

Chapter 13:

Summary of EIAR Mitigation and Monitoring Measures

13.0 SUMMARY OF EIAR MITIGATION & MONITORING MEASURES

13.1 INTRODUCTION

The central purpose of EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. This chapter of the EIAR document has been prepared by **John Spain Associates** and sets out a summary, for ease of reference, of the range of methods described within the individual chapters of this EIAR document which are proposed as mitigation and for monitoring during the construction and operational phases of the proposed development. It is intended that this chapter of the EIAR document will provide a useful and convenient summary to the competent/consent authority of the range of mitigation and monitoring measures proposed.

EIA related conditions are normally imposed by the competent/consent authority as part of conditions of planning consent and form a key part of the Impact Anticipation and Avoidance strategy. Conditions are principally used to ensure that undertakings to mitigate are secured by explicitly stating the location, quality, character, duration and timing of the measures to be implemented. A secondary role of EIA related conditions is to ensure that resources e.g. bonds / insurances will be available and properly directed for mitigation, monitoring or remedial action, in the event that the impacts exceed the predicted levels.

Monitoring of the effectiveness of mitigation measures put forward in the EIAR document, both by the competent authorities and the developer, is also an integral part of the process. Monitoring of environmental media and indicators arise either from undertakings or from conditions.

In the case of mitigation and monitoring measures it is important for all parties to be aware of the administrative, technical, legal and financial burdens that can accompany the measures proposed. It is also important to ensure that, where monitoring is provided for, it is clearly related to thresholds, which if exceeded cause a clearly defined set of actions to be implemented.

The 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government state:

“While not a mandatory requirement an EIAR can very usefully include a summary table of features and/or measures envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects of the proposed development, and a timescale for the implementation of proposed mitigation measures.”

Given the complexity of the scheme in question, and the detail provided within this EIAR, this chapter seeks to provide a complete overview of mitigation and monitoring measures proposed, in the spirit of the above statement within the EIA Guidelines albeit not formatted as a table.

13.2 MITIGATION STRATEGIES

13.2.1 Introduction

There are three established strategies for impact mitigation - avoidance, reduction and remedy. The efficacy of each is directly dependent on the stage in the design process at which environmental considerations are taken into account (i.e. impact avoidance can only be considered at the earliest stage, while remedy may be the only option available to fully designed projects).

13.2.2 Mitigation by Avoidance

Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and consideration of alternatives have been taken into account at the earliest stage in the project design processes. The consideration of alternatives with respect to the development of the subject lands has been described in Chapter 2.

13.2.3 Mitigation by Reduction

This is a common strategy for dealing with effects which cannot be avoided. It concentrates on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the "*end of pipe*" approach because it does not seek to affect the source of the problems (as do avoidance strategies above). As such this is regarded as a less sustainable, though still effective, approach.

13.2.4 Reducing the Effect

This strategy seeks to intercept emissions, effects and wastes before they enter the environment. It monitors and controls them so that acceptable standards are not exceeded. Examples include wastewater treatment, filtration of air emissions and noise attenuation measures.

13.2.5 Reducing Exposure to the Impact

This strategy is used for impacts which occur over an extensive and undefined area. Such impacts may include noise, visual impacts or exposure to hazard. The mitigation is effected by installing barriers between the location(s) of likely receptors and source of the impact (e.g. sound barriers, tree screens or security fences).

13.2.6 Mitigation by Remedy

This is a strategy used for dealing with residual impacts which cannot be prevented from entering the environment and causing adverse effects. Remedy serves to improve adverse conditions which exist by carrying out further works which seek to restore the environment to an approximation of its previous condition or a new equilibrium.

13.3 MITIGATION AND MONITORING MEASURES

The following provides a list, for ease of reference, of the mitigation and monitoring measures recommended in each chapter of the EIAR.

13.3.1 Project Description & Alternatives Examined

Construction Phase

PD&AE CONST 1: It will be necessary for the appointed contractor to prepare and implement a construction management plan (including traffic management) to reduce the impacts of the construction phase on local residents and ensure the local road network is not adversely affected during the course of the construction project.

PD&AE CONST 2: The appointed contractor should prepare a Construction and Operational Waste Management Plan for the proposed development as part of their contractual responsibilities. The Waste Management Plan should meet the requirements of the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects.

Operational Phase

Not applicable.

Monitoring

Not applicable.

13.3.2 Population and Human Health

Construction Phase

POP & HH CONST 1: In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction and Environmental Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

Operational Phase

Not applicable.

Monitoring

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in regards to the other environmental topics such as water, air quality and climate and noise etc. sufficiently address monitoring requirements.

13.3.3 Archaeology and Cultural Heritage

Construction Phase

CH PRE-CONST 1: It is acknowledged that preservation *in-situ* of archaeological sites is the preferable option. However given the difficulties of redesigning the layout of the development, coupled with the truncated nature of the archaeological remains, preservation by record of the features in AA1–6 is recognised as an acceptable form of archaeological mitigation in this instance. This will be carried out by a licence-eligible archaeologist in consultation with the National Monuments Service of the DoCHG. Full provision will be made available for the resolution of any archaeological remains, both on site and during the post excavation process, should that be deemed the appropriate manner in which to proceed.

CH PRE-CONST 2: A buffer of 10m surrounding the remains has been set out on Figure 4.5 and 4.6 and these areas are considered to be the minimum excavation areas. No groundworks or construction works will be carried out within these area without prior consultation with the project archaeologist.

CH PRE-CONST 3: All topsoil stripping and ground disturbances associated with the proposed development will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

Operational Phase

N/A

Monitoring

The mitigation measures recommended above, including the monitoring of works by qualified archaeologists would support effective monitoring during construction to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

No monitoring is required during the post-development phase of works

13.3.4 Biodiversity

Construction Phase

BIO CONST 1: Habitat Loss – mitigation by reduction and compensation

The extent of hedgerow and treeline loss has been minimised to the greatest degree possible. In total, 640m of field boundary is to be retained, equating to 27% of the total.

To compensate for the loss of habitat a new, native hedgerow, of approximately 700m in length will be planted along the northern and western boundary. A large number of new trees, of a variety of species, are also to be planted. The amenity open space will include a native meadow area, which will be flower rich, and planted with Irish-grown seed. While these measures will not compensate entirely for the loss of high value field boundaries, they will reduce the severity of the impact from 'moderate negative' to 'minor negative'.

BIO CONST 2: Mortality to animals during construction – mitigation by avoidance

2a. The removal of hedgerow, treeline or scrub vegetation should not take place from March to August inclusive as per the Wildlife Act.

2b. Trees which are to be removed, should be felled during the autumn months of September, October or November (and so avoiding periods when the bats are most active).

BIO CONST 3: Pollution during construction – mitigation by reduction

A Construction Method Statement should be prepared, and which should include pollution prevention measures in accordance with best practice guidelines from Inland Fisheries Ireland (2016). This should identify the location of the site compound, storage areas for potentially polluting substances, and specific measures to prevent the loss of silt-laden water to any water course. Culverting of the drainage ditch should be undertaken 'in the dry' to avoid the excessive loss of sediment during this phase.

Operational Phase

BIO OPER 1: Tree damage – mitigation by avoidance

To avoid damage to trees the developer should follow the guidance from the National Roads Authority in establishing root protection areas (RPA) along hedgerows to be retained.

The NRA gives the following equation for calculating the root protection area (RPA) (NRA, unknown year):

$$RPA(m^2) = \pi(\text{stem diameter mm} / 1,000)^2 \times 2$$

The RPA gives the area around which there should be no disturbance or compaction of soil. This will be calculated for the largest tree within each hedgerow. Prior to construction this area will be clearly labelled 'sensitive ecological zone', fenced off with durable materials and instruction given to construction personnel not to disturb this buffer zone. As a rule of thumb this buffer zone should extend at least to the canopy of the trees concerned.

Monitoring

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant.

Construction Phase

The mitigation measures are considered to be standard measures and come with a high level of confidence with regard to their success. Further monitoring is not required.

Operation Phase

No monitoring is required during the operation phase.

13.3.5 Landscape and Visual Impact

Design Phase

L&V Des 1

The development lands slope down from north to south and there would be potential visual impacts from the R147 and from the residents of early phases of the Willows development to the south. The taller elements of the scheme have been restricted to the lowest site elevations to reduce their visual impact on the surrounding landscape.

L&V Des 2

There are glimpse views through the existing mature hedgerow into the site from the Dunshaughlin Business Park to the west. There are also views of the site from the Maelduin Estate particularly from the rear second floor windows. A landscape strip of up to 16M width along this boundary has been included in the Landscape Masterplan with a visually strong landscape strip (See Doyle O'Troithigh Drawing LP-01-PP to LP-05-PP) which will include the retention of the existing boundary hedgerow with mature trees and the planting of a significant number native species trees and hedgerows in this area to provide screening for affected receptors to the west of the site (See Photomontage 5).

L&V Des 3

The northern part of the site is partially open to views from the Coldrick's Pass / Kellett's Grove Estates (See Photomontages 6, 7 & 8). It is proposed to provide separation between this estate boundary and the development and create a landscaped area with suitable tree, native species hedgerow and shrub planting (See Doyle O'Troithigh Landscape Layout Proposals Fig. 6.3.2). It is also proposed to create a pedestrian / cycleway link between the development and Kellett's Grove Estate.

L&V Des 4

There is no visible housing to the east of the site and the nearest housing is separated from the site by intervening mature hedgerows and open farmland. The taller elements of the development are located on the eastern side which will reduce the visual impact to the existing residential areas associated with Dunshaughlin to the west and southwest and minimal visual impact to views from the east. (See Photomontage No. 10).

Landscape proposals for the eastern section of the site bounding the proposed Outer Relief Road include a separation between the development and the roadway which will contain landscaped open space with extensive tree, shrub and hedgerow planting (See Doyle O'Troithigh Masterplan No. LP-01-PP and CGI No. 14).

Construction and Operational Phases

N/A

Monitoring

The retained hedgerows will be monitored by the project arborist for the duration of the construction period and will advise on maintenance and management over this period. Similarly with the landscape, construction and subsequent planting will be monitored by the consultant Landscape Architect during the landscape defects period. Ongoing landscape maintenance of all the site's planting as part of the development plans will ensure the planting will provide screening into the future.

13.3.6 Land and Soils

Construction Phase

L&S CONST 1

- A construction and environmental management plan is to be implemented prior to construction. The plan must be agreed with the local authority prior to development.
- Topsoil and subsoil to be stockpiled temporarily during construction.
- Reduced soil levels should be infilled with the required construction materials in a timely manner to reduce erosion risk.
- Stockpiled soil mounds, should be kept a minimum distance of 20m from any ditch drain to reduce the risk of contaminated runoff entering the stream networks. On completion of works, any excess soil must either be landscaped into the development or removed off-site.
- The storm water drainage system must include petrol interceptors to minimise the risk of contamination of the receiving water and soils.
- Dust control measures are required and are to be included in the construction and environmental management plan. Measures to prevent and reduce dust, by covering or wetting stockpiles, must be included to greatly reduce the effect of dust. Personal Protective Equipment must be worn by workers in areas susceptible to dust to reduce exposure.
- Control measures to ensure continuous monitoring in relation to spillages of hazardous substances, fuels, oils must be detailed in the construction and environmental management plan including remedial actions in the event of spillages of hazardous substances, fuels, oils & grease during the construction phase of works.
- Fuels, Oils, Chemicals, Hazardous Substances, etc., must be stored in a suitably designated, bunded area to reduce the potential extent of contamination should accidental spillages occur.
- A detailed Site Investigation for each future phase of the development should be carried out.

Operational

L&S Operat 1:

- The drainage design for surface water run-off is to include a mechanism for removal of pollutants i.e. by way of oil interceptor or suitable treatment within a sustainable urban drainage system per Greater Dublin Strategic Drainage Study CIRIA guidance.

Monitoring

Execution of the construction and environmental management plan during the construction phase is to be monitored by the Construction Supervisor to local authority requirements.

Monitoring is to include:

- Dust management and monitoring
- Storage of hazardous materials
- Remove and importing of soil material.

13.3.7 Water

Construction Phase

W CONST 1

- Groundwater levels are to be monitored prior to construction at the proposed locations of attenuation devices. The attenuation devices proposed are Concrete Tanks. A water tight tank system is required to prevent groundwater entering the drainage network.
- A construction and environmental management plan is to be implemented prior to construction. The plan must be agreed with the local authority prior to development.
- Concrete mixing facilities should be located on an impermeable surface in a designated area.
- The ditch drain flowing into the site from the business park to the west must be diverted as specified by Joseph O'Reilly Consulting Engineers, drainage proposals.
- Stockpiled soil mounds should be kept a minimum distance of 20m from any ditch drain to reduce to the risk of contaminated runoff entering the stream networks. On completion of works, any excess soil must either be landscaped into the development or removed off-site.
- Control measures to ensure continuous monitoring in relation to spillages of hazardous substances, fuels, oils must be detailed in the construction and environmental management plan including remedial actions in the event of spillages of hazardous substances, fuels, oils & grease during the construction phase of works.
- Fuels, Oils, Chemicals, Hazardous Substances, etc., must be stored in a suitably designated, bunded area to reduce the potential extent of contamination should accidental spillages occur.
- 'Wheel Wash' systems must be provided for vehicles to reduce quantities of soil deposits on the local road network.
- The storm water drainage system is to be constructed as designed in accordance with Sustainable Urban Drainage System principles and as per Greater Dublin Strategic Drainage Study (GDSDS) guidelines. The greenfield runoff rates must not be exceeded. The proposed design includes for attenuation of surface water and petrol interceptors, reducing potential contaminants from entering the receiving environment. The construction of the drainage system as per Joseph O'Reilly Consulting Engineer's design, is integral to mitigating the risk of surface water flooding and poor water quality entering the receiving environment.

Operational

W OPER 1

- An operation and maintenance manual should be provided by the contractor upon completion of the construction phase.
- The operation and maintenance manual should detail all operational and maintenance aspects of the foul water and surface water drainage systems and is to be agreed with Meath County Council prior to its

implementation. This includes inspecting and maintaining the petrol interceptors, Hydrobrakes, attenuation devices, etc.

- Ensure all mitigation measures in the Site-Specific Flood Risk Assessment are implemented.
- Connection to the foul sewer will be gradual over-time. Capacity of Irish Water's wastewater treatment plant to accept the loading from the development must be assessed on an ongoing basis through-out the construction of the development. Connections must be agreed with Irish Water prior to connecting to the foul sewer network.

Monitoring

- Surface water drainage works should be overseen by Meath County Council relative departments.
- Foul sewer construction works will be monitored by Irish Water connections department.
- Water supply construction works will be monitored by Irish Water connections department.
- Execution of the construction and environmental management plan during the construction phase must be monitored by the local authority.
- Execution of the operation and maintenance requirement outlined in the operation and maintenance manual for the development must be monitored by the local authority.

13.3.8 Air Quality & Climate

Construction Phase

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.

- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM₁₀ are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the southern, western and north-western site boundaries to minimise fugitive windblown dust emissions falling on existing residential areas and the Dunshaughlin Business Park.

Operational

AQ OP1 : Climate Impact Mitigation Measures

Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.

All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be “Nearly Zero Energy Buildings” (NZEB’s) by 31st December 2020, where applicable.

In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:

- Passive solar design including the orientation, location and sizing of windows
- The use of green building materials: low embodied energy & recycled materials
- Energy efficient window units and frames with certified thermal and acoustic insulation properties
- Building envelope air tightness
- Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
- Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating in all units
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Mobility management measures which support use of sustainable transport modes, supported by the developments proximity of Bus Eireann and private bus operator’s commuter services on the R147 Dublin Road and proximity of Iarnrod Eireann’s park and ride facility at Pace, Clonee train station
- Provision of open landscaped areas, pedestrian and cycle routes to encourage residents to avail of healthy lifestyle options

Monitoring

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust and construction vehicle exhaust emissions as NO₂ generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and the Dunshaughlin Business Park bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter. The proposed monitoring locations (D1 – D4) are presented below in Figure 9.4.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m²-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m²-day (measured as per German Standard Method VDI 2119 – *Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic*. is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m²-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to Meath County Council.

NO₂ Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1 year period at the baseline air quality locations, A1 & A2. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO₂ in the ambient air to allow for the assessment of measured NO₂ levels against levels measured in EPA Zone D areas over a similar period. NO₂ levels shall also be assessed against the annual limit value NO₂ as defined in National Air Quality Standards Regulations 2011

(S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m³, for the protection of human health, over a calendar year.

13.3.9 Noise & Vibration

Construction Phase

NV CONST 1 Noise Mitigation Measures

- An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site specific *Construction Phase Noise Management Plan*. The Plan shall include all relevant noise and vibration control measures as specified in this Chapter of the EIAR. The Plan shall be submitted to Meath County Council for approval as required.
- The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.
- A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint.
- Appropriate signage shall be erected on all access roads in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.
- HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.
- The hours of operation for the site shall be limited to the following hours:
07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays
- All onsite generator units (if required) used to supply electricity to the site shall be silenced models or enclosed and located away from any receptor.
- The site compound shall be located at a point on site furthest away from any residential development.
- Mains power shall be used to supply electricity to all site offices and site lighting at the earliest instance.
- The use of generators during the nighttime shall be avoided.

NV CONST 2 Construction Works Noise Mitigation Measures

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- The Developer shall appoint an acoustic consultant independent of the Contractor to conduct routine noise audit surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria

detailed in this document and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.

- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.
- Acoustic screens 3m high shall be erected along the southern aspect of the site on the commencement of any site works in this area where the existing Willow's residential houses are located.
- Acoustic screens 3m high shall be erected along the western and north western site boundaries of the site on the commencement of any site works in this area where the existing Maelduin, Coldrick's Pass and Kellett's Grove residential estates are located.
- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.
- Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order
- Where noisy plant is required to operate in works areas next to residential houses low noise noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
- Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be "sound reduced" or "super silent" models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
- Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.

- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.
- Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.
- All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.
- Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
- Excessive revving of all vehicles shall be avoided.
- Unnecessary dropping of heavy items onto ground surfaces shall be banned.
- The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.
- The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.
- The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.
- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events.
- In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Meath County Council shall be immediately notified prior to the works commencing.
- A nominated person from the Project Management team will be appointed to liaise with and inform local residents and Meath County Council regarding out of hours works.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

NV CONST 3 Vibration Mitigation Measures

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day

- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.
- In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, structural vibration monitoring shall be conducted during the course of the project works if required.
- It is proposed that vibration monitoring will be conducted at adjacent properties (The Willows, Maelduin, Coldrick's Pass and Kellett's Grove estates) as required using calibrated vibration monitors and geophones and that audible and visual alarm units may be installed to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.
- As detailed in Section 10.2.2 the transient vibration guide values for cosmetic damage as specified in British Standard BS 7385: Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz. This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

N V CONST 4 : In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 10.9 of the EIA Report.

Operational

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focussed on this building element to ensure that their insulation is adequate. All apartments shall have external windows shall have acoustically rated windows to prevent breakthrough of external noise. In addition, Heat Recovery and Mechanical Ventilation systems will be incorporated into the design thus there will be no requirement for passive air vents. All houses shall have acoustically rated double glazed windows.

Acoustic Design requirements for residential buildings

Windows

In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_w):

40dB R_w for Living rooms & Bedrooms

37dB R_w for Kitchen – Dining Rooms.

The acoustic performance specifications detailed are the minimum requirements which shall apply to the overall glazing system when installed on site. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc. All exterior wall and door frames should be sealed tight to the exterior wall construction.

Ventilation Systems

The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

Wall Constructions

The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB R_w .

Roof Construction

The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 40dB R_w should be used for roof spaces. This can nominally be achieved using tiled pitched roof with 100mm acoustic insulation and 15mm soundbloc plasterboard ceiling.

Monitoring

Proposed Noise Monitoring Programme During Site Construction

On commencement of the site construction activities, routine noise monitoring shall be conducted in the vicinity of the site to assess the impact that site activities may have on local external noise levels and on ambient noise levels on local receptors.

It is proposed to conduct quarterly noise monitoring surveys to establish the noise impacts of site activities at the closest receptors to the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2016: Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*. The measurement parameters to be recorded include wind speed, temperature, L_{Aeq} , L_{A90} , L_{A10} and L_{Amax} and 1/3 Octave Frequency analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at residential noise sensitive receptors adjacent to the site boundaries and as identified in the baseline noise assessment.

Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries as required using calibrated vibration monitors and geophones and that audible and visual alarm units may be installed to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in British Standard *BS 7385: Evaluation and measurement for vibration in buildings, Part 1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings* and *Part 2 1993 Guide to damage levels arising from ground borne vibration*. This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

Proposed Noise Monitoring Programme During Site Construction

On commencement of the site construction activities, routine noise monitoring shall be conducted in the vicinity of the site to assess the impact that site activities may have on local external noise levels and on ambient noise levels on local receptors.

It is proposed to conduct quarterly noise monitoring surveys to establish the noise impacts of site activities at the closest receptors to the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

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Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at residential noise sensitive receptors adjacent to the site boundaries and as identified in the baseline noise assessment.

13.3.10 Material Assets

Construction Phase

MA CONST 1: The proposed development should comply with the provisions of the Construction and Operational Waste Management Plan with respect to construction waste.

MA CONST 2: A construction and environmental management plan, including traffic management, should be implemented by the contractor for the construction stage to protect local amenities and the integrity and operation of the local road network during the construction phase.

MA CONST 3: Provision of utilities should be carried out in accordance with the recommendations of the relevant statutory bodies (ESB, Gas Networks Ireland, Irish Water, EIR / Virgin, MCC etc.)

MA CONST 4: Water Metering should be included in each unit to record consumption.

Operational Phase

Not applicable.

Monitoring

Monitoring measures will be in accordance with provisions outlined elsewhere in this EIAR document.