

16.0 MITIGATION AND MONITORING

16.1 Introduction

Annex IV (7) of the amended Directive has been incorporated into the Planning and Development Regulations 2011 (as amended) at Schedule 6 (2) (g) which states-

“a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of an analysis after completion of the development), explaining the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset during both the construction and operational phases of the development” should be contained in an EiAR.

Chapters 4 to 14 of this EiAR contain mitigation measures where required. This chapter of the EiAR summarises the mitigation measures outlined in the assessment of the environmental factors within the EiAR document. This Project has been subject to Stage 2 Appropriate Assessment Screening and a NIS accompanies the application. For the assessment of mitigating measures relating to prevention of potential adverse impacts on the Natura Network please refer to the NIS.

There are four established strategies for the mitigation of effects-avoidance, prevention, reduction and offsetting.

Mitigation by Avoidance	Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and the consideration of alternatives have been taken into account at the earliest stage in the project design processes.
Mitigation by Prevention	This usually refers to technical measures. Prevention measures are also put in place to prevent the effects of accidental events from giving rise to adverse effects. The installation of a fire-water retention basin is an example of mitigation against such risk by prevention.
Mitigation by Reduction	This is a very common strategy for dealing with effects which cannot be avoided. It tends to concentrate 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 tends not to affect the source of the problems. As such this is regarded as a less sustainable, though still effective, approach.
Mitigation by Remedy/Offsetting	This is a strategy used for dealing with adverse effects which cannot be prevented or reduced. Remedy is compensating for or counteracting adverse effects while offsetting can be described as when an adverse impact is balanced by a positive impact.

16.2 Summary of Mitigation and Monitoring

This table should be read in conjunction with Table 15.1 of Chapter 15. The summary of mitigation measures is followed by any monitoring proposed in the case of each environmental factor.

16.2.1 Population and Human Health

No mitigation or monitoring required.

16.2.2 Biodiversity

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Habitat Loss	<p>Habitat disturbance during construction work will be confined strictly to within the direct land-take of the proposed scheme.</p> <p>Construction machinery will be restricted to site roads and the footprint of the proposed scheme.</p> <p>Enhancement tree planting will be undertaken as part of the proposed landscaping within the project site. As part of the landscape plan for the project it is proposed to provide a wooded parkland area to the northwest of the site. This parkland feature will be provided adjacent to a hedgerow that runs north to the railway and connects into this linear biodiversity corridor. This will provide linkage between the new woodland/parkland habitat and biodiversity corridors in the wider area.</p>
Birds	<p>Where possible vegetation to be cleared onsite will be completed outside the nesting bird season between March and August inclusive. Where it is not possible to time such works outside these months then a survey of hedgerow/treeline vegetation for the presence of nesting birds should be completed prior to the commencement of vegetation removal by an experienced ecologist. In the event that nests are identified in hedgerow/treeline vegetation their clearance/removal will be postponed until the after the nest sites are abandoned. In the event that it is not possible to postpone such works, then they will only be allowed to proceed following consultation with the NPWS, and where required, upon receipt of a licence from the Department/NPWS permitting the destruction of the nests.</p>
Bats	<p>The lighting design in the vicinity of habitat features that offer suitable foraging bats, such as boundary hedgerow that are to be retained and new woodland/parkland habitat that will be provided as part of the project landscaping, has been prepared in line with best practice measures for minimising the impacts of artificial lighting to bats, as detailed in the Institute of Public Lighting 2018 guidance document Bats and Artificial Lighting in the UK. This lighting plan aims to limit lighting and light spill on to these habitats to ensure that optimum foraging conditions, that include unlit and low artificial light over the woodland/parkland and the boundary hedgerows are provided for bats such as Common pipistrelle and Leisler's bat.</p>
Surface Water Runoff and Wastewater	<p>Measures required to manage surface water runoff from the project site during the construction phase and to thereby avoid the potential for pollution to watercourses in the wider surrounding area have been detailed in Chapter 7 of this EIAR and also in the Natura Impact Statement and the Infrastructure Design Report for the project, both of which are provided under separate cover with the planning application</p>

Environmental Factor & Topics	Mitigation Measures
	documentation. Provide all these measures are implemented the project will not result in the release of polluted surface water to watercourses in the wider surrounding area or the release of inadequately treated wastewater to receiving waters.
Impacts to protected areas	Please refer to Natural Impact Statement

16.2.2.1 Monitoring

Construction Phase –If in the event that vegetation clearance is proposed to coincide with the breeding bird season monitoring of the vegetation for evidence of nesting birds will be required in line with the mitigation requirements specified above.

Operational Phase – No monitoring required

16.2.3 Land, Soils and Geology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Stripping of Topsoil	<ul style="list-style-type: none"> ▪ Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. ▪ Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. ▪ Topsoil stockpiles will also be located so as not to necessitate double handling. ▪ Surface water runoff from areas stripped of topsoil will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate. ▪ On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.
Excavation of subsoil layers	<ul style="list-style-type: none"> ▪ The designed road levels and floor levels for the site have been designed to minimise excavation of existing subsoil layers. ▪ Disturbed subsoil layers will be stabilised as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). The duration that subsoil layers are exposed is to be minimised in order to mitigate against weather effects. ▪ Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. ▪ Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).

Environmental Factor & Topics	Mitigation Measures
Imported fill	<ul style="list-style-type: none"> ▪ No large or long-term stockpiles of fill material will be held on the site. At any time, the extent of fill material held on site will be limited to that needed in the immediate vicinity of the active work area. ▪ Smaller stockpiles of fill, where required, will be suitably protected to ensure no sediment laden runoff enters existing surface water drains. Such stockpiles are to be located in order to avoid double handling.
Construction Traffic	<ul style="list-style-type: none"> ▪ Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site. ▪ Vehicles using unsurfaced site roads will have their speed restricted to 20km/hour. ▪ Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site. ▪ Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.
Accidental Spills and Leaks	<ul style="list-style-type: none"> ▪ In order to mitigate against spillages contaminating underlying soils, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area. ▪ Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out off site).
Operational Phase	
	No mitigation measures required

16.2.3.1 Monitoring

Construction Phase

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to Preliminary Construction Management Plan (and any Construction Management Plan subsequently prepared by the contractor).
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).

Operational Phase

No ongoing monitoring is proposed on completion of the construction phase.

16.2.4 Water & Hydrology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
	<ul style="list-style-type: none"> ▪ A site-specific Construction and Environment Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environment Management Plan. ▪ Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate. ▪ Weather conditions and typical seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations with an objective of minimizing soil erosion. ▪ In order to mitigate against spillages contaminating the surrounding surface water and hydrogeological environments, all oils, fuels, paints and other chemicals should be stored in a secure bunded hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (where not possible to carry out such activities off site). ▪ Concrete batching will take place off site and wash down and wash out of concrete trucks will take place off site (at authorized concrete batching plant in full compliance with relevant planning and environmental consents). ▪ Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds. ▪ The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established. ▪ The construction compound's potable water supply shall be protected from contamination by any construction activities or materials. ▪ Reinstatement – Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility. Offaly County Council's Environmental Control Section is to be notified of the proposed destination for disposal of any liquid fuels.

Environmental Factor & Topics	Mitigation Measures
	<ul style="list-style-type: none"> ▪ Reinstatement – All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer’s drawings.
Operational Phase	
Surface Water Drainage	<p>Surface water runoff from the site will be attenuated to the greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by a Hydrobrake type vortex control device in conjunction with below ground attenuation storage.</p> <p>The following methodologies are being implemented as part of a SuDS surface water treatment train approach:</p> <ul style="list-style-type: none"> ▪ Impermeable Roads / Footpaths Drained via Tree ▪ Permeable Paved Areas Draining via SUDS ▪ House Roofs Draining via SuDS (permeable paving) ▪ Apartments – Green Roof ▪ Attenuation of the 1 in 100 year storm event in above ground in detention basins. ▪ Installation of a vortex flow control device (Hydrobrake or equivalent), limiting surface water discharge from the site to 2.38 l/sec/ha ▪ Surface water discharge will also pass via a Class 1 full retention fuel / oil separator (sized in accordance with permitted discharge from the site). <p>A contract will be entered into with a suitably qualified contractor from maintenance of the attenuation system, Hydrobrake and full retention fuel / oil separator noted above.</p>
Foul Water	No specific mitigation measures are proposed in relation to foul drainage however, all new foul drainage lines will be pressure tested and be subject to a CCTV survey in order to identify any possible defects prior to being made operational.

Environmental Factor & Topics	Mitigation Measures
Water Supply	No specific mitigation measures are proposed in relation to water supply, however, water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.

16.2.4.1 Monitoring

Construction Phase

Proposed monitoring during the construction phase in relation to the water and hydrogeological environment are as follows:

- Adherence to Outline Construction Management Plan
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content)

Operational Phase

During the operational phase an inspection and maintenance contract is to be implemented in relation to the proposed Class 1 full retention fuel / oil separators.

16.2.5 Air Quality and Climate

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Air Quality	<p>The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 8.3. In summary the measures which will be implemented will include:</p> <ul style="list-style-type: none"> ▫ 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. ▫ Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions. ▫ Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads. ▫ Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates. ▫ Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. ▫ 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. ▫ During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. <p>At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.</p>
Climate	No mitigation measures required

Operation phase	
Local air Quality Climate Human Health	No mitigation measures required

16.2.5.1 Monitoring

Construction Phase

Monitoring of construction dust deposition at nearby sensitive receptors (residential dwellings) during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m²*day) during the monitoring period between 28-32 days.

Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

16.2.6 Noise and Vibration

Environmental Factor & Topics	Mitigation measures
Construction Phase	
Noise	<p>Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:</p> <ul style="list-style-type: none"> ▪ selection of quiet plant; ▪ noise control at source; ▪ screening, and; ▪ liaison with the public. <p>Further comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring, where required.</p> <p><i>Selection of Quiet Plant</i></p> <p>This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.</p>

Environmental Factor & Topics	Mitigation measures
Noise (Continued)	<p data-bbox="551 256 2089 288"><i>Noise Control at Source</i></p> <p data-bbox="551 320 2089 504">If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control “at source”. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.</p> <p data-bbox="551 536 2089 568">The following best practice migration measures should be considered:</p> <ul data-bbox="551 600 2089 1318" style="list-style-type: none"> <li data-bbox="551 600 2089 679">▪ Site compounds should be located away from noise sensitive boundaries within the site constraints. The lifting of bulky items, dropping and loading of materials within these areas should be restricted to normal working hours. <li data-bbox="551 695 2089 775">▪ For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left idling. <li data-bbox="551 791 2089 871">▪ For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system. <li data-bbox="551 887 2089 1023">▪ For percussive tools such as pneumatic breakers, noise control measures include fitting muffler or sound reducing equipment to the breaker ‘tool’ and ensure any leaks in the air lines are sealed. Localised screens should be erected around breaker or drill bits when in operation in close proximity to noise sensitive boundaries. <li data-bbox="551 1038 2089 1118">▪ For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials. <li data-bbox="551 1134 2089 1214">▪ Compressors, generators and pumps should be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation. <li data-bbox="551 1230 2089 1318">▪ All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Environmental Factor & Topics	Mitigation measures
	<p><i>Screening</i></p> <p>Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4m in height) with a mass per unit of surface area greater than 7 kg/m² can provide adequate sound insulation. This is recommended, as a minimum, around the site perimeter.</p> <p><i>Liaison with the Public</i></p> <p>A designated noise liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.</p> <p><i>Project Programme</i></p> <p>The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities. This will be reviewed in relation to other potential cumulative works occurring on adjacent construction sites in close proximity to noise sensitive properties, which have the potential to lead to significant construction noise impacts. To date no other construction sites nearby have been identified.</p>
Vibration	No mitigation measures required
Operation Phase	
Noise (Traffic, Plant, car parking and Crèche) & Vibration	No mitigation measures required

16.2.6.1 Monitoring

Construction Phase

During the construction phase noise monitoring will be undertaken at the nearest sensitive locations to ensure construction noise limits outlined in Table 9.5 are not exceeded. Noise monitoring will be conducted in accordance with the International Standard ISO 1996: *Acoustics – Description, measurement and assessment of environmental noise Part 1 (2016) and Part 2 (2017)*. The selection of monitoring locations will be based on the nearest sensitive buildings to the working areas.

It is recommended that noise control audits are conducted at regular intervals throughout the construction programme in conjunction with noise monitoring. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions and to identify opportunities for improvement, where required.

Operational Phase

Noise or vibration monitoring is not required once the development is operational

16.2.7 Material Assets – Traffic

Environmental Factor & Topics	Mitigation measures
Construction Phase	
Traffic	<p>The Construction Management Plan and the associated Construction Traffic Management Plan (CTMP) in addition to the applications accompanying Construction and Waste Management Plan will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.</p> <p>In order to ensure satisfactory operation of the construction stage the following is proposed:</p> <ul style="list-style-type: none"> ▪ Provision of sufficient on-site parking and compounding to ensure no potential overflow onto the local network. ▪ It is likely that some numbers of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential. ▪ Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas. ▪ Finally, truck wheel washes will be installed at construction entrances and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
Operational Phase	
Traffic	<p>With the objective of mitigating the potential impact of the proposed development during its operational stage, the following initiatives have been identified and subsequently form an integral part of the subject development proposals.</p> <ul style="list-style-type: none"> ▪ Management – A Mobility Management (MMP) is to be compiled with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.

Environmental Factor & Topics	Mitigation measures
Traffic (continued)	<ul style="list-style-type: none"> ▪ Infrastructure - The proposed scheme design incorporates the cycle facilities along the 'Link Street' and on all approaches to the proposed new signal controlled junction. In addition, permeable links with adjacent residential areas are proposed thereby maximising connectivity for walking and cycle trips. ▪ Infrastructure – 2 no. new bus stops are proposed in the vicinity of the subject site access which will not only benefit future residents of the subject development but also existing residents in the surrounding area. ▪ Infrastructure – New cycle infrastructure is proposed along Clonminch Road, as part of the subject scheme, which will provide dedicated cycle lanes between the subject site and Tullamore Town Centre. Accordingly, following the implementation of the proposed cycle infrastructure, the subject development will be more accessible by bicycle with the potential for future residents to choose cycling as a mode of travel increased significantly.

16.2.7 Monitoring

Construction Phase

During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and External road conditions; and
- Timings of construction activities in terms of start / finish times.

Operational Phase

As part of the MMP process, bi-annual post occupancy surveys are recommended to be carried out in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

16.2.8 Material Assets – Waste Management

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Waste Management	<p>A project specific C&D WMP has been prepared in line with the requirements of the requirements of the guidance document issued by the DoEHLG and is included as Appendix 12.1. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development. Prior to commencement, the contractor(s) will be required to refine/update the C&D WMP or submit an addendum to the C&D WMP to OCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.</p> <p>A quantity of soil, stone, gravel and clay will need to be excavated to facilitate the proposed development. Project Engineers have estimated that c. 51,000m³ of material will be excavated and reused on the site as non-structural fill and for landscaping.</p> <p>Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.</p> <p>In addition, the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> • Building materials will be chosen with an aim to ‘design out waste’; • On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated: <ul style="list-style-type: none"> o Concrete rubble (including ceramics, tiles and bricks); o Plasterboard; o Metals; o Glass; and o Timber. • Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible; • All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;

Environmental Factor & Topics	Mitigation Measures
	<ul style="list-style-type: none"> • Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required); • A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works; • All construction staff will be provided with training regarding the waste management procedures; • All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal; • All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and • All waste leaving the site will be recorded and copies of relevant documentation maintained. <p>Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.</p> <p>These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, the EMR Waste Management Plan (2015-2021). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.</p>
Operational Phase	
Waste Management	<p>A project specific OWMP has been prepared and is included as Appendix 12.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021 and abiding by the DCC waste bye-laws.</p>

Environmental Factor & Topics	Mitigation Measures
Waste Management (continued)	<p>In addition, the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> • On-site segregation of all waste materials into appropriate categories including (but not limited to): <ul style="list-style-type: none"> ○ Organic waste; ○ Dry Mixed Recyclables; ○ Mixed Non-Recyclable Waste; ○ Medical waste; ○ Glass; ○ Waste electrical and electronic equipment (WEEE); ○ Batteries (non-hazardous and hazardous); ○ Cooking oil; ○ Light bulbs; ○ Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); ○ Furniture (and from time to time other bulky waste); and ○ Abandoned bicycles. • All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials; • All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and • All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities. <p>These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the <i>Waste Management Act 1996</i>, as amended, associated Regulations, the <i>Litter Pollution Act 1997</i>, the <i>EMR Waste Management Plan (2015 - 2021)</i> and the OCC Waste Bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.</p>

16.2.8 Monitoring

Construction Phase

The management of waste during the construction phase should be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the C&D WMP including maintenance of waste documentation.

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&D WMP specifies the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues.

Operational Phase

The management of waste during the operational phase should be monitored to ensure effective implementation of the OWMP by the building management company and the nominated waste contractor(s). During the operational phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the WSAs where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

16.2.9 Material Assets – Built Services

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
ESB Network Gas Supply Telecoms	<ul style="list-style-type: none"> ▪ Provision of connections to the existing electricity, gas and telecommunications networks are to be coordinated with the relevant utility provider and carried out by approved contractors. ▪ A detailed “Construction Management Plan” will be prepared by the Contractor and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the “Construction Management Plan”. ▪ Contractor to prepare Method Statement detailing proposals for works in the vicinity of existing utilities (method statement to be agreed with PSDP). ▪ Contractor to locate and record all services on site prior to commencement of excavations (including but not limited to a GPR utility survey along the Clonminch and slit trench investigation to confirm the location of existing infrastructure). ▪ Contractor to comply with HSA Code of Practice for Avoiding Danger from Underground Services. ▪ Ducting and / or poles along the proposed relocated route will be constructed and ready for rerouting of cables in advance of decommissioning of existing overhead electricity lines. ▪ Reinstatement of any excavations, trenches etc. relating to the provision of electrical, gas and telecommunications connections is to be carried out in accordance with the relevant utility provider’s requirements.
Operational Phase	
	No mitigation measures required

16.2.9.1 Monitoring

Construction Phase - No monitoring required

Operational Phase - No monitoring required

16.2.10 Cultural Heritage including Archaeology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
	<p>Mitigation measures shall be undertaken as directed by the Department of Housing, Local Government and Heritage (DHLGH, previously DCHG) in compliance with national policy guidelines and statutory provisions for the protection of archaeology and cultural heritage.</p> <ol style="list-style-type: none"> 1. Should development proceed at this location, it is recommended that the 2 <i>fulachtaí fia</i> identified in the course of advance archaeological assessment be fully recorded and excavated under licence to the Department of Culture Heritage and the Gaeltacht. 2. Should development proceed at this location, it is recommended that groundworks across the remainder of the site be monitored by a suitably qualified archaeologist.
Operation Phase	
	No mitigation measures required

16.2.10.1 Monitoring*Construction Phase*

It is proposed that all future archaeological works be carried out in accordance with the requirements of the DCHG and the planning authority and under licence to the DCHG in consultation with the National Museum of Ireland.

Operational Phase

No monitoring required

16.2.11 Landscape and Visual

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
	<ul style="list-style-type: none"> ▪ Hoarding and fences will assist in limiting views from public amenity / open space areas. ▪ The construction work and development areas are located away from peripheral trees and hedgerows allowing for their retention and augmentation ensuring that they contribute to visual screening and buffers.
Operation Phase	
	<ul style="list-style-type: none"> ▪ Implementation and completion of landscape plan (please refer to Park Hood drawing no. 6473-L-303) including planting to site boundaries, retention of existing vegetation where possible and extensive internal open spaces.

16.2.11 Monitoring

Construction Phase – No monitoring required

Operational Phase - The management of all areas will initially be undertaken by an ACLI approved landscape contractor with the developer remaining as client for duration of their contract for each section of the development. After 12 months the maintenance will be handed over to the long-term Management Company who will take over maintenance of set areas on completion of the development. There will be a five year guarantee after construction that all the proposed planting works still exists and has established in line with landscape design expectations. This will ensure that no planting has been removed or damaged due to the subsequent construction or plant failure. The planning application is accompanied by Landscape Management and Maintenance Plans setting out the objectives for management of external spaces or public realm areas for a 20 year period.

Regular monitoring will be undertaken to determine success of landscape operations and ensure they are behaving in the manner anticipated at design stage. If required, elements of the design can be adapted to accommodate changes required by actual field experience.