APPENDIX C – DUST MANAGEMENT PLAN

1.0 INTRODUCTION

AWN Consulting Limited has been commissioned to formulate a Dust Management Plan detailing a 'Best Practice' approach to dealing with potential dust emissions during the construction phase of the proposed Mound Removal and Site Support Services project with particular emphasis on the nearby Rye Water / Carton Valley cSAC.

The Plan will be adopted by all contractors and sub-contractors involved in construction activities on the site. The Site Manager will ensure that adequate instruction is provided to contractors regarding the dust control measures contained within this report.

Detailed guidance is available from the UK and the USA for construction sites[1-6]. This report documents the current best practices which can be effectively implemented on site to minimise dust emissions.

2.0 EXISTING LEVELS OF DUST AND DUST GENERATION POTENTIAL

Whilst construction activities are likely to produce some level of dust during earth moving and excavating phases of the project, these activities will mainly be confined to particles of dust greater than 10 microns. Particles of dust greater than 10 microns are considered a nuisance but do not have the potential to cause significant health impacts. For instance, bulldozing and compacting operations release 84% of particles which are greater than PM_{10} with only 16% of particles being less than 10 microns[1].

The effect of airborne particulate matter on plants has been reviewed in a recent literature study[7]. The review found that the direct physical effects of mineral dusts on vegetation become apparent only at relatively high surface loads (> 7 g/m^2) (i.e. 7000 mg/m^2) although the chemical effects of reactive material such as cement dust may become evident at > 2g/m^2. Mineral dust in general is less soluble and less reactive than anthropogenic acid-forming sulphate and nitrate particles whilst dusts with pH values ≥ 9 may cause direct injury to leaf tissues on which they are deposited or indirectly through alteration of soil pH. The study also found that dust deposited on leaf surfaces can reduce growth, yield, flowering and reproduction of plants although the effects of dust deposited on plant surfaces are more likely to be linked to their chemistry rather than simply the mass of deposited particles[7].

There are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been set in respect of this development. However, guidelines from the Department of the Environment, Heritage and Local Government currently exist for dust emissions from quarrying and ancillary activities[8]. These can implemented with regard to dust emissions from the current construction site.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust)[9] sets a maximum permissible immission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary.

Recommendations outlined by the Department of the Environment, Health & Local Government[8], apply this limit of 350 mg/(m^2*day) to the site boundary of quarries.

The concern from a health perspective is focused on particles of dust which are less than 10 microns. EU ambient air quality standards (Council Directive 1999/30/EC transposed into Irish

law as S.I. 271 of 2002) centres on PM_{10} (particles less than 10 microns) as it is these particles which have the potential to be inhaled into the lungs and cause some adverse health impacts. Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe has recently set an ambient standard for $PM_{2.5}$ (particles less than 2.5 microns) which came into force in 2015 (see Table 1).

Pollutant	Standard	Limit Type	Value
Dust deposition (non-hazardous dust)	TA-Luft as interpreted by DOEHLG (2004)	Average daily dust deposition at the boundary of the site	350 mg/(m^2*day) Total Dust
PM_{10}	EU Directive 2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
$PM_{2.5}$	EU Directive 2008/50/EC	Annual limit value for protection of human health	25 µg/m^3

Table 1 Air Quality Standards for Dust Deposition, PM_{10} & $PM_{2.5}$

Current levels of PM_{10} in County Kildare are low. Results for Naas, Newbridge and Celbridge as reported by the EPA[10] indicate that levels are well in compliance with the ambient air quality standards.

3.0 DETAILS OF CONSTRUCTION PLAN AND PHASING OF THE DEVELOPMENT

Dust will arise from several sources during the mound removal and construction phase of the proposed Mound Removal and Site Support Services project. The proposed construction project details have been outlined in the main section of the "*Mound Removal And Site Support Services Outline Construction Environmental Management Plan At Intel Ireland Ltd*".

An Outline Construction Environmental Management Plan (CEMP) describes the construction procedures and methodology that will be used for the construction of the Site Support Services. The intent of this plan is to describe the construction sequence and the methods employed at each stage including environmental controls. This Outline CEMP is a separate document within the planning application document set.

Traffic associated with the construction of the REMF will temporarily increase the AADT on surrounding roads. Construction trucks delivering or removing material will do so on a staged basis and all trucks removing material from the site will be tarped. During the course of these works washing of site roads shall take place over the course of each working day to ensure that no loose material is deposited on the site.

4.0 SITE POLICY ON DUST CONTROL

4.1 Overview of Dust Management Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors and that the cSAC is not negatively impacted by fugitive dust. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA[1-6, 8].

Effective site management regarding dust emissions will be ensured by the formulation of a dust management plan (DMP) for the site.

The key features of the DMP are:

- the specification of a site policy on dust;
- the identification of the site management responsibilities for dust;
- the development of documented systems for managing site practices and implementing management controls;
- the development of means by which the performance of the dust management plan can be assessed.

4.2 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the planning stage, the siting of construction activities will take note of the location of sensitive areas (such as the cSAC) and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 of the EIAR for the windrose for Casement Aerodrome from 2013-2017).

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs. As shown in Table 2, weather conditions in the Kildare region are generally favourable for the suppression of dust. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed[6,7]. As shown in Table 2, rainfall levels of 0.2mm/day or greater occurs for 183 days/annum or slightly greater than 50% of the time. In addition to little or no rainfall, the potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials[1]. As shown in Table 2, wind speeds are generally moderate in the Kildare region with average wind speeds well below this level at all times of the year. Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. However, as shown in Table 2, the frequency of gales in the Kildare region is low averaging around 18 days / annum. Thus, the prevailing meteorological conditions in the Kildare region are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures should be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- There will be a Principal Contractor management team on site for the duration of the construction phase. The team will supervise the construction of the development, including

monitoring the contractors' performance to ensure that the proposed construction phase mitigation measures are implemented and that construction impacts and nuisance are minimised;

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions with particular emphasis on the cSAC;
- Complaint registers will be kept on site detailing all telephone calls and letters of complaint received in connection with construction activities, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are highlighted below.

RAINFALL *(mm)*	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
mean monthly total	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.2
greatest daily total	30.0	32.2	31.1	38.7	29.8	97.5	33.7	89.3	51.1	50.1	82.0	46.8	97.5
mean num. of days with >= 0.2mm	17	14	16	14	15	14	15	16	14	16	16	16	183
mean num. of days with >= 1.0mm	12	10	11	10	11	10	10	11	10	12	11	12	130
mean num. of days with >= 5.0mm	4	3	3	3	3	3	3	4	4	4	4	5	43
WIND (knots)													
mean monthly speed	13.6	12.9	12.4	9.8	9.1	8.6	8.8	9.0	9.6	11.1	11.6	12.3	10.7
max. gust	80	78	71	59	63	51	58	55	59	65	66	82	82
max. mean 10-minute speed	57	54	47	43	43	36	39	36	38	44	46	57	57
mean num. of days with gales	4.5	3.2	2.1	0.6	0.4	0.1	0.1	0.2	0.3	1.2	1.9	3.5	18.1
mean monthly total	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.2

Table 2 Rainfall and Wind Speed Seasonal Averages at Casement Aerodrome (1981 –2010)

5.0 DUST CONTROL MEASURES

5.1 Site Roads

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. However, effective control measures can easily be enforced. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%[(5)].

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles on unpaved haul roads and for all roads within 100m of the cSAC;

- Bowsers will be available during periods of dry weather throughout the construction period. Research has found that the effect of watering is to reduce dust emissions by 50%[(5)]. The bowser will operate during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;

- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

5.2 Soil and Rock Excavation

Soil and rock excavation and rock breaking during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and rock and thus suppress dust.

- During periods of very high winds (gales), construction activities likely to generate significant dust emissions should be postponed until the gale has subsided.

5.3 Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures.

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;

- At the main construction traffic exit, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. The wheel wash will be located a minimum of 20m but sufficiently far from the exit to allow trucks to 'drip off' prior to exit. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.

- Vehicles onsite shall turn off engines when not in use to prevent idling emissions.

5.4 Summary

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be monitored and assessed;
- The specification of the measures to be taken to control dust emissions before it occurs and effective measures to deal with any complaints received.

6.0 REFERENCES

(1) USEPA (1986) Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)
(2) Mayor Of London (2006) The Control of Dust & Emissions From Construction & Demolition Best Practice Guidance
(3) The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
(4) USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
(5) UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
(6) BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
(7) Prajapati, S (2012) Ecological Effect of Airborne Particulate Matter On Plants, Environmental Sceptics and Critics, 2012, 1(1) 12-22
(8) DOEHLG (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities (2004)
(9) German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
(10) Environmental Protection Agency (2018) Air Quality Monitoring Report 2017 (& previous annual reports 1997-2016)