to the other Metropolitan Areas, in line with the NPF. As such, the mechanisms for the closer integration of land use planning, with transport planning and investment, will be rolled out and extended nationally, leading to a more coherent relationship between the location of housing, employment, retail and commercial development, and transport services. Any future Transportation Strategies for these Metropolitan Areas will be required to be subject to SEA and AA as appropriate.

3.3 Appropriate Assessment and Integrated Biodiversity Impact Assessment

3.3.1 Appropriate Assessment

A Stage 2 Appropriate Assessment (AA) has been undertaken alongside the preparation of the Plan.

The requirement for AA is provided under the EU Habitats Directive (Directive 1992/43/EEC).

The AA concluded that the Plan will not affect the integrity of the European Sites[2].

The preparation of the Plan, SEA and AA has taken place concurrently and the findings of the AA have informed both the Plan and the SEA. All recommendations made by the AA were integrated into the Plan.

3.3.2 Integrated Biodiversity Impact Assessment

Many elements of Integrated Biodiversity Impact Assessment as detailed in the EPA's (2013) Practitioner's Manual have been aligned with in the undertaking of the SEA for the Plan. These include:

Scoping

- Biodiversity-relevant issues were identified for consideration at scoping stage and these are now detailed in Section 4.
- Reference to a zone of influence is provided, including at Section 4.

Current State of the Environment

- Biodiversity data sources relevant for this regional level assessment have been identified.
- Designated sites and other habitats and species of ecological value are identified.
- AA information has been incorporated into the SEA.

Alternatives

- Impacts upon biodiversity are considered under each of the alternatives and certain potential conflicts can be mitigated.

[2] Except as provided for in Article 6(4) of the Habitats Directive, viz. There must be:
(a) no alternative solution available;
(b) imperative reasons of overriding public interest for the plan/programme/project to proceed; and
(c) adequate compensatory measures in place.

Impact assessment

- Effects on biodiversity are identified and assessed and the AA gives consideration to the interrelationship between biodiversity and potential effects on European sites.

Mitigation and monitoring

- Taking into account all measures contained within the Plan, all the proposed mitigation measures deriving from the various processes were generally consistent and compatible.
- Indicators and associated targets have been included in SEA for monitoring European Sites.

Reporting

- This SEA ER addresses all biodiversity-related considerations relevant for this level of assessment.
- This SEA ER contains all biodiversity-relevant information, data, figures and maps relevant for this level of assessment.
- This SEA ER has been informed by the AA findings.

Communication and consultation

- Submissions from various environmental authorities have been taken on board.
- The preparation of the Plan, SEA and AA has taken place concurrently and the findings of the AA have informed both the Plan and the SEA.

3.4 Scoping

3.4.1 Introduction

The scope of environmental issues to be dealt with by the SEA together with the level of detail to which they are addressed was decided upon taking into account the level of detail included in the Plan and submissions from environmental authorities. Scoping allowed the SEA to become focused upon key issues relevant to the environmental components which are specified under the SEA Directive[3].

3.4.2 Scoping Notices

Relevant environmental authorities identified under the European Communities (Environmental Assessment of Certain Plans and Programmes), as amended, were sent SEA scoping notices by the National Transport Authority indicating that submissions or observations in relation to the scope and level of detail of the information to be included in the environmental report could be made to the Authority.

[3] These components comprise biodiversity, fauna, flora, population, human health, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors.

3.4.3 Submissions

Submissions were made by four environmental authorities: Northern Ireland Environment Agency, Environmental Protection Agency, Department of Communications, Climate Action and Environment and Department of Culture, Heritage and the Gaeltacht.

Submissions from the Northern Ireland Environment Agency provided information/ suggestions on topics including the following that informed the preparation of the Plan and SEA:

- A clear statement indicating the opinion (and the reasons for it), about whether or not the implementation of the Plan, in combination with any identified measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment, is likely to have a significant effect on Northern Ireland;
- Marine environment and in particular any transboundary issues;
- Air quality issues; and
- Biodiversity, flora and fauna issues.

A submission from the Environmental Protection Agency provided information/ suggestions on topics including the following, which informed the preparation of the Pan and SEA:

- *Ireland's Environment - An Assessment 2016* (EPA, 2016) report and key plans and programmes;
- Implications for greenhouse gas emissions and air quality issues;
- Climate change mitigation and adaptation;
- Alternative fuels, biofuels obligation scheme/smarter travel;
- Noise pollution and lighting; and
- Biodiversity, flora and fauna issues.

A submission from the Department of Communications, Climate Action and Environment provided information/suggestions on topics including the following that have been taken into account by the relevant parts of this report:

- Soil and Geology;
- Material Assets; and

- Datasets and viewers to help with the compilation of the SEA.

A submission from the Department of Culture, Heritage and the Gaeltacht provided information/suggestions on topics including the following that informed the preparation of the Plan and SEA:

- Integration of biodiversity, flora and fauna issues into the Plan; and
- SEA guidance, scope of the Environmental Report and information sources available.

3.5 Environmental Report

In this SEA Environmental Report, an earlier version of which was placed on public display alongside the Draft Plan, the likely environmental effects of the Plan and the alternatives are predicted and their significance evaluated. The Environmental Report provides the Department, stakeholders and the public with a clear understanding of the likely environmental consequences of the Plan.

Mitigation measures to prevent or reduce significant adverse effects posed by the Plan are identified in Section 9 - these have been integrated into the Plan.

The Environmental Report has been updated in order to take account of recommendations contained in submissions and in order to take account of changes that were made to the original Plan that was placed on public display.

The Environmental Report contains the information specified in Schedule 2 of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (SI No. 435 of 2004), as amended.

No significant difficulties have been encountered during the undertaking of the assessment.

3.6 SEA Statement

On finalisation of the Plan, an SEA Statement is prepared that includes information on:

- How environmental considerations have been integrated into the Plan, highlighting the changes to the Plan which resulted from the SEA process;
- How the SEA Environmental Report and consultations have been taken into account, summarising the key issues raised in consultations and in the Environmental Report indicating what action was taken in response;
- The reasons for choosing the Plan in the light of other alternatives considered, identifying these alternatives, commenting on their potential effects and explaining why the final Plan was selected; and
- The measures decided upon to monitor the significant environmental effects of implementing of the Plan.

Table 3.1 Checklist of Information included in this Environmental Report

Information Required to be included in the Environmental Report	Corresponding Section of this Report
(A) Outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes	Sections 2, 5 and 8
(B) Description of relevant aspects of the current state of the environment and the evolution of that environment without implementation of the plan or programme	Section 4
(C) Description of the environmental characteristics of areas likely to be significantly affected	Sections 4, 7 and 8
(D) Identification of any existing environmental problems which are relevant to the plan or programme, particularly those relating to European protected sites	Section 4
(E) List environmental protection objectives, established at international, EU or National level, which are relevant to the plan or programme and describe how those objectives and any environmental considerations have been taken into account when preparing the Plan	Sections 5, 7, 8 and 9
(F) Describe the likely significant effects on the environment	Sections 7 and 8
(G) Describe any measures envisaged to prevent, reduce and as fully as possible offset any significant adverse environmental effects of implementing the plan or programme	Section 9
(H) Give an outline of the reasons for selecting the alternatives considered, and a description of how the assessment was undertaken (including any difficulties)	Sections 6, 7 and 8
(I) A description of proposed monitoring measures	Section 10
(J) A non-technical summary of the above information	Non-Technical Summary
(K) Interrelationships between each environmental topic	Addressed as it arises within each Section

Section 4 Relevant aspects of the current state of the Environment

4.1 Introduction

Reflecting the specifications in the SEA Directive, the relevant aspects of the current state of the environment for the following environmental components are identified in this section:

- Air and Climatic Factors;
- Population and Human Health;
- Biodiversity, Flora and Fauna;
- Material Assets;
- Water;
- Landscape;
- Cultural Heritage;
- Soil; and
- The interrelationship between the above factors.

Information which is relevant to lower tier planning and project development and associated environmental assessments is identified (note that Article 5 of the SEA Directive, in accordance with the established European principle of subsidiarity, requires that the Environmental Report includes the information that may reasonably be required taking into account, inter alia, the extent to which certain matters are more appropriately assessed at different levels in that process in order to avoid duplication of the assessment).

4.2 Geographical Scope of the Assessment

The spatial scope of the Plan provisions generally corresponds to the jurisdictions of the seven local authorities of the Greater Dublin Area[4]. However, while the initial legislation governing the Plan was more clearly limited to the delivery of the Transport Strategy for the Greater Dublin Area, subsequent amendments have somewhat diluted this position. While the bulk of the Plan relates solely to the Greater Dublin Area, certain areas such as public transport services and activities related to small public service vehicles, will be dealt with on a national basis. The spatial specificity of the Plan beyond the Greater Dublin Area is reduced and relatively insignificant. Therefore, the spatial scope of the SEA provides greater focus on the Greater Dublin Area while providing sufficient information on national sensitivities and opportunities (through both the baseline and Strategic Environmental Objectives – see Section 5) to allow for an adequately scaled assessment of Plan provisions.

Under the Plan, beyond the Greater Dublin Area, projects are only capable of being proceeded with if they have been included in adopted lower-tier land use/transport Plans and have been subjected to associated appropriate levels of SEA and AA.

Projects that have not been included in adopted lower-tier land use/transport Plans and that have not been subject to associated appropriate levels of SEA and AA cannot be proceeded with until they have been included in adopted lower-tier Plans and subjected to associated appropriate levels of SEA and AA.

The Plan provides a context for lower tier planning, including the specification of mitigations measures/targets (see Section 9 of this report).

Most proposals included within the Plan have been already included within plans that have already been subject to SEA including the Transportation Strategy for the Greater Dublin Area 2016-2035, Project Ireland 2040 (including the National Planning Framework 2018) and the Greater Dublin Area Cycle Network Plan 2016.

4.3 National Reporting on the Environment

The EPA's *"Ireland's Environment - An Assessment 2016"* report provides an integrated assessment of the overall quality of Ireland's environment, the pressures being placed on it and the societal responses to current and emerging environmental issues. This report has informed various parts of the

[4] Dublin City Council, Dún Laoghaire Rathdown County Council, Fingal County Council, South Dublin County Council, Kildare County Council, Meath County Council and Wicklow County Council in addition to an area of County Louth to take account of the Dublin to Drogheda rail line.

environmental baseline provided below. The key environmental challenges or messages identified by the report are:

Environment and Health and Wellbeing

Recognising the benefits of a good quality environment to health and wellbeing.

Climate Change

Accelerating mitigation actions to reduce greenhouse gas emissions and implement adaptation measures to increase resilience in dealing with adverse climate impacts.

Implementation of Legislation

Improving the tracking of plans and policies and the implementation and enforcement of environmental legislation to protect the environment.

Restore and Protect Water Quality

Implementing measures that achieve ongoing improvement in the environmental status of water bodies from source to the sea.

Sustainable Economic Activities

Integrating environmental sustainability ideas and performance accounting across economic sectors and sectoral plans should be a key policy for growth.

Nature and Wild Places

Protecting pristine and wild places that act as biodiversity hubs, contributing to health and wellbeing, and providing tourism opportunities

Community Engagement

Informing, engaging and supporting communities in the protection and improvement of the environment.

Chapter 11 of the State of the Environment Report focuses specifically on transport and includes the following key high level messages:

a. The need to support a modal shift away from the private car to an efficient sustainable transport system through better alignment of land use and transport planning and by making public transport faster, cleaner, more convenient and more affordable.
b. Ensure that all major transport forms (HGVs, car, bus, train) become much more fuel efficient, as well as incentivising a very significant increase in alternative fuels and electric vehicle use.
c. Develop a prudent mix of planning, infrastructural investment and fiscal measures to bring about a reduction in transport demand.
d. For larger urban areas, we need to change our current silo approach and work on many different levels to have a much more integrated network, where all streets are walkable, bikeable and pleasant to live and work in.

The Integrated Implementation Plan facilitates an advancement of these transport related actions.

4.4 Likely Evolution of the Environment in the Absence of a New Plan

The implementation of the Plan is likely to give rise to the following residual adverse environmental effects:

- An extent of travel related greenhouse gas and other emissions to air. This has been mitigated by provisions which have been integrated into the Plan, including those relating to sustainable mobility;
- An extent of travel related greenhouse gas and other emissions to air. This has been mitigated by provisions which have been integrated into the Plan, including those relating to sustainable mobility;
- Loss of an extent of non-protected habitats as a result of new or widened transport infrastructure that involves the replacement of semi-natural land covers with artificial surfaces;
- Losses or damage to ecology (these would be in compliance with relevant legislation);
- Residual wastes (these would be disposed of in line with higher level waste management policies);
- Potential residual losses to built/amenity assets and infrastructure including as a result of new or widened transport infrastructure;
- Flood related risks remain due to uncertainty with regard to extreme weather events;
- Residual visual effects (these would be in compliance with landscape designation provisions);
- Potential alteration to the context and setting of designated cultural heritage however these will occur in compliance with legislation. Potential loss of unknown archaeology however this loss will be mitigated by measures integrated into the Plan; and
- Loss of an extent of soil function arising from the replacement of semi-natural land covers

with artificial surfaces and from sea level rise/coastal erosion.

In the absence of a new Plan, none of the adverse effects detailed above would result due to the implementation of the Plan. However, lower-tier Plans would continue to be reviewed and implemented and applications for permission for new projects would continue to be made. Compliance with the mitigation measures outlined under Section 9 of this report would be necessary in order to help ensure that the following significant adverse environmental effects do not occur:

- Emissions to air and associated issues;
- Potential interactions if effects upon environmental vectors such as air are not mitigated;
- Arising from both construction and operation of transport infrastructure and services and associated facilities/ infrastructure: loss of/damage to biodiversity in designated sites, ecological connectivity and non-designated habitats; and disturbance to biodiversity and flora and fauna;
- Habitat loss, fragmentation and deterioration, including patch size and edge effects;
- Disturbance (e.g. due to noise and lighting along transport corridors) and displacement of protected species and coastal squeeze;
- Effects in riparian zones where new crossings of waters, if any, are progressed;
- Potential effects on vegetation from transport emissions;
- Generation of construction waste;
- Loss or damage to built/amenity assets and infrastructure including as a result of new or widened transport infrastructure;
- Adverse impacts upon the status of water bodies and entries to the WFD Register of Protected Areas, arising from changes in quality, flow and/or morphology;
- Increase in the risk of flooding;
- Occurrence of adverse visual impacts and conflicts with the appropriate protection of statutory designations relating to the landscape;
- Potential effects on protected and unknown archaeology and protected architecture arising from construction and operation activities, including as a result of increasing traffic flows;
- Adverse impacts on the hydrogeological and ecological function of the soil resource as a result of construction of transport and associated transport facilities/ infrastructure;
- Adverse impacts on features or areas of geological / geomorphological interest as a result of construction of transport and associated transport facilities/ infrastructure; and
- Potential for increase in coastal erosion.

In the absence of the Plan, it would be less certain as to which public transport, cycling and walking projects would be progressed or prioritised. Lower-tier plans and projects would be less coordinated. It would be less certain as to whether the positive effects (that would be facilitated by implementation of the Plan), such as the following, would be achieved:

- A shift from car to more sustainable and non-motorised transport modes;
- Management of traffic flows and associated effects on air quality;
- Reductions in travel related greenhouse gas and other emissions to air and energy usage;
- The development of transport infrastructure and services in locations which will facilitate use by those living and working in urban/suburban areas;
- Reuse and regeneration of brownfield lands thereby contributing towards a higher efficiency of land utilisation, sustainable mobility and a reduction in the need to develop greenfield lands; and
- Enhancement of the public realm (including cultural heritage and its context) in urban areas by facilitating the replacement of motorised modes of transport with more sustainable and non-motorised modes such as walking, cycling and light rail/metro.

4.5 Air and Climatic Factors

4.5.1 Overview

The Plan facilitates a mode shift away from the private car to public transport, walking and cycling and associated positive effects, including those relating to:

- Contributions towards reductions in greenhouse gas emissions and associated achievement of legally binding targets – directly and as a result of facilitating development within urban and suburban areas;
- Contributions towards reductions in consumption of non-renewable energy sources and achievement of legally binding renewable energy targets;
- Energy security; and
- Contributions towards reductions in emissions to air (including noise) and associated achievement of air quality objectives, thereby contributing towards improvement of air quality and protection of human health.

4.5.2 Greenhouse Gas Emissions

The key issue involving the assessment of the effects of implementing the Plan on climatic factors relates to greenhouse gas emissions arising from transport. Interactions are also present with flooding (see Section 4.9.3).

Ireland's Provisional Greenhouse Gas Emissions 1990-2017 (EPA, 2018) details provisional estimates of greenhouse gas emissions for the period 1990-2017. For 2017, total national greenhouse gas emissions are estimated to be 60.75 million tonnes carbon dioxide equivalent (Mt CO_2eq). This is 0.9% lower (0.53 Mt CO_2eq) than emissions in 2016. Greenhouse gas emissions from the Transport sector decreased by 2.4% or 0.29 Mt CO_2eq in 2017. This is the first year of decreased emissions after four successive years of increases in transport emissions. In road transport in 2017, petrol use continued to decrease by 9.8% while diesel use increased by 0.4% and biofuels use increased by 35.6%.

The EPA 2018 publication *Ireland's Greenhouse Gas Emission Projections 2017-2035* provides an assessment of Ireland's progress towards achieving its emission reduction targets set down under the EU Effort Sharing Decision (Decision No 406/2009/EC) for the years 2013-2020 and a longer term assessment based on current projections. Ireland's 2020 target is to achieve a 20% reduction of non-Emission Trading Scheme (non-ETS) sector emissions (i.e. agriculture, transport, the built environment, waste and non-energy intensive industry) on 2005 levels with annual limits set for each year over the period 2013-2020. Key Insights identified as part of the report's package of documents are that:

- Latest EPA greenhouse gas emissions projections indicate an overall increase in greenhouse gas emissions from most sectors. The projected growth in emissions is largely underpinned by projected strong economic growth and relatively low fuel prices leading to increasing energy demand over the period.
- The positive impact on emissions of existing and planned policies and measures is tempered by the strong economic outlook and associated increase in energy demand.
- Ireland is not projected to meet 2020 emissions reduction targets and is not on the right trajectory to meet longer term EU and national emission reduction commitments.
- Fossil fuels such as coal and peat continue to be key contributors to emissions from the power generation sector and the extent of their use will be a key determinant in influencing future emissions trends from this sector.
- A strong growth in emissions projections from the transport sector is attributed to a rise in fuel consumption particularly for diesel cars and diesel freight up to 2025. A projected accelerated deployment of electric vehicles between 2025 and 2030 does however result in a projected decline in emissions during this period.
- Agriculture emissions are projected to continue to grow steadily over the period. This is based on an updated outlook which sees an increase in animal numbers particularly for the dairy herd.
- The gap between the two scenarios – With Existing Measures and With

Additional Measures – is narrowing over the period to 2020 indicating that mitigation options in the short-term are largely established.

- These projections do not consider the impact of policies and measures that form part of the recently announced National Development Plan or the full impact of policies and measures included in the National Mitigation Plan. It is anticipated that additional impact will be provided to the EPA by relevant Government Departments and Agencies and included in the 2019 Emission Projections.

The contribution by the transport sector to Ireland's greenhouse gas emissions highlights the need for a concerted effort to reduce transport emissions. In the transport sector, emissions are projected to increase from current levels by 14-15% by 2020, peaking at 24-26% in 2025, and falling to by 18-21% by 2030. The projected decline in emissions from 2025 to 2030 is due to the assumption of an acceleration in the number of electric vehicles on Irish roads. After 2030, emissions from transport are projected to start increasing again.

Ireland's National Policy position is to reduce CO_2 emissions in 2050 by 80% on 1990 levels across the Energy Generation, Built Environment and Transport sectors, with a goal of Climate neutrality in the Agriculture and Land-Use sector. The 2016 emissions for all of these sectors are rising, making achievement of long-term goals more difficult.

The National Mitigation Plan (Department of Communications, Climate Action and Environment, 2017), represents an initial step to set Ireland on a pathway to achieve the level of decarbonisation required. It is a whole-of-Government Plan, reflecting in particular the central roles of the key Ministers responsible for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture, as well as drawing on the perspectives and responsibilities of a range of other Government Departments.

The National Adaptation Framework Department of Communications, Climate Action and Environment, 2018), sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The National Adaptation Framework outlines a whole of government and society approach to climate adaptation. Under the Framework a number of Government Departments will be required to prepare sectoral adaptation plans in relation to a priority area that they are responsible for. A non-Statutory sectoral adaptation plan for the transport sector "Adaptation Planning: Developing Resilience to Climate Change in the Irish Transport Sector" was published by the Department of Transport, Tourism and Sport in 2017. It is understood that a statutory Adaptation Plan for the transport sector to comply the requirements of the Climate Action and Low Carbon Development Act 2015 will be prepared.

Since the base year (1990), Northern Ireland's total greenhouse gas emissions have decreased by 17.8% from 25.2 to 20.7 million tonnes of carbon dioxide equivalent (MtCO2e). This is less than the reduction seen for the UK as a whole, which saw a decrease of 38.2% compared to the base year. The largest sources of emissions in 2015 were agriculture (29%), transport (21%) and energy supply (19%). Most sectors showed a decreasing trend since the base year, the largest decreases were in the energy supply, residential and waste sectors. They were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management. Between 2014 and 2015, emissions from the transport and agriculture sectors accounted for most of the increase[5].

4.5.3 Alternative Fuels and Renewable Electricity Generation Targets

The use of alternative fuels, including electricity, forms a significant part of government policy to reduce transport emissions. The Plan facilitates a mode shift away from the private car to public transport, walking and cycling and provisions relating to electric vehicles. This will contribute towards reductions in the consumption of non-renewable energy sources and achievement of legally binding renewable energy targets.

[5] Information in this paragraph is taken from Northern Ireland's Environmental Statistics Report 2018

Renewable Energy Directive (Directive 2009/28/EC) requires each Member State to adopt a national renewable energy action plan (NREAP) to set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating in 2020 that will ensure delivery of the overall renewable energy target. These sectoral targets are referred to as RES-E (electricity), RES-T (transport) and RES-H (heat).

The overall target for Ireland in Directive 2009/28/EC is a 16% share of renewable energy in Gross Final Consumption (GFC) by 2020. Under the Directive (2009/28/EC), Ireland is obliged to deliver 10% of transport energy by renewable sources by 2020[6].

The Draft Bio Energy Plan commitment to continuation of the Bio Fuels Obligation Scheme is relevant to the Plan and will remain a key means by which Ireland's 2020 10% renewable transport target is likely to be met.

4.5.4 Energy Security

Greater use of alternative fuels, including renewable energy, has the potential to further contribute towards energy security.

Indigenous production accounted for 32% of Ireland's energy requirements in 1990. However, since the mid-1990s import dependency had grown significantly, due to the increase in energy use together with the decline in indigenous natural gas production at Kinsale since 1995 and decreasing peat production. Ireland's overall import dependency reached 90% in 2006. It varied between 85% and 90% until 2016 when it fell to 69%. This trend reflects the fact that Ireland is not endowed with significant indigenous fossil fuel resources and has only in recent years begun to harness significant quantities of renewable resources and more recently natural gas from the Corrib field.

4.5.5 Journeys in the Greater Dublin Area

Operating under a contract with the Authority, Dublin Bus carried a total of c.136 million passengers in 2017. When combined with Bus Éireann commuter services in the Dublin region, 143 million passengers were carried on State operated bus services in the Dublin area, compared with 38 million on Luas and 33 million passengers on the DART and rail commuter services.

In percentage terms, the bus system accounts for over 67% of public transport passenger journeys in the Greater Dublin Area. That means that whilst the bus carries two thirds of all public transport passengers, Luas carries 18% and DART plus commuter rail services deliver the remaining 15%.

Figure 4.1 maps journeys by car taken as a percentage of all journeys taken (2011 base year). The lowest amount of journeys by car taken as a percentage of all journeys taken occur in areas in Dublin within the M50, in areas surrounding the M50 along the M4, M7, N81 and R156. The highest amount of journeys by car taken as a percentage of all journeys taken occur in more rural areas, away from settlements.

[6] Department of Communications, Climate Action and Environment (2017) National Renewable Energy Action Plan Fourth Progress Report submitted under Article 22 of Directive 2009/28/EC

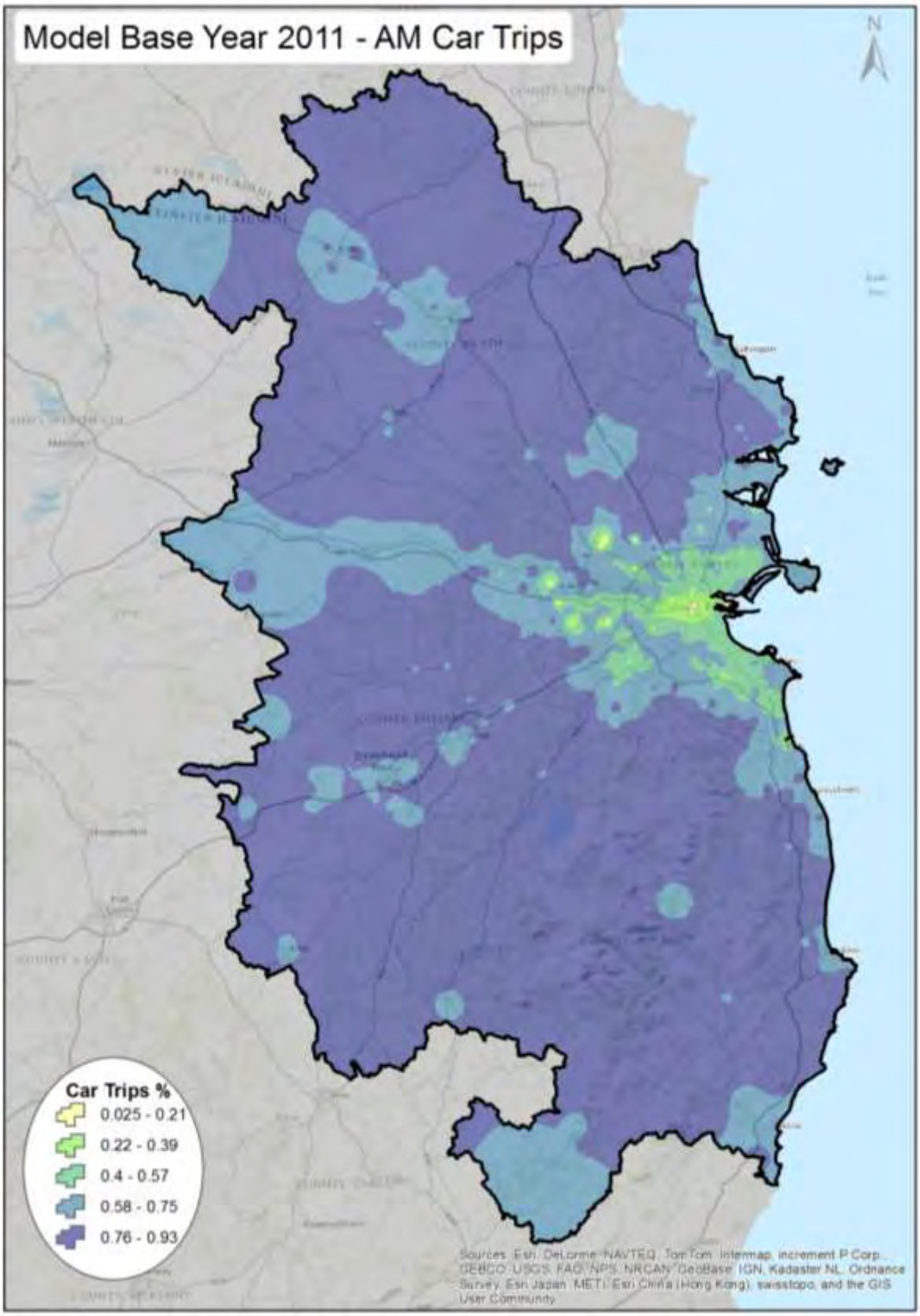

Figure 4.1 Journeys by car taken as a percentage of all journeys taken (2011 base year)

4.5.6 Ambient Air Quality

In order to protect human health, vegetation and ecosystems, EU Directives set down air quality standards in Ireland and the other Member States for a wide variety of pollutants. These pollutants are generated through fuel combustion, in space heating, traffic, electricity generation and industry and, in sufficient amounts, could affect the well-being of the areas inhabitants. The EU Directives include details regarding how ambient air quality should be monitored, assessed and managed.

The principles to this European approach are set out in the Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) (which replaces the earlier Air Quality Framework Directive 1996 and the first, second and third *Daughter Directives*; the fourth *Daughter Directive* will be included in CAFE at a later stage).

In order to comply with the directives mentioned above, the EPA measures the levels of a number of atmospheric pollutants. For the purposes of monitoring in Ireland, four zones are defined in the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).

The EPA's (2018) *Air Quality in Ireland 2017* identifies that:

- No levels above the EU limit value were recorded at any of the ambient air quality network monitoring sites in Ireland in 2017;
- The tighter World Health Organisation (WHO) guideline values were exceeded at a number of monitoring sites for particulate matter (PM_{10} and $PM_{2.5}$), ozone and NO_2; and
- 2017 dioxin survey shows that concentrations of dioxins and similar pollutants remain at a consistently low level in the Irish environment.

Air pollution from transport is dominated by NO_x emissions. Of these, NO_2 is particularly impactful from a health perspective. The report describes that concentrations of NO_2 at urban areas in Ireland are close to the EU annual limit value. The potential implications for air quality with increases in traffic numbers or from certain weather conditions unfavourable to dispersion of pollutants could result in exceedances of the EU limit value.

The report states that:

- "Short-term exposure to NO_2 is linked to adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in asthmatics.
- Long-term exposure is associated with increased risk of respiratory infection in children. NO_X is a major precursor in the formation of ground level ozone. It is also a major precursor in the formation of photochemical 'smog'."

With regards to solutions, the report identifies possible actions that could help improve and maintain local air quality. These include:

- Any shift from the burning of solid fuel to cleaner, more energy efficient methods of home heating which will result in cleaner air quality for the consumer, their family and neighbours with a resultant improvement in their health; and
- A transition in modes of transport away from the use of the private diesel and petrol powered motor cars to alternative modes of transport such as walking, cycling and forms of transport that are environmentally friendly and sustainable such as electric motor powered vehicles. This is especially important in our at-risk urban environments.

The most recent air quality report for Northern Ireland "Air Pollution in Northern Ireland 2017" (Department of Agriculture, Environment and Rural Affairs, 2019) identifies that EU limit values, target values and corresponding Air Quality Strategy objectives, have been met by the due dates for the following pollutants in Northern Ireland: particulate matter as PM_{10} and $PM_{2.5}$, carbon monoxide, benzene, sulphur dioxide and elements lead, arsenic, cadmium and nickel. However, two monitoring sites with sufficient data for a valid annual mean did not meet the limit values and objectives for nitrogen dioxide in 2017; Belfast Stockman's Lane and Downpatrick Roadside. All are traffic-related sites.

The Plan facilitates improvements in sustainable mobility, thereby facilitating reductions in and limiting increases of emissions to air. Such emissions would occur

otherwise with higher levels of motorised transport and associated traffic.

4.5.7 Noise

Noise is unwanted sound. The Noise Directive - Directive 2002/49/EC relating to the assessment and management of environmental noise - is part of an EU strategy setting out to reduce the number of people affected by noise in the longer term and to provide a framework for developing existing EU policy on noise reduction from source. The Directive requires competent authorities in Member States to:

- Draw up *strategic noise maps* for major roads, railways, airports and agglomerations, using harmonised noise indicators[7] and use these maps to assess the number of people which may be impacted upon as a result of excessive noise levels;
- Draw up action plans to reduce noise where necessary and maintain environmental noise quality where it is good; and,
- Inform and consult the public about noise exposure, its effects, and the measures considered to address noise.

In compliance with the Directive and transposing Environmental Noise Regulations (S.I. No. 140 of 2006), Noise Action Plans have been prepared for each local authority area within the country. These action plans address the agglomeration of Dublin and major roads, railways and airports. The Action Plans include noise mapping and are required to include measures to manage noise issues and effects, including noise reduction if necessary.

Noise mapping across the Greater Dublin Area from the EPA's third round of strategic noise mapping of roads, rail and Dublin airport, in the form of noise contours for the L_{den} (day, evening, night; a measurement over 24 hours) period harmonised noise indicator for the Dublin agglomeration and the major roads outside of the agglomeration is provided on Figure 4.2.

4.5.8 Existing Problems

Legislative objectives governing air and climatic factors were not identified as being conflicted with.

However, the Climate Change Advisory Council's Annual Review 2018 has identified that Ireland will miss 2020 and 2030 emissions reduction targets unless urgent action that leads to tangible and substantial reductions in greenhouse gas emissions is taken. The Integrated Implementation Plan will, in combination with various plans and programmes from the transport sector and from other sectors, contribute towards reducing greenhouse gas emissions and moving in the direction of these targets.

With regard to air quality, it is the transport sector which has the greatest impact on NO_2 concentrations, particularly in urban areas where the WHO guideline value, approaching the EU limit value and could face exceedances of this EU limit in the future if vehicle numbers continue to rise. The Transport Plan will help to facilitate reductions in emissions and a transition from dependence on fossil fuel combustion powered transport.

[7] L_{den} (day-evening-night equivalent level) and L_{night} (night equivalent level)

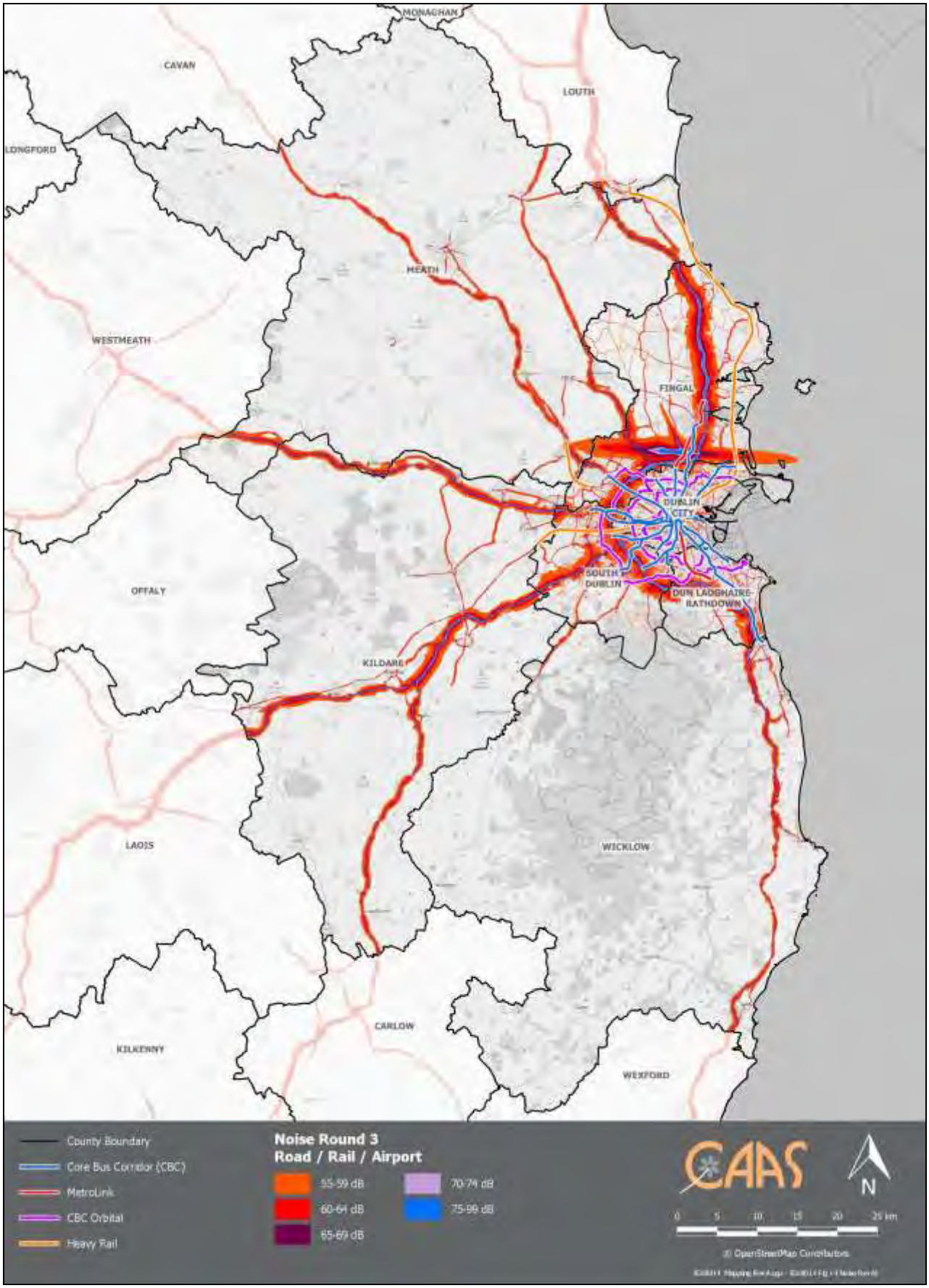

Figure 4.2 Noise Mapping L_{den} (day, evening, night; a measurement over 24 hours)

4.6 Population and Human Health

4.6.1 Population

Most users of transport infrastructure and services will reside in and commute to and from urban/suburban areas.

A spread of settlement areas occurs throughout the country with a generally higher concentration of settlement areas in the eastern half of the country. The biggest settlements comprise Dublin, Galway, Cork, Limerick and Belfast in Northern Ireland

Figure 4.3 shows population density per Electoral Division across the Greater Dublin Area. Population for each division has been classified into ten categories with an equal number of units in each category. The most populous divisions are generally concentrated within and surrounding the M50 motorway, along the coast (as far south as Wicklow), in areas of Meath closest to Dublin and within North-East Kildare and along the M7 corridor. The uplands in County Wicklow, North-West and South Kildare and North County Meath are among the least populous divisions.

Locating transport infrastructure and services closer to urban/suburban areas (which have higher populations and densities) will allow for a greater number of journeys via sustainable transport modes and associated positive environmental effects on energy usage and air and noise emissions.

4.6.2 Human Health

With regard to human health, impacts relevant to the SEA are those which arise as a result of interactions with environmental vectors (i.e. environmental components such as air, water or soil through which contaminants or pollutants, which have the potential to cause harm, can be transported so that they come into contact with human beings). Hazards or nuisances to human health can arise as a result of exposure to these vectors e.g. interactions with human health that could occur in urban locations that experience high levels of traffic congestion and associated particulate matter and noise emissions to air.

Transport issues that present potential interactions with human health include emissions to air including noise and other emissions. These issues are identified under the relevant environmental component and potential interactions have been taken into account by the provisions contained within the Integrated Implementation Plan.

Emission limits for discharges to air, soil and water are set with regards to internationally recognised exposure limit values. These are generally set to be many times the safe exposure limit - in order to provide protection. In the event that a plan or programme began to have adverse health effects on surrounding populations it is likely that it would have been identified as being in breach of such emission standards at a very early stage - and long before the manifestation of any adverse health effects in the population.

4.6.3 Existing Problems

There is historic and predictive evidence of flooding across the country (see Section 4.9.3).

Issues relating to emissions to air are detailed under Section 4.5.

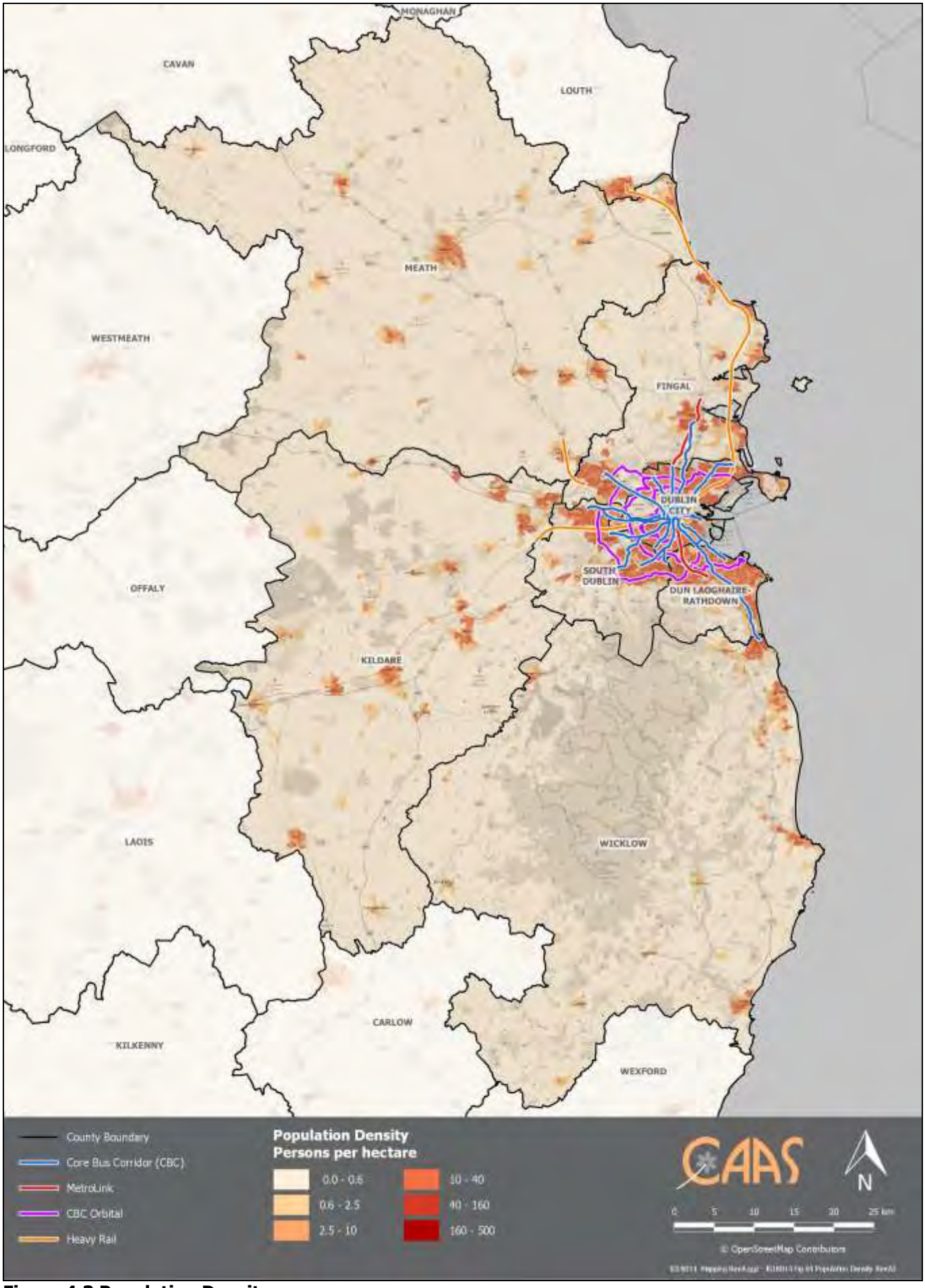

Figure 4.3 Population Density

4.7 Biodiversity and Flora and Fauna

Information on biodiversity and flora and fauna which is relevant to lower tier project planning and development and associated environmental assessment includes available information on designated ecological sites and protected species, ecological connectivity (including stepping stones and corridors) and non-designated habitats.

Habitats occurring in Ireland include:

- Coastal habitats including sand and machair systems and sea inlets;
- Upland habitats including blanket bogs, heaths and forests;
- Lowland habitats including raised bogs and agricultural lands;
- Surface waters including rivers, lakes and estuaries;
- Limestone pavements, calcareous springs and turloughs, including those concentrated in the Burren (an example of geological heritage); and
- Ancient and semi-natural woodlands of oaks, yew and pine.

Ecological designations include:

- Special Areas of Conservation[8] (SACs), including candidate SACs;
- Special Protection Areas[9] (SPAs);
- UNESCO World Heritage and UNESCO Biosphere sites[10];
- Ramsar Sites[11];
- Salmonid Waters[12];
- Shellfish Waters[13];
- Freshwater Pearl Mussel catchments[14];
- Flora Protection Order[15] sites;
- Wildlife Sites (including Nature Reserves[16]);
- Certain entries to the Water Framework Directive Register of Protected Areas[17];

[8] SACs have been selected for protection under the European Council Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC) due to their conservation value for habitats and species of importance in the European Union. The Habitats Directive seeks to establish Natura 2000, a network of protected areas throughout the EU. It is the responsibility of each member state to designate SACs to protect habitats and species, which, together with the SPAs designated under the 1979 Birds Directive, form Natura 2000. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010. The Regulations have been prepared to address several judgments of the Court of Justice of the European Union (CJEU) against Ireland, notably cases C-418/04 and C-183/05, in respect of failure to transpose elements of the Birds Directive and the Habitats Directive into Irish law.

[9] SPAs have been selected for protection under the 1979 European Council Directive on the Conservation of Wild Birds (79/409/EEC) - referred to as the Birds Directive - due to their conservation value for birds of importance in the European Union.

[10] United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List comprises sites of outstanding universal value: cultural, natural or mixed. The UNESCO Biosphere Reserves List comprises areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with its sustainable use.

[11] Ramsar sites are designated and protected under the Convention of Wetlands of International Importance, especially as Water Fowl Habitat, which was established at Ramsar in 1971 and ratified by Ireland in 1984. Ireland presently has 45 sites designated as Wetlands of International Importance, with surface areas of 66,994 hectares. The objective of a Ramsar site is the conservation of wetlands for wildfowl. While Ireland ratified the Ramsar Convention in 1984 there is no legal backing for Ramsar sites unless they are also Nature Reserves or SPAs and as such are protected by the Wildlife Acts 1976-2012 or the Birds or Habitats Directives.

[12] Salmonid waters are designated and protected as under the European Communities (Quality of Salmonid Waters) Regulations 1988 (SI No. 293 of 1988). Designated Salmonid Waters are capable of supporting salmon (Salmo salar), trout (Salmo trutta), char (Salvelinus) and whitefish (Coregonus).

[13] In order to protect existing shellfish waters and to ensure the future protection of these areas, the European Union introduced the Shellfish Waters Directive (2006/113/EC). The purpose of this Directive is to put in place concrete measures to protect waters, including shellfish waters, against pollution and to safeguard certain shellfish populations from various harmful consequences, resulting from the discharge of pollutant substances into the sea. The Directive applies to the aquatic habitat of bivalve and gastropod molluscs only (includes oysters, mussels, cockles, scallops and clams). It does not include crustaceans such as lobsters, crabs and crayfish.

[14] Freshwater pearl mussel is a globally threatened, long-lived and extremely sensitive species that can be impacted by many forms of pollution, particularly sediment and nutrient pollution and by hydrological and morphological changes, which may arise from developments, activities or changes in any part of the catchment.

[15] The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 1999.

[16] A Nature Reserve is an area of importance to wildlife, which is protected under Ministerial order. There are currently 78 Statutory Nature Reserves. Most are owned by the State but some are owned by organisations or private landowners.

[17] In response to the requirements of the Water Framework Directive a number of water bodies or parts of water bodies which must have extra controls on their quality by virtue of how their waters are used by wildlife have been listed on Registers of Protected Areas (RPAs). RPAs include those for Protected Habitats or Species, Shellfish, Salmonid, Nutrient Sensitive Areas, Recreational Waters and Drinking Water.

- Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)[18];
- Wildfowl Sanctuaries (see S.I. 192 of 1979)[19];
- National Parks[20];
- Refuges for Flora and Fauna[21];
- Biogenic Reserves[22]; and
- Tree Preservation Orders (TPOs)[23].

Ecological designations in Northern Ireland include:

- European Sites (see description above);
- Areas of Special Scientific Interest (ASSIs)[24];
- Nature Reserves[25]; and
- Ramsar Sites (see description above).

Protected Species include:

- Annex IV (Habitats Directive) species of flora and fauna, and their key habitats (i.e. breeding sites and resting places), which are strictly protected wherever they occur, whether inside or outside the above sites, e.g. Otter and bats;
- Other species of flora and fauna and their key habitats which are protected under the Wildlife Acts, 1976-2012, wherever they occur; and
- 'Protected species and natural habitats' as defined in the European Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008, including: Birds Directive – Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur) and Habitats Directive – Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur).

The following information is relevant to ecological networks and connectivity and non-designated habitats:

- CORINE land cover mapping (including areas likely to contain a habitat listed in Annex 1 of the Habitats Directive)[26];
- Watercourses, wetlands and peatlands;
- Other relevant County Development Plan designations;
- The EPA's Framework National Ecological Network for Ireland[27];
- Areas that are recognised as locally important for biodiversity or nature (e.g. in County Biodiversity and/or Development Plans, semi-natural habitats including wetlands and woodlands); and
- Other sites of high biodiversity value or ecological importance as identified by, for example, the Department of Agriculture, Food and the Marine

[18] NHAs are designated due to their national conservation value for ecological and/or geological/geomorphological heritage. They cover nationally important semi-natural and natural habitats, landforms or geomorphological features, wildlife plant and animal species or a diversity of these natural attributes. NHAs are designated under the Wildlife (Amendment) Act 2000. pNHAs were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats.

[19] Wildfowl Sanctuaries are areas that have been excluded from the 'Open Season Order' so that game birds can rest and feed undisturbed. There are 68 sanctuaries in the State. Shooting of game birds is not allowed in these sanctuaries.

[20] Designated as per criteria of the International Union for the Conservation of Nature 1969.

[21] As provided for by the Wildlife Acts 1976-2012.

[22] The objective of this designation is conservation of representative examples of natural European heritage, scientific research and exchange of information. The Council of Europe launched the concept of a European Network of Biogenetic Reserves in 1973, the programme was started in 1976.

[23] TPOs are a planning mechanism whereby individual trees or groups of trees can be identified as important and protected by a TPO.

[24] Areas of Special Scientific Interest (ASSIs) are protected areas that represent the best of Northern Ireland's wildlife and geological sites that make a considerable contribution to the conservation of Northern Ireland's most valuable natural places.

[25] Nature reserves are chosen from among the very best examples of Northern Ireland's wildlife, habitats and geology. They contain a wide range of species, communities and geology and their designation is a public recognition of their importance.

[26] The CORINE land cover mapping classifies land cover under various headings. This dataset allows for the identification of lands that are likely to be most valuable to biodiversity including those which are likely to contain a habitat listed in Annex 1 of the Habitats Directive e.g. natural grasslands, peat bogs, salt marshes. CORINE Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. Land cover is the observed physical cover, as seen from the ground or through remote sensing, including for example natural or planted vegetation, water and human constructions which cover the earth's surface.

[27] The EPA's Framework National Ecological Network provides a classification of the relative importance of areas by virtue of the biodiversity and flora that they contain and the connectivity they provide. Many of the areas identified are corridors.

(badger sets), relevant datasets from the National Biodiversity Data Centre and BirdWatch Ireland's 'Important Bird Areas' (Crowe et al., 2009).

Ecological networks are important in connecting areas of local biodiversity with each other and with nearby designated sites so as to prevent islands of habitat from being isolated entities. They are composed of linear features, such as treelines, hedgerows and rivers/streams, which provide corridors or stepping stones for wildlife species moving within their normal range. They are important for the migration, dispersal and genetic exchange of species of flora and fauna particularly for mammals, especially for bats and small birds and facilitate linkages both between and within designated ecological sites, the non-designated surrounding countryside and urban areas.

Article 10 of the Habitats Directive recognises the importance of ecological networks as corridors and stepping stones for wildlife, including for migration, dispersal and genetic exchange of species of flora and fauna. The

Directive requires that ecological connectivity and areas of ecological value outside the Natura 2000 network of designated ecological sites are maintained.

Ecological islands or areas of habitat that are not connected to surrounding ecologically valuable habitats can also be important.

In general, and on a national level, ecological sensitivities occur in greatest concentrations in the western half of the country and in particular along the western seaboard (including north-western and south-western coasts). Designated inland areas are generally concentrated around water bodies, bogs and upland areas. Other areas of significant extent designated include estuaries, islands and mountain areas, including those at the Wicklow Mountains to the south of Dublin.

Within the Greater Dublin Area, areas containing the greatest extent of sensitive ecological features include coastal habitats (including intertidal flats, islands, sand and dunes) and those in the uplands of County Wicklow (including peat bogs and forests). In addition to coastal waters there are a number of rivers and lakes draining the area which provide habitats for sensitive species. Dublin has the least concentration of sensitive habitats, although Dublin Bay is heavily designated. Wicklow's sensitivities include peat bogs and forest areas, including those found in the uplands, and coastal areas. Kildare's sensitivities include peat bogs in the North-West of the County. Dispersed areas of marginal agricultural lands that may include ecological sensitivities generally occur in Counties Meath, Kildare and Wicklow.

4.7.1 Further Detail

4.7.1.1 European Sites

Additional information on European Sites is provided in the AA Natura Impact Report which accompanies the Plan and this Environmental Report on public display.

Figure 4.4 maps European Sites within 15km of the Greater Dublin Area. The greatest extent of area designated within the Greater Dublin Area comprises the Wicklow Mountains. Lands at the coastal margins and coastal waters are also designated. Other European Sites designations include river systems (e.g. River Boyne and Blackwater in West and North Meath, River Barrow and Nore in West and South Kildare and River Slaney in South Kildare) and patches of bog designations (primarily in West Kildare).

4.7.1.2 Natural Heritage Areas, Proposed Natural Heritage Areas and Areas likely to contain Annex I Habitats

Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs) and areas likely to contain habitats listed on Annex I of the Habitats Directive are illustrated on Figure 4.5. Where they occur, pNHA and NHA designations often overlap with European Site boundaries. On national level greater concentrations of these sites occur in the western half of Ireland (including counties of Kerry, Clare, Galway, Mayo, Sligo and Donegal) and elsewhere in the country around lakes, bog areas, the Grand and Royal Canals, Shannon Estuary, Wicklow uplands, and coastal areas including islands and marine waters. Within the Greater Dublin Area they include lakes, bog areas, the Grand and Royal Canals and coastal areas including islands and waters.

Areas likely to contain Annex I Habitats comprise selected 2012 CORINE land cover mapping entries which are indicative of these

areas: broad-leaved forest, peat bog, natural grassland, water bodies, coastal lagoons, mixed forests, moors and heaths, intertidal flats, beaches dunes sand, inland marshes, stream courses, estuaries, sparsely vegetated areas, burnt areas, salt marshes, bare rocks, transitional woodland scrub and land principally occupied by agriculture with areas of natural vegetation. In the Greater Dublin Area, these areas cover much of the uplands and foothills of County Wicklow, the bogs in Kildare and smaller pockets elsewhere.

4.7.2 Existing Problems

Previous changes in land uses arising from human development have resulted in a loss of biodiversity and flora and fauna however legislative objectives governing biodiversity and fauna were not identified as being conflicted with.

The Plan includes robust measures to contribute towards the protection of biodiversity and flora and fauna.

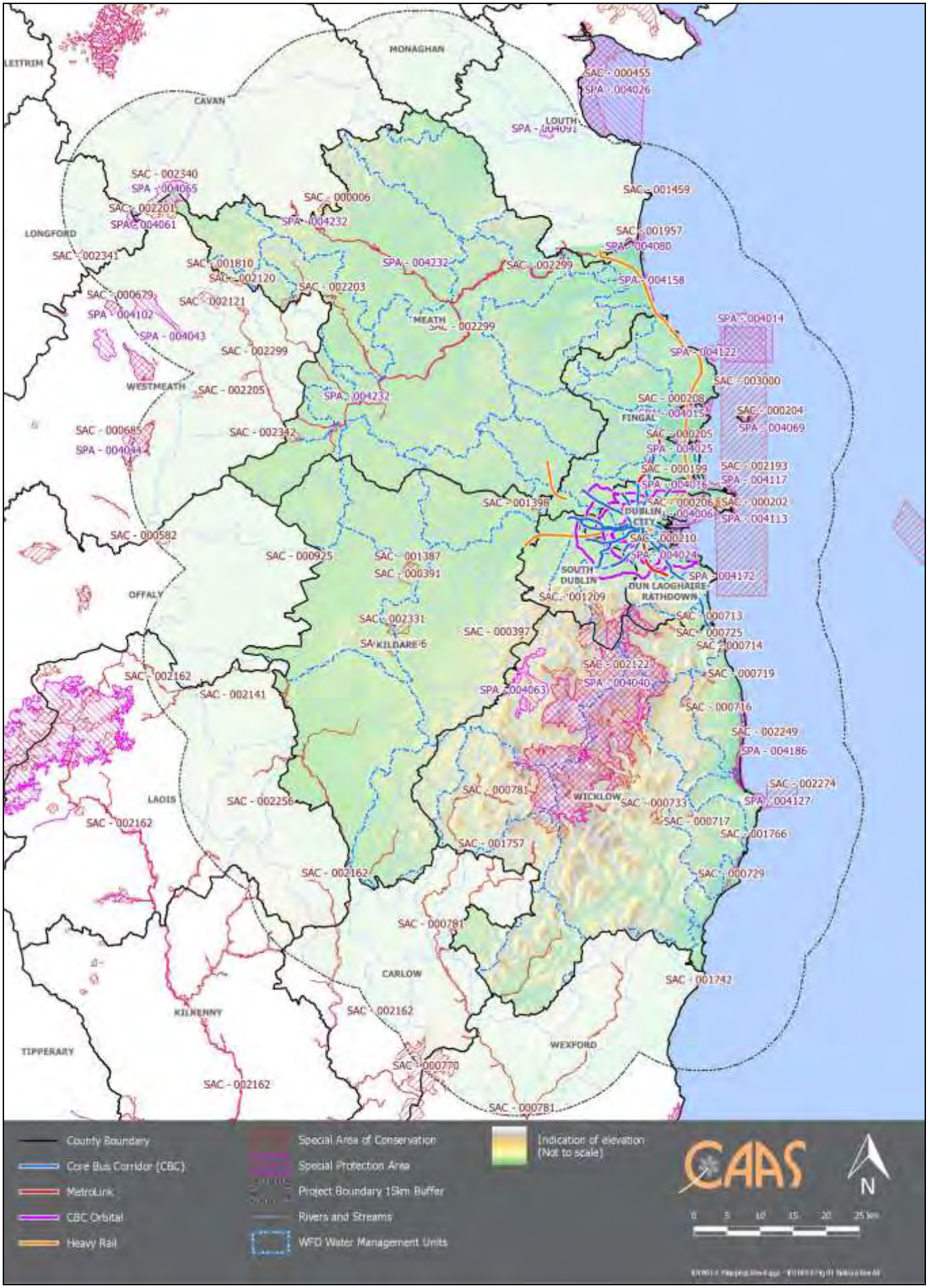

Figure 4.4 European Sites

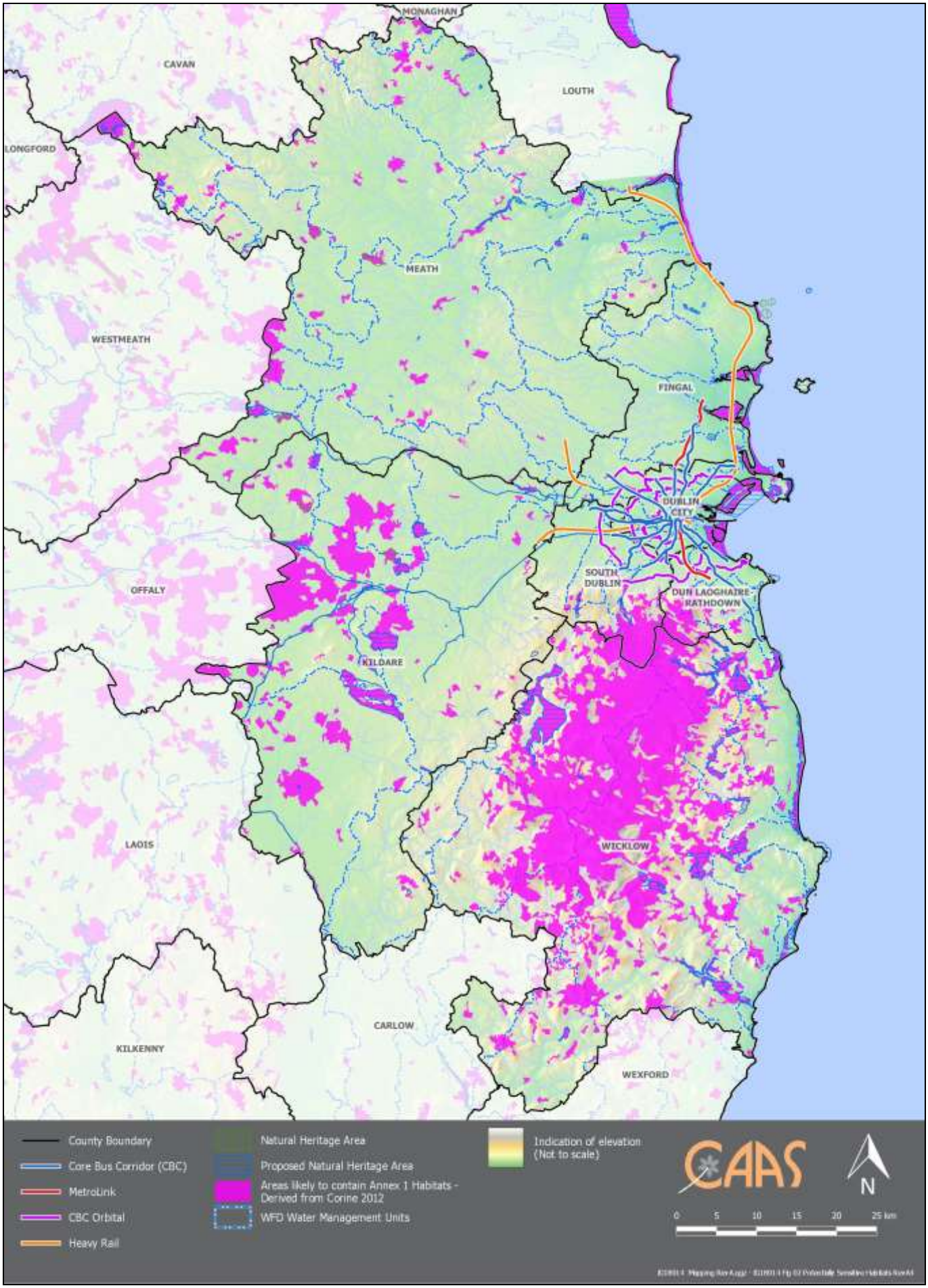

Figure 4.5 Potential Habitat Sensitivity

4.8 Material Assets

4.8.1 Introduction

Resources that are valued and that are intrinsic to specific places are called 'material assets'. Material Assets relevant to this SEA include:

- Built/amenity assets and infrastructure;
- Land; and
- Waste management.

Other material assets covered by the SEA include archaeological and architectural heritage (see Section 4.11) natural resources of economic value, such as air and water (see Sections 4.5 and 4.9).

4.8.2 Built/Amenity Assets and Infrastructure

Built/amenity assets and infrastructure which have the potential to be impacted upon by the development of transport infrastructure, if unmitigated, include public open spaces, parks and recreational areas, public buildings and services, housing and utility infrastructure (electricity, gas, telecommunications, water supply, wastewater infrastructure etc.). These resources are generally located within the immediate outskirts of urban/suburban areas.

4.8.3 Land

The development of transport infrastructure and services has the potential to enable the reuse and regeneration of brownfield sites thereby contributing towards sustainable mobility and reducing the need to develop greenfield lands and associated adverse environmental effects. Brownfield lands are generally located within urban/suburban areas. Further information on land cover types and land take is provided under Sections 4.10 and 4.12.

4.8.4 Waste Management

Any construction waste arising from the development of infrastructure is required to be dealt with in compliance with relevant EU and National waste management policy, including that relating to the waste hierarchy of prevention, recycling, energy recovery and disposal.

For the purposes of waste management planning, Ireland is now divided into three regions: Southern, Eastern-Midlands and Connacht-Ulster. Qaste management plans for each waste management region were published in 2015.

The 2016 EPA Report "Irelands Environment - An Assessment 2016" identifies that 11.91 Mt of waste was generated in Ireland during 2014. Of this total, 23% was generated by municipal sources, 28% by construction and demolition sources and 49% by other sources such as industry and agriculture. The bulk of construction and demolition waste is made up of uncontaminated soil and stones, with the remainder segregated wastes such as rubble, concrete, bricks, glass, plastic, wood, metals and mixed construction and demolition waste.

4.8.5 Existing Problems

No existing problems relevant to the SEA relating to material assets were identified by the assessment.

4.9 Water

4.9.1 The Water Framework Directive

Since 2000, Water Management in the EU has been directed by the Water Framework Directive 2000/60/EC (WFD). The WFD requires that all Member States implement the necessary measures to prevent deterioration of the status of all waters - surface, ground, estuarine and coastal - and protect, enhance and restore all waters with the aim of achieving *good status*. All public bodies are required to coordinate their policies and operations so as to maintain the *good status* of water bodies which are currently unpolluted and improve polluted water bodies to *good status.*

Article 4 of the WFD sets out various exemptions for deterioration in status caused as a result of certain physical modifications to water bodies. This is provided: all practicable mitigation measures are taken; there are reasons of overriding public interest or the benefits to human health, safety or sustainable development outweigh the benefits in

achieving the WFD objective; there are no better alternatives; and the reasons for the physical modification are explained in the River Basin Management Plan (RBMP).

The EU's Common Implementation Strategy Guidance Documents No. 20 and 36 provide guidance on exemptions to the environmental objectives of the WFD.

For the purpose of assessment, reporting and management, water is divided into groundwater, rivers, lakes, estuarine waters and coastal waters which are in turn divided into specific, clearly defined water bodies.

4.9.2 Catchment Characterisation

4.9.2.1 Status of surface and ground waters

WFD Monitoring Programmes are undertaken in Ireland by the Environmental Protection Agency and in Northern Ireland by the Department of the Environment's Northern Ireland Environmental Agency. Overviews of the status for monitored waterbodies are published and made available online. The WFD defines surface water status as the general expression of the status of a body of surface water, determined by the poorer of its ecological status and its chemical status. For example, if the ecological status is *good* and the chemical status *moderate* the overall status of the surface water body is identified as the poorer of the two i.e. as *moderate* status. Thus, to achieve *good* surface water status both the ecological status and the chemical status of a surface water body need to be at least *good*.

Ecological status is an expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as being of *good* ecological status when they meet Directive requirements.

Chemical Status is a pass/fail assignment with a failure defined by a face-value exceedance of an Environmental Quality Standards (EQS) for one or more Priority Action Substances (PAS) listed in Annex X of the Water Framework Directive (WFD). The EQS values for individual PAS substances are set at European level. *Good* surface water chemical status means that concentrations of pollutants in the water body do not exceed the environmental limit values specified in the Directive.

The most recent EPA assessment of water quality monitoring data in Ireland was undertaken for 2013-2015[28]. The 2013-15 status information shows 57% of river water bodies, 46% of lakes, 31% of transitional waters and 79% of coastal waters achieving "good" or "high" status. For groundwater, 91% of water bodies are at "good" status. Nationally the number of monitored river water bodies and lakes at "good" or "high" status appears to have declined by 4% since 2007-2009. However, this decline also masks an underlying trend of improvement and dis-improvement across monitored river water bodies and lakes since 2009[29].The Department of Agriculture, Environment and Rural Affairs (Northern Ireland) publish an annual Northern Ireland Environmental Statistics Report which includes information on the status of waterbodies. The 2018 report identifies that:

- In 2015, 32.7% of NI river waterbodies were classified as "high" or "good" quality;
- In 2015, five of the 21 lake waterbodies in Northern Ireland were classified as having a "good" status and 16 lake waterbodies were classified as having a less than "good" status; and
- In 2015, 9 marine water bodies were classified as "high" or "good" status whilst the remaining 16 were at "moderate", "poor" or "bad" status.

Rivers for which classifications have been provided are generally of good, moderate or poor status. Lakes for which classifications have been provided are generally of good or moderate status. WFD water surface status within Greater Dublin Area is shown on Figure 4.6.

For groundwater bodies, the approach to classification is different from that for surface water. For each body of groundwater, both the chemical status and the quantitative status

[28] Other sources of information from the EPA that are available for use in lower tier assessments include the Geoportal and Envision websites and reports including Water Quality in Ireland (various), Integrated Water Quality Reports (various) and Quality of Estuarine and Coastal Waters (various).

[29] Department of Housing, Planning and Local Government (2018) River Basin Management Plan for Ireland 2018 - 2021

must be determined. Both have to be classed as either *good* or *poor*. The WFD sets out a series of criteria that must be met for a body to be classed as good chemical and quantitative status. Nationally, for groundwater, 91% of water bodies are at *good* status.

Groundwater within the Greater Dublin Area is generally identified as being of *good* status however there are some areas which are identified as being of poor status (as shown on Figure 4.7) as a result of, for example, historical mining or industrial activities.

4.9.2.2 Groundwater productivity and vulnerability

The Geological Survey of Ireland (GSI) rates groundwaters according to both their vulnerability to pollution and their productivity.

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features.

Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes[30].

Groundwater vulnerability varies across the Greater Dublin Area (as shown on Figure 4.8). The most of County Kildare and north-west/south-west of County Meath are underlain by "High" and "Moderate" groundwater vulnerability. The south-east parts of County Meath, northern parts of County Fingal, coastal areas of County Wicklow and some pocket areas in County Kildare and surrounding Dublin City are having "Low" groundwater vulnerability. The Wicklow Mountains and upland areas within the Greater Dublin Area are generally identified as having either "Extreme" or "Extreme (Rock near surface)" vulnerability.

The GSI also rates aquifers based on the hydrogeological characteristics and on the value of the groundwater resource. This is referred to as aquifer productivity. Ireland's entire land surface is divided into nine aquifer productivity classifications that encompass various types of regionally, locally important and poor aquifers.

Groundwater productivity within the Greater Dublin Area is shown on Figure 4.9. The aquifer underlying parts of north/north-east part of County Meath and west/south-west parts of County Kildare is classified as "regionally important aquifer (karstified bedrock)" with "regionally" and "locally important gravel aquifer" overlying in places.

Regionally important aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or excellent yields (>400 m^3/d). Bedrock aquifer units generally have a continuous area of >25 km^2 and groundwater predominantly flows through fractures, fissures, joints or conduits. Regionally important sand/gravel aquifers are >10 km^2, and groundwater flows between the sand and gravel grains.

4.9.2.3 Groundwater Source Protection Areas

Groundwater Source Protection Area delineation provides an assessment of the land that contributes groundwater to a borehole or spring. Source reports have been undertaken by the GSI on behalf of Local Authorities since the mid-1990s. Since then, more than 120 have been completed.

There are number of Source Protection Areas located within the Greater Dublin Area (as mapped on Figure 4.10). Groundwater vulnerability classifications within these areas are also shown.

4.9.2.4 WFD Registers of Protected Areas

The WFD requires that Registers of Protected Areas (RPAs) are compiled for a number of water bodies or part of water bodies which must have extra controls on their quality by virtue of how their waters are used by people and by wildlife.

The WFD requires that these RPAs contain: areas from which waters are taken for public or private water supply schemes; designated shellfish production areas; bathing waters; areas which are affected by high levels of substances most commonly found in fertilizers, animal and human wastes - these areas are

[30] Source: Geological Survey of Ireland (2014) Metadata

considered nutrient sensitive; areas designated for the protection of habitats or species e.g. Salmonid areas; Special Areas of Conservation (SACs); and, Special Protection Areas (SPAs).

Entries to the RPAs in Ireland include:

- Drinking Water Rivers and Lakes;
- Nutrient Sensitive Rivers, Lakes and Estuaries;
- Shellfish Areas;
- Salmonid Rivers;
- Bathing Areas; and
- Groundwater for Drinking Water.

For presentation purposes, SACs and SPAs (although entries on the RPAs) are not included on this map – these are shown separately on Figure 4.4.

Entries to the WFD RPAs within Greater Dublin Area are shown on Figure 4.11.

4.9.2.5 Bathing Waters

For bathing waters, Mandatory and Guide Values are set out for bathing waters in the 2006 EU Bathing Water Directive and transposing Regulations. Mandatory Values are values which must be observed if the bathing area is to be deemed compliant with the Directive. Compliance with Guide Values exceeds guidance with Mandatory Values and can be regarded as quality objectives which bathing sites should endeavour to achieve.

The EPA report "*Bathing Water Quality in Ireland 2017*" presents the assessment of Ireland's 142 bathing waters identified under the Bathing Water Quality Regulations 2008 and is based on the results of monitoring covering the period 2014 to 2017. It also provides information on water quality at other locations where bathing activities occur and the water quality monitoring is undertaken by local authorities as a public health measure.

The key findings of the EPA report identified that:

- 93% (132) of coastal and lake beaches across the country met the minimum standard of sufficient water quality;
- 84.5% (120) were classed as either excellent or good water quality;
- 8 beaches showed some deterioration in quality – five of which are in the Dublin area (namely: Sandymount, Claremont, Donabate, Rush South, Skerries;
- 7 beaches were classed as poor – five of which are in the Dublin area; and
- 4 beaches showed an improvement in water – all from rural or small urban areas.

4.9.2.6 Potential Water Sensitivity Map

A potential water sensitivity map (see Figure 4.12) has been prepared as part of the SEA process. The purpose of the map is to indicate at a regional level where the main concentrations of water sensitivities might occur within and surrounding the Greater Dublin Area.

The map is prepared at the regional scale and different layers or weightings would produce different map outputs. Where the sensitivity mapping shows a concentration of water sensitivities there is an increased likelihood that development will conflict with this sensitivities and cause environmental deterioration, if mitigation is not applied. It is emphasised that the occurrence of water sensitivities does not preclude development; rather it flags at a strategic level that the mitigation measures - which have already been integrated into the Plan - will need to be adhered to at lower tiers of decision making in order to ensure that the implementation of the Plan contributes towards the objectives of the Water Framework Directive. It is emphasised that the map is a high scale, regional map and additional, local water sensitivities may become apparent during the consideration of projects at local level.

The potential water sensitivity map (Figure 4.12) has been prepared by weighting layers relating to water sensitivity and overlaying them using GIS software. The layers and associated weightings are detailed on Table 4.1.

Table 4.1 Water Sensitivity Layers and Weighting

Layer	Weight
WFD River, Coastal, Transitional Waters of Moderate / Poor / Bad Status	10
WFD Groundwater of Poor Status	10
GSI Groundwater Vulnerability Extreme or Karst	10
GSI Groundwater Vulnerability High	5

Layer	Weight
WFD RPA Entries for Drinking Water (surface and ground), Bathing Waters, Shellfish Waters, Salmonid Rivers and Nutrient Sensitive Areas	10

On Figure 4.12 areas with higher water sensitivities are indicated by darker orange colours, areas with moderate water sensitivities are indicated by yellow colours and areas with lower water sensitivities are indicated with green colours.

Sensitive rivers are generally found away from upland areas, draining lowland areas of settlement and agriculture. Heightened sensitivities arising from groundwater vulnerability and poor status data are found in much of County Wicklow, North-West and East Meath, Dublin County and central Kildare. Areas of sensitivity are also found in coastal areas.

Figure 4.12 should be viewed alongside figures under Section 4.7 which provide information including ecological designations.

4.9.3 Flooding

Flooding is an environmental phenomenon which, as well as causing economic and social impacts, could in certain circumstances pose a risk to human health. The existence of flood risk across the country is illustrated by various sources of information on historical flooding events – including those available from the Office of Public Works, the lead Authority on flooding in the country, National Flood Hazard Mapping website. In addition to this historic mapping there is predictive, modelled Preliminary Flood Risk Assessment and Flood Risk and Hazard mapping available from the OPW including through the National Catchment Flood Risk Management Programme (CFRAM). These mapping sources identify flood risk from various sources, including fluvial, pluvial, coastal and groundwater.

4.9.4 Existing Problems

Subject to exemptions provided for by Article 4 of the WFD[31], based on available water data, certain surface and groundwater bodies will need improvement in order to comply with the objectives of the WFD.

There are various bathing water locations across the country that do not meet mandatory bathing water values.

There is historic and predictive evidence of flooding in locations across the country.

[31] Article 4 of the WFD sets out various exemptions for deterioration in status caused as a result of certain physical modifications to water bodies. This is provided: all practicable mitigation measures are taken; there are reasons of overriding public interest or the benefits to human health, safety or sustainable development outweigh the benefits in achieving the WFD objective; there are no better alternatives; and the reasons for the physical modification are explained in the relevant River Basin Management Plan.

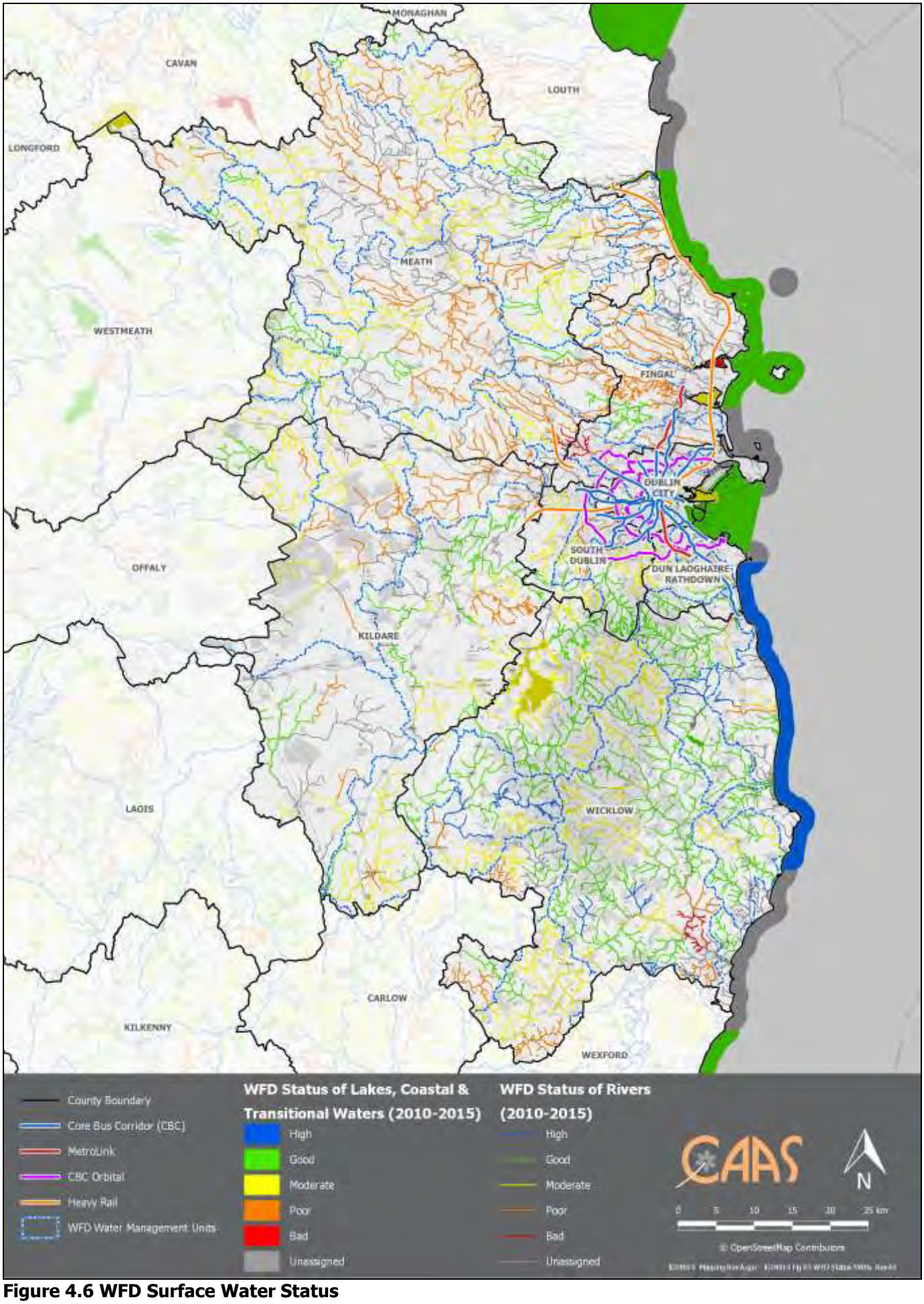

Figure 4.6 WFD Surface Water Status

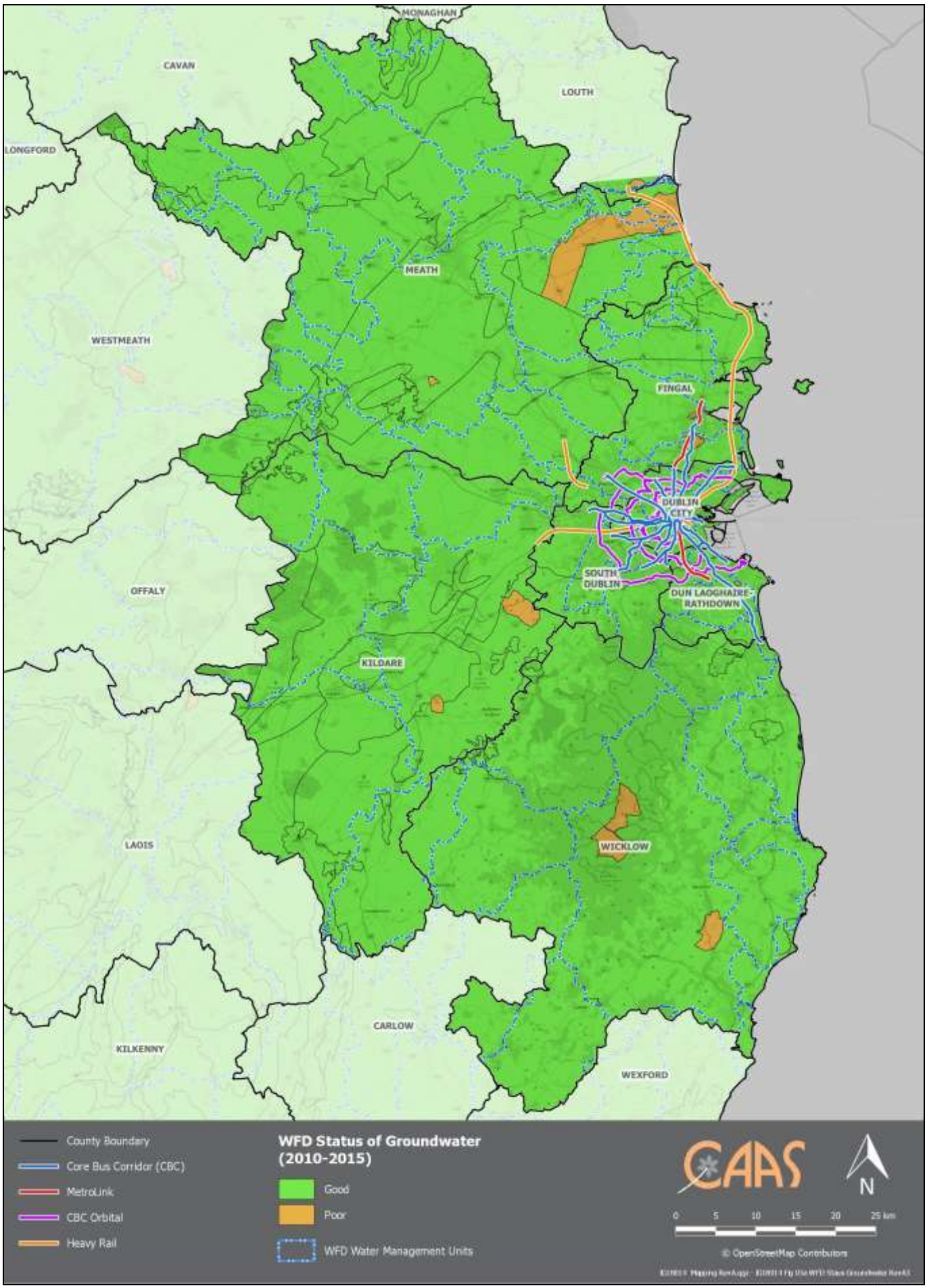

Figure 4.7 WFD Groundwater Status

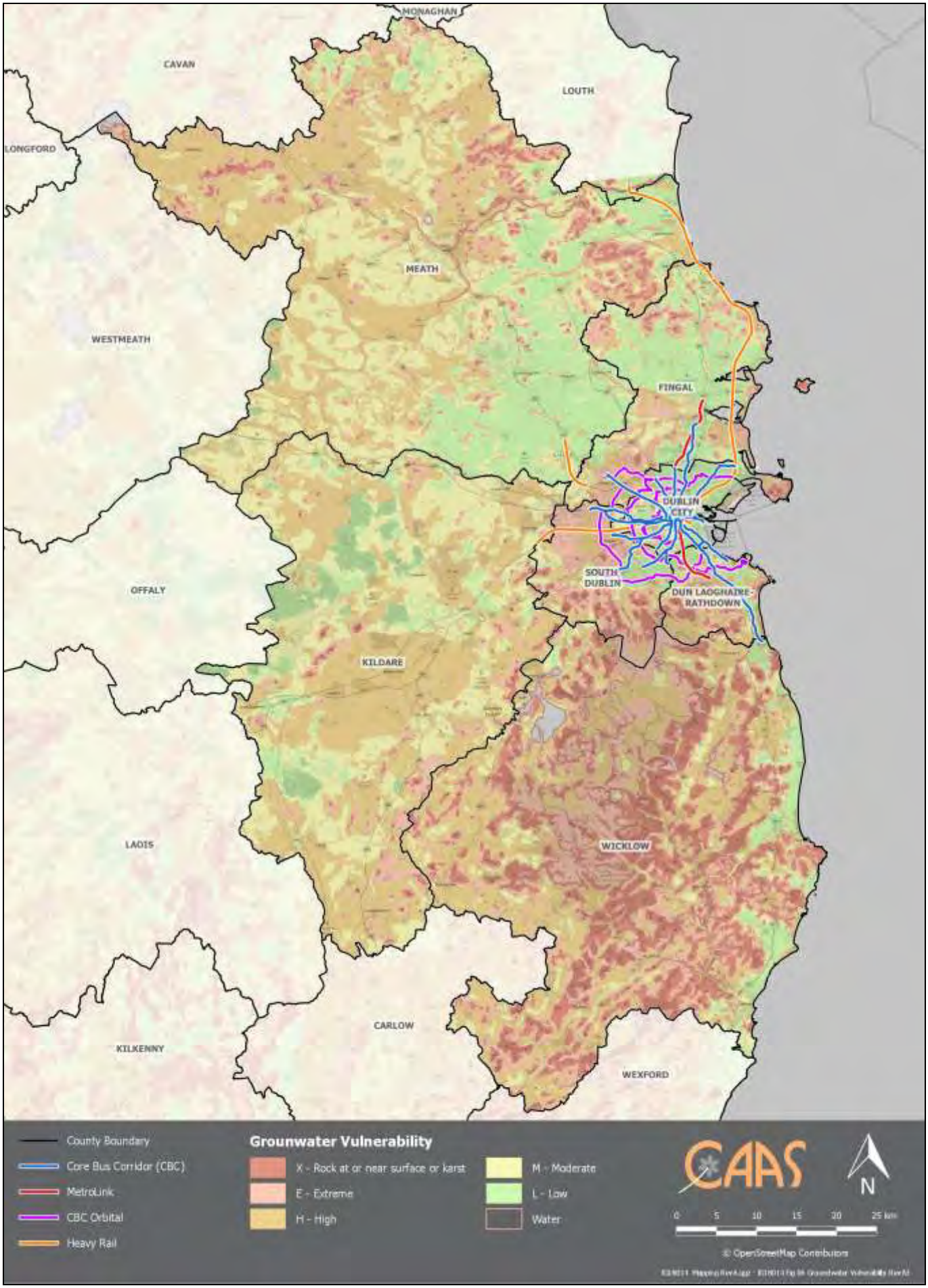

Figure 4.8 Groundwater Vulnerability

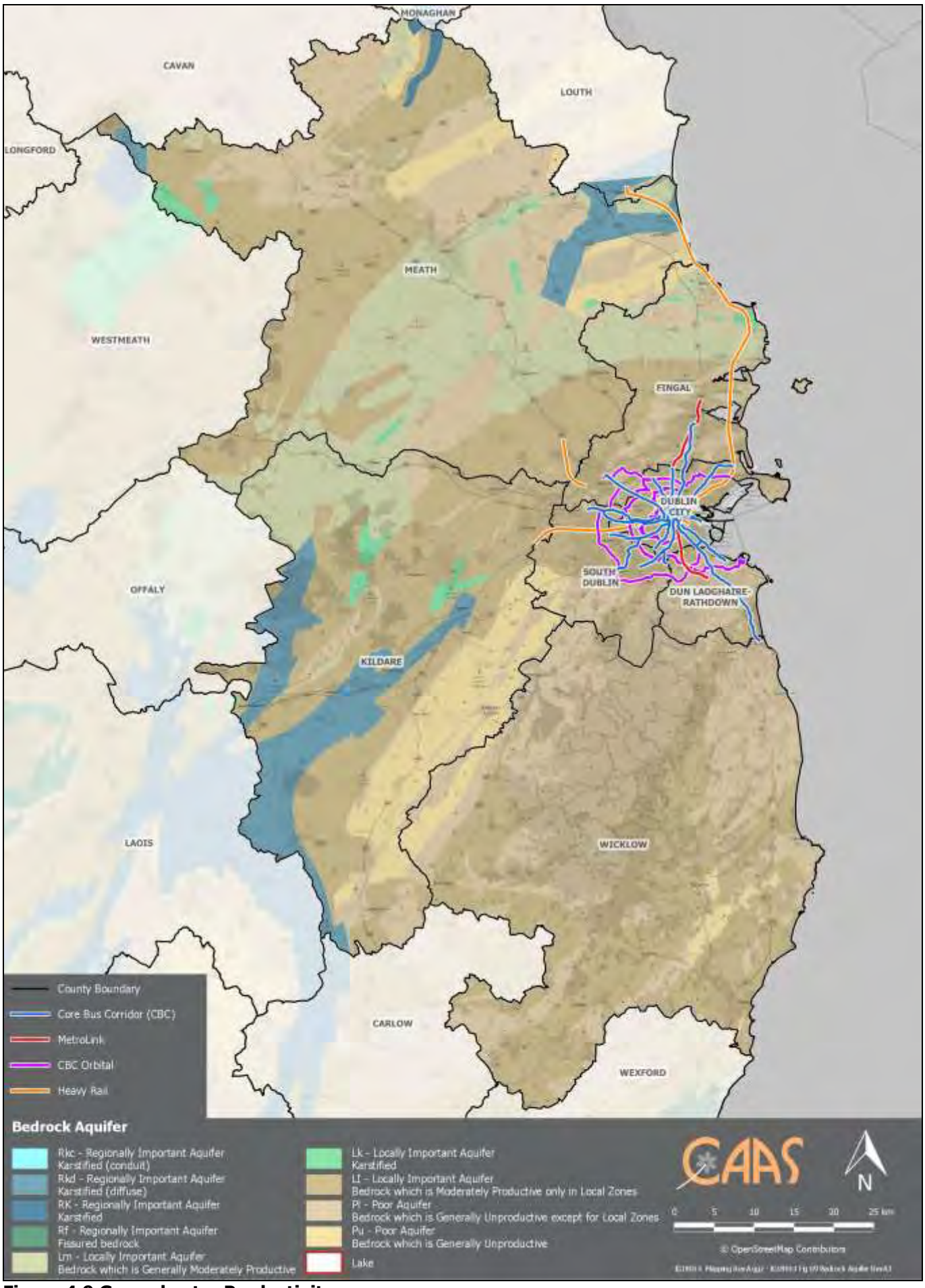

Figure 4.9 Groundwater Productivity

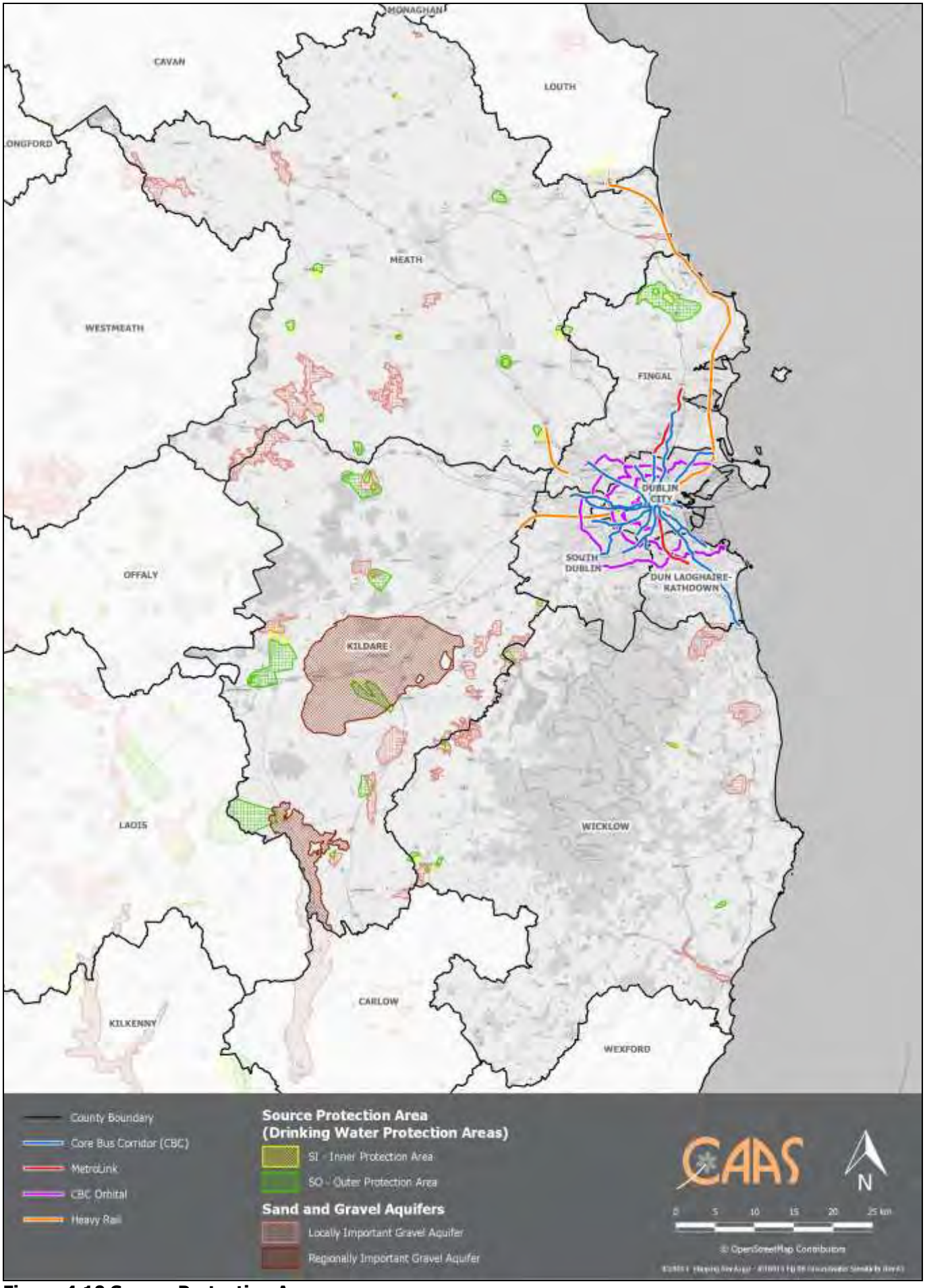

Figure 4.10 Source Protection Areas

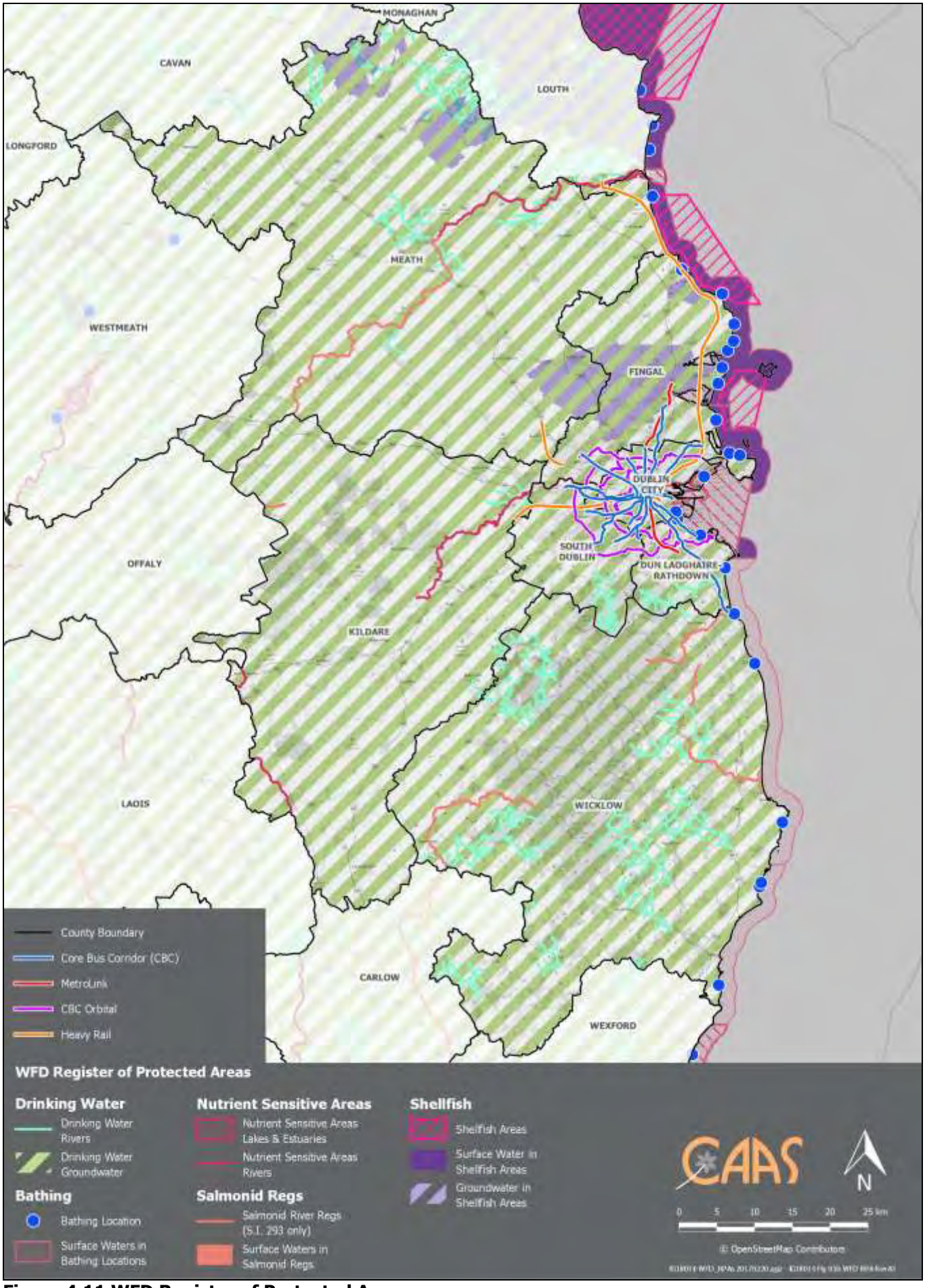

Figure 4.11 WFD Register of Protected Areas

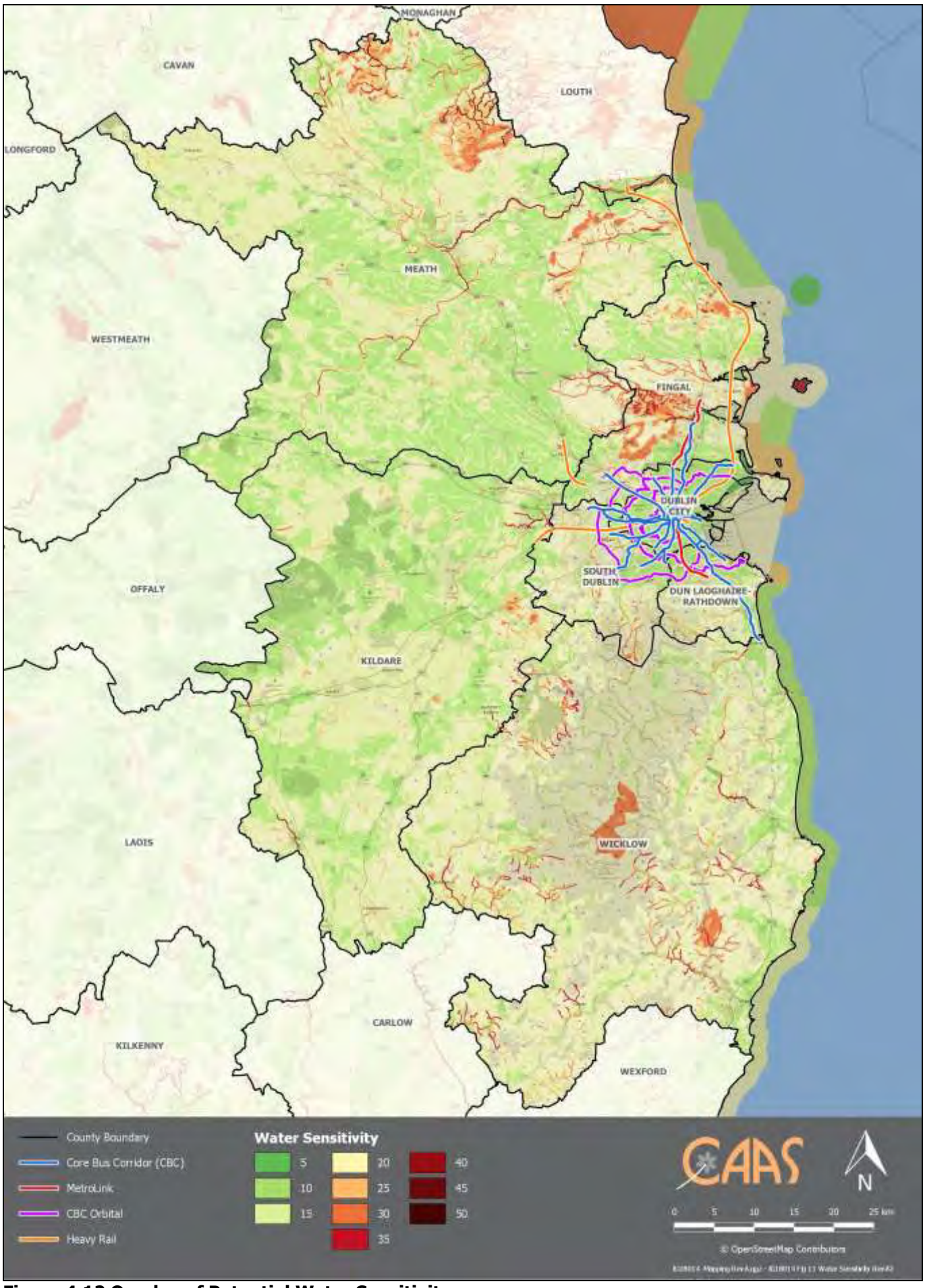

Figure 4.12 Overlay of Potential Water Sensitivity

4.10 Landscape

4.10.1 Introduction

Landscapes are areas which are perceived by people and are made up of a number of layers: landform, which results from geological and geomorphological history; land cover, which includes vegetation, water, human settlements, and; human values which are a result of historical, cultural, religious and other understandings and interactions with landform and land cover.

4.10.2 Designations

The importance of landscape and visual amenity and the role of its protection are recognised in the Planning and Development Act 2000 as amended, which requires that Development Plans include objectives for the preservation of the landscape, views and the amenities of places and features of natural beauty. These objectives and associated plan content often designate different aspects of the landscape such as the following:

- Landscape character areas;
- Landscape sensitivity and value areas;
- High amenity zones;
- Scenic views and prospects; and
- Land use objectives relating to landscape protection.

The European Landscape Convention - also known as the Florence Convention, - promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues. The Convention defines landscape as *'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'.* As a signatory of the Convention, Ireland fulfilled an obligation to prepare a National Landscape Strategy in 2015.

Land cover (see below) is one factor which is taken into account in the designation of these aspects.

Such designations, which vary from local authority to local authority and change over time, should be taken into account by lower tier planning and environmental assessments.

In addition to the aforementioned landscape designations, planning authorities are empowered (under section 202 of the Planning and Development Act 2000), to make a Special Amenity Area Order for reasons of outstanding natural beauty or an area's special recreational value and having regard to any benefits for nature conservation. The purpose of these Orders is to preserve/enhance landscape character and to prevent/limit development. Such areas should also be taken into account by lower tier planning and environmental assessments where/if relevant. There are four SAAOs in the Greater Dublin Area as follows: North Bull Island; Howth Head; Liffey Valley; and County Wicklow (Bray Head).

4.10.3 Land Cover

CORINE land cover mapping classifies land cover under various headings. This dataset allows for the identification of areas that are likely to be most visually sensitive and robust.

Land cover is the observed physical cover, as seen from the ground or through remote sensing, including for example natural or planted vegetation, water and human constructions which cover the earth's surface.

Artificial surfaces in Ireland account for just under 2.46% of the land surface, significantly below the European Union average of 4.2% (European Environment Agency 2012 CORINE mapping).

The CORINE Land Cover map is based on interpretation of satellite images. Three categories of potential land cover sensitivity have been identified on Figure 4.13 by combining the following land cover layers below.

Category 1 Robust Land Cover

- Sport and leisure facilities
- Continuous urban fabric
- Discontinuous urban fabric
- Industrial or commercial units
- Road and rail networks
- Sea ports
- Airports
- Mineral extraction sites
- Dump
- Construction sites

Category 2 Normal Land Cover

- Non-irrigated land
- Coniferous forest
- Complex cultivation patterns
- Pasture
- Transitional woodland scrub
- Land principally occupied by agriculture with areas of natural vegetation

Category 3 Sensitive Land Cover

- Fruit trees and berry
- Green urban sites
- Broad-leaved forest
- Peat bog
- Natural grassland
- Water bodies
- Coastal lagoons
- Mixed Forests
- Moors and Heaths
- Intertidal Flats
- Beaches Dunes Sand
- Inland marshes
- Stream Courses
- Estuaries
- Sparsely Vegetated Areas
- Burnt Areas
- Salt Marshes
- Bare Rocks

In the Greater Dublin Area, normal land cover is the predominant land cover type and is generally found throughout much of County Meath, County Kildare, County Wicklow and Dublin County. Robust land cover is found within and surrounding the M50 motorway and in pockets throughout the Greater Dublin Area. Sensitive land cover are most common in the Wicklow Mountain uplands/foothills, in bog areas in North-West Kildare and in coastal areas and parklands.

4.10.4 Existing Environmental Problems

New developments have resulted in changes to the visual appearance of lands over time however legislative objectives governing landscape and visual appearance were not identified as being conflicted with.

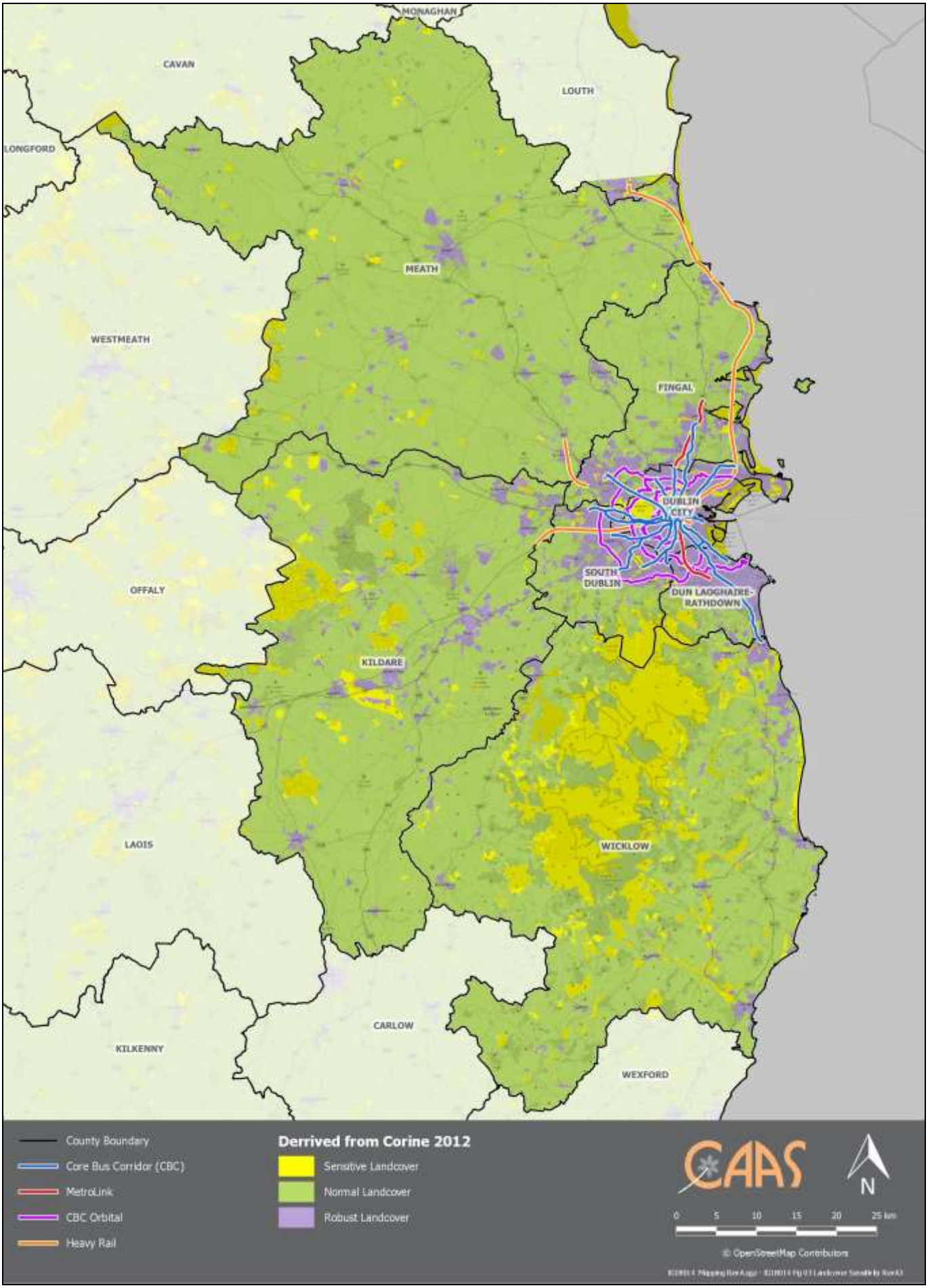

Figure 4.13 Potential Land Cover Sensitivity Mapping

4.11 Cultural Heritage

4.11.1 Archaeological Heritage

Archaeology is the study of past societies through the material remains left by those societies and the evidence of their environment. Archaeological sites and monuments vary greatly in form and date; examples include earthworks of different types and periods, (e.g. early historic ringforts and prehistoric burial mounds), megalithic tombs from the Prehistoric period, medieval buildings, urban archaeological deposits and underwater features.

The European Convention on Protection of the Archaeological Heritage known as the Valletta Convention of 1992. This was ratified by Ireland in 1997 and requires that appropriate consideration be given to archaeological issues at all stages of the planning and development process.

Archaeological heritage is protected under the National Monuments Acts (1930-2004), Natural Cultural Institutions Act 1997 and the Planning Acts.

The Record of Monuments and Places (RMP) is an inventory, put on a statutory basis by amendment to the National Monuments Act 1994, of sites and areas of archaeological significance, numbered and mapped. It is available from the National Monuments Service and at archaeology.ie.

The term 'monument' includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. All monuments in existence before 1700 A.D. are automatically considered to be historic monuments within the meaning of the Acts. Monuments of architectural and historical interest also come within the scope of the Acts. Monuments include: any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections; any cave, stone or other natural product, whether or not forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position; any, or any part of any, prehistoric or ancient tomb, grave or burial deposit, or, ritual, industrial or habitation site; and any place comprising the remains or traces of any such building, structure or erection, any such cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site, situated on land or in the territorial waters of the State', but excludes 'any building or part of any building, that is habitually used for ecclesiastical purposes' (National Monuments Acts 1930-2004).

A recorded monument is a monument included in the list and marked on the map which comprises the RMP set out county by county under Section 12 of the National Monuments (Amendment) Act, 1994 by the Archaeological Survey of Ireland. The definition includes Zones of Archaeological Potential in towns and all other monuments of archaeological interest which have so far been identified.

Archaeological heritage designations in Northern Ireland include entries to the Northern Ireland Sites and Monuments Record and Areas of Significant Archaeological Interest and Archaeological Potential.

Entries to the Record of Monuments and Places within the Greater Dublin Area are shown on Figure 4.14. A buffer of 250m (radius) has been applied to make these designations noticeable at the regional scale of the mapping produced. Where zones associated with the monuments have been provided by the National Monuments Service these have been used instead. National Monuments that are in State care are differentiated on the map. Monuments are concentrated within urban/suburban areas and are less common in areas which are not settled, most noticeably much of the Wicklow Mountains.

Also included on Figure 4.14 is the Brú na Bóinne archaeological landscape World Heritage Site in the north east of County Meath at the bend in the Boyne.

4.11.1.1 Underwater Archaeology [32]

The Underwater Archaeology Unit was established within the National Monuments Service to manage and protect Ireland's underwater cultural heritage, including the quantification of the underwater resource and assessing development impacts in order to manage and protect this aspect of Ireland's

[32] DCC (2013) *North Lotts and Grand Canal Dock Planning Scheme*

heritage. The Shipwreck Inventory is principally a desktop survey with information gathered from a broad range of cartographic, archaeological and historical sources, both documentary and pictorial. An inventory of wrecks covering the coastal waters off County Dublin was published in 2008. Wrecks over 100 years old and archaeological objects found underwater are protected under the National Monuments (Amendment) Acts 1987 and 1994. Significant wrecks less than 100 years old can be designated by Underwater Heritage Order (UHO) on account of their historical, archaeological or artistic importance. UHOs can also be used to designate areas of seabed or land covered by water to more clearly define and protect wreck sites and archaeological objects. Under the legislation all diving on known protected wreck sites or with the intention of searching for underwater cultural heritage is subject to licensing requirements. There are a number of historically recorded shipwrecking events located in vicinity of the Dublin Bay area.

4.11.2 Architectural Heritage

4.11.2.1 Architectural Heritage

The term architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments Act 1999 as meaning all: structures and buildings together with their settings and attendant grounds, fixtures and fittings; groups of structures and buildings; and, sites which are of technical, historical, archaeological, artistic, cultural, scientific, social, or technical interest.

4.11.2.2 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a State initiative under the administration of the Department of Culture, Heritage and the Gaeltacht and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister of Culture, Heritage and the Gaeltacht to the local authorities for the inclusion of particular structures in their Record of Protected Structures (RPS). The NIAH encompasses a survey of Historic Gardens and Designed Landscapes.

Figure 4.14 shows entries to NIAH in within the Greater Dublin Area for planning authority areas where the NIAH survey has been completed (this survey has not been completed in Dún Laoghaire-Rathdown County and Dublin City Councils' areas and the Record of Protected Structures dataset is used in these areas instead). Similar to the general spatial spread of archaeological heritage, clusters of architectural heritage are indicated within already developed urban and suburban areas.

4.11.2.3 Records of Protected Structures and Architectural Conservation Areas

Records of Protected Structures are legislated for under Section 12 and Section 51 of the Planning and Development Act 2000 as amended. Protected Structures are defined in the Planning and Development Act 2000 as amended as structures, or parts of structures that are of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social or technical point of view.

In relation to a protected structure or proposed protected structure, the following are encompassed:

(i) The interior of the structure;
(ii) The land lying within the curtilage[33] of the structure;
(iii) Any other structures lying within that curtilage and their interiors; and,
(iv) All fixtures and features which form part of the interior or exterior of any structure or structures referred to in subparagraph (i) or (iii).

[33] Curtilage is normally taken to be the parcel of ground immediately associated with the Protected Structure, or in use for the purposes of the structure. Protection extends to the buildings and land lying within the curtilage. While the curtilage sometimes coincides with the present property boundary, it can originally have included lands, features or even buildings now in separate ownership, e.g. the lodge of a former country house, or the garden features located in land subsequently sold off. Such lands are described as being attendant grounds, and the protection extends to them just as if they were still within the curtilage of the Protected Structure.

In addition to Protected Structures, the Planning and Development Act, 2000 provides the legislative basis for the protection of Architectural Conservation Areas (ACAs). An ACA is a place, area or group of structures or townscape which is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or value, or contributes to the appreciation of protected structures, whose character it is an objective to preserve in a development plan. The ACA designation requires that planning permission must be obtained before significant works can be carried out to the exterior of a structure in the ACA which might alter the character of the structure or the ACA.

Entries from the Records of Protected Structures are identified in the relevant planning authority Development Plan and at myplan.ie.

Architectural heritage designations in Northern Ireland include those relating to Listed Buildings and Historical Parks and Gardens.

Entries from the Records of Protected Structures within the administrative areas of Dún Laoghaire-Rathdown County and Dublin City Councils are shown on Figure 4.14. These datasets are shown on this map as the NIAH survey has not been completed in these areas. A buffer of 250m (radius) has been applied to make these designations noticeable at the regional scale of the mapping produced. Similar to the general spatial spread of monuments, Protected Structures are concentrated within urban/suburban areas and are less common in areas which are not settled, most noticeably much of the Wicklow Mountains.

4.11.3 Existing Problems

The context of archaeological and architectural heritage has changed over time however no conflicts with legislative objectives governing archaeological and architectural heritage have been identified.

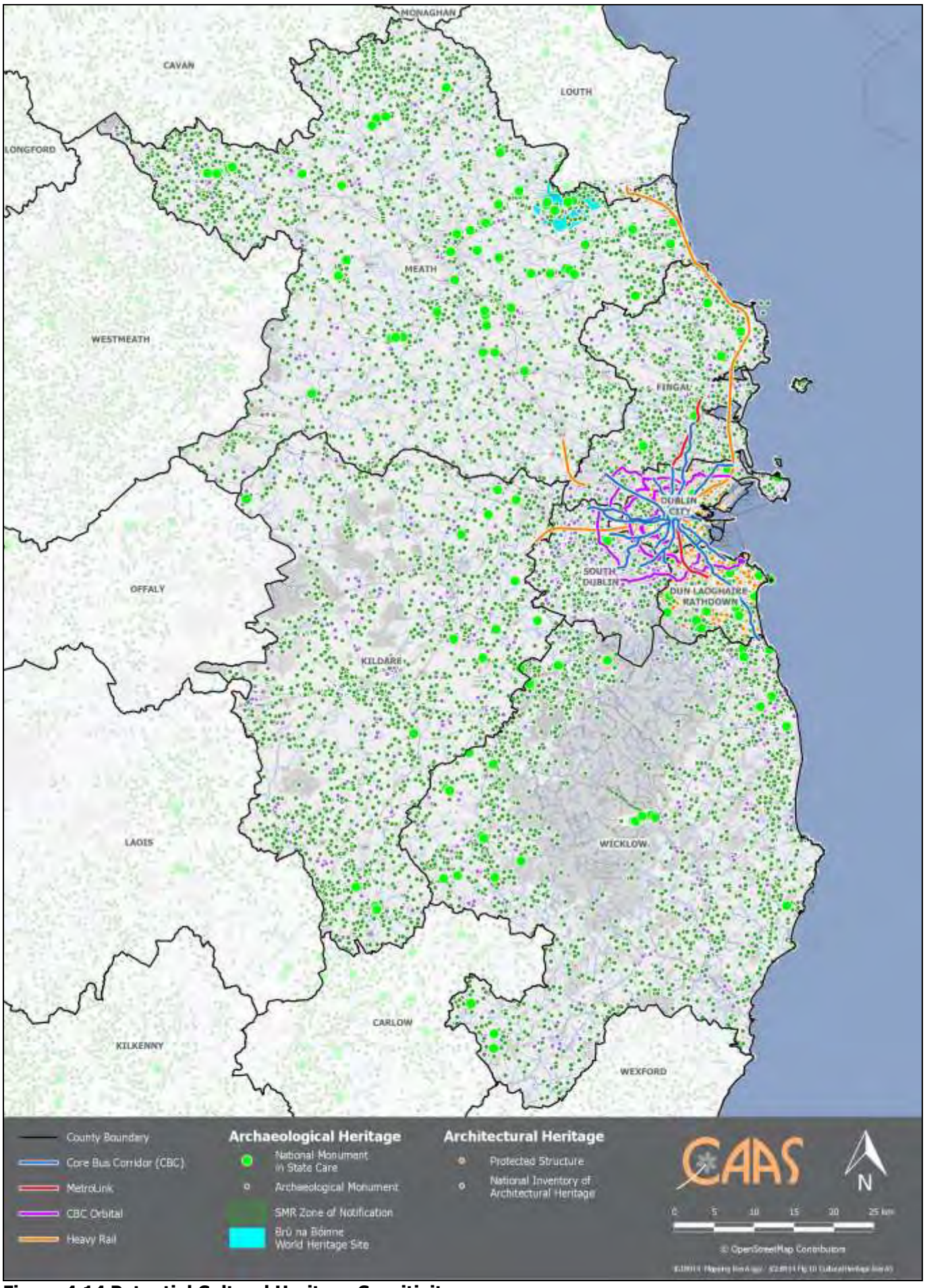

Figure 4.14 Potential Cultural Heritage Sensitivity

4.12 Soil

4.12.1 Introduction

Soil is the top layer of the earth's crust. It is formed by mineral particles, organic matter, water, air and living organisms. Soil can be considered as a non-renewable natural resource because it develops over very long timescales. It is an extremely complex, variable and living medium and performs many vital functions including: food and other biomass production, storage, filtration and transformation of many substances including water, carbon, and nitrogen. Soil has a role as a habitat and gene pool, serves as a platform for human activities, landscape and heritage and acts as a provider of raw materials. Such functions of soil are worthy of protection because of their socio-economic as well as environmental importance. Soils in any area are the result of the interaction of various factors, such as parent material, climate, vegetation and human action.

To date, there is no legislation which is specific to the protection of soil resources. However, there is currently an EU Thematic Strategy on the protection of soil which includes a proposal for a Soil Framework Directive which proposes common principles for protecting soils across the EU.

4.12.1 Land Take and Soil Sealing

Land take results from the expansion of cities and spread of urban areas, including development of transport infrastructure, and involves the replacement of formerly open soil with impermeable layers – this process is known as soil sealing.

Soil sealing can place pressure on water resources, increase the risk of flooding, affect the carbon cycle, reduce agricultural and extractive industry potential and adversely affect biodiversity.

4.12.2 Sources

Information sources relevant to the environmental component of soil which may be used in lower tier planning and environmental assessments includes:

- Soil types (2006) published by Teagasc, Geological Survey of Ireland (GSI), Forest Service & EPA;
- Soils and Subsoils Class (2006) published by Teagasc, GSI, Forest Service & EPA (2006);
- Sites of Geological Interest which have been published for some counties and provisional information on same for other counties (both available from GSI);
- Other datasets published by and available from GSI including those relating to Bedrock Geology, Quaternary Geology, Mineral deposits, Groundwater Resources and Landslides; and
- Datasets on contaminated soils which may be kept by planning authorities (these occur most often in urban areas).

4.12.3 County Geological Sites

Sites that are appraised, but which are not selected for NHA designation, are classified as 'County Geological Sites' (CGS), as recognised in the National Heritage Plan (2002). This enables their integration into County Development Plans. All sites of geological heritage importance are currently classified as CGS until such time that the most significant sites can be designated as geological NHAs. Nationally, audits of geological sites in 19 counties have been completed to date.

There are 170 County Geological Sites located within the Greater Dublin Area (shown on Figure 4.15):

- Co. Wicklow (65)
- Co. Kildare (22)
- Co. Meath (28)
- Co. Fingal (21)
- Co. South Dublin (10)
- Co. Dublin (12)
- Co. Dún Laoghaire-Rathdown (12)

4.12.4 Existing Problems

Legislative objectives governing soil were not identified as being conflicted with.

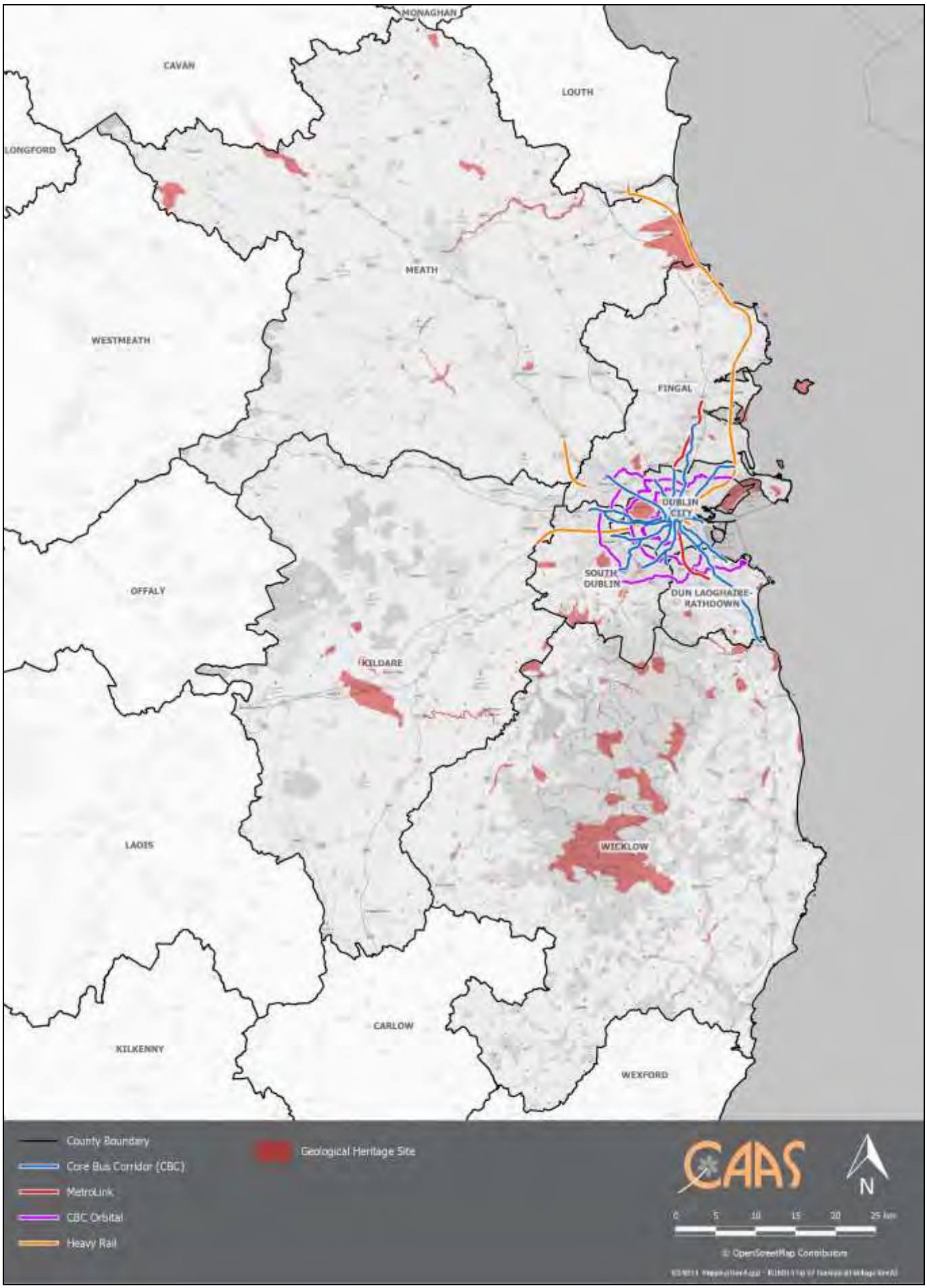

Figure 4.15 County Geological Sites

4.13 Overall Environmental Sensitivities and Opportunities/ Robustness

4.13.1 Overview

Some of the environmental information for the Greater Dublin Area detailed under previous subsections has been weighted and mapped to show overall environmental sensitivity (see Figure 4.16) and overall environmental opportunities/robustness (see Figure 4.17) with regard to the development of transport projects. The purpose of the mapping is to indicate at a regional level where the main concentrations of sensitivities might occur.

The maps are prepared at the regional scale and different layers or weightings would produce different map outputs. Where the sensitivity mapping shows a concentration of environmental sensitivities there is an increased likelihood that development will conflict with these sensitivities and cause environmental deterioration, if mitigation is not applied. It is emphasised that the occurrence of environmental sensitivities does not preclude development; rather it flags at a strategic level that the mitigation measures - which have already been integrated into the Plan - will need to be adhered to at lower tiers of decision making in order to ensure that the implementation of the Plan contributes towards environmental protection.

Where the robustness mapping shows a concentration of environmental opportunities there is a decreased likelihood that development will conflict with the environment.

It is emphasised that the maps are high scale, regional maps and additional, local sensitivities and opportunities may become apparent during the consideration of projects at local level.

A weighting system applied through Geographical Information System (GIS) software was used in order to calculate sensitivity and opportunities/robustness.

The maps have been prepared by weighting layers relating to environmental sensitivity and opportunities/robustness and overlaying them using GIS software. The layers and associated weightings are detailed on Table 4.2 and Table 4.3 below.

4.13.2 Environmental Sensitivities

For the environmental sensitivity mapping shown on Figure 4.16 weightings were applied as per Table 4.2. On Figure 4.16, which also includes River Basin District boundaries, areas with higher environmental sensitivities are indicated by darker orange/red colours, areas with moderate environmental sensitivities are indicated by yellow colours and areas with lower environmental sensitivities are indicated with green colours. Heightened areas of sensitivity include those in the uplands and foothills of the Wicklow Mountains, in the bog areas of west Kildare, in river valleys (e.g. the River Boyne in central and North Meath, the River Barrow in West and South Kildare and Slaney in South Wicklow) and at lakes. Lands at the coastal margins and coastal waters are also sensitive, especially within and to the north of Dublin Bay. Lower levels of sensitivity occur elsewhere.

Table 4.2 Environmental Sensitivity Layers and Weighting

Layer	Weight
Any areas covered by SACs or SPAs (see Figure 3.2)	10
Any areas covered by NHAs (see Figure 4.5)	10
Any areas covered by pNHAs or potential Annex I land covers (see Figure 4.5)	5
Sensitive Land Covers (see Figure 4.13)	10
Recorded Monuments and Protected Structures and associated 250m buffers (see Figure 4.14)	10
Highest Water Sensitivity (highest scores on Figure 4.12 from 35 to 50 inclusive)	15
Moderate Water Sensitivity (middle scores on Figure 4.12 from 20 to 30 inclusive)	10
Lowest Water Sensitivity lowest scores on Figure 4.12 from 5 to 15 inclusive)	5

4.13.3 Environmental Opportunities/ Robustness

For the environmental opportunities/ robustness mapping shown on Figure 4.17, weightings were applied as per Table 4.3. On Figure 4.17, which also includes River Basin District boundaries, areas with higher environmental opportunities/robustness are indicated by darker green colours, areas with moderate environmental robustness are indicated by yellow colours and areas with lower environmental opportunities/robustness are indicated with red/pink colours.

Heightened areas of opportunities/robustness include those within and surrounding the M50 motorway, in much of County Meath, especially south and south-east Meath, in much of County Kildare, especially north-east Kildare, and in County Wicklow, between the Mountains and the coast. Lower levels of opportunities/robustness occur elsewhere.

Table 4.3 Environmental Opportunities/ Robustness Layers and Weighting

Layer	Weight
Any areas not covered by SACs or SPAs (see Figure 3.2)	10
Any areas not covered by NHAs, pNHAs or potential Annex I land covers (see Figure 4.5)	10
Robust Land Covers (see Figure 4.13)	10
Normal Land Covers (see Figure 4.13)	5
Areas not covered by Recorded Monuments and Protected Structures and associated 250m buffers (see Figure 4.14)	10
Water Sensitivity High (lowest scores on Figure 4.12 from 5 to 15 inclusive)	15
Water Sensitivity Moderate (middle scores on Figure 4.12 from 20 to 30 inclusive)	10
Water Sensitivity Low (highest scores on Figure 4.12 from 35 to 50 inclusive)	5
Population Density High (highest 4 intervals on Figure 4.3)	15
Population Density Moderate (middle 3 intervals on Figure 4.3)	10
Population Density Low (middle 3 intervals on Figure 4.3)	5

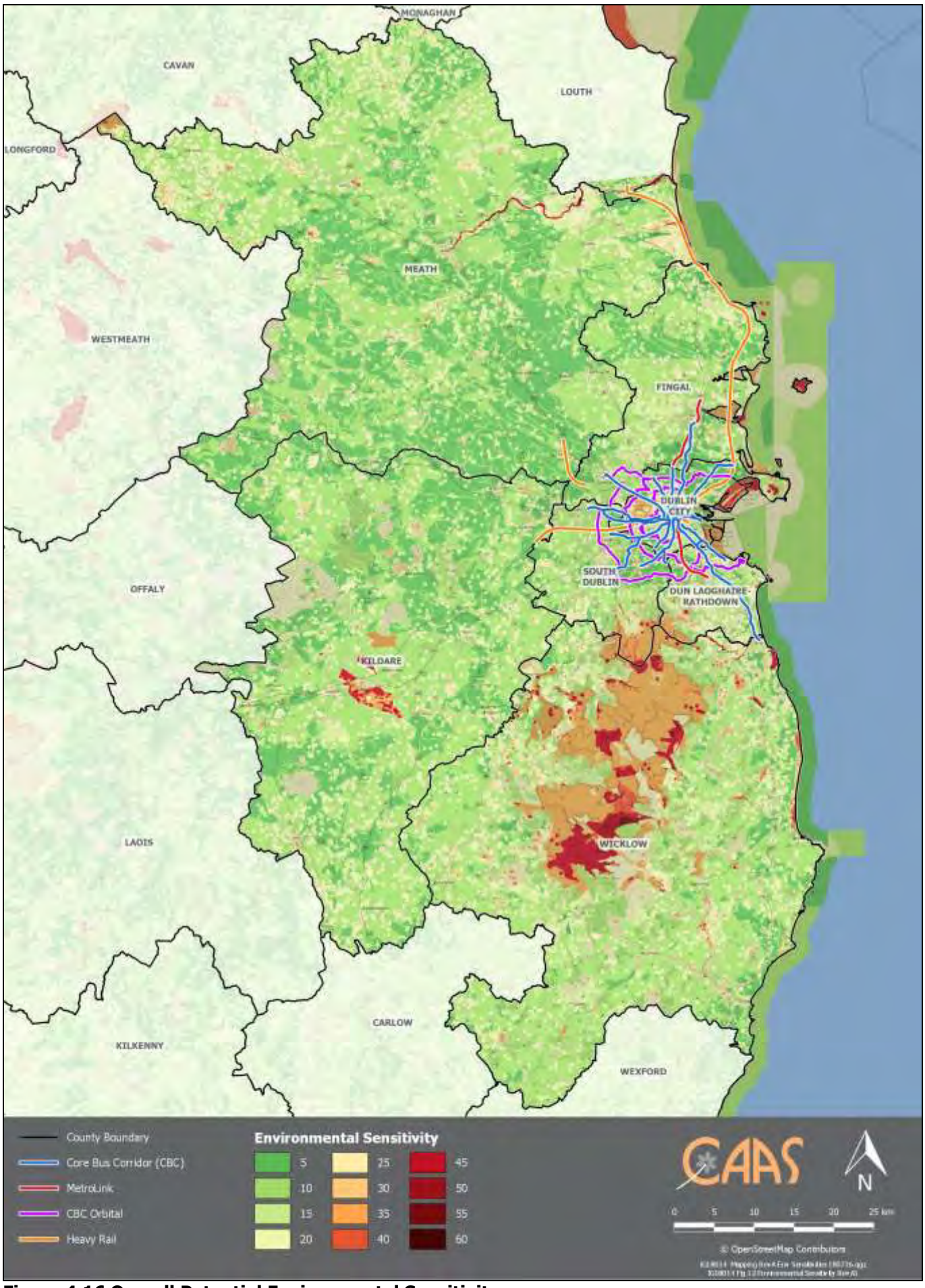

Figure 4.16 Overall Potential Environmental Sensitivity

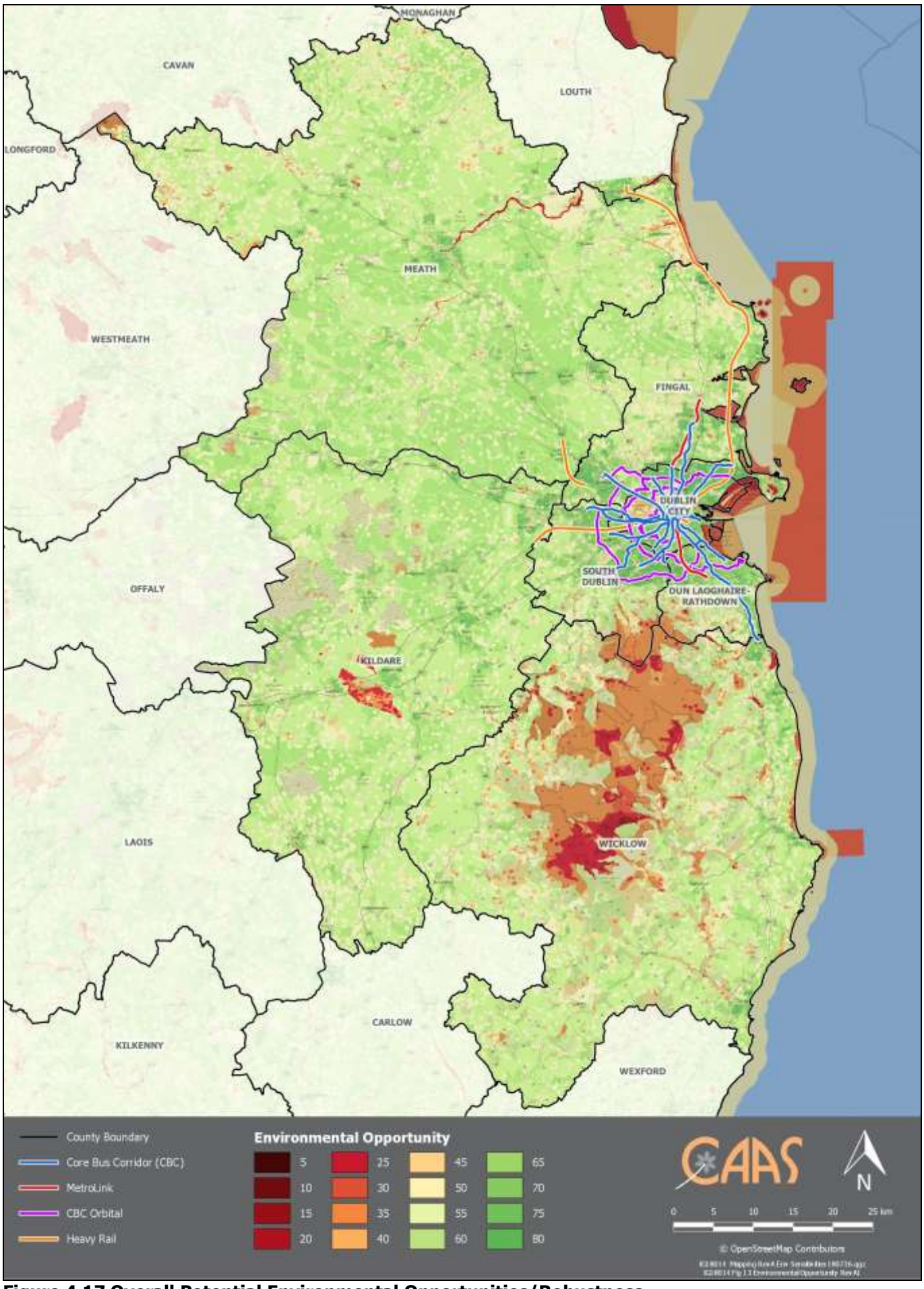

Figure 4.17 Overall Potential Environmental Opportunities/Robustness

Section 5 Strategic Environmental Objectives

Strategic Environmental Objectives (SEOs) are methodological measures developed from policies which generally govern environmental protection objectives established at international, Community or Member State level e.g. the environmental protection objectives of various European Directives which have been transposed into Irish law and which are required to be implemented.

The SEOs are set out under a range of topics and are used as standards against which the provisions of the Plan and the alternatives are evaluated in order to help identify which provisions would be likely to result in significant environmental effects and where such effects would be likely to occur, if - in the case of adverse effects - unmitigated.

The SEOs are linked to indicators which can facilitate monitoring the environmental effects of the Plan as well identifying targets which the Plan can help work towards.

All SEOs, indicators and targets are provided on Table 5.1 overleaf while background to these measures is provided in the subsections below.

Further detail on legislation, plans and programmes are provided under Section 2 (and associated Appendix I "Relationship with Legislation and Other Plans and Programmes") and Section 4.

Table 5.1 Strategic Environmental Objectives, Indicators and Targets

Environmental Component	Strategic Environmental Objectives	Indicators	Targets
Air and Climatic Factors	AC1: To contribute towards reductions in travel related emissions (including pollutants, noise and greenhouse gas emissions) to air	AC1i: Compliance with Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive and associated legislation AC1ii: Greenhouse gas emissions from transport	AC1i: To contribute towards compliance with legislative air quality limits and target values AC1ii: To facilitate a reduction in greenhouse gas emissions from transport AC1iii: The incorporation of Integrated Implementation Plan objectives into the preparation and review of the National Mitigation Plan, National Adaptation Framework and relevant Sectoral Adaptation Plan(s) and the incorporation of the necessary targets/ actions/ provisions arising from these developing policies once they are in place
	AC2: To encourage modal change from car to more sustainable forms of transport	AC2: Percentage of population travelling to work, school or college by public transport or non-mechanical means	AC2: An increase in the percentage of the population travelling to work, school or college by public transport or non-mechanical means See also Target AC1iii
	AC3: To facilitate a reduction in energy use by the transport sector and an increase in the proportion of energy from renewable sources by the transport sector	AC3i: Energy use by the transport sector as a percentage of Total Final Energy Consumption AC3ii: Proportion of energy from renewable sources	AC3i: To facilitate a reduction in energy use by the transport sector as a percentage of Total Final Energy Consumption AC3ii: To facilitate an increase in the proportion of energy from renewable sources by the transport sector See also Target AC1iii
Population and Human Health	PHH1: To develop transport infrastructure and services closer to urban/suburban areas thereby facilitating consolidation of growth and limiting urban sprawl	PHH1: Extent of urban/suburban areas within the catchment of transport infrastructure and services	PHH1: To maximise the extent of urban/suburban areas within the catchment of transport infrastructure and services
	PHH2: To contribute towards the protection of populations and human health from exposure to incompatible land uses	PHH2: Occurrence (any) of a spatially concentrated deterioration in human health arising from environmental factors resulting from development provided for by the Plan, as identified by the Health Service Executive and Environmental Protection Agency	PHH2: No spatial concentrations of health problems arising from environmental factors as a result of implementing the Plan

Environmental Component	Strategic Environmental Objectives	Indicators	Targets
Biodiversity, Flora and Fauna	B1: To contribute towards compliance with the Habitats and Birds Directives with regard to the protection of European Sites and Annexed habitats and species[34]	B1: Conservation status of habitats and species as assessed under Article 17 of the Habitats Directive	B1: Maintenance of favourable conservation status for all habitats and species protected under National and International legislation to be unaffected by implementation of the Plan[35]
	B2: To contribute towards compliance with Article 10 of the Habitats Directive with regard to the management of features of the landscape which - by virtue of their linear and continuous structure or their function as stepping stones (designated or not) - are of major importance for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species	B2: Percentage loss of functional connectivity without remediation resulting from development provided for by the Plan	B2: No significant ecological networks or parts thereof which provide functional connectivity to be lost without remediation resulting from development provided for by the Plan
	B3: To contribute towards avoidance of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites and to contribute towards compliance with the Wildlife Acts 1976-2012 with regard to the protection of listed species	B3i: Number of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites resulting from development provided for by the Plan B3ii: Number of significant impacts on the protection of listed species resulting from development provided for by the Plan	B3i: Avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites resulting from development provided for by the Plan B3ii: No significant impacts on the protection of listed species
Material Assets	MA1: To contribute towards the protection of built/amenity assets and infrastructure	MA1: Protection of built/amenity assets and infrastructure such as	MA1: Minimisation of impacts upon the use of and access to built/amenity assets and infrastructure
	MA2: To contribute towards the reuse and regeneration of brownfield sites	MA2: Extent of brownfield land reused and regenerated which has been facilitated by the Plan	MA2: To maximise the sustainable reuse and regeneration of brownfield sites
	MA3: To reduce waste volumes, minimise waste to landfill and increase recycling and reuse	MA3: Preparation and implementation of construction and environmental management plans	MA3: For construction and environmental management plans to be prepared and implemented for relevant projects

[34] 'Annexed habitats and species' refer to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.
[35] Except as provided for in Article 6(4) of the Habitats Directive, viz. There must be:
(a) No alternative solution available;
(b) Imperative reasons of overriding public interest for the plan/programme/project to proceed; and
(c) Adequate compensatory measures in place.

Environmental Component	Strategic Environmental Objectives	Indicators	Targets
Water	W1: To contribute towards the maintenance and improvement, where possible, of the quality and status of surface waters	W1i: Interactions with classification of Overall Status (comprised of ecological and chemical status) under the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009) resulting from development provided for by the Plan W1ii: Mandatory and Guide values as set by the EU Bathing Water Directive and transposing Bathing Water Quality Regulations (SI No. 79 of 2008)	W1i: Not to cause deterioration in the status of any surface water or affect the ability of any surface water to achieve 'good status', subject to exemptions provided for by Article 4 of the WFD[36] W1ii: To contribute towards the achievement of - as a minimum - Mandatory values and, where possible, to achieve Guide values as set by the EU Bathing Water Directive and transposing Bathing Water Quality Regulations (SI No. 79 of 2008)
	W2: To contribute towards maintaining and improving, where possible, the chemical and quantitative status of groundwaters	W2: Interactions with Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC resulting from wind energy development (including associated development) permitted by planning authorities adhering to the Guidelines	W2: Not to affect the ability of groundwaters to comply with Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC, subject to exemptions provided for by Article 4 of the WFD
	W3: To contribute towards compliance with the provisions of the Flood Risk Management Guidelines	W3: Compliance of relevant lower tier assessments and decision making with the Flood Risk Management Guidelines	W3: For lower tier assessments and decision making to comply with the Flood Risk Management Guidelines
Landscape	L1: To contribute towards avoidance or, where infeasible, minimisation of conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities	L1: Number of unmitigated conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities, resulting from development provided for by the Plan	L1: No unmitigated conflicts with the appropriate protection of statutory designations relating to the landscape
Cultural Heritage	CH1: To contribute towards the protection of archaeological heritage (including entries to the Record of Monuments and Places) and its context	CH1: Percentage of entries to the Record of Monuments and Places - including Zones of Archaeological Potential (and the context of the above within the surrounding landscape where relevant) - protected from significant adverse effects resulting from development provided for by the Plan	CH1: Contribution towards the protection of archaeological heritage (including entries to the Record of Monuments and Places) and its context
	CH2: To contribute towards the protection of architectural heritage (including entries to the Record of Protected Structures, entries to the National Inventory of Architectural Heritage and Architectural Conservation Areas) and its context	CH2: Percentage of entries to the Record of Protected Structures and Architectural Conservation Areas and their context protected from significant adverse effects resulting from development provided for by the Plan	CH2: Contribution towards the protection of architectural heritage (including entries to the Record of Protected Structures, entries to the National Inventory of Architectural Heritage and Architectural Conservation Areas) and its context
Soil	S1: To minimise land take and loss to extent of soil resource	S1: Artificial surfaces land cover extent	S1: Contribute towards the target of the National Planning Framework's SEA (2018) to "Maintain built surface cover nationally to below the EU average of 4%."

[36] Article 4 of the WFD sets out various exemptions for deterioration in status caused as a result of certain physical modifications to water bodies. This is provided: all practicable mitigation measures are taken; there are reasons of overriding public interest or the benefits to human health, safety or sustainable development outweigh the benefits in achieving the WFD objective; there are no better alternatives; and the reasons for the physical modification are explained in the relevant River Basin Management Plan.

Section 6 Description of Alternatives

6.1 Need for the Plan

The emergence of increasing road congestion in recent years has underlined the need to provide an enhanced level of public transport provision to provide an alternative to car-based commuting. Congestion is a challenge that must be addressed by the transport system in a context where significant population growth, and associated economic activity and social, cultural and recreational activity is being planned for.

Furthermore, the significance of the need for action to reduce the use of fossil fuels and diminish the generation of greenhouse gases is recognised and required by legislation. The National Transport Authority is required to adhere to the National Climate Change Adaptation Framework, which was published by the Minister for Communications, Climate Action and Environment in 2018, and the Department of Transport, Tourism and Sport's Sectoral Adaptation Plan, published in 2017.

The National Transport Authority is required by the Dublin Transport Authority Act 2008 to prepare a six year Integrated Implementation Plan to, inter alia, facilitate the implementation of the Transport Strategy for the Greater Dublin Area 2016-2025. The Transport Strategy, which was subject to full SEA and Stage 2 AA, is therefore a key in shaping the six-year Integrated Infrastructure Plan.

6.2 Existing provisions already in place

The Transport Strategy for the Greater Dublin Area 2016-2035 establishes an overall framework for transport investment in Counties Dublin, Meath, Kildare and Wicklow over the next two decades.

The Transport Strategy (and consequently the Implementation Plan) focuses on improving public and sustainable transport across the Greater Dublin Area while seeking to ensure primacy for transport options that provide for unit reductions in carbon emissions. This involves: promoting public transport, walking and cycling; seeking to reduce car use in circumstances where alternative options are available; and transitioning to lower emission vehicles for transport use. Transport Strategy provisions include those relating to: light rail; including the development of the MetroLink project; heavy rail (inclusive of expanded electrification on the suburban rail lines); cycling facilities; pedestrian movement; interchange facilities; information provision; and park and ride developments. To date the Authority has focused significant levels of investment in these sustainable modes, including the reopening of the Phoenix Park Tunnel and the delivery of Luas Cross City. The continuation of this focus is facilitated by the Transport Strategy and it is intended that it will continue under the Implementation Plan.

Most proposals included within the Plan have been already included within plans that have already been subject to SEA including the Transportation Strategy for the Greater Dublin Area 2016-2035, Project Ireland 2040 (including the National Planning Framework 2018) and the Greater Dublin Area Cycle Network Plan 2016.

In addition to aligning with the Transportation Strategy, the Implementation Plan aligns with other existing provisions including those included within the Project Ireland 2040 (including the National Planning Framework 2018) and the Greater Dublin Area Cycle Network Plan 2016. These existing provisions have been subject to SEA.

6.3 Alternatives

The various elements of the Plan are at different stages in the planning/environmental process. Furthermore, different elements of the Plan will be developed by different agencies, at different times, according to different funding allocations. For these reasons the alternatives are expressed as alternative scenarios about the sequence and degree of implementation of key elements that make up the Plan.

Transportation is highly integrated with both land-use planning and the provision of other public infrastructure, such as water services. Different alternative scenarios will give rise to different land-use patterns, resulting in different environmental effects.

The following three alternative scenarios are examined:

- Scenario A: Balanced Bus and Rail;
- Scenario B: MetroLink Prioritisation of Funding; and
- Scenario C: MetroLink Reduced Funding.

Each scenario has been developed in line with government priorities in investment and taking into account the overarching provisions of the Transport Strategy for the Greater Dublin Area 2016-2035.

6.3.1 Scenario A: Balanced Bus and Rail

This scenario will advance the implementation of the National Transport Authority's Transport Strategy in a manner which balances investment into rail and bus projects (including both the Core Bus Network and the new MetroLink urban light rail metro service project), along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

This scenario will give rise to orderly development with balanced patterns of land use allocation – resulting in a greater likelihood of financially viable supporting utilities and amenities – as well as earlier attainment of income generation goals (through fares from orderly provision of new housing concentrations at scale). Growth will be balanced as a result of this scenario.

6.3.2 Scenario B: MetroLink Prioritisation of Funding

This scenario will advance the implementation of the National Transport Authority's Transport Strategy in a manner which prioritises investment into rail projects (specifically the new MetroLink) along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

In established urban nodes served by the MetroLink project and its associated feeder routes, this scenario will give rise to orderly development with very concentrated patterns of land use allocation within the immediate catchment of new stations. This will result in a greater likelihood of financially viable supporting utilities and amenities – as well as earlier attainment of income generation goals (through fares from orderly provision of new housing concentrations at scale). However, elsewhere in the Greater Dublin Area, growth will be uneven as a result of this scenario.

6.3.3 Scenario C: MetroLink Reduced Funding

This scenario will advance the implementation of the National Transport Authority's Transport Strategy in a manner which prioritises investment into bus projects (including the Core Bus network), along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

This scenario will give rise to orderly development with very dispersed patterns of land use allocation within the Greater Dublin Area. This will result in a significantly reduced and/or deferred likelihood of financially viable supporting utilities and amenities – as well as much later attainment of income generation goals (through loss of fares from orderly provision of new housing concentrations at scale). Growth will be very uneven as a result of this scenario.

Section 7 Evaluation of Alternatives

7.1 Introduction

This section provides a comparative evaluation of the environmental effects of implementing the alternative scenarios described in Section 6. This determination sought to understand whether each alternative was likely to improve, conflict with or have a neutral interaction with environmental components.

7.2 Methodology

The relevant aspects of the current state of the environment (see Section 4) and the Strategic Environmental Objectives (see Section 5 and Table 7.1) are used in the evaluation of alternatives.

The alternatives are evaluated using compatibility criteria (see Table 7.2) in order to determine how they would be likely to affect the status of the SEOs. The SEOs and the alternatives are arrayed against each other to identify which interactions - if any - would cause effects on specific components of the environment. Where the appraisal identifies a likely conflict with the status of an SEO the relevant SEO code is entered into the conflict column - e.g. B1 which stands for the SEO likely to be affected - in this instance *'to contribute towards compliance with the Habitats and Birds Directives with regard to the protection of European Sites and Annexed habitats and species*[37]*'.*

The interactions identified are reflective of likely significant environmental effects[38].

The degree to which effects can be determined is limited as the Plan will be implemented through the lower tier environmental assessments and decision making of planning authorities and An Bord Pleanála. Nonetheless a comparative evaluation of the various alternatives can be provided.

[37] 'Annexed habitats and species' refer to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.

[38] These effects include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects.

Table 7.1 Strategic Environmental Objectives

Environmental Component	SEO Code	SEO
Air and Climatic Factors	**SEO AC1**	To contribute towards reductions in travel related emissions (including pollutants, noise and greenhouse gas emissions) to air
	SEO AC2	To encourage modal change from car to more sustainable forms of transport
	SEO AC3	To facilitate a reduction in energy use by the transport sector and an increase in the proportion of energy from renewable sources by the transport sector
Population and Human Health	**SEO PHH1**	To develop transport infrastructure and services closer to urban/suburban areas thereby facilitating consolidation of growth and limiting urban sprawl
	SEO PHH2	To contribute towards the protection of populations and human health from exposure to incompatible land uses
Biodiversity, Flora and Fauna	**SEO B1**	To contribute towards compliance with the Habitats and Birds Directives with regard to the protection of European Sites and Annexed habitats and species[39]
	SEO B2	To contribute towards compliance with Article 10 of the Habitats Directive with regard to the management of features of the landscape which - by virtue of their linear and continuous structure or their function as stepping stones (designated or not) - are of major importance for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species
	SEO B3	To contribute towards avoidance of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites and to contribute towards compliance with the Wildlife Acts 1976-2012 with regard to the protection of listed species
Material Assets	**SEO MA1**	To contribute towards the protection of built/amenity assets and infrastructure
	SEO MA2	To assist with the reuse and regeneration of brownfield sites
	SEO MA3	To reduce waste volumes, minimise waste to landfill and increase recycling and reuse
Water	**SEO W1**	To contribute towards the maintenance and improvement, where possible, of the quality and status of surface waters
	SEO W2	To contribute towards maintaining and improving, where possible, the chemical and quantitative status of groundwaters
	SEO W3	To comply as appropriate with the provisions of the Flood Risk Management Guidelines
Landscape	**SEO L1**	To contribute towards avoidance or, where infeasible, minimisation of conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities
Cultural Heritage	**SEO CH1**	To contribute towards the protection of archaeological heritage (including entries to the Record of Monuments and Places) and its context
	SEO CH2	To contribute towards the protection of architectural heritage (including entries to the Record of Protected Structures, entries to the National Inventory of Architectural Heritage and Architectural Conservation Areas) and its context
Soil	**SEO S1**	To minimise land take and loss to extent of soil resource

Table 7.2 Criteria for appraising the effect of Alternatives on SEOs

Likely to **Improve** status of SEOs to a **greater** degree	Likely to **Improve** status of SEOs to a **lesser** degree	**Least Potential Conflict** with status of SEOs-likely to be mitigated	**Potential Conflict** with status of SEOs-likely to be mitigated	**Most Potential Conflict** with status of SEOs-likely to be mitigated	Probable **Conflict** with status of SEOs-unlikely to be mitigated

[39] 'Annexed habitats and species' refer to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.

7.3 Cumulative Effects

Cumulative effects are one of the types of effects which have been considered by the assessment. Cumulative effects can be described as the addition of many small impacts to create one larger, more significant, impact.

There are 2 types of cumulative effects that have been considered, namely:

- *Intra-Plan* cumulative effects - these arise from the interactions between different types of environmental effects resulting from a plan, programme, etc. The interrelationships between environmental components that help determine these effects are identified on Table 8.4 e.g. interrelationships between: human health and air quality; human health and water quality; air quality and vegetation; human health and flood risk; and ecology and water quality. Effects that have been identified by the assessment (see Table 8.4) include those which are interrelated; implementation of the Plan will not affect the interrelationships between these components.
- *Inter-Plan* cumulative effects - these arise when the effects of the implementation of one plan occur in combination with those of other plans, programmes, projects, etc. With regard to potential *inter-Plan* cumulative environmental effects, these occur as a result of the combination of: environmental effects which are identified by the assessment; and the effects arising from other policies, plans and programmes.

Other legislation, plans, programmes or developments arising that have been considered by the assessment of environmental effects include those which are detailed under Sections 2, 3, 4, 5, 6 and Appendix I. The types of plans and programmes which are most likely to interact with the Transport Plan include those relating to transport and land use planning. Figure 3.2 details the Hierarchy of Planning and Environmental Assessment and the levels at which environmental assessment is undertaken. This assessment of the Plan recognises the existence of other environmental assessments (of both transport and land use related plans and developments) with a view to avoid duplication of assessment, in compliance with the SEA Directive.

Other policies, plans and programmes that have been considered by the assessment of effects include those which are detailed under Sections 2.4 (and associated Appendix I "Relationship with Legislation, Plans and Programmes") and 3.2 "Hierarchy of Planning and Environmental Assessment. Policies, plans and programmes from various sectors will interact with the Guidelines, including those relating to transport and land use planning. These policies, plans and programmes are subject to their own environmental assessment requirements (SEA, EIA, AA and FRA) as relevant. Examples include policy, plans and programmes for:

- Transport (e.g. Transportation Strategy for the Greater Dublin Area 2016-2035, Project Ireland 2040 - including the National Planning Framework 2018 - and the Greater Dublin Area Cycle Network Plan 2016);
- Land use (e.g. Project Ireland 2040 - including the National Planning Framework 2018 -, Regional Spatial and Economic Strategies, Development Plans, Local Area Plans and Planning Schemes);
- Water services, waste management and energy infrastructure (e.g. Irish Water's Water Services Strategic Plan and associated Capital Investment Plan and Regional Waste Management Plans); and
- Environmental protection and management (e.g. River Basin Management Plan 2018-2021, National Mitigation Plan 2017, National Adaptation Framework 2018 and Flood Risk Management Plans).

Potential cumulative/in-combination effects include:

- Contributions towards management of traffic and a shift from motorised transport modes to more sustainable and non-motorised transport modes, in combination with plans and programmes from various sectors, including transport and land use planning.

- Contributions towards reductions in greenhouse gas and other emissions to air and associated achievement of legally binding targets (in combination with plans and programmes from all sectors, including energy, transport and land use planning) as a result of facilitating:
    - A shift from car to more sustainable and non-motorised transport mode;
    - A transition to lower emission vehicles for transport use; and
    - More consolidated urban areas and reductions in sprawl.

- Contributions towards in travel related greenhouse gas and other emissions to air (in combination with plans and programmes from all sectors, including transport and land use planning) as a result of facilitating transport infrastructure and services. This has been mitigated by provisions which have been integrated into the Plan, including those relating to sustainable mobility.

- Contributions towards energy security and reductions in energy usage (in combination with plans and programmes from all sectors, including energy, transport and land use planning) as a result of facilitating:
    - A shift from car to more sustainable and non-motorised transport mode;
    - A transition to lower emission vehicles for transport use; and
    - More consolidated urban areas and reductions in sprawl.

- Contributions towards the enhancement of cultural heritage (archaeological and architectural) and its context in urban areas and their surrounds (in combination with the provisions of land use plans that have undergone SEA), as a result of replacing motorised transport modes with more sustainable and non-motorised modes such as walking, cycling and light rail.

- Potential effects on all environmental components arising from the construction of new transport related development (in combination with all development arising from plans and programmes from all sectors). The type of these effects are consistent with those described on Table 7.3.

The SEA undertaken for the Plan has taken account of the need for the implementation of the Plan to comply with all environmental legislation and align with and cumulatively contribute towards – in combination with other users and bodies and their plans etc. – the achievement of the objectives of the regulatory framework for environmental protection and management.

7.4 Detailed Evaluation of Alternatives

7.4.1 Effects Common to all Alternatives

Significant positive effects likely to occur and potentially significant adverse effects, if unmitigated, that are common to all alternatives are identified on Table 7.3.

Table 7.3 Effects Common to all Alternatives

Environmental Component	Significant Positive Effect likely to occur	Potentially Significant Adverse Effect, if unmitigated
Air and climatic factors	• Contributions towards reductions in greenhouse gas and other emissions to air and associated achievement of legally binding targets (in combination with plans and programmes from all sectors, including energy, transport and land use planning) as a result of: facilitating a shift from car to more sustainable and non-motorised transport modes; and facilitating more consolidated urban areas and reductions in sprawl. • Contributions towards reductions in consumption from non-renewables and associated achievement of legally binding renewable energy targets, including sectoral targets for transport (in combination with plans and programmes from all sectors, including energy, transport and land use planning). • Contributions towards managing traffic flows (and associated management of adverse effects as a result of traffic on air quality and noise levels).	• Emissions to air and associated issues.
Population and human health	• Provides for the development of transport infrastructure and services in locations which will facilitate use by those living and working in urban/suburban areas. • Facilitates contribution towards the protection of human health as a result of contributing towards the protection of environmental vectors, especially air.	• Potential interactions if effects upon environmental vectors such as air are not mitigated
Biodiversity and flora and fauna	• Facilitates lower overall effects on ecology (including designated sites, ecological connectivity, habitats) – due to increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites. • Contributions towards the protection of vegetation as a result of contributing towards the protection of environmental vectors, especially air. • Potential ecological enhancement interventions along transport corridors.	• Arising from both construction and operation of transport infrastructure and services and associated facilities/ infrastructure: loss of/damage to biodiversity in designated sites, ecological connectivity and non-designated habitats; and disturbance to biodiversity and flora and fauna. • Habitat loss, fragmentation and deterioration, including patch size and edge effects. • Disturbance (e.g. due to noise and lighting along transport corridors) and displacement of protected species and coastal squeeze. • Effects in riparian zones where new crossings of waters, if any, are progressed. • Potential effects on vegetation from transport emissions.

Environmental Component	Significant Positive Effect likely to occur	Potentially Significant Adverse Effect, if unmitigated
Material Assets	• Contributions towards energy security (in combination with plans and programmes from all sectors, including energy, transport and land use planning) as a result of reducing traffic flows and associated energy use. • Contributions towards a mode shift away from the private car to public transport, walking and cycling and associated enhancement of the public realm. • Contributions towards the protection of built/amenity assets and infrastructure. • Contributions towards the reuse and regeneration of brownfield lands thereby contributing towards a higher efficiency of land utilisation, sustainable mobility and a reduction in the need to develop greenfield lands. By facilitating increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites there will be lower adverse effects upon ecology, landscape designations, architectural and archaeological heritage and soil. • Contributions towards appropriate waste management.	• Generation of construction waste. • Loss or damage to built/amenity assets and infrastructure including as a result of new or widened transport infrastructure.
Water	• Contributions towards lower effects on ground and surface waters due to higher levels of development within established and serviced settlement centres that have installed/upgraded water services capable of delivering Water Framework Directive targets. • Contributions towards compliance with the Flood Risk Management Guidelines.	• Adverse impacts upon the status of water bodies and entries to the WFD Register of Protected Areas, arising from changes in quality, flow and/or morphology. • Increase in the risk of flooding.
Landscape	• Contributions towards the protection of landscape designations as a result of facilitating compliance with relevant plans.	• Occurrence of adverse visual impacts and conflicts with the appropriate protection of statutory designations relating to the landscape.
Cultural Heritage	• Contributions towards the protection of cultural heritage (archaeological and architectural) as a result of facilitating compliance with relevant legislation. • Contributions towards the enhancement of cultural heritage and its context in urban areas and their surrounds as a result of replacing motorised modes with more sustainable and non-motorised modes of transport such as walking, cycling and light rail/metro.	• Potential effects on protected and unknown archaeology and protected architecture arising from construction and operation activities, including as a result of increasing traffic flows.
Soil	• Minimises land-take and loss of extent of soil resource – as a result of facilitating increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites. • Contributions towards the protection of the environment from contamination arising from brownfield development. • Contributions towards the protection of features or areas of geological / geomorphological interest.	• Adverse impacts on the hydrogeological and ecological function of the soil resource as a result of construction of transport and associated transport facilities/ infrastructure. • Adverse impacts on features or areas of geological / geomorphological interest as a result of construction of transport and associated transport facilities/ infrastructure. • Potential for increase in coastal erosion.

7.4.2 Scenario A: Balanced Bus and Rail[40]

This scenario will advance the implementation of the Transport Strategy for the Greater Dublin Area 2016-2035 in a manner which balances investment into rail and bus projects (including both the Core Bus Network and the new MetroLink urban light rail metro service project), along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

This scenario will give rise to orderly development with balanced patterns of land use allocation – resulting in a greater likelihood of financially viable supporting utilities and amenities – as well as earlier attainment of income generation goals (through fares from orderly provision of new housing concentrations at scale). Growth will be balanced as a result of this scenario.

This scenario will give rise to the least adverse environmental effects[41] as it would facilitate the concentration of development around planned nodes – which will have appropriate social, environmental and mobility resources – because development will occur on lands that have been zoned and subject to SEA, AA and SFRA. Orderly development of this kind will give rise to the least adverse effects on populations, biodiversity and environmental components including air and water. The orderly and timely provision of services will help to anticipate and avoid effects on water and associated interactions with ecology and human health.

This scenario will:

- Facilitate the greatest improvement in sustainable mobility of all alternatives (reducing and limiting increases in the number of journeys by car taken as a percentage of all journeys taken), thereby facilitating the greatest reduction and limit of increases in greenhouse gas emissions, noise emissions and other emissions to air (with associated effects on human health). Such emissions would occur otherwise with higher levels of motorised transport and associated traffic. By significantly increasing the potential for plan-led, integrated development, greater usage of public transportation and less movement within denser settlements, this alternative would also be likely to result in a higher efficiency of energy resource utilisation. [42]

- Provide for the development of transport infrastructure and services in locations which will facilitate use by those living and working in urban/suburban areas. [43]

- Facilitate lower overall effects on ecology (including designated sites, ecological connectivity, habitats) – due to increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites. [44]

- Facilitate the reuse and regeneration of brownfield lands thereby contributing towards a higher efficiency of land utilisation, sustainable mobility and a reduction in the need to develop greenfield lands. By facilitating increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites there will be lower adverse effects upon ecology, landscape designations, architectural and archaeological heritage and land take/ soil. [45]

- Facilitate lower effects on ground and surface waters due to higher levels of development within established and serviced settlement centres that have installed/upgraded water services capable of delivering Water Framework Directive targets (and associated effects on the protection of ecology and human health). [46]

[40] Footnotes like this are used in this section in order to identify instances where interactions between the relevant alternative and the relevant SEOs occur. The nature of these interactions is identified on Table 7.4.
[41] SEOs AC1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1
[42] SEOs AC1 AC2 AC3 PHH2
[43] SEO PHH1
[44] SEOs B1 B2 B3 MA1
[45] SEOs MA2 AC1 AC2 AC3 PHH1 B1 B2 B3 W1 W2 W3 PHH2 CH1 CH2 L1 S1
[46] SEOs W1 W2 W3 B1 B2 B3 PHH2

- Facilitate the enhancement of cultural heritage and its context in urban areas and their surrounds as a result of replacing motorised transport modes with more sustainable and non-motorised modes such as walking, cycling and the new MetroLink. [47]

- The higher levels of certainty under this alternative is likely to increase spatial concentrations of market-led development – residential, commercial and industrial – in areas that are consistent with regional and local land-use planning objectives. These planning objectives are required to be subject to SEA, AA and SFRA that facilitate the integration of environmental considerations. Also, the timely availability of transportation infrastructure will significantly increase the likelihood of co-location of other services – especially water services – in areas that are consistent with the principles of proper planning and sustainable development. [48]

7.4.3 Scenario B: MetroLink Prioritisation of Funding

This scenario will advance the implementation of the Transport Strategy for the Greater Dublin Area 2016-2035 in a manner which prioritises investment into rail projects (specifically the new MetroLink) along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

In established urban nodes served by the MetroLink project and its associated feeder routes, this scenario will give rise to orderly development with very concentrated patterns of land use allocation within the immediate catchment of new stations. This will result in a greater likelihood of financially viable supporting utilities and amenities – as well as earlier attainment of income generation goals (through fares from orderly provision of new housing concentrations at scale). However, elsewhere in the Greater Dublin Area, growth will be uneven as a result of this scenario.

In established urban nodes served by the MetroLink project and its associated feeder routes, this scenario will give rise to a low amount and extent of adverse environmental effects[49] as it would facilitate the concentration of development around planned nodes – which will have appropriate social, environmental and mobility resources, because development will occur on lands that have been zoned and subject to SEA, AA and SFRA. Orderly development of this kind will give rise to least adverse effects on – and therefore would contribute towards the protection of – populations, biodiversity and environmental components including air and water[50]. The orderly and timely provision of services will help to anticipate and avoid effects on water and associated interactions with ecology and human health.

In established urban nodes served by the MetroLink project and its associated feeder routes, Scenario B will give rise to the effects described under Section 7.4.2.

However, elsewhere in the Greater Dublin Area, under this scenario:

- There will be uneven growth which would mean that unsustainable patterns of mobility and land-use will persist – with unchanged trend levels of effects on populations, biodiversity and environmental components including air and water. [51]

- There would be an increased likelihood of congestion and delay issues at critical locations including major junctions, especially along the M50 in the near term; and over-crowding on key public transport routes, especially within the M50. Congestion will mean that there will be significant delays in reaching targets for lower emissions to air – including noise and pollutants – and this will be compounded by lower utilisation of public transportation. There would be a failure to maximise contributions towards improving sustainable mobility (there would be increases in the number of journeys by car taken as a percentage of all journeys

[47] SEOs CH1 CH2
[48] SEOs AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1
[49] SEOs AC1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1
[50] SEOs AC1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1
[51] SEOs AC1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1

taken) and a failure to contribute towards managing traffic flows. Uneven growth would also be likely to result in a reduced efficiency of energy resource utilisation. [52]

- There would not be enough transport infrastructure and services to maximise use by those living and working in urban/suburban areas. [53]

7.4.4 Scenario C: MetroLink Reduced Funding

This scenario will advance the implementation of the Transport Strategy for the Greater Dublin Area 2016-2035 in a manner which prioritises investment into bus projects (including the Core Bus network), along with the complimentary implementation of cycling and walking infrastructure across the Greater Dublin Area.

This scenario will give rise to orderly development with very dispersed patterns of land use allocation within the Greater Dublin Area. This will result in a significantly reduced and/or deferred likelihood of financially viable supporting utilities and amenities, as well as much later attainment of income generation goals (through loss of fares from orderly provision of new housing concentrations at scale). Growth will be very uneven as a result of this scenario.

This scenario would:

- Through the progression of bus projects, facilitate the improvements in sustainable mobility (reducing and limiting increases in the number of journeys by car taken as a percentage of all journeys taken), thereby facilitating the greatest reduction and limit of increases in greenhouse gas emissions, noise emissions and other emissions to air (with associated effects on human health). Such emissions would occur otherwise with higher levels of car transport and associated traffic. By increasing the potential for plan-led, integrated development in some areas and greater usage of bus transportation, this alternative would also be likely to contribute towards a higher efficiency of energy resource utilisation. [54]

- Facilitate orderly development in some (dispersed) locations, including lands that have been zoned and subject to SEA, AA and SFRA; this would contribute towards sustainable development and environmental protection and management locally[55].

This scenario gives rise to the most potential adverse environmental effects[56] as:

- Development will not concentrate solely around planned nodes – which will have appropriate social, environmental and mobility resources. Very uneven growth means that unsustainable patterns of mobility and land-use will persist throughout the Greater Dublin Area on both zoned and unzoned lands as well as in areas with poor public transport. [57]

- There would be an increased likelihood of congestion and delay issues at critical locations including major junctions, especially along the M50 in the near term; and over-crowding on key public transport routes, especially within the M50. Congestion will mean that there will be significant delays in reaching targets for lower emissions to air – including noise and pollutants – and this will be compounded by lower utilisation of public transportation. There would be a failure to maximise contributions towards improving sustainable mobility (there would be increases in the number of journeys by car taken as a percentage of all journeys taken) and a failure to contribute towards managing traffic flows. Uneven growth would also be likely to result in a reduced efficiency of energy resource utilisation. [58]

[52] SEOs AC1 AC2 AC3 PHH2
[53] SEO PHH1
[54] SEOs AC1 AC2 AC3 PHH2
[55] SEOs AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1
[56] SEOs AC1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1
[57] SEOs AC1 AC2 AC3 PHH1 PHH2
[58] SEOs AC1 AC2 AC3 PHH2

- There would not be enough transport infrastructure and services to maximise use by those living and working in urban/suburban areas. [59]

- Very uneven development will give rise to adverse effects on populations, biodiversity and environmental components including air and water. [60]

- The lack of orderly and timely provision of services will generally not avoid effects on water and associated interactions with ecology and human health. [61]

Table 7.4 Evaluation of Alternatives against SEOs

Alternative	Likely to **Improve** status of SEOs to a **greater** degree	Likely to **Improve** status of SEOs to a **lesser** degree	**Least Potential Conflict** with status of SEOs- likely to be mitigated	**Potential Conflict** with status of SEOs- likely to be mitigated	**Most Potential Conflict** with status of SEOs- likely to be mitigated	Probable **Conflict** with status of SEOs- unlikely to be mitigated
Scenario A: Balanced Bus and Rail	**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1**		**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1**			
Scenario B: MetroLink Prioritisation of Funding		**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA2 W1 W2 W3 L1 CH1 CH2 S1**		**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1**		
Scenario C: MetroLink Reduced Funding		**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA2 W1 W2 W3 L1 CH1 CH2 S1**			**AC1 AC2 AC3 PHH1 PHH2 B1 B2 B3 MA1 MA2 MA3 W1 W2 W3 L1 CH1 CH2 S1**	

7.5 Selected Alternative

The most preferable outcome from the environmental assessment of alternatives is identified as being Alternative Scenario A and the approach outlined by this alternative is the one that is followed by the Plan.

This alternative will give rise to orderly development with balanced patterns of land use allocation – resulting in a greater likelihood of financially viable supporting utilities and amenities – as well as earlier attainment of income generation goals (through fares from orderly provision of new housing concentrations at scale). Growth will be balanced as a result of this alternative.

This alternative will also facilitate the greatest improvement in sustainable mobility of all alternatives (reducing and limiting increases in the number of journeys by car taken as a percentage of all journeys taken), thereby facilitating the greatest reduction and limit of increases in greenhouse gas emissions, noise emissions and other emissions to air (with associated effects on human health).

Potentially significant adverse environmental effects will be mitigated by the various provisions that have been integrated into the Plan (see Section 9 of this report).

[59] SEO PHH1
[60] SEOs PHH1 PHH2 B1 B2 B3 MA1 MA3 W1 W2 W3 L1 CH1 CH2 S1
[61] SEOs MA1 MA2 W1 W2 B1 B2 B3 PHH2

Section 8 Evaluation of Plan Provisions

8.1 Introduction

The relevant aspects of the current state of the environment (see Section 4) and the Strategic Environmental Objectives (see Section 5 and Table 8.1) are used in the evaluation of alternatives.

The provisions are evaluated using compatibility criteria (see Table 8.2 overleaf) in order to determine how they would be likely to affect the status of the SEOs. The SEOs and the Plan provisions are arrayed against each other to identify which interactions - if any - would cause effects on specific components of the environment. Where the appraisal identifies a likely conflict with the status of an SEO the relevant SEO code is entered into the conflict column - e.g. B1 which stands for the SEO likely to be affected - in this instance 'to contribute towards compliance with the Habitats and Birds Directives with regard to the protection of European Sites and Annexed habitats and species [62]'.

The interactions identified are reflective of likely significant environmental effects[63]:

1. Interactions that would be likely to improve the status of a particular SEO would be likely to result in a significant positive effect on the environmental component to which the SEO relates.

2. Interactions that would potentially conflict with the status of an SEO and would be likely to be mitigated would be likely to result in potential significant negative effects however these effects will be mitigated by measures which have been integrated into the Plan (see Section 9).

3. Interactions that would probably conflict with the status of an SEO and would be unlikely to be mitigated would be likely to result in a significant negative effect on the environmental component to which the SEO relates.

The degree to which effects can be determined is limited as the Plan will be implemented through the lower tier environmental assessments and decision making of planning authorities.

[62] 'Annexed habitats and species' refer to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.
[63] These effects include secondary, cumulative (see Section 7.3), synergistic, short, medium and long-term permanent and temporary, positive and negative effects.

Table 8.1 Strategic Environmental Objectives

Environmental Component	SEO Code	SEO
Air and Climatic Factors	**SEO AC1**	To contribute towards reductions in travel related emissions (including pollutants, noise and greenhouse gas emissions) to air
	SEO AC2	To encourage modal change from car to more sustainable forms of transport
	SEO AC3	To facilitate a reduction in energy use by the transport sector and an increase in the proportion of energy from renewable sources by the transport sector
Population and Human Health	**SEO PHH1**	To develop transport infrastructure and services closer to urban/suburban areas thereby facilitating consolidation of growth and limiting urban sprawl
	SEO PHH2	To contribute towards the protection of populations and human health from exposure to incompatible land uses
Biodiversity, Flora and Fauna	**SEO B1**	To contribute towards compliance with the Habitats and Birds Directives with regard to the protection of European Sites and Annexed habitats and species[64]
	SEO B2	To contribute towards compliance with Article 10 of the Habitats Directive with regard to the management of features of the landscape which - by virtue of their linear and continuous structure or their function as stepping stones (designated or not) - are of major importance for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species
	SEO B3	To contribute towards avoidance of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites and to contribute towards compliance with the Wildlife Acts 1976-2012 with regard to the protection of listed species
Material Assets	**SEO MA1**	To contribute towards the protection of built/amenity assets and infrastructure
	SEO MA2	To assist with the reuse and regeneration of brownfield sites
	SEO MA3	To reduce waste volumes, minimise waste to landfill and increase recycling and reuse
Water	**SEO W1**	To contribute towards the maintenance and improvement, where possible, of the quality and status of surface waters
	SEO W2	To contribute towards maintaining and improving, where possible, the chemical and quantitative status of groundwaters
	SEO W3	To comply as appropriate with the provisions of the Flood Risk Management Guidelines
Landscape	**SEO L1**	To contribute towards avoidance or, where infeasible, minimisation of conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities
Cultural Heritage	**SEO CH1**	To contribute towards the protection of archaeological heritage (including entries to the Record of Monuments and Places) and its context
	SEO CH2	To contribute towards the protection of architectural heritage (including entries to the Record of Protected Structures, entries to the National Inventory of Architectural Heritage and Architectural Conservation Areas) and its context
Soil	**SEO S1**	To minimise land take and loss to extent of soil resource

Table 8.2 Criteria for appraising the effect of Plan provisions on SEOs

Likely to **Improve** status of SEOs	Potential **Conflict** with status of SEOs- likely to be mitigated	Probable **Conflict** with status of SEOs- unlikely to be mitigated	**No Likely** interaction with status of SEOs

[64] 'Annexed habitats and species' refer to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.