TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

13.0 CLIMATE

Section 1 (Introduction), Section 6 (Site Setting) and Section 8 (Description of the Proposed Development) of the EIS should be referred to before reading this section.

13.1 Introduction

This section of the EIS provides information on local meteorological conditions and assesses the likely impacts of the continued activities associated with the Application Site.

13.2 Methodology

Information for the assessment of the impacts to climate was obtained by means of a desk-based review of meteorological data to describe the existing climate in the Walshestown area. The nearest meteorological station to the Site is the Casement Aerodrome at Baldonnel, which is approximately 17 km northeast of the Application Site. Due to the close proximity, observations from this location will be indicative of conditions experienced in the Walshestown area.

The following sources were also used to assess climate conditions and potential impacts:

- Environmental Protection Agency (2000) Ireland's Environment: A Millennium Report. Environmental Protection Agency, Dublin; and
- Ireland's Emissions of Greenhouse Gases for the period 1990-2006 Provisional figures for Ireland's 2006 Greenhouse Gas Emissions for the period 1990-2006.

13.3 Existing Environment

The following sections describe the existing climate and weather conditions in Ireland and the Walshestown area. Conditions typical of Ireland as a country are first described. Following this description, the conditions specific to the Walshestown area are then presented in table form, and are subsequently described.

13.3.1 General Climate

The temperate, maritime climate in the area of the Application Site is typical of Ireland. The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. The climate is characterised by the passage of Atlantic low pressure weather systems and associated frontal rain belts from the west during much of the winter period. Over summer months, the influence of anticyclonic weather conditions will result in drier continental air, in particular when winds are from the east, interspersed by the passage of Atlantic frontal systems. Drought conditions can occur during periods of

anticyclonic weather which may last up to 2 or 3 weeks, as experienced in the summer of 2006.

13.3.2 Temperature

The average annual temperature in Ireland is approximately 9 °C. The east and middle of the country tends to be somewhat more extreme than other regions. Summer mean daily maximum is about 19 °C and winter mean daily minimum is about 2.5 °C in these areas.

Temperature data from the Casement Aerodrome indicate that the region is relatively mild. July is the warmest month, with a mean daily temperatures ranging between 10.7 and 19.7 degrees °C (Table 13.1). The coolest month is February, with a mean daily temperatures ranging between 1.7 and 7.6 degrees °C.

Table 13.1 Monthly and annual mean temperature values from Casement Aerodrome at Baldonnel 1968-1996 (°C)

TEMP (°C)	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Mean daily max	7.8	7.6	9.6	11.8	14.6	17.7	19.7	19.3	16.8	13.6	9.9	8.3	13.1
Mean daily min	2.0	1.7	2.5	3.2	5.7	8.6	10.7	10.3	8.5	6.7	3.6	2.8	5.5
mean	4.9	4.6	6.0	7.5	10.1	13.1	15.2	14.8	12.6	10.1	6.7	5.6	9.3
Absolute max	15.4	14.7	18.8	21.3	24.7	27.5	29.8	30.5	24.7	21.3	17.7	15.4	30.5
Absolute min	-12.4	-10.3	-7.8	-4.5	-3.0	0.3	2.5	2.5	-0.3	-4.1	-6.2	-9.7	-12.4
Mean no. days with air frost	7.5	7.7	6.3	4.9	1.0	0.0	0.0	0.0	0.0	1.4	5.9	6.6	41.3
Mean no. days with ground frost	15.3	15.0	13.1	12.8	6.3	1.1	0.1	0.1	1.6	4.5	11.0	13.5	94.3

Source: http://www.met.ie/climate/casement.asp

13.3.3 Sunshine

Annually, most areas of Ireland get an average of between 3.25 and 3.75 hours of sunshine each day. The southeast region has the highest duration of sunshine in the country. May and June are the sunniest months in Ireland, during which the daily sunshine duration averages between 5 and 6.5 hours over the majority of the country. The extreme southeast gets the most sunshine, averaging over 7 hours a day in early summer. In contrast, the month of

December gets the least amount of sunshine, with daily sunshine averaging from approximately 1 hour in the north to 2 hours in the extreme southeast.

Table 13.2 Mean sunshine hours from Casement Aerodrome at Baldonnel 1968-1996

SUNSHINE (hours)	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Mean daily duration	1.63	2.38	3.04	4.85	5.65	5.63	5.01	4.83	4.04	3.07	2.16	1.42	3.64
Greatest daily duration	8.1	9.2	10.9	13.6	15.4	16.0	15.4	14.4	12.3	9.8	8.5	6.9	16.0
Mean no. of days with no sun	10	7	5	2	2	2	1	2	3	5	7	11	55

Source: http://www.met.ie/climate/casement.asp

The local sunshine duration trends in the area of the Application Site are similar to the rest of Ireland. The sunniest months in the area are May through July, with a mean daily duration ranging from 5.01 to 5.65 hours of sunshine (Table 13.2). The months with the least amount of sunshine are December and January, during which the mean daily sunshine ranges between 1.42 and 1.63 hours per day.

13.3.4 Wind

Wind patterns in Ireland are generally from a quadrant centred on west-southwest. The proximity to the Atlantic Ocean cause relatively warm winds and frequent rain. On a less frequent basis, winds are generated from the east, which are generally attributed to weaker winds and cooler weather from the northeast in springtime and from the southeast in summer months.

Long-term wind speed statistics are presented in Table 13.3 for the period 1968-1996. The mean annual wind speed at Baldonnel is 11 knots. Wind speeds of about 9.7 knots or more are likely to cause re-suspension of dust from roads and quarry areas if associated with dry weather conditions. The mean monthly wind speeds are above this threshold 9.7 knots for 8 months of the year. Wind speeds tend to be higher during the winter months, with the summertime (May-August) mean monthly wind speeds ranging between 8.7 and 9.1 knots. Therefore, potential dust nuisances are more likely to arise during dry periods in the months of September to April inclusive.

To assess the prevailing wind direction at the Application Site, wind direction data from Dublin Airport were obtained (Figure 13.1). These data indicate the prevailing wind direction is westerly. Wind speed and direction at a particular location can be influenced by factors such as obstruction by large objects such as buildings or trees, local topography and deflection by nearby mountains or hills. In the case of the Application Site, significant

hedgerows and tree stands around the boundaries of the majority of the Application Site are likely to mitigate dust nuisances arising from the proposed activities at the Application Site.

Table 13.3 Mean wind speeds from Casement Aerodrome at Baldonnel 1968-1996 (knots)

WIND (hours)	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Mean monthly speed	14.1	12.5	12.8	10.1	9.1	8.7	8.9	8.7	10.1	11.2	12.3	13.3	11.0
Max. gust	80	78	71	59	63	53	58	58	69	65	68	81	81
Max. mean 10-minute speed	57	54	47	43	43	36	39	39	46	44	49	57	57
Mean no. of days with gales	5.2	2.7	2.7	0.6	0.5	0.1	0.1	0.2	0.6	1.4	2.4	3.7	20.3

Source: http://www.met.ie/climate/casement.asp

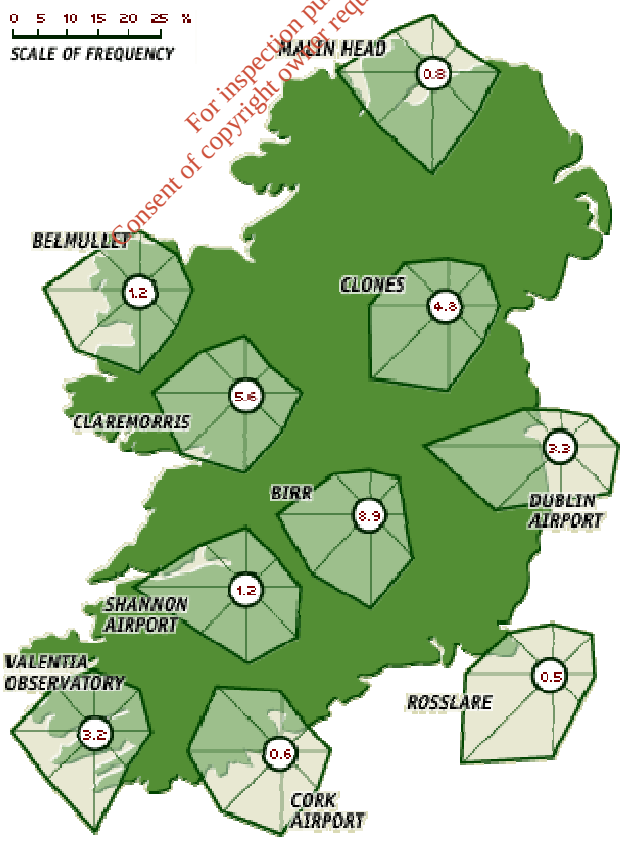

Figure 13.1 Wind direction roses for Ireland (percentage frequency of wind direction)

13.3.5 Rainfall

The average annual rainfall in Ireland varies between about 800 and 2,800 mm. Rainfall accumulation in the country tends to be highest in winter and lowest in early summer. The wettest months for the majority of Ireland are December and January. In contrast, April is the driest month; however, June is the driest month in many southern parts. Hail and snow contribute very little to the measured precipitation.

The annual number of days with more than 1 mm of rain varies between about 150 in the drier parts and over 200 in the wetter parts of the country. The majority of the eastern half of the country ranges between 750 and 1,000 millimetres (mm) of rainfall in the year. Rainfall in the west tends to average between 1,000 and 1,250 mm. Rainfall figures are highest in the northwest, west and southwest of the country, especially over the higher ground. In fact, the mountainous regions of Ireland exceed 2,000 mm of rainfall per year.

Long-term rainfall records at Baldonnell are given in Table 13.4 which indicates that the mean annual precipitation rate is approximately 711.4 mm. The precipitation occurring in the winter period tends to be associated with more prolonged Atlantic frontal weather depressions passing over the region compared to the summer when rainfall is more likely to be associated with heavier showery conditions.

Table 13.4 Mean rainfall data from Casement Aerodrome at Baldonnel 1968-1996 (mm)

RAINFALL	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Mean monthly total	68.7	50.7	53.8	49.9	56.6	53.0	48.9	63.7	58.7	67.2	67.2	73.1	711.4
Greatest daily total	31.4	42.8	30.0	35.3	34.3	108.6	41.4	73.0	32.1	48.5	58.4	42.9	108.6
Mean no. of days with >= 0.2mm	18	14	17	14	15	14	14	14	15	16	16	17	185
Mean no. of days with >= 1.0mm	13	10	12	10	11	10	9	10	10	11	11	12	131
Mean no. of days with >= 5.0mm	5	3	3	3	4	3	3	4	4	4	4	5	45

Source: http://www.met.ie/climate/casement.asp

The rainfall records indicate that some 185 days during the year typically record in excess of 0.2 mm, with levels of precipitation exceeding 1 mm on for approximately 131 days. The number of days when the grounds of the Application Site and haul roads will be saturated will be substantially greater, especially during the winter months when evaporation from the surfaces is much lower compared to the summer. These surface conditions will significantly

reduce the potential for the re-suspension of dust due to trucks travelling along the access and internal haul road surfaces. However, during the drier months, higher day-time temperatures and lower relative humidity will increase the evaporation rate of moisture from the road surfaces and so this will increase the potential for dust-blow from surfaces especially during windy conditions.

13.3.6 Climate Change

The scientific evidence is growing that man-made greenhouse gas emissions are having a significant effect on the earth's climate. On 29th March 1998, the European Union (EU) signed up to the Kyoto Protocol and agreed to take a "burden sharing" approach to cut greenhouse gas emissions as a whole by 8% in 2012 from the 1990 level. To reach this goal, each EU member state has made individual commitments related to their own greenhouse gas emission cut backs. Ireland has made a commitment to limit carbon dioxide emissions to no more than 13%. However, the most recent figures measured in 2006 indicate that Ireland's emissions are 25.5% higher than the 1990 baseline estimate that underlies the national allowable emissions for the period 2008-2012.

Agriculture is the largest contributor to greenhouse gas emissions in Ireland; however, the total percentage of agricultural emissions has been steadily decreasing since 1990. In contrast, greenhouse gas emissions related to transportation have increased significantly since 1990, with an increase of 165%. This increase is largely attributed to growing national economic prosperity, including related factors such as population increase and correlated number of vehicles on the road. Road freight transport is also considered to be a major contributing factor to greenhouse gas emissions in the country. Other major contributors to greenhouse gas emissions in Ireland are the energy and commercial industries, contributing to 22.3% and 17.2% of total greenhouse gas emissions in Ireland in 2006, respectively (EPA 2006).

It is noted that the proposed traffic movements for this development will be restricted to similar traffic movements to previous activities on the Site (i.e. 95 loads/day as highlighted in P.P.R. No. 96/100). Furthermore, as the Application Site is located within 32 km (20 miles) of city centre Dublin, and in the centre of the GDA, the proximity principle will apply. Greenhouse gas emissions from transportation will therefore be kept to a minimum.

13.4 Impacts

The nature and scale of the proposed development is such that no significant impact is likely to be caused to the climate. Notwithstanding this, climatic conditions are likely to influence other media during the life of the restoration project, including air, noise and water.

The winter rainy season will significantly reduce the potential for the re-suspension of dust due to trucks travelling along the access and internal haul road surfaces. However, during the

summer months, higher day-time temperatures and lower relative humidity will increase the evaporation rate of moisture from the road surface and so this will increase the potential for dust-blow from surfaces and also plant equipment, particularly during windy conditions.

Climatic and weather data indicate that the incidence of extended adverse weather conditions is low (e.g. slight dust dispersal during extended dry weather). If mitigation measures for dust reduction at these times are followed then adverse impacts are unlikely to occur (Section 14.0, Air).

Traffic volumes are not anticipated to increase from volumes previously associated with extraction activities (95 loads per day, as observed in the 96/100 Planning Permission).

The proposed development therefore is not anticipated to significantly impact local, national, or global climate.

13.5 Cumulative Impacts

It is considered that "cumulative" refers to the "growth in amount or strength". The restoration activities at the Application Site is not considered to be a significant growth in amount or strength as it is the restoration of a previous activity, which has been envisaged as part of previous Planning Applications for the Site. Therefore, no cumulative impacts related to climate are anticipated due to the proposed restoration activities at the Application Site.

13.6 Mitigation

Since traffic volumes are not anticipated to increase above former levels, and there are plans to ultimately restore the lands to the previous eastern uplands character, no mitigation measures are required relating to climate. However, all reasonable efforts will be made to keep traffic volume to a minimum during the construction phase, and the most feasible fuel efficient plant should be used. Additionally, precautions will be taken to ensure that all materials accepted at the Site are indeed inert to eliminate landfill-generated greenhouse gas emissions. Furthermore, if mitigation measures for dust reduction during dry conditions are followed then no adverse impacts are predicted in terms of fugitive dust emissions (Section 14.0, Air).

13.7 Residual

Since no significant impacts are anticipated due to the proposed activities, similarly, neither are residual impacts anticipated to occur if the proper mitigation measures are implemented.