

CHAPTER 3 – ENVIRONMENTAL CONTEXT

This chapter presents a description of how physical, human, and industrial factors influence patterns of waste arisings and waste disposal in the arc21 Region

INTRODUCTION

- 3.1 It is essential to describe and understand the current environmental characteristics of the arc21 Region to ensure that the WMP is set in context. This chapter of the WMP is inextricably linked to the environmental baseline established for the Strategic Environmental Assessments (SEA). Environmental baseline information is established for the SEA process to assist in the prediction and understanding of the likely impact that the arc21 WMP will have on the physical and human environment. Once the baseline environmental information is established it can be easily updated and expanded to provide a resource base to inform the future development of the WMP, projects arising from implementation of the WMP and subsequent SEA work.
- 3.2 The nature of waste arising and its management within the arc21 Region is affected by the physical characteristics of the landscape and are a reflection of the settlement pattern. Northern Ireland is, by virtue of its topography, a relatively compact region. It is physically centred on Lough Neagh, with a radial pattern of main roads and railways converging on the City of Belfast.
- 3.3 The arc21 Region covers 25% of Northern Ireland, which has a land area of 3522 km². Much of the arc21 Region is bounded by coastline with only Ballymena and Castlereagh Borough Councils not having some part of their boundary adjacent to a water body.
- 3.4 The population of Northern Ireland is 1,685,267 (Census 2001) with approximately 57% of the total population living in the arc21 Region. The population is predicted to increase to approximately 1.8 million in 2019; this is a 6.8% rise over 18 years. The number of households is also increasing with 626,718 recorded in Census 2001 and the prediction that there will be an increase of 187,000 (29%) between 2001 and 2025. Two thirds of this increase is attributable to a predicted increase in one-person households; a trend often associated with an ageing population.

PHYSICAL ENVIRONMENT

Geology

- 3.5 The geology and hydrogeology of the arc21 Region has important implications for waste disposal practice and the location of new facilities. Key aspects are the suitability of geological materials for the siting and formation of waste management

facilities, and the protection of water resources used for industrial and domestic water supplies.

Solid Geology

3.6 The arc21 Region can be divided into three broad areas:

- Tertiary basalt to the north;
- Shales of the Silurian and Ordovician period to the south; and
- Triassic shales, marls and sandstones forming a central divide between the two.

3.7 The Tertiary volcanic lava and Mesozoic rocks of County Antrim are the youngest geological entity in Northern Ireland, although the Mesozoic rocks are mostly hidden by the later volcanic lava. The Antrim Lava Group is mostly basalt lava of similar composition, divided into upper, middle and lower units. Above the basalt, under and around Lough Neagh are clays and silts of the Lough Neagh Group. These clays are poorly consolidated and include lignite in places.

3.8 In the south of the arc21 Region are rocks mostly of greywacke sandstone with subordinate slate mudstone. These rocks have been intruded in many places by narrow igneous dolerite dykes. Historically the greywacke has been much quarried as road and building stone, while lead with silver in quartz veins was mined in the past. In South Down are massive intrusions of Newry granodiorite and the younger Tertiary granites of the Mourne Mountains are found here.

3.9 Triassic rocks, especially Sherwood (red) Sandstone and Mercia Mudstone (marl) significantly outcrop over a sizeable area of the Lagan Valley. The Mercia Mudstone includes substantial slate beds in the Carrickfergus to Larne area. Further north grey mudstones, the Cretaceous Hibernian Greensand Formation and the Ulster White Limestone all form narrow strips of land around the Antrim Plateau.

Drift Geology

3.10 Superficial deposits over the arc21 Region comprise till or boulder clay deposited during the last major re-advance of ice from the Central part of Northern Ireland just over 25,000 years ago. As the ice melted away the floodwaters deposited outwash sands and gravels. Although the till varies according to the substrate it is generally stiff silt clay with locally derived boulders. In its upper metre the till, which is often up to tens of metres thick, weathers to allow superficial water movement.

3.11 Significant glacial sands and moraines occur in the Lagan Valley from Lisburn to the Malone Road, in the Enler Valley between Dundonald and Comber, along the Sixmilewater between Antrim and Ballyclare and north of Ballymena. Typically these deposits give rise to well drained and leached soils.

Hydrogeology

- 3.12 The hydrogeological map of Northern Ireland, published by Geological Survey Northern Ireland (GSNI) indicates a number of wells and boreholes used for public supply in the Lagan Valley and Ards area. Detailed information on hydrogeology is available direct from GSNI at: <http://www.bgs.ac.uk/gsni/> and may be useful for further information at a project or site specific level.

Groundwater Vulnerability

- 3.13 The Groundwater Vulnerability Information for Northern Ireland, published by GSNI, indicates three major geological classes and establishes a three-fold classification of aquifers at outcrop based on their permeability characteristics. The information grades the permeability of aquifers and this information can provide a useful guide to the potential areas of constraint for waste management activities at a site or project specific level. A full assessment of groundwater vulnerability can only be achieved by detailed local studies based on the modelling of specific site attributes and abstraction points.
- 3.14 The rock type of County Antrim comprises moderately permeable rocks that can be fractured or potentially fractured and which do not have high primary permeability. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flow to rivers. The Ulster White Limestone is a hard white limestone that has a very low porosity and water flow is mostly through joints, but the Greensand below is a significant aquifer and the source of many major springs. Although not an aquifer, water may be present in basalt within joints and weathered zones.
- 3.15 The rocks of County Down are made up of weakly permeable formations with negligible permeability that is generally regarded as not containing groundwater in exploitable quantities. They tend to be lime-poor and are poor aquifers as they have been strongly compressed and, having very few pore spaces, carry virtually no groundwater except in joints or in weathered zones.
- 3.16 The Lagan Valley area has highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and are able to support large abstractions for public supply and other purposes.

Topography

- 3.17 The land surface of Northern Ireland is predominantly lowland, with most of it forming an extensive saucer shaped lowland around Lough Neagh. From there, coastal lowland extends eastwards into the Lagan Valley, through Belfast and ultimately to the Ards Peninsula beyond Strangford Lough.

- 3.18 There are four main uplands in Northern Ireland, two of which are associated with the arc21 Region and are visible from Belfast. To the north the skyline of three summits (Divis, Black Mountain and Cavehill) is part of the Tertiary basalt plateau of County Antrim. From Belfast to the north there are extruded sheets of basalt lava, which extend some 80km to the cliff coastline of the Giants Causeway (World Heritage Site) in north Antrim. This area has a main plateau surface of between 300 and 400m above sea level.
- 3.19 Fifty kilometres south of Belfast are the Mourne Mountains in County Down, made up of hard, Tertiary granites. Although small in area the Mournes have fifteen summits above 600m and a further thirty above 300m.

Drainage

- 3.20 As much of the lowland is underlain by clay-rich glacial deposits of low permeability, many surface watercourse gradients are often very gentle in the lower course, and in areas where no artificial improvements have been made poor land drainage can restrict land use. The 'basket of eggs' topography produced by the drumlin swarms of County Down has caused impeded drainage in areas, though modern drainage has overcome this to allow agriculture and other development.
- 3.21 A notable feature of the drainage pattern is that so much appears to feed inward and pass through Lough Neagh. This inward drainage is now represented by the catchment of the River Bann and its tributaries, which drain 38% of the land area of Northern Ireland and a significant portion of the arc21 Region.

Agriculture and Soils

- 3.22 A total of 256,924 hectares of land in the arc21 Region is farmed. Grassland predominates within and occupies approximately 75% of the agricultural land area. Cereal production is most widespread in Ards with 14.5% of the arc21 Region's total, while Castlereagh, Down and Lisburn each provide just less than 10%. Market gardening including a range of root vegetables, particularly potatoes, occurs in North Down, the Ards Peninsula and in some parts of South Down.
- 3.23 Agricultural land in Northern Ireland is graded using the Agricultural Land Classification of England and Wales into 6 classes, from excellent to very poor quality. The majority of land in the arc21 Region falls within grades 1-3 and classed as of excellent to moderate quality. There are three areas of excellent quality land around Newtownards, in the Lagan Valley and the Sixmilewater river valley. Poor land is found in the Mournes and Cavehill areas.
- 3.24 There is a wide range of soil types in the arc21 Region, which are generally suitable for agriculture, and these can be grouped into three broad soil leaching potential

classes. Within the arc21 Region are soils of high leaching potential through which contaminants can easily discharge into watercourses. The soil types found in the Sixmilewater, Lagan Valley and Ards area are also of high leaching potential.

- 3.25 Parts of the arc21 Region, particularly to the west around Lough Neagh, consist of low lying land which is within a few metres of sea level, where the water table is at or close to the surface. The potential for groundwater ingress places additional engineering and management constraints on waste disposal activities. This may influence the suitability of a particular location for certain waste management facilities such as landfill development.

Landscape

- 3.26 The arc21 region has a wide variety of scenic countryside which reflects its contrasting geology and topography and long history of settlement and land use. Landscapes recognised as being of distinctive character and special scenic value have been designated as Areas of Outstanding Natural Beauty (AONBs) by Government in order to protect and enhance their qualities and to promote their enjoyment by the public. AONBs within the arc21 Region are identified in Appendix C to the SEA. Within the arc21 Region these include:

- Antrim Coast and Glens – the southern part of this AONB falls within the northern part of the arc21 Region and includes the Glens of Antrim;
- Mourne – the edge of the Mourne AONB falls within the southern part of the arc21 Region;
- Lecale Coast – coastal area between Strangford Lough and the Mourne, stretching from Dundrum Bay to Strangford village;
- Lagan Valley – focusing on the course of the River Lagan most of the AONB now lies within the Lagan Valley Regional Park which was designated in 1967;
- Strangford Lough – an almost landlocked area of sea set within a diverse lowland topography. The Lough is of international importance for wintering wildfowl while the surrounding area provides great landscape diversity, nature conservation and heritage interest.

- 3.27 There are also a number of areas of scenic quality throughout the arc21 Region. These are of regional importance and have been designated as Areas of High Scenic Value (AoHSV) within Development Plans. The process of identifying AoHSV is assisted by the identification of Areas of Scenic Quality within the Landscape Character Assessment 2000, published by DOE. There are eight of these within the arc21 Region: Lough Neagh Fringe; Island Magee; Carrickfergus Escarpment; Carnmoney Hill; Belfast Basalt Escarpment; Craigantlet Escarpment; Castlereagh Slopes, and Magheraknock Loughs. Development Plans also designate Local Landscape Policy Areas which are those which are within or adjoining settlements which are considered to be of greatest amenity value,

landscape quality or local significance. These designations are illustrated in Appendix C of the SEA.

Nature Conservation and Biodiversity

- 3.28 The arc21 Region has a wealth of habitat types and includes some important ornithological sites. Some of these sites are recognised as being of international importance for nature conservation and are classed as Ramsar sites, special protection areas (SPA) and special areas of conservation (SAC). There is one marine nature reserve (MNR), Strangford Lough, within the region. Other sites of national significance for nature conservation are designated as areas of special scientific interest (ASSI) and national nature reserves (NNR). Designations within the arc21 Region are presented in Appendix C to the SEA. Sites of local nature conservation importance, including woodlands and countryside parks are outlined in local Area Plans. This information includes sites designated for earth science interest.
- 3.29 Special procedures are in place to protect sites of particular importance and certain plants and animals are protected by law. Therefore any proposals for waste management facilities will need to take account of any possible effects such developments may have on protected habitats and species.
- 3.30 The Northern Ireland Biodiversity Strategy was published in October 2000. It contains 76 recommendations for the conservation of biodiversity in Northern Ireland and is intended to inform policy and promote action on biodiversity conservation. The key recommendations include:
- The assessment of all policies and programmes for their impact on biodiversity; and
 - Better co-ordination of work on biodiversity.
- 3.31 Biodiversity Action Plans for the Irish Hare, Chough and Curlew were published in October 2000 and others are expected to follow. The Action Plans and the Biodiversity Strategy will have to be considered when proposing new developments.
- 3.32 The biodiversity of the arc21 Region has unique ecological communities. The area contains sites of international and national importance, including sites of local nature conservation importance.

HUMAN ENVIRONMENT

Settlement

- 3.33 Northern Ireland is much less urbanised than many other European regions. The arc21 Region's development network consists of a web of independent centres or urban hubs ranging in scale from the metropolitan area focused on Belfast, through traditional market towns and villages to small rural settlements, with a regional transport network providing the cohesive links between all parts of the arc21 Region. Bangor, Castlereagh, Lisburn, Newtownabbey and Carrickfergus all coalesce to form part of the core Belfast metropolitan area.
- 3.34 Outside the city of Belfast, the arc21 Region is characterised by a dispersed settlement pattern. The extensive network of traditional market centres i.e. Antrim, Ballymena, Downpatrick, City of Lisburn, Larne and Newtownards are evenly spread and well paced to provide services to a strong rural community living in villages, small rural settlements, or in a distinctive pattern of dispersed dwellings in the open countryside. These regional centres also have the potential to accommodate population growth.
- 3.35 Although the population density of the arc21 Region is low by comparison with other European rural regions at 51 persons per square kilometre, the scattered distribution of farms and houses creates the visual impression of a 'peopled countryside'.
- 3.36 The health and social well being of the population has improved steadily throughout the last century. The arc21 Region exhibits a number of well-established lifestyle and consumer habits, which have led to an increase in the amounts of waste produced. Trends include, increasing home ownership and an increasing number of single households, coupled with increased consumption of disposable products.
- 3.37 Increased use of the car has also facilitated the dispersal of housing and economic activity. This in turn affects accessibility and transportation opportunities for future waste management planning.
- 3.38 Although these lifestyle changes are associated with increased waste production there is a growing recognition in society of 'green' issues. Concern over global environment and health issues has led to greater emphasis on protection of the environment and the concept of sustainable development.

Greenbelt

- 3.39 Development pressures within the Greater Belfast area, resulting from increased mobility have the potential to result in urban sprawl, spoiled landscapes, loss of

potential recreation areas and a general wasteful use of land resources. Green Belt policies have been designed to deal with the complex inter-relationships between urban areas and the nearby countryside. The Green Belt provides the urban areas with a setting which defines limits, enhances attractiveness and provides citizens with a highly visible, unspoilt and easily accessible countryside. A more protective policy operates within Green Belt areas. Additionally, some council areas operate Rural Policy Areas where policy reflects that of the Green Belt. The objectives of Green Belt policy are to:

- Control expansion of urban development into the surrounding open country;
- Maintain the rural character of the countryside within the Green Belt and prevent its deterioration by ribbon or scattered development; and
- Prevent the towns and settlements around Belfast merging with the Belfast Urban Area or with each other.

Communications

3.40 Northern Ireland is almost totally dependent on a road based transportation system, which is a reflection of the small internal transport market and dispersed settlement pattern. There are 75.2km of motorway, 90.3km of dual carriageway and 773km of A class roads in the arc21 Region. The two motorway routes are the southerly M1 to Dungannon and the northerly M2 to Randalstown. Three key transport corridors originate within the arc21 Region:

- *Eastern Seaboard Corridor* with the potential to provide high speed, high quality and high capacity road and rail links between Belfast and Dublin and onwards towards Larne, Warrenpoint and Rosslare to facilitate the movement of freight and people in this important North-South route.
- *Belfast Metropolitan Area- Derry/Londonderry Corridor* connecting the two biggest cities in Northern Ireland and strengthening their access to and from Belfast International airport.
- *Northern Corridor* linking the Belfast Metropolitan Area to Antrim, Ballymena, Ballymoney, Coleraine, Limavady and Derry/Londonderry by road and rail and providing access to the Antrim Glens and Coast.

3.41 Car ownership has increased by over 400% since 1960 and there are now around 700,000 vehicles registered in Northern Ireland. This figure is expected to grow to over 1 million by 2025. Total distance traveled has also increased by 7 billion miles giving a 155% rise since 1971. If present trends continue it is anticipated that road traffic would double by 2025. Since the vast majority of waste in the arc21 Region is currently transported to disposal or treatment facilities by road, it is anticipated that this predicted increase in traffic levels would reduce transport efficiency for waste.

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- 3.42 The rail network mainly serves the eastern half of Northern Ireland. Lines radiate from Belfast north to Londonderry, east to Bangor and southwest through Lisburn to Dublin. The use of public transport, both by rail and road has declined in parallel with growing dependence on the car.
- 3.43 The arc21 Region has good modern port facilities providing high quality shipping services and freight handling with Belfast port performing a shipping role of international/European importance. The ports within the arc21 Region offer an extensive range of services, with Belfast and Larne providing the main routes for the movement of materials in and out of Ireland and are therefore key links to the UK and the rest of Europe. There are no waterways within the arc21 Region suitable for transportation.
- 3.44 Two airports in the arc21 Region, Belfast International and Belfast City play a significant role in accessing markets, encouraging inward investment and boosting tourism.

Cultural Heritage

- 3.45 Within the arc21 Region the landscape contains many significant man-made features which are evidence of the development of our society. Archaeological sites and monuments, traditional buildings, areas and buildings of architectural and historic interest are part of our heritage and culture. Sites are listed in the Sites and Monuments Record of Northern Ireland. Estimated totals for sites of archaeological interest, listed buildings and conservation areas for the Councils within the arc21 Region are provided in Table 3.

Air

- 3.46 Air quality in Northern Ireland is generally improving, as decreasing emissions have led to reductions in ambient concentrations of these pollutants. National and European air quality objectives are in place and these objectives are being implemented through district and local authorities. Lead and Sulphur Dioxide objectives have been met, however, there continues to be a concern about the levels of particulate matter, Ozone and Nitrogen Dioxide which mainly stem from vehicle emissions.

Table 3.1 - Sites of Cultural Heritage

Council	Archaeological Sites	Listed Buildings	Conservation Areas
Antrim	600	225	2 Antrim Town, Randalstown
Ards	374	600	3 Central Portaferry, Greyabbey, Donaghadee
Ballymena	774	294	1 Gracehill
Belfast	138	1300	3 Areas of Victorian and Edwardian townscape
Carrickfergus	195	63	2 Whitehead, Carrickfergus town centre
Castlereagh	650	37	-
Down	751	800	7 Ardglass, Castlewellan, Downpatrick, Killough, Killyleagh, Strangford, Saintfield
Larne	444	250	1 Glenarm
Lisburn	657	316	3 Lisburn town centre, Hillsborough, Moira
Newtownabbey	274	46	1 Merville Garden Village
North Down	81	282	-

Climate

3.47 Research and modeling on climate change predicts that Northern Ireland is likely to see warmer wetter winters and drier summers. The frequency of extreme weather events such as flooding may increase as rainfall patterns change which, for example, may have an effect on dust levels and leaching at landfill sites. Climatic factors are considered in the SEA and further information on climate change will be monitored and incorporated into future arc21 publications.

Recreation and Open Space

3.48 Each Council has statutory powers for the provision of recreational facilities in its area, while there are a number of other bodies who contribute to the provision and development of sport, recreation and open space facilities including sports clubs, education authorities and the Northern Ireland Sports Council. Further details can be found in the relevant local Area Plans. In addition the DOE Planning Service has produced Planning Policy Statement (PPS)8 ‘ Open Space, Sport and Outdoor Recreation’, which sets out the Department’s planning policies for the protection of open space, the provision of new areas of open space in association with residential development and the use of land for sport and outdoor recreation, and advises on the treatment of these issues in development plans. It embodies the

Government's commitment to sustainable development, to the promotion of a more active and healthy lifestyle and to the conservation of biodiversity.

Industrial Environment

- 3.49 Traditionally Northern Ireland has had a predominantly low wage economy biased towards the production of low value-added manufactured goods. Although the local economy still remains dependent on the public sector the economic forecast for Northern Ireland is positive. Government policy is encouraging further movement away from the traditional manufacturing and agricultural sectors to a more knowledge based economy. Such trends will lead to different waste streams being produced and potentially new markets being developed for reused/recycled materials.
- 3.50 Changing employment patterns through the use of information technology, the growth of small businesses and tourism offer the prospect of a wider spread of job opportunities. This forecast growth will impact on the production of waste.

Agriculture

- 3.51 Agriculture in Northern Ireland has undergone considerable change over the last 25 years caused by the world-wide trends of intensive farming methods, advancing technologies and farm rationalisation. Alterations in agricultural support policies together with advances in farming practice and technology and a decline in employment opportunities will continue to have major impact on rural society. Since December 1999 there has been an overall decrease in the number of livestock and crops yielded. The only sector to experience increase has been the dairy sector with a 2% rise in the number of dairy cows.
- 3.52 Agriculture will always remain an integral part of the rural area and the farmer will remain a producer and a steward of the countryside. The continuing development of the agricultural industry will inevitably lead to further change in rural areas. The DOE recognises that the maintenance of a healthy rural economy is one of the best ways of conserving and enhancing the rural environment.
- 3.53 The main agricultural waste arising is animal matter resulting from keeping and housing animals and as the nature of farming in the arc21 Region changes, so will the nature of waste arising from this sector. However agricultural waste has the potential to be co-composted with putrescible household and commercial/industrial waste.

Mineral Workings

- 3.54 Mineral reserves in the arc21 Region comprise basalt and igneous rock (other than granite), sandstone, limestone and sand and gravel (DETI Annual Minerals Statement 1999). Over three quarters of the total sandstone production in 1999 came from County Down, with County Antrim producing 43% and 19% of total basalt and sand and gravel respectively. These figures are likely to be an over estimate of the quantity produced in the arc21 Region as it includes material produced in Ballymoney, Moyle, Banbridge and part of Newry & Mourne Council areas.
- 3.55 Mineral extraction has historically provided most of the sites used for waste disposal while ongoing mineral extraction adds to the potential void space.

Manufacturing

- 3.56 Belfast continues to be the centre of economic activity for much of Northern Ireland, having 30% of Northern Ireland's manufacturing companies and 21% of all retail activity within the arc21 Region. There is a concentration of heavy industry around the port, although this is declining. The adjacent council area of Castlereagh also boasts a large industrial base composed of the engineering and manufacturing sectors.
- 3.57 Antrim has a small manufacturing base, largely in the electronics and printing works sectors which contribute to the Borough's employment. Ards has a highly variable base of small and medium sized businesses with a few large employers in the engineering and food industry. There is also an abundance of retail and distribution centres.
- 3.58 By virtue of good access to airports, ports and major population centres both Lisburn and Newtownabbey feature strong manufacturing bases. The dormitory town of Carrickfergus has a strong retail service sector, with energy production associated with the power station. As a traditional dormitory area for Belfast, North Down has been emerging as an important location for advanced technology companies. Additionally a number of injection moulding and plastic tube extrusion companies also have significant presence here.
- 3.59 Ballymena is a rapidly expanding dormitory town with a strong manufacturing base of tobacco, textiles and light engineering. The Down council area is predominantly rural with a relatively small manufacturing base, largely made up of business in the agri-food sector.

Services

- 3.60 There is a general consensus that the service sector is and will continue to be the main source of employment growth in the arc21 Region. Since 1990 most new job creation has been in services and this sector now accounts for 67% of all employment.
- 3.61 In Antrim the service sector provides employment to the largest numbers of people and there is a high relative concentration in transport and communication, largely attributable to the location of the International Airport within the Borough, and the construction industry. Almost 20% of those employed in Ballymena work in service related industry. Carrickfergus town plays an important industrial, commercial and service role for its residents and the wider hinterland. However its role as a dormitory town, the need to maintain an identity for the town and the retail and service competition it faces from its proximity to Belfast are serving to restrict growth. Newtownabbey has a number of call centres and retail services, the latter largely focused on the Abbey Centre development, while Lisburn has also developed as an important focus for retail particularly in terms of the central shopping area and the regional shopping centre at Sprucefield. Larne has a relatively strong commercial and service base including storage and freight businesses associated with its port activities.

Tourism

- 3.62 The arc21 Region's diverse landscape and history, coupled with Northern Ireland's 'clean and green' image are both key assets when attracting tourism. The arc21 Region's proximity to significant scenic and wildlife resources offers considerable potential for expansion in its tourism and leisure roles. In 1996 tourism income for the whole of Northern Ireland accounted for only 2% of GDP compared to 5.6% for the UK and 6.8% in the Republic of Ireland. Although dependent on the continuing success of the peace process, Northern Ireland is in a good position to tap into expanding sectors of the tourism market, with potential rapid short term employment growth. Both Down and Carrickfergus have a growing tourism service industry.