



Preliminary Construction, Demolition and Waste Management Plan

Mixed-use Development at Mooretown Stage 3, Swords, Co. Dublin

April 2022

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Client Name: Gerard Gannon Properties
Document Reference: 21-011r.005 Preliminary Construction, Demolition and Waste Management Plan
Project Number: 21-011

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015)

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1. Introduction

Waterman Moylan in conjunction with the Developer have prepared the following Preliminary Construction, Demolition & Waste Management Plan which is to accompany the planning application for the implementation of the construction of the mixed-use development at Mooretown Phase 3, Swords, Co. Dublin.

The plan sets out typical arrangements and measures which may be undertaken during the construction phase of the project in order to mitigate and minimise disruption / disturbance to the area around the site. The purpose of this report is to summarise the possible impacts and measures to be implemented and to guide the Contractor who will be required to develop and implement the Preliminary Construction, Demolition & Waste Management Plan on site.

This management plan is indicative only and should not be construed as representing the exact method or sequence in which the construction works shall be carried out.

As is normal practice, the Main Contractor for the project is responsible for the method in which the construction works are carried out and to ensure that best practices and all legal obligations including Local Authority requirements and Health and Safety legislation are complied with. The main contractor is also responsible for the design and installation of all temporary works required to complete the permanent works. The plan can be used by the Main Contractor to develop their final construction management plan. The Applicant reserves the right to deviate from the contents of this Report as the construction of the development progresses on-site. Any such deviation from this report however shall still comply with all relevant Local Authority requirements and legislation.

2. Surrounding Environs and the Proposed Site

The Phase 3 site is located at Mooretown, Swords, Co. Dublin, just south of the Rathbeale Road, as shown in *Figure 1* below, and is part of the Oldtown-Mooretown LAP lands as shown in *Figure 2* overleaf.

The site is currently agricultural land (tillage), approximately 18.378 ha in area and is located 2km west of Swords town centre.

The subject site is bounded to the east, west and partially to the south by agricultural land. Also, to the south is the Abbeyvale residential development. To the north is the completed Mooretown School Campus, and future Mooretown Phase 2 (granted planning reference: F16A/0505).

The Mooretown School Access Road has been constructed, and completed, under planning reference number: F14A/0012. The northern portion of the Mooretown Distributor Road from the Rathbeale Road has been constructed under planning reference number F12A/0270. The Mooretown Distributor Road Extension as shown with a blue boundary in *Figure 1* below, has received decision to grant of planning permission, and has an application reference number of: F20A/0096. We also refer you to site layout drawing P1000 accompanying this report.



Figure 1 | Site Location (Source: Google Earth)

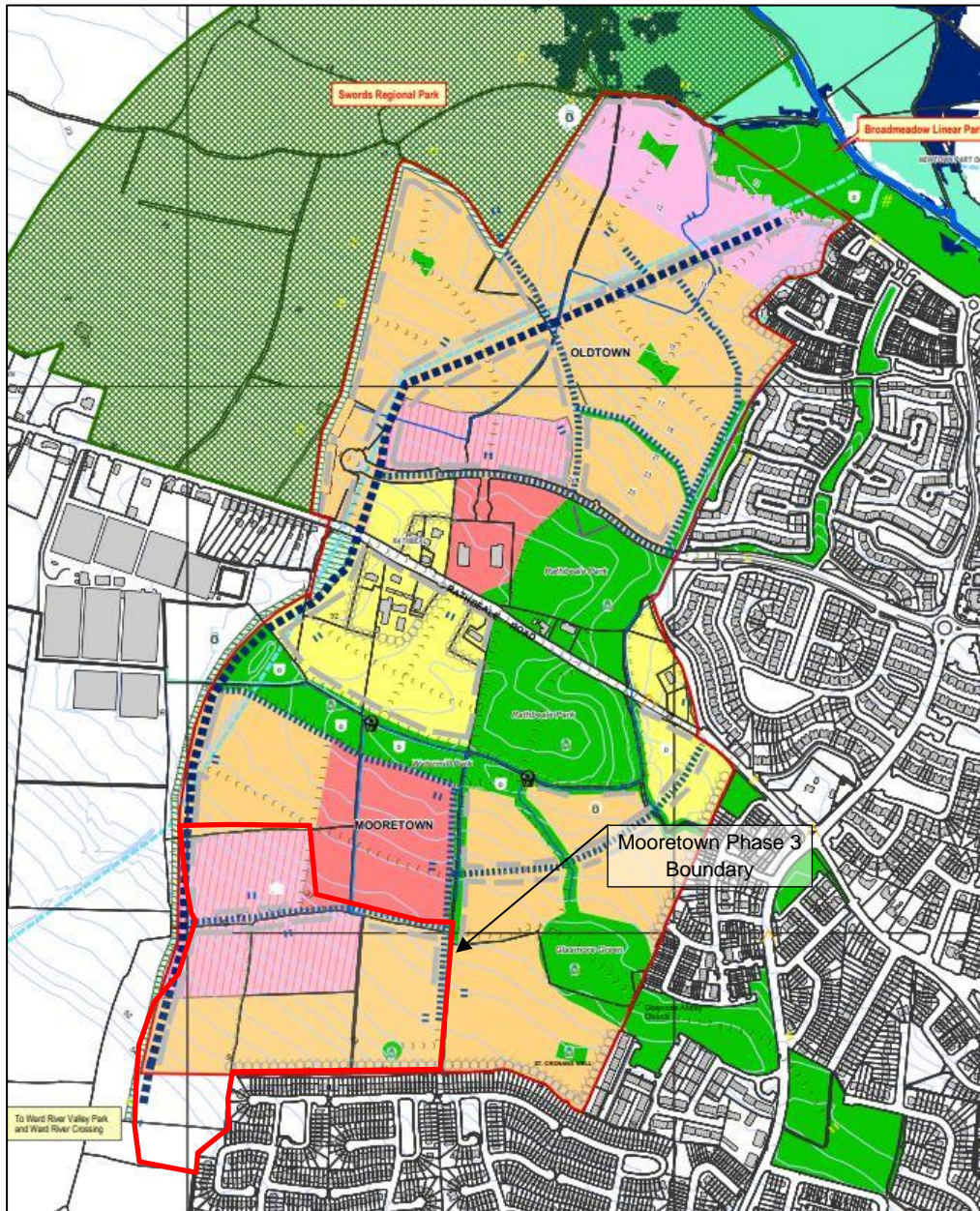


Figure 2 | Image Extracted from the Oldtown-Mooretown LAP 2010

The subject site is Greenfield in nature and slopes from a height of 58m in the southwest corner to 37m in the north-east. The site lies within the catchment of the Broadmeadow River which outfalls to the Malahide estuary. The estuary is a Special Protection Area (SPA), a candidate Special Area of Conservation (cSAC) a proposed National heritage Area (pNHA) and a RAMSAR site.

The proposed development will consist of 650 units, comprising of: 265 No. houses, 119 No. Duplex/Triplexes units, and 266 No. apartments. A creche and 946sqm of retail and café uses clustered in a small village centre..

The development will be designed to include all associated site works, boundary treatments, drainage, and service connections.

3. General Site Set Up and Pre-Commencement Measures

A detailed condition survey (including photographs) will be carried out on the streets and footpaths surrounding the site. The purpose of the survey would be to record the condition of the streets and footpaths around the site prior to the works commencing.

Site compound including offices and welfare facilities will be set up by the main contractor in locations to be decided.

Prior to any site works commencing, the main contractor will investigate / identify the exact location of and tag all existing services and utilities throughout the site with the assistance of the relevant Irish Water, FCC technical divisions and utility company records.

Typical working hours for the site would be 08.00 to 19.00 from Monday to Friday and 08.00 to 14.00 on Saturday. No Sunday or Bank Holiday work will generally be permitted. The above working hours are typical; however, special construction operations may need to be carried out outside these hours in order to minimise disruption to the surrounding area.

4. Site Security and Hoarding Lines

Hoarding lines and site security will be set up within the development site as required.

A detailed traffic management plan will be prepared by the Contractor and agreed with the Roads Authority prior to commencing works on the public road.

Access gates will be operated by a flagman who will divert incoming/outgoing vehicles/pedestrians and general traffic as necessary.

Construction exclusion zones for the protection of the trees, as set out in the accompanying Arborist's report, must be adhered to and agreed by the contractor prior to construction.

5. Tree Constraint Zones

Arborist Associates Ltd has been appointed as the project arborist and has undertaken a Tree and vegetation survey of the site and prepared an Arboricultural Report and associated drawings. The documents have been prepared and developed to aid the design team in the layout of the development.

The Arborist’s drawing “Tree Constraints Plans”, a sample of which is extracted in the Figure below, shows proposed construction tree constraint zones. These zones have been established by the arborist and full details can be found in the Arborist’s reports and drawings, which accompany this submission under a separate cover.

For any trees and hedges deemed to be suitable for retention by the Landscape Architect, the principal tree protection methodology is exclusion by fencing, thus preserving everything within the fenced area. Suitable and clearly identifiable fencing will be required to be installed (represented by the orange line in the figure below), in line the Arboricultural Report and as outlined in the Tree Constraint Drawings. The erection of this protective fencing is to occur prior to construction work, after the primary Arboricultural clearance work, and is to be signed off by the Arborist.

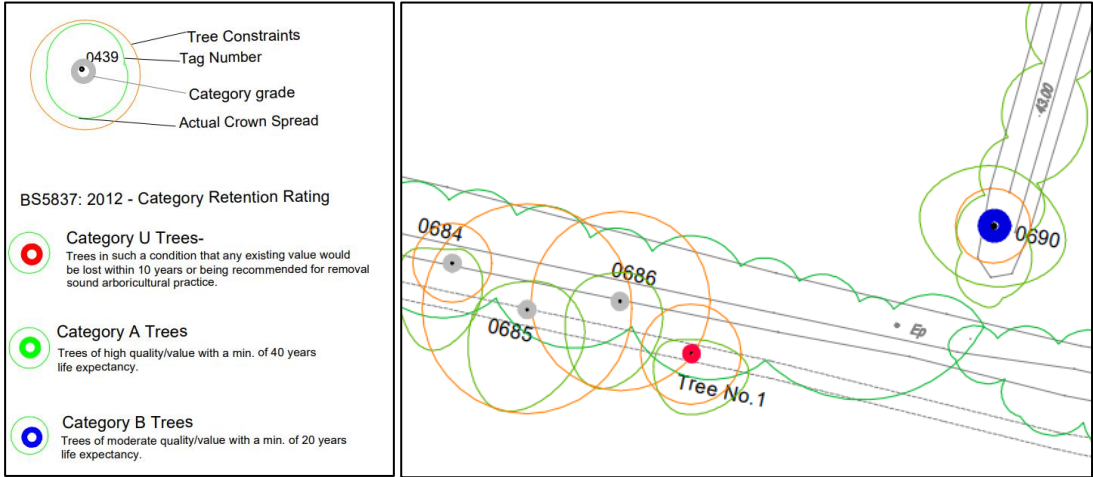


Figure 3 | Arborists Tree constraints Plan Drawing, Typical Sample Extract

Any construction works in tree constraint zones for trees and hedges to be retained must utilise low impact methodologies, such as pipejacking rather than excavating or utilising geotextiles to form part of the sub-base to eliminate the need for excavations in Root Protection Areas.

The method statement for any works to be undertaken within these zones, or any works adjacent to the construction constraint zones, are to be reviewed and approved by the Arborist. The Arborist is to determine if supervision is required when the approved works are being undertaken.

6. Construction Waste Management

The main sources of construction waste arising from this project will be:

- Topsoil and subsoil
- Packaging and general waste from construction activities
- General site clearance waste including tree stumps, etc.

It is practical that all topsoil and subsoil generated remains on site and is used for landscaping and engineering purposes as appropriate. Please refer to sections 6.6 & 6.7 for further details.

6.1 Policy and Legislation

The principles and objectives to deliver sustainable waste management for this project have been incorporated in the preparation of this report and are based on the following strategic objectives:-

- National Policy: The Waste Management Acts 1996 to 2005.
- Local Policy: Waste Management Plan for the Dublin Region 2005 – 2010, November 2005.

This Waste Management Plan is also in accordance with the following guidance note published by the Department of the Environment, Heritage and Local Government in July 2006:-

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition (C&D) Projects.

The hierarchy of waste management sets out the guiding principles in order of importance as follows:-

1. Reduction of the amount of waste generated by the construction process.
2. Segregation of waste is a key concept that will be implemented during the course of the construction phase of the development to enable ease of re-use and recycling, wherever appropriate.
3. Recycle waste material where feasible, including the use of excess excavations as fill material, recycling of various waste fractions such as; metals, packaging etc.

6.2 On site Waste Management

An estimate of the quantities of surplus construction and demolition (C&D) waste and materials which will arise during the course of the construction phase shall be created by the main contractor.

The Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creation of unnecessary waste.

6.3 Off Site Waste Management Licensing/Permitting

All waste materials (where necessary, after in-situ reuse and recycling options have been fully considered) shall be disposed of off-site, under the appropriate Duty of Care and subject to approvals/consents from the relevant statutory bodies. It is the responsibility of the Main Contractor to ensure that any company to whom waste is transferred is legally permitted to do so and that the facility they bring the waste to is licensed to handle that type of waste as outlined in the Waste Management Acts 1996-2005. The Waste Collection Permit Register, in accordance with the Waste Management (Collection Permit) Regulations 2001 will be consulted to ensure that waste carriers hold the appropriate permit.

It is anticipated that there is the possibility that waste materials will have to be moved off-site. It is the intention to engage specialist waste service contractors, who will possess the requisite authorisations, for

the collection and movement of waste off-site, and to transport the material to a facility which currently holds a Waste Licence, Waste Permit, or Certificate of Registration. Details of waste service contractors and demolitions are not confirmed at the time of writing. The following waste authorisations will be arranged specifically for the project:

Authorisation Type	Specific Need for Project (Yes / No?)
Waste Licence	Yes
Waste Permit	Yes
Waste Collection Permit	Yes
Transfrontier Shipment Notification	Not expected
Movement of Hazardous Waste Form	Not expected

Table 1 | Specific Waste Authorisation Necessary for the Scheme

Any wastes that have to be disposed/recycled off site will be transported to the nearest appropriate facility in order to comply with the proximity principle and reduce the associated emissions from the transportation of waste. The Environmental Protection Agency holds details of waste facilities, which will be consulted where necessary.

An inspection of the site shall be made by the Main Contractor for hazardous substances, gas cylinders and the like. If such substances are encountered during the course of construction, then works must be halted. The project supervisor for construction stage (PSCS) and the responsible Statutory Authority shall be informed immediately.

The Contractor shall prepare a detailed inventory of construction based hazardous waste generated, such as tars, adhesives, sealants, and other dangerous substances, and these will be kept segregated from other non-hazardous waste to prevent possible contamination. Arrangements shall be made for such substances for disposal in a safe manner to an authorized disposal site or by means acceptable to the relevant Authority.

Certificates and licenses of waste hauliers and recycling/ disposal facilities shall be held by the main contractor for inspection as part of the contractor’s own construction waste management plan

The Contractor shall ensure that the excavation works are carried out in accordance with best standard practice and excavation materials are well segregated to minimize any potential cross-contamination.

In the unlikely case of a soil/topsoil surplus the Contractor shall carry out appropriate environmental chemistry testing in order to determine the waste classification of the soils that are to be excavated and that shall include Waste Acceptance Criteria testing. The test regime shall be agreed with the receiving landfill operator and the testing shall be carried out by an accredited laboratory.

Should excavation materials be assessed to be hazardous, the Contractor shall carry out pre-treatment of the waste soils to a methodology that is agreed with the receiving landfill operator and in accordance with Environmental Protection Agency guidance.

The Main Contractor is encouraged to reuse and recycle any waste materials as far as is reasonably practicable.

The Main Contractor shall manage and carry out the works in accordance with best environmental practice and in accordance with the requirements of Local Authority, EPA and all requirements as specified in this document.

6.4 Appointment of C&D Waste Manager

A C&D Waste Manager shall be appointed from the Contractor’s Staff and have overall responsibility for the implementation of the project Waste Management Plan (WMP) during the construction phase. The C&D Waste Manager will be appropriately trained and assigned the authority to instruct all site personnel to comply with the specific provisions of the WMP. At the operational level, a designated person from the main contractor and from each sub-contractor on the site shall be assigned the direct responsibility to ensure that the operations stated in the WMP are performed on an on-going basis.

Copies of the WMP will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the WMP and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the WMP. Posters will be designed to reinforce the key messages within the WMP and will be displayed prominently for the benefit of site staff.

6.5 C&D Record Keeping

Details of all arisings, movement and treatment of C&D waste shall be recorded as part of the Waste Auditing regime.

It is the duty of the C&D Waste Manager to ensure that necessary licenses have been obtained as needed. Each consignment of C&D waste taken from the site will be subject to documentation which will conform with *Table 2* along with Transportation Dockets to ensure full traceability of the material to its final destination.

Detail	Particulars
Project of Origin	Mooretown Phase 3, Swords, Co. Dublin
Material being Transported	Soil, Construction waste
Quantity of Material	TBC by Contractor prior to starting works
Date of Material Movement	TBC by Contractor prior to starting works
Name of Carrier	TBC by Contractor prior to starting works
Destination of Material	TBC by Contractor prior to starting works
Proposed Use	TBC by Contractor prior to starting works

Table 2 | Details of Materials Taken from Site

6.6 Topsoil

In the case of topsoil careful planning and on-site storage can ensure that this resource is reused on-site as much as possible. Any surplus of soil not reused on site can be sold. However, topsoil is quite sensitive and can be rendered useless if not stored and cared for properly.

- It is important that topsoil is kept completely separate from all other construction waste as any cross-contamination of the topsoil can render it useless for reuse.

- It is important to ensure that topsoil is protected from all kinds of vehicle damage and kept away from site-track, delivery vehicle turning areas and site plant and vehicle storage areas.
- The required inspections and analysis of topsoil (also applicable to subsoil) properties will be undertaken to accompany any Article 27 applications.

If topsoil is stored in piles of greater than two metres in height the soil matrix (internal structure) can be damaged beyond repair. It should also be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

Records of topsoil storage, movements and transfer from site should be kept by the C&D Waste Manager. It is projected that topsoil will be reused on-site for landscaping purposes in both private residential gardens and public green areas, and any excess topsoil will be used on adjacent phases within the Oldtown/Mooretown development, transferred through the Article 27 application process and associated licence grant.

6.7 Earthworks (Subsoil) – Cut and Fill Policy

Earthworks for road and structure foundations form a major part of the quantity of waste that will be generated by the construction phase of this project. In order to optimise the impact of the generation of surplus material due to excavation the following principles has been considered during the detail design and construction phase:

- The quantity of excavated materials to be removed from or imported into the site has been reduced by establishing levels of the proposed buildings which optimise the volume of cut and fill. It is not envisaged that any surplus excavated material will result from this development and that all arisings from excavations will be retained and reused on site. Should any import or export of subsoil material be required to/from the adjacent Oldtown/Mooretown Phases, any subsoil transfer such as this shall require an article 27 application and associated licence grant.
- Unsuitable sub-soils generated by excavations on site will be reviewed for reuse as landscaping or non-engineering fills on adjoining or other construction sites within the region.
- Careful separation of builder's rubble packaging and contaminated waste from re-usable material will result in the minimisation of the disposal of material to landfill.

7. Deliveries

It is intended that deliveries to the construction site will typically be made to one main access which is expected to be the main entrance via the Mooretown Distributor Road, north-west of the proposed site.

Materials should be ordered and delivered to site on an “as needed” basis in order to prevent over supply to site. Deliveries will be managed upon arrival to the site and systems should be provided in order to avoid any queuing of delivery vehicles, for example: in the event that large concrete pours are required, which may result in congestion at the entrance to the site, the deliveries will be organised such that concrete trucks will queue at a pre-determined staging point (such that they do not cause an obstruction to general traffic in the area) and will then be called in by radio as appropriate to the site. A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

On the basis that the construction period is 48 months, typically 170 units a year could be under construction at the same time.

An estimate of the day-to-day traffic movements associated with the construction activities, based on experience of similar sites, projects that the number of construction related HGV movements to and from the application site will be approximately 20 arrivals and departures per day.

Similarly, the general workforce, which equates to 150-240 employees and with an allowance for shared journeys could equate to a maximum of around 75-120 arrivals and departures per day by private vehicle.

This number of construction vehicle movements is low compared to the number of trips expected to be generated by the proposed development during the operational phase. It should be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours, and it is not considered that this level of traffic would result in any operational problems.

Care will be taken to ensure existing pedestrian routes are suitably maintained as necessary during the construction period, and temporary car parking is provided within the site for contractor’s vehicles.

It is proposed that a Construction Management Plan (CMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road. The CMP will consider the following aspects:

- Minimise the volume of material removed from site by optimising the cut to fill requirements within the site;
- Segregation of waste material produced during the construction process to minimise the contamination or reusable fill material resulting from excavation on the site;
- Wheel wash to be provided for vehicles leaving the site when earthworks are being carried out during winter periods;
- Ensure that deliveries to the site and removal of spoil material from this site are restricted to off peak periods where possible and practicable.
- Optimise routes to be used by heavy vehicles and detail construction traffic forecast;
- Determine the working hours of the site;
- Facilities for loading and unloading and;
- Facilities for parking cars and other vehicles.

Set procedures and designated wash-out areas will be provided, or alternatively vehicle wash-out will be prohibited if a suitable wash-out area is not identified.

All delivery vehicles will be co-ordinated by the flagman on duty at the relevant access gate.

8. Parking and Storage

There is adequate space to accommodate on-site parking during the construction programme.

The main contractor will be required to schedule delivery of materials strictly on a daily basis. If necessary, the main contractor will be required to provide a secure materials staging compound remote from the site, in which to temporarily store materials from suppliers, until such time as these can be accommodated on site.

9. Dust and Dirt Control

Nuisance dust emissions from construction activities are a common and well recognised problem. Fine particles from these sources are recognised as a potential significant cause of pollution.

The main contractor will be required to demonstrate that both nuisance dust and fine particle emissions from the site is adequately controlled and are within acceptable limits.

Dust and fine particle generation from construction and demolition activities on the site can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming air borne, since suppression is virtually impossible once it has become air borne.

The following are techniques and methods which are widely used currently throughout the construction industry and which may be used in the development.

1. The roads around the site are all surfaced, and no dust is anticipated arising from unsealed surfaces.
2. A regime of 'wet' road sweeping can be set up to ensure the roads around the immediate site are as clean and free from dirt / dust arising from the site, as is reasonably practicable. This cleaning will be carried out by approved mechanical sweepers.
3. Footpaths immediately around the site can be cleaned by hand regularly, with damping, as necessary.
4. High level walkways and surfaces such as scaffolding can be cleaned regularly using safe 'wet' methods, as opposed to dry methods.
5. Vehicle waiting areas or hard standings can be regularly inspected and kept clean by brushing or vacuum sweeping and will be regularly sprayed to keep moist, if necessary.
6. Vehicle and wheel washing facilities can be provided at site exit(s) where practicable. If necessary, vehicles can be washed down before exiting the site.
7. Netting can be provided to enclose scaffolding in order to mitigate escape of air borne dust from the existing and new buildings.
8. Vehicles and equipment shall not emit black smoke from exhaust system, except during ignition at start up.
9. Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
10. Servicing of vehicles and plant should be carried out regularly, rather than just following breakdowns.
11. Internal combustion plant should not be left running unnecessarily.
12. Exhaust direction and heights should be such as not to disturb dust on the ground and to ensure adequate local dispersal of emissions.
13. Where possible fixed plant such as generators should be located away from residential areas.
14. The number of handling operations for materials will be kept to a minimum in order to ensure that dusty material is not moved or handled unnecessarily.

15. The transport of dusty materials and aggregates should be carried out using covered / sheeted lorries.
16. Material handling areas should be clean, tidy, and free from dust.
17. Vehicle loading should be dampened down and drop heights for material to be kept to a minimum.
18. Drop heights for chutes / skips should be kept to a minimum.
19. Dust dispersal over the site boundary should be minimised using static sprinklers or other watering methods, as necessary.
20. Stockpiles of materials should be kept to a minimum and if necessary, they should be kept away from sensitive receptors such as residential areas etc.
21. Stockpiles where necessary, should be sheeted or watered down.
22. Methods and equipment should be in place for immediate clean-up of spillages of dusty material.
23. No burning of materials will be permitted on site.
24. Earthworks excavations should be kept damp where necessary and where reasonably practicable.
25. Cutting on site should be avoided where possible by using pre-fabrication methods.
26. Equipment and techniques for cutting / grinding / drilling / sawing / sanding etc, which minimise dust emissions and which have the best available dust suppression measures, should be employed.
27. Where scabbling is to be employed, tools should be fitted with dust bags, residual dust should be vacuumed up rather than swept away, and areas to be scabbled should be screened off.
28. Wet processes should be used to clean building facades if possible. If dry grit blasting is unavoidable then ensure areas of work are sealed off and dust extraction systems used.
29. Where possible pre-mixed plasters and masonry compounds should be used to minimise dust arising from on-site mixing.
30. Prior to commencement, the main contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions. Furthermore, the main contractor should prepare environmental risk assessments for all dust generating processes, which are envisaged.
31. The main contractor should allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.

10. Ground Water

The excavations for the drainage pipes, water supply, utilities and foundations have been designed to be as shallow as possible in order to reduce excavation depths. Careful attention will be required to maintain the excavations clear of ground water.

A discharge licence will be required for all water pumped from the excavations to any public water course or sewer.

All water pumped from the excavations will require to be treated for silt and deleterious matter. During any discharge of surface water from the excavations, the quality of the water will be regularly monitored visually for hydrocarbon sheen and suspended solids. Periodic laboratory testing of discharge water samples will be carried out in accordance with the requirements of the discharge licence obtained from the Local Authority.

11. Noise Assessment and Control Measures

The contractor is to meet the requirements of the Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition.

This Guide has been produced with reference to the London Good Practice Guide: Noise and Vibration Control for Demolition and Construction produced by the London Authorities Noise Action Forum, July 2016.

11.1 Environmental Noise Mitigation Measures:

General Considerations:

1. All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
2. Site hoarding should be erected to maximise the reduction in noise levels.
3. The contact details of the Main Contractor and site manager shall be displayed to the public, together with the permitted operating hours, including any special permissions given for out of hours work.
4. In the event that the Main Contractor gets a complaint about noise from a neighbour he will act immediately to remedy the situation.
5. The site entrance shall be located to minimise disturbance to noise sensitive receptors.
6. Internal haul routes shall be maintained, and steep gradients shall be avoided.
7. Material and plant loading and unloading shall only take place during normal working hours unless the requirement for extended hours is for traffic management (i.e. road closure) or health and safety reasons (advance notification, or possibly an application to the local council would be required if proposing to work outside non-typical hours).
8. Use rubber linings in chutes, dumpers and hoppers to reduce impact noise.
9. Minimise opening and shutting of gates through good coordination of deliveries and vehicle movements.

Plant:

1. Ensure that each item of plant and equipment complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC.
2. Fit all plant and equipment with appropriate mufflers or silencers of the type recommended by the manufacturer.
3. Use all plant and equipment only for the tasks for which it has been designed.
4. Shut down all plant and equipment in intermittent use in the intervening periods between work or throttle down to a minimum.
5. Power all plant by mains electricity where possible rather than generators.
6. Maximise screening from existing features or structures and employ the use of partial or full enclosures for fixed plant.
7. Locate movable plant away from noise sensitive receptors where possible
8. All plant operators to be qualified in their specific piece of plant.

9. Compressors and generators will be sited in areas least likely to give rise to nuisance where practicable.

Vehicle activity:

1. Ensure all vehicle movement (on-site) occur within normal working hours. (Other than where extension of work requiring such movements has been granted in cases of required road closures or for health and safety reasons).
2. Plan deliveries and vehicle movements so that vehicles are not waiting or queuing on the public highway, if unavoidable engines should be turned off.
3. Plan the site layout to ensure that reversing is kept to a minimum.
4. Where reversing is required use broadband reverse sirens or where it is safe to do so disengage all sirens and use banks-men.
5. Rubber/neoprene or similar non-metal lining material matting to line the inside of material transportation vehicles to avoid first drop high noise levels.
6. Wheel washing of vehicles prior to exiting the site shall take place to ensure that adjoining roads are kept clean of dirt and debris. Regular washing of adjoining streets should also take place as required by road sweepers.

Demolition Phase:

1. Employ the use of acoustic screening; this can include planning the demolition sequence to utilise screening afforded by buildings to be demolished.
2. If working out of hours for Health and Safety reasons (following approval by council) limit demolition activities to low level noise activity (unless absolutely unavoidable).
3. Use low impact demolition methods such as non-percussive plant where practicable.
4. Use rotary drills and 'burstors' activated by hydraulic or electrical power or chemically based expansion compounds to facilitate fragmentation and excavation of hard material.
5. Avoid the transfer of noise and vibration from demolition activities to adjoining occupied buildings through cutting any vibration transmission path or by structural separation of buildings.
6. Consider the removal of larger sections by lifting them out and breaking them down either in an area away from sensitive receptors or off site.

Ground Works and Piling Phase:

1. The following hierarchy of groundwork/piling methods should be used if ground conditions, design and safety allow;
 - Pressed in methods, e.g., hydraulic jacking
 - Auger/bored piling
 - Diaphragm walling
 - Vibratory piling or vibro-replacement
 - Driven Piling or dynamic consolidation
2. The location and layout of the piling plant should be designed to minimise potential noise impact of generators and motors.
3. Where impact piling is the only option utilise a non-metallic dolly between the hammer and driving helmet or enclose the hammer and helmet with an acoustic shroud.

4. Consider concrete pour sizes and pump locations. Plan the start of concrete pours as early as possible to avoid overruns.
5. Where obstructions are encountered, work should be stopped, and a review undertaken to ensure that work methods that minimise noise are used.
6. When using an auger piling rig do not dislodge material from the auger by rotating it back and forth. Use alternate methods where safe to do so.
7. Prepare pile caps using methods which minimise the use of breakers, e.g., use hydraulic splitters to crack the top of the pile.

Monitoring:

1. Carry out regular on-site observation monitoring and checks/audits to ensure that BPM is being used at all times. Such checks shall include;
 - Hours of work
 - Presence of mitigation measures
 - Number and type of plant
 - Construction methods
2. In the event that the Main Contractor gets a complaint about noise from a neighbour he will act immediately to remedy the situation.
3. A sound level digital meter will be employed as necessary to monitor noise, with results recorded to inform the contractor of noise level.
4. Site reviews must be recorded and made available for inspection.
5. Appraise and review working methods, processes and procedures on a regular basis to ensure continuous development of BPM.

Communication and Liaison:

1. A Community Liaison Plan should be developed by the developer in consultation with local residents/businesses and a single point of contact nominated to engage with Fingal County Council and the residents/businesses and to handle complaints and communication of site information.
2. All site staff should be briefed on the complaints procedure and mitigation requirements and their responsibilities to register and escalate complaints received.

11.2 Risk Assessment & Mitigation

The main contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives, by means of risk assessment and mitigation / precautionary measures and equipment, all pursuant to the current health and safety legislation.

Current legislation limits, assessment period of 8 hours of one week (noisiest 8 hours likely to experience):

- Lower Action Value (LAV) – 80 dBA $L_{EX,8}$, 135 dB Peak – Hearing Protection shall be made available and information shall be provided.
- Upper Action Value (UAV) – 85 dBA $L_{EX,8}$, 137 dB Peak – Use of Hearing Protection is mandatory, measures to eliminate the noise as much as possible shall be applied.
- Exposure Limit Value (ELV) – 87 dBA $L_{EX,8}$, 140 dB Peak – Not to be exceeded.

Protection by ear plugs/muffs given by their Signal-to-Noise Ratio (SRN) or Noise Reduction Rating (NRR) is typically 20 – 30 dB.

$$\text{Exposure} = L_{EX,8} - (\text{SNR} - 10)$$

As a guide, if it is difficult to hear a normal conversation at a distance of 2m or a workplace is consistently noisier than a busy street, it is likely that the noise levels in the area are above 80 dBA.

It is not envisaged that any excessively noisy activities will be carried out over extended periods of time during the construction stage. However, due to the nature of the construction works, exposure to noise levels in excess of 80 dBA (Safe Working Limit) may occur occasionally. The Main Contractor will carry out a noise assessment in relation to the proposed works at construction stage. The noise assessment identified the following steps in its analysis:-

1. **Potentially Hazardous Activities:** Use of site machinery and power tools. For example, concrete saws, angle grinders, vibratory plate compactors etc.
2. **Potential Hazards:** Excessive noise
3. **Persons at Risk:** People in the vicinity of the work generating an excessive noise. These persons include employees, contractors and members of the public.
4. **Risk of Exposure to the Potential Hazard:** Temporary or permanent hearing loss.
5. **Risk Assessment before the Implementation of Control Measures:** Medium.
6. **Risk Assessment after the Implementation of Control Measures:** Low.
7. **Control Measures Implemented by:** Site Manager / Works Supervisor.

The following control measure are to be implemented for persons at risk:-

1. Site Manager shall monitor a likelihood of prolonged exposure to excessive noise and commission noise surveying/monitoring programme where necessary.
2. Works Supervisor shall assess risk arising from noise prior to each particular activity taking place and determine appropriate action. The aim shall be to minimise the exposure to excessive noise levels.
3. If it is likely that the noise exposure exceeds Lower Action Value, then hearing protection must be made available.
4. If it is likely that the noise exposure exceeds Upper Action Value, then hearing protection is mandatory to be used. Work Supervisor shall decide on the most suitable hearing protection to be used based on Exposure (see formula above) and worker's personal preference (earmuffs or earplugs).
5. Works Supervisor shall ensure proposed measures are put in place and that their effectiveness and suitability is evaluated on a regular basis.
6. Site management shall minimise noise at work by looking for alternative processes and/or working methods, which would make the work quieter and/or exposure times shorter.
7. Site Manager shall liaise with all site contractors in order to effectively control noise exposure.
8. Number of people working near source of the noise shall be minimised.
9. Employees must use hearing protection where its use is made compulsory.
10. Hearing protection zones shall be identified where necessary.
11. Spot checks on appropriate use of hearing protection shall be carried out.
12. Operators of rock breaking machines and workers nearby must wear adequate ear protection.

11.3 Proper use of hearing protection

1. Earmuffs: Workers must make sure that they totally cover their ears, fit tightly and that there are no gaps around the seals. Hair, glasses, jewellery, hats etc. shall not interfere with the seal. Seals and insides of earmuffs shall be kept clean. Workers shall make sure that any headband keeps its tension.
2. Earplugs: Workers shall make sure that they are wearing them properly. They shall practice fitting them and get help if they are having trouble. Hands shall be clean before fitting earplugs. Earplugs must not be shared with other workers.
3. Semi-inserts/caps: Same applies as for earplugs. Worker shall make sure that any headband keeps its tension.

All workers are expected to:

1. Co-operate: Help the Company to do what is needed to protect their hearing. Make sure that they use properly any noise control device and follow any working methods that are put in place.
2. Wear any hearing protection they are given: Make sure that they are wearing it properly. They shall wear it all the time when they are exposed to a noisy environment (over UAV). Taking it off even for a short while means that the hearing could still be damaged.
3. Maintain their hearing protection so as to preserve its working condition.
4. Report any problems: Report any problems with the hearing protection or effectiveness of the measures to the work supervisor.

12. Proposed Construction Phasing and Programme

A detailed construction programme has not been developed at this stage. However, it is anticipated that the total construction period for the development will be approximately 48 months. Commencement is estimated to begin in 2023 and will achieve completion in 2027.

13. Runoff Pollution and Sediment Control

13.1 Runoff Pollution Control

Significant quantities of waste and potential pollutants can be generated during construction. Controls will be put in place to prevent these pollutants from washing into the local storm water system during storm events.

The Inland Fisheries Ireland document: Guidelines on Protection of Fisheries During Construction Works In and Adjacent to Waters 2006, outlines the following areas to be considered for the protection of adjacent water courses during the construction stage

1. Damage to the aquatic and associated riparian habitat due to loss of vegetation, damage to banks & changes in watercourse morphology & hydrology.
2. Pollution of waters due to construction materials.
3. Introduction of non-native species such as plants, algae, fish & shellfish.
4. Interference to the movement of aquatic life.
5. Timing of in-stream works on seasonal salmonid activity.
6. Temporary crossing structures in waters.
7. Permanent crossing structures in waters.
8. Construction impacts such as cast in-situ concrete, sediment laden surface water, hydrocarbon leaks & water abstraction. (Also discussed in section 13.2)

In consideration of the above list the following methods listed, but not limited to, will be implemented on site as appropriate:

1. Fuels, oils, greases and hydraulic fluids will be stored in bunded compounds well away from the watercourse/ditches. Refuelling of machinery, etc., will be carried out in bunded areas.
2. Runoff from machine service and concrete mixing areas will not enter the watercourse.
3. Stockpile areas for sands and gravel will be kept to minimum size, well away from the watercourse.
4. Runoff from the above will only be routed to the watercourse via suitably designed and sited settlement ponds/filter channels.
5. Settlement ponds will be inspected daily and maintained regularly.
6. Temporary crossings will be designed to the criteria laid down for permanent works.
7. Watercourse banks will be left intact if possible. If they have to be disturbed, all practicable measures should be taken to prevent soils from entering the watercourses.

The main pollutants of site water are silt, fuel/oil, concrete, and chemicals. See the *Table 3* overleaf, for a list and brief description of pollution prevention measures.

Source	Action
Detergents	Use of detergents will be carried out in designated areas draining to the foul sewer.
Fuel/Oil	Fuel/oil stores will be located away from the site drainage system and the edge of watercourses.
Fuel/Oil	Ensure adequate measures are identified to prevent or contain any spillage such as creating a fall away from any drainage grid or blocking drainage points.
Fuel/Oil	Prevent oil pollution by <ul style="list-style-type: none"> • Suitable bunded storage of fuel/oil, and use of drip trays under plant, and • An oil separator, and/or • On-site spill-kit • Commercially available absorbent granules, pads or booms.
Material Storage	Store drums, oil and chemicals on an impervious base and within a secured bund.
Material Storage	Ensure topsoil and/or spoil heaps are located at least 10m away from water courses. Consider seeding them or covering with a tarpaulin to prevent silty runoff and losses due to wind.
Leaks and Spills	Storage facilities will be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution.
Leaks and Spills	Ensure appropriate spill response equipment is located near to the material in case of containment failure or material spills, and ensure site staff know how to use it.
Leaks and Spills	Adequate stocks of absorbent materials, such as sand or commercially available spill kits and booms will be available at all times.
Litter	Provide waste bins on-site as appropriate.
Construction Vehicles	Provide vehicle wheel washing.
Concrete, Cement and Bentonite	Washout of these materials will be carried out in a designated, impermeable contained area. The washout water itself should be disposed of off-site, or discharged to the foul sewer if authorised.

Table 3 | Pollution Protection Measures

13.2 Sediment Control

Construction runoff is heavily laden with silt which can block road gullies and reduce the hydraulic capacity in pipes and watercourses, contributing to ponding and flooding. Continued development without appropriate controls will ultimately keep maintenance costs elevated, whether that be in cleaning gullies, jetting pipes or dredging. Sediment control plans can be implemented on-site to mitigate these issues.

Sediment basins and traps should be installed before any major site grading takes place. Additional sediment traps and silt fences should be installed as grading takes place to keep sediment contained on site at appropriate locations.

Key runoff-control measures should be located in conjunction with sediment traps to divert water from planned undisturbed areas away from the traps and sediment-laden water into the traps. Diversions should be installed above the areas to be disturbed before any grading operations. Any perimeter drains should be installed with stable outlets before opening major areas for development. Any additional facilities needed for runoff control should be installed as grading takes place.

During grading operations temporary diversions, slope drains, and inlet and outlet protection installed in a timely manner can be very effective in controlling erosion and sediment build up.

The main run-off conveyance system with inlet and outlet protection measures should be installed early and used to convey stormwater run-off through the development site without creating gullies or channels. Install inlet protection for storm drains as soon as the drain is functional to trap sediment on site in shallow pools and to allow the flood flows to enter the storm drainage system safely. Install outlet protection at the same time as the conveyance system to prevent damage to the receiving watercourse.

During the final stages of construction unstable sediment from sediment basins and traps should be removed and if possible incorporated into the topsoil, not just spread on the surface.

13.2.1 Sediment Control Measures

Sediment entrapment facilities are necessary to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream.

Straw Bales:

Straw bales can be placed at the base of a slope to act as a sediment barrier. These are not recommended for use within a swale or channel. Straw bales are temporary in nature and may perform for only a period of weeks or months. Proper installation and maintenance is necessary to ensure their performance.

Silt Fencing

A silt fence is made of a woven synthetic material, geotextile, and acts to filter run-off. Silt fencing can be placed as a temporary barrier along the contour at the base of a disturbed area but is not recommended for use in a channel or swale. The material is durable and will last for more than one season if properly installed and maintained. Silt fencing is not intended to be used as a perimeter fence or in area of concentrated flow. If concentrated flow conditions exist, a more robust filter should be considered.

Silt Barriers

Silt barriers can also be temporarily installed in any road gullies of partially constructed roads to prevent sediment movement into downstream drainage systems or SUDS components.

When the catchment area is greater than that allowed for straw bale barriers or silt fences, runoff should be collected in diversion drains and routed through temporary sediment basins.

Diversions Drains

Diversions drains are simple linear ditches, often with an earth bund, for channelling water to a desired location. If the drains are being eroded, they can be lined with geotextile fabric or large stones or boulders.

UK and Ireland Office Locations

