

Environmental Report

Volume 1 - Non Technical Summary

Greater Dublin Area **Draft Transport Strategy** **2011-2030** **2030 vision**



NTS 1 INTRODUCTION

NTS 1.1 INTRODUCTION TO THE NTS

This document comprises the Non-Technical Summary (NTS) of the draft **Environmental Report** for *2030Vision*, the Preliminary Draft Transport Strategy for the Greater Dublin Area (GDA) prepared by the National Transport Authority (NTA).

This chapter provides a brief overview of the NTS of the Environmental Report; its contents and structure; and the background and context to *2030Vision*.

As this is a summary document, the reader is directed to the Environmental Report for further and more detailed information on the SEA of *2030Vision*.

NTS 1.2 BACKGROUND TO THE SEA OF 2030VISION

The requirement to undertake an SEA is based on Directive 2001/42/EC ('SEA Directive') which was transposed into Irish Law under two sets of Irish Regulations. These regulations require that the plans and programmes of certain sectors (including transport), which are likely to have significant effects on the environment, be subject to environmental assessment. This process is called SEA.

This SEA is being carried out in accordance with S.I. 435 of 2004, which is focused on a range of sectoral plans and programmes such as transport, water, waste, forestry and energy.

The *2030Vision* SEA process considered SEA guidance provided by the Environmental Protection Agency (EPA): *Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland* (2003). This guidance document provided advice on the overall SEA process as well as specific advice on the SEA scoping process, preparation of the Environmental Report and on monitoring. The Department of Environment, Heritage and Local Governments' SEA guidelines (*Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning Authorities*, 2004) were also used in this SEA process.

NTS 2.1 OVERVIEW

The Preliminary Draft Transport Strategy is not a standalone document – it is the top level in a hierarchy of transport plans for the GDA that will include an Implementation Plan and Strategic Traffic Management Plan, both of which will be published by the Authority after the adoption of this Strategy.

The Preferred Strategy objectives can be grouped into economic, social and environmental categories. The Strategy aims to meet:

- *Economic objectives* by reducing delays and improving journey time reliability, particularly for business travel and the movement of goods, and by improving access to and within town centres;
- *Social objectives* by improving safety, reducing travel related stress and reducing the adverse impacts of traffic on neighbourhoods and centres whilst enabling all sectors of society to travel to the destinations they need to reach; and
- *Environmental objectives*, by giving priority to those means of travel that are less damaging to our natural and built environment.

NTS 2.2 KEY ELEMENTS

The Preferred Strategy can be broadly divided into four main components and these are:

1. Planning for sustainable living;
2. Walking and Cycling;
3. Public Transport;
4. Roads, Freight and Travel Demand Management

Some of the key measures within these elements include:

- A three-tier settlement hierarchy, linked to the RPG settlement categorization. The three categories are Dublin City, Designated Towns and Designated Districts. This hierarchy will guide future urban and transport planning in the GDA.
- Measures that support walking and cycling include restrictions on motorised traffic and traffic speeds travelling through the heart of Dublin city centre and other town centres, whilst permitting through movement for cyclists, buses, trams or taxis where necessary.
- Bus-specific measures in the Strategy include regular bus network reviews and commitment to alterations to improve services as required. The

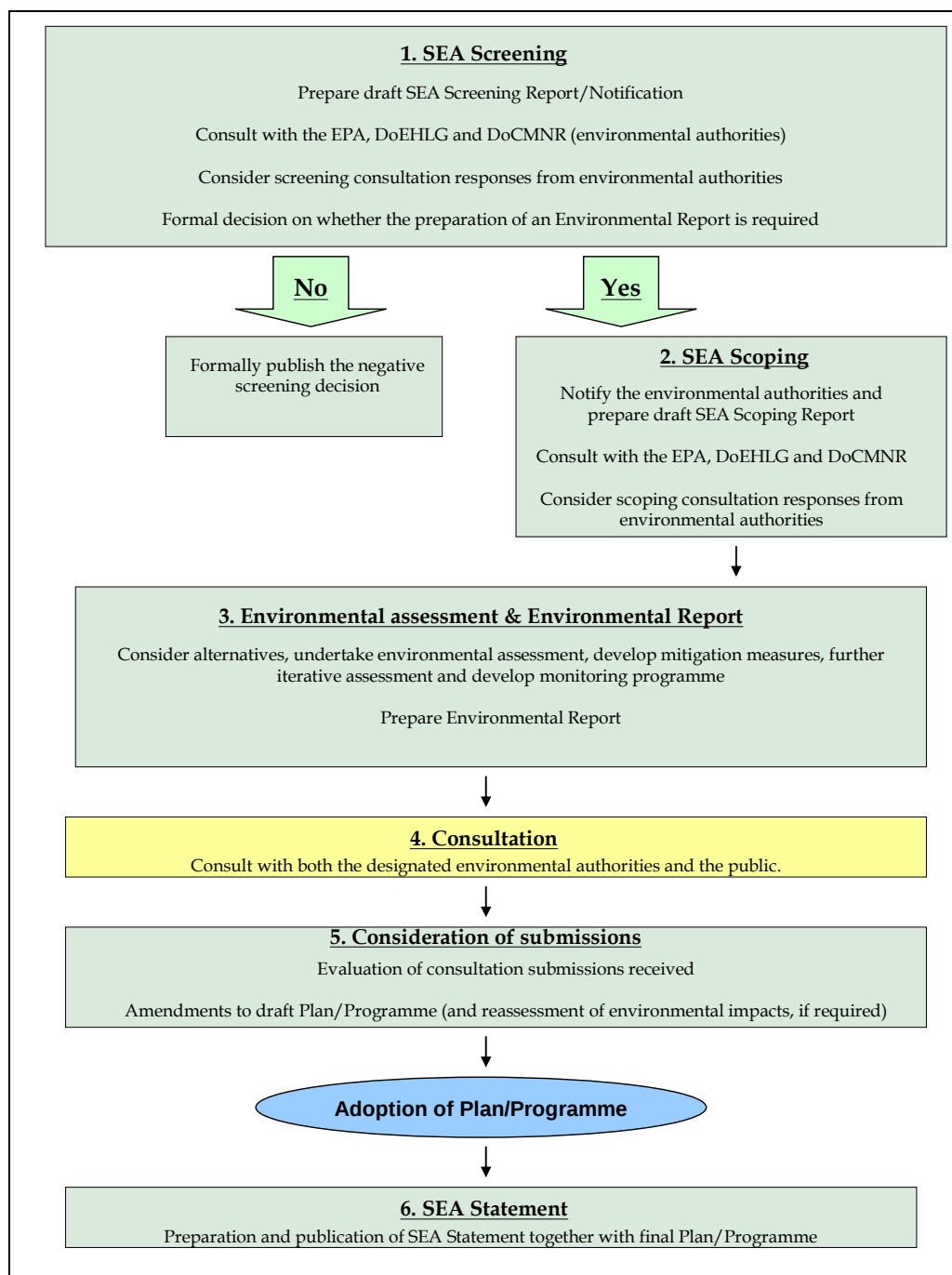
potential upgrade of four major Dublin QBCs to high quality Bus Rapid Transit type operations – Stillorgan Road, Malahide Road, Lucan Road and Navan Road – will also be explored.

- Supporting key rail and light-rail based public transport projects such as Metro North; Metro West; DART Underground and associated electrification of the Northern, Kildare and Maynooth rail lines; Luas BXD (city centre to Broombridge); Luas Lucan; and additional tracking of the Northern rail corridor.
- Measures are also proposed to make public transport easier to use and these include the introduction and further development/expansion of Smartcard ticket system and using development planning process to ensure that no new home in an urban area is more than 800 metres from a bus, tram or rail stop with a shorter distance of 500 metres to be targeted wherever feasible.
- Only limited road development is envisaged during the period of the Strategy: the Eastern Bypass corridor will be protected, and a Leinster Orbital Route corridor will be confirmed and protected, with possible incremental implementation of this road. Local accident remedial measures at locations with a poor road safety record will also be catered for.
- The Strategy includes a series of measures to move freight more efficiently and sustainably. These include the identification, as part of the local authority Development Plan process, of appropriate locations for freight intensive activities and the preparation and implementation of Construction Logistics Plans and Distribution and Servicing Plans for freight intensive developments. The Strategy also supports an extension of the existing HGV Management scheme.
- Develop and introduce a road use charging scheme for the GDA prior to 2020. Following public consultation, and as part of a future Implementation Plan, the exact form of the charging scheme, including the structure of the charges and the area to which they are to be applied will be decided.

NTS 3.1 SEA PROCESS SUMMARY

The SEA process can be divided into six broad stages and these are summarised in *Figure NTS 1* below. The yellow box indicates the current stage of the SEA process.

Figure NTS 1 Key stages in the SEA Process



NTS 3.2 **SEA PROCESS AND PROGRESS TO DATE**

NTS 3.2.1 **Screening**

The NTA undertook an SEA Screening exercise (to determine if full SEA was required for *2030Vision*) and consulted with the designated environmental authorities (Department of Communications, Marine & Natural Resources; Department of Environment, Heritage & Local Government; Environmental Protection Agency). The NTA's final determination was that SEA was required and that it would proceed to the next stage in the SEA process, which is the scoping stage.

NTS 3.2.2 **Scoping**

The second stage in the SEA process is scoping and this is the determination of the key issues, which are to be addressed in the Environmental Report. Scoping ensures that the SEA is focused on the relevant environmental issues and examines issues at the appropriate level of detail. To ensure that the *2030Vision* SEA was adequately scoped, the NTA voluntarily elected to prepare both a Draft and Final SEA Scoping Report. Furthermore, the NTA hosted a Scoping Workshop in June 2008 and invited 22 authorities, agencies and departments to the workshop.

The Draft Scoping Report was submitted in September 2008 to the relevant designated environmental authorities so that they could make submissions on the scope of the SEA. In addition to consultation with the designated environmental authorities, other public bodies and authorities were also consulted on the draft SEA Scoping Report.

Additionally, a separate *SEA Scoping Consultation Submissions Report* was prepared in parallel with the Final SEA Scoping Report. This summarised the content of the submissions received during scoping consultation, responded to the matters raised in each and records where the submission has resulted in changes to the Draft Scoping Report. The Final Scoping Report and the Submissions Report were then uploaded to the *2030Vision* website and the remaining consultees were informed of their availability. They also were available to the public as background reading for the strategy consultation process itself.

A key aspect of the scoping stage of the SEA process was the development of a set of SEA Objectives through which the environmental assessments will be undertaken. A total of 27 SEA Objectives were developed and these are presented in *Table NTS 1* below.

Table NTS 1 Final SEA Objectives

SEA Topic	Proposed SEA Objective
Biodiversity, flora & fauna	1. To avoid impacts on the integrity of European Conservation Sites (SACs and SPAs) and nationally designated sites (NHAs).
	2. To support the overall goal of the National Biodiversity Plan.
	3. To minimise impacts on locally-important biodiversity in the Greater Dublin Area.
Landscape	4. To avoid or, where infeasible, minimise impacts on designated and protected landscapes and conservation areas.
	5. To minimise impacts on undesignated landscape resources (townscapes, seascapes, riverscapes, general landscapes).
Population	6. To increase accessibility to economic and employment opportunities, in particular for those who are physically, economically or socially disadvantaged within the GDA.
	7. To increase accessibility to quality public, cultural and community services, in particular, for those who are physically, economically or socially disadvantaged within the GDA.
Human health	8. To contribute to improvements to transport-related aspects of quality of life for residents, workers and visitors to the GDA.
	9. To support the objectives of the Environmental Noise Directive in relation to transport-related noise.
	10. To minimise safety risks to human health arising from transport related activity.
	11. To support health improvements and benefits from transport-related activities.
Water	12. To support the forthcoming River Basin Management Plans (RBMP) and Programme of Measures (POM). Where these are not available, the objective is to support the aims and objectives of the Water Framework Directive (WFD).
	13. To minimise impacts to surfacewater systems and resources.
	14. To minimise impacts to groundwater systems and resources.
	15. To minimise impacts to coastal systems and resources.
	16. To minimise impacts to transitional systems and resources.
	17. To minimise the risk of flooding.
Air	18. To reduce negative air quality impacts arising from transport-related emissions.
	19. To ensure compliance with the Air Framework Directive and associated daughter Directives (and the transposing Regulations in Ireland).
Climatic factors & climate change	20. To contribute to the reduction of greenhouse gas emissions arising from transport-related activities.
Soil & geology	21. To minimise negative impacts on important and vulnerable soils resources used for agricultural purposes.
	22. To reduce consumption of construction material and generation of construction waste as part of transport infrastructure projects.
	23. To avoid or, where infeasible, minimise impacts to protected and designated geological and geomorphological sites.

SEA Topic	Proposed SEA Objective
	24. To protect public assets and infrastructure.
Material assets	25. To reduce the fossil fuel demand by the transport sector. 26. To assist with the reuse and regeneration of brownfield sites.
Cultural heritage (inc. architectural and archaeological heritage)	27. To avoid or, where infeasible, minimise impacts to designated cultural, architectural and archaeological resources.

NTS 3.2.3 *Environmental Assessment and Environmental Report*

A three-part assessment was undertaken by the NTA as follows:

1. SEA Potential Measures Assessment;
2. Alternatives Assessment; and
3. Preferred Strategy Assessment.

SEA Potential Measures Assessment

The NTA chose to undertake a preliminary environmental assessment during the early stages of the Preferred Strategy development process. This preliminary assessment was undertaken on a suite of high-level Transport Measures. This assessment fed into the development of the various detailed proposals which comprised the alternatives and the Preferred Strategy.

The preliminary environmental assessment results were published in the *Preferred Strategy Potential Measures SEA Report* in February 2009 for public consultation. It was also formally submitted to the designated environmental authorities and a range of public bodies and authorities. A total of 32 of these consultees were notified and invited to make written submissions on the Draft Report. The *Final Strategy Potential Measures SEA Report* was published in July 2009.

Alternatives Assessment

Following on from the high-level Transport Measures, the NTA developed three alternative Packages of alternatives (Economic, Social and Environment) and these were assessed against the SEA Objectives. The results of this assessment can be found in *Chapter 8* of the draft Environmental Report and a summary of the findings are presented in *Section NTS 5* of this document.

Preferred Strategy Assessment

This was the environmental assessment of the Preliminary Draft Strategy, as developed by the NTA, based on the work undertaken in the Alternatives Assessment. These results can be found in *Section NTS 6* of this document.

NTS 3.2.4 *Consultation*

This is the current stage of the NTA SEA process. Consultation on the Strategy and the Environmental Report is required with the relevant designated environmental authorities and the public before the Strategy can be approved by the Minister for Transport. Both the draft plan and the Environmental Report (or draft Environmental Report in the case of the *2030Vision* SEA) must be publicly available for comment. Comments and submissions may be made on either, or both, documents by the designated environmental authorities and the public, including any public authority or body.

NTS 3.2.5 *Consideration of Submissions*

It is a formal requirement of the SEA Directive that all consultation submissions received must be considered and the Strategy amended, if deemed necessary. Any amendments to the Strategy will need to be considered for their potential for significant effects. If such additional significant effects do arise, then there may be a need to develop additional mitigation measures. Following consideration of the consultation submissions received and associated amendments to the Strategy, the NTA may begin procedures to submit a Draft Strategy to the Minister for approval.

As the NTA has chosen to prepare both a Draft (consultation) and Final (post-consultation) Environmental Report; the latter task will be completed following the consideration of the consultation submissions and any amendments to the Preliminary Draft Strategy. It will be based on any amendments deemed necessary to the draft Environmental Report as a result of consultation and will accompany the Draft Strategy submitted by the NTA for approval by the Minister for Transport.

NTS 3.2.6 *Preparation of the SEA Statement*

The Minister for Transport will seek to adopt *2030Vision* and part of this process involves the preparation of an SEA Statement. This is a document summarising how environmental considerations have been integrated into the preparation of *2030Vision*. It also summarises how the consultation submissions were considered and if these resulted in the Strategy being amended.

NTS 3.2.7 *Monitoring*

Monitoring of the implementation of the Strategy will be undertaken for the duration of the plan up until its review. The overall objective of this stage is to monitor the significant environmental effects of the implementation of *2030Vision* so as “to identify at an early stage unforeseen adverse effects and to be able to undertake appropriate remedial action” (Article 10/1; SEA Directive 2001/42/EC). The monitoring programme for *2030Vision* can be found in *Chapter 11* of the Environmental Report.

This section presents a summary of the ‘headline’ points regarding baseline conditions and current environmental problems in the Greater Dublin Area, in relation to the SEA of 2030*Vision*. Greater information on the baseline can be found in *Chapter 7* of the Environmental Report.

NTS 4.1 **BIODIVERSITY, FLORA & FAUNA**

There are a total of 118 designated and protected sites in the GDA, ranging from Special Areas of Conservation (SACs), Special Protection Areas (SPAs) – both European designations – National Heritage Areas (NHAs) and proposed National Heritage Areas (pNHAs). A survey of the health and status of the European designated sites in Ireland revealed that the majority of these protected habitats are either in a poor or bad condition. This assessment also applies to their future prospects.

The increased levels of urban development in recent years have increased pressures on habitats and species throughout Ireland, resulting in habitat and biodiversity loss or damage (a key reason for the poor overall status of many of these sites). This is of greater significance within the GDA due to the relatively higher levels of urban development and expansion. Climate change (a key ‘driver’ of which is emissions from the transport sector) is also considered as a potential threat to the health and vitality of biodiversity throughout the GDA and is expected to eventually lead to a reduction in numbers of native species. Climate change may – in the long-term – result in a different assemblage of habitats and species in Ireland.

NTS 4.2 **LANDSCAPE**

The landscape in the GDA is very diverse and includes urban areas, rural areas, mountains and upland areas, plains, canals, valleys and coastal areas. Transport infrastructure (roads, rail-lines, etc.) have historically formed a key component and influence on the development and evolution of the landscape character of the GDA. The main landscape features of the GDA are the Dublin/Wicklow Mountains and the Irish Sea coastline (both north and south of Dublin city).

As with biodiversity, flora and fauna, a primary pressure on designated landscapes is ongoing urban development and expansion of the GDA. This large growth in the population of the GDA has resulted in significant growth in the smaller town and villages of the GDA, primarily within the three outer Local Authorities (Meath, Kildare and Wicklow). Much of this development is of low density, thus resulting in large residential areas encroaching into the countryside surrounding much of these smaller town and villages.

NTS 4.3 *POPULATION*

All counties within the GDA experienced population growth during each of the intercensal periods of 1996 to 2002 and 2002 to 2006. Some of the most significant population increases over the period 1996 to 2006 were in areas of Kildare, Meath and especially Fingal. These population growths were largely attributable to the growth of commuter towns, from where workers travel into and out of Dublin City Centre and surrounding employment centres. In 2006, the population of the GDA was 1,662,536, an increase of over 18% since 1996. This growth has been broadly equally split between the Dublin agglomeration (comprising the four local Authorities) and the Mid East Region (Meath, Kildare and Wicklow).

There has been a consistent growth in employment since the period 1996 to 2007. However, the recent economic slow-down has resulted in a dramatic decrease in overall employment and a corresponding increase in unemployment. From the period 1996 to 2006, there was an overall growth in employment of 262,890, an increase of 49% over that 10 year period. The rate of growth in employment actually exceeded the growth in population.

With the large increase in overall population and employment from the late 1990's, and the growth in low density development in the three outer Local Authorities (Meath, Kildare and Wicklow), there has been an associated increase in travel demand in the GDA. The majority of this demand is being met by the private car as a mode of transport. However, walking and cycling are significant modes of transport within Dublin, especially close to Dublin city centre. Likewise, public transport is also significant for transport within the Dublin metropolitan area.

NTS 4.4 *HUMAN HEALTH*

Ireland has a male life expectancy of 76.5 years and 81.4 years for females. Ireland's infant mortality is 4.9 per 1,000 live births. The Healthy Life Years (HLY) indicator (also called disability-free life expectancy) measures the number of remaining years that a person of a certain age is still supposed to live without disability. It is used to distinguish between years of life free of any activity limitation and years experienced with at least one activity limitation. Ireland's HLY is 63.3. The average within the EU is 61.6.

Ireland currently ranks 12th out of 27 countries in the EU (2006 data) in regards to the number of road deaths per capita. The EU average in deaths per million population is 86, with Ireland averaging 87. The GDA has 28.5% of all accidents in Ireland and 25% of all registered vehicles. The four Dublin Local Authorities dominate the accident data, with 17.7% of all reported collisions. Regarding road fatalities, the four Dublin Local Authorities have a combined total of 10.3%, with the GDA having 21% of all road fatalities in Ireland. Statistics from the Road Safety Authority show that the majority of road fatalities were males aged 21 to 34.

However, it should be noted that since 1996, there has been a dramatic decrease in overall accidents in the GDA, falling from just under 17,000 in 1996 to just over 4,200 in 2005. The Road Safety Authority noted that since 1997, there has been a 68% reduction in fatalities in Dublin city and a 73% reduction in numbers killed and seriously injured in Dublin City.

NTS 4.5 NOISE

Road traffic is the main source of environmental noise in the four Local Authorities of County Dublin as railway noise does not have a major impact on overall noise levels. The proportion of the population of Dublin city exposed to undesirable day time noise levels (>70dB) from traffic are relatively minor (3.7% in Dublin City Council to 9.5% in Dun Laoghaire-Rathdown County Council). However, the percentage of the population exposed to undesirable night time noise levels (>55dB) is considerably greater (58.5% in Dublin City Council to 21.6% in Fingal County Council). Other results also reveal that the greatest source of road traffic noise exposure is not limited to 'Major roads' (defined as carrying more than 16,438 vehicles per 24 hours): these comprise 9.9% of the overall roads in the Dublin agglomeration, with other roads being the greatest source of this exposure.

The dramatic growth in population and employment in the GDA since the mid 1990s has resulted in a greater quantum of people being exposed to undesirable noise levels. A key concern is the potential impacts of night time noise levels and this can impact on sleeping patterns of people, with negative health consequences.

NTS 4.6 WATER

River water quality in Ireland between 2004 and 2006 showed a small improvement compared with the 2001 to 2003 period. It also reports that throughout Ireland 71.4% of watercourses have been determined to be unpolluted. However, within the ERBD, the river basin district which covers almost 75% of the GDA, there have been signs of deterioration in the river water quality between 1998 and 2003, but with some significant improvement between 2003 and 2006. The percentage of unpolluted length of river channel in the ERBD has increased from 42% (in 1998-2000) to 52% (in 2004-2006). However, this is still below the national average of 71.4%.

Throughout Ireland, and within the GDA, there has been a general problem of water pollution due to the inadequate treatment of effluents and spillages and leaks from sewerage networks. The issue of poor and inadequate treatment of wastewater is exacerbated by the large growth in the population and level of employment of the GDA. This has placed even greater pressure on the existing wastewater treatment network of the GDA.

Climate change could also potentially lead to more frequent flood events (due to an increase in the incidence of high-intensity rainfall), which in addition to

potential summer droughts could seriously affect the viability of drinking water supplies.

Groundwater resources under the urbanised areas of the GDA area at risk of not attaining the standards as required under the WFD, whereas groundwater resources under the less developed (rural) areas are considered more likely to attain the required standards. A slight increase in nitrates and phosphates was recorded in groundwater across the country between 1995 and 2006, with elevated nitrate concentrations observed in the GDA. Microbial problems have also been observed at vulnerable aquifers due to the absence of protection against pollutants in organic wastes (which may contain faecal bacteria), such as septic tank effluent and farm manures and slurries.

An SEA has been undertaken to examine a series of alternatives to ensure that a sustainable and viable water supply to the Dublin region can be implemented. It examined ten options, including a proposal to transport water from the Shannon Region, to supplement existing drinking water supplies in the GDA as medium-term drinking water supply deficits have been identified.

NTS 4.7 *AIR*

In comparison with other European nations, Ireland's air quality is generally good. This can be attributed to Ireland's general lack of old and heavy industry and also to the meteorological systems which influence Ireland (which provide very good air mixing and dispersion).

It is expected that future emissions and performance of cars will improve as a consequence of programmed improvements to engine and fuel technology. However, the increase in traffic flows in Dublin city centre has resulted in the various air quality standards almost being breached on a number of occasions. The key challenge in relation to air quality is to ensure compliance with the daily and annual limit values for particulate matter (PM₁₀) and nitrogen dioxide (NO₂). Levels have approached legal limit values in recent years and there is a risk that limits could be exceeded in urban areas. PM₁₀ levels vary significantly depending on meteorological conditions. As such, average levels need to be well below the limit to ensure that compliance is maintained.

NTS 4.8 *CLIMATIC FACTORS & CLIMATE CHANGE*

In the period 1990 to 2006, Ireland's GHG emissions, increased by 25.5% from 55.5 million tonnes of carbon dioxide equivalent to 69.7 million tonnes carbon dioxide equivalent. This has since reduced to 11.2% over 1990 levels for 2009. The EPA noted that the transport sector showed the greatest increase in emissions at 165% between 1990 and 2006 due to the increased number of private cars and goods vehicles on Irish roads, a trend towards purchasing larger vehicles and an overall increase in number of journeys made and the length of the average journey. On a per capita basis, Ireland is one of the highest emitters of GHGs and above the EU average.

Transport represented 19.7% of the total emissions in Ireland in 2006. The European average transport emissions for the same period is 19.3%. No data is available for the GDA, although as this region has the largest population and the greatest volume of vehicles and car use, it is expected that the GDA is one of the largest contributors to the national transport-based GHG emissions. Transport is the sector with the largest increase in GHG emissions with other sectors actually falling (such as energy and agriculture).

The average temperature in Ireland has increased by approximately 0.7°C over the period 1890-2004, at an average rate of 0.06°C per decade. The temperature increase was particularly rapid during the period 1980-2004. This trend has been replicated in numerous countries around the globe. Climate models suggest that at current atmospheric GHG levels the global temperature will increase by a further 0.6°C over the coming decades. The Intergovernmental Panel on Climate Change (IPCC) is of the view that severe climate change impacts will increase significantly if global temperatures increase by more than 2°C above pre-industrial times.

Current projections show that Ireland will exceed its Kyoto Protocol GHG limit. Even if all projected reductions from existing and planned policies and measures (as outlined in the *National Climate Change Strategy*) are delivered, Ireland is still expected to exceed its target by 1.4 Million tonnes of CO₂e (CO₂ equivalent – a index measure of GHG). The EPA notes that additional domestic policies and measures and/or additional Government purchases will be required to bridge this gap.

NTS 4.9 SOILS & GEOLOGY

The bedrock geology of the GDA is composed of igneous and sedimentary formations. There are a variety of soil types to be found in the GDA, the most commonly found being Grey Brown Podzolics, Gleys, Acid Brown Earths and Brown Podzolics. The GDA is dominated by soils with drainage properties considered to be well, moderate and imperfect. The majority of the ERBD (representing over 75% of the GDA) is considered to have a low risk of runoff (65% of the area), with 15% and 20% rated as having moderate and high risks of runoff, respectively.

It can be expected that the majority of the most valuable soils (in relation to agricultural production) will be located in the rural areas of Fingal, Meath and Kildare. Regarding Wicklow, this county's soil characteristics are dominated by the Wicklow Mountains, presenting greater challenges to agricultural practices. The soils within the four Local Authorities of Dublin are likely to be under limited agricultural use, given that urban development is the dominate landuse.

Ireland does not have the same extent of historical contaminated sites (in comparison to the UK or Europe). There has been a general trend of re-developing such sites which are of economic value (e.g. Dublin Docklands and

inner town/city sites), although the rate of remediation and subsequent redevelopment of these contaminated sites will be significantly reduced and slower in the coming years due to the recession.

NTS 4.10 ***CULTURAL HERITAGE (INCLUDING ARCHITECTURAL AND ARCHAEOLOGICAL HERITAGE)***

The Record of Monuments and Places; provided by the Department of Environment, Heritage Local Government; is a statutory list of all known National Monuments in Ireland. There are in-excess of 10,000 such monuments in the GDA across all major types of areas (urban, rural, semi-rural etc.) and across all seven counties.

The growth and urban expansion of the GDA in the last 10 years has resulted in considerable pressure being placed on the status and condition of the GDA's cultural heritage resources. Although these resources are protected via legislation, and also through the planning system, damage and deterioration has resulted over the last 10 years. The majority of the damage to cultural heritage resources in the GDA is a result of the cumulative overall impact of urban development within the DGA.

NTS 4.11 ***MATERIAL ASSETS***

Given that the GDA contains almost 40% of Ireland's population, the region contains many material assets relative to the other regions in Ireland. Dublin contains most of Ireland's public transport network and is the hub of the national bus and rail networks. The M50 is the hub of Ireland's national radial road network and Dublin Port and Dublin Airport are the largest port and airport in Ireland, respectively. There is an extensive network of utilities (electricity, gas, telecommunications, water supply, wastewater network etc.) throughout the GDA, serving the various towns and urban areas. Another key material asset class comprises the various public assets such as parks and open spaces (key ones being Phoenix Park, Wicklow National Park and Liffey Valley Park) and the many town and village centres, providing a range of public and community facilities for the GDA's population.

The global focus on fossil fuel consumption and long-term reserves means that national fossil fuel supplies should be considered as a form of asset. Oil is currently the dominant energy source in Ireland - accounting for 53% of Ireland's Total Primary Energy Requirement (TPER) in 2006. Ireland's total unleaded petrol consumption has risen by 18.8% during the period 2000-2006. The total consumption in 2006 stood at 1.73 million tonnes. Regarding diesel (and gasoil), this rose by over 22.9% over the same six-year period. 2006 consumption was 3.72 million tonnes. Ireland's overall oil consumption rose by over 10.5% over the period 2000-2006.

NTS 4.12 ***INTER-RELATIONSHIPS***

Considering inter-relationships within the environment is an important aspect of SEA - i.e. where one environmental topic can also have both a direct or

indirect effect on another environmental topic. Interrelationships between environmental topics are common and this is not surprising, given the interconnected nature of ecosystems and environmental cycles. *Table 7.25* of the draft Environmental Report identifies 22 various environmental topic interrelationships by way of a matrix which has informed the assessment. Further details can be found in *Section 7.14* of the Environmental Report.

NTS 5.1 ALTERNATIVES PACKAGES

The NTA prepared three Alternative strategy options which consist of a range of different transport measures such as specific transport schemes and projects, transport and planning policies, and best-practice measures. The three Alternatives are called **Economic** (ECON), **Social** (SOC) and **Environmental** (ENV).

Each of the Alternatives is based around a particular focus (e.g. ECON is focused on maximising economic benefits for the GDA). Further detail on the three Alternative options is provided in *Sections 6.4 to 6.8* of the Strategy document.

NTS 5.2 SUMMARY OF ALTERNATIVES ASSESSMENT RESULTS

Table NTS2 provides a visual summary of the results of the environmental assessment of the Alternatives strategy options. The assessment consisted of comparing all three alternatives against each of the SEA Objectives and then applying a rating of - 3 (major negative) to + 3 (major positive). Greater detail is provided in *Chapter 8* of the Environmental Report.

The following key applies to the rating in *Table NTS2*.

+ 3	Major positive impacts
+ 2	Moderate positive impacts
+ 1	Minor positive impacts
0	Neutral
- 1	Minor negative impacts
- 2	Moderate negative impacts
- 3	Major negative impacts

Table NTS 2 Summary of Alternatives Assessment Results

SEA Objective	ECON	SOC	ENV
1	- 3	- 3	- 1
2	- 2	- 2	- 1
3	- 2	- 2	- 1
4	- 2	- 2	- 1
5	- 2	- 2	- 1
6	+ 2	+ 1	+ 2
7	+ 2	+ 1	+ 2
8	+ 2	+ 1	+ 3
9	0	0	+ 2
10	+ 1	+ 1	+ 2
11	- 1	- 1	+ 2
12	- 2	- 2	- 1
13	- 2	- 2	- 1
14	- 1	- 1	0

SEA Objective	ECON	SOC	ENV
15	- 2	- 2	- 1
16	- 2	- 2	- 2
17	- 2	- 2	- 1
18	- 1	- 1	+ 2
19	0	0	- 1
20	- 1	- 1	+ 2
21	- 2	- 2	- 1
22	- 2	- 2	- 1
23	- 1	- 1	0
24	+ 1	+ 1	+ 1
25	- 1	- 1	+ 2
26	+ 2	+ 2	+ 2
27	- 1	- 1	0

See Table NTS 1 for the SEA Objectives

The broad conclusions that can be drawn from the assessment of alternatives are:

- ENV performs best against SEA Objectives relating to direct landtake impacts for topics such as biodiversity, landscape, water and cultural heritage. ENV has the smallest level of additional infrastructure provision whereas ECON and SOC give rise to much greater infrastructure (primarily roads) and thus moderately negative permanent impacts are expected (with minor negative for ENV). However, note that ENV (as well as the other two Alternatives) has the potential to cause some direct impacts on the Natura 2000 network in the GDA and this poses significant challenges for their implementation.
- ENV provides positive long term impacts for reduced fossil fuel consumption, reduced greenhouse gas emissions, lower overall road traffic emissions and lower noise emissions. Generally ECON and SOC result in negative impacts for all of these topics due to increases in overall kms travelled by cars, compared to the Do-Minimum traffic levels. However ENV has some negative impacts for air quality standards on a small number of road links.
- ENV provides positive impacts under safety and reduction in predicted accidents (ECON and SOC are also positive, but to a lesser extent) and provides the prospect of significantly positive permanent health benefits (through increasing uptake of walking and cycling). ECON and SOC actually result in anticipated minor negative impacts for health as there is a reduction in overall walking and cycling compared to the Do-Minimum.
- All three packages result in long term improvements in overall accessibility in the GDA. ENV and ECON perform best, followed by SOC. ENV would have performed the best but this package contains road-user pricing and while this provides a more efficient road-network, it has a negative impact on economically disadvantaged people with low or no incomes.

In addition to the above strategic environmental assessment, the three alternative Strategy options were separately appraised to determine the relative benefits and contribution that each option makes to meeting strategy objectives and to addressing the transport challenges. The appraisal took place in two stages:

1. Contribution of option to strategy objectives; and
2. How they perform against transport criteria, guided by the Department of Transport's appraisal approach

An outline assessment of the benefits and costs of major infrastructural schemes in each Alternative package was also undertaken on a corridor by corridor basis. This helped determine which infrastructural elements within each Alternative package were contributing most to meeting strategy objectives, and assisted in assembly of the Preliminary Draft Strategy itself.

These combined results shaped the emerging Preliminary Draft Transport Strategy. Those elements of infrastructure that best met Strategy objectives and performed best in terms of transport appraisal were brought forward for inclusion. In terms of roads, this meant that only two schemes were specifically included. Policy proposals that succeeded best in reducing car use also formed a major part of the Strategy.

**NTS 6 ENVIRONMENTAL ASSESSMENT OF PRELIMINARY DRAFT
TRANSPORT STRATEGY**

NTS 6.1 OVERVIEW

As with the Alternatives assessment, the strategy assessment process involved assessing the Preferred Strategy against each of the SEA Objectives and determining a - 3 to + 3 rating, using the same colour key as presented in Section NTS 5.2.

NTS 6.2 SUMMARY OF ENVIRONMENTAL ASSESSMENT RESULTS

A summary of these findings is provided below in Table NTS 3 and the full findings are presented in Section 9 of the Draft Environmental Report.

Table NTS 3 Summary of Environmental Assessment of Preferred Strategy

SEA Objective	Rating	Text summary
Biodiversity		
1	0 to -2	A Habitats Directive Appropriate Assessment; Natura Impact Statement (HDA) Report has been prepared which identified 13 Natura 2000 sites for consideration in relation to the Strategy. The assessment has identified five prospective infrastructure projects that are included in the Strategy which could potentially result in significant direct impacts on Natura 2000 sites. The elements of the Strategy could have differing effects on sites of European importance and this is reflected in the rating range which has been provided. The integrity of most of the European sites will not be adversely affected given the mitigation set out in the Strategy, and hence a zero rating would apply. The remaining sites could be significantly affected by the Northern Rail Line Upgrade. There are, however, a number of reasons to suggest that this upgrade could be undertaken without adverse effects on the European sites. As these cannot be confirmed until the detailed design is available at the project level, a risk still remains at this stage and hence a more precautionary rating range of 0 to - 2 has been applied.
2	0	The transport schemes proposed within the Preferred Strategy have the potential, in the absence of scheme specific mitigation, to result in some localised loss of biodiversity (especially in greenfield locations such as along the Metro West corridor and P&R schemes located on undeveloped lands), though, in the context of the study area as a whole, this would not be expected to have a significant outcome for biodiversity across the region. It should also be noted that measures in the Strategy to support urban consolidation of the GDA would be expected to reduce development pressure on greenfield sites and hence on biodiversity. This would contribute to “conservation and sustainable use of biodiversity globally”. Overall, a neutral rating is judged to be appropriate for this SEA Objective.

3	- 1	The quantum of infrastructure being provided in the Preferred Strategy is relatively low with only two new roads and the rest consisting of rail infrastructure, such as Metro North, DART Underground and Luas Lucan. The transport schemes proposed have the potential, in the absence of scheme specific mitigation, to result in some localised loss of biodiversity. It is assumed that relevant design standards, good construction practice and management will apply in the implementation of all infrastructural schemes. All of these schemes will also require development consent and in some cases, project-level EIA; and these 'lower-tier' processes will also assist in reducing, managing and limiting negative impacts.
Landscape		
4	- 1	Potential negative impacts on important and sensitive landscapes can be expected from the new infrastructure which is proposed in the Preferred Strategy (such as the Leinster Orbital or schemes in sensitive urban streetscapes, such as Luas BX). However, regardless of this; where there is a commitment to good quality designs, careful use of landscaping and screening, use of good quality materials and finishing, and regular maintenance and cleaning, all of these can reduce the severity of impacts on these important landscapes and conservation areas. All of these schemes will also require development consent and in some cases, project-level EIA, and these 'lower-tier' processes will also assist in reducing, managing and limiting negative landscape impacts. It is likely that there will be landtake from a limited no of greenfield areas as a consequence of infrastructure in the Preferred Strategy and this may lead to localised impact on landscape. This is unlikely to have a significant impact in the context of the GDA as a whole and a minor negative rating is given.
5	+ 1	The transport schemes proposed within the Preferred Strategy will introduce new infrastructure into the landscape, including in some greenfield locations such as along the Metro West corridor and the P&R schemes located on undeveloped lands. In the absence of scheme mitigation, this may lead to localised adverse landscape impacts, though, in the context of the study area as a whole, this would not be expected to have a significant impact on undesignated landscape across the region. With regard to this specific objective and the townscape aspect of it, some schemes included in the Strategy have the potential to enhance townscapes, especially those which can result in urban renewal and streetscape enhancements such as new light rail lines and high quality transport interchanges. Overall, this SEA Objective has been assigned a minor positive rating on the basis of the Strategy's focus on improving streetscape through good transport and urban planning. The actual benefits which arise may actually be greater once the implementation is underway, but it is too early in the development process to confirm such a conclusion.
Population		
6	+ 2	Accessibility modelling undertaken by the NTA indicates that the Preferred Strategy will result in improvements in accessibility to employment and economic opportunities for the general population of the GDA. It will also result in specific access improvements for those who are economically and socially disadvantaged. The Strategy provides a large benefit for car-based commuters travelling to business locations from home (a 22% reduction in this specific journey time): this is due to the significant modal shift from car-based commuting to various public transport modes of travel which frees up overall road capacity. Public transport journey times to/from work are also reduced but to a much lesser extent. However, there is a significant increase in overall public transport usage (including a 46% increase in peak passenger kms travelled) with a greater modal split in 2030 (rising from 58% to 66%) due to the majority of the population travelling by public transport rather than car. There will also be improvements in overall public transport provision, frequency, availability, journey reliability and significant reductions in peak-time overcrowding. Overall, the Preferred Strategy is rated as having a moderate benefit against this SEA Objective.

7	+ 2	The modelling results for SEA Objective #6 also apply here in that <i>2030Vision</i> will improve accessibility to city, town and local centres where public, cultural and community services tend to be located. In addition to the various transport benefits identified in SEA Objective #6, increases in the uptake of walking and cycling are also expected as a result of the measures such as traffic restrictions, streetscape improvements, lower speeds in town centres etc. These types of trips can be very effective in increasing accessibility to local services and facilities and can also specifically benefit populations in disadvantaged areas (CLAR and RAPID areas). Overall, the Preferred Strategy is rated as having a moderate benefit against this SEA Objective.
Human Health		
8	+ 2	The Preferred Strategy will result in significant improvements to the transport-related quality of life for residents, workers and visitors of the GDA. There will be a significant increase in overall public transport availability, accessibility, frequency, facilities and infrastructure improvements and journey reliability with the Strategy. The Strategy results in a 10% reduction of public transport services operating over-capacity, despite there being a 46% increase in peak-passenger kms travelled on public transport (and a 7% increase in public transport's modal shift; to 66% by 2030).
9	+ 1	The analysis shows that the Preferred Strategy creates a general shift to lower noise levels and eliminates the occurrence of high noise levels in the 84 - 86 dB(A) range. However, there is an increase in the number of road links in the 74 to 78 dB(A) range for the Preferred Strategy. Overall, this results in a net reduction of overall average road traffic noise across the modelled road network. The result is a net benefit of approximately 10% of road links experiencing a reduction in modelled road traffic noise. The reduction the highest band (84 - 86 dB) is significant in for the group of road links in populated areas in terms of the Dublin Agglomeration Noise Action Plan which aims, in the long term to remove populations from this level of exposure. In accordance with the WebTAG appraisal methodology, the 'Estimated Population Annoyed' (EPA) is reduced by about 3,500 people, or 5% of the population estimated to be directly exposed to noise from the network within the standard impact corridor of 25m either side of the road. An overall rating of minor positive is appropriate for this SEA Objective.
10	+ 2	The Preferred Strategy will result in moderately positive benefit under this SEA Objective. Modelling data provided by the NTA notes that these benefits to safety and reduced risk of accidents will arise primarily from the lower numbers of car kilometres travelled on the road network. It is estimated that this will result in a 33% reduction in fatal and a 27.5% fall in serious casualties during morning peak periods.
11	+ 1	The Preferred Strategy will result in a small increase in uptake in walking and cycling as a result of the various measures to enhance and promote these forms of transport. Additionally, the significant modal shift to public transport will also increase start and end of journey walking and cycling. A minor positive rating has been assessed for this SEA Objective.
Water		
12	0	The Preferred Strategy is rated as having a neutral effect on the relevant River Basin Management Plans (RBMPs) and the overall objectives of the Water Framework Directive (WFD), the primary focus of which is to achieve 'good' ecological status for all waters by 2015. The Strategy does have the potential to directly impact on water resources in the GDA, but these are actually relatively limited in their occurrence. Note that there are many aspects of RBMPs that are non-transport issues and not relevant to <i>2030Vision</i> .

13	-1	Analysis was undertaken to identify the number of total river crossings by proposed transport infrastructure. The main rivers (and their tributaries) crossed are the Boyne (crossed 6 times), Liffey, including its tributaries, (crossed 7 times) and the Tolka (crossed 3 times). All of these crossings are caused by the rail-based transport schemes in <i>2030Vision</i> . Additionally, not all of the transport schemes in the Strategy were available as GIS information and these schemes (Sutton to Sandycove cycle scheme, Leinster Orbital and passing rail loops on the south-eastern rail line) will also result in additional river crossings. It is assumed that relevant design standards, good construction practice and management will apply in the implementation of all infrastructural schemes. Adopting a cautious and precautionary approach, an overall minor negative rating is deemed appropriate for this SEA Objective.
14	-1	Analysis identified no direct impacts on the Groundwater Source Protection Zones in the GDA. It is assumed that transport schemes in the Strategy will comply with relevant design standards and good construction practice and management will apply in the implementation of all schemes. It is considered unlikely that the type of infrastructure schemes proposed in the Strategy would have a significant effect on groundwater systems across the region. While impacts are considered unlikely, the potential for impacts can only fully be investigated at a project-specific stage (e.g. EIA etc.). A minor negative rating is determined for this SEA Objective, based on a cautious and precautionary approach to the assessment.
15	-1	Analysis was undertaken to determine the potential impacts on coastal systems as classified by the WFD. This identified proximity to the following coastal systems: Balbriggan, Lusk, Skerries, Sluice and Loughlinstown. As with all transport schemes in the Strategy, it is assumed that relevant design standards, good construction practice and management will apply in the implementation of all schemes. A rating of minor negative is appropriate for this SEA Objective.
16	-1	Analysis was undertaken to determine the potential impacts on transitional systems as classified by the WFD. This identified proximity to the following systems: Tolka Estuary, Liffey Estuary Upper, Liffey Estuary Lower, Malahide and Broadmeadow Estuary. As with all transport schemes in the Strategy, it is assumed that relevant design standards, good construction practice and management will apply in the implementation of all schemes. A rating of minor negative is appropriate for this SEA Objective.
17	-1	There is no national flood hazard mapping available so it is not possible to determine the risk of flooding for these schemes at this strategic stage of the implementation of the various schemes. These will also be subject to their individual flood risk assessments, if required by the planning authority, as part of the planning consent process. While on this basis, it is considered unlikely that there would be significant impacts arising from flooding as a consequence of the Strategy, a cautious rating of minor negative has been assumed for assessment purposes so that this issue is not overlooked.
Air		
18	-1	Population-based air quality modelling identified that, for PM10, there is a net benefit for approximately 6,300 people who will have exposure reductions of >0.5µg/m ³ . Thus, the Strategy will have a small positive impact for PM10 across the region. However, for NO ₂ , there is a net negative impact for approximately 22,900 people who will have exposure increases of 1µg/m ³ . Thus, the Strategy will have a small to moderate negative impact for NO ₂ across the region. Overall, a greater number of roads subject to slight deterioration in air quality and a greater number of people in the GDA are exposed to slight decreases in air quality. The assessment undertaken is based on traffic modelling data provided by the NTA and this did not directly consider some of the demand management and reduction measures proposed in the Strategy. These elements of <i>2030Vision</i> can be expected to reduce overall traffic and trips. Thus, a cumulative consideration of the modelled components of the Strategy plus the non-modelled components results in a minor negative rating against this SEA Objective.

19	-1	Impacts in relation to the EU AQ directives (and associated Irish Regulations) were assessed by identifying the worst-case impacts predicted anywhere on the road network for the Do-Min and the Preferred Strategy. The assessment indicated that the annual mean air quality standard for PM10 was comfortably achieved in both the Do-Min and the Preferred Strategy. However regarding the annual mean NO2, negative impacts were identified with an additional 278 people being impacted by NO2 concentrations greater than 40 µg/m3 with the Strategy, compared to the Do-Min. Additionally, it is estimated that approximately 107 people are exposed to NO2 concentrations between 36 and 40 µg/m3 with the Strategy compared to the Do-Min. It is important to note that the majority of roads where NO2 concentrations approach or exceed the air quality standard are major regional roads such as sections of the M50, the M1, N7 and the N2. This suggests that the Strategy is concentrating traffic into these roads, and away from the city centre. This is beneficial in one respect as it means that no locations in the city centre where there is a high population density are predicted to be in excess of the standard. As noted in the previous SEA Objective, the NTA traffic model did not directly consider some of the demand management and reduction measures proposed in the Strategy and this can be expected to reduce overall traffic and trips. Additionally, the NTA has developed a new policy commitment that will address this potential air quality issue by putting in place mitigation measures to reduce the impacts of traffic. This may include tolling, changes to the proposed road pricing system, or network changes which will reduce emissions to below EU limits. The overall rating of minor negative takes into account this committed policy.
Climatic Factors		
20	+1	The assessment quantified the total annual CO2 emissions on the assessed road network, and compared this to the Do-Min CO2 emissions. Rating criteria were used of >30% decrease as +3; 15-30% decrease as +2; 5-10% decrease as +1; 5% decrease to 5% increase as 0; 5-10% increase as -1; 15-30% increase as -2; and >30% increase as -3. The Preferred Strategy demonstrated a total decrease of 7.1% compared to the Do-Min. On this basis the score of +1 was awarded. This analysis takes account only of road traffic and makes no account of increased CO2 emissions from other/indirect sources, for example power generation required for additional light rail. The assessment also does not account for some of the demand management and reduction measures within the Strategy (some these are noted in the text for SEA Objective #19) and a qualitative consideration of these can be expected to result in further greenhouse gas benefits.
Soils & Geology		
21	0	The Strategy has the potential to give rise to impacts on soils and some of these could be important and vulnerable soils used for agricultural purposes (especially in the outer counties of Fingal, Meath and Kildare), though the potential is considered likely to be low. This is because the quantum of infrastructure being provided in the Preferred Strategy is relatively low with only two new road and the remainder consisting of rail schemes (most of which are located in urban areas). Against these potential impacts on potentially important soil resources is the positive aspect of urban consolidation of the GDA. A neutral rating is applied for this SEA Objective.
22	-1	There is likely to be an increase in the consumption of construction material and the generation of construction waste through the development of new infrastructure projects. The various urban and streetscape improvements will also result in additional resource consumption. The potential for impacts will be reduced where the principles of sustainable development are applied to construction and procurement of materials (ie re-used or recycled materials).

23	- 1	The transport schemes included within the Preferred Strategy may have the potential to impact on geological and geomorphological sites. However, there is no national (or regional) designation for geological and geomorphological sites. Potential direct impacts on geological and geomorphological sites is considered unlikely given the reduced quantum of new infrastructure development and given that much of this is in urban areas which have already been developed; the potential for impacts can only fully be investigated at a project-specific stage (e.g. EIA etc.). A minor negative rating is determined for this SEA Objective, based on a cautious and precautionary approach to the assessment.
Material Assets		
24	+ 1	The Strategy is assessed as positive for the protection of public assets and infrastructure as it increases regional accessibility through enhanced transport infrastructure in the GDA, thereby enhancing access to public assets and infrastructure. Enhancing and increasing access to these public assets (such as Dublin Airports, Dublin Ports, national road network, rail network, regionally-important recreational spaces and facilities, key urban centres etc) benefits them as they require certain levels of usage and therefore good accessibility to make them economically and socially viable and to encourage ongoing investment.
25	+2	The assessment quantified the total annual vehicle kilometres on the road network as a proxy for fossil fuel usage. Climate change calculations identified that the Strategy will result in a 16.9% decrease in total kms travelled by vehicles on the road network, a moderately positive impact. Please note that this rating (or the calculations) do not account for electric vehicles on the road network or future improvements in engine technology. The assessment also does not account for some of the demand management and reduction measures within the Strategy and a qualitative consideration of these can be expected to result in further reductions in fossil fuel demand.
26	+ 2	The Preferred Strategy contains planning policy elements which promotes the consolidation of the urban areas of the GDA. The Preferred Strategy also assume a distribution of development which will directly and indirectly promote the reuse and regeneration of brownfield sites, especially those close to high quality public transport corridors. The urban consolidation of the GDA will also increase the value and viability of brownfield sites in the GDA, thus indirectly promoting their value and development potential.
Cultural Heritage		
27	- 1	Analysis shows that there are no direct impacts on National Monuments in the GDA from the GIS files of the transport schemes in the Preferred Strategy. However, it is assumed that some potentially negative indirect impacts can be expected at a project-specific level given the quantum of transport infrastructural development as there are 91 National Monuments within 20m of these schemes. Schemes which are in the urban centres of the GDA (such as the Luas BX scheme on College Green and O'Connell Street) may potentially impact on the setting and context of historically important streets and areas. However, it is assumed that all transport projects will be constructed in accordance with the required design standards in accordance with all required planning and environmental regulations and that standard mitigation measures are incorporated into the design and construction. It is unlikely that the Strategy would lead to a significant adverse impact across the study area as a whole.
Cumulative effects		
Cumulative impacts and impact interactions	-1 to +1	Section 7.14 of this report presented a set of possible baseline impact interactions and interrelationships. These same types of interaction and interrelationship are also relevant to the environmental assessment results of the Preliminary Draft Transport Strategy. For example, potential adverse impacts on biodiversity or flora and fauna from landtake for new infrastructure may also result in combined impacts on landscape and the setting of heritage features, and visa versa. In addition, where proposals for new infrastructure in the Strategy may lead to biodiversity enhancement along a given corridor, there may also be a related potential for combined enhancements to landscape and the setting of heritage features at the same time. Overall, it is not expected that interactions/interrelations between environmental

	topics and subsequent cumulative effects will lead to significant impacts over and above those identified already with respect to the SEA objectives. A further point to note with respect to the potential for cumulative impacts is the role that the Transport Strategy is likely to play in conjunction with other relevant plans and programmes. In particular, the Transport Strategy and the Regional Planning Guidelines for the Greater Dublin Region are expected to work together to provide positive cumulative outcomes in terms of more sustainable planning, urban consolidation and transport provision.
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A key feature of the development of mitigation measures is that the minimisation of negative impacts was considered through-out the development of the various iterations of *2030Vision*. The mitigation measures have been presented in two categories:

1. *Embedded and Iterative mitigation* this is mitigation and Strategy-improvement actions which were created and developed in parallel with the evolution of early iterations of *2030Vision*; and
2. *Additional mitigation*: this is specific mitigation which has been subsequently developed to address specific impacts identified in the environmental assessment of *2030Vision*.

Regarding embedded mitigation, the NTA undertook a preliminary environmental assessment during the early stages of the Preferred Strategy development process. This preliminary assessment was undertaken on a suite of high level Measures which were then used to build the three Alternatives packages. A key feature of this preliminary assessment was that mitigation was proposed to address the generic environmental impacts identified. These were then taken into account in the development of the Alternatives packages, the environmental assessment of which also resulted in further refinement during the development of the Preferred Strategy.

Additional mitigation refers to measures which have been subsequently developed in response to potential negative impacts identified in the environmental assessment of *2030Vision* (and summarised in *Section NTS6* above). These additional mitigation measures have been developed with and fully accepted by the NTA. Thus, they can now be considered as being formally part of *2030Vision*. These additional mitigation measures consist of additional policies and policy amendments in the Strategy. These covered the following topics:

- Specific policy-protection of Natura 2000 sites;
- Addressing potential NO₂ air quality standard exceedances;
- Brownfield development policy; and
- Implementation of transport schemes and infrastructure.

Further detail on mitigation is provided in *Chapter 10* of the Environmental Report.

The SEA monitoring programme for *2030Vision* is set-out in the Environmental Report. The intention when developing the monitoring programme was to build upon the existing data collected by the NTA and the other agencies in the Greater Dublin Area. If monitoring identifies a regular frequency of a negative significant environmental effect, then more frequent – such as annual – monitoring report may be required to determine if remedial action is effective in addressing the negative effect. The suite of monitoring measures should also be reviewed on an annual basis with new monitoring measures included should new and relevant data sets become available. Some of the key monitoring measures includes:

- Monitoring of effects on Natura 2000 sites from the implementation of *2030 Vision*;
- Time taken to travel to work, including for disadvantaged;
- Specific monitoring of accessibility (travel times, frequency of PT, alternative PT options etc.);
- Monitoring and reporting associated with the Dublin Agglomeration Noise Action Plan;
- Number Injured and killed in the GDA in Road Accidents; and
- Air quality monitoring reports.