Construction Environmental Management Plan (CEMP)

Footpath and Cyclepath Works Ardmore Road, Mullingar Co. Westmeath

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1 Introduction

This Construction Environmental Management Plan (CEMP) sets out the procedures, standards, work practices and management responsibilities to address potential environmental effects that may arise during the development of a hard-surfaced shared footpath/cycling route, segregated from the vehicular carriageway on Ardmore Road, Mullingar Co. Westmeath

The CEMP outlines the approach that will be adopted for environmental management throughout the project works at the site, with the primary aim of reducing and avoiding any adverse effects from construction on the environment. The CEMP remains at all times a live document, subject to amendment including the revision and addition of content throughout the works. In this context, the values and information presented herein are subject to change and refinement through the selection of the contractor and the delivery of the project.

This plan shall be further refined and expanded by the appointed Contractor (hereafter referred to as the Contractor). The elements contained within this plan will be included in the Contractor's CEMP, which will be prepared before construction by the appointed Contractor and approved by the Client.

1.1 Objectives

The objectives of this CEMP and any subsequent Contractor CEMP are therefore to:

- Act as a continuous link and reference document for environmental issues between the design, construction, testing and commissioning stages of the Project;
- Demonstrate how construction activities and supporting design shall properly integrate the requirements of environmental legislation, planning consent conditions, policy, good practice, and those of the environmental regulatory authorities and third parties;
- Record environmental risks and identify how they will be managed during the construction period;
- Record the objectives, commitments and mitigation measures to be implemented together with the programme of works and date of achievement;
- Identify key staff structures and responsibilities associated with the delivery of the Project and environmental control and communication and training requirements as necessary;
- Describe the Contractor's proposals for ensuring that the requirements of the environmental design are achieved, or are in the process of being achieved, during the Contract Period;
- Act as a vehicle for transferring key environmental information at handover to the body responsible for the operational management of the proposed development site. This shall include

details of the asset, short and long-term management requirements, and any monitoring or other environmental commitments (where required); and

- Provide a review, monitoring and audit mechanism to determine the effectiveness of, and compliance with, environmental control measures and how any necessary corrective action shall take place (where required).

1.2 Scope and Description of Works

The scope of this CEMP covers the design and construction of a hard-surfaced shared footpath/cycling route, segregated from the vehicular carriageway on Ardmore Road, Mullingar Co. Westmeath.
This CEMP considers the following subject areas:

- Environmental Management;
- Roles and Responsibilities
- Biodiversity
- Water Quality
- Noise and Vibration
- Air Quality (Dust and Emissions) ; and
- Rubbish, Litter and Waste

1.2.1 Site Location

The subject site is located on the southeast of Mullingar along Ardmore Road. The proposed cycleway and walkway will provide active travel connectivity between the Ardmore Hills and Ardmore Close. The subject site is surrounded by housing estates, roads, amenity grasslands, industrial estates and areas of agricultural grasslands. The closest designated site to the subject site is Wooddown Bog SAC 2.5km to the northeast and Lough Ennell SAC and SPA 3.6km to the southwest. This is connected to a drain on the site via a series of town drains and culverts and via the Brosna river over a total distance of over 5km.

1.2.2 Project Description

The scope of this CEMP covers works associated with the development of a hard-surfaced shared footpath/cycling route, segregated from the vehicular carriageway, which will require the widening of the roadway with the consequent removal of trees and culverting of a drain. The southern side of the site in front of the Holy Family National School and the three no. dwellings to the east have a shared cycle/footpath which will remain in its current form. The southern side of the site in front of the housing estate, Ardmore Hills, will be subject to works to widen the existing footpath to create a shared pedestrian/cycling route. A crossing point will be provided to the eastern end of the site to connect the north side and south side pedestrian/cycle paths. Works are expected to be approximately 6 months.

The works will generally consist of the following:

- Excavation of soils and subsoils
- disposal of surplus soil off site to an authorised waste facility
- culvert drain
- importation, placement and compaction of hardcore (crushed stone)
- installation of 50mm macadam surfacing
- ducting for and provision of public lighting
- tree removal
- plantings (new field boundaries will be marked with fencing and a compensatory hedge and tree line) and
- noise and general construction disturbance during daytime hours

2 Environmental Management

2.1 Overview

As noted earlier, the CEMP shall fully address the particular requirements of the objectives listed in Section 1.1, and any updated or new supplementary environmental reports made available to the Contractor as necessary. The CEMP shall also comply with the requirements of the relevant authorities/environmental bodies.

The CEMP shall be reviewed and updated by the Contractor and submitted prior to works commencing on Site. It shall be prepared in sufficient detail to describe the framework of the Contractor's proposed management, control and mitigation strategy for each environmental aspect considered here.

2.2 Roles & Responsibilities

The Contractor shall appoint a Construction Environmental Management Plan Co-ordinator (CEMPC). This can be a member of site staff including the Site Forman or Project Manager. A CEMPC or an Environmental Site Representative(s) shall be present on-site for the duration of the Project. The CEMPC shall be the point of contact for dealing with environmental issues for the Contractor's employees, subcontractors, relevant authorities/environmental bodies, and members of the public. The CEMPC will also be responsible for controlling the construction impacts arising from the activities of the Contractor and his Subcontractors in accordance with the CEMP. The CEMPC shall prepare, implement, manage, review and revise the CEMP with the sole purpose of ensuring that the environment and public are safeguarded at all times from anticipated or unexpected adverse impacts during construction.

Within the Contractor's team, the CEMPC shall have the authority to ensure that the CEMP is effectively implemented. The CEMPC must notify the Client of any transgressions in respect of the CEMP so that necessary sanctions can be imposed.

In general, the duties of the CEMPC can include the following:

- Implementation of the CEMP procedures;
- Routine environmental monitoring, recording and reporting;
- Maintaining and auditing the CEMP and documents that underpin it;
- Environmental training including toolbox talks to site staff and design staff;
- Liaison with statutory authorities as required;
- Assist in liaison with the relevant authorities/environmental bodies and local community;
- Any other activities that may be necessary in order to protect wildlife and the environment during the works.

3 Environmental Management Procedures and Plans

3.1 Biodiversity

3.1.1 Regulatory & Policy Framework

The following legislation and guidance documents are of relevance to ecological constraints present within the proposed development site.

- The Irish Wildlife Act 1976 and 2000, as amended;
- European Communities (Birds and Natural Habitats) Regulations 2011, as amended;
- The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna);
- The Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds); and
- The Water Framework Directive (WFD) 2000/60/EC;
- Fisheries Consolidation Act 1959 (No. 14 of 1959), as amended;
- The Inland Fisheries Act 2010 (No 10 of 2010), as amended; and
- The Local Government (Water Pollution Acts) 1977-1990, as amended;
- Various National Road Authority (NRA) guidance from the 'Environmental Planning and Construction Guidelines series'.

3.1.2 Key Ecological Features

In general, works occur in an area that is not sensitive for biodiversity. The area is however on an urban fringe which can often be significant for highly mobile and transitory species, bats and mammals. A drain is

also present on the site that may provide amphibian habitat. Care should be taken to avoid disturbance or impacts to species using the site during construction.

3.1.3 Mammals

To avoid negative impacts on any mammals potentially present within close proximity to the works area or moving through the works area the following precautionary construction mitigation measures are recommended.

- Good housekeeping practices should be implemented on sites such as storage of materials and liquids away from viable habitats
- To avoid entrapment or injury to any mammals on site, excavations should be covered at the end of each day. Any open pipes should be capped each evening; and
- If at any stage an otter, badger or fox are encountered during the works, all work should be temporarily stopped in that area and an ecologist consulted for advice.

3.1.4 Bats

While no bat roosting sites was identified the adjoining hedgerows and agricultural land may be used by foraging bats during their active season (May to October).

- If works occur during bats active season works should not take place outside of daylight hours to avoid impacts on bats normal function.

3.1.5 Amphibians

A small agricultural field drain runs adjacent to the site of works. Depending on the time of year works are undertaken there is a possibility that impacts on amphibians and in particular frogs may occur.

- Works should not clear the drainage ditch during the frog spawning season February to mid-summer.
- If works do occur within this window a preconstruction survey should be carried to out see if any frogspawn and tadpoles are present. A licence from NPWS will be required to remove these if any are found within the works area.

3.2 Water Quality

It is understood that this drainage ditch has connectivity to the Brosna River via a series of drain and culverts through town over a distance of 1.8km. The Brosna eventually discharges in to Lough Ennell SAC/SPA a further 3.5km downstream. The closest water course is the Royal Canal which is located 860m from the scheme's southern extent.

3.2.1 Legislation

The following legislation and guidance documents are of relevance to the water quality of the Site:

- Planning and Development Act, 2000, as amended;
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 S.I. No. 386 of 2015;
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2010 S.I. No. 327 of 2012;
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2009 S.I. No. 272 of 2009;
- European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 S.I. No. 366 of 2016;
- European Union (Drinking Water) Regulations 2014. S.I. No. 122 of 2014;
- Environmental Protection Agency's Draft Interim Guidelines Values (IGVs) for the Protection of Groundwater, 2003; and
- European Union WFD 2000/60/EC.

3.2.2 Guidance Documents:

- CIRIA guidance documentation C648 'Control of Water Pollution from Linear Construction Projects';
- CIRIA guidance documentation C532 'Control of water pollution from construction sites: guidance for consultants and contractors';
- CIRIA guidance documentation C741 'Environmental good practice on site guide
- CIRIA guidance documentation R164 'Design of Containment Systems for the Prevention of Water Pollution from Industrial Accidents'; and,
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, National Roads Authority (NRA).

3.2.3 Key Impacts

The water quality impacts occurring during the construction phase (in the absence of adequate management and mitigation measures) can arise from several activities. These would include:

- Polluted drainage and discharges from the site;
- Discharge of construction materials, e.g. uncured concrete;
- Uncontained spillage of washdown water;
- Uncontrolled contaminated silty runoff and
- Refuelling facilities, chemical and waste storage or handling areas;

3.2.4 Environmental Control Measures and Proposals

For each of the potential sources of an environmental impact on the existing environment, the Contractor will identify the control and protection measures to be implemented. The following mitigation measures should be followed.

3.2.5 General Measures

- Any diesel or fuel oils stored on site must be bunded to 110% of the capacity of the storage tank. The design and installation of fuel tanks must be in accordance with best practice guidelines BPGCS005, and oil storage guidelines. Drip trays and spill kits must be kept available on-site. Loose containers will be stored in a dry area.
- All stationary plant must be placed on drip trays to prevent leaking oils from reaching the adjacent drains
- Drip trays and spill kits must be kept available on-site. Loose containers will be stored in a dry area.
- No washings or waste materials of any kind can be directed into the local drainage network or the existing field drain on the site (including concrete washout from any concrete delivery).
- Machinery on site must have pollution control kits on hand in the event of an emergency.
- Any cement kept on site should be stored internally in a dry area.
- Care should be taken when refuelling. Drip trays should be present whilst refuelling.
- Any fuel to be stored on site should be stored in a safe area where the likelihood of damage to the fuel container by moving vehicles is minimised. Fuel, if being stored, should be stored in a double-bunded, undamaged, fit-for-purpose storage unit, specifically designed for fuel storage.
- All excavation equipment should be in good working order and checked daily for any hydraulic leaks/oil leaks. It should not be used unless in good working order.

3.3 Noise

A baseline environmental noise survey report was conducted for the proposed development. This can be seen in Appendix 1. No.4 Noise Sensitive Locations (NSL's) were surveyed between 8.00am and 8.00pm for 2 No. 30-minute sample periods. Noise results at NSL's ranged between 41dB – 51dB LA_{90}.

Table 1: Noise levels results from NSL's

	NSL1	NSL 2	NSL3	NSL 4
Baseline Noise Levels	56dB	61dB	63dB	58dB
Total Predicted Daily Exposure (50m)	64dB	64dB	64dB	64dB
Difference	8dB	3dB	1dB	6dB
Short Term Impact Classification	Moderate	Minor	Negligible	Moderate

3.3.1 Legislation and Guidance

- European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001 and 2016

3.3.2 Key Impacts

Key impacts relate to nuances of noise during the construction period. Initial works for the proposed project will involve the excavation of soils and subsoils and transportation offsite. A tracked excavator will be used to remove soils and artic lorries will be used to move materials offsite. Once soils are removed a drainage system will be installed and a hardcore surface will be placed on top. Hardcore will be imported to the site using artic lorries and will be compacted into place with a roller. A 50mm macadam surfacing will be lain on top of this using a paver and will be compacted using a steel wheeled roller. Although the definitive construction method and a number of machines are not known at this stage, the following equipment is expected to be used during the construction process:

- Mini Road Planer
- Vibratory Roller 3T
- Asphalt paver (+ tipper lorry) 12T
- Tracked Excavator
- Road Lorry

If all plant assumed to be used as part of this project are running simultaneously this gives an LAeq 8hour of 78dB at 10m from the noise source. However, assuming that noise sources will be an average of 50m from an NSL throughout the road construction works, a total daily noise exposure of 64dB is predicted. This is less than 10dB above the current baseline noise levels at the various NSL's and therefore within the proposed daytime limits set out in the brief for each NSL.

3.3.3 General Measures

The following mitigation measures are outlined to reduce noise impacts to NSL and the general locality during construction works. The appointed Contractor(s) will be required to adhere to the noise mitigation measures during construction activities. Actions include the following:

- Heavy machinery works including Asphalt pavers (+ tipper lorry), Tracked Excavator and Road Lorry's works should be restricted and not allowed to operate between 8.30am and 9.00am, between 1.00pm and 1.45pm and between 2.00pm and 2.45pm to avoid drop-off and pick-up times for children at the Holy Family National School.
- Trucks entering the site required to wait on site will switch off engines to avoid unnecessary fuel usage and noise;
- The unnecessary revving of engines should be avoided and equipment should be switched off when not required;
- Rubber linings shall be used in chutes and dumpers etc. to reduce noise;
- Drop heights of materials shall be minimised;

- Generators will be located away from NSL and will be enclosed;
- Careful selection of equipment, construction methods and programming to reduce noise where possible. Only equipment, including road vehicles, conforming to relevant national or international standards, directives and recommendations on noise and vibration emissions, will be used;
- Ensure that all plant is shut down when not in use;
- Where possible contractors should restrict the use of machinery to one machine at a time to reduce the noise burden;
- Where possible contractors should refrain from working on the same section of the road for a prolonged period of time to reduce the noise burden in one particular area.
- All practicable measures shall be taken to reduce the level of noise emitted from the works. The proposed works shall comply with British Standard 5228 ' Noise Control on Construction and open sites Part 1. Code of practice for basic information and procedures for noise control.

3.4 Air Quality (Dust and Emissions)

3.4.1 Dust and particulate emissions

The contractor is required to implement the following measures in relation to air quality and dust during the duration of the construction phase of this project. Dust and particulate emissions from a health perspective are focused on particles which are less than 10 microns (PM10) and less than 2.5 microns (PM2.5). With regards to larger dust particles (greater than 75 microns) these fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and can give rise to the potential dust nuisance at the sensitive receptors. This size range is broadly described as silt. There are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of developments in Ireland.

3.4.2 Emissions (Greenhouse Gas and associated emissions)

Ireland is a party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same

level as action to cut and curb emissions. In order to meet the commitments under the Paris Agreement, the EU enacted Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030.

3.4.3 Legislation and Guidance

TII (2022) Air Quality Assessment of Proposed National Roads - Standard PE-ENV-01107 December 2022

3.4.4 Key Impacts

Dust

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. In addition, dust generation is considered negligible on days when rainfall is greater than 0.2 mm.

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM10 and PM2.5 emissions. PM10 emissions can occur within 15 m of the site for the development of this scale. The Holy Family National School is found to the south of the development and the key receptor is within 15m of the site boundary. Therefore, in the absence of mitigation, there is the potential for slight, negative, short-term impacts on air quality as a result of the proposed works

Emissions

There is the potential for several greenhouse gas emissions to the atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO2 and N2O emissions. The Institute of Air Quality Management document Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) states that site traffic and plant are unlikely to make a significant impact on climate. Therefore, the potential impact on climate is considered to be imperceptible, neutral and short-term.

3.4.5 Dust

Heavy machinery is restricted and not allowed to operate between 8.30am and 9.00am, between 1.00pm and 1.45pm and between 2.00pm and 2.45pm to avoid drop-off and pick-up times for children at the Holy Family National School.

Implementation of 'standard mitigation', as stated in the TII guidance, including the following measures.

- Public roads affected by the proposed scheme will be regularly inspected for soiling associated with the construction activities and cleaned as necessary
- During movement of dust generating materials both on and off-site, trucks will be covered with tarpaulin, and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place;
- Wetting down of dust, particularly during prolonged dry spells in any areas likely to produce dust. Areas are to be wetted down using a combination of large and small droplets, (to capture particles of different sizes.
- Generators will be located away from sensitive receptors in so far as practicable; and
- Control of vehicle speeds, speed restrictions and vehicle access as required.

The appointed contractor will keep the effectiveness of the mitigation measures under review and revise them as necessary. In the event of dust nuisance associated with the proposed scheme occurring outside the boundary of the works, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.

3.4.6 Emissions

Heavy machinery is restricted and not allowed to operate between 8.30am and 9.00am, between 1.00pm and 1.45pm and between 2.00pm and 2.45pm to avoid drop-off and pick-up times for children at the Holy Family National School.

- All plant and vehicles shall comply with European Union (EU) emission limits for their vehicle class as a minimum and are to be regularly maintained
- Any processes or equipment that emit fumes, odours or smoke is to comply with the manufacturer's specifications and, if appropriate, regulatory limits to prevent nuisance
- Any plant and equipment emitting black smoke will be taken out of service immediately and the defect rectified
- Where possible use of mains or battery powered equipment over diesel powered equipment should be promoted.

3.5 Rubbish Waste and Litter

3.5.1 Legislation and Guidance

The Irish Government issued a policy statement in September 1998, Changing Our Ways, which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five-year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013). In response to the Changing Our Ways report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled 'Recycling of Construction and Demolition Waste' concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste. In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, 'A Waste Action Plan for a Circular Economy' (WAPCE), replaces the previous national waste management plan, "A Resource Opportunity" (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The primary legislative instruments that govern waste management in Ireland and are applicable to the development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 (as amended) 14.

The approaches presented in these documents are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.5.2 Key Impacts

Waste including food waste, wind-blown litter and C and D waste can have a detrimental impact on the local environment of the area including water quality, air quality, human health and public nuisance.

3.5.3 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown below The List of Waste (LoW) code (applicable as of 1 June 2015) (also referred to as the European Waste Code (EWC)) for each waste stream is also shown.

Table 2: Waste Materials and codes

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, and plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

* Individual waste types may contain hazardous substances

3.6 Potentially Hazardous Wastes Materials

Table 3: Potentially hazardous wastes that may arise and their management

Waste Type	Management
Contaminated Soil	If any contaminated material is found on site, this material will need to be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled 'Waste Classification: List of Waste &

	Determining if Waste is Hazardous or Non-Hazardous' 16 using the HazWasteOnline application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC 17 , which establishes the criteria for the acceptance of waste at landfills. In the event that ACMs are found, the removal will only be carried out by a suitably permitted waste contractor, in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All asbestos will be taken to a suitably licensed or permitted facility.
Fuel/Oils	Fuels and oils are classed as hazardous materials; any on-site storage of fuel/oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site.
Invasive Plant Species	An invasive plant species survey was carried out in January 2023. No Third Schedule invasive species were found on the site at this time. If one or more growing seasons May to October pass between this survey and the date of works commencing this survey should be repeated.
Asbestos	If Asbestos is detected, removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from the site by a suitably permitted/licenced waste contractor. in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All materials will be taken to a suitably licensed or permitted facility.
Other Known Hazardous Substances	Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor. In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury-containing waste may be generated during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.6.1 Waste Management

The Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects promote that the CEMPC should be responsible for managing wastes on site or should appoint a person for waste management. This job may be performed by a number of different individuals over the life cycle of the Project.

Waste materials generated will be segregated on-site, where it is practical. Where the onsite segregation of certain waste types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at the source, where feasible. All waste receptacles leaving the site will be covered or enclosed. The appointed waste contractor will collect and transfer the waste as receptacles are filled.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required. During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off-site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR/permit/licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contractors who collect waste from the site and COR/permit/licence for the receiving waste facility for all waste removed off-site for appropriate reuse, recycling, recovery and/or disposal. Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, and chemicals, if required.

3.6.2 Management of Waste-by-Waste Type

Table 4: Waste types and management actions

Waste Type	Management
Soil, Stone, Clay & Made Ground	The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and

	recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase. When a material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from the site until approval from the EPA has been received. The potential to reuse the material as a by-product will be confirmed during the course of the excavation works, to eliminate any unnecessary disposal of material. The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use. Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27. Article 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials. If the material is deemed to be a waste, then removal and reuse/recovery/disposal of the material will be carried out in accordance with the Waste Management Act 1996 as amended, the Waste Management (Collection Permit) Regulations 2007 as amended and the Waste Management (Facility Permit & Registration) Regulations 2007 as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

Concrete Blocks, Bricks, Tiles & Ceramics	The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible.
Hard Plastic	As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.
Timber	Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off-site.
Metal	Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.
Waste Electrical & Electronic Equipment (WEEE)	Any WEEE will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling.
Other Recyclables	Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off-site.
Non-Recyclable Waste	C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboard, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

3.6.3 Record Keeping

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site. A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time

- Waste Contractor
- Company waste contractor appointed by, e.g. contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type and
- EWC / LoW.

Appendix 1 Noise Monitoring Report

Rowan

Baseline Environmental Noise Survey Report 2023



Location: Ardmore Road, Mullingar, Co. Westmeath

Client: Flynn Furney (Westmeath County Council)

Date: March 2023

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Table of Contents

Section 1 Introduction

1.1 Introduction

Rowan Engineering Consultants Ltd (Rowan) were contracted by Flynn Furney Ltd to undertake a daytime baseline noise survey along the Ardmore Road, Mullingar, Co. Westmeath and to determine the expected noise levels arising during the proposed roadworks activities for improving the cycling and pedestrian infrastructure in that area. During the noise survey, noise levels were recorded 4No. NSL's. The site area is illustrated on a map in Appendix A.

Section 2 Methodology

2.1 Monitoring Locations and Period

In order to assess the surrounding environmental noise levels, a daytime noise survey was conducted on the 9th of February 2023. Following a review of the nearby sensitive receptors, it was considered sufficient to monitor 4No. Noise Sensitive Locations.

Eoin Downey of Rowan Engineering Consultants Ltd undertook all the noise monitoring. The measurements were taken for 2No. 30 minutes periods at each of the 4No. NSL's. Grid references were taken at each monitoring location and the noise monitoring locations are illustrated on the map in Appendix B.

In order to assess the baseline noise environment at the proposed site, the following criteria was used:

Table 1: Noise monitoring locations, period and duration of monitoring

Noise Monitoring Locations, Period and Duration of Monitoring	
Period	**Survey Duration**
Noise Sensitive Locations (NSL's)	
Daytime (08:00-20:00)	**2No. 30-minute sample periods**

2.2 Noise Monitoring Equipment and Calibration

The equipment used during this noise survey was a SVAN 971 Class 1 IEC 61672-1:2013 Sound Level Meter (Serial No. 77617).

The sound level meter was calibrated before the measurements, and its calibration checked after, using a SVANTEK SV33A Class 1 Acoustic Calibrator (Serial No. 79912). No calibration drifts were found to have occurred during surveys.

All noise equipment had been calibrated to a traceable standard by UKAS (United Kingdom Accreditation Service) accredited laboratories within 12 months preceding the surveys.

2.3 Noise Monitoring Standard and Methodology

All measurements were carried out in general accordance with ISO 1996: '*Acoustics- Description and measurement of environmental noise*'. Consultation was also given to the Agency's 2016, *'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'* prior to the noise survey been conducted. The 'Objective method for assessing the audibility of tones in noise' as detailed in Appendix E of ISO 1996-2:2007 was used to assess the 1/3 octave frequency analysis.

In addition to the EPA Guidance Note for Noise, the following methodology has been adopted:

- Review of appropriate guidance in order to identify appropriate noise criteria for the proposed Project;
- Carry out noise monitoring at a number of critical locations (e.g. in the vicinity of the nearest NSL's); and
- Assess the predicted noise levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

Appendix E presents a glossary of the acoustic terminology used in this section.

Appendix F presents an overview of the basic fundamentals of acoustics to assist in the understanding of this report.

Measurements were made placing the microphone at a height of 1.2m above ground level and were free field, measured >3.5m from reflecting surfaces. The measurement results were noted onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis, notes were taken in relation to the primary contributors to noise build-up at each location. A 1/3 octave frequency analysis was also carried out.

2.4 Metrological Conditions

Weather conditions during the surveys were in line with the conditions described within ISO 1996, Acoustics 'Description and Measurements of Environmental Noise'. During the daytime survey, the weather was dry and overcast and a light westerly breeze (1.9 m/s), the air temperature was recorded at 8^{o}C.

2.5 Noise Parameters

Environmental noise parameters which were measured are defined below:

Table 2: Environmental Noise Parameters

Noise Parameter	Description
L_{Aeq}	*Is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value.*
L_{A10}	*Is the A-weighted sound level that is exceeded for 10% of the measurement period and is used to quantify road traffic noise.*
L_{A90}	*Is the A-weighted sound level that is exceeded for 90% of the measurement period and is used to quantify background noise level.*
A-weighting	*Is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of 2x10-5 Pa.*
Tonal Analysis	*One-third octave band tonal analysis involves the calculation of an averaged noise level to represent the frequencies within each third of an octave. These noise levels are then compared with the noise levels calculated for the adjacent one-third octave bands. The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands to be considered tonal:* • *15dB in low-frequency one-third-octave bands (25Hz to 125Hz);* • *8dB in middle-frequency bands (160Hz to 400Hz) and;* • *5dB in high-frequency bands (500Hz to 10,000Hz).*

Section 3 Legislative Framework

3.1 Provision of Cycle/Pedestrian Paths along Ardmore Road, Mullingar (Phase 3) WH/21/0003

Brief for the appointment of a consultant to carry out an Appropriate Assessment Screening and Construction Environmental Management Plan:

(ii) Noise

(a) The applicant shall ensure that activities at the site shall not give rise to noise levels off site which exceed the following sound pressure limits (Leq: 30 minutes) beyond the site boundary;

Day-time (8.00am to 8.00pm) 55dB(A) and Night-time (8.00pm to 8.00am) 45dB(A).

(b) Noise levels measured at noise sensitive locations in the vicinity of the site shall not exceed a level of 10dB(A) above existing noise levels during core working hours, and 5dB(A) at any other time.

(c) All noise measurements shall be carried out and assessed in accordance with Environmental Protection Agency Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). Noise sensitive locations shall be agreed in writing with Westmeath County Council. Prior to commencement of works, a baseline report shall be submitted for the approval of Westmeath County Council.

3.2 Guidance Note for Noise: Licence Applications, Surveys, and Assessments in Relation to Scheduled Activities (NG4)

The EPA's 2012 '*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*' sets out scope, content, and methodology for scheduled / licensed industrial and waste activities in Ireland.

In accordance with the NG4 guidance, it is necessary to designate the noise environment at each sensitive receptor location as a 'Quiet Area', a 'Low Background Noise Area' or 'Not an Area of Low Background Noise'.

To be categorised as a 'Quiet Area' the following criteria must be met:

- At least 3km from urban areas with a population > 1,000 people;
- At least 10km from any urban areas with a population >5,000 people;
- At least 15km from any urban areas with a population >10,000 people;
- At least 3km from any local industry;
- At least 10km from any major industry centre;
- At least 5km from any National Primary Route; and
- At least 7.5km from any motorway or dual carriageway.

If any of the above criteria are not met, then it is necessary to undertake a baseline noise survey of the existing daytime noise environments in order to establish whether the receptor is located in a 'Low Background Noise Area' or 'Not an Area of Low Background Noise'.

The noise criteria for these designations are shown in Table 3 below. For an area to be designated as an area of low background noise (LAF_{90}), the daytime, evening, and night-time noise limits must all be met.

Table 3: Noise Criteria for Area Designation

Designation	Day $L_{AF\ 90}$ dB	Evening $L_{AF\ 90}$ dB	Night $L_{AF\ 90}$ dB
Low Background Noise Area	≤40	≤35	≤30
Not an Area of Low Background Noise	≥41	≥35	≥31

The procedure outlined in the NG4 Guidance document then sets out a methodology to determine an acceptable noise limit at a receptor location. This noise limit is termed the noise rating level (or $L_{Ar,T}$) and includes, if necessary, a plus 5dB tonal penalty, or a plus 5dB impulsive penalty. If a noise source is both tonal and impulsive however, only one adjustment should be made.

In order to determine whether or not a 5dB tonal penalty should be applied, it is necessary to obtain third octave frequency data of the noise source in question.

The NG4 guidance states that:

'... the time average sound pressure level in the one-third-octave band of interest should exceed the time-average sound pressure levels of both adjacent one third- octave bands by some constant level difference'. 'The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:

- 15dB in low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in middle-frequency bands (160Hz to 400Hz); and
- 5dB in high-frequency bands (500Hz to 10,000Hz).'

In order to determine whether or not a 5dB impulsive penalty should be applied to a noise source, it is necessary to establish whether or not the noise in question may be 'described as something with a thumping, banging or impact noise that is clearly audible above everything else.'

The permitted rating noise level in each designated area is shown in Table 4 on the following page.

Table 4: Permitted Rating Noise Levels

Designation	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-Time Noise Criterion, dB $L_{Ar,T}$ (23:00 to 07:00hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey.
Areas of Low Background Noise	45.0	40.0	35.0
All other Areas	55.0	50.0	45.0

3.3 British Standard 5228: 2009+A1:2014

British Standard 5228-1:2009+A:2014 Noise and vibration control on construction and open sites, Part 1: Noise (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. It can be used to predict noise levels arising from the operations of proposed road construction work sites. BS5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment.

Noise levels generated by site operations and experienced at local receptors will depend upon a number of variables, the most significant of which are:

- The amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
- The periods of operation of the plant at the development site, known as the “on-time”;
- The distance between the noise source and the receptor, known as the “stand-off”;
- The attenuation due to ground absorption or barrier screening effects; and,
- Any reflections of noise due to the presence of hard vertical faces such as walls.

3.4 Guidelines for Noise Impact Assessment (IEMA)

The Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA) are generally recognised as established good practice standards for scope, content, and methodology of noise impact assessment.

These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. These guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. An example impact scale offered by the IEMA guidelines is shown in Table 5.

Table 5: Example Impact Scale from the Change in Sound Levels (IEMA)

Long Term Impact Classification	Short Term Impact Classification	Sound Level Change dB LpAeq (+ive or –ive) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥1 dB and < 3 dB
Minor	Moderate	≥3.0 dB and < 5 dB
Moderate	Major	≥5.0 dB and < 10 dB
Major		≥10.0

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. A 10dB change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

To determine the overall noise impact, the magnitude and sensitivity Noise Effects Descriptors are presented in Table 6.

Table 6: Noise Effects Descriptors (IEMA)

Very Substantial	Greater than 10 dB LAeq change in sound level perceived at a receptor of great sensitivity to noise.
Substantial	Greater than 5 dB LAeq change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB LAeq change in sound level at a receptor of great sensitivity to noise.
Moderate	A 3 to 4.9 dB LAeq change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB LAeq change in sound level at a receptor of some sensitivity.
Slight	A 3 to 2.9 dB LAeq change in a sound level at a receptor of some sensitivity.
None/Not Significant	Less than 2.9 dB LAeq change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development.

As recognised in the IEMA guidance, there are however many factors which affect people's perception and responses to noise. Magnitude of the impact and significance of the effects are presented in Appendix G.

Section 4 Noise Monitoring Results

4.1 Baseline Conditions at Noise Sensitive Locations

As part of the noise survey, 4No. NSL's were selected. The locations of the NSL's are illustrated on the map in Appendix B. The NSL's monitoring were undertaken for 2No. 30-minute sample periods during the day. The results from the NSL's are provided in Tables 7-10 below and the 1/3 Octave Band Analysis Results can be reviewed in Appendix D.

4.2 NSL1 Monitoring Results

The survey results for NSL 1 are summarised in Table 7 below.

Table 7: NSL1 Monitoring Results 9th February 2023

Monitoring Location	Monitoring Period	Tonal/ Impulsive	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$	$L(A)_{Max}$
NSL 1 E245199, N252416	10:50 -11:20	No	56.1	60.3	42.9	74.1
	12:35 – 13:05	No	55.9	60.4	40.6	69.7
	Arithmetic Average of L_{Aeq} (dB)				**56**	

The L_{Aeq} results were used at NSL1. During the daytime survey periods, the main sources of noise noted in the area were vehicles passing on the road, dogs barking and birds chirping. Daytime noise levels were in the range of 55.9 - 56.1dB $L_{Aeq.}$

4.3 NSL2 Monitoring Results

The survey results for NSL2 are summarised in Table 8 below.

Table 8: NSL2 Monitoring Results 9th February 2023

Monitoring Location	Monitoring Period	Tonal/ Impulsive	L(A)eq	L(A)10	L(A)90	$L(A)_{Max}$
NSL 2 E245617 N252490	11:28 – 11:58	No	61	64.6	46.6	83.1
	13:13 – 13:43	No	61.2	64.7	50.4	79.3
	Arithmetic Average of L_{Aeq} (dB)				**61.1**	

The L_{Aeq} results were used at NSL2. During the daytime survey periods, the main sources of noise noted were vehicles passing on the road and birds chirping. Daytime noise levels were in the range of 61 – 61.2dB $L_{Aeq.}$

4.4 NSL3 Monitoring Results

The survey results for NSL3 are summarised in Table 9 below.

Table 9: NSL3 Monitoring Results 9th February 2023

Monitoring Location	Monitoring Period	Tonal/ Impulsive	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$	$L(A)_{Max}$
NSL 3 E245737, N252572	12:01 -12:31	No	62.6	67.4	45.3	77.5
	13:49 – 14:19	No	62.6	67.5	47.6	75.6
	Arithmetic Average of L_{Aeq} (dB)				**62.6**	

The L_{Aeq} results were used at NSL3. During the daytime survey periods, the main sources of noise noted vehicles passing on the road and birds chirping. Daytime noise levels were at 62.6dB L_{Aeq} for both readings.

4.5 NSL4 Monitoring Results

The survey results for NSL4 are summarised in Table 10 below.

Table 10: NSL4 Monitoring Results 9th February 2023

Monitoring Location	Monitoring Period	Tonal/ Impulsive	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$	$L(A)_{Max}$
NSL 4 E245272, N252396	15:13 – 15:43	No	58.2	62.4	45.1	76.5
	15:43 – 16:13	No	58.6	62.8	45.3	74.2
	Arithmetic Average of L_{Aeq} (dB)				**58.4**	

The L_{Aeq} results were used at NSL4. During the daytime survey periods, the main sources of noise noted were vehicles passing on the road and birds chirping. Daytime noise levels were in the range of 58.2 – 58.6dB $L_{Aeq.}$

4.6 1/3 Octave

Upon reviewing the 1/3 Octave data gathered at the NSL's 1-4, data demonstrated that there were no tones detected.

Please revert to Appendix D which provides a visual overview of the 1/3 Octave Analysis at the 3No. noise sensitive locations.

4.7 Results Discussion

Noise results at NSL1, NSL2, NSL3 and NSL4 (after been rounded up or down to the nearest whole number) ranged between 41dB – 51dB LA_{90} which is greater than the noise criteria for area designation as set out in Table 4 (Noise Criteria for Area Designation).

Given that the daytime baseline noise levels at the 4No. selected NSL's were greater than 55dB LA_{eq}, it is unrealistic that the predicted noise levels when factoring in the construction activities will be below 55dB. Therefore, the proposed limits are less than 10dB above the recorded baseline levels.

Section 5 Predicted Impacts

The proposed project is to improve the cycling and pedestrian infrastructure along the Ardmore Road. Potential effects that could occur as a result of works from the proposed Project include:

- Excavation of soils and subsoils.
- Disposal of surplus soil off site to an authorised waste facility.
- Culvert drain.
- Importation, placement and compaction of hardcore (crushed stone).
- Installation of 50mm macadam surfacing.
- Ducting for and provision of public lighting.
- Tree removal.
- Plantings (new field boundaries will be marked with fencing and a compensatory hedge and tree line).

Initial works for the proposed project will involve the excavation of soils and subsoils and transportation offsite. A tracked excavator will be used to remove soils and artic lorries will be used to move materials offsite. Once soils are removed a drainage system will be installed and a hardcore surface will be placed on top. Hardcore will be imported to the site using artic lorries and will be compacted into place with a roller. A 50mm macadam surfacing will be lain on top of this using a paver and will be compacted using a steel wheeled roller. Although the definitive construction method and number of machines are not known at this stage, the following equipment are expected to be used during the construction process:

- Mini Road Planer
- Vibratory Roller 3T
- Asphalt paver (+ tipper lorry) 12T
- Tracked Excavator
- Road Lorry

The following assumptions are made with regards to the works carried out.

- As road lorries will be entering and exiting the site, it is assumed that they will be in operation for a maximum of two hours per day.
- All other machinery will be in operation for a maximum of six hours per day.
- Due to the length of the road, it is expected that noise sources will be an average of 50m from the NSL's over the course of the road construction works.

The predictions outlined in Table 11 have been made based on $LA_{eq8hour}$ value and this may be considered a worst-case scenario, as it assumes all plant and machinery will be running for 100% of the time, while in reality it is unlikely that all plant and machinery would be running simultaneously for any extended period at the site and therefore the noise levels would be expected to be lower. Prediction calculations for the daily site operations have been conducted generally in accordance with the British Standard 5228-1:2009+A1:2014.

Table 11: Predicted Total Daily Noise Exposure

Phase	Plant Item (BS 5228 Ref.)	L_{Aeq}	Duration of activity per day	Daily Exposure	Total Daily Exposure (10m)	Total Daily Exposure (50m)
All plant and machinery running simultaneously	Mini Road Planer	**68dB**	**6 hours**	**67dB**	**78dB**	**64dB**
	Vibratory Roller 3T	**67dB**	**6 hours**	**66dB**		
	Asphalt paver (+ tipper lorry) 18T	**75dB**	**6 hours**	**74dB**		
	Tracked Excavator	**74dB**	**6 hours**	**73dB**		
	Road Lorry 39T (Full)	**76dB**	**2 hours**	**70dB**		

Based on calculations shown on Table 11 above, the use of all plant equipment simultaneously gives an LA_{eq}8hour of 78dB at 10m from the noise source. However, assuming that noise sources will be an average of 50m from an NSL over the course of the road construction works, a total daily noise exposure of 64dB is predicted. This is less than 10dB above the current baseline noise levels at the various NSL's and therefore within the proposed daytime limits set out in the brief for each NSL. This is outlined in Table 12 below.

	NSL1	NSL 2	NSL3	NSL 4
Baseline Noise Levels	**56dB**	**61dB**	**63dB**	**58dB**
Total Predicted Daily Exposure (50m)	**64dB**	**64dB**	**64dB**	**64dB**
Difference	**8dB**	**3dB**	**1dB**	**6dB**
Short Term Impact Classification	**Moderate**	**Minor**	**Negligible**	**Moderate**

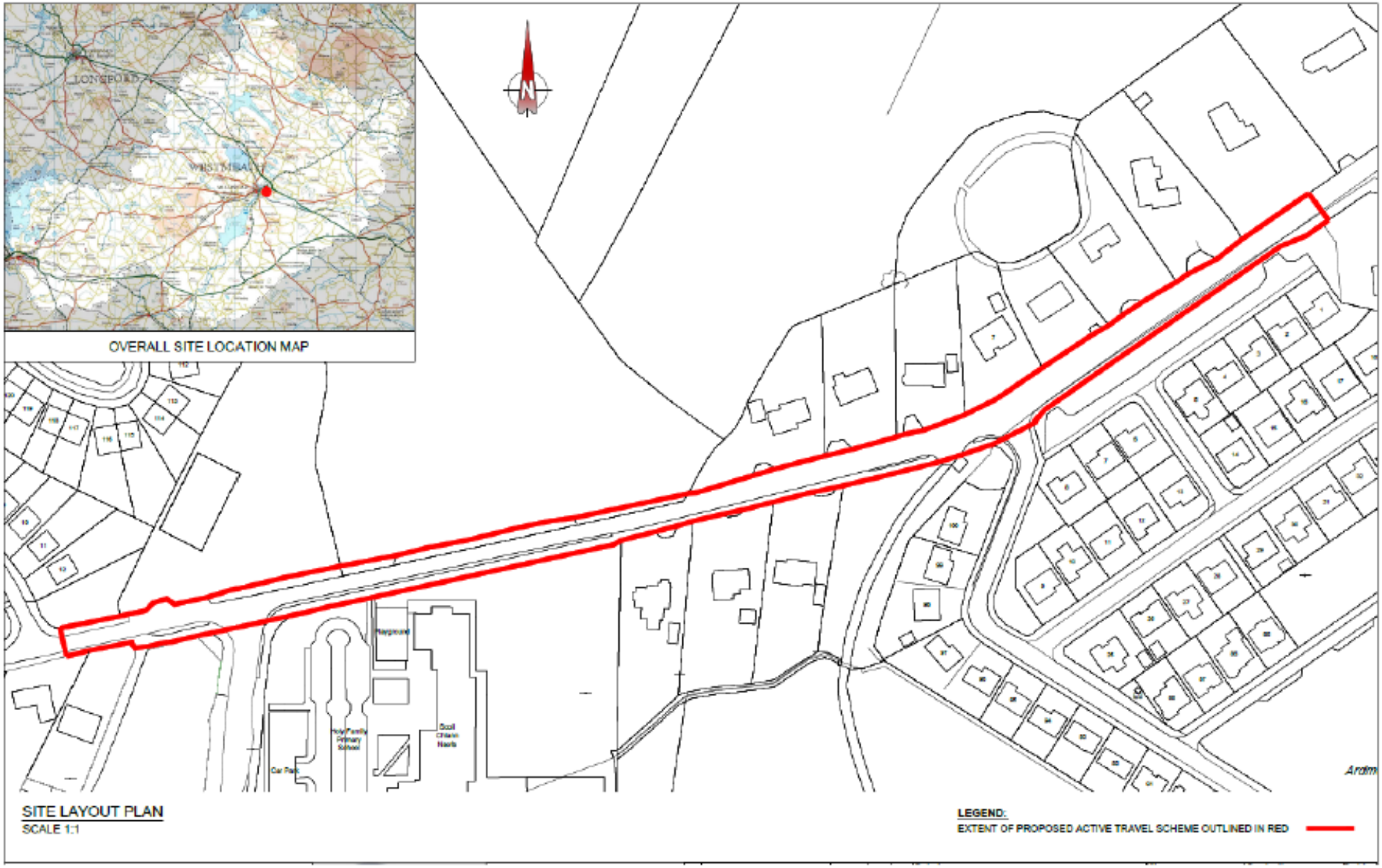
Section 6 Conclusion

This conclusion is Rowans professional opinion based on the baseline noise survey carried out at the at the site in Ardmore Road, Mullingar, Co. Westmeath on the 9th of February 2023.

Day noise measurements were recorded at 4No. NSL's. The daytime LA_{eq} recorded at NSL's ranged between 56dB – 62.2dB. The LA_{90} readings ranged between 40.6dB and 50.4dB. Table 11, demonstrates that when a worst-case scenario is implemented, when all plant equipment is in use, the noise levels at the NSL's are less than 10dB above the current baseline noise levels and are therefore compliant with the proposed noise limits for the area of 66dBL_{eq},T between 08:00 and 20:00hrs. The following recommendations are advised to mitigate noise levels during development:

- Please ensure that all site machinery and equipment are turned off when not in use.
- It is recommended to restrict the use of machinery to one machine at a time where possible.
- It is recommended to refrain from working at the same section of the road for a prolonged period of time to ensure that the noise burden is not prolonged in a single area.

Appendix A: Proposed Construction Area



Appendix B: Noise Monitoring Locations

Appendix C: Calibration Certificates

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Rowan Engineering Consultants Unit 14 Scurlockstown Business Park Co. Meath	SLM230174

Test Date: 12/01/2023
Procedure: TP-SLM-1

Equipment

Item Calibrated:	Sound Level Meter	**Model**	971
Make:	Svantek	**Serial Number:**	77617

Calibration Procedure

The sound level meter was allowed to stabilize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound level meter was calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2003).

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
Stanford Research DS360	123803

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

SONITUS SYSTEMS

Certificate of Calibration

Issued to:	Certificate Number
Rowan Engineering Consultants Unit 14 Scurlockstown Business Park Co. Meath	AC230175

Test Date: 12/01/2023
Procedure: TP-ACOCAL-1

Equipment Information

Item Calibrated:	Acoustic Calibrator	**Model:**	SV33A
Make:	Svantek	**Serial Number:**	79912

Calibration Procedure

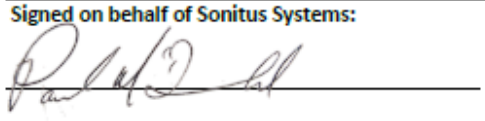
The above calibrator was verified in line with the requirements of BS EN 60942:2003. The calibrator was allowed to stablize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound pressure level in the cavity (half-inch) was measured. The operating frequency and signal distortion were also measured.

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	148F7F9
GRAS 42AA Pistonphone	227947
GRAS 46A0 Pressure Field Microphone	228216

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:



Appendix D: 1/3 Octave Band Analysis Results

Date: 09/02/2023	NSL1 Day	NSL1 Day	NSL2 Day	NSL2 Day	NSL3 Day	NSL3 Day	NSL4 Day	NSL4 Day
Time:	10:50 -11:20	12:35 – 13:05	11:28 – 11:58	13:13 – 13:43	12:01 -12:31	13:49 – 14:19	15:13 – 15:43	15:43 – 16:13
Frequency [Hz]	LAeq [dB]	LAeq [dB]	LAeq [dB]	LAeq [dB]	LAeq [dB]	LAeq [dB]	LAeq [dB]	LAeq [dB]
25	10.7	13.1	14.9	18.4	14.3	18.2	11.4	10.5
31.5	14.9	18.6	19.7	21.8	17.3	20.8	17.3	16.5
40	21.5	23.1	27.7	27.2	22.3	25.8	25.2	24.7
50	29.7	29.7	31.5	33.0	29.0	30.1	30.0	29.6
63	32.7	32.1	34.5	36.6	32.8	33.6	32.1	32.4
80	31.7	32.0	35.1	38.4	33.0	32.6	30.2	32.1
100	34.2	32.5	37.4	41.3	32.6	33.3	32.7	33.3
125	34.9	33.9	38.9	39.4	34.4	35.9	34.6	34.2
160	36.0	35.5	38.8	39.1	37.0	37.9	36.0	36.0
200	37.8	38.1	41.2	40.7	39.4	40.2	38.1	38.3
250	39.5	39.2	43.3	42.8	41.5	42.6	40.0	40.6
315	39.9	39.3	43.8	43.2	42.6	43.5	41.1	41.7
400	40.9	40.6	44.1	44.1	44.9	45.9	42.7	43.7
500	42.0	42.1	46.1	46.0	48.4	49.0	45.1	46.0
630	45.6	45.0	48.8	48.9	51.3	51.7	47.3	47.9
800	47.6	48.1	51.9	52.3	54.8	55.0	49.9	50.3
1,000	49.3	49.6	52.1	53.3	55.7	55.6	50.8	51.1
1,250	48.7	48.5	52.0	52.9	54.1	54.1	49.3	49.6
1,600	46.5	46.3	53.1	53.7	54.3	53.9	49.7	50.0
2,000	43.1	42.6	51.0	51.6	52.9	52.2	47.9	48.1
2,500	39.4	38.2	49.0	48.5	49.1	48.7	44.9	45.0
3,150	37.6	34.9	49.8	45.8	46.3	46.6	42.8	42.9
4,000	40.1	32.2	44.9	43.5	43.1	42.6	39.6	41.7
5,000	37.4	28.9	42.5	40.0	38.9	39.1	36.4	36.3
6,300	33.1	24.3	40.2	38.0	35.6	36.0	34.8	34.8
8,000	30.2	20.6	35.1	36.0	31.7	32.4	31.4	35.7
10,000	20.5	12.4	30.0	29.1	27.1	27.6	27.2	37.8

Appendix E: Glossary of Terms

Ambient Noise The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

Background Noise The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T $_{(LAF90,T)}$.

A-Weighting A frequency weighting applied to measured or predicted sound levels in order to compensate for the non-linearity of human hearing.

Broadband Sounds that contain energy distributed across a wide range of frequencies.

dB (Decibel) The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).

Hertz (Hz) The unit of sound frequency in cycles per second.

Impulsive Noise A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

L_{10} The noise level exceeded for just 10% of a sample period. $L_{10(1hour)}$ is therefore the noise level exceeded for 10% of the time over a period of one hour. $L_{10(18hour)}$ is the arithmetic average of the eighteen $L_{10(1hour)}$ values between 06:00 and 24:00hrs.

L_{90} The noise level exceeded for 90% of a sample period; typically used as a descriptor for background noise level.

L_{max} The instantaneous maximum sound level measured during a sample period.

$L_{Aeq,T}$ This 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 (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFmax} Is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).

L_{AF90} Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

Noise Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

NSL Noise Sensitive Location - Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

Octave Band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

PPV Peak Particle Velocity (PPV) expressed in millimetres per second (mm/s) is a vibration indicator used for the purposes of assessing potential annoyance to humans or damage to buildings.

Tonal Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

1/3 Octave Analysis Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

The "A" suffix denotes that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

An "F" suffix would denote that the parameter has been measured with 'Fast' time-weighting applied.

A "T" suffix would denote within a specified time interval.

Appendix F: Fundamentals of Acoustics

This appendix is intended to provide a brief overview of the fundamentals of acoustics and to offer a broad understanding of some of the technical discussion in this noise assessment. This section is not intended to give a complete description of all of the quantities used in acoustics and noise control.

Sound pressure is the small variation above and below atmospheric pressure created by the passage of a sound wave; this is what most people think of as noise. The human ear is a very sensitive anatomical organ and can detect a wide range of fluctuations in pressure levels, from the quietest whisper to a jet engine take off. In order to represent this range of detectable pressure changes in a more efficient manner, sound is typically measured in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The sound pressure as measured by a microphone varies in time and can also be described in terms of the frequency of the sound. The ear has different sensitivities to sounds of different frequencies, and a frequency weighting is often applied to the signal to make it more representative of the sound perceived by a listener.

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). Human hearing is less sensitive at very low and very high frequencies, that is to say it is not uniform across the sound spectrum. In order to account for this weighting, filters are commonly applied when measuring and/or assessing sound. The most common frequency weighting in current use is ‘A-weighting’, which is applied to instrument-measured sound levels in an effort to account for the relative loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies. SPL’s measured using ‘A-weighting’ are expressed as LpA (dB). The ‘A’ subscript denotes that the sound levels have been A-weighted.

In terms of sound pressure levels, audible sound ranges from 0dB (i.e. the threshold of hearing) to the threshold of pain at 120dB. A doubling/halving of pressure equates to a 3dB increase/decrease in decibel level. Typically, under normal circumstances, a 3dB change in environmental noise level is the smallest noticeable to the human ear. A 10dB increase/decrease in sound level normally equates to a subjective doubling/halving of noise.

An indication of the level of some common sounds on the LpA (dB) scale is presented in Figure A5.2.1 below.

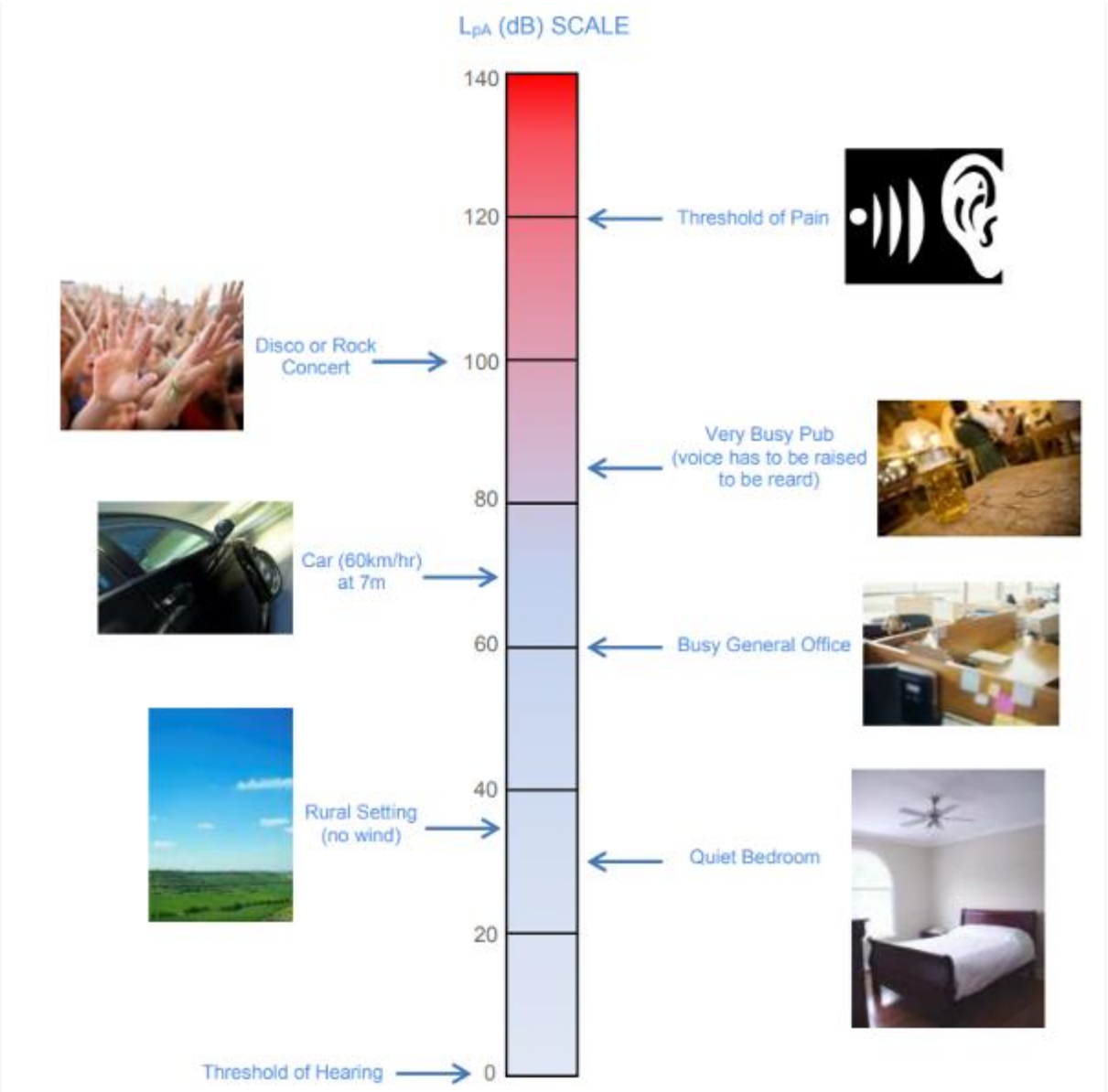


Figure A5.2.1: dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)

Appendix G: Generic Relationship between Noise Impact and Noise Effect

GENERIC RELATIONSHIP BETWEEN NOISE IMPACT (MAGNITUDE) AND NOISE EFFECT (MAGNITUDE + SENSITIVITY), INCLUDING THE EVALUATION OF EFFECT SIGNIFICANCE

MAGNITUDE (Nature of Impact)		DESCRIPTION OF EFFECT (on a specific sensitive receptor)	SIGNIFICANCE (as required within EIA)
Substantial	BENEFICIAL	**Receptor perception = Marked change** Causes a material change in behaviour and/or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) Less Likely to be Significant
Moderate	BENEFICIAL	**Receptor perception = Noticeable improvement** Improved noise climate resulting in small changes in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight	BENEFICIAL	**Receptor perception = Just noticeable improvement** Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	
Negligible		N/A = No discernible effect on the receptor	**Not Significant**
Slight	ADVERSE	**Receptor perception = Non-intrusive** Noise impact can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) More Likely to be Significant
Moderate	ADVERSE	**Receptor perception = Intrusive** Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance[81]. Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial	ADVERSE	**Receptor perception = Disruptive** Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	
Severe	ADVERSE	**Receptor perception = Physically Harmful** Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Significant

81. Further information on the effects of noise on sleep can be found in the World Health Organization's Guidelines on Community Noise (WHO, 1999) and Night Noise Guidelines for Europe (WHO, 2009).