

SEA ENVIRONMENTAL REPORT APPENDIX II

NON-TECHNICAL SUMMARY

FOR THE

DRAFT TRANSPORT STRATEGY

FOR THE

GREATER DUBLIN AREA

2016-2035

for: National Transport Authority

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OCTOBER 2015

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Section 1 Introduction and Terms of Reference

This is the Non-Technical Summary of the Strategic Environmental Assessment (SEA) Environmental Report for the Draft Transport Strategy for the Greater Dublin Area 2016-2035. The purpose of the Environmental Report is to comply with SEA legislation and provide a clear understanding of the likely environmental consequences of decisions regarding the adoption and implementation of the Strategy.

What is an SEA?

SEA is a systematic process of predicting and evaluating the likely environmental effects of implementing a proposed plan, or other strategic action, in order to ensure that these effects are appropriately addressed at the earliest appropriate stage of decision-making on a par with economic, social and other considerations.

Why is it needed?

The SEA is being carried out in order to comply with the provisions of the SEA Regulations as amended and in order to contribute towards environmental management and sustainable development. The output of the process is an Environmental Report which should be read in conjunction with the Draft Strategy.

How does it work?

Relevant aspects of the current state of the environment are assembled and presented to the team who prepared the Draft Strategy. This helps them to devise a Strategy that protects whatever is sensitive in the environment. To decide how best to make a Draft Strategy that helps to protect the environment as much as possible, the Authority examined different alternatives for the initiative. This helped to highlight where conflicts could occur and facilitated the development of mitigation measures which will help to avoid/reduce adverse environmental effects.

What is included in the Environmental Report which accompanies the Draft Strategy?

The Environmental Report contains the following information:

- A description of the relevant aspects of the current state of the environment;
- A description and assessment of alternatives;
- An assessment of Draft Strategy provisions; and,
- Mitigation measures which set out to aid compliance with important environmental protection legislation - e.g. the Water Framework Directive, the Habitats Directive - and which will help to avoid/reduce the adverse environmental effects of implementing the Strategy.

What happens at the end of the process?

When the Strategy is finalised, an SEA Statement will be prepared and made available. The SEA Statement will include information on how environmental considerations were integrated into the Strategy and why the preferred alternative was chosen for the Strategy.

Section 2 The Draft Strategy

2.1 Introduction

The strategy provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) for the next two decades. It presents the transport requirements for the Greater Dublin Area based on principles of effective, efficient and sustainable urban and rural living for the period up to 2035 insofar as this can be delivered by transport. To view it in financial terms, the infrastructure and associated costs set out in this document represent how much investment will be required in transport to sustain Ireland's economic engine and largest centre of social, cultural and tourism activity for the next 20 years and beyond, in terms of meeting the forecast demand for the movement of people and goods in the region.

2.2 Dublin Transport Authority Act

Under section 12 of the 2008 Dublin Transport Authority Act, the Authority is required to prepare a Transport Strategy for the Greater Dublin Area. Section 12 (3) states that the objective of the strategy shall be to provide a long-term strategic planning framework for the integrated development of transport infrastructure and services in the GDA and, in accordance with section 12 (4), shall consider the future development of the transport system in the GDA for a period of not less than 12 years and not more than 20 years.

Section 12 (5) states that when preparing a transport strategy the Authority shall have regard to:

1. the National Spatial Strategy;
2. the regional planning guidelines in force for the GDA;
3. the development plans in force in the GDA, the Dublin Docklands Development Authority's master plan and the Grangegorman Development Agency's strategic plan;
4. Transport 21 or any subsequent capital investment framework for transport published by the Minister or Government;
5. the Department of Transport's sectoral plan under the Disability Act 2005 or any subsequent sectoral plan under that Act;
6. demographic, economic, social, travel and transport trends in the GDA;
7. existing, planned and projected land use developments;
8. trends and requirements of persons travelling from outside the GDA into the GDA, and vice versa, and the demand for such travel;
9. any proposals received from public transport authorities and operators, and
10. such other matters as may be prescribed by the Minister or as the Authority considers appropriate.

The Transport Strategy must also be reviewed every 6 years.

2.3 Layout

The Strategy is set out over 9 chapters as detailed below:

- Chapter 1 - Introduction and Context
- Chapter 2 - Policy Review
- Chapter 3 - Transport in the Greater Dublin Area
- Chapter 4 - Development of the Strategy
- Chapter 5 - The 2035 Transport Network
- Chapter 6 - Transport Services and Integration
- Chapter 7 - Land Use Integration and Behavioural Change

- Chapter 8 - Environmental Protection and Management
- Chapter 9 – Summary of Outcomes

Various appendices including this SEA Environmental Report and an AA Natura Impact Report accompany the Strategy.

The Transport Strategy includes, inter alia, a number of different schemes grouped under four main modes; rail, bus, cycle and road.

2.4 Relationship with other relevant Plans and Programmes

The Strategy sits within a hierarchy of strategic actions such as plans and programmes, including the following:

- UN Kyoto Protocol and the Second European Climate Change Programme (ECCP II)
- EU 2020 climate and energy package
- Habitats Directive (92/43/EEC)
- Birds Directive (2009/147/EC)
- European Union Biodiversity Strategy to 2020
- The Clean Air for Europe Directive (2008/50/EC)
- Fourth Daughter Directive (2004/107/EC)
- Noise Directive 2002/49/EC
- Floods Directive (2007/60/EC)
- Water Framework Directive (2000/60/EC)
- Groundwater Directive (2006/118/EC)
- Bathing Water Directive (2006/7/EC)
- Drinking Water Directive (98/83/EC)
- Urban Waste Water Treatment Directive (91/271/EEC)
- Environmental Liability Directive (2004/35/EC)
- SEA Directive (2001/42/EC)
- EIA Directive (2011/92/EU as amended by 2014/52/EU)
- National Recovery Plan 2011-2014
- Infrastructure and Capital Investment 2012-16: Medium Term Exchequer Framework
- Smarter Travel – A Sustainable Transport Future – A New Transport Policy for Ireland 2009 – 2020 (2009)
- Ireland’s First National Cycle Policy Framework (2009)
- National Climate Change Strategy 2007 – 2012 (2007)
- Delivering a Sustainable Energy Future for Ireland – The Energy Policy Framework 2007 – 2020 (2007)
- National Renewable Energy Action Plan
- National Energy Efficiency Action Plan for Ireland 2007 – 2020 (2007)
- Sustainable Development – A Strategy for Ireland (1997)
- Wildlife Act of 1976
- Wildlife (Amendment) Act, 2000
- Actions for Biodiversity 2011-2016 Ireland’s National Biodiversity Plan, 2011
- The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)
- European Communities (Water Policy) Regulations of 2003 (SI 722 of 2003)
- European Communities (Water Policy) Regulations of 2003 (SI 350 of 2014)
- European Communities Environmental Objectives (Surface waters) Regulations of 2009 (SI 272 of 2009)
- European Communities Environmental Objectives (Groundwater) Regulations of 2010 (SI 9 of 2010)
- Water Pollution Acts 1977 to 1990
- Groundwater Protection Schemes
- Water Quality Management Plans

- European Communities (Urban Waste Water Treatment) Regulations 2001 (S.I. No. 254/2001)
- Water Services Act 2007
- Water Services (Amendment) Act 2012
- Water Services Act 2013
- National Spatial Strategy 2002-2020 (2002)
- Grid25 Implementation Programme
- National Landscape Strategy 2015
- National Rural Development Programme (draft/in preparation)
- National Forestry Programme 2014-2020 (draft/in preparation)
- National Peatlands Strategy (draft/in preparation)
- National Biodiversity Action Plan
- Flood Risk Management Plans arising from National Catchment Flood Risk Assessment and Management Programme (draft/in preparation)
- Greater Dublin Area Cycle Network Plan
- Note that this Plan incorporates the Sutton to Sandycove cycleway and the parts of the National Cycle Route Network, including parts of the Dublin to Galway Greenway Plan
- Regional & County Green Infrastructure Plans/Strategies – including any relevant Waterways Ireland plans/programmes
- River Basin Management Plans and associated Programmes of Measures
- Regional Planning Guidelines
- Development Plans including those for Dublin City, Fingal, Dún Laoghaire-Rathdown, South Dublin and Counties Meath, Kildare and Wicklow
- Planning Schemes for Strategic Development Zones e.g. Docklands, Grangegorman and Cherrywood
- Biodiversity Action Plans
- Heritage Plans
- County Landscape Character Assessments
- Special Amenity Area Orders
- Freshwater Pearl Mussel Sub-Basin Management Plans
- Local Catchment Flood Risk Management Plans

The Strategy must comply with relevant higher level strategic actions and may, in turn, guide lower level strategic actions.

The Strategy 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 3.13. 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 by 2015.

Section 3 Relevant aspects of the current state of the environment

3.1 Introduction

Reflecting the specifications in the SEA Directive, the relevant aspects of the current state of the environment for the following environmental components are summarised in this section: biodiversity and flora and fauna, population and human health, soil, water, air and climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors. The spatial scope of the Strategy generally corresponds to the jurisdictions of the seven local authorities of the Greater Dublin Area¹.

3.2 Likely Evolution of the Environment in the Absence of the Plan

The implementation of the Strategy 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 Strategy, including those relating to sustainable mobility;
- Loss of an extent of non-protected habitats arising from 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 public assets;
- 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 Strategy; and
- Loss of an extent of soil function arising from the replacement of semi-natural land covers with artificial surfaces.

In the absence of a new Strategy, none of the adverse effects detailed above would result due to the implementation of the Strategy. 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:

- Potential interactions with human health 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 upon ecology from transport emissions;
- Generation of construction waste;
- Loss or damage to public assets and 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;

¹ 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.

- Potential effects on protected and unknown archaeology and protected architecture arising from construction and operation activities; and
- Adverse impacts on the hydrogeological and ecological function of the soil resource as a result of construction of associated facilities/ infrastructure

In the absence of the Strategy, it is uncertain as to which projects would be progressed or prioritised. Lower-tier plans and projects would be less coordinated. It is uncertain as to whether the following positive effects (that would be facilitated by implementation of the Strategy) would be achieved:

In the absence of the Strategy and the investment in public transport, walking and cycling proposed, lower-tier plans and projects would be less coordinated and it is uncertain as to whether the following positive effects 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 cultural (archaeological and architectural) 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.

3.3 Air and Climatic Factors

Climatic Factors

The key issue involving the assessment of the effects of implementing the Strategy on climatic factors relates to greenhouse gas emissions arising from transport.

The Draft Strategy facilitates improvements in sustainable mobility, thereby facilitating reductions in and limiting increases of greenhouse gas emissions. Such emissions would occur otherwise with higher levels of motorised transport and associated traffic.

Ireland's emissions profile has changed considerably since 1990, with the contribution from transport more than doubling and the share from agriculture reducing since 1998.

Maximising sustainable mobility will help Ireland meet its emission target for greenhouse gases under the 2020 EU Effort Sharing target which commits Ireland to reducing emissions from those sectors that are not covered by the Emissions Trading Scheme (e.g. transport, agriculture, residential) to 20% below 2005 levels.

Figure 3.1 maps journeys by car taken as a percentage of all journeys taken (2011 base year) across the GDA. 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.

Ambient Air Quality

The EPA's (2014) *Air Quality in Ireland 2013* identifies that, overall, air quality in Ireland compares favourably with other EU Member States and continues to be of good quality relative to other EU countries.

The Draft Strategy facilitates improvements in sustainable mobility, thereby facilitating reductions in and limiting increases of emissions to air (including noise). Such emissions would occur otherwise with higher levels of motorised transport and associated traffic.

3.4 Population and Human Health

Most users of transport within the Greater Dublin Area will reside in and commute to and from urban/suburban areas. Figure 3.2 shows population density across the Greater Dublin Area per Electoral Division. 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 of the GDA (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 journeys via sustainable transport modes and associated positive environmental effects on energy usage, air and noise emissions.

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.

3.5 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.

Ecological designations include:

- Candidate Special Areas of Conservation² (cSACs) and Special Protection Areas³ (SPAs);
- UNESCO World Heritage and UNESCO Biosphere sites⁴;
- Ramsar Sites⁵;
- Salmonid Waters⁶;

² cSACs 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) by the DECLG due to their conservation value for habitats and species of importance in the European Union. The sites are *candidate* sites because they are currently under consideration by the Commission of 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.

³ 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 - by the DECLG due to their conservation value for birds of importance in the European Union.

⁴ 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.

⁵ 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 and 2000 or the Birds or Habitats Directives.

- Shellfish Waters⁷;
- Freshwater Pearl Mussel catchments⁸;
- Flora Protection Order⁹ sites;
- Wildlife Sites (including Nature Reserves¹⁰);
- Certain entries to the Water Framework Directive Register of Protected Areas¹¹;
- Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)¹²;
- Wildfowl Sanctuaries (see S.I. 192 of 1979)¹³; and
- Tree Preservation Orders (TPOs)¹⁴.

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, 1976-2000, 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)¹⁵;

⁶ 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*).

⁷ 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.

⁸ 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.

⁹ The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 1999.

¹⁰ 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.

¹¹ 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.

¹² 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.

¹³ 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.

¹⁴ TPOs are a planning mechanism whereby individual trees or groups of trees can be identified as important and protected by a TPO.

¹⁵ 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.

- Watercourses, wetlands and peatlands;
- Other relevant County Development Plan designations;
- The EPA's Framework National Ecological Network for Ireland¹⁶; and
- Other sites of high biodiversity value or ecological importance, e.g. 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.

Figure 3.3 maps Natura 2000 sites within 15km of the Strategy Area. The greatest extent of area designated within the GDA comprises the Wicklow Mountains. Lands at the coastal margins and coastal waters adjacent to the GDA are also designated. Other Natura 2000 designations within the GDA 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).

Natural Heritage Areas (NHAs), proposed NHAs and areas likely to contain habitats listed on Annex I of the Habitats Directive are illustrated on Figure 3.4. Where they occur, pNHA and NHA designations often overlap with Natura 2000 site boundaries and 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 landcover 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. These areas cover much of the uplands and foothills of County Wicklow, the bogs in Kildare and smaller pockets elsewhere.

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 by the assessment.

The Department of Arts, Heritage and the Gaeltacht's Article 17 report on the Status of EU Protected Habitats and Species in Ireland (2013) identifies many Irish habitats to be of unfavourable status and many to be still declining, although it also identifies that a range of positive actions are underway. The report identifies that the majority of EU-protected species are, however, in "Favourable" status in Ireland, and stable, although a small number are considered to be in "Bad" status and continue to require concerted efforts to protect them.

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

¹⁶ 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.

3.6 Material Assets

Resources that are valued and that are intrinsic to specific places are called 'material assets'.

Public Assets and Infrastructure

Public assets and infrastructure which have the potential to be impacted upon by the development of transport infrastructure, if unmitigated, include 'on the ground' resources such as public open spaces, parks and recreational areas; public buildings and services; utility infrastructure (electricity, gas, telecommunications, water supply, wastewater infrastructure etc.). Within the Strategy area, these resources are generally located within the immediate outskirts of urban/suburban areas.

Land

The development of transport infrastructure and services has the potential to assist with 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. Within the Strategy area, brownfield lands are generally located within urban/suburban areas.

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. The Strategy area is located within the Eastern-Midlands Region. Draft waste management plans for each waste management region were published for public consultation in November 2014.

3.7 Water

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" by 2015. 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 by 2015.

A potential water sensitivity map (see Figure 3.5) 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 GDA. Layers relating to water sensitivity taken into account by the mapping include the following:

- WFD River, Coastal, Transitional Waters of Moderate / Poor / Bad Status
- WFD Groundwater of Poor Status
- Geological Survey of Ireland (GSI) Groundwater Vulnerability Extreme or Karst
- GSI Groundwater Vulnerability High
- WFD Register of Protected Area (RPA) Entries for Drinking Water (surface and ground), Bathing Waters, Shellfish Waters, Salmonid Rivers and Nutrient Sensitive Areas

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.

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 Strategy - will need to be adhered to at lower tiers of decision making in order to ensure that the implementation of the Strategy 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.

Rivers throughout the region show up as being sensitive. Heightened sensitivities arising from groundwater data are found in much of County Wicklow, North-West and East Meath, Dublin County and central Kildare. Sensitivity is also attached to coastal areas. Figure 3.5 should be viewed alongside Figure 3.3 and Figure 3.4 which provide information including ecological designations.

3.8 Landscape

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; landcover, 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 landcover.

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.

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

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. The CORINE Land Cover map is based on interpretation of satellite images.

Three categories of potential landcover sensitivity have been identified within the GDA on Figure 3.6 by combining the following landcover layers:

Category 1 Robust Landcover

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 Landcover

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 Landcover

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

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

3.9 Cultural 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. Archaeological heritage is protected under the National Monuments Acts (1930-2004), Natural Cultural Institutions Act 1997 and the Planning Acts. 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 by the government. Monuments are concentrated within urban/suburban areas and are less common in areas which are not settled.

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. Records of Protected Structures are legislated for under Section 12 and Section 51 of the Planning and Development Act 2000 as amended. 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. 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.

3.10 Soil

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).

3.11 Overall Environmental Sensitivities and Opportunities/Robustness

Some of the environmental information summarised under previous subsections has been weighted and mapped to show overall environmental sensitivity (see Figure 3.7) and overall environmental

robustness (see Figure 3.8) with regard to the development of transport projects. The purpose of the map is to indicate at a regional level where the main concentrations of sensitivities might occur within and surrounding the GDA.

The maps are prepared at the regional scale and different layers or weightings would produce different map outputs. 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.

Environmental Sensitivities

For the environmental sensitivity mapping, 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 within the GDA 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 adjacent to the GDA are also sensitive, especially within and to the north of Dublin Bay. Lower levels of sensitivity occur elsewhere.

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 Strategy - will need to be adhered to at lower tiers of decision making in order to ensure that the implementation of the Strategy contributes towards environmental protection.

Environmental Opportunities/Robustness

For the environmental opportunities/robustness mapping, areas with higher environmental robustness are indicated by darker green colours, areas with moderate environmental robustness are indicated by yellow colours and areas with lower environmental robustness are indicated with red/pink colours.

Heightened areas of robustness within the GDA 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 robustness occur elsewhere.

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

3.12 Appropriate Assessment

A Stage 2 Appropriate Assessment (AA) has been undertaken alongside the Draft Strategy. The requirement for AA is provided under the EU Habitats Directive (Directive 1992/43/EEC). The AA concluded that the Strategy will not affect the integrity of the Natura 2000 network¹⁷.

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

¹⁷ Except as provided for in Section 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.

3.13 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. SEOs used in the assessment (this assessment is detailed in the main SEA Environmental Report) are as follows:

- *To facilitate a reduction in travel related emissions (including pollutants, noise and greenhouse gas emissions) to air*
- *To encourage modal change from car to more sustainable forms of transport*
- *To facilitate a reduction in energy use by the transport sector*
- *To develop transport infrastructure and services closer to urban/suburban areas*
- *To protect populations and human health from exposure to incompatible landuses*
- *To contribute towards compliance with the Habitats and Birds Directives with regard to the protection of Natura 2000 Sites and Annexed habitats and species¹⁸*
- *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 act 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*
- *To avoid 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 1976-2010 with regard to the protection of listed species*
- *To contribute towards the protection of public assets and infrastructure*
- *To assist with the reuse and regeneration of brownfield sites*
- *To reduce waste volumes, minimise waste to landfill and increase recycling and reuse*
- *To contribute towards the maintenance and improvement, where possible, of the quality and status of surface waters*
- *To contribute towards the protection of groundwater against pollution and contamination*
- *To comply as appropriate with the provisions of the Planning System and Flood Risk Management: Guidelines for Planning Authorities*
- *To avoid or, where infeasible, minimise conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities*
- *To contribute towards the protection of archaeological heritage including entries to the Record of Monuments and Places and/or their context*
- *To contribute towards the protection of architectural heritage including entries to the Records of Protected Structures and Architectural Conservation Areas and their context*
- *To minimise damage to the hydrogeological and ecological function of the soil resource*

¹⁸ '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.

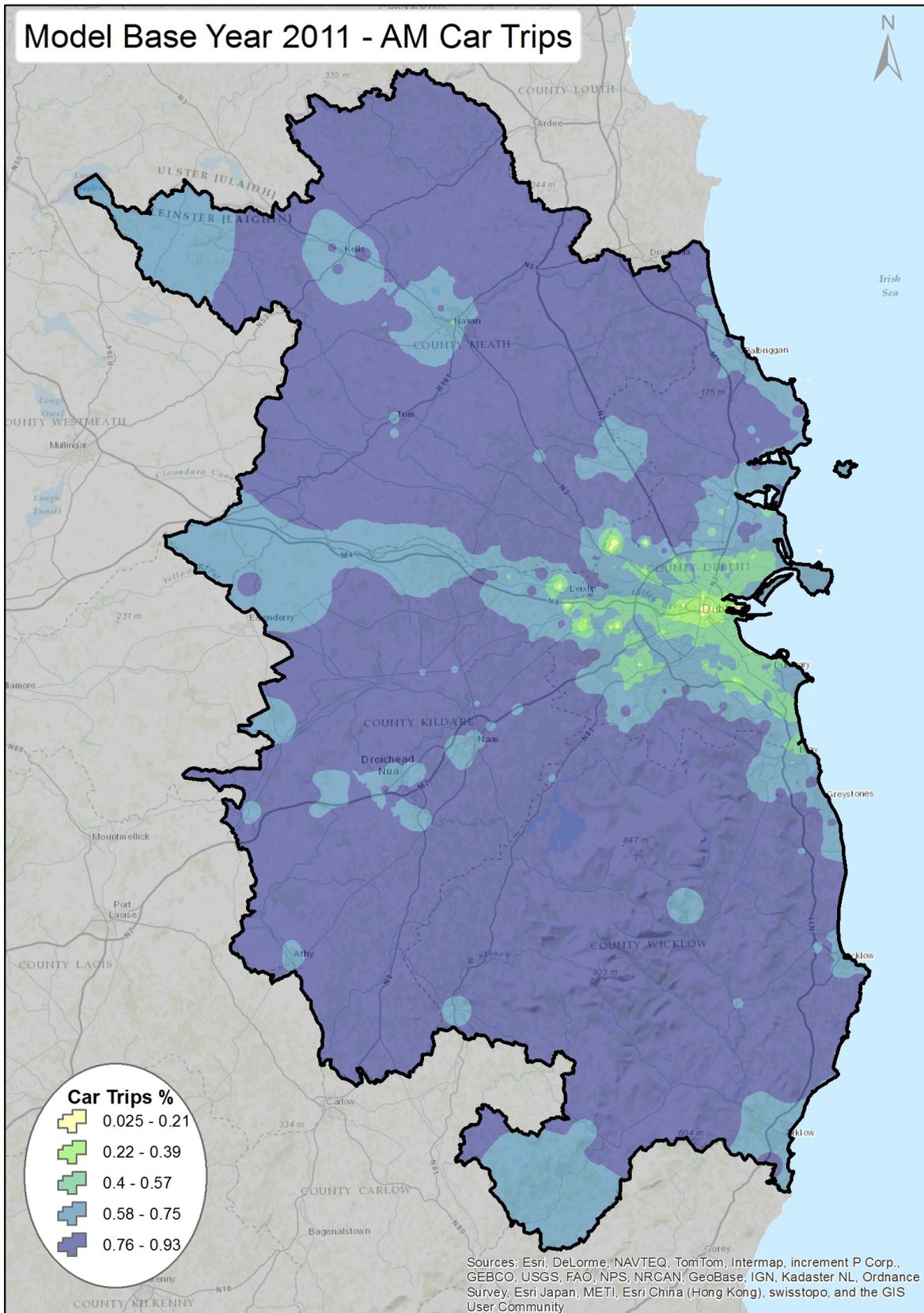


Figure 3.1 Journeys by car taken as a percentage of all journeys taken (2011 base year)

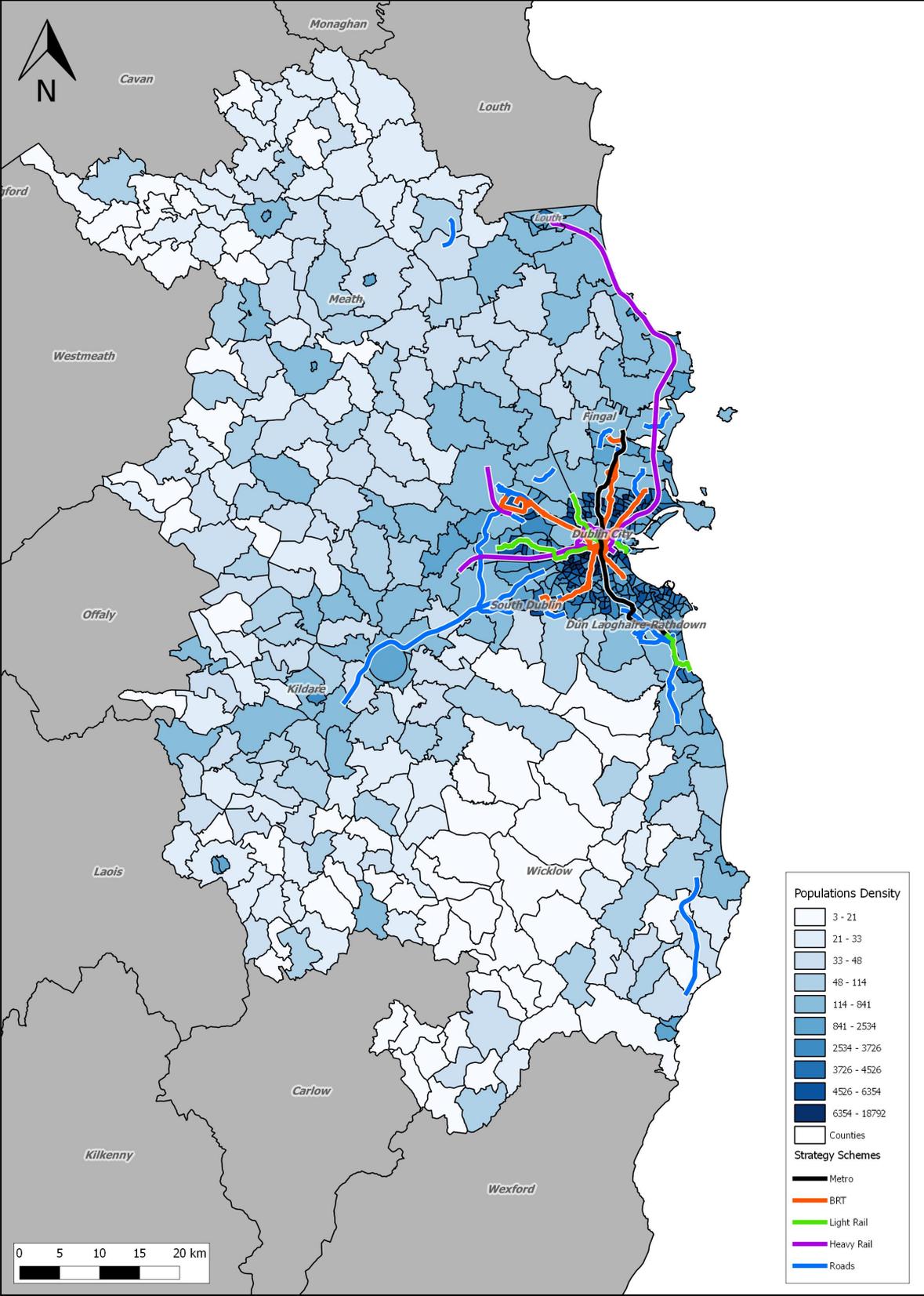


Figure 3.2 Population Density

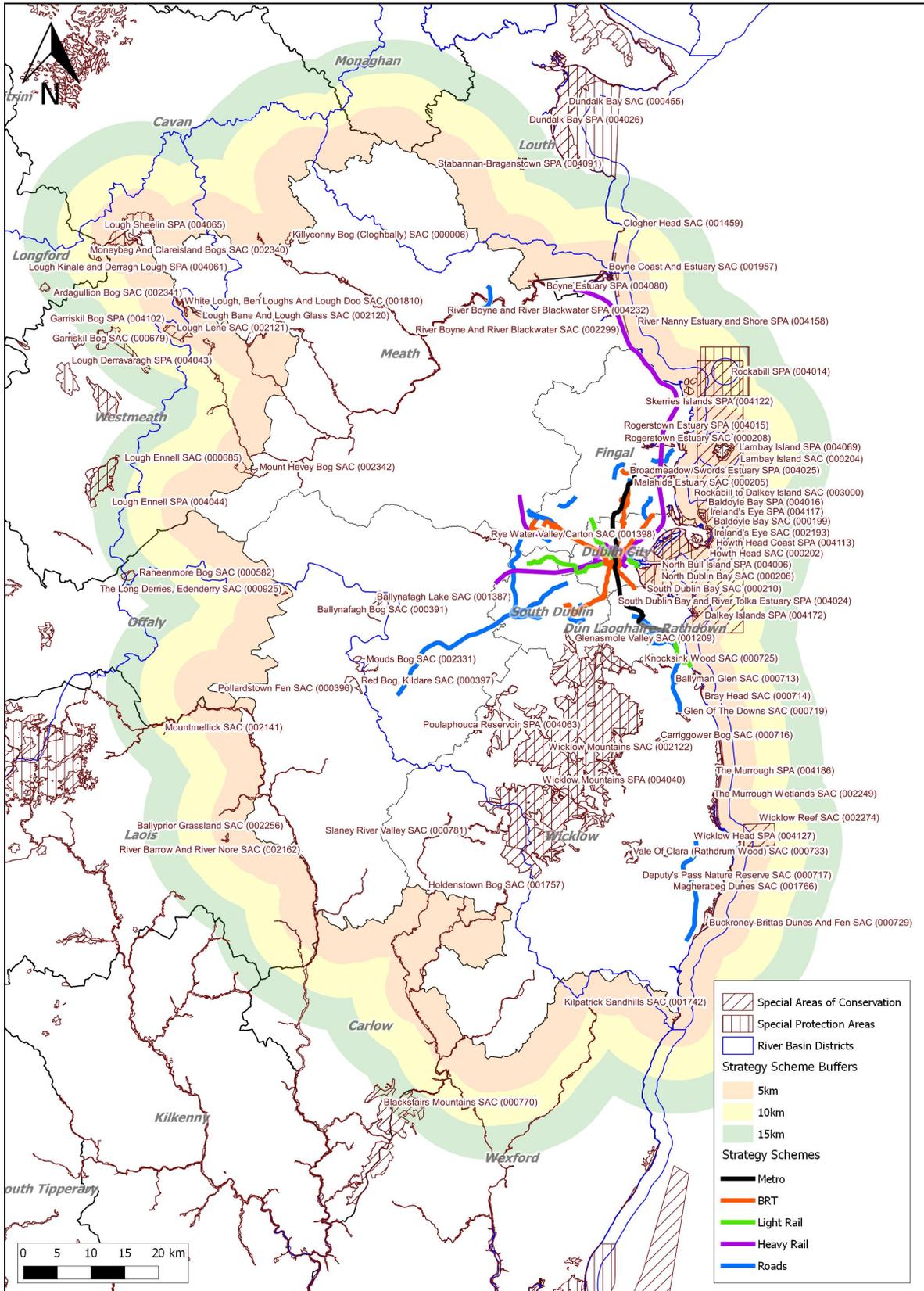


Figure 3.3 Natura 2000 sites within 15 km of the Strategy Area and River Basin Districts

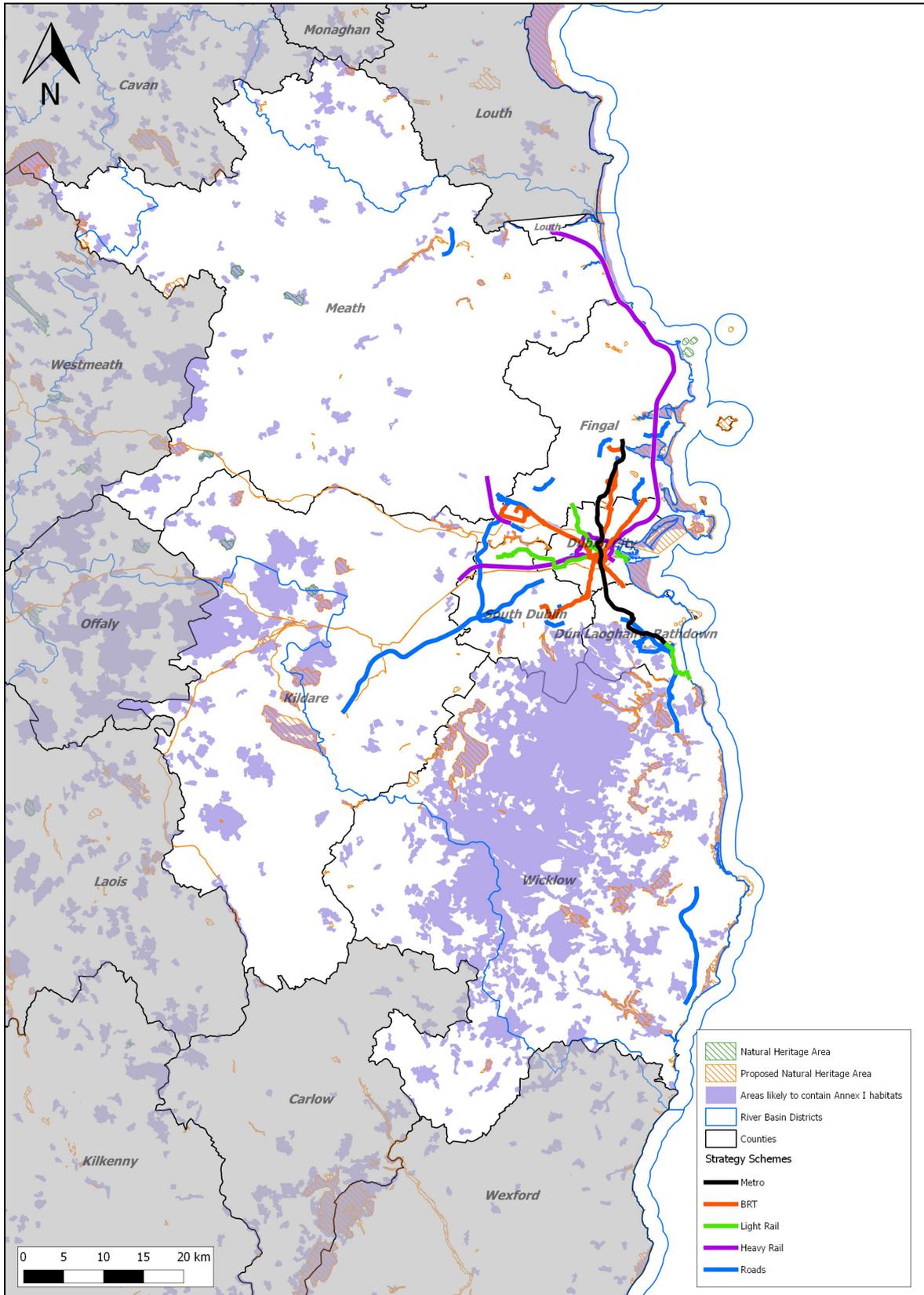


Figure 3.4 Potential Habitat Sensitivity: Natural Heritage Areas (NHAs), proposed NHAs and areas likely to contain Annex I Habitats

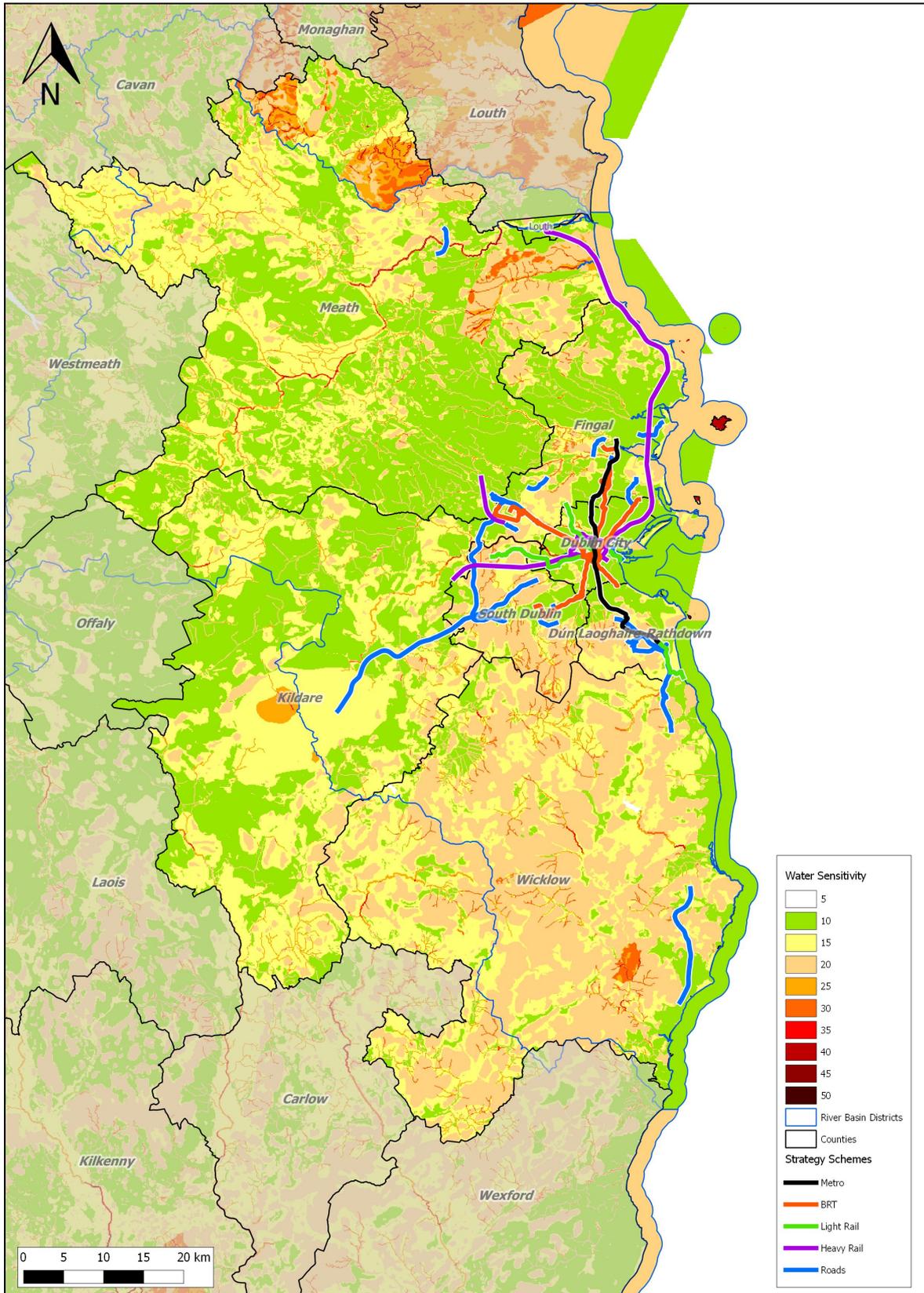


Figure 3.5 Potential Water Sensitivity

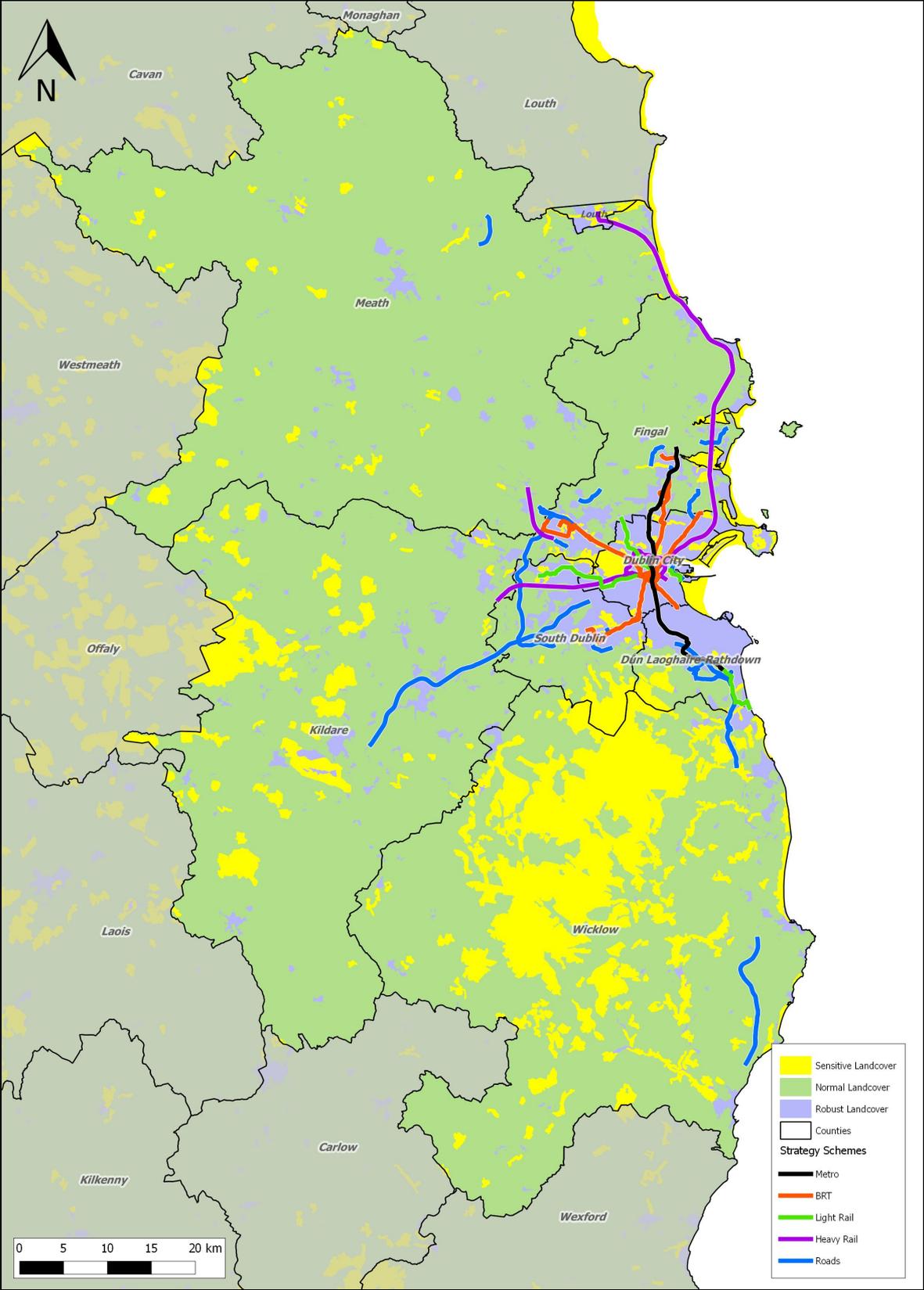


Figure 3.6 Potential Landcover Sensitivity Mapping

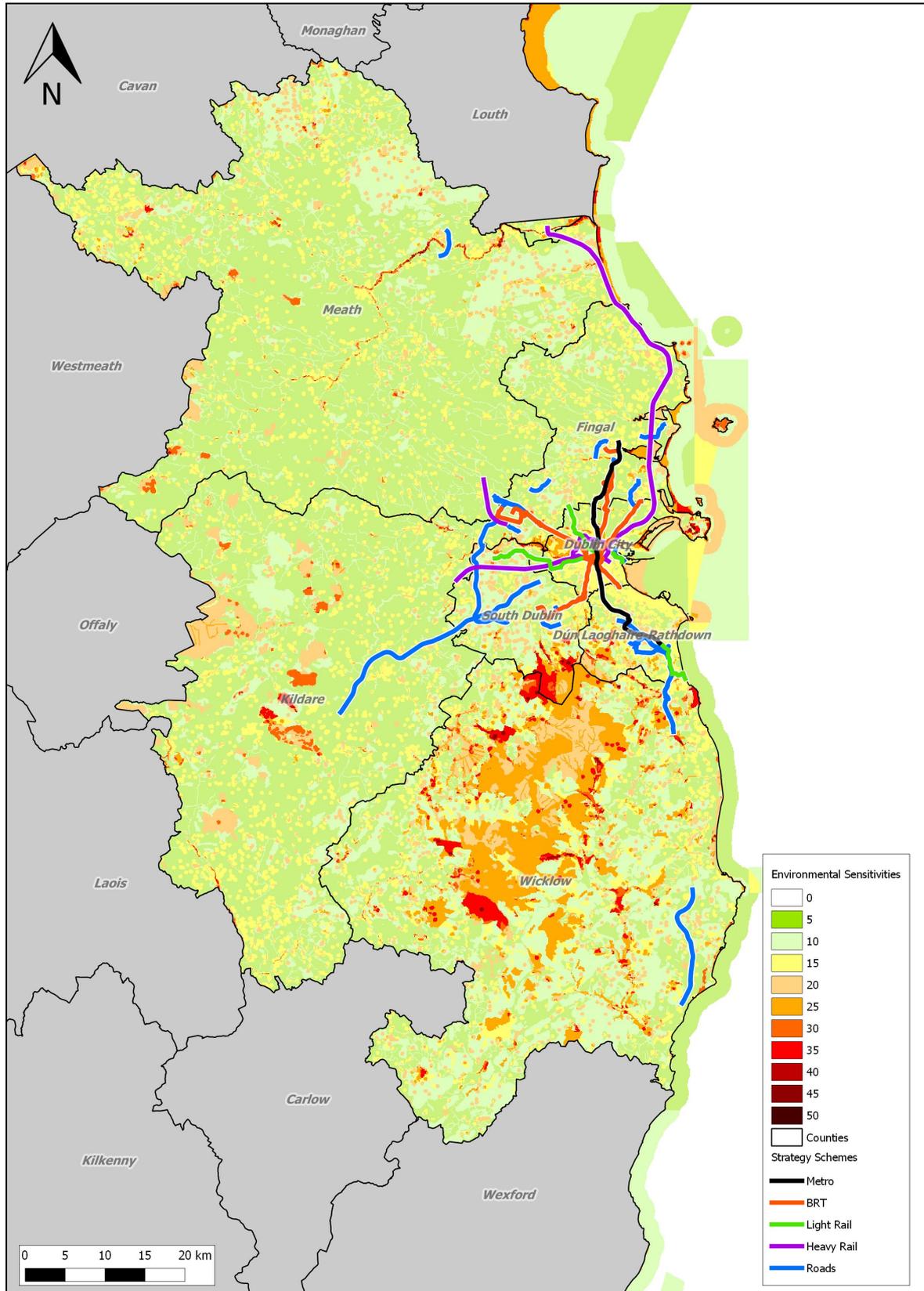


Figure 3.7 Overall Potential Environmental Sensitivity

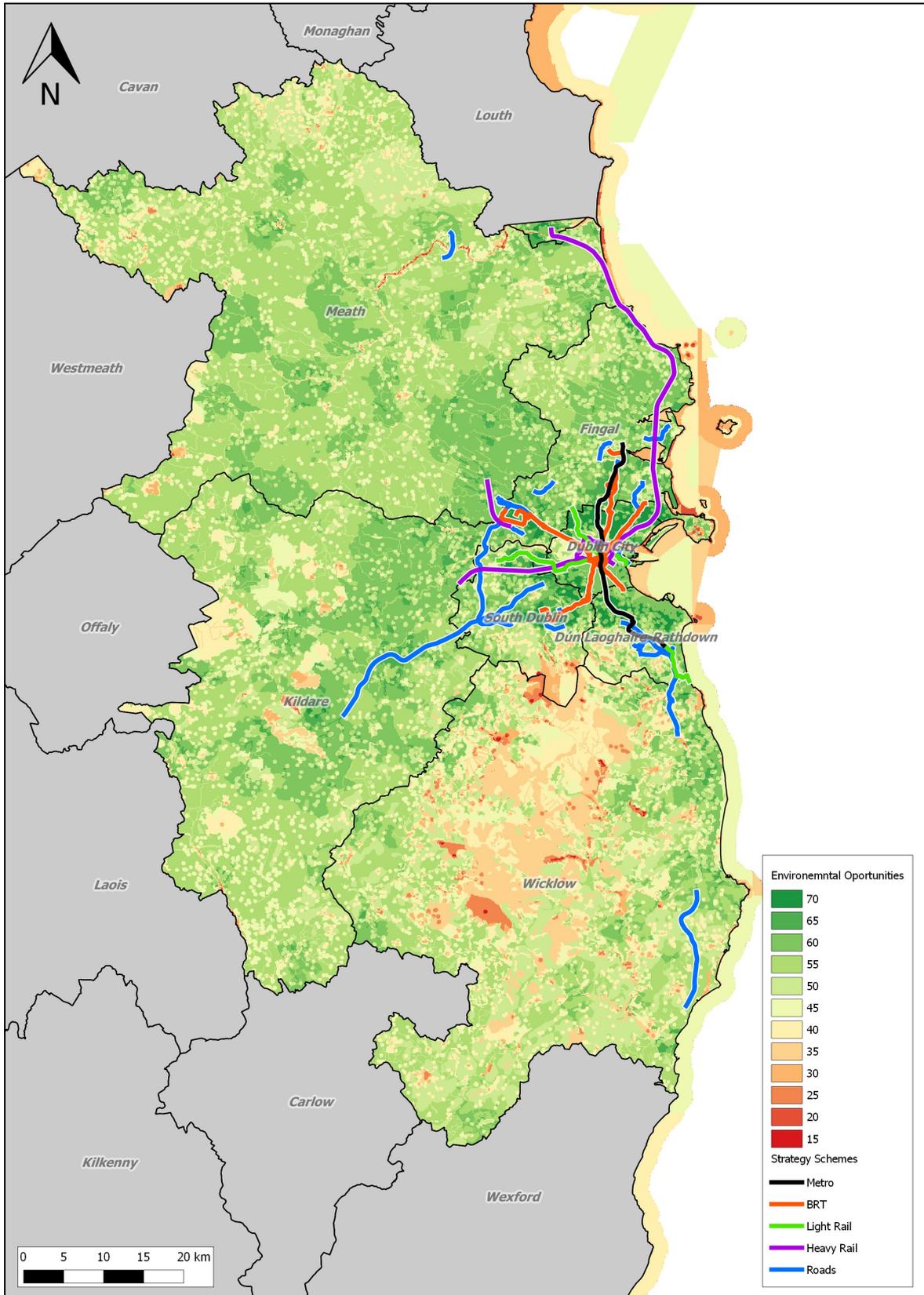


Figure 3.8 Overall Potential Environmental Opportunities/Robustness

Section 4 Effects of Alternatives and the Plan

4.1 Summary of Alternatives

The following three main alternatives are examined:

Alternative 1: Orderly Provision of Transport

All elements of the Transport Strategy for the Greater Dublin Area will be implemented in an orderly fashion according to priorities based on transport demand within a larger regional context of patterns of demography and economic activity occurring broadly in line with forecast trends and current plans.

Alternative 2: Uneven Provision of Transport

Most major elements and targets of the Transport Strategy are implemented – in broad outline – with some significant delays or omissions that tend to discourage growth in central areas and inner suburbs, and attract development into peripheral suburban areas close to the M50 and into the coastal strip.

Alternative 3: Under Provision of Transport

A rapid, overheating Dublin-centred economic recovery producing high levels of economic and demographic development concentrated into East Leinster. The effects of such development is worsened because this occurs in circumstances, similar to Scenario 2, where development of critical elements of transportation infrastructure has been delayed or disrupted.

4.2 Summary of Evaluation of Alternatives

Alternative 1: Orderly Provision of Transport

Alternative 1, orderly provision of transport and associated sustainable patterns of land-use and mobility, would:

- 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.
- Provides for the development of transport infrastructure and services in locations which will facilitate use by those living and working in urban/suburban areas.
- 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.
- 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 soil.
- 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).

- 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 light rail/metro.
- 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 have been the subject of SEA and AA which have facilitated 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.

Alternative 2: Uneven Provision of Transport

Alternative 2, uneven provision of transport and associated uneven patterns of land-use and mobility, would:

- Result in both: 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 [LUAS, DART and Commuter rail]. 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. By reducing the potential for plan-led, integrated development, this alternative would also be likely to result in a reduced efficiency of energy resource utilisation.
- In some locations, not providing enough transport infrastructure and services to maximise use by those living and working in urban/suburban areas.
- Result in mixed effects on ecology (including designated sites, ecological connectivity, habitats), as significant delays or omissions in the implementation of elements of the Strategy would tend to concentrate development into the immediate hinterland of the M50 – both inside and outside – and into the coastal strip. Urbanised areas would continue to benefit, to a lesser extent, from increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites; however, vulnerable coastal fringe areas and certain terrestrial areas with heightened sensitivity e.g. north Wicklow would be subject to occasional pressures and conflicts.
- Result in mixed effects on landscape, architectural and archaeological heritage and ecology – with occasional pressures and conflicts – due to lower utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites combined with sporadic green-field developments outside of planned cores. Both beneficial and adverse effects would be present.
- Result in mixed effects on waters – urbanised areas will continue to benefit from 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 – however vulnerable coastal fringe areas and sensitive terrestrial areas (especially in North Kildare and South Meath) will be subject to higher pressures and more conflicts than under Alternative 1.

Alternative 3: Under Provision of Transport

Alternative 3, under provision of transport and resultant un-coordinated and unsustainable patterns of land-use and mobility, would:

- Result in a delay/deferral of critical transport infrastructure and ensuing dispersed pattern of development which would make it increasingly difficult to find concentrations of development

that would justify the cost-benefit assessments of public capital projects; a spiral of dysfunctional land-use patterns that are highly car-dependent will persist with 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, with resultant adverse effects on greenhouse gas emissions, noise emissions and other emissions to air (with associated effects on human health) as well as energy usage.

- Fail to locate enough transport infrastructure and services in locations which will maximise use by those living and working in urban/suburban areas.
- Result in mixed effects on ecology, as significant delays or omissions in the implementation of elements of the Strategy would tend to concentrate development into the immediate hinterland of the M50 – both inside and outside – and into the coastal strip. Urbanised areas would not benefit to the same extent from increased utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites as under Alternatives 1 and 2. Additionally vulnerable coastal fringe areas and sensitive terrestrial areas – especially in north Wicklow would be subject to occasional pressures and conflicts.
- Result in sustained ecological pressure on the terrestrial and marine environment of the region (including designated sites, ecological connectivity, habitats) as weakly co-ordinated, market-led development puts pressure on vulnerable coastal fringe areas and sensitive terrestrial areas (especially in north Wicklow) giving rise to continuous and significant pressures and conflicts on the Region’s biodiversity and flora and fauna, including designated sites.
- Result in significant adverse effects on the region’s ground and surface waters due to higher levels of weakly co-ordinated development outside established and serviced settlement centres – indeed significant developments in areas without installed/upgraded water services will lead to conflicts in delivering Water Framework Directive targets that will eventually impede further growth. Vulnerable coastal fringe areas and sensitive terrestrial areas (especially in North Kildare and South Meath) will be significantly subjected to pressures and conflicts in relationship to the availability of water services.
- Result in mixed effects on landscape, architectural and archaeological heritage and ecology – with occasional pressures and conflicts – due to far lower utilisation of lands within existing development boundaries and use of existing utilities and brownfield sites combined with sporadic green-field developments outside of planned cores. Both beneficial and adverse effects would be present.

4.2.1 Outcome of the Assessment

The most preferable outcome from the Alternatives Assessment is Alternative 1 and the full and orderly build-out of the strategy, with a high degree of integration between transport planning and land-use development.

This alternative facilitates the greatest 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. Such emissions would occur otherwise with higher levels of motorised transport and associated traffic. Among other positive environmental effects, this alternative facilitates 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 light rail/metro, cycling and walking.

There are potentially significant adverse effects arising from the alternative and these have been detailed and are tabulated overleaf. These effects will be mitigated by the various provisions which have been integrated into the Strategy. These mitigating provisions together with the contribution that the Strategy will make to sustainable mobility will mean that the selected alternative which has been developed for the Draft Strategy facilitates various significant positive effects upon environmental components.

Table 4.1 below details the various effects with respect to *Alternative 1: Orderly Provision of Transport* which has been developed as the Draft Strategy and placed on public display. By complying with appropriate mitigation measures - including those which have been integrated into the Draft Strategy – potentially significant adverse environmental effects which could arise as a result of implementing the Strategy would be likely to be avoided, reduced or offset. Residual adverse environmental effects would be generally non-significant. Significant residual adverse effects would be in compliance with the relevant environmental protection legislation.

Table 4.1 Summary of Effects of Implementing the Draft Strategy

Environmental Component	Significant Positive Effect, likely to occur	Potentially Significant Adverse Effect, if unmitigated	Residual Adverse Effect
Air and climatic factors	<ul style="list-style-type: none"> • Facilitates contribution towards a shift from car to more sustainable and non-motorised transport modes • Facilitates contribution towards managing traffic flows and associated adverse effects on air quality • Facilitates contribution towards reductions in travel related greenhouse gas and other emissions to air 	<ul style="list-style-type: none"> • Emissions to air 	<ul style="list-style-type: none"> • An extent of travel related greenhouse gas and other emissions to air. This has been mitigated by provisions which have been integrated into the Strategy, including those relating to sustainable mobility.
Population and human health	<ul style="list-style-type: none"> • Facilitates contribution towards the protection of human health as a result of contributing towards the protection of environmental vectors, especially air • Provides for the development of transport infrastructure and services in locations which will facilitate use by those living and working in urban/suburban areas 	<ul style="list-style-type: none"> • Potential interactions if effects upon environmental vectors such as air are not mitigated 	<ul style="list-style-type: none"> • An extent of travel related greenhouse gas and other emissions to air. This has been mitigated by provisions which have been integrated into the Strategy, including those relating to sustainable mobility.
Biodiversity and flora and fauna	<ul style="list-style-type: none"> • 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. • Facilitates contribution 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 	<ul style="list-style-type: none"> • 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 from transport emissions 	<ul style="list-style-type: none"> • Loss of an extent of non-protected habitats arising from the replacement of semi-natural land covers with artificial surfaces • Losses or damage to ecology (these would be in compliance with relevant legislation)

Environmental Component	Significant Positive Effect, likely to occur	Potentially Significant Adverse Effect, if unmitigated	Residual Adverse Effect
Material Assets	<ul style="list-style-type: none"> Facilitates contribution towards the protection of public assets and infrastructure such as: public open spaces, parks and recreational areas; public buildings and services; utility infrastructure (electricity, gas, telecommunications, water supply, wastewater infrastructure etc.) Facilitates 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. Facilitates appropriate waste management 	<ul style="list-style-type: none"> Generation of construction waste Loss or damage to public assets and infrastructure 	<ul style="list-style-type: none"> Residual wastes (these would be disposed of in line with higher level waste management policies) Potential residual losses to public assets
Water	<ul style="list-style-type: none"> Facilitates 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Flood related risks remain due to uncertainty with regard to extreme weather events
Landscape	<ul style="list-style-type: none"> Contribution towards the protection of landscape designations by facilitating compliance with relevant plans 	<ul style="list-style-type: none"> Occurrence of adverse visual impacts and conflicts with the appropriate protection of statutory designations relating to the landscape 	<ul style="list-style-type: none"> Residual visual effects (these would be in compliance with landscape designation provisions)
Cultural Heritage	<ul style="list-style-type: none"> Contribution towards the protection of cultural heritage by facilitating compliance with relevant legislation Facilitates the enhancement of cultural (archaeological and architectural) 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. 	<ul style="list-style-type: none"> Potential effects on protected and unknown archaeology and protected architecture arising from construction and operation activities 	<ul style="list-style-type: none"> 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 Strategy
Soil	<ul style="list-style-type: none"> Facilitates contribution towards the protection of environment from contamination arising from brownfield development Facilitates contribution towards the protection of features or areas of geological / geomorphological interest 	<ul style="list-style-type: none"> Adverse impacts on the hydrogeological and ecological function of the soil resource as a result of construction of associated facilities/ infrastructure 	<ul style="list-style-type: none"> Loss of an extent of soil function arising from the replacement of semi-natural land covers with artificial surfaces

4.3 Overall Findings

The overall findings of the SEA are that:

- **Compliance with Legislation and Guidelines – Environmental Protection and Sustainable Development**

The National Transport Authority have integrated all recommendations arising from the SEA and Appropriate Assessment processes into the Transport Strategy, facilitating compliance of the Strategy with various European and National legislation and Guidelines relating to the protection of the environment and the achievement of sustainable development.

- **Improvements in Sustainable Mobility and Associated Effects (emissions, noise and energy usage)**

The Strategy facilitates 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 a reduction/limit of increases in greenhouse gas emissions, noise emissions, other emissions to air and energy usage. Such emissions would occur otherwise with higher levels of motorised transport and associated traffic.

- **Positive Effects in Urban Areas (including cultural heritage)**

Among other positive environmental effects, the Strategy facilitates 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 light rail/metro, cycling and walking.

- **Potentially Significant Adverse Effects to be mitigated**

There are potentially significant adverse effects arising from the alternative and these have been detailed and these effects will be mitigated by the various provisions which have been integrated into the Strategy including those which have arisen through the SEA and AA processes (these are summarised at Section 5.1). These mitigating provisions together with the contribution that the Strategy will make to sustainable mobility means that the Draft Strategy facilitates various significant positive effects upon environmental components.

Chapter 9 of the Transport Strategy provides a summary – based on detailed analysis and modelling – of how the strategy will meet the demand for travel in 2035 how the revised networks are expected to perform; and the benefits which will accrue from the implementation of the Strategy. Key issues identified include:

- **Performance of the Transport Network**

To meet the forecast growth in travel demand, a number of network improvements are proposed, particularly in relation to public transport, but also in order to facilitate an increase in the level of walking, cycling and car use. While the emphasis is on public transport for trips over 3km, additional road capacity is essential to support the investment in strategic National Roads and to facilitate increased speed and convenience for public transport, walking and cycling. As such, a number of road schemes form part of the Strategy, however, the bulk of the increase in travel demand will be catered for by non-car modes.

- **Performance of the Road Network**

The Strategy aims to facilitate the forecast growth in travel demand without significantly impacting on the road network. In general, the performance of road network in the GDA will improve.

- **Performance of the Public Transport Network**

The Strategy proposes a considerable expansion of the GDA's public transport network.

- **Mode Share**

The implementation of the Strategy will have a significant positive impact on the objective of reducing the proportion of all trips undertaken by private car from 59.9%, in 2011, to 52.2% in 2035¹⁹, with a corresponding positive impact on the proportions using public transport, walking and cycling.

- **Journey Time**

The area within 1 hour's travel time to the city centre is far more extensive in the future and accordingly, the areas within shorter journey times are correspondingly greater. Of particular note, is the impact of Metro Swords on the northern corridor, including Dublin Airport, which facilitates significantly shorter journey times within this area.

- **Land Use Benefits**

The implementation of the Strategy will facilitate a more efficient use of land within the GDA and will improve the accessibility of central areas, which will potentially lead to the greater consolidation of trip intensive developments such as employment and retail into locations served by public transport.

The NTA also undertook environmental assessment as part of the modelling which was undertaken in conjunction with the preparation of the Strategy. Detailed consideration was given to emissions, noise and severance as follows:

- **Modelled Emissions**

All types of vehicle emissions (Carbon Monoxide, Carbon Dioxide, Nitrous Oxides and Hydrocarbons) reduce under the Transport Strategy. This highlights the air quality improvements for the GDA associated with the introduction of the GDA Transport Strategy provisions

- **Modelled Noise**

There is significant improvements to noise levels within the Core City Centre network, where the Dublin City Centre Transport Plan measures are implemented.

- **Modelled Severance**

There is significant improvements to severance within the Core City Centre Network, where the Dublin City Centre Transport Plan measures are implemented. Substantial improvements to severance are noted on the quays, and at the Westmoreland Street / D'Olier Street public transport interchange area.

¹⁹ Transport model output for all trip purposes, AM peak (2011 & 2035)

Section 5 Mitigation and Monitoring Measures

5.1 Mitigation

Transport is one of many sectors operating in the Greater Dublin Area and the Transport Strategy is expected to facilitate improvements in environmental management and protection within this area. There are various positive environmental effects likely to be facilitated by the implementation of the Strategy and these have been detailed under the preceding sections.

The SEA and AA processes which have been undertaken alongside the preparation of the Strategy have brought about changes to the emerging Strategy thereby enabling the mitigation of any potentially adverse environmental effects. All recommendations made by the SEA and AA processes were integrated into the Draft Strategy. The changes which have been brought about by the SEA and AA processes are summarised as follows:

- Amendments throughout Draft Strategy text
- Insertion of Section 8 entitled “Environmental Protection and Management” into the Transportation Strategy. This section includes measures covering the following:
 - Regulatory framework for environmental protection and management
 - Information to be considered at lower levels of decision making and environmental assessment
 - Corridor and Route Selection Process for relevant new infrastructure
 - Appropriate Assessment
 - Protection of Natura 2000 Sites
 - Other Measures²⁰

5.2 Monitoring

The Environmental Report contains proposals for monitoring the potential significant effects of implementing the Strategy, if unmitigated, which are adopted alongside the Strategy. Monitoring enables, at an early stage, the identification of unforeseen adverse effects and the undertaking of appropriate remedial action.

Monitoring is an ongoing process and the Programme allows for flexibility and the further refinement of indicators and targets. The Monitoring Programme may also be updated to deal with specific environmental issues - including unforeseen effects - as they arise.

A stand-alone Monitoring Report on the significant environmental effects of implementing the Strategy will be prepared in advance of the review of the Strategy. This report will address the indicators set out below. The National Transport Authority is responsible for the ongoing review of indicators and targets, collating existing relevant monitored data, the preparation of monitoring evaluation report(s), the publication of these reports and, if necessary, the carrying out of corrective action, in combination with the relevant authorities.

²⁰ These include measures relating to: Construction and Environmental Management Plans; Maintenance Plan; Air and Energy Human Health; Protection of Biodiversity including Natura 2000 Network; NPWS & Integrated Management Plans; Coastal Zone Management; Biodiversity and Ecological Networks; Protection of Riparian Zone and Waterbodies and Watercourses; Non-Designated Sites; Non-native invasive species; National Peatlands Strategy; Construction Waste; Waste Creation; Waste Disposal; Public Assets and Infrastructure; Water Framework Directive and associated legislation; River Basin Management Plan; Bathing Water; Flood Risk Management Guidelines; Surface Water Drainage and Sustainable Drainage Systems (SuDs); Landscape Designations; Coastal Areas and Seascapes; National Landscape Strategy; Archaeological Heritage; Protection of Archaeological Sites; Consultation; Underwater Archaeological Sites Architectural Heritage; Soil Protection and Contamination; Areas of geological interest