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	Compensatory tree and supplementary hedgerow planting has been included to offset the loss of hedgerows arising from this project. Along with areas of pollinator-friendly planting, it is considered that in time this will reduce the overall impact of this effect.
Species Mortality	If possible, site clearance works should proceed outside the nesting season, i.e. from September to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest.
	Suitable roost sites are available for bats in mature trees (although these trees are not to be directly affected). Preliminary mitigating measures are contained in the Bat Assessment that accompanies this EIAR under separate cover. This includes the following- "*All trees with roost potential shall be felled between September and November to ensure that bats are not breeding or hibernating within trees and to ensure that birds are unaffected".*
Pollution During Construction	Construction will follow guidance from Inland Fisheries Ireland (IFI, 2016) for the protection of fish habitat. Surface run off from the site will only be discharged to local drains via a settlement pond so that only silt-free water will enter the environment. Dangerous substances, such as oils, fuels etc., will be stored in a bunded zone. Emergency contact numbers for the Local Authority Environment Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident. Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same. The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of works, and a record of these inspections will be maintained. See section 10 of the preliminary CMP.

Environmental Factor & Topics	Mitigation Measures
Damage to hedgerows to be retained	To avoid this the developer should follow the guidance from the National Roads Authority in establishing root protection areas (RPA) along hedgerows to be retained. The NRA gives the following equation for calculating the root protection area (RPA) (NRA, unknown year): RPA(m2) = π(stem diameter mm 12)/1,000) x2 The RPA gives the area around which there should be no disturbance or compaction of soil. This will be calculated for the largest tree within each hedgerow. Prior to construction this area will be clearly labelled 'sensitive ecological zone', fenced off with durable materials and instruction given to construction personnel not to disturb this buffer zone. As a rule of thumb this buffer zone should extend at least to the canopy of the trees concerned.
Impacts to protected areas	Please refer to Natural Impact Statement
Operational Phase	
Habitat Fragmentation including loss of bat foraging habitat	It is considered that new habitat creation along the access road will ensure that long-term, negative impacts arising from fragmentation will not occur.
Wastewater	No mitigation required
Surface Water run-off	No mitigation required
Disturbance to species from human disturbance	As part of the submission of details to the Planning Authority, the lighting plan should be reviewed by the bat ecologist. This should ensure that lighting is not directed at semi-natural vegetation and that every effort is made to minimise lighting to the greatest degree feasible.
Landscaping	No mitigation required – Positive Impact
Impacts to Protected Areas	Please refer to Natural Impact Statement

16.2.2.1 Monitoring

Construction –None required

Operational - None required

16.2.3 Land, Soils Geology and Hydrogeology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Excavation and Infilling	The design of the proposed development has taken account of the potential impacts on the land, soils and geology environment. Measures have been incorporated into the design to mitigate any potential effects on the surrounding land, soils and geology. All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. In the event that any unusual staining or odour is noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated, classified and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.
Accidental release to ground	To minimise any impact on the underlying subsurface strata from material spillages it is proposed that all fuels, oils, solvents and paints used during construction will be stored within temporary bunded areas or will be contained in double skinned tanks in designated areas of the site away from surface water drains. Re-fuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place off site or in a designated area that will be away from any existing surface water drains. The area will be determined by the contractor prior to commencement on site but is likely to be carried out in a designated area of the contractor's compound. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "*Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors*" (CIRIA 532, 2001) will be complied with.
Operational Phase	
Accidental Emissions	There will be no bulk storage of fuel required for the operation of the proposed residential development. The majority of the site c. (c.60%) will be covered in hardstanding. The impermeable surface will minimise the potential influx of any contaminants into soils and underlying groundwater. Any accidental leaks from cars within the car parking/road areas will be directed through the surface drainage system via an appropriately sized interceptor. Attenuation will be provided by underground tanks to ensure that the discharge rate is maintained at greenfield runoff rate. The attention facility will accommodate rainfall events up to, and including, the 1-in-100-year storm event.

Environmental Factor & Topics	Mitigation Measures
Reduction in local recharge to groundwater	No mitigation required

16.2.3.1 Monitoring

Construction

Regular inspection of surface water run-off and any sediment control measures e.g. silt traps will be carried out during the construction phase. Regular auditing of construction/mitigation measures will be undertaken e.g. concrete pouring, refuelling in designated areas etc.

Operation

No future soil or groundwater monitoring is proposed as part of the proposed development. Petrol interceptor(s) will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

16.2.4 Hydrology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Increased runoff & Sediment Loading	During the construction phase any drains carrying a high sediment load will be diverted through settlement ponds/tanks. The settlement ponds/tanks will be located between the area of construction and the nearest field drain. Surface water runoff will not be discharged directly to local watercourses. The following mitigation measures will be adopted; ▪ the drainage system and settlement ponds/tanks will be constructed as a first step; ▪ silt reduction measures including sit traps and settlement tanks will be employed during construction; ▪ any excavations required will remain open for as little time as possible before the placement of fill. This will help to minimise potential for groundwater ingress into excavations; ▪ the drainage ditch identified to the south of the site will be culverted; ▪ weather conditions will be considered when planning construction activities to minimise risk of run off from the site; and ▪ distance between topsoil piles etc. and drainage courses will be maintained – to protect from dampening operations. ▪ The generation of runoff from stockpiles of soils, excavated during construction, will be prevented from entering watercourses by diverting runoff to the settlement ponds/tanks on site, and removing the material off-site as soon as possible to designated storage areas.
Contamination of Local Water Courses	To minimise any impact on minor drainage channels onsite from material spillages, all oils, solvents, paints and fuels used during construction will be stored within temporary bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Filling and draw-off points will be located entirely within the bunded area(s). Drainage from the bunded area(s) will be diverted for collection and safe disposal. There is no notable surface water course onsite. The drainage ditch to the south is to be culverted as part of the initial construction works. Wet concrete operations adjacent to watercourses will be avoided where possible. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to groundwater.

Environmental Factor & Topics	Mitigation Measures
Contamination of Local Water Courses (Cont.)	The contractor will be required to make provision for removal of any concrete wash waters, most likely by means of 7inkering off-site and no such wash waters will be discharged to groundwater. Any effluent generated by temporary onsite sanitary facilities will be taken off-site for appropriate treatment. Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/ equipment will take place in designated bunded areas where possible. Re-fuelling will be avoided in so far as possible at the other work sites but where necessary will take place on hard stand areas and fuel stored in bunded areas. If it is not possible to bring a machine to the refuelling point, fuel will be delivered in a double skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. The vehicles and equipment will not be left unattended during refuelling. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment.
Removal of surface water drainage features	No mitigation required
Operational Phase	
Increased Surface Water Runoff	Waterman Moylan have identified that the above storm water drainage systems will accommodate a 1:100-year storm event accounting for a 20% increase with climate change. As such these will be no change in the green field run-off from the site and no measureable impact on receiving waters. Please see Waterman Moylan documents and drawings for full details of proposed drainage system designed in accordance with Great Dublin Strategic Design System specifications.
Contamination of Surface Water	Due to a variety of measures such as the design of the attenuation system with hydrocarbon interceptors and the design of the wider drainage system in line with SuDS the likelihood of any spills entering the water environment is negligible.
Foul Water	Please refer to Waterman Moylan Engineering Assessment Report for details of foul water design proposal. In summary, a 225mm Ø gravity foul sewer network be constructed across the site which will connect into the existing 225mm Ø diameter public foul sewer on Marsh Road. The increase in flow to the existing public foul sewer is not expected to have a negative effect on the foul drainage system in the area.
Water Supply	The water system will be metered to facilitate detection of leakage and the prevention of water loss. Dual & low flush toilets, aerated showerheads, spray taps, draw off tap controls, rainwater reuse are some of the water saving measures boing proposed. The increase in demand for water supply is not expected to have a negative effect on the water supply in the area as IW has confirmed there is adequate capacity available. Please refer to Waterman Moylan Engineering Assessment Report for details.

16.2.4.1 Monitoring

Construction

Regular inspection of surface water run-off and any sediment control measures e.g. silt traps will be carried out during the construction phase. Regular auditing of construction/mitigation measures will be undertaken e.g. concrete pouring, refuelling in designated areas etc.

Operation

No future surface water monitoring is proposed as part of the proposed development due to the low hazard potential at the development Petrol interceptor(s) will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

16.2.5 Air Quality and Climate

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Air Quality	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. ▪ The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues; ▪ The development of a documented system for managing site practices with regard to dust control; ▪ The development of a means by which the performance of the dust management plan can be monitored and assessed; ▪ The specification of effective measures to deal with any complaints received. At all times, the procedures within the plan 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.
Climate	No mitigation required
Operation phase	
Local air Quality Regional Air Quality Air Quality on Sensitive Ecosystems	No migration required

16.2.5.1 Monitoring

Construction

Monitoring of construction dust deposition at nearby sensitive receptors 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/(m^2*day) during the monitoring period between 28 - 32 days.

Operation

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	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: ▪ selection of quiet plant; ▪ noise control at source; ▪ screening, and; ▪ liaison with the public. Further detail on the above is contained at section 9.8 of Chapter 9. In addition, the construction 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 and the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities.
Vibration	No mitigation required
Operation Phase	
Nose (Traffic) & Vibration	No mitigation required
Inward Noise Study	The following mitigation measures are recommended to protect future residents from inward noise impact- ▪ Boundary treatment is recommended to the south of the site using a solid blockwork wall, or acoustic timber screen at a height of 2.5m to reduce noise levels external to terrace houses along this boundary. ▪ Enhanced acoustic glazing and vents are recommended at properties to the south of the site and at windows to the east of Apartment Block 7. Specific details of boundary treatments and glazing requirements are set out in the relevant sections of Chapter 9.

16.2.6.1 Monitoring

Construction Phase

The contractor will be required to ensure construction activities operate within the noise limits set out within Table 9.1. The contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

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	A preliminary construction management plan is submitted under separate cover. It is considered that a detailed 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: ▪ dust and dirt control measures. ▪ noise assessment and control measures ▪ routes to be used by vehicles; ▪ working hours of the site; ▪ details of construction traffic forecasts; ▪ times when vehicle movements and deliveries will be made to site; ▪ facilities for loading and unloading; and ▪ facilities for parking cars and other vehicles Further to the above, a detailed traffic management plan (TMP) will be prepared by the main contractor. This document will outline proposals in relation to construction traffic and associated construction activities that impact on the surrounding roads network. The document will be prepared in coordination and agreed with the Local Authority. Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have an imperceptible impact on pedestrian and cycle infrastructure. Through the implementation of the CMP and TMP, it is anticipated that the effect of traffic during the construction phase will have a slight effect on the surrounding road network for a short-term period.

Operational Phase	
Traffic	The analysis of road networks surrounding the subject site has shown that the existing junctions will operate within capacity for the design year 2037 + Development + Committed Development with acceptable queue lengths. This has been achieved by updating the traffic control signals at Junction 1 and Junctions 2 so that they operate in tandem. Details of the signal phasing are provided in the Traffic and Transport Assessment Report

16.2.7 Monitoring

Construction Phase

During the Construction Phase the following monitoring is advised. The specific compliance exercises to be undertaken in relation to the range of measures detailed in the final construction management plan will be agreed with the planning authority.

- Construction vehicles routes and parking
- Internal and external road conditions
- Construction activities hours of work

Operational Phase

The Mobility Management Plan for the proposed development will be monitored and updated at regular intervals. This will enable tracking in terms of a reduction in the dependence on private car journeys and a shift towards sustainable transport options such as walking, cycling and the use of public transport such as buses and trains.

16.2.8 Material Assets – Waste Management

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Waste Management	A project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG and is included as Appendix 11.1. In addition, the following mitigation measures will be implemented: ▪ 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: ▪ Concrete rubble (including ceramics, tiles and bricks); ▪ Plasterboard; ▪ Metals; ▪ Glass; and ▪ 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; ▪ 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. The mitigation measures outlined in the Natura Impact Statement (NIS) will be implemented including display of emergency contact numbers for the Local Authority Environment Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.

Environmental Factor & Topics	Mitigation Measures
	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)* as detailed in the C&D WMP (Appendix 11.1). EPA approval will be obtained prior to moving material as a by-product. 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, the *Litter Pollution Act 1997* and 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.
Operational Phase	
Waste Management	A project specific OWMP has been prepared and is included as Appendix 11.2. In addition, the following mitigation measures will be implemented: ▪ On-site segregation of all waste materials into appropriate categories including (but not limited to): ▫ Organic waste; ▫ Dry Mixed Recyclables; ▫ Mixed Non-Recyclable 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.); and ▫ Furniture (and from time to time other bulky waste). ▪ 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.

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.

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).

16.2.9 Material Assets – Built Services

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
1. Surface Water Drainage	▪ The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment. ▪ Cut off trenches along the northern boundary of the development boundary will be constructed prior to stripping topsoil. These cut off trenches will have a settlement pond / silt trap at the end of each trench with an overflow. Straw bales will be placed within the cut off trenches at strategic locations and at the outfall of the settlement ponds to the overflow. These measures will be implemented and maintained during the construction phase to prevent surface water runoff from discharging directly into the local water course. ▪ Settlement ponds / silt traps as outlined above will be provided to prevent silt runoff into the existing ditches / watercourses during the drainage works ▪ Regular testing of surface water discharges will be undertaken at the outfall from the subject lands. The location will be agreed between the project ecologist and the site foreman at the commencement of works. Trigger levels for halting works and re-examining protection measures will be pH >9.0 or pH <6.0; and/or suspended solids >25 mg/l. These trigger levels are based on those outlined within 'Guidelines on Protection of Fisheries During Works in and Adjacent to Waters (IFI, 2016)'. ▪ Where silt control measures are noted to be failing or not working adequately, works will cease in the relevant area. The project ecologist will review and agree alternative pollution control measures, such as deepening or redirecting trenches as appropriate, before works may recommence. ▪ All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks / containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a minimum distance of 50 m from any watercourse or other water conducting features, including the cut off trenches. ▪ All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. ▪ Temporary traffic management will be implemented as appropriate during the construction of the outfalls on Marsh Road.

Environmental Factor & Topics	Mitigation Measures
2. Water Supply	▪ All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. ▪ A c. 1 km of existing 3", 6" and 150 mm mains along Marsh Road is to be replaced with a 200 mm NB mains. ▪ The break in the existing 8" main on Marsh Road is to be repaired. ▪ The setting of the existing pressure relief valve at the inlet to Marsh Road DMA will be increased by c. 17 m. ▪ All water mains will be cleaned, sterilised and tested to the satisfaction of the Irish Water/Local Authority prior to connection to the public water main. ▪ All connections to the public water main will be carried out under the supervision of the Irish Water/Local Authority ▪
3. Foul Water Drainage	▪ All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. ▪ Foul water pipes to be laid with sufficient falls to ensure self-cleansing velocity ▪ Foul and surface water pipes will be carefully laid so as to minimise the potential for cross connections.
4. ESB Supply	▪ Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.
5. Gas Supply	▪ Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works. ▪ Connections to the existing gas networks will be coordinated with the relevant utility provider and carried out by approved contractors.
6. Telecommunications	▪ Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works. ▪ Connections to the existing telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Environmental Factor & Topics	Mitigation Measures
Operational Phase	
1. Surface Water Drainage	▪ Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff from discharging above green field rates to the ditch / culvert. ▪ Attenuation systems will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather. Furthermore, the proposed Stormtech attenuation system (Catchment A) contains an 'Isolator Row' which provides treatment even in low flow conditions. This row is surrounded with filter fabric that provides for settling and filtration of sediments as the water passes through. This ensures that the majority of the solids are removed within the isolator row which prevents silt build-up in the remainder of the chambers, therefore minimising maintenance requirements and associated costs. The Stormtech systems have a stone base and permeable chambers which encourages water to permeate into the ground. ▪ Sustainable urban drainage measures such as filter drains, permeable paving, rainwater harvesting, swales etc. will be provided. ▪ A petrol interceptor will be installed to prevent hydrocarbons entering the surface water outfall. ▪ The attenuation storage systems will be constructed at a fall to maintain movement of water and thus prevent stagnation. Silt would be collected at a sump and removed periodically.
2. Water Supply	▪ None Required
3. Foul Water Drainage	▪ The drainage network will be inspected annually and maintained.
4. ESB Supply	▪ None Required
5. Gas Supply	▪ None Required
6. Telecommunications	▪ None Required

16.2.9.1 Monitoring

The proposed monitoring of the various built services during the operation stage will include:

- Surface water drainage and SUDS features will be monitored and maintained by Louth County Council.
- The water usage within the proposed development will be monitored via the bulk water meters. Records will be maintained by Irish Water to ensure any excess usage is identified and investigated as necessary.
- Irish Water will monitor the operation of the foul drainage network including the receiving environment.
- Monitoring of the quality and quantity of the soil being removed from site is necessary to ensure the efficient re-use of suitable excavated soils on the site.
- The construction and waste management plans will be adhered to.
- The provision of utility services including electricity, gas and broadband will be monitored by the relevant utility provider.

16.2.10 Cultural Heritage including Archaeology

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Archaeological Excavation of features identified	Preservation by record (excavation) of archaeological material identified and which cannot be avoided in the construction process. A license (19E0433) for this work has been granted by the National Monuments Service.
Topsoil Removal	Archaeological monitoring of all topsoil removal associated with the development. Consultation with Licensing Section of National Monuments Service should further archaeological sites or features be uncovered.
Impacts to recorded monuments	No mitigation required
Operation Phase	
Impacts on known archaeological, architectural and cultural heritage (Recorded Monuments)	No mitigation required

16.2.10.1 Monitoring

Construction

Archaeological monitoring of all topsoil removal associated with the proposed development should be undertaken. The monitoring should be carried out under licence from the NMS by a suitably qualified archaeologist. Any further archaeological sites and/or features identified during topsoil removal, and which will be directly impacted by the development, should be preserved by record (excavation). The appointed archaeologist shall consult with the Licensing Section of the NMS if further archaeological features are uncovered and methodologies shall be agreed regarding their resolution. A report is required to be compiled on completion of the archaeological excavation and monitoring and will be submitted to the relevant authorities.

Operation

None

16.2.11 Landscape and Visual

Environmental Factor & Topics	Mitigation Measures
Construction Phase	
Construction 1. Removal of site vegetation 2. Telecommunications/power lines	▪ Protection of existing trees and hedge to be retained. ▪ Erection of site hoarding. ▪ The undergrounding of existing overhead power lines is seen as a positive impact – No mitigation required
Operation Phase	
Operation 1. Introduction of new structures 2. Access Roads 3. Lighting 4. Landscaping	▪ The landscaping proposals for this scheme form an integral part of the development. There are several measures that shall reduce the visual impact of this proposed development on the landscape, i.e. extensive planting, retention of existing hedgerows and trees, development of pathways, seating areas and textured road & path surfaces. This will mitigate the introduction of new structures proposed and the new access road. ▪ As part of the submission of details to the Planning Authority, the public lighting plan will be reviewed by the bat ecologist. This plan will ensure that lighting is not directed at semi-natural vegetation and that lighting is minimized as far as possible while providing adequate public safety and security within the development. ▪ The proposed landscape plan is detailed in the Landscape Rationale by Ronan MacDiaramada & Associates and accompanied by drawings detailed a Landscape Masterplan, Planting Plan, Hardscape Plan, Boundary Treatment and Public Lighting Details.

16.2.11 Monitoring

Construction Phase - None required

Operational Phase - None Required