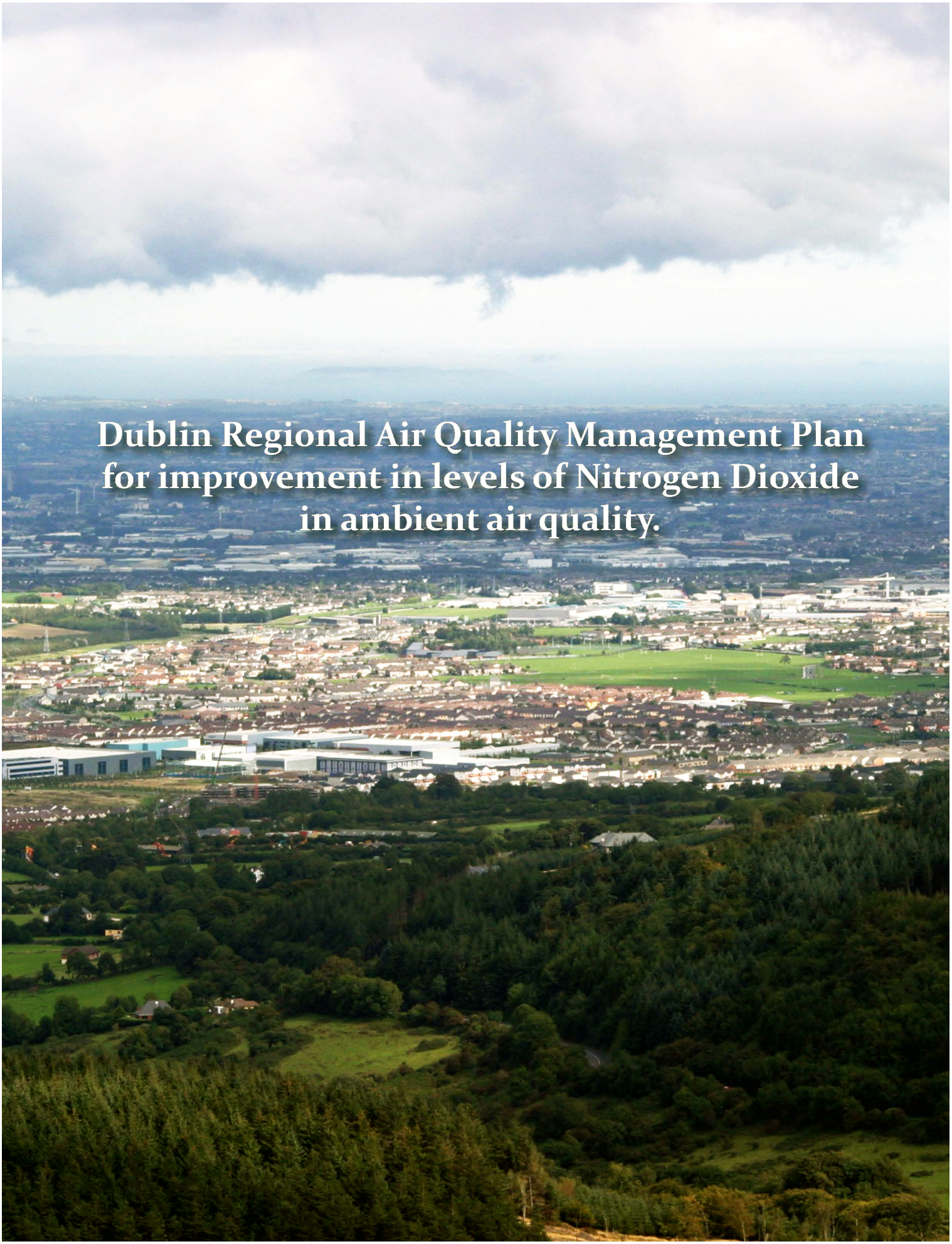
Dublin Regional Air Quality Management Plan for improvement in levels of Nitrogen Dioxide in ambient air quality.



Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Comhairle Contae
Átha Cliath Theas
South Dublin County Council

Comhairle Contae Fhine Gall
Fingal County Council

Dún Laoghaire-Rathdown
County Council Comhairle Contae
Dhún Laoghaire-Ráth an Dúin

DUBLIN REGIONAL AIR QUALITY MANAGEMENT PLAN FOR IMPROVEMENT IN LEVELS OF NITROGEN DIOXIDE IN AMBIENT AIR QUALITY

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Section 1

1.1 Introduction

Ambient air quality monitoring is carried out in the Dublin Region by the four local authorities under the direction of the Environmental Protection Agency.
This involves monitoring for a range of air pollutants specified under European Union rules to ensure that legal standards for air quality are met. For the purposes of air quality classification, the Dublin conurbation is designated as one Zone i.e. Zone A. Each local authority provides air quality monitoring data to the Environmental Protection Agency for review and verification.

The range of air pollutants comprises of both gaseous and particulate pollutants including Nitrogen Dioxide (NO_2). Nitrogen Dioxide levels in the Dublin Region are primarily associated with traffic emissions. In recent years they have been historically close to limit values in heavily trafficked areas.

Nitrogen Dioxide is a significant air pollutant as short-term exposure is linked to adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in asthmatics. Long-term exposure is associated with increased risk of respiratory infection in children. Nitrogen oxides are a major precursor in the formation of ground level ozone and in the formation of photochemical 'smog'. Along with Sulphur Dioxide it also contributes to acidic deposition.

1.2 Areas of excess air pollution in Dublin region

In September 2010 the Environmental Protection Agency wrote to the City and County Managers in the Dublin Region informing them that an exceedance had occurred at the NO_2 Winetavern Street. monitoring station during 2009.

In accordance with the Air Quality Standards Regulations 2002, the Environmental Protection Agency require the four local authorities to prepare an air quality management plan to ensure compliance with the limit value for Nitrogen Dioxide and to submit this to the Environmental Protection Agency by 23 December 2011.

There is an existing ***"Dublin Regional Air Quality Management Plan 2009-2012***[(1)]**.** That plan deals with the overarching measures in place between the four local authorities to address air quality issues.

"Dublin Regional Air Quality Management Plan for Improvement In Levels Of Nitrogen Dioxide In Ambient Air Quality" is a companion document to that plan and seeks to address the very specific challenges of addressing Nitrogen Dioxide levels in the region.

This plan initially provides a situational analysis of the underlying causes of ambient Nitrogen Dioxide, the pattern in ambient levels determined by monitoring over a number of years, and an overview of regional and national factors that influence those levels. This plan then addresses the multifaceted approach that is in place to reduce emissions from the transport sector and identifies further interventions to address these issues.

One of the primary challenges in dealing with reducing the emissions from the transport sector is that those multifaceted challenges require input and actions from a wide range of stakeholders. It is therefore crucial that those stakeholders are aware of the

challenge currently faced in protecting air quality in the Dublin region. It is equally crucial that their activities address air quality as a priority for them and not solely for those charged with monitoring air quality. The solutions to the air quality challenges facing Dublin rest in large measure with those stakeholders who can influence traffic and transport in the region.

It is also significant the high levels of nitrogen dioxide are continuing at a time when overall traffic volumes have decreased. The influence of localised climatic conditions or events may be a significant factor in this pattern, although that would require, and deserves, further in-depth consideration. If that is the case, and such conditions are repeated, it is feasible that if traffic volumes return to previous levels, the pressures of maintaining air quality within acceptable parameters would also increase. This is but one of the many factors to be borne in mind in the drive towards national economic recovery. In that context this plan provides the basis both for the local authorities involved and for engaging other statutory bodies and agencies.

The 2011 Air Quality Standards Regulations, revoked 2002 Regulations[(2)]. Article 22 of the 2011 Regulations provides:

Air quality plans

(1) Where, in given zones or agglomerations, the levels of pollutants in ambient air exceed any limit value or target value, plus any relevant margin of tolerance in each case, the Agency shall ensure that air quality plans are established for those zones and agglomerations in order to achieve the related limit value or target value.

(2) For the purpose of Regulation 22(1) the Agency shall:
(a) identify and notify to the relevant local authority or authorities those areas, consisting of zones and agglomerations in whole or in part, where the Agency considers measures are likely to be necessary to ensure compliance with the limit value or values for the relevant pollutant within the time limit specified in the relevant Schedule for that pollutant; and
(b) provide to the local authority or authorities concerned all data relevant to the air quality assessment for the area concerned.

(3) The local authority or authorities so notified shall prepare a clear, comprehensible and accessible air quality plan, or review and revise an existing plan, to ensure compliance with the limit value or values within the time limit specified for the relevant pollutant or pollutants.

(4) Where the attainment date for a limit value has passed, the air quality plan must set out the measures intended to ensure compliance with limit value as soon as possible.

(5) Air quality plans must include the information listed in Schedule 15.

(6) Air quality plans must be communicated to the Minister and the Commission no later than two years after the end of the year the first exceedance was observed.

(7) Where an air quality plan is required in relation to more than one pollutant, the Agency must ensure the plans are integrated in relation to all pollutants concerned.

(8) Wherever possible, air quality plans must be consistent with other plans drawn up in accordance with obligations imposed under Council Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants4, Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants5, and Council Directive 2002/49/EC on assessment and management of environmental noise.

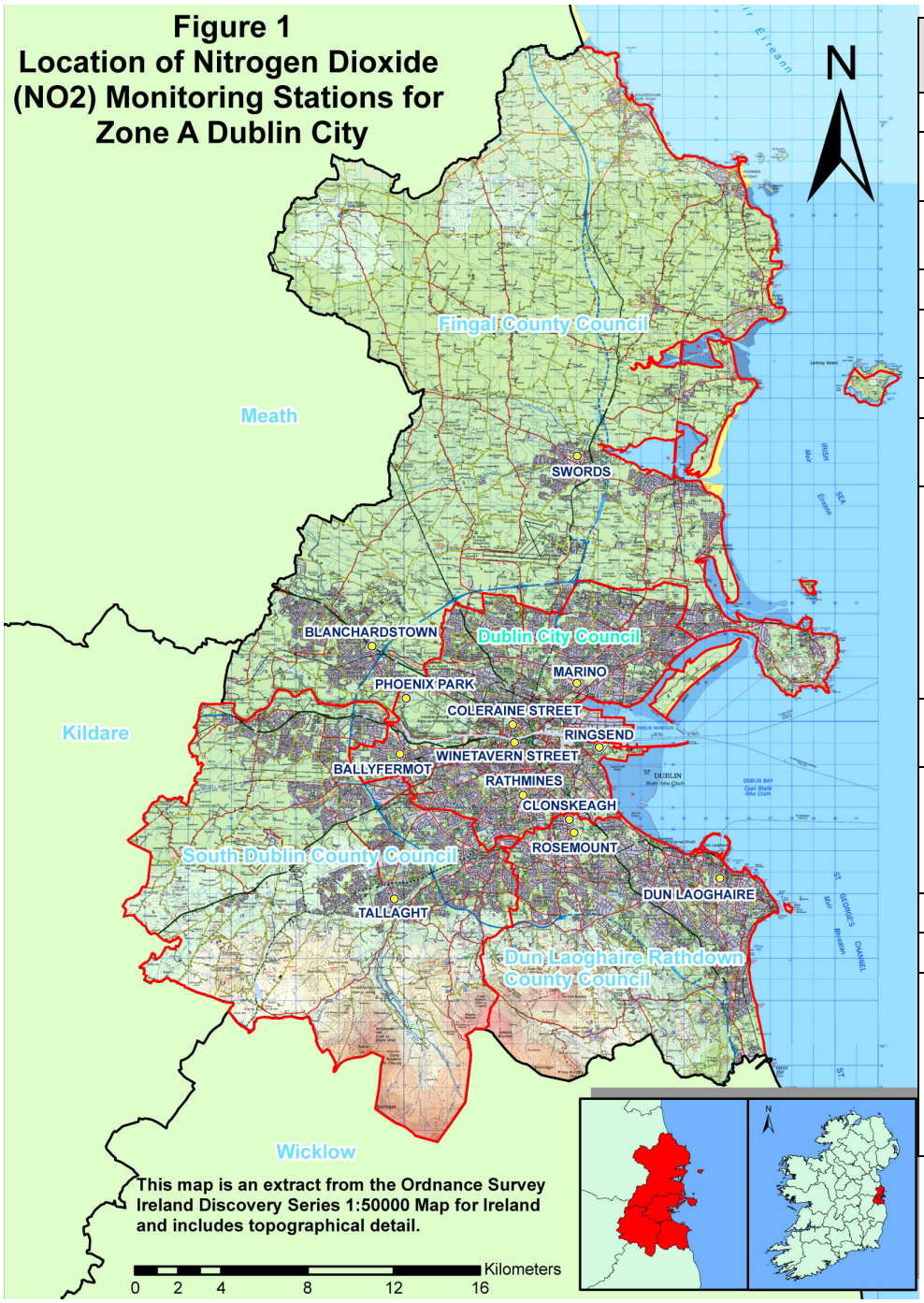
In March 2011, the four authorities agreed a framework with the EPA to prepare an air quality improvement plan to address this exceedance and to show corrective actions or improvements since then to prevent a recurrence. The following is the written improvement plan response to the EPA.

Timetable for future policy implementation:

The implementation of the recommendations of this plan requires buy- in from a wide range of stakeholders, is subject to prevailing economic conditions, and the Programme for National Recovery agreed with the EU & IMF. The benefits for reduced air pollution

from the continued development of mass public transport systems and cycle infrastructure will be advocated whenever possible.

1.3 Location of Air Monitoring Stations



Name	Pollutants measured
Ballyfermot	SO_2 PM_{10}
Blanchards-town	NO_2 PM_{10}
Coleraine Street	NO_2, SO_2, $PM_{2.5}$, CO
Clonskeagh	O_3
Dun Laoghaire	PM_{10} NO_2
Marino	$PM_{2.5}$
Phoenix Park	PM_{10}
Rathmines	$PM_{2.5}$, PM_{10}, NO_2, SO_2 O_3, BTEX, PAH, Heavy Metals (HM)
Ringsend	Black Smoke
Rosemount	PAH, Heavy Metals (HM)
Tallaght	SO_2, PM_{10}
Swords	NO_2, O_3
Winetavern Street	NO_2, CO, SO_2, PM_{10}, PAH, Heavy Metals (HM)

Section 2

Background information

2.1 Characterisation of Dublin Region

The Dublin Region is situated to the east of Ireland and occupies an area of 92,200 hectares. The Dublin Region comprises the administrative areas of Dublin City, South-Dublin County, Dun Laoghaire-Rathdown County and Fingal County. The population of the Region was 1.27 million in 2011 which represented approximately 28% of the State's population. With the exception of Dublin City, each of the county administrative areas has a mix of rural and urban Electoral Districts.

The overall Dublin Region consists of four local authority areas - Dublin City Council, Dun Laoghaire/Rathdown, Fingal County, and South Dublin. The population of each of these functional areas as determined in the 2011 Census is as follows:

	2011 Population *(3)*
Dublin City	525,383
Dún Laoghaire-Rathdown	206,995
Fingal	273,051
South Dublin	265,174
Dublin Region	1,270,603

Dublin is a vibrant region and was the powerhouse of the recent expansion in the Irish economy. Dublin is also an historic region, whose heritage is complemented by the major investments in Information and Communications Technology, Transport and Renewal activities of recent years.

The Dublin Region consists of the nation's Capital and includes an International Airport and two main seaports, one of which is the largest in the State. Dublin City has become a truly European City and one of the world leaders in software development. Dublin has become one of the fastest growing regions within Europe.

This growth has had serious effects on all aspects of the economy, on all members in society and on the green and built environment. In fact the Dublin Region today is unrecognisable to the Dublin Region of only 15 short years ago. Studying the facts of this growth, one can appreciate not only how the change is affecting the lives of Dublin's citizens, but also what measures need to be taken to ensure that the growth of Dublin is sustained and equitable for all its citizens.

In 2008, it was estimated that 40% of the total population of Ireland*(4)* lived within 100 km (60 miles) of Dublin. According to research from the University College Dublin (UCD) School of Geography, Planning and Environmental Policy the outward growth of the commuter belt of Dublin extended to over 100km from Dublin City through Leinster and into South Ulster.

However, this commuter expansion has begun to contract to previous levels as people who planned to live in towns and villages in adjacent counties to Dublin have moved back to the urban region owing to loss of employment and the availability in Dublin of more affordable accommodation.

2.2 Estimate of the polluted area and population exposed.

The 2011 population of the city wards adjacent to the monitoring location at Winetavern Street where the breach occurred during 2009 is as follows:

2011 Population [(3)]	
Arran Quay C	4,207
Merchants Quay A	2,079
Merchants Quay B	3,815
Wood Quay A	2,663
Ushers A	3,084
Ushers B	1,260
Ushers C	3,724
Royal Exchange A	4,233
Royal Exchange B	1,911
Inns Quay C	2,698
North City	5,243
Total	**34,917**

2.3 Climatic data and Topography

The climate of the region plays a major role in the levels of air pollutants measured. Day to day changes in weather profoundly influence changes in air quality.

Weather determines how quickly pollutants are dispersed and how emissions are diluted in a vertical direction. Pollutants typically are mixed with the help of convection or blown by the wind from their source. However pollutants can also be trapped close to the ground, and if they cannot escape, may build up to unhealthy levels. This can happen when wind speeds are weak and when the air close to the ground cools down and warm air moves over. This creates a stable condition that keeps pollutants close to the surface. Such “inversions” typically occur on clear, dry, still nights.

Poor air quality can also result from high temperatures. In hot, sunny weather photochemical smog can form through complex chemical reactions involving nitrogen oxides, ozone, and volatile organic compounds. Air pollution can also be washed out by rain, fog or snow. This is called “wet deposition”. When air pollution deposits without the benefit of rain, it is called “dry deposition.

The dominant influence on Ireland's climate is the Atlantic Ocean. Consequently, Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. Although inland meteorological stations show more variation, there is only about one day or less per year when the air temperature stays below freezing point. Minimum air temperature falls below zero on about 40 days per year at inland stations, but on less than 10 days per year in most coastal areas. Air temperatures inland normally reach 18 to 20 °C during summer days, and about 8°C during wintertime.

Most of the eastern half of the country gets between 750 and 1000 (mm) of rainfall in the year. Rainfall in the west generally averages between 1000 and 1400 mm. The wettest months, in almost all areas are December and January. April is the driest month generally across the country. However, in many southern parts, June is the driest. Hail and snow contribute relatively little to the precipitation measured.

Wind direction[(5)] and speed at a particular location can be influenced by a number of factors such as obstruction by buildings or trees, the nature of the terrain and deflection by nearby mountains or hills. For example, the rather low frequency of southerly winds at Dublin Airport is due to the sheltering effect of the mountains to the south with an average annual speed of about 5.2 metres/second. Average annual wind speeds range from 11 kph in parts of south Leinster to over 29 kph in the extreme north. On average there are less than 2 days with gales each year at some inland places like Kilkenny, but more than 50 a year at northern coastal locations such as Malin Head.

Apart from a mountain range rising to 752 metres to the south, the region is a relatively low lying area. There are three major rivers and rich pastures to the west and to the north. The region also contains two canals linking the city centre to the River Shannon.

2.4 Identification of targets (human and material) requiring protection in the zone

The overriding concern associated with excessive Nitrogen Dioxide levels in ambient air in Dublin is the related potential health affects. Nitrogen Dioxide is known to irritate the lungs and lowers resistance to respiratory infection, especially for those already suffering with breathing difficulties e.g. asthma, bronchitis.

These two conditions - asthma and bronchitis[(6)], are of particular important in the Irish context. Ireland is now ranked among the top four countries in the world with the highest prevalence rates for asthma. The Asthma Society of Ireland has estimated that 274,000 people suffer from asthma in Ireland. Asthma affects at least 1 in 7 Irish children, and 1 in 20 adults.

The first major study to investigate the impact of asthma in Irish households has revealed a huge impact on quality of life. Of those surveyed:

- 55% of patients are awakened at night by asthma symptoms.
- 73% experienced some limitation in their normal activities due to asthma.
- 21% felt limited in what they could do.
- 70% experienced asthma symptoms due to being exposed to cigarette smoke.

Other findings of the preliminary audit included:

- In adults, almost three working days a year are lost to asthma. This represents a cost to the Irish economy of Euro 16.6 million, based on average industrial wages.
- Children aged between 5 and 11 miss on average three and a half days of school a year because of asthma, and teenagers aged 12 to 16 miss over two days a year.
- 79% of the children did not have their illness under control.[(7)]

With regard to bronchitis, in a 16 country survey[(8)] carried out for the European Community Respiratory Health Survey (ECRHS) Study Group 11, Ireland was second only to Spain in terms of the prevalence of chronic bronchitis (approximately 8% versus a median prevalence of 2.6% for all centres).

The Asthma Society of Ireland also report[(6)] that *Asthma was the second most prevalent single condition reported in proportional terms, with approximately 5% of persons aged 18 years and over indicating that they have at one point or another suffered from the condition -when combined with chronic bronchitis 6.4% of adults report chronic airways disease.* Respiratory diseases are the third most frequently reported long-term illness group after cardiovascular and musculoskeletal diseases. 15% of all GP consultations relate to respiratory disease.

Major health studies[(9)] of air quality in Dublin on morbidity and mortality such as that led by Dr. Luke Clancy, St James' Hospital reveal encouraging findings. The "Clancy Study" estimated that 359 deaths, or almost one per day, were prevented each year since 1990 due to the introduction of a ban on the sale of bituminous coal products in the Dublin area.

Section 3

Nature and assessment of Air pollution issues

3.1 Air quality assessment methodologies in Dublin Region and monitoring network

The monitoring of Nitrogen Dioxide levels in ambient air in the Dublin Region is carried out in accordance with the Air Quality Standards Regulations 2011. These regulations give effect to Council Directive 2008/50/EC1 of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (CAFÉ Directive).

Accordingly the reference method utilised in the Dublin Region for the measurement of Nitrogen Dioxide and oxides of nitrogen is that described in EN 14211:2005 "*Ambient air quality — Standard method for the measurement of the concentration of Nitrogen Dioxide and nitrogen monoxide by chemiluminescence*".

Table 3.1 - NO_2 limits set out in the CAFÉ Directive 2008/50/EC

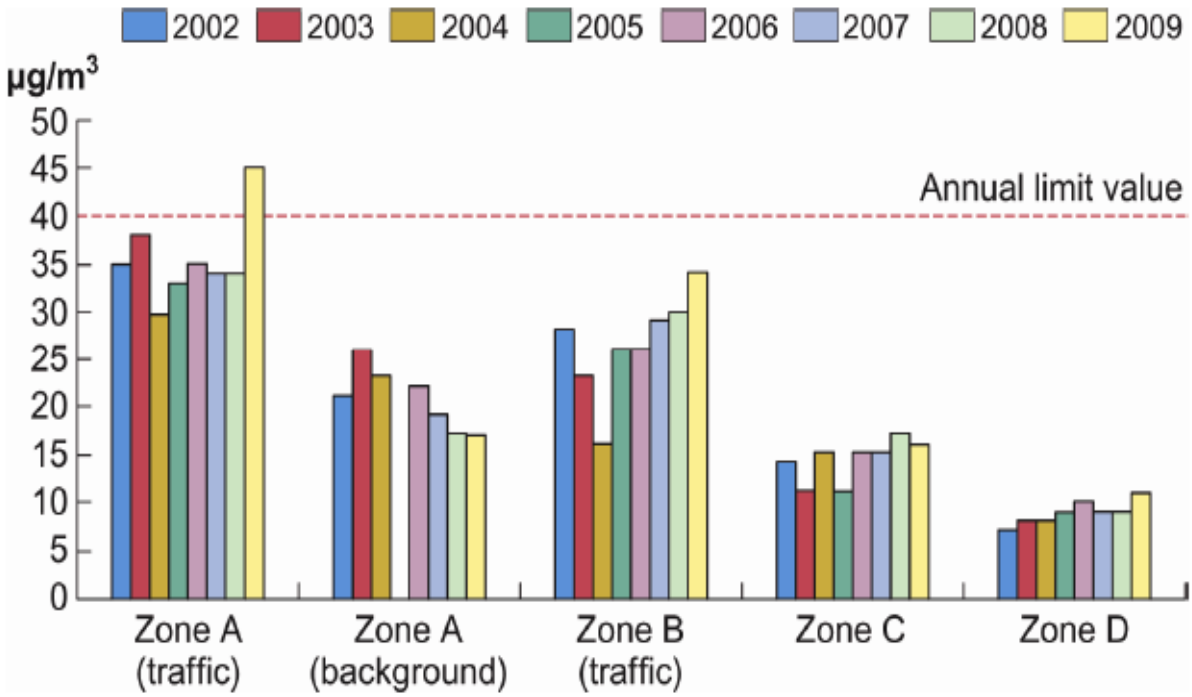
Pollutant	Limit value for	Concentration $\mu g/m^3$	Averaging Period
NO_2	Health protection	200	Hourly(not to be exceeded more than 18 times per year)
NO_2	Health protection	40	Annual mean
NO_2	Vegetation protection	30	Annual mean

Section 1 contains a map (Figure 1) of the locations of each of the sites where Nitrogen Dioxide monitoring is carried out.

3.2 Concentrations observed 2002- 2009 and associated implementation of improvement measures[(10)]

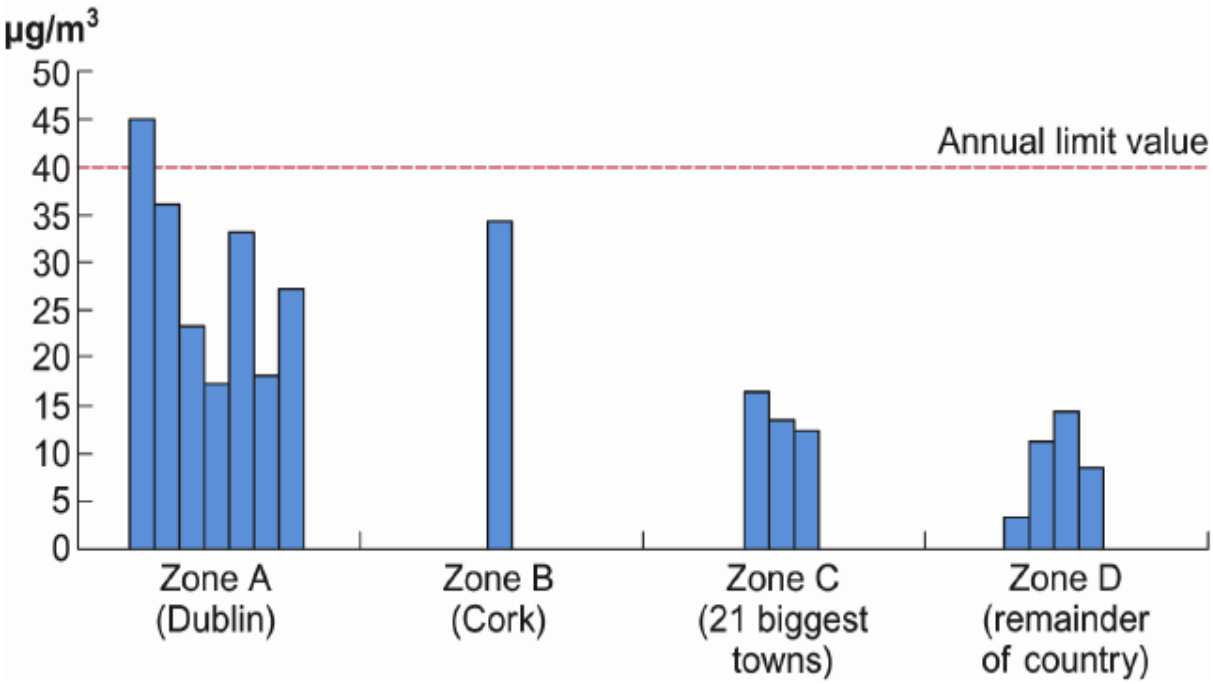
The national trend in Nitrogen Dioxide concentrations during these 8 years would indicate that levels in highly trafficked areas of the Dublin Region (which is in Zone A) have approached the annual limit value set by EU Directives. In 2009 the first exceedance of this limit value was recorded. See Figure 3.1 below:

Figure 3.1 - Annual mean Nitrogen Dioxide concentrations 2002-2009



The levels as recorded during 2009 for each of the individual stations are shown in Figure 3.2 below. As indicated there was one exceedance at one location (Winetavern Street) Dublin.

Figure 3.2 – 2009 Annual mean Nitrogen Dioxide concentrations at individual stations



Section 4

Analysis of the Origins and causes of the Nitrogen Dioxide levels in the Dublin Region

4.1 Factors and sources responsible for the excess pollutants

In its latest (2010) review "Review of Ambient Air Quality Monitoring in Ireland"[(9)] the EPA states:

> *"NO_2 levels are close to or above the limit value in Dublin and Cork city centre stations. NOx levels in urban areas are influenced by weather episodes which accounts for some of the variation seen in annual results. A period of stable airflow over a city centre can lead to build up of NO_2. Continued increase in NOx emissions within urban centres may lead to further breaches of the limit value in the future. Although technological advances continue to lead to lower NOx emissions from individual cars, this is offset by the increase in the number of the vehicles on the road. It is important to effectively manage our traffic in urban areas and curtail the further growth in road traffic".*

It is generally accepted that the dominant primary source of nitrogen dioxide in ambient air in the Dublin Region is vehicular traffic. While individual vehicle engines have become less polluting and more efficient over time, the number of vehicles and their pattern of movement have given rise to continuing elevated levels of nitrogen dioxide. The Dublin Region is not unique in this regard either within the European Region or further afield.

In the context of measures to address traffic issues the degree to which the Region's Land use and Transportation Planning Strategies have rigorously demonstrated how and to what degree their Air Quality benefits are to be achieved is unclear. This should be more rigorously tested and explicitly demonstrated.

In addition, local meteorological conditions also have a pronounced effect on air quality. In the Dublin Region, while the prevailing winds and rainfall levels are generally favourable to good air quality, there are episodes of calm, dry, cold weather where levels of ambient atmospheric pollutants can rise significantly. This has been particularly noticeable in some locations within the Dublin Region in recent years during severe weather episodes. Developing a better understanding of localised metrological conditions is an important consideration in understanding air quality trends in the region.

4.2 Main Emission Sources

NOx refers to the two pollutants nitric oxide (NO) and Nitrogen Dioxide (NO_2). They are produced during combustion at high temperatures mainly from **motor vehicles and from power generation plants.**

While the transport sector is recognised as having the major impact, over power generation, on air quality in the Dublin region, there are also a number of other sources that contribute to the overall pollution burden. These include construction activities and uncontrolled burning.

4.3 Total quantity of Emissions from Sources

The EPA inventory on national NOx emissions for the years 2000 2009[11] shown below in Table 4.1, reveal a significant downward trend since the start of the new millennium. The overall reduction of NOx out put was 47, 684 kilo tonnes which represented a fall of 34.56%. However, whereas transport increased it's percentage of the total out from 46.6% to 52.75%, power station emissions almost halved in the same 10 years from 28.8% to 14.7%..

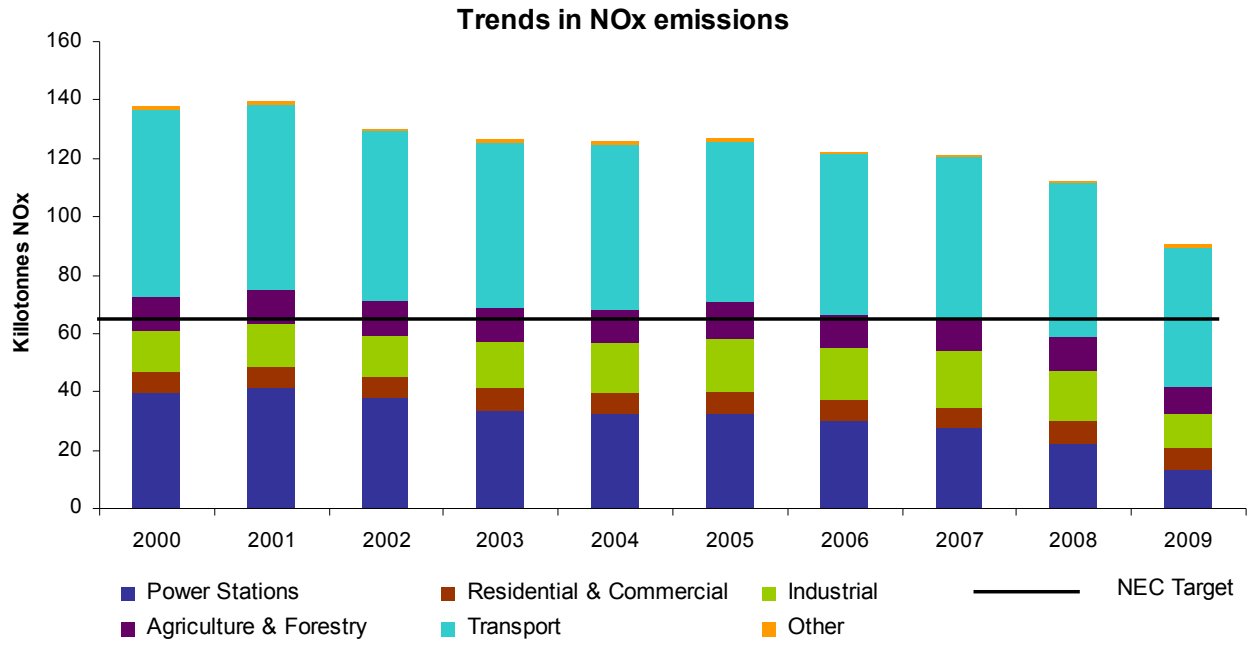
The figure for transport correlates very closely to the London Atmospheric Emissions[12] Inventory of 2003 which estimated that road traffic accounts for over 51% of nitrous oxides and 73% of PM_{10} levels.

Table 4.1 EPA inventory on national NOx emissions for the period 2000 – 2009 [11]

NO_X Emissions	% share 2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	% share 2009	% change 1990-2009
Power Stations	28.8%	39.731	41.156	37.630	33.820	32.342	32.396	29.885	27.295	21.985	13.262	14.7%	-71.4%
Residential & Commercial	5.0%	6.852	7.154	7.050	7.251	7.287	7.613	7.481	7.378	7.937	7.696	8.5%	-1.1%
Industrial	10.3%	14.244	14.920	14.535	15.978	17.395	18.216	17.514	19.240	17.664	11.619	12.9%	20.0%
Agriculture & Forestry	8.5%	11.666	11.801	11.846	11.891	11.395	12.228	11.712	10.992	10.942	9.210	10.2%	-1.7%
Transport	46.6%	64.301	63.465	58.092	56.485	56.347	55.541	54.911	55.259	52.883	47.565	52.7%	-6.5%
Other	0.8%	1.166	1.352	1.181	0.760	0.984	1.059	0.923	1.004	0.916	0.924	1.0%	-40.1%
Total	**100.0%**	**137.959**	**139.847**	**130.334**	**126.185**	**125.750**	**127.052**	**122.425**	**121.168**	**112.327**	**90.275**	**100.0%**	**-28.1%**
NEC Target		**65.000**	**65.000**	**65.000**	**65.000**	**65.000**	**65.000**	**65.000**	**65.000**	**65.000**	**65.000**		

The above figures above are set out in Figure 5.1 below to show the trends in tabular form for the first decade of the new millennium.

Figure 4.1 Trends in NOx Emissions in Ireland from 2000 – 2009[11].



The sources of the NO_2 exceedance at the Winetavern Street site in centre of Dublin city are localised and not significantly influenced by trans-boundary pollution.

Section 5

Current Policies and Measures for improvement in Air quality

5.1 International, National, Regional and Local Planning and Transport Policies

(i) International Policies

EU Thematic Strategy on Air Pollution [13]

The EU Commission in September 2005 published the Thematic Strategy on Air Pollution, one of seven thematic strategies promised in the 6th Environment Action Programme. The Strategy represents the next generation of environmental policy on air quality which takes a medium perspective to 2020.

The Thematic Strategy aims to cut the annual number of premature deaths from air pollution-related diseases by almost 40% by 2020 (using 2000 as base year), as well as substantially reducing the area of forests and other ecosystems suffering damage from airborne pollutants. The cost effective ambition of the Strategy is estimated to deliver at least 42bn Euro annually in projected health benefits while costing approximately 7bn Euro annually to implement.

(ii) National Policies

National Spatial Strategy

The National Spatial Strategy (NSS) 2002-2020[14] (published on 28th November 2002) is a 20-year coherent national planning framework for Ireland. It aims to achieve a better balance of social, economic and physical development across Ireland, supported by more effective and integrated planning. The strategy emphasises continued strong growth in the Greater Dublin Area (GDA), but with significant improvement in other regions to achieve more balanced regional development The NSS provides the policy framework for all regional and local plans, including the Regional Planning Guidelines for the GDA. The Minister for the Environment, Community and Local Government leads the Strategy's implementation.

The 2010 NSS Update and Outlook[15] report represented both a re-affirmation of the Government's commitment to implementing long-term planning frameworks such as the NSS, and a statement of new priorities and objectives, taking account of experience since 2002 and the new environmental, budgetary and economic challenges.

There has been a significant expansion of the bus network[16] with bus lanes, quality bus corridors, and an expanded bus fleet with modern lower emission vehicles.

Greater densities of development have been achieved. This with mixed uses and lower levels of on-site parking facilitate alternative modes of travel or reduced travel demand.

While road development has proceeded broadly in line with the strategy timeframe, light and heavy rail projects have lagged behind. Despite significant growth in the Dublin Metropolitan Area (DMA), it has not occurred in line with projections for the GDA area, while growth projections in the hinterland have exceeded projections

'Transport 21' published in November 2005[17] set out a €34bn national investment framework for transport infrastructure nationally for the ten year period up to 2016, €16bn of which was to be spent on improving public transport infrastructure and services, primarily within the GDA [e.g. LUAS extensions, Metro, DART underground, electrification etc. largely based on 'A Platform for Change' that sought to reduce private car usage, congestion and pollution;.

While some projects have proceeded, the investment programme has been scaled back since 2007, resulting in delays in delivering several of the planned projects; Metro, DART underground, electrification of the Maynooth and Kildare commuter lines etc. These projects are considered important if the strategic objectives to develop an enhanced public transport system for the Dublin Region that would encourage a shift in travel from private to public transport. Such a shift is required to relieve congestion, and improve both economic competitiveness and air quality. Recently the government has confirmed that expenditure on transport projects is to be reviewed downwards in the light of the availability of funding, with the deferment of Metro, DART underground, and LUAS extensions. The implications of these decisions for the achievement of better air quality standards in the Dublin Region could be significant. In the interim however, it has been confirmed that integrated ticketing for the existing public transport network within the Dublin region will be available from 2012, and the LUAS BXD line to Broombridge will also proceed. It is anticipated that this will ease access to and across the public transport network.

Smarter Travel

Smarter Travel is a National Transport Policy*(18)* document launched in 2009 setting out a broad vision for the future and establishing objectives and targets. It concludes past trends in population and economic growth and transport are unsustainable into the future.

The aim is that by 2020 future population and economic growth will have to predominantly take place in sustainable compact urban and rural areas which discourage dispersed development and long commuting. Ambitious targets are set out for sustainable modes of travel. It establishes key policy objectives and targets for all regional policies and plans – including the RPGs for the GDA. Two of the key findings of Smarter Travel were that between the years 1996 and 2006 in Ireland, Green House Gas emissions from transport increased by 88%, and Energy consumption doubled.

Smarter Travel recognises the challenge is to change mind-sets, and to alter travel behaviour will require the alignment of policies right across Government.

The document outlines a suite of 49 actions required to achieve these targets – including:

- Actions aimed at reducing distances travelled by car including the use of fiscal measures to discourage use of the car to reduce congestion and pollution.
- Actions aimed at ensuring that alternatives to the car are more widely available to reduce congestion and pollution.

National Cycle Planning Policy Framework 2009-2020*(19)*.

Launched in April 2009 this policy outlined 19 specific objectives, and details 109 individual but integrated actions, which include:

- Investing in better, safer cycle routes and safe cycle parking facilities for commuters, leisure cyclists and visitors to reduce private car usage, congestion and pollution.
- Ensuring integration of public transport and cycling (e.g. trains or buses carrying bikes);
- Introducing a new approach to the design of urban roads to better recognise the needs of cyclists and pedestrians to reduce congestion and pollution.
- Retrofitting major road junctions and roadways in key cities and towns to make them cycle-friendly to reduce congestion and pollution.

Back to Work Cycle scheme

This has been a huge success with the sale of new bicycles exceeding 150,000 in the period since its introduction in 2008.

(iii) Regional Policies

Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.[20]

The Regional Planning Guidelines for the Greater Dublin Area (RPGs) were first published in 2004 and covered the period 2004 to 2016. In accordance with the Planning and Development Act 2000 (amended in 2010), the RPGs were reviewed and new guidelines for the period 2010 to 2022 were adopted.

It incorporates the National Spatial Strategy and more updated population forecasts based on the 2006 census. It promotes consolidated urban development based on enhanced public transport for the Dublin Metropolitan Area (DMA) as defined in the strategy document to minimise commuting, congestion and pollution.

For the surrounding hinterland, development was to focus on Growth Centres separated by strategic green belts. These growth centres were to be linked to the DMA by enhanced transport links.

It was an objective of the strategy to maintain/promote continuing improvement in air quality. A key element of the 2010 amended Planning and Development Act is the requirement of local Development Plans to prepare evidence based core strategies and show how they are consistent with the RPGs and the NSS. The strategy provides that development in the GDA shall be directly related to investment in integrated high quality public transport, focused on achieving a compact urban form with reduced private car usage, congestion and pollution.

Retail Strategy for the Greater Dublin Area 2008-2016 (RPSGDA)[21]

This was initially produced in 2001 and sets out the Retail Hierarchy for the GDA from metropolitan to neighbourhood centres, based on the Growth Centres identified in the Regional Planning Guidelines for the Greater Dublin Area. It serves to reinforce the settlement strategy that seeks to minimise commuting, congestion and pollution. A projected quantum of additional retail development was identified and allocated to different levels in the retail hierarchy. A revised RPSGDA was published by the Regional Authority in July 2008. It sets out an updated analysis of the future retail needs of the GDA to 2016 and seeks to give guidance to the local authorities on where future retail facilities should be provided and issues to be addressed.

Core elements of the updated RPSGDA include:

- Encouraging local shopping provision for lower order goods to reduce trip lengths; and
- The linking of provision of new retail facilities to public transport nodes to achieve reduced private car usage, congestion and pollution.

Platform for Change 2001

This strategy from the Dublin Transportation Office (DTO)[22], set up by Government in 1995, was given primary responsibility for strategic transportation planning in the GDA.

The DTO's "Dublin Transportation Blueprint 2000-2006" developed into an integrated transportation strategy for the Greater Dublin Area "Platform for Change" that sought to concentrate investment on:

- developing, extending and increasing the capacity of the bus network;

- implementing the light rail network approved by Government in 1998. Two extensions of the LUAS lines were completed in 2011.
- exploiting much more fully the potential for development of the suburban rail network and the promotion of public transport integration to reduce private car usage, congestion and pollution;
- completion and upgrading of the M50, Port Access Tunnel and national road projects;
- implementation of non-national road projects of relevance to DTO Strategy objectives and appropriate traffic management measures
- provision of cycle infrastructure and facilities to minimise, congestion and pollution;

Platform for Change was a long-term transportation strategy to 2016 for the GDA that followed the preparation of a medium-term Investment and Implementation Programme for the period 1994-1999 and the initial "Blueprint". It incorporated where relevant also all national and regional strategies including those relating to pollution, and initiated a continuous transportation planning process.

The strategy had the following objectives

- promote implementation of the Strategic Planning Guidelines for the Greater Dublin Area the proposed National Spatial Strategy and sustainable land uses
- within the Region, consolidate growth in the Dublin Metropolitan Area;
- within the Hinterland Area, promote the self-sufficiency of the Development Centres.
- optimise the use of existing infrastructure and facilities and reduce private car usage, congestion and pollution;
- ensure the efficient and cost-effective use of resources – public, EU and private sector and timely implementation;
- promote legislative, institutional and administrative structures to optimise implementation and maximise self-enforcement;

(iv) Local Policies

All development plans in the Dublin Region are prepared by the respective 4 Councils and reviewed by (i) the Regional Authority to ensure that they adequately had regard to the Regional Planning Strategies and (ii) The National transport Authority to ensure that they adequately had regard to the Regional Strategy and Platform for Change. In this regard these local Development Plans incorporate regional objectives at the local level that seek to reduce congestion and pollution. In addition the local plans set out some more detailed policies and objectives in relation to air quality that serve to guide the development management process in each constituent local authority area. Each local authority has a statutory obligation to uphold its development plan.

- Dublin City Council Development Plan – 2011 - 2017
- Dun Laoghaire Rathdown County Council Development Plan 2010 – 2016
- South Dublin County Council Development Plan 2010 – 2016
- Fingal County Council Development Plan 2011 – 2017.

Dublin Bike Rental Scheme

Inaugurated in September 2009, the scheme facilitates Dublin City Council to innovatively fund the provision of public cycling amenities by advertising in the City. 450 bikes at 40 stations have been provided. The network is designed to facilitate people using bicycles for short journeys in the city centre area, and facilitates each bicycle being hired several times a day, significantly reducing short vehicular trips. This

has been one of the great transport initiatives in recent times. To date 2.6 million bicycle journeys have been taken in this scheme.

An expansion of the scheme in Dublin City is being prepared and an examination of extending it beyond the city is being explored. The scheme supports objectives to reduce congestion and pollution.

Dublin HGV Management Strategy[23]

This Strategy aims to encourage maximum use of the Port Tunnel by port-related traffic and to enhance the city centre environment and reduce pollution. It provides for a ban on 5+ axle vehicles during the hours of 07.00-19.00 seven days a week from a designated cordon area within parts of Dublin City and Dun Laoghaire Rathdown with a limited permit scheme for 5+ axle vehicles that need to load/unload within this area. In addition, as the HGV cordon is a closed cordon around the port area, Dublin City Council operates an Eastlink Rebate Scheme for affected vehicles. The HGV Strategy has resulted in dramatic reductions of 5+ axle vehicles of between 80 - 94% on different routes within the cordon area.

Adaptive Transport Management:

Adaptive Traffic Control (ATC) systems dynamically adjust traffic signal timings and phasing in response to changing traffic conditions. The ATC's algorithms generally seek to minimize queuing and delays for motorised traffic. It is commonplace to alter the control strategy based on the time of day and the day of the week, or for other special circumstances such as a major event causing unusual traffic conditions. There are two ATC systems in use in Dublin. SCATS (the Sydney Co-ordinated Adaptive Traffic System) was developed in Sydney, Australia and is used by Dublin City Council in the city centre and along strategic arterial routes. SCOOT (Split, Cycle and Offset Optimisation Technique) developed in the UK is used by South Dublin County Council.

Both ATC systems use data collected by traffic detectors, which detect passing or stopped traffic. The commonest types of detectors are inductive loops cut in to the road surface. Other detectors use radar or video recognition. The detectors provide traffic flow and queuing data which is input to the ATC. The ATC uses the data to optimise traffic signal timings and phasing e.g. it can give more green time to an approach to a junction that is experiencing heavy queuing, or shorten or even skip a phase that has little or no traffic. Both ATC systems are capable of using air quality monitoring data as inputs. The controlling algorithms can respond to air quality data by reducing the volume of traffic entering an area with high pollutant levels. This capability has not yet been activated in the Dublin Region.

5.2 Dublin Regional Air Quality Policies

Dublin Regional Air Quality Management Plan. 2009-2012.

This was formally adopted by all authorities in the Dublin Region following consultation on a 2008 draft. The plan identified that overall Dublin's air quality is good compared to other European cities and has improved dramatically over the years. It found that the ban on bituminous coal burning in Dublin had significantly improved air quality, saving an estimated 359 lives every year for the previous 19 years(St James/Luke Clancy study ref number) and also identified that the benefits of fuel improvements such as the introduction of lead-free petrol have been offset by the doubling of car users in Ireland between 1990 and 2006.

5.3 Observed effects of these policies:

Existing Measures impinging on Air Quality and their impact

No	Measure	Strategy	Started	Impact	Progress
01	Cycle Network	Platform for Change	1998	Increased cycle usage	199km of cycle lanes provided in the City area.
02	City Bikes	City Council Action plan	Sept. 2009	2.6 million journeys taken by May 2011 mostly in the city centre.	450 bikes at 40 stations
03	Cycle to work	Smarter Travel	Jan. 2009	Incentive for cycle usage	Operates in many public and private sector workplaces
04	5 axle ban	HGV Management Strategy	Feb. 2007	The banning of HGVs from entering the city centre without permit.	80- 94% removal of 5 axle HGVs from the city
05	LUAS	Platform for Change	1996 & 2008 for Extension	Increased public transport capacity	32 kilometres completed on the red and green LUAS lines. 2 extensions completed in 2011.
06	Kildare Rail Route	Platform for Change	2005	Diversion of traffic from road to rail	Many new rail stations opened along the Arrow route.
07	Quality Bus Network	Platform for Change	2001	Bus priority measures introduced	200kms of Quality Bus Corridors
08	Bus Lanes	Platform for Change	2001	Diversion of traffic from private car to bus	250 Km of bus lanes and more QBCs planned
09	Vehicle scrapage	National Fiscal Policy	2009 - 2011	Higher standards for car emissions and cleaner technology	4,550 old vehicles scrapped in the Dublin region. (Now terminated)
11	Traffic calming	Platform for Change	2001	Increased walking & cycling	On-going
12	Urban planning policies	RPGs	2004	Higher density and street pattern, linkages to public transport, promote reduced car usage & congestion.	Higher densities achieved support increased public transport use.
13	Bus fleet managing	Transport 21	2009	Changes increase the efficiency of services.	Reduced bus pollution
14	Green Schools Travel Programme	Smarter Travel	2009	Supported by the Dept of Transport and the National Transport Authority	Schools set their own travel targets to increase pupil numbers walking, cycling or using public transport.
15	Smarter Travel Workplaces	Smarter Travel	2009	Promotes cycling, public transport, car-sharing and trip reduction in Workplace Travel Plans	Assisting large employers (with over 250 employees) in managing commuting and business travel sustainably.
16	Personal Travel Plans	Smarter Travel	2009	Increased awareness of alternatives to private car use	Pilot project underway

Section 6

Measures or projects planned or envisaged for the long term.

6.1 Possible measures for improvement of air quality

This section gives details of measures that address exceedances of the NO_2 limit values within the agglomeration. This includes both measures that have already been taken and which are proposed to be taken. The indications from the main emission sources in Section 4.2 are that appropriate measures should impact on local road traffic sources in this zone.

Measures

Measures potentially affecting NO_2 in this zone have been taken and /or are planned at a range of administrative levels. These are:

- European Union
- National
- Regional
- Local

Details of European Union measures can be found on the European Commission's website

http://ec.europa.eu/environment/air/index_en.htm

Examples of EU measures would include European standards, fuel quality directives and Integrated Pollution Prevention and Control.

National and regional measures

In its report on Ireland's Transboundary Gas Emissions in 2009[11] the EPA submission shows Ireland exceeding its 2010 NOx ceiling by 24 kilotonnes in 2009. However NOx emissions have decreased by 31.3% between 1990 and 2009 and emissions have decreased by over 17.4 kt, or 16.4%, in 2009 alone (see figure 4.1). This reduction was achieved by improved abatement measures in Moneypoint power plant and reduced demand for clinker/cement and a reduction in fuel used in road transportation. Emissions of NOx from the coal-fired power plant at Moneypoint have decreased by over 51% between 2007 and 2009.

The application of low-NOx burner technology in several major power stations, supported by the EPA's Integrated Pollution Prevention and Control (IPPC) licensing regime, and the increased use of natural gas have reduced NOx emissions from electricity generation by 71 per cent on 1990 levels. This is in the context of electricity total final consumption having increased by 110 per cent over the same period. The benefits achieved by the installation of catalyst control in cars and heavy duty vehicles, which achieved substantial decreases in NOx emissions from road transport from the mid-1990's, have been offset by the large increases in traffic volumes and the associated fuel use. Overall, road transport has seen a decline in emissions of 17% between 1999 and 2009.

Local Measures and Strategies

The current overall strategic planning approach for the Dublin Region can be summarised as the promotion of **"consolidated urban development based on enhanced public transport"**. All local strategies are now consistent with this.

This comes from the recently adopted Regional Planning Guidelines (2010) based in turn on the National Spatial Strategy.

Each local development plan now sets out how and where consolidated development is to occur. Government guidelines now give clearer guidance on how development is to be consolidated, with provision for minimum densities in certain locations and the encouragement of mixed use development. Recent planning legislation has reduced the discretion with these guidance documents.

The enhancement of public transport is based on Rail, Light Rail and Bus - in that order. This is the basis for Metro, Dart underground and LUAS extensions. The objective here is to shift the split in traffic from private motor traffic towards more public transport. The role of bus transport is to compliment rail transport. The Draft Greater Dublin Area Transport Strategy for 2011 – 2031 currently undergoing public consultation by the National Transport Authority confirms this. This is also the strategy document that provides for the strategic objective for transport planning to provide for improvements in environmental quality. The implications for air quality as a result of the recent government decisions to reduce public transport investment should be assessed and possible alternatives explored.

There is also a sub-objective to increase the use of cycles and walking for shorter journeys. The latter requires that the traffic environment be addressed in terms of overall traffic levels, speed and infrastructure (for cyclists and pedestrians). The Smarter Travel Initiatives, Bike to Work scheme, Personal Travel Plans, Dublin Bikes etc are relevant here.

6.2 Other Potential Measures to impinge on Air Quality

The following table summarises a range of possible new or additional measures that have the potential to impinge on and improve air quality. Some of these measures are being examined in the context of new strategies currently being developed.

No	Measure	Related Strategy	Phase	Anticipated Impact	Obstacles to progress
1	Integrated public transport fares and ticketing	Draft Greater Dublin Area Transport Strategy 2020-2030	Short Term	Facilitates ease and greater integrated use of the public transport networks	To be rolled out with new ITC systems in 2012
2	Road Pricing	Draft Greater Dublin Area Transport Strategy 2020-2030	Long term	Where road pricing is additional to fuel duty, evidence suggests that this could result in significant emission reductions:	Legislation required. Implementation and enforcement
3	Real-time air quality monitoring by traffic control systems	Draft Greater Dublin Area Transport Strategy 2011-2030	Medium term	Linking the regions' adaptive traffic control systems [SCATS & SCOOT] to air quality monitoring would allow traffic management respond to air quality changes	System compatibility Equipments costs
4	Car clubs	Smarter Travel	Long Term	Similar to Bike scheme: Reduced car usage	Legislation & insurance issues

No	Measure	Related Strategy	Phase	Anticipated Impact	Obstacles to progress
5	Local emissions taxes	None at present	Long Term	Reduce pollution	New Legislation required
6	Retro fit demand management	Draft 2030 Vision Strategy	Long Term	Reduced car usage	Strategic Plan required
7	'Intelligent' transport systems. E.g. driver-centric technology for vehicle control	Draft 2030 Vision Strategy	Long Term	More efficient movement	Technological development
8	Strategic logistics	Draft 2030 Vision Strategy	Long Term	Efficient scheduling of deliveries	Technological development
9	Workplace Travel Plans	Draft 2030 Vision Strategy	Long Term	Reduced dependency on car travel	Strategic Plan required
10	Personalised Travel Planning	Draft 2030 Vision Strategy	Long Term	Reduced dependency on car travel	Strategic Plan required
11	School Travel Planning	Draft 2030 Vision Strategy	Long Term	Reduced dependency on car travel	Strategic Plan required
12	Promoting Health benefit of Active Travel	Draft Public Heath policy	Long Term	Reduced car usage	Strategic Plan required
13	Enhanced local weather forecasting	None at present	Long Term	Reduced car usage	Technological development

Section 7

Conclusion and Recommendations.

7.1 Conclusions

i. Levels of nitrogen dioxide in the ambient air have been in compliance with European Union limit values until 2009, when the limit value was exceeded at one location. There is no room for complacency as levels recorded at various times and locations over a number of years have approached this limit value. There is a strong possibility that the limit value will be exceeded in subsequent years unless existing initiatives continue and additional appropriate measures are considered and implemented.

ii. The overriding concern with regard to an exceedance of the European limit value for nitrogen dioxide is the public health dimension. The Clean Air for Europe Directive prioritises the need to reduce pollution to levels which minimise harmful effects on human health, paying particular attention to sensitive populations. The evidence base from previous experience in the Dublin Region of health affects from pollution from bituminous fuels is a clear reminder that timely action is of the essence to protect public health when air quality limits values are breached.

iii. It is generally accepted that the dominant primary source of nitrogen dioxide in ambient air in the Dublin Region is vehicular traffic. While individual vehicle engines have become less polluting and more efficient over time, the number of vehicles and their pattern of movement have given rise to continuing elevated levels of nitrogen dioxide. The Dublin Region is not unique in this regard either within the European Region or further afield.

iv. Local meteorological conditions have a pronounced effect on air quality. In the Dublin Region, while the prevailing winds and rainfall levels are generally favourable to good air quality, there are episodes of calm, dry, cold weather where levels of ambient atmospheric pollutants can rise significantly. This has been particularly noticeable in some locations within the Dublin Region in recent years during severe weather episodes. Developing a better understanding of localised metrological conditions is an important consideration in understanding air quality trends in the region.

v. The management of traffic across the Dublin Region is a multi-faceted process requiring a truly integrated approach. To date, integration of real time air quality into that process has not featured. Given the stress on the overall process in terms of air quality, this must now be addressed

vi. Efforts have been made to incorporate ambient air quality considerations in a range of national, regional, and local transport strategies in the Dublin Region by a variety of agencies. It is imperative that these agencies appraise their contribution to ensure air quality is prioritised, given the possibility of further exceedances of European Union limit values.

vii. In the 2008 “State of the Environment Report “ the Environmental Protection Agency indicated "Emissions of air pollutants particularly PM10 and NOX, from road traffic remain the main threat to air quality in urban areas. While new standards for car emissions and the resultant cleaner technology have curbed emissions from individual vehicles, this has been offset by the increasing number

and bigger engine sizes of vehicles on Ireland's roads. Air quality issues must therefore be an integral part of traffic management and planning processes, and there needs to be a modal shift from the private car to high-quality public transport." Achieving this modal shift will be an even greater challenge now, given the national economic situation.

viii. It is not clear how Land use and Transportation Planning Strategies have rigorously demonstrated how and to what degree their Air Quality benefits are to be achieved.

ix. Traffic Management by each the Local Authorities in the Dublin Region could have an improved integrated Regional focus to address Air Quality in problem areas.

x. Given the advances in technology it is now feasible and timely to consider measures to integrate real time air quality monitoring, predictive air quality modelling, and traffic management systems.

xi. Many of the proposed transport infrastructure measures currently under consideration have considerable lead-in times, and funding for these measures is not yet certain. Under these circumstances there is a need to harness public information measures and pro-active encouragement of behaviour change in transport usage.

xii. There are real choices available to individual transport users and commuters in terms of their personal contribution to air emissions. While some initiatives have clearly been successful in demonstrating this, much still remains to be done. Linking such initiatives to potential savings in transport fuel costs for individuals would strike a chord in current economic circumstances.

xiii. Recently the government has confirmed that expenditure on public transport projects is to be revised downwards in the light of the availability of funding, with the deferment of both Metro projects, DART underground, and some LUAS extensions. The implications of these decisions for the achievement of increased public transport usage leading to reduced congestion and improved air quality in the Dublin Region should be assessed and possible alternatives explored.

xiv. No one agency or authority can bring about and sustain a reduction of nitrogen dioxide levels in ambient air in the Dublin region. This report is but a first step in commencing the dialogue to achieve this.

7.2 Recommendations

i. This report must be disseminated to the various agencies with input to national, regional, and local transport policy to highlight that controlling nitrogen dioxide levels in ambient air in the Dublin Region requires concerted action.

ii. Putting the safeguarding of health of the public at the forefront of intersectroal strategies and initiatives must be a priority. There is a clear need to ensure that lowering nitrogen dioxide levels in the Dublin Region to an acceptable level and maintaining them there is seen as a shared objective in all relevant intersectroal strategies.

iii. The support of the Environmental Protection Agency, The National Transport Authority, The Department of Transport and the Department of Environment Community and Local Government in ensuring that air quality is a priority for these agencies is essential and a dialogue on how to harness that support is a priority step in this process.

iv. The implications of recent government decisions on public transport investment on air quality standards in the Dublin Region should be assessed and possible alternatives should be explored.

v. Local authorities in the Dublin Region need to integrate real time air quality monitoring with traffic management systems with a view to reducing nitrogen dioxide levels during periods of peak risk.

vi. Integrating air quality monitoring with localised meteorological monitoring is a valuable tool that needs to be utilised in predicting periods when elevated levels of nitrogen dioxide may occur.

vii. This report demonstrates the wide variety of policies, strategies and initiatives that address air quality. Research into these to evaluate which have the most beneficial effect on air quality should be undertaken.

viii. A public information campaign dealing with transport usage, eco-driving and making air quality based commuter choices, particularly during times of potential air quality risk should be undertaken.

Section 8

Contact names and addresses of persons responsible for this plan

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Section 9

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Appendix

Summary of Air Quality benefit from existing National, Regional and Local strategies

Strategy	Description	Objective	Air Quality benefit
National Programme on Transboundary Pollutants	In conjunction with 2003 Discussion paper on Strategy to Reduce Emissions of Transboundary Air Pollution by 2010	Member States are required to limit their annual national emissions of SO2, NOx, VOC and NH3 to not greater than the emissions ceiling laid down in Directive 2001/81/EC by 2010.	Overall decrease in NOx emissions by 31.3% between 1990 and 2009.
National Emission Reduction Plan	Sets limits for emissions of SO2 and NOx from existing plant which are significantly more ambitious than the minimum requirements of Directive 2001/80/EC	In the period from 2008-2016 the NERP is 27% more ambitious for SO2 and 46% more ambitious for NOx emissions	Improvements in air quality expected
National Spatial Strategy 2002-2020	Provides the policy framework for all regional and local plans including the RPG's for the GDA	Deliver more balanced social, economic and physical development between regions	Air quality a priority in regional and local plans
National Development Plan 2007-2013	National Plan	The plan aims to deal with infrastructural deficits including Transport and Traffic	Improved air quality expected due to reduced congestion
National Cycle Planning Policy Framework 2009-2020	Outlines 19 specific objectives and details 109 individual but integrated actions	Reduce private car usage, congestion and pollution	Improvements in air quality expected
Regional Planning Guidelines (RPG's) for the Greater Dublin Area (GDA) 2010-2022	Requirement for Local Development Plans to prepare evidence based core strategies and show how they are consistent with the RPG's and the NSS	Development in the GDA shall be directly related to investment in integrated high quality public transport to minimise commuting, congestion and pollution.	Maintain/promote continuing improvement in air quality
Retail Planning Strategy for the Greater Dublin Area 2001-2016	Sets out the Retail Hierarchy for the GDA from metropolitan to neighbourhood centres based on the Growth Centres identified in the Strategic Planning Guidelines	Reinforce the settlement strategy that seeks to minimise commuting, congestion and pollution	Improvements in air quality expected

Strategy	Description	Objective	Air Quality benefit
Retail Planning Strategy for the Greater Dublin Area 2008-2016	Sets out an updated analysis of the future retail needs of the GDA and seeks to give guidance to the local authorities on where future retail facilities should be provided	Encourage local shopping to reduce travel demand and trip lengths. Linking of provision of new retail facilities to centres of population and to public transport nodes to achieve reduced travel demand and private car usage, and thus reduced congestion and pollution	Improvements in air quality expected
Platform for Change 2001. Dublin Transportation Office (DTO)	DTO given primary responsibility for strategic transportation planning in the GDA	Reduce private car usage, congestion and pollution	Maintain/promote continuing improvement in air quality
Transport 21 (2005)	Set out a €34bn national investment framework for transport infrastructure up to 2016	Reduce private car usage, congestion and pollution	Maintain/promote continuing improvement in air quality
Smarter Travel. A new Transport Policy for Ireland 2009-2020	Sets out a broad vision for the future and establishes objectives and targets for transportation	Reduce dependency on car travel. Increase public transport modal share. Improve quality of life	Minimise environmental impact by reducing localised air pollutants and greenhouse gases
Greater Dublin Area Draft Transport Strategy 2011-2030	The RPG's for the GDA set out the planning context for the strategy and as required by legislation, all objectives and policies contained within the strategy are consistent with the RPG's.	The Strategy Vision is for a competitive, sustainable city-region with a good quality of life for all. There are 5 high level objectives to support the vision with a set of transport specific sub-objectives	Improvements in air quality expected due to reduced traffic congestion
Dublin Region Air Quality Management Plan 2009-2012	Formally adopted by all 4 local city and county authorities in the Dublin Region following consultation on 2008 draft	Prevention or limitation of air pollution or the preservation or improvement of air quality	Strategies 2,3,4,5 will impinge positively on Nitrogen Dioxide levels
Dublin Agglomeration Noise Action Plan 2008-2013	Prepared by the 4 local authorities in the Dublin city and county region under Directive 2002/49/EC	Reduction of environmental noise including from traffic sources	Sections 6.2.1 to 6.2.4 outline measures which will also have improved air quality benefits