

10.0 NOISE & VIBRATION

10.1 INTRODUCTION

This section assesses the noise and vibration impacts associated with the proposed extension to the Waste Management Facility (WMF) at the Drehid site, Timahoe, Co. Kildare. Chapter 2 of the EIAR provides the detail of the description of the existing licensed facility and the permitted operations.

The assessment includes a description of the receiving ambient noise climate in the vicinity of the subject site, an assessment of the potential noise and vibration impact associated with the construction, operation and decommissioning of the proposed development on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the facility is operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate.

Chapter 2 (Description of the Existing Infrastructure and Proposed Development) provides the detail of the description of the proposed development.

10.1.1 Statement of Authority

This assessment has been prepared by Jennifer Harmon Associate at AWN. Jennifer holds BSc Hons in Environmental Science, a Diploma in Acoustics and is a full member of the Institute of Acoustics (IOA). She has worked in Environmental Consultancy for over 20 years specialising in environmental noise and vibration impact assessment over this period. She has prepared numerous noise impact assessments for a wide range of project types including, transport, industrial, commercial and residential project across Ireland.

10.2 ASSESSMENT METHODOLOGY

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the following Environmental Protection Agency (EPA) guidelines were considered and consulted in the preparation of this Chapter:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, 2022; and
- EPA Advice Notes on current practise in the preparation of Environmental Impact Statements, 2003.

There are no statutory standards in Ireland relating to noise and vibration limit values for construction works or for environmental noise relating to the Operational Phase. In the absence of specific statutory Irish guidelines, the assessment has made reference to non-statutory national guidelines, where available, in addition to international standards and guidelines relating to noise and / or vibration impact for environmental sources. These are summarised here:

- British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228-1) (BSI 2014a);
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (hereafter referred to as BS 5228 - 2) (BSI 2014b);
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385-2). (BSI 1993);
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472-1) (BSI 2008);
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS 8233 (BSI 2014c);
- Environmental Protection Agency (EPA) Guidance Noise for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 2016)
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 - 2) (ISO 1996);
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 - 1) (ISO 2016);
- ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (hereafter referred to as ISO 1996 - 2) (ISO 2017);
- Kildare County Council (KCC) Third Noise Action Plan 2019 - 2023 (hereafter referred to as KCC NAP 2019 - 2023). (KCC, 2019)
- S.I. No. 549/2018 - European Communities (Environmental Noise) Regulations 2018 (hereafter referred to as the Noise Regulations);
- S.I. No. 241/2006 - European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006;
- Transport Infrastructure Ireland (TII) (previously National Roads Authority (NRA)) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (hereafter referred to as the TII Noise Guidelines 2004) (NRA 2004);
- TII: Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes (hereafter referred to as the TII Noise Guidelines 2014) (NRA 2014);
- UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1998);
- United Kingdom (UK) Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) Sustainability and Environmental Appraisal - LA 111 Noise and Vibration, Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHA 2020);

The study has been undertaken using the following methodology:

- A review of annual noise monitoring surveys conducted as part of the existing licensed WMF has been undertaken in order to characterise the prevailing noise environment at the nearest noise sensitive locations (NSLs);
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site;

- Predictive calculations have been performed to assess the potential impacts associated with the operational and decommissioning phase of the development at the nearest sensitive locations surrounding the development site, where relevant;
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development, and;
- An assessment of the potential cumulative impacts of the proposed development with surrounding planned or permitted developments has been undertaken.

10.2.1 Relevant Guidelines and Standards

The following sets out the relevant noise criteria applicable for the construction and operational phases of the development.

10.2.1.1 Construction Phase

Criteria for Assessing Construction Noise Impacts

For the proposed project, construction noise sources include plant and machinery used for construction of the proposed new buildings, landscaping and internal road works. Ongoing landfill activities, including construction of new cells are licenced under the facilities EPA licence and the relevant noise Emission Limit Values (ELVs) apply to these operations. These are discussed in Section 10.2.1.3.

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control construction activities by imposing limits on the hours of construction.

In the absence of specific statutory guidance, reference has been made to the TII Noise Guidelines 2004 (NRA 2004), TII Noise Guidelines 2014 (NRA 2014) and BS 5228-1 (BSI 2014a) in order to review and set appropriate noise construction criteria.

TII Guidelines

The TII Noise Guidelines 2004 (NRA 2004) and TII Noise Guidelines 2014 (NRA 2014) specify noise levels that are deemed acceptable in terms of construction noise for national road projects. The KCC NAP 2019 – 2023 refers to these guidelines as appropriate limits during the construction phase of infrastructure projects. These limits are set out in Table 10-1.

Table 10-1 TII Construction Noise Thresholds

Days and Times	Noise Levels (dB re 2 x 10 ⁻⁵ Pa)	
	L _{Aeq}	L _{ASmax}
Monday to Friday 07:00hrs to 19:00hrs	70	80
Monday to Friday 19:00hrs to 22:00hrs	60*	65*
Saturdays 08:00hrs to 16:30hrs	65	75
Sundays and Bank Holidays 08:00hrs to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the local authority.

British Standard BS 5228 -1: 2009+A1: 2014

Potential noise impacts during the construction stage of a project are often assessed in accordance with BS 5228-1 (BSI 2014a). Various mechanisms are presented as examples of recommended threshold values for determining if an impact is occurring, these are discussed in the following paragraphs. This is the most widely accepted standard for construction projects in Ireland that are not covered under the TII guidelines i.e. national roads and transport infrastructure.

Potential Significance Based on Noise Change – ABC Method

The approach adopted here calls for the designation of a noise sensitive residential location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a potential significant noise impact is associated with the construction activities.

Table 10-2 sets out the Construction Noise Thresholds (CNT) which when exceeded, signify a potential significant effect at the facades of residential receptors, depending on context.

Table 10-2 Construction Noise Thresholds for Potential Significant Effects at Dwellings (BS 5228-1)

Assessment Category and Threshold Value per Period	Construction Noise Threshold (CNT) Value (dB)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Daytime (07:00 – 19:00) Saturdays (07:00 – 13:00)	65	70	75
Evening and Weekends ^{D)}	55	60	65
Night-time (23:00 – 07:00)	45	50	55

- A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
- B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
- C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.
- D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays

Potential Significance Based on Fixed Limits

Section E.2 of BS 5228-1 (BSI 2014a) sets out recommended threshold levels using a fixed limit value set depending on the setting of the noise environment. For example, paragraph E.2 states:

‘Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.’

Paragraph E.2 goes on to state: -

‘Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: -

70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;

75 decibels (dBA) in urban areas near main roads in heavy industrial areas’.

These limits apply to daytime working outside living rooms and offices.

Proposed Construction Noise Thresholds (CNT) for Proposed Project

Making reference to the standards and guidelines discussed above, and taking into account the project type and the prevailing noise environment, it is considered appropriate to adopt the relative noise criteria from BS-5228-1 ABC method to set CNTs at the closest NSLs.

The baseline noise environment discussed in Section 10.3 confirms that the relevant CNT for NSLs in the vicinity of the development site is **Category A** for all periods. This is based on the ambient noise levels measured at NSLs being below the values for Category A in Table 10-2.

For the proposed development, construction working hours are between 07:30 to 19:00hrs Monday to Saturday. Referring to Table 10-2, the following CNT values therefore apply at NSLs surrounding the site:

- Weekday 07:00 to 19:00hrs: 65 dB L_{Aeq,12hr}
- Saturdays 07:00 – 13:00hrs: 65 dB L_{Aeq,6hr}
- Saturdays 13:00 – 19:00hrs: 55 dB L_{Aeq,6hr}

Interpretation of the Construction Noise Levels (CNL)

In order to assist with interpretation of significance of a CNL, Table 10-3 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is taken from the UK document *Design Manual for Roads and Bridges (2020) LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2 (DMRB 2020)* and is adapted to include the EPA 2022 EIAR Guidelines. The approach is as follows:

- determine the threshold value for construction noise according to the method from BS5228-1 described above;
- compare the predicted construction noise level with the existing noise levels and the CNT according to the criteria in Table 10-2; and
- A significant effect is deemed to occur where a moderate or major impact is likely to occur for a period of greater than 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months.

Table 10-3 Construction Noise Significance Ratings

Impact Guidelines for Noise Impact Assessment Significance (adapted from DMRB)	Classification of Impact		
	CNL Per period	EPA EIAR Guidelines	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on duration, CNL and baseline noise level
Minor	Above baseline and below or equal to CNL	Slight to Moderate	
Moderate	Above CNL and below or equal to CNL +5 dB	Moderate to Significant	
Major	Above CNL +5 dB	Significant to Very Significant	

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages

10.2.1.2 Criteria for Assessing Construction Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. For the purpose of the proposed development, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Building Response to Vibration

Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228: 2009 +A1 2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS5228-2).

BS7385-2 and BS5228-2 advise that, for soundly constructed residential properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 of BS5228-2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges. For buildings or structures that are structurally unsound, lower vibration magnitudes will apply, typically 50% of those for structurally sound buildings. Protected or historic buildings are not automatically assumed to be more vulnerable to vibration unless they have existing structural defects.

The documents note that minor structural damage can occur at vibration magnitudes that are greater than twice those presented in Table 10-4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at base of the building.

Table 10-4 sets out the limits as they apply to vibration frequencies below 4Hz, where the most conservative limits are required.

Table 10-4 Transient Vibration Thresholds values for Buildings

Type of Building	Allowable vibration (in terms of PPV) at closest part of sensitive property to source of vibration, at frequency of ≤ 4 Hz	
	Transient vibration	Continuous vibration
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s	25 mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15 mm/s	7.5 mm/s

Human Response to Vibration

Humans are sensitive to vibration stimuli, and perception of vibration at high magnitudes may cause concern to building occupants. BS5228-2 notes that vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. Higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known.

Table 10-5 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS5228-2 and the DMRB Noise and Vibration (UKHA 2020) document and the associated EPA significant ratings.

Table 10-5 Guidance on effects of human response to PPV magnitudes

Criteria	DMRB Impact Magnitude	EPA Significance Rating
≥10 mm/s PPV	Very High	Very Significant
≥1 mm/s PPV	High	Moderate to Significant
≥0.3 mm/s PPV	Medium	Slight to Moderate
≥0.14 mm/s PPV	Low	Not significant to Slight
<0.14 mm/s PPV	Very Low	Imperceptible to Not significant

10.2.1.3 Operational Phase

Operational Phase Noise – On Site Activities

EPA – NG4 (2016)

The existing facility is licensed by the EPA under waste licence IE Licence Reg. No. W0201-03. The licence includes operational noise Emission Limit Values (ELV) which are specified under Schedule B *Emission Limits*. Schedule B.3 includes the relevant noise ELVs, reproduced below. These limits relate to all on-site activities occurring within the facility (e.g. operational fixed plant, mobile plant items, site traffic along internal roads etc.).

Table 10-6 Existing Noise ELVs

Period	Relevant Hours	ELV
Daytime	08:00 – 22:00 hrs	55 dB(A) $L_{Aeq, (30minutes)}$ ^{Note 1}
Night-time	22:00 – 08:00 hrs	45 dB(A) $L_{Aeq, (30minutes)}$ ^{Note 1}

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.

Should permission be granted for the proposed development, the existing waste licence will be reviewed and updated where required. In line with the EPA document NG4 2016, a new evening period (19:00 to 23:00) would typically form part of a reviewed or updated licence to bring in line with the most up to date EPA noise guidance. In this instance, a lower operational noise limit would apply to the evening period compared to the daytime and the time periods for daytime and night-time are subsequently altered.

The following summarises the expected revised operational noise limits and their associated time periods in line with the EPA NG4 2016 document which the facility will be licensed under.

Table 10-7 Proposed Updated Noise ELVs

Period	Relevant Hours	ELV
Daytime	07:00 – 19:00 hrs	55 dB(A) $L_{Aeq, (30minutes)}$ ^{Note 1}
Evening	19:00 – 23:00 hrs	50 dB(A) $L_{Aeq, (30minutes)}$ ^{Note 1}
Night-time	22:00 – 08:00 hrs	45 dB(A) $L_{Aeq, (30minutes)}$ ^{Note 1}

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.

The noise ELVs within the EPA NG4 document are in line with those set within other noise guidance documents to achieve suitable internal noise levels within noise sensitive buildings during day and night-time periods e.g. BS 8233 (2014)

BS 8233 (2014)

BS 8233 sets recommended internal noise levels for dwellings and other noise sensitive buildings to achieve acceptable internal noise levels to permit rest, concentration, sleeping etc. These are reproduced in Table 10-8.

Table 10-8 Recommended Internal Noise Levels in Dwellings – BS 8233 (2014)

Activity	Rooms	Design Range, $L_{Aeq, T}$ dB	
		Daytime $L_{Aeq, 16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq, 8hr}$ (23:00 to 07:00hrs)
Resting	Living room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hr}$	-
Dwelling - Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

To set an external noise level limit based on the internal criteria noted above, the degree of noise reduction afforded by a partially open window has been considered, which is suggested in BS 8233 as a 15 dB reduction. Using this value, external noise levels of 50 to 55 dB $L_{Aeq, T}$ are considered appropriate for day and evening periods to achieve suitable internal noise levels for resting and dining. During night-time periods an external noise level of 45 dB $L_{Aeq, T}$ is appropriate for sleeping. In this instance, the following criteria would apply to the nearest dwellings surrounding the site.

- Daytime (07:00 to 23:00hrs) 50 to 55 dB $L_{Aeq, T}$
- Night-time (23:00 to 07:00hrs) 45 dB $L_{Aeq, T}$

These criteria align with those from NG4 (2016) discussed above.

The assessment of potential noise impacts are therefore assessed against the proposed new ELVs for day, evening and night-time periods in Table 10-7.

Change in Traffic Noise Levels

In the absence of any Irish guidelines or standards describing the effects associated with changes in road traffic noise levels on the surrounding road network, reference has been made to the DMRB Noise and Vibration (UKHA 2020) document. This document provides magnitude rating tables relating to changes in road traffic noise. The document suggests that during the year of opening, the magnitude of impacts between the Do Minimum and the Do Something

scenarios are likely to be greater compared to the longer term period (fifteen years post opening) when people become more habituated to the noise level change.

For the proposed development, the initial significance criteria are used to describe the magnitude of change for the short and medium term period, (i.e. the year of opening up to 15 years post). For these assessment years, a 1 dB change between the Do Minimum and Do Something scenarios is the smallest that is considered perceptible. Table 10-9 summarises the potential impact associated with defined changes in traffic noise level during the short to medium periods of the schemes operation.

Table 10-9 Significance of Change Criteria - Short to Medium Term Period

Change in Noise Level, dB	DMRB - Short to Medium Term Magnitude Classification	EPA Significance of Effect
Less than 1.0	Negligible	Imperceptible
1.0 to 2.9	Minor	Not Significant - Slight
3.0 to 4.9	Moderate	Moderate
Greater than or equal to 5.0	Major	Significant

Where changes in traffic noise levels in the short to medium term is less than 3 dB, the impact is deemed Not Significant. Where changes in traffic noise levels are greater than 3 dB, the impact is deemed to be potentially significant.

Further consideration of the magnitude of change in noise levels are determined for the long-term period (i.e. between the year of opening Do Minimum and the design year Do Something). For the design year, a 3 dB change is the smallest that is considered to pose any notable impact when considered over a long term 15 year period between year of opening and design year in accordance with the DMRB Noise and Vibration (UKHA 2020) guidance document. Table 10-10 summarises the likely impact associated with defined changes in traffic noise level between the Do Minimum and Do Something scenarios during the long-term period.

Table 10-10 Significance of Change Criteria - Long Term Period

Change in Noise Level, dB	DMRB -Long Term Magnitude of Impact Classification	EPA Significance of Effect
Less than 3.0	Negligible	Imperceptible - Not Significant
3.0 to 4.9	Minor	Slight
5 to 9.9	Moderate	Moderate
Greater than or equal to 10.0	Major	Significant

10.2.1.4 Operational Vibration

The EPA NG4 2016) document does not set any operational vibration ELVs for licensed facilities. This is due to the absence of any significant sources of vibration as standard operating on industrial and waste licensed facilities.

There are no sources of vibration associated with the operation of the existing WMF or those associated with the proposed development. In terms of human response, the proposed development will not give rise to any perceptible levels of vibration off-site and therefore the associated impact is not significant and not considered further.

10.3 RECEIVING ENVIRONMENT

The overall Bord na Móna landholding is located within the Timahoe bog near Carbury, County Kildare. Within the landholding, Bord na Móna operates the permitted Drehid Waste Management Facility, accessed from the regional R403 road, at Killinagh Upper, by a 4.8 km long internal access road, which is dedicated to the waste management facility.

The existing WMF is regulated by the EPA in accordance with IE Licence Reg. No. W0201-03. This existing facility comprises an engineered landfill, composting facility and associated infrastructure including administration buildings, gas utilisation plant, settlement lagoons, leachate management infrastructure, weighbridge and access roads.

The hours of operation of the existing facility are limited between the hours of 08:00 and 19:00 Monday to Saturday. The waste acceptance hours are between 08:00 and 18:30 Monday to Saturday.

In terms of noise generating activities, the main sources within the existing facility relate to vehicles entering and exiting the site, mobile plant and equipment working at landfill areas and accessing the composting facility, operational plant serving the composting facility and a gas utilisation plant. All activities cease on site post 19:00 with the exception of the compost facility fans (housed internally) and the gas utilisation plant, both of which operate continuously.

The surrounding environment is rural in nature with residential properties located around all boundaries at varying distances from the landholding boundary. The site boundary of the Drehid Waste Management Facility is positioned within the central part of the landholding and, hence is significantly set back from noise sensitive properties. The closest properties are at distances of approximately 850 m from the site boundary of the existing WMF and in excess of 1 km from on-site activities.

10.3.1 Annual Noise Monitoring

In accordance with the conditions of the existing licence (W0201-03), a scheduled noise survey is undertaken on an annual basis over a day and night-time period. The most recent survey results for the years 2020, 2021 and 2022 are summarised in this Section. These have been chosen to reflect the most recent monitoring data which represent the most up to date operations at the facility and its contribution to environmental noise associated with its ongoing operation.

10.3.1.1 Noise Monitoring Locations

Noise monitoring is undertaken at five locations. One of these locations is a noise sensitive property (N1/NSL1) whilst the remainder four locations (N2 – N5) are at boundary locations around the perimeter of the site. These are described below and displayed in Figure 10-1.

- N1 Noise Sensitive receptor located to the south-west of the WMF footprint.
- N2 Boundary location to the north west of the facility on the L5025 road.
- N3 Boundary location to the north east of the facility.
- N4 Boundary location to the south west of the WMF along the R403 road at the entrance to the facility.

N5 Boundary location to the south east of the facility.

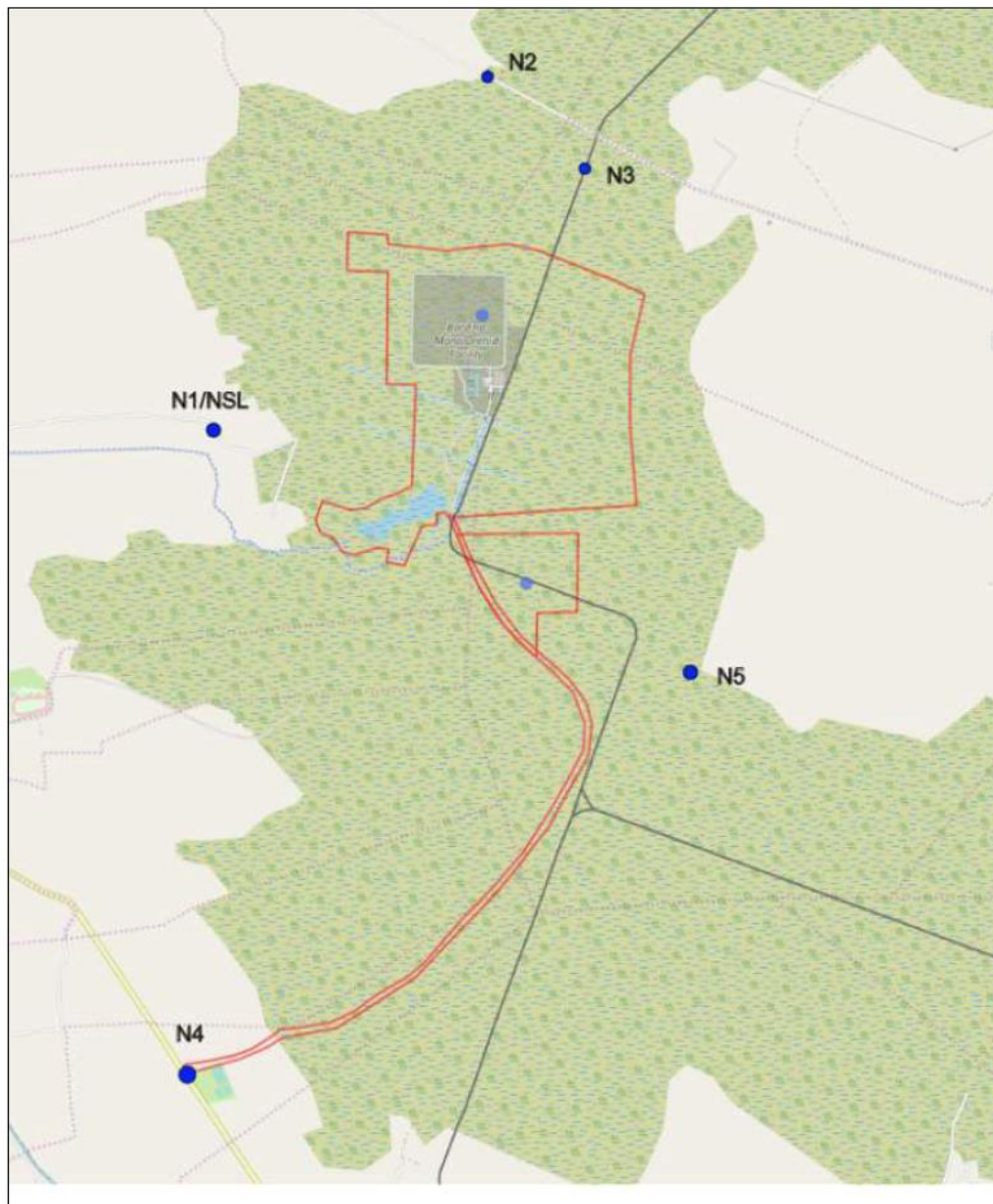


Figure 10-1 Noise Monitoring Locations

10.3.1.2 Monitoring Procedure and Periods

2020: The daytime surveys were conducted on 14 and 15 October 2020.

The night-time surveys were conducted on 14 and 15 October 2020.

2021: The daytime surveys were conducted on 2 and 3 June 2021.

The night-time surveys were conducted on 1, 2 and 3 June 2021.

2022: The daytime surveys were conducted on 23 and 31 August 2022.

The night-time surveys were conducted on 30 and 31 August 2022.

The surveys were undertaken in general accordance with *ISO 1996-2:2017 Acoustics -- Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels* (2017) and in accordance with the EPA's noise survey and assessment guidance document *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (2016).

10.3.1.3 Monitoring Parameters

The noise survey results are presented in terms of the following four parameters:

- L_{Aeq}** is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
- L_{Amax}** is the instantaneous maximum sound level measured during the sample period.
- L_{A90}** is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
- L_{A10}** is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

10.3.1.4 Monitoring Results

The monitoring results for day and night-time periods surveyed in 2020, 2021 and 2022 for the five survey locations are summarised in Table 10-11 to Table 10-13.

Table 10-11 2020 Annual Noise Survey Results

Monitoring Location	Time Period	L _{Aeq}	L _{A10}	L _{A90}	L _{AFmax}	Survey Observations
N1 (NSL)	Day	36 - 48	35 - 44	26 - 27	64 - 72	Faint hum in distance, birdsong, overhead aeroplanes, nearby mushroom factory
	Night	28 - 29	30	23 - 26	36 - 43	Distant traffic. Occasional farm animal calls, birdsong
N2	Day	42 - 45	45 - 48	28 - 32	58 - 68	Passing road traffic, ongoing public roadworks nearby, site activities inaudible
	Night	19 - 27	20 - 31	20	41 - 44	Faint plant noise. Road traffic dominates, livestock & dogs barking (round 2)
N3	Day	42 - 44	46 - 48	24 - 37	55 - 59	Faint hum from site along with site traffic, birdsong, overhead aeroplanes
	Night	38 - 42	42 - 47	20	54 - 55	Faint hum from site, passing road traffic, farm animal calls
N4	Day	60	64 - 65	45 - 46	76 - 83	Traffic entering and exiting site, passing traffic along R403, bird and animal calls
	Night	47 - 49	37 - 40	20	72 - 76	Passing traffic along R403, dogs barking in distance, site activities inaudible
N5	Day	36 - 45	39 - 48	27 - 29	54 - 74	Site activities not audible, road traffic, overhead aeroplanes, bird and animal calls
	Night	24 - 25	25 - 27	21 - 23	34 - 39	Site activities not audible, occasional road traffic

Table 10-12 2021 Annual Noise Survey Results

Monitoring Location	Time Period	L _{Aeq}	L _{A10}	L _{A90}	L _{AFmax}	Survey Observations
N1 (NSL)	Day	40 - 43	42 - 46	27 - 38	60	Faint hum in distance, birdsong, overhead aeroplanes.
	Night	26 - 27	28 - 29	23 - 24	45 - 50	Site activities not audible, birdsong, farm animal calls, passing road traffic
N2	Day	50 - 51	53 - 55	39 - 40	63 - 85	Passing road traffic dominates, site not audible, birdsong
	Night	49 - 51	53 - 55	35	65 - 69	Very faint hum from site, infrequent road traffic, birdsong
N3	Day	44 - 46	45 - 49	36 - 39	64 - 76	Hum from site and site machinery operating, birdsong, dog walkers talking, overhead aeroplanes
	Night	30 - 33	25 - 29	20 - 22	55 - 57	Very faint hum from site, infrequent road traffic
N4	Day	59 - 61	64 - 65	41 - 45	75 - 78	Traffic entering and exiting site, passing road traffic, birdsong

Monitoring Location	Time Period	L _{Aeq}	L _{A10}	L _{A90}	L _{AFmax}	Survey Observations
N5	Night	47 - 51	46 - 49	20	69 - 73	Occasional road traffic along R403, dogs barking in distance
	Day	44 - 46	46 - 47	38 - 41	57 - 66	Faint noise from site machinery in distance, animal calls and birdsong
	Night	20 - 24	20 - 22	20	39 - 42	Very faint noise from site machinery, occasional road traffic in distance audible

Table 10-13 2022 Annual Noise Survey Results

Monitoring Location	Time Period	L _{Aeq}	L _{A10}	L _{A90}	L _{AFmax}	Survey Observations
N1 (NSL)	Day	32 - 34	33 - 35	27 - 28	47 - 59	Very faint hum from site in distance. Background: Birdsong, Maximum level (59 dB L _{AFmax}) during helicopter passing overhead during third measurement round
	Night	25 - 26	26 - 30	21 - 23	37 - 39	Site: Very faint hum from site in distance. Background: Birdsong, and occasional other farm animal calls.
N2	Day	41 - 46	46 - 50	25 - 30	56 - 64	Site: Site activities not audible. Background: Infrequent Road traffic and birdsong.
	Night	17 - 23	20 - 24	20	27 - 41	Site: Very faint hum from site Background: Very quiet, infrequent passing road traffic in distance
N3	Day	32 - 43	35 - 46	27 - 38	49 - 58	Site: Hum from site along with machinery operating on site. Background: Construction works associated with nearby solar farm development
	Night	36 - 43	40 - 48	20 - 25	53 - 57	Site: Site activities are not audible. Background: Infrequent passing road traffic
N4	Day	57 - 58	61 - 62	30 - 34	76 - 79	Site: Traffic entering and exiting the site. Background: Road traffic, animal and birdsong.
	Night	47	38 - 41	20	60 - 70	Site: Site activities are not audible. Background: Infrequent passing road traffic on local road
N5	Day	32 - 35	36 - 37	24 - 25	48 - 57	Site: Site activities are not audible. Background: Animal and birdsong, 4 x no. aeroplanes passing overhead
	Night	23 - 29	25 - 28	21 - 22	33 - 48	Site: Site activities are not audible. Background: Occasional Road traffic in distance audible. Aeroplanes passing overhead

The subjective observations made during the annual monitoring surveys note that activities from the Drehid WMF are just audible at very low levels or are inaudible at the monitoring locations during both day and night-time periods. Where the facility was just audible, this was noted during lulls in other surrounding sources such as road traffic.

The two sources noted to be faintly audible during the survey periods were occasional mobile plant activity and faint background sounds from operational plant.

At the closest monitored residential property, to the southwest of the facility (N1/NSL1), ambient noise levels during daytime periods were measured in the range of 32 to 48 dB $L_{Aeq,30 mins}$ with background noise levels measured in the range of 26 to 38 dB $L_{A90,30 mins}$. During this monitoring period the Drehid WMF was not audible above surrounding sources including an adjacent facility and overhead aircraft. Faint hum from on-site plant was audible in the background at very low level in absence of other surrounding sources.

During the night-time period, ambient noise levels were measured in the range of 25 to 29 dB $L_{Aeq,30 mins}$ with background noise levels measured in the range of 21 to 26 dB $L_{A90,30 mins}$. During this monitoring period environmental sources including birdsong, farm animal calls and road traffic contributed to the measured noise levels. The Drehid WMF was not audible at this location during night-time periods. A very faint hum was just detected during the 2022 night-time survey, however background noise levels were measured in the range of 21 to 23 dB $L_{A90,30mins}$ indicating a very low noise environment.

The ambient noise levels measured at the boundary monitoring locations set back from road traffic (N2, N3, and N5), are all below the daytime and night-time noise emission limit values of 55 and 45 dB $L_{Aeq, 30mins}$ respectively.

Highest noise levels were recorded at Location N4 measured at the junction of the R403 and the site entrance. Passing road traffic along the R403 and traffic entering the facility was the dominant noise source at this location. Site activities from within the WMF were not audible at this location. The closest NSL to this monitoring position are residential dwellings the south and south west at distances of approximately 100 m.

The steady state background noise level measured by the L_{A90} parameter is low at all monitoring locations indicating the low contribution of the operational facility to the overall noise environment.

The survey results confirm noise emissions from the existing facility are significantly below the day and night-time noise ELV's set within the IE licence and hence is fully compliant with the facilities noise conditions.

10.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

The proposed development comprises an extension of the existing Drehid WMF to provide for additional landfill infrastructure, a new Municipal Solid Waste (MSW) processing and compost facility, a new soil, stones and C&D rubble processing facility and increased throughput of waste to the existing compost facility.

The primary elements of the proposed development, and for which planning permission is being sought, are set out in detail in Chapter 2.

During the initial construction phase, site activities including, site clearance, excavation, levelling, building construction, landscaping, internal road works and paving all have the potential to generate elevated levels of noise within the site. Vibration will be limited to any minor excavation works depending on ground conditions.

During the operational phase, the key potential sources of noise are associated with the following activities:

- Traffic entering and exiting the site;
- Mobile plant working at landfill areas during its ongoing construction, operation and capping;
- Mobile plant accessing various on-site buildings and waste handling areas;
- External operational plant and equipment;
- Potential noise breakout from operational activities within on-site buildings.

These sources are assessed in the appropriate sections below.

As per Section 10.2.1.4, there are no significant vibration impacts sources associated with the operational phase.

10.5 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

10.5.1 Do Nothing Impact

Under the Do-Nothing scenario, the existing facility will remain in place and continue operations until the licence has expired. The proposed developments relating to the extended WMF are not in operation. From a noise point of view, existing noise levels recorded as part of the facilities annual compliance monitoring are expected to remain the same (Refer to Section 10.3) given these represent the existing scenario which would continue under a Do Nothing scenario. The existing facility will continue to operate within its noise ELVs in accordance with the IE Licence Reg. No. W0201-03.

In summary, the potential noise and vibration impact associated with a Do Nothing scenario is neutral.

10.5.2 Potential Effects During Construction Phase

10.5.2.1 Construction Noise

Construction works associated with the proposed development will involve those associated with construction of new buildings (excavation, foundations and building works), landscaping and internal road works. Construction and development of the extended landfill area form part of the on-going operations over the lifespan of the landfill and proposed development and hence are assessed as part of the operational phase.

The duration of construction of the new MSW processing and compost plant, soils processing building, maintenance building, road network and ancillary infrastructure is expected to last for a period of 12 months.

Indicative noise levels associated with construction may be calculated in accordance with the methodology set out in *BS 5228-1*. This standard sets out sound power levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations.

Construction works associated with activities such as excavation, foundations and structural works associated with the MSW processing and compost plant, soils processing building and maintenance building will require the use of excavators, loaders, dozers, cranes, generators and concreting works. For these items of plant noise levels are quoted in the range of 70 to 80 dB L_{Aeq} at 10m within BS 5228-1.

For ongoing construction activity associated with the above activities, a total construction noise level of 82 and 85 dB L_{Aeq} at 10 m has been used for the purposes of construction noise calculations representing a variety of activities over this phase. This would include, for example two items of plant at 80 dB L_{Aeq} and three items of plant at 75 dB L_{Aeq} operating simultaneously within one work area resulting in a total noise level of 85 dB L_{Aeq} . A total noise level of 82 dB L_{Aeq} at 10 m has been assessed also for this phase which would include, for example, up to six items of plant with a noise level of between 70 and 75 dB L_{Aeq} . This approach allows a robust assessment of a range of scenarios to occur for the purposes of assessment representing a likely and worst case scenario.

For construction work areas with lower noise levels such as those associated with site compounds or superstructure works of the proposed buildings, a total construction noise level of 78 dB L_{Aeq} at 10 m has been used for the purposes of indicative calculations. This would include, for example one item of plant at 75 dB L_{Aeq} and three items of plant at 70 dB L_{Aeq} operating simultaneously within a work area.

The closest NSLs to the proposed development are residential dwellings located to the east, west and north of the site boundaries at distances in excess of 1 km from any of the construction works associated with the proposed development. Construction noise levels have been calculated at this distance using the construction noise levels discussed above assuming two scenarios:

- Scenario 1: each group of activities are occurring at a distance of 1 km from the closest NSL;
- Scenario 2: three groups of each activity are occurring at a distance of 1 km from the closest NSLs

The calculated levels do not take account of any on-site noise mitigation measures or screening and assume plant items are in operation continually over the assessment period. All of the above assumptions represent a highly conservative assessment. The results are summarised in Table 10-14.

Table 10-14- Indicative Construction Noise Calculations at Nearest NSLs

Construction Activity	Scenario 1 Source Level L_{Aeq} at 10 m	Predicted Construction Noise Level at 1km (dB $L_{Aeq,T}$)	Scenario 2 Source Noise Level at 10m	Predicted Construction Noise Level at 1km (dB $L_{Aeq,T}$)
Site clearance, excavation, utility, and structural works	85	37	90	41
	82	34	87	38
Compounds, super structure	78	30	83	34

The calculated construction noise levels presented in Table 10-14 range between 30 and 41 dB $L_{Aeq,T}$ for the assessed construction activities and scenarios. The distance between construction activity associated with site clearance, site buildings, compounds etc. at the nearest NSLs is such

that noise levels generated on site will be reduced to within or below the ambient noise levels outside of the site.

The calculated construction noise levels are all significantly below the adopted CNT of 65 dB $L_{Aeq,12hr}$ during weekend and 65 dB $L_{Aeq,6hr}$ during Saturday morning periods.

The calculated construction noise levels are also all below the adopted CNT of 55 dB $L_{Aeq,6hr}$ applied for Saturday afternoon periods.

Referring to Table 10-3, the calculated noise levels are below the adopted CNT and in line with or below the prevailing noise environment, hence the potential noise impact during this phase is negative, not significant and temporary to short-term.

10.5.2.2 Construction Vibration

There are no significant sources of vibration associated with the construction phase. There will be a requirement for excavation works for utility works, shallow foundations for buildings and excavation of landfill areas.

Excavation into soils and soft ground will not generate significant level of vibration at source. In the event that breakers are required for breaking made ground during the initial phase of the proposed works, there is potential for localised low levels of vibration in the immediate vicinity of the source, however even at close distances, the magnitude of vibration from this activity is orders of magnitude below those associated with cosmetic damage to buildings as set out in Table 10-4.

Empirical data for this activity is not provided in BS 5228-2 (BSI 2014b), however AWN Consulting have previously conducted vibration measurements under controlled conditions, during trial construction works on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator; and
- 6 tonne hydraulic breaker on large Liebherr tracked excavator.

Peak vibration levels during staged activities using the 3 tonne breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 m to 50 m respectively from the breaking activities. Using a 6 tonne breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 m to 50 m respectively. Whilst these measurements relate to a solid concrete slab, the range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity of any initial made ground.

Referring to the vibration magnitudes above, vibration impacts during initial stage hard ground breaking activities using medium or heavy breakers at distances of 50 m from the source, are orders of magnitude below those included in Table 10-4 for all building types to avoid any form of cosmetic damage. The closest residential dwellings are in excess of 1 km from building works and hence vibration magnitudes at this distance will be orders of magnitude below those associated with human response to vibration discussed in Table 10-5.

For all other works, vibration impacts will be further below those discussed above.

Taking account of the construction activities required on site, the vibration magnitudes associated with the most intrusive potential activities and the extensive distance to the nearest

off-site sensitive buildings, the vibration impact during the construction phase is neutral, imperceptible and temporary.

10.5.3 Potential Effects During Operational Phase

The footprint of the proposed development comprises the new landfill to the south-east of the existing, new waste handling buildings and wet land area immediately to the south of the existing landfill.

The red line boundary of the existing WMF and the proposed development is illustrated in Figure 10-2 (illustrated in full in Drawing 11290-2003). The location of the closest NSLs (residential dwellings) are annotated in green in Figure 10-2. The closest NSLs to the proposed new landfill or waste handling buildings are in excess of 1 km to the north, south, east and west.

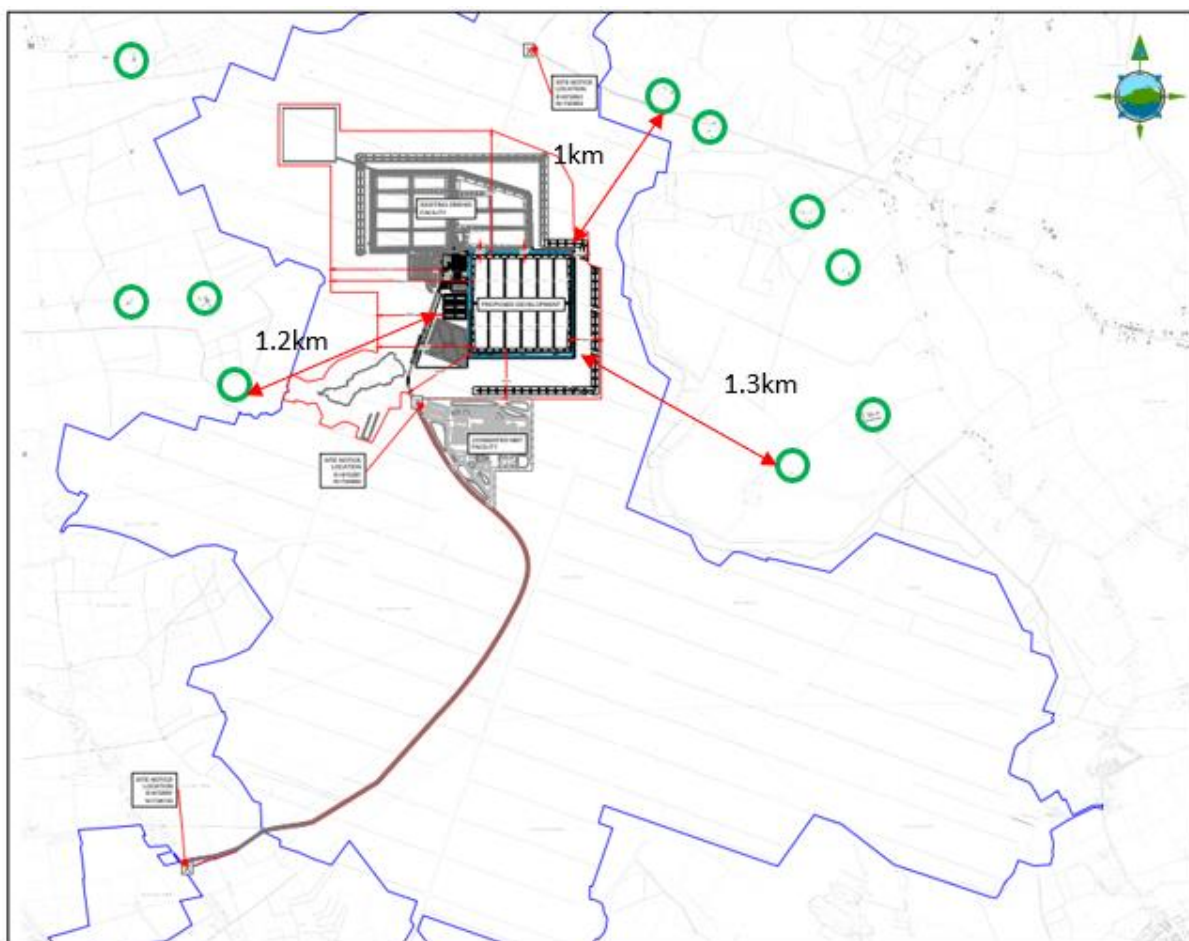


Figure 10-2 Site Layout and closest NSLs (Planning Drawing 11290-2003)

The proposed site layout is illustrated in Figure 10-3 for context only. (Refer to Drawing 11290-2010 for detailed layout information).

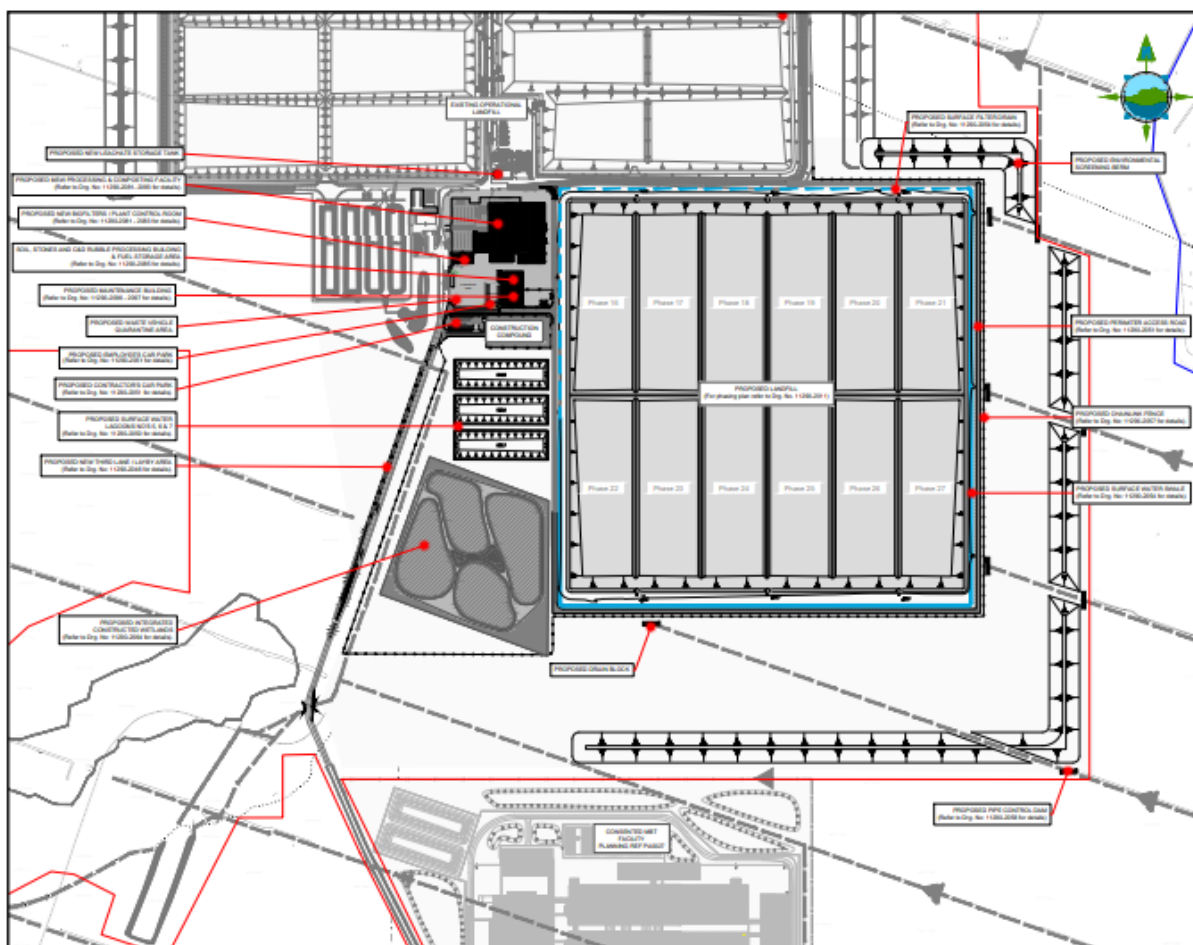


Figure 10-3 Site Layout Plan (Planning Drawing 11290-2010)

10.5.3.1 On-site Activities

The proposed operational hours of the proposed development are between 07:30 and 19:00 hrs Monday to Saturday with the proposed hours of waste acceptance between 07:30 and 18:30.

Chapter 2 (Description of the Existing Infrastructure and Proposed Development) includes a description of the existing site activities and those associated with the proposed development. Section 2.2.7.6 of Chapter 2 describes the various mobile plant and equipment to be employed for the proposed development associated with moving, transporting and processing material into and around the proposed landfill and within the proposed new processing buildings. These are summarised in Table 10-15.

Each of the areas associated with the proposed development are discussed in the following sections.

Table 10-15- Operational Mobile Plant and Equipment

Area	Existing Plant and Equipment	Additional Plant and Equipment
Existing Compost facility	<ul style="list-style-type: none"> 2 no loading shovels (internal) 1 no. tractor and trailer unit currently 	n/a

	in operation (external)	
MSW Processing and Composting Building	n/a	<ul style="list-style-type: none"> • 1 no. loading shovel in waste intake area (internal) • 1 no. loading shovel for materials processing and loading of outgoing RDF / SRF material (internal) • 1 no. loading shovel for filling new composting tunnels (internal) • 1 no. tractor and trailer unit for transferring stabilised compost material to the landfill (external) • 1 no. forklift for loading outgoing recyclables (internal)
Soils Processing Building	n/a	<ul style="list-style-type: none"> • Mobile screening plant (internal) • 1 no. excavator or loading shovel (internal) • An existing dump truck will be used to haul processed materials onto the landfill (external)
Landfill	<ul style="list-style-type: none"> • 1 No. excavator • 1.No. bulldozer • 1 No compactor 	<ul style="list-style-type: none"> • No additional machinery required on new landfill as equipment in use on the existing landfill will transfer over to the new landfill upon commencement of waste placement
Common Areas	<ul style="list-style-type: none"> • Water tanker/ bowser • Road sweeper 	n/a

MSW Processing and Composting Building

The MSW processing and compost building (hereafter referred to as MSW building) will extend to the east of the existing composting building, located to the south of the existing landfill. All aspects of the MSW process will be undertaken in fully enclosed buildings. Access doors at the waste reception of the MSW building will be rapid closing doors, with an opening or closing time of approximately 20 seconds. The core composting process will be undertaken in fully enclosed concrete composting tunnels located within the enclosed building - thereby providing double containment features for odour control purposes.

The building will comprise a three bay steel structure with reinforced concrete walls and metal cladding. All operational plant items located within this building will therefore not generate any notable noise sources external to the building. Given the distance to the nearest off-site NSLs (>1 km), waste processing and handling activities within this building will be imperceptible external to the site. The noise impact from this area of the site is neutral, not significant and long term.

The south of building will comprise a steel frame with metal cladding to match the adjacent existing and proposed buildings which will house a Technical Room. This area will house a fan and scrubber area, pump room, control room, electrical room and welfare facilities. All items of plant in this building will be enclosed. Given the distance to the nearest off-site NSLs (>1 km), waste processing and handling activities within this building will be imperceptible external to the site. The impact from this area of the site is neutral, not significant and long term.

Stabilised compost material will be transferred from this building to the landfill via an additional tractor and trailer. Currently one tractor and trailer operates on site used for material transport from the existing compost building.

Reference to Section 10.3 indicates mobile plant at the existing MSW is just audible at low level at Location N3 (boundary location to the north-east of the existing facility) and is inaudible at all other monitoring locations. Measured background noise levels at Location N3 are in the range of 24 to 39 dB L_{A90} during daytime periods when mobile plant were in operation. Mobile plant across the full site includes the excavator, bulldozer and compactor operating at the existing landfill in addition to any tractor and trailer movements between the compost building and the landfill.

Noise levels associated with a tractor and trailer are referenced in BS5228-1 (Reference C4.75). The values quoted relate to the maximum noise level associated with a tractor towing a trailer and is quoted as 80 dB L_{AFmax} at 10 m. Allowing for the typical operation of tractor movements between the MSW building and the proposed landfill, a distance of 1.2 km to the nearest NSLs has been used. The calculated noise level associated with a tractor drive by is ≤ 30 dB L_{AFmax} at a distance of 1.2 km. The related L_{Aeq} noise level will be lower than the maximum drive by noise level. Conservatively this is assumed to be 5 dB lower resulting in an operational noise level of ≤ 25 dB L_{Aeq} associated with tractor and trailer movements transferring stabilised compost material to the landfill throughout the day.

Combining the additional noise from this activity to the highest background noise level at Location N3 (39 dB) results in no increase in background noise level. Given the closest NSLs are all at distances of at least 1.2 km from this activity, the operational noise level associated with an additional tractor and trailer is of the order of 25 dB L_{Aeq} and will not alter the prevailing noise environment outside of the site.

The calculated and measured noise levels at NSLs are all below the daytime ELV of 55 dB $L_{Aeq, 30mins}$. Noise levels associated with activities occurring at the proposed new MSW building discussed above will therefore be of similar magnitude to those associated with existing operations and will remain significantly below the facilities daytime ELV.

The impact from this area of the site is neutral, not significant and long term.

Soils Processing Building

A new processing building for waste soil, stones and C&D rubble (hereafter referred to as Soils Processing Building) will be constructed to the south of the proposed MSW processing and compost building. This processing building will be constructed as a single-bay steel portal framed structure with reinforced concrete walls, metal cladding and will include roller shutter doors for ease of access for machinery. As per Table 10-15 a screener, excavator and loading shovel will operate within the building, which will be fully enclosed. Given the distance to the nearest off-site NSLs (>1 km), waste handling activities within this building will be imperceptible external to the site. The impact from this area of the site is neutral, not significant and long term

A dump truck will transport material between the soil process building and the landfill. This mobile plant is part of the existing on-site machinery used for material transport to the landfill area and its operation forms part of the existing noise environment as referred to in Section 10.3. Given this will operate in a similar area to that proposed as part of the existing facility, i.e. at distances of a least 1 km from the closest NSL, the operation of this item of plant to noise emissions at NSLs outside the site boundary will be of the same magnitude. The impact from this area of the site is neutral, not significant and long term.

New Landfill

A new non-hazardous landfill is proposed to the south-east of the existing landfill footprint. The proposed new landfill will be divided into 12 no. phases of approximate equal volume. Based on an operational lifetime of 25 years, each phase will cater for approximately 2.1 years of waste placement. The development of each phase will typically be as follows:

- Site clearance and surveys – 6 months
- Construction – 6 months
- Operation/deposition of waste – 2 to 2.5 years
- Temporary capping – 1 year
- Final capping – 1 year

The operational hours of this area will be between 07:30 and 19:00.

The key sources of noise from this area of the site will be from delivery vehicles and mobile plant used for clearance, waste deposition and capping which will use an excavator, bulldozer and compactor. This activity currently forms part of the existing landfill operations and forms part of the existing noise environment as referred to in Section 10.3.

The location of mobile plant will move closer to NSLs to the east of the site, albeit at a significant distance from any on-site activity (> 1 km). Reference to Section 10.3 confirms that mobile plant operating at the existing landfill at distances of between 900 m to 1 km measured at Locations N1 and N3 were in the range of 36 to 48 dB $L_{Aeq, 30mins}$ and 24 to 39 dB $L_{A90, 30mins}$ during daytime periods when the facility was in normal operation. The measured noise levels are all below the daytime ELV of 55 dB $L_{Aeq, 30mins}$. Noise levels associated with activities occurring at the proposed new landfill discussed above will be of similar noise levels and will remain well below the facilities daytime ELV.

On-site activities for the proposed development are proposed to commence 30 minutes earlier than those currently permitted, i.e. commencing at 07.30hrs instead of 08:00hrs. The operation of landfill activities during all daytime periods (07:00 to 19:00hrs) will remain well below the daytime ELV of 55 dB $L_{Aeq, 30mins}$.

On-Site Vehicle Movements and Common Areas

As noted in Table 10-15, the use of a water taker/ bowser and road sweeper which forms part of the existing site operations will continue as per existing operations with the proposed development in place.

As part of the proposed development increased capacity, there is potential for additional traffic movements along the internal haul road transporting materials and waste into and out of the waste processing buildings and landfill.

Noise levels associated with passing event such as road traffic along the internal haul road may be expressed in terms of its Sound Exposure Level (L_{AX}). The Sound Exposure Level can be used to calculate the contribution of an event or series of events to the overall noise level in a given period using the following formulae:

$$L_{Aeq,T} = L_{AX} + 10\log_{10}(N) - 10\log_{10}(T) \text{ dB}$$

where:

- $L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (in seconds);
- L_{AX} is the "A-weighted" Sound Exposure Level of the event considered (dB); and

- N is the number of events over the course of time period T.

The following Sound Exposure Level (L_{AX}) reference values have been used for the assessment. The specific data has been obtained from AWN's in-house data base of road vehicle sound exposure levels measured under controlled conditions for other applications. The L_{AX} values relate to vehicles traveling at a low to moderate speed. The reference noise values are also comparable with those within the European Commission (EC) Joint Research Centre Institute for Health and Consumer Protection. EUR 25379 EU. *Common Noise Assessment Methods in Europe* (CNOSSOS-EU 2012) document for road traffic noise for light, medium and heavy vehicles at moderate speeds (<60 Km/hr).

Table 10-16- Reference Sound Exposure Levels for Traffic

Vehicle Type	L_{AX} at 5m from road edge, dB (A)
Car	72
LGV	75
HGV	85

Traffic flow associated with the existing and proposed development, provided by the traffic consultants has been used to evaluate the change in traffic noise along the internal road using the formula and sound exposure levels above. Chapter 14 (Traffic and Transportation) of this EIAR includes an assessment of traffic associated with the proposed development.

Table 10-17 summarises the calculated contribution of traffic noise along the internal haul road at the nearest off-site NSL which is located 100 m to the south-west of the entrance along the R403 Road in Killinagh Lower. The table includes the traffic flows in Annual Average Daily Traffic (AADT) for the year of opening (2024) and future design years (2039 and 2049).

Two scenarios are considered for each year which include traffic associated with day to day operation of the landfill and the second includes traffic associated with operation of the landfill and construction of landfill cells. For the year 2024, construction traffic also includes for construction of the new proposed on-site buildings (i.e. MSW Processing and Composting Building, Maintenance Building and C&D Processing Building.)

Traffic noise levels are calculated over the 11 hour period that traffic will access the facility, i.e. 07:30 to 18:30hrs.

Table 10-1-Traffic Noise along Internal Haul Road

2022 Existing Landfill Operations					
AADT – Light Vehicles		AADT - HGVs	Traffic Noise dB $L_{Aeq,T}$ at closest NSL		
59		127	47		
2024 – Landfill operations & Construction of cells		Traffic Noise dB $L_{Aeq,T}$ at closest NSL	2024 – Landfill operations and construction		Traffic Noise dB $L_{Aeq,T}$ at closest NSL
AADT – Light Vehicles	AADT - HGVs		AADT – Light Vehicles	AADT - HGVs	
39	60	44	101	213	49

2039 – Landfill operations		Traffic Noise dB $L_{Aeq,T}$ at closest NSL	2039 – Landfill operations and construction		Traffic Noise dB $L_{Aeq,T}$ at closest NSL
AADT – Light Vehicles	AADT – HGVs		AADT – Light Vehicles	AADT – HGVs	
9	156	48	39	199	49
2049 – Landfill operations		Traffic Noise dB $L_{Aeq,T}$ at closest NSL	2049 – Landfill operations and construction		Traffic Noise dB $L_{Aeq,T}$ at closest NSL
AADT – Light Vehicles	AADT – HGVs		AADT – Light Vehicles	AADT – HGVs	
9	157	48	39	200	49

The calculated traffic noise level associated with internal traffic movements at the closest NSL is between 48 to 49 dB $L_{Aeq,T}$ for the scenarios and years assessed. The calculated noise levels are within the operational daytime ELV for the facility at the closest NSL. At all other NSLs locations set back at greater distances from the haul road, the contribution of internal traffic movements is significantly less. At distances of 1 km from the internal haul road, traffic movements are calculated below 40 dB $L_{Aeq,T}$.

In summary, traffic associated with internal traffic movements along the internal site access road are within the daytime operational noise criterion of 55 dB $L_{Aeq,T}$. The calculated noise level is the same or within 1dB of the existing contribution from existing traffic along the haul route, hence no perceptible change is forecast as a result of the proposed development. The impact is therefore, neutral, long-term and not significant.

No HGV traffic will access the facility (existing or proposed) during evening or night-time periods hence the contribution of traffic during these periods is neutral.

Summary of Noise Impacts from Proposed Development.

Noise levels associated with the proposed development will remain largely unchanged compared to the operational phase of the existing MWF due to the same items of external mobile plant being utilised as part of the proposed development. There is one additional tractor and trailer proposed to transport material between the MSW building and landfill area, the contribution from this item of plant is determined to be negligible and will not alter the prevailing noise environment. New items of plant and equipment associated with the new waste handling buildings will be fully enclosed and hence breakout to the surrounding environment will be insignificant, particularly given the significant distances to the nearest NSLs external to the site.

The assessment has determined a potential increase in noise levels associated with haul road traffic of 1 dB during at the closest NSLs. During all other activities associated with the proposed development there is no forecasted increase in ambient noise levels.

The maximum increase in noise levels associated with the proposed facility is therefore 1 dB during daytime periods at the closest NSL from all activities. At all NSLs surrounding the site, the operational noise levels are below the day, evening and night-time limits.

In summary, the cumulative impact of existing and proposed development including all additional traffic along the internal haul road has been assessed and determined to be negative and not significant at the closest NSLs and is within the operational ELVs of the facility for all periods.

10.5.3.2 Traffic along Surrounding Road Network

Traffic travelling to and from the proposed development will involve potential increases to traffic flows along the surrounding road network. A detailed analysis of traffic generation and traffic impacts has been undertaken and is included in Chapter 14 of this EIAR. Information from the traffic analysis has been used to determine the potential noise changes along the surrounding road network for the Do Nothing and Do Something scenarios. The Do Nothing scenario assumes no landfill operations. The Do Something Scenario includes the forecasted traffic associated with the proposed development added to the baseline flows. As a worst case assessment, the highest operational scenario for the assessment years is presented in Table 10.18 which includes traffic associated with day to day operation of the landfill and the construction of landfill cells. For the year 2024, traffic associated with construction of the new additional buildings is also included.

The traffic volumes along the affected link roads where traffic will travel have been used to calculate the change in traffic noise levels. In this instance, it is possible to determine the change in noise level by calculating the contribution of noise levels from light good vehicles (LGV's) and Heavy Good Vehicles (HGV's) for both the Do Nothing and Do Something scenarios as per Section 10.5.3.1. Table 10-18 presents the calculated change in traffic noise along the surrounding road network for the opening year, 2024.

Table 10-2-Change in Traffic Noise along Surrounding Road Network - Opening Year

Road Link	Do Nothing -2024		Do Something -2024		Change in Traffic Noise Level, dB	Significance - Short Term Rating
	AADT - Light Vehicles	AADT - HGVs	AADT - Light Vehicles	AADT - HGVs		
R402 East of Carbury	6,166	357	6,182	453	+0.8	Imperceptible
R402 West of Carbury	8,292	435	8,313	450	+0.1	
R403 South of Carbury	5,944	266	5,981	377	+1.1	
R403 North of Canal	4,494	276	4,558	378	+1.1	
R415 South of Allenwood	4,492	170	4,518	197	+0.4	
R403 East of Allenwood	6,530	379	6,567	456	+0.6	
R409 North of Goatstown	2,624	79	2,624	79	0.0	
R403 East of Prosperous	8,814	491	8,840	562	+0.4	
R407 South of Clane	15,512	702	15,512	702	0.0	
R408 North-east of Prosperous	3,232	111	3,245	113	+0.1	

Road Link	Do Nothing -2024		Do Something -2024		Change in Traffic Noise Level, dB	Significance – Short Term Rating
	AADT – Light Vehicles	AADT - HGVs	AADT – Light Vehicles	AADT - HGVs		
R415 North-east of Kildare	3,331	162	3,341	166	+0.1	
R403 North-east of Clane	13,640	540	13,657	544	0.0	
R409 North-west of Carragh	5,543	115	5,543	115	0.0	
R409 South-east of Carragh	202	3	202	3	0.0	
R416 North-west of Newbridge	5,073	132	5,089	155	+0.4	
R416 South-east of Newbridge	7,573	100	7,589	123	+0.4	
L2002 Local Road Bypassing Clane	4,551	273	4,559	337	+0.7	

The assessment has determined that the change in traffic noise along all roads surrounding the facility is less than 1.1 dB (A) during the year of opening. Reference to Table 10-9 confirms the related noise impact is negative, imperceptible and short to medium term.

Table 10-18 presents the calculated change in traffic noise along the surrounding road network for the design year, 2039. The Do Something scenario for this year includes day to day site operations traffic and landfill cell construction traffic.

Table 10-3-Change in Traffic Noise along Surrounding Road Network – Design Year

Road Link	Do Nothing -2039		Do Something -2039		Change in Traffic Noise Level, dB	Significance – Long Term Rating
	AADT – Light Vehicles	AADT - HGVs	AADT – Light Vehicles	AADT - HGVs		
R402 East of Carbury	6,954	465	6,955	555	+0.6	Imperceptible
R402 West of Carbury	9,352	567	9,366	581	+0.1	
R403 South of Carbury	6,704	346	6,718	450	+0.9	
R403 North of Canal	5,069	359	5,094	455	+0.8	
R415 South of Allenwood	5,067	222	5,084	253	+0.4	
R403 East of Allenwood	7,365	494	7,372	560	+0.4	

Road Link	Do Nothing -2039		Do Something -2039		Change in Traffic Noise Level, dB	Significance - Long Term Rating
	AADT - Light Vehicles	AADT - HGVs	AADT - Light Vehicles	AADT - HGVs		
R409 North of Goatstown	2,959	103	2,959	103	0.0	
R403 East of Prosperous	9,942	640	9,949	700	+0.3	
R407 South of Clane	17,496	915	17,492	915	0.0	
R408 North-east of Prosperous	3,646	144	3,647	146	0.0	
R415 North-east of Kildare	3,757	211	3,764	215	+0.1	
R403 North-east of Clane	15,384	704	15,390	708	0.0	
R409 North-west of Carragh	6,251	151	6,251	151	0.0	
R409 South-east of Carragh	228	4	228	4	0.0	
R416 North-west of Newbridge	5,722	173	5,732	200	+0.4	
R416 South-east of Newbridge	8,541	131	8,552	152	+0.3	
L2002 Local Road Bypassing Clane	5,133	356	5,138	410	+0.5	

The assessment has determined that the change in traffic noise along all roads surrounding the facility is less than 1 dB (A) during the design year, 2039. Reference to Table 10-10 confirms the related noise impact is negative, imperceptible and long term.

Traffic reviewed for the year 2049 results in similar noise level changes, which are all below 1 dB (A).

10.5.4 Decommissioning Phase

The new landfill infrastructure has a proposed operational lifetime of 25 years after which the landfill will be fully capped and will enter an aftercare phase which does not have any operational noise sources with the exception of continued gas and leachate extraction. The capping of landfill cells form part of the operational phase of the development as assessed in Section 10.5.3.

Any ancillary infrastructure associated with the landfill will be decommissioned where it is not required for the long-term aftercare, i.e., leachate and landfill gas management. Groundwater pumps maintaining low water levels below the liner during the construction and operational phases will be decommissioned. Some pumps may be retained on site for alternative uses or where not required, will be removed from site.

All mobile plant and equipment associated with the facility will be removed from site and will no longer be a noise source.

In the event that structures and buildings or structures are to be dismantled, the related noise impact will be no greater than those discussed in Section 10.5.2.1 relating to the construction phase. The impact of this phase is therefore neutral to not significant.

10.6 MITIGATION MEASURES

10.6.1 Construction Phase

Construction phase noise and vibration impacts are determined to be not significant at the nearest off-site sensitive buildings. No specific mitigation measures are required to control noise or vibration during the construction phase given the significant distance between the site works and the nearest NSLs. Notwithstanding, best practice noise and vibration control measures will be applied on site as standard during this phase.

With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from construction activities. Best practice control measures will be considered and applied during the construction of the proposed development where necessary. Details are in the Construction Environmental Management Plan (CEMP).

These measures will ensure that:

- During the Construction Phase, the works will be managed to comply with the limits detailed in 10.2.1.1 using methods outlined in BS 5228-1; and
- The best means practicable, including proper maintenance of plant and equipment, will be employed to minimise the noise produced by on site operations.

10.6.1.1 Operational Phase

There are no additional operational noise mitigation measures required to control noise from the proposed development.

The layout and design of the site incorporates inherent noise mitigation measures through the position of the proposed facility away from noise sensitive boundaries, the location of operational sources on-site and the hours of operation. The results of the assessment have indicated that operational noise levels associated with on-site noise sources are all below the noise limit value recommended for day, evening and night-time periods.

In order to ensure noise levels associated with the operational phase of the development are minimised as far as practicable, the following mitigation measures will be incorporated into the site design as best practice;

- All roller shutter doors and building access points are maintained closed at all times and opened only to permit vehicle and personnel entrance/egress, and;
- All operational plant will be switched off during evening and night-time periods when the facility is not in operation, with the exception of the fixed plant items required to operate on a continual basis for odour control and gas utilisation.

10.7 CUMULATIVE IMPACTS

10.7.1 Construction Phase

During the construction phase of the proposed development, activities taking place within the proposed development are determined to be Not Significant at off-site NSLs. In the event that construction works are occurring at other permitted or proposed developments in the area, the noise contribution will depend on their proximity to individual NSLs. Given however the insignificant noise impact associated with construction noise from the proposed development, cumulative construction noise impacts associated with the proposed development and other adjacent developments are not significant. Assuming as a highly conservative assessment, the contribution of another adjacent application results in the same construction noise level as the proposed development at off-site NSLs, the construction noise levels within Table 10-14 would be increased by 3 dB (i.e. doubling of the sound energy). An addition of 3 dB to the construction noise levels in Table 10-14 results in noise levels between 33 and 41 dB at the closest NSLs. The cumulative noise levels remain significantly below the CNTs and in line with the prevailing noise environment. Reference to Table 10-3 confirms the impact is Not Significant.

10.7.2 Operational Phase

The operational assessment has considered the cumulative effect of the proposed development added to the prevailing noise environment which includes the existing WMF and other existing activities in the surrounding environment as measured as part of the baseline noise surveys. The assessment has determined that the operation of the proposed development in addition to the existing facility will be of negative and not significant to slight impact as discussed in Section 10.5.3.1.

The traffic data assessed for the operational stage impacts noise includes the cumulative traffic associated with existing and the proposed development in addition to traffic from the surrounding road network. Therefore, the cumulative impact for traffic along the surrounding road network is included within the operational stage impact for the Proposed Development. The impact is predicted to be negative, imperceptible and long-term with respect to noise.

Appendix 4-2 includes a list of planning applications in the vicinity of the proposed development with potential for cumulative impacts on the surrounding environment when considered alongside the proposed development.

The most significant of the developments with potential for operational noise impacts at common NSLs to the proposed development relate to the following:

- proposed Timahoe North Solar Farm located to the north of the Drehid Landholding;
- a proposed solar farm at Coolcarrigan, Timahoe West (Planning Ref 22/1203) located south east of the Drehid Landholding; and

- a proposed wind farm at Ballydermot to the south-east of the Drehid Landholding (application not yet submitted).

The closest common NSLs to the Timahoe North Solar farm and the Drehid WMF are along the Derrymahon Road which lies to the south of the proposed solar farm development and north of the Drehid WMF. Reference to Chapter 10 (Noise) within the published EIAR for the proposed solar farm indicates that calculated noise levels at the closest NSLs along the L5025 Derrymahon Road is <25 dB L_{Aeq} . Lowest background noise levels at monitoring Location N2 along the L5025 Road during night-time periods are of the order of 20 dB L_{A90} (Refer to Section 10.3.1.4) which includes the normal operation of the WMF within the Drehid Landholding. There is no increase in night-time noise levels associated with the proposed extension to the WMF as no night-time operations are planned. The addition of up to 25dB to the prevailing background noise level from the Timahoe Solar farm results in a cumulative noise level of 26 dB – this cumulative effect is associated with the Solar farm. As set out in 10.5.3, the proposed extension to the WMF will not result in any increased noise levels at NSLs during night-time periods. The cumulative impact associated with the proposed development is therefore neutral and long term during night-time periods.

During daytime periods the lowest background noise level measured at Location N2 was 25 dB L_{A90} . Adding the operational noise level associated with the solar farm (<25 dB), results in an increase of the order of ≤ 3 dB, resulting in a potential cumulative noise level of up to 28 dB. This cumulative effect is associated with the solar farm. The operation of the proposed extension of the WMF to properties to the north of the site is negligible due to the distance of the site operations. The overall impact is neutral and long term.

The cumulative noise levels during day, evening and night-time periods are all below the noise ELVs for the facility.

The closest common NSLs to the Coolcarrigan Solar farm at Timahoe West and the Drehid WMF are those at Coolcarrigan House and Gardens, located in excess of 1.5 km south east of the Drehid WMF. Reference to the noise assessment submitted as part of the planning application for this development (22/1203) indicates that calculated noise levels at the closest NSLs Coolcarrigan House and Gardens are 38 dB L_{Aeq} during operation of Phase 1 and Phase 2 of the solar farm. The contribution of the proposed extension to the WMF at Drehid will be below 40 dB L_{Aeq} . When added to the prevailing noise environment and the operation of the proposed extension to the WMF within the Drehid Landholding, there is potential for an increase in ambient noise levels of the order of 1 to 2 dB during daytime periods. The cumulative noise level remains well below the daytime ELV of 55 dB L_{Aeq} at this location. The impact is not significant and long term. There is no increase in night-time noise levels from the Drehid facility, hence the impact is neutral and long term during this period.

The closest common NSLs to the Ballydermot wind farm and the Drehid WMF are along the local road along R403 Road to the west of the Drehid WMF and east of the proposed wind farm. The planning application has not yet been submitted for this development, however, given the closest turbine location is some 5 km from the Drehid WMF and the closest common NSLs are some 3 km from the Drehid on-site activities, there is no cumulative noise impact associated with the operation of both development on the closest NSLs to either development. The impact is neutral, long term.

The cumulative noise impact is predicted to be neutral to not significant, and long-term with respect to noise and vibration.

10.8 RESIDUAL IMPACTS

During the construction phase, the potential noise and vibration impacts are determined to be not significant.

During the operational phase, noise levels associated with the proposed development will remain largely unchanged compared to the operational phase of the existing MWF due to the same items of external mobile plant being utilised as part of the proposed development across the site. There is one additional tractor and trailer proposed to transport material between the MSW building and landfill area, the contribution from this item of plant is determined to be negligible off-site and will not alter the prevailing noise environment. The remaining new items of plant and equipment associated with the new waste handling buildings will be fully enclosed and hence breakout to the surrounding environment will be insignificant, particularly given the significant distances to the nearest NSLs external to the site. The cumulative impact associated with the existing and proposed development is determined to be neutral.

The cumulative impact of existing and additional traffic flow along the internal haul road has been assessed and determined to be not significant.

The maximum increase in noise levels associated with the proposed facility is therefore 1 dB during daytime periods at the closest NSL from all activities. At all NSLs surrounding the site, the operational noise levels are below the day, evening and night-time limits.

In summary, the cumulative impact of existing and proposed development including all additional traffic along the internal haul road has been assessed and determined to be negative and not significant to slight at the closest NSLs and is within the operational ELVs of the facility for all periods.

The assessment of traffic flows along the surrounding road network has determined that the change in traffic noise along all roads surrounding the facility is less than 1.1 dB (A) during the design year. Reference to Table 10-10 confirms the related noise impact is negative, imperceptible and long term.