13.8 References

Chapter 4-12 of Volume 2 of this EIAR

Environmental Resources Management Ireland Ltd (2005) Public Safety Zones Report

EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

Garda Mapping Section – Seveso Sites Ireland WebMap [Viewed Online 05.07.2022] https://www.arcgis.com/home/item.html?id=a01b5a0a6ff24f10adff30beaa3b6fd0

Office of Emergency Planning (2020) 'A National Risk Assessment for Ireland 2020' Department of Defence Publication

Statutory Instrument (SI). No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018

14 INTERACTIONS

14.1 Introduction

As a requirement of Planning Regulations and the Environmental Protection Agency's '*Guidelines on information to be contained in Environmental Impact Assessment Reports*' (2017), interrelationships between various environmental aspects must be considered when assessing the impact of the Proposed Development, as well as individual significant impacts. The significant impacts of the Proposed Development and the proposed mitigation measures have been detailed in the relevant chapters of this report. However, as with all developments that pose potential environmental impacts, there also exists potential for interactions/interrelationships between the impacts of different environmental aspects. The results may exacerbate or ameliorate the magnitude of impacts. This chapter of the EIAR addresses the interactions between the various environmental factors of the Proposed Development.

The following Section is directed by Article 3 section 1(e) of the EIA Directive. The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft, 2017) and Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015) were also considered.

Article 3 of the Directive states:

1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:
    a) population and human health;
    b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
    c) land, soil, water, air and climate;
    d) material assets, cultural heritage and the landscape;
    e) the interaction between the factors referred to in points (a) to (d)

14.2 Study Methodology

The interactions between impacts on different environmental factors have been addressed throughout this EIAR. Close co-ordination and management with the EIAR team was carried out to ensure that all likely relevant interactions were addressed at the scoping stage of the EIAR and interactions have been adequately assessed.

Following an assessment of the EIAR, a matrix was produced to display where interactions between impacts on different factors have been addressed. This has been carried out by use of chapter headings included in the EIAR and details of any interaction during all phases of the Proposed Development.

14.3 Interactions

The following matrix has been produced to show where potential significant interactions between effects on different factors have been addressed, see Table 14-1.

As this EIAR has been prepared by a number of specialist consultants, an important aspect of the EIA process was to ensure that interactions between the various disciplines have been taken into consideration. The principal interactions requiring information exchange between the environmental specialists and the design team are summarised below in Table 14-2 to Table 14-10.

Table 14-1: Interactions between Factors

Interaction	4. Population and Human Health	5. Biodiversity	6. Land and Soil	7. Hydrology and Hydrogeology	8. Air Quality and Climate	9. Noise and Vibration	10. Landscape and Visual Amenity	11. Archaeology, Architecture and Cultural Heritage	12.1 Material Assets (Traffic)	12..2 Material Assets (Waste & Utilities)
Population and Human Health										
Biodiversity										
Land and Soil										
Hydrology and Hydrogeology										
Air Quality and Climate										
Noise & Vibration										
Landscape & Visual Amenity										
Archaeology, Architectural and Cultural Heritage										
Material Assets (Traffic)										
Material Assets (Waste & Utilities)										

	No Interaction
	Interaction
	N/A

Table 14-2 Population and Human Health

Population and Human Health	
Summary	
Chapter 4 of this EIAR, *Population and Human Health,* details the potential direct and indirect impacts of the Proposed Development on Population and Human Health; and sets out any required mitigation measures where appropriate. The population in the vicinity of the Site of the Proposed Development has been assessed in terms of demography, economic activity and employment, tourism and amenity, landscape and visual, human health and social health.	
Interactions	
Noise and Vibration	Construction activities such as site clearance, building construction works, and trucks and vehicles entering and exiting the Site have the potential to interact with the surrounding population and human health and cause nosie disturbance. The impact assessment of noise and vibration has concluded that additional noise associated with the construction and operational phase will not cause a significant impact. The operation of on-site machinery will be intermittent and last only for the duration of the Construction Phase. As such, there will be no significant impact on population and human health. The operational noise and vibration impact is not significant with a neutral effect. Noise is fully assessed in Chapter 9 of this EIAR.
Hydrology	Pollution events can impact the water quality and thus impact the human heath of the surrounding population. Appropriate surface water and foul water control measures will be implemented as part of the Proposed Development. No public health issues associated with the water conditions at the Site have been identified for the Construction Phase or Operational Phase of the Proposed Development. There are no likely significant adverse impacts as a result of Hydrology and as such there will be no significant impacts on population and human health. Hydrology has been fully assessed in Chapter 7 of this EIAR.
Land and Soil	Dust from the site and from soil spillages on the existing road network around the site may impact human health, especially during dry conditions. Best practise measures and mitigation measures have been identified in Chapter 6 of this EIAR. No significant impacts are predicted in relation to land and soil and as such there will be no significant impat on population and human health.
Air Quality and Climate	Interactions with air quality during the construction and operational phase has the potential to cause dust nuisance issues impacting on human health. However, Chapter 8 has concluded that there will be no significant air quality impacts. All ambient air quality legislative limits will be complied with and therefore the predicted impact is not significant with a neutral effect on human health. Air quality is discussed further in Chapter 8 of this EIAR.

Material Assets – Traffic	Construction activities will result in an increased number of HGV movements during the Construction Phase. The Proposed Development will also result in an increase in the population of the surrounding area and subsequently an increase in the number of vehicles. There is potential for significant impacts on population and human health in relation to the capacity and operation of the surrounding road network. No traffic routes are predicted to experience increases of more than 25% in total traffic flows during the Operational Phase. The overall impact of the Proposed Development on the transportation infrastructure in the local area will be minimal.
Material Assets – Waste and Utilities	The improper removal, handling and storage of hazardous waste has the potential to negatively impact on the health of construction workers. The Preliminary Construction and Demolition Waste Management Plan (CDWMP) (Waterman Moylan, August 2022) and CEMP (Enviroguide, August 2022) details mitigation measures to ensure the safety of the workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health. Chapter 12 of this EIAR has concluded there will be no significant impacts on the Material Assets (Waste and Utilities) as a result of the Proposed Development subsequebntly there will be no significant impact on population and human health.
Landscape and Visual	The Proposed Development will alter the visual appearance of the Site which is predominantly a greenfield Site. It is not considered that the Proposed Development by virtue of its visual appearance and in the context of the proposed zoning of the Site of the Proposed Development and the rural and residential nature of the surrounding landscape, will not cause any significant impacts and as such there will be no significant impact on population and human health.
Conclusions	
The Proposed Development has the potential to provide employment opportunities and health improvements. Employment and income are among the most significant determinants of long-term health, influencing a range of factors including the quality of housing, education, diet, lifestyle, coping skills, access to services and social networks. The Proposed Development will result in a number of new jobs being created. It is proposed approximately 300 jobs will be created during the Construction Phase and that approximately 135 jobs will be created during the Operational Phase of this development having both a direct and indirect positive impact on the local economy and employment. The Proposed Development will also create additional indirect employment for example at shops, cafes, fuel stations etc. in the vicinity of the Proposed Development. The Proposed Development will have a slight positive effect in terms of additional direct and indirect employment and on the local socio-economic environment.	

Table 14-3: Biodiversity

Biodiversity	
Summary	
Chapter 5 of this EIAR, *Biodiversity,* details the potential direct and indirect impacts of the Proposed Development on habitats, flora and fauna associated with Site of the Proposed Development. Based on an Appropriate Assessment Screening report which was carried out in relation to the Proposed Development and accompanies this application, it was concluded that the possibility may be excluded that the Proposed Development will have a significant effect on any of the European Sites listed below: • South Dublin Bay SAC (000210) • Baldoyle Bay SAC (000199) • Howth Head SAC (000202) • Rockabill to Dalkey Island SAC (003000) • Malahide Estuary SAC (000205) • Ireland's Eye SAC (002193) • Rogerstown Estuary SAC (000208) • Ireland's Eye SPA (004117) • Howth Head Coast SPA (004113) • Dalkey Islands SPA (004172) However, the possibility may not be excluded that the Proposed Development will have a likely significant effect on the following sites and accordingly a Natura Impact Statement (NIS) has been prepared; • North Dublin Bay SAC (000206) • North Bull Island SPA (004006) • South Dublin Bay and River Tolka Estuary SPA (004024) • Baldoyle Bay SPA (004016) • Malahide Estuary SPA (004025) • Rogerstown Estuary SPA (004015)	
Interactions	
Hydrology and Hydrogeology	The interactions identified are between hydrology and water and biodiversity with respect to the potential impact of water pollution on protected areas. This is addressed in further detail in the NIS that accompanies this application under separate cover.
Land and Soil	An assessment of the potential impact of the Proposed Development on land and soils is outlined in Chapter 6 – Land and Soils. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are described in full in Chapter 6.

Air Quality and Climate	An assessment of the potential impact of the Proposed Development on Air Quality and Climate is outlined in Chapter 8 - Air Quality and Climate. Designated sites of ecological conservation importance, including SPAs, SACs, NHAs and nature reserves, within 200m of the Affected Road Network (ARN) are required to be included in the air quality assessment. No sites of ecological conservation importance have been identified within 200m of the ARN; therefore, this analysis has been excluded in the current assessment and significant effects are not expected to occur. Therefore, the impact of the interaction between air quality and climate and biodiversity is insignificant.
Material Assets: Waste and Utilities	An assessment of the potential impact of the Proposed Development on Waste Management is outlined in Chapter 12.2 – Material Assets: Waste and Utilities. These impacts are considered to be relevant to the protection of small mammals which may become entangled or trapped in construction waste in the absence of mitigation, as discussed in this Chapter; and mitigation measures addressing these potential impacts are described in full in Chapter 12.
Landscape and Visual	The landscaping proposed for the Site entails the planting of over 700 trees, many of which are native species. This increase in tree cover across the Site will provide additional nesting/foraging resources for local passerines, along with a slight increase in habitat connectivity over what is currently open field habitat.
Conclusions	
Based on the the mitigation measures out-lined in the NIS, when implemented, will ensure that no adverse effects on the Natura 2000 sites will arise during the construction stage of the Proposed Development or as a consequence of run-off of sediment/silt or contaminated waters into the Naniken River during the construction stage of the Proposed Development.	

Table 14-4: Land and Soils

Land and Soil	
Summary	
Chapter 6 of this EIAR, *Land and Soil*, details the potential direct and indirect impacts of the Proposed Development on the local land, soils, and geology; and sets out any required mitigation measures where appropriate. The removal of topsoil during earthworks and the construction of roads, services and buildings, in particular basements and foundations, will expose subsoil to weathering and may result in the erosion of soils during adverse weather conditions. Surface water runoff from the surface of the excavated areas may result in silt discharges to the Naniken River. Excavations for basements, foundations, roadworks and services will result in a surplus of subsoil. Surplus subsoil will be used in fill areas where applicable. Dust from the site and from soil spillages on the existing road network around the site may be problematic, especially during dry conditions. Accidental oil or diesel spillages from construction plant and equipment, in particular at refuelling areas, may result in oil contamination of the soils and underlying geological structures. During the operational stage of the development, it is not envisaged that there will be any ongoing impacts on the underlying soil as a result of the Proposed Development. Any hydro-geological impacts are temporary and associated with the construction of the Proposed Development. No negative residual impacts in the context of land, soils and geology are anticipated regarding this Proposed Development.	
Interactions	
Population and Human Health	Dust from the site and from soil spillages on the existing road network around the site may impact human health, especially during dry conditions. Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works. It is noted that specific issues relating to Population and Human Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.
Hydrology and Hydrogeology	Accidental oil or diesel spillages from construction plant and equipment, in particular at refuelling areas, may result in oil contamination of the soils and underlying geological structures, including surface water and groundwater. Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses from oil and petrol leakages. An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is included in Chapter 7 of this EIAR.

Traffic	Excess soil excavated during construction works for the development will be transported by road for disposal in approved locations as provided for in this EIAR. Movements of construction traffic will be managed in accordance with the Construction Traffic Management Plan.
Biodiversity	Accidental oil or diesel spillages from construction plant and equipment may impact local flora and fauna. Such spills will be mitigated in accordance with Chapter 5 of this EIAR.
Noise and Vibration	Heavy machinery used for excavations may impact on noise and vibration. Both will be controlled and monitored as set out in Chapter 9 of this EIAR.
Air Quality and Climate	Dust from the site and from soil spillages on the existing road network around the site may impact air quality, especially during dry conditions. Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works. Air Quality will be controlled and monitored as set out in Chapter 8, *Air Quality and Climate,* of this EIAR.
Material Assets: Waste and Utilities	Excess soil excavated during construction works, including any potential contaminated soils, will be managed and disposed of in approved locations as provided for in this EIAR.
Conclusions	
With the protective measures noted in the respective chapters above in place during excavation works, any potential impacts on land and soils in the area will not have significant adverse impacts, and no significant adverse impacts on the soils and geology of the subject lands are envisaged.	

Table 14-5: Hydrology and Hydrogeology

Hydrology and Hydrogeology	
Summary	
Chapter 7 of this EIAR, Hydrology and Hydrogeology, provides an assessment of the potential direct and indirect impacts of the Proposed Development on hydrology, water and hydrogeology and sets out any required mitigation measures where appropriate.	
Interactions	
Population and Human Health	No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standards and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers. It is noted that specific issues relating to Public Heath associated with the Proposed Development are set out in Chapter 4 of this EIAR.
Land and Soils	An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment during the Operational Phase of the Proposed Development is set out in Chapter 6 Land, Soil and Geology.
Traffic	Any possibility of cumulative impacts on water courses at off-site locations in the immediate vicinity of the Site (i.e. The Naniken Stream and Tolka Estuary), due to sediment that may be entrained in road runoff due to Traffic activities and resulting tracked sediment and debris being tracked offsite during the Construction Phase of the Proposed Development are addressed in Section 7.5.3.2 in this Chapter. The Proposed Development will have no significant impact on overall traffic volumes at the Proposed Development Site during the Operational Phase and therefore traffic will not result in any significant impacts on water quality or quantity at sensitive water body receptors. Any specific issues relating to Traffic impacts associated with the Proposed Development are set out in Chapter 12 of this EIAR.
Biodiversity	The Proposed Development will potentially impact ecological receptors via surface water runoff to road gullies and sewers and groundwater migration. An assessment of the potential impacts of the Proposed Development on the Biodiversity of the Proposed Development Site, with emphasis on habitats, flora and fauna which may be impacted as a result of the Proposed Development is included in Chapter 5 of this EIAR. It also provides an assessment of the impacts of the Proposed Development on habitats and

	species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these impacts.
Material Assets: Waste and Utilities	Any discharges to the public foul sewer and abstractions from water supply from the Proposed Development will be under consent from Irish Water. An assessment of the potential impact of the Proposed Development on the Material Assets including built services, infrastructure, traffic, and waste management has been set out in Chapter 12 of this EIAR.
Conclusions	
Overall, provided the mitigation measures outlined in the respective Chapters outlined above, there will be no significant adverse impacts on the receiving hydrological and hydrogeological environment associated with the Construction Phase of the Proposed Development.	

Table 14-6: Air Quality and Climate

Air Quality and Climate	
Summary	
Chapter 8 of this EIAR, Air Quality and Climate, provides an assessment of the potential impacts from the Proposed Development on ambient air quality and climate, and sets out appropriate mitigation measures where necessary. There is the potential for combustion emissions from onsite machinery and traffic derived pollutants of CO_2 and N_2O to be emitted during the construction phase of the development. However, due to the size and duration of the construction phase, and the mitigation measures proposed, the effect on national GHG emissions will be insignificant in terms of Ireland's obligations under the Kyoto Protocol and therefore will have no considerable impact on climate. Overall, climatic impacts are considered to be short-term and imperceptible. The CFD study carried out for the Proposed Development has shown that under the assumed wind conditions typically occurring within Dublin for the past 30 years, the development is designed to be a high-quality environment for the scope of use intended for each area/building (i.e., comfortable and pleasant for potential pedestrians). A Flood Risk Assessment (FRA) was undertaken for the Proposed Development and concluded that as a result of the proposed mitigation measures, the residual risk of flooding from any source is low. Increased LDV and HGV traffic flow as a result of the Proposed Development is likely to contribute to increases in GHG emissions such as CO_2 and N_2O. However, these contributions are likely to be marginal in terms of overall national GHG emission estimates and Ireland's obligations under the Kyoto Protocol, and therefore unlikely to have an adverse effect on climate. The Energy Analysis Report has determined that through a number of energy and servicing strategies, an A2/A3 BER should be attainable.	
Interactions	
Population and Human Health	Interactions between Air Quality and Population and Human Health have been considered as the Operational Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as negligible, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.
Land and Soil	There is the potential for dust from soil spillages on the existing road network around the site to impact air quality, especially during dry conditions. However, dampening down measures with water sprays will be implemented during period of dry weather to reduce dust levels arising from

	the development works. Therefore, the impact of the interaction between air quality and climate and biodiversity is insignificant.
Traffic	There can be a significant interaction between air quality, climate and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as negligible. Therefore, the impact of the interaction between air quality and climate is insignificant.
Biodiversity	Designated sites of ecological conservation importance within 200m of the Affected Road Network (ARN) are required to be included in the air quality assessment. This includes special protection areas, special areas of conservation, natural heritage areas, and nature reserves. Only sites that are sensitive to nitrogen deposition should be included in the assessment, it is not necessary to include sites such as those which have been designated as a geological feature or water course. No Sites of ecological conservation importance have been identified within 200m of the ARN; therefore, this analysis has been excluded in the current assessment and significant effects are not expected to occur. Therefore, the impact of the interaction between air quality and climate and biodiversity is insignificant.
Conclusions	
It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, appropriate mitigation measures, as outlined within the Preliminary Construction, Demolition and Waste Management Plan (CDWMP) and Construction Environmental Management Plan (CEMP), will be employed as necessary to further prevent such impacts occurring. The Proposed Development is likely to result in a long-term increase in traffic on the roads surrounding the Proposed Development Site; however, this increase in traffic has been determined to have negligible impacts in terms of local air quality. Furthermore, the increase in traffic has been determined as marginal with regard to climatic impacts. Therefore, no adverse residual impacts are anticipated from the proposed scheme in the context of air quality and climate.	

Table 14-7: Noise and Vibration

Noise and Vibration	
Summary	
Chapter 9 of this EIAR, Noise and Vibration, provides a description and assessment of the likely impact of the proposed activities from noise, and sets out appropriate mitigation measures where necessary. The noise-generating activities associated with the current Site are as follows: • Site clearance, including demolition works of the pre-fab building within the grounds; • Building construction works; • Trucks entering and exiting the Site.	
Interactions	
Population and Human Health	The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the Site boundary. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development. It is noted that specific issues relating to Population and Human Health associated with the Proposed Development are set out in Chapter 4 of this EIAR.
Biodiversity	Interactions between noise and vibration and biodiversity have been considered as the Proposed Development has the potential to cause short-term impacts on biodiversity as a result of noise and vibration in the absence of mitigation measures. However, the mitigation measures employed at the Proposed Development will ensure that biodiversity will not be affected. An assessment of the potential impact of the Proposed Development on biodiversity is included in Chapter 5 of this EIAR.
Land and Soil	Soil excavation works will cause an increase in noise; however, it has been determined within Chapter 9 of this EIAR that this increase in noise will be intermittent and insignificant.
Traffic	The Proposed Development will have no significant impact on overall traffic volumes and therefore traffic will not result in any significant increases of noise at sensitive receptors.
Conclusions	
No traffic routes are predicted to experience increases of more than 25% in total traffic flows during the Operational Phase and therefore no detailed assessment is required as per the DMRB Guidelines. The impact of noise from operational traffic will be unnoticeable and will not have a negative impact.	

The noise assessment has concluded that significant impacts of noise and vibrations are not expected to occur and any potential interactions with impacts of other environmental aspects, as outlined in this EIAR, are insignificant.

Table 14-8: Landscape and Visual

Landscape and Visual Assessment	
Summary	
Chapter 10 of the EIAR, Landscape and Visual Assessment, provides a description and assessment of the likely impact of the Proposed Development on the landscape and visual amenities of the area. The main interactions with the townscape and visual impact assessment include, Architectural Design, Landscape Design, Archaeology and Cultural Heritage, Planning and Biodiversity	
Interactions	
Archaeology and Cultural Heritage	As there are no known archaeological or architectural remains found during the desk top survey as well as the walkover survey, it is not predicted that any changes in landscape or visual impact will affect in any way the archaeology of the area.
Population and Human Health	The Proposed Development will alter the visual appearance of the Site which is predominantly a greenfield Site. It is not considered that the Proposed Development by virtue of its visual appearance and in the context of the proposed zoning of the Site of the Proposed Development and the rural and residential nature of the surrounding landscape, will cause any significant impacts for the residential local population.
Biodiversity	The landscaping proposed for the Site entails the planting of over 700 trees, many of which are native species. This increase in tree cover across the Site will provide additional nesting/foraging resources for local passerines, along with a slight increase in habitat connectivity over what is currently open field habitat.
Conclusions	
Subject to implementation of all mitigation measures detailed in Chapter 10, there will be no negative residual impacts upon the landscape and visual resources.	

Table 14-9: Archaeology and Cultural Heritage

Archaeology and Cultural Heritage	
Summary	
Chapter 11 of the EIAR, Archaeology and Cultural Heritage, provides information on the known architectural, archaeological and cultural heritage sites in the study area in relation to Proposed Development. Subject to implementation of mitigation measures, there will be no negative residual impacts upon the archaeological or cultural heritage resource.	
Interactions	
Landscape and Visual	It is not predicted that any changes in landscape or visual amenities will affect in any way the archaeology and cultural heritage of the area.
Conclusions	
Subject to implementation of mitigation measures detailed in Chapter 11, there will be no negative residual impacts upon the archaeological or cultural heritage resource.	

Table 14-10: Material Assets - Traffic, Waste and Utilities

Material Assets - Traffic, Waste and Utilities	
Summary	
Chapter 12 of the EIAR, Material Assets, provides an assessment of the potential impacts of the Proposed Development on Material Assets including traffic, built services and infrastructure.	
Interactions – Traffic	
Air Quality	In the current assessment, traffic derived pollutants which may affect Air Quality and Climate have been deemed as negligible. Therefore, the impact of the interaction between air quality and climate is insignificant.
Noise	It has been concluded as part of the noise and vibration assessment that operational traffic will not result in adverse impacts on sensitive receptors in terms of noise.
Population and Human Health	Construction activities will result in an increased number of HGV movements during the Construction Phase. The Proposed Development will also result in an increase in the population of the surrounding area and subsequently an increase in the number of vehicles. There is potential for significant impacts on population and human health in relation to the capacity and operation of the surrounding road network. No traffic routes are predicted to experience increases of more than 25% in total traffic flows during the Operational Phase. The overall impact of the Proposed Development on the transportation infrastructure in the local area will be minimal.
Land and Soil	Excess soil excavated during construction works for the development will be transported by road for disposal in approved locations as provided for in this EIAR. Movements of construction traffic will be managed in accordance with the Construction Traffic Management Plan.
Waste and Utilities	Waste collection activities at the Proposed Development have the potential to impact upon traffic movements in the Raheny and Clontarf areas. Potential impacts on traffic are addressed in Chapter 12.1 of this EIAR.
Interactions – Waste & Utilities	
Land and Soils	Improper handling and segregation of hazardous or contaminated wastes could lead to the contamination of soil and stones excavated from the site. Potential impacts on land and soils are addressed in Chapter 6 of this EIAR.
Hydrology and Hydrogeology	Any connections to the public water network (water supply or foul sewer) during the Construction and Operational Phases will be under consent from Irish Water. Potential impacts on water are addressed in Chapter 7 of this EIAR.

Population and Human Health	The improper removal, handling and storage of waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health. Potential impacts on population and human health are addressed in Chapter 4 of this EIAR.
Biodiversity	The improper handling and storage of waste during the Construction and Operational Phases could negatively impact on biodiversity. Potential impacts on biodiversity are addressed in Chapter 5 (Biodiversity) of this EIAR.
Traffic	Waste collection activities at the Proposed Development have the potential to impact upon traffic movements in the Raheny and Clontarf areas. Potential impacts on traffic are addressed in Chapter 12.1 of this EIAR.
Conclusions	
A Preliminary Construction and Demolition Waste Management Plan (CDWMP), which is submitted as a separate document with this planning application, sets out that all waste generated during the Construction Phase will be segregated onsite to enable ease in re-use and recycling, wherever appropriate. Due to the use of permitted/licensed waste collection/waste management facilities, it is not predicted that the production of waste will cause any likely significant effects on the environment. It is the responsibility of the Main Contractor to ensure that waste collection contractors are legally permitted to carry the waste, and that the facility they bring the waste to is licensed to handle that type of waste as outlined in the Waste Management Act 1996 as amended.	

14.4 References

EIAR Chapters 4 to 12 inclusive.

15 MITIGATION AND MONITORING MEASURES

15.1 Introduction

This EIAR has assessed the impacts and resulting effects likely to occur as a result of the Proposed Development on the various aspects of the receiving environment.

The Proposed Development will be operated in a manner that will ensure that the potential impacts on the receiving environment are avoided where possible. In cases where impacts or potential impacts have been identified, mitigation measures have been proposed to reduce the significance of particular impacts. These mitigation recommendations are contained within each chapter exploring specific environmental aspects.

This chapter of the EIAR collates and summarises the mitigation commitments made in Chapter 4 to Chapter 13.

15.2 Summary of Mitigation Measures

15.2.1 Population and Human Health

15.2.1.1 Construction Phase

15.2.1.1.1 Mitigation

No specific mitigation measures are required during the Construction Phase of the Proposed Development in relation to population and settlements, given the lack of direct effects resulting from the Proposed Development. However, mitigation measures in relation to air emissions (dust), noise, traffic, waste etc. are identified in their respective chapters in this EIA Report.

15.2.1.1.2 Monitoring

No specific monitoring measures are required in relation to population and settlements, given the lack of direct effects resulting from the Proposed Development. However, monitoring in relation to noise and traffic are identified in their respective chapters in this EIA Report.

15.2.1.2 Operational Phase

15.2.1.2.1 Mitigation

No specific mitigation measures are required during the Operational Phase of the Proposed Development in relation to population and settlements, given the lack of direct effects resulting from the Proposed Development. However, mitigation measures in relation to air emissions, noise, traffic, waste etc. are identified in their respective chapters in this EIA Report.

15.2.1.2.2 Monitoring

No specific monitoring measures are required in relation to population and settlements, given the lack of direct effects resulting from the Proposed Development. However, monitoring in relation to noise and traffic are identified in their respective chapters in this EIA Report.

15.2.2 Biodiversity

15.2.2.1 Mitigation Measures

15.2.2.1.1 Mitigation 1: Controlled Vegetation Removal

Hedgehog

During the Construction Phase of the Proposed Development Hedgehogs in particular have the potential to be significantly impacted through the loss of suitable hibernation and nest sites in the form of piles of dead wood, vegetation and leaves on site.

This can be mitigated through the careful removal of dead wood/leaves to another part of the site where they will not be affected. Woody debris from the proposed management of hedgerow/treeline areas on site should also be left in this out-of-the way area as compensatory hedgehog habitat during the Construction Phase.

Work likely to cause disturbance during hibernation – for example removal of hibernation habitats such as log piles and dense scrub/hedgerow – should not take place during Winter i.e., 1st November to 1st March, but also must take into account the breeding bird season (1st March to 31st August.) in order to avoid potential nest destruction and bird mortality.

As such, it is recommended that any removal of trees or scrub be carried out in **September/October** in order to ensure the best biodiversity outcome and to comply with the Wildlife Acts 1976 and Amendments.

Nesting birds

The removal of trees and scrub will be completed outside the main bird nesting season where possible, i.e., **1st March to 31st August.** Should removal within this period be unavoidable, a suitably qualified Ecologist will be instructed to survey the affected vegetation prior to removal. Should any active nests and/or eggs be present, the section of vegetation containing them will be noted and fenced off and protected until the young birds have fledged and left the nest or, where possible, the end of the nesting season. Fledging will be confirmed by the Ecologist through further surveys. Once this has been confirmed the nest can be removed and the vegetation cleared under the supervision of the Ecologist. Please note that active nests will require a buffer zone to limit the disturbance of works in their vicinity. This will be agreed in consultation with the Ecologist.

15.2.2.1.2 Mitigation 2: Badgers

Transport Infrastructure Ireland's (TII, previously the NRA) *Guidelines for the treatment of badgers prior to the construction of national road schemes,* will be consulted in terms of the management of potential badger setts at the Site of the Proposed Development. The following measures are taken from this guidance document and the Badger Assessment Report prepared by Brian Keeley (2022) (See Appendix E) and adapted to apply to the Proposed Development.

Prior to the commencement of any construction works, a pre-construction badger survey will be carried out by a suitably qualified Badger specialist; to establish the current status of the badger setts (main and annexe setts) located in the north-western corner of the Site.

As badgers are known to inhabit the Site and surrounding lands, a Construction Phase Badger Management Plan will be prepared by the Badger specialist, to be approved by the NPWS prior to any works commencing on site. This document will detail any protection zones required to ensure the works do not undermine the setts or their tunnels, and the mitigation measures that will be required to protect badger for the extent of the Construction Phase e.g., no works buffer zone, badger-proof fencing to prevent access to the Site during works etc.

Works close to badger setts will only be conducted under the supervision of the badger specialist under licence from the NPWS. During the breeding season (December to July inclusive), no works should be undertaken within 50m of active setts nor blasting or pile driving within 150m of active setts.

Badger sett tunnel systems can extend up to ca. 20m from sett entrances. As there is the possibility that tunnels would be destroyed by movement of heavy plant over the ground above them, it is essential that no heavy plant cross within 30 metres of a sett entrance (where there is potential for chambers or tunnels beyond this, a 50 metre distance should be observed). This will ensure that setts are not damaged and that badgers are not inadvertently crushed during construction. Lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances unless under the supervision of the badger specialist.

15.2.2.2 Sett removal

The retention of the setts in-situ is unfeasible due to spatial constraints and the footprint of the Proposed Development. As such, a suitably qualified Badger specialist will be instructed to prepare an exclusion plan for the decommissioning of the setts and their destruction once all badgers have been confirmed to have vacated. The objective is to allow the badgers to remain within their territory, even though a portion of their current territory will be lost as a result of the Proposed Development. The provision of an artificial sett within the Site of the Proposed Development will also be incorporated into the landscape plan as detailed below.

The existing setts will not be excluded or destroyed until the artificial replacement sett has been constructed.

Exclusion of badgers from the setts

Exclusion of badgers from the setts should only be carried out during the period of **August to November (inclusive)** in order to avoid the badger breeding season.

As per the TII guidance, the removal of badgers from affected setts and subsequent destruction of these setts will only be conducted with NPWS permission/approval, and by experienced badger specialists. The exclusion process will include monitoring to ensure that badgers have fully evacuated the setts prior to their destruction. The NPWS grant permission/approval to the experts undertaking the badger operations and not to the developer or contractor. A badger sett exclusion plan and method statement will be prepared by the badger specialist and provided to the NPWS prior to commencement for their approval. No works will take place without the supervision of the Badger specialist.

Measures to ensure the sett has been vacated and is devoid of all badgers will be designed by the Badger specialist, involving a combination of:

- one-way badger gates on active entrances,

- badger proof fencing,
- soft and hard blocking of inactive entrances, and
- recurring inspections.

Gates will be left installed, with regular inspections, over a minimum period of 21 days before the sett is deemed inactive. Any badger activity at all will require the procedures to be repeated or additional measures taken. Sett destruction should commence immediately following the 21 day exclusion period, provided that all badgers have been excluded. Should a badger be discovered during this operation, the NPWS will be advised immediately and all excavation will cease until it is agreed with NPWS that it may continue.

No exclusion will commence in advance of the completion of the artificial sett.

All setts should be assessed on a case by case basis by a suitably experienced badger expert, with measures adapted to suit the situation as per the expert's direction.

Sett destruction

The destruction of a successfully evacuated badger sett may only be conducted under the supervision of qualified and experienced personnel with approval/permission from the NPWS. The possibility of badgers remaining within a sett must always be considered; suitable equipment should be available on hand to deal with badgers within the sett or any badgers injured during sett destruction.

TII Guidelines recommend that sett destruction is usually undertaken with a tracked 12-25 ton digger, commencing at ca. 25m from the outer sett entrances and working towards the centre of the sett, cutting ca. 0.5m slices in a trench to a depth of 2m. Exposed tunnels may be checked for recent badger activity with full attention paid to safety requirements in so doing.

A report detailing the evacuation procedures, sett excavation and destruction, and any other relevant issues will be prepared by the badger specialist and submitted to the NPWS.

Artificial sett provision

An artificial main sett will be provided within the north-eastern corner of the Site as compensation for the loss of the existing main sett. The possibility of installing an artificial sett elsewhere in the park as compensation was also considered and is a viable alternative, however, the installation of the new sett within a suitable location at the Site is the preferred option.

The new sett location will be located in the north-eastern corner of the Site, approx. 230m east of the existing main sett and linked by the existing woodland corridor present along the Site's northern and eastern boundaries (See Figure 15-2). The new sett will be constructed and established before the badgers are excluded from the existing setts and they are destroyed.

The artificial sett will be accessed by six entrances and will require a minimum of six chambers to accommodate a breeding group of badgers. The badger specialist recommends an area of 15m x 15m for the sett. A dense section of scrub vegetation (e.g., Gorse, Brambles, Elder, Hawthorn, Blackthorn) will be planted within the designated artificial sett area; the goal being to connect the site with the woodland margin along the Site's eastern boundary and provide connectivity with the rest of the park for the badgers to forage as before, to provide shelter

and protection for the sett and minimise human related disturbance from the Proposed Development; thus maximising the setts chances of being adopted.

All lighting will avoid illumination of the setts or any alternative setts installed within the Site.

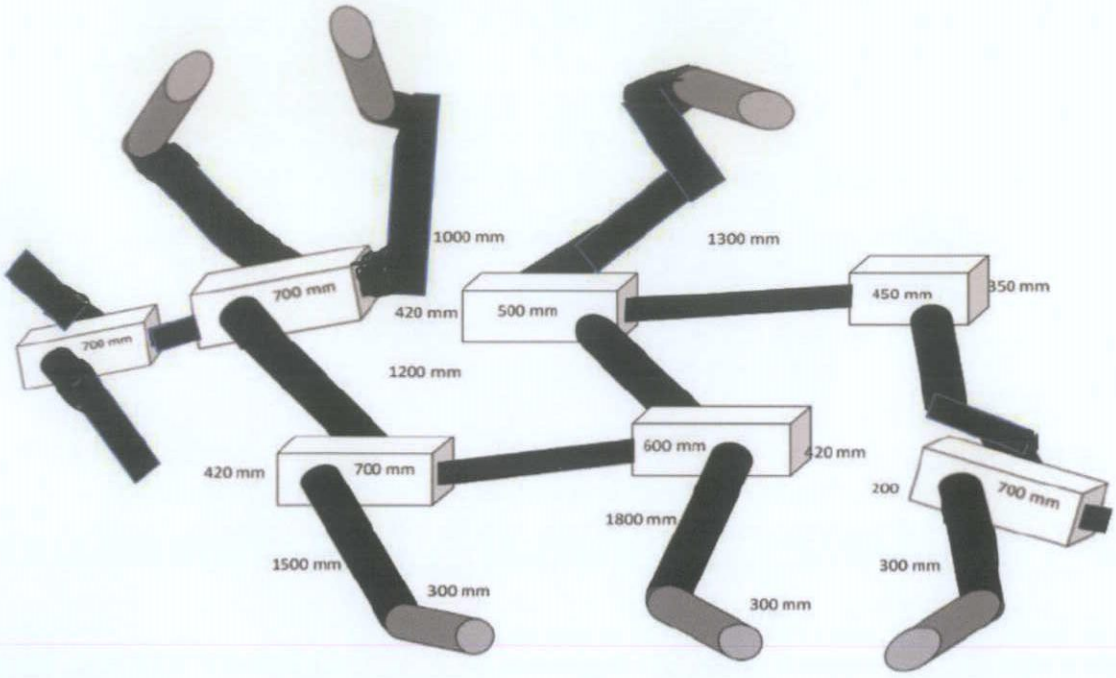

Figure 15-1. Schematic representation of an artificial sett design with 7 chambers and 6 entrances. Three open tunnels would allow expansion of the sett following occupation. Extracted from Badger Assessment Report (Keeley, 2022).

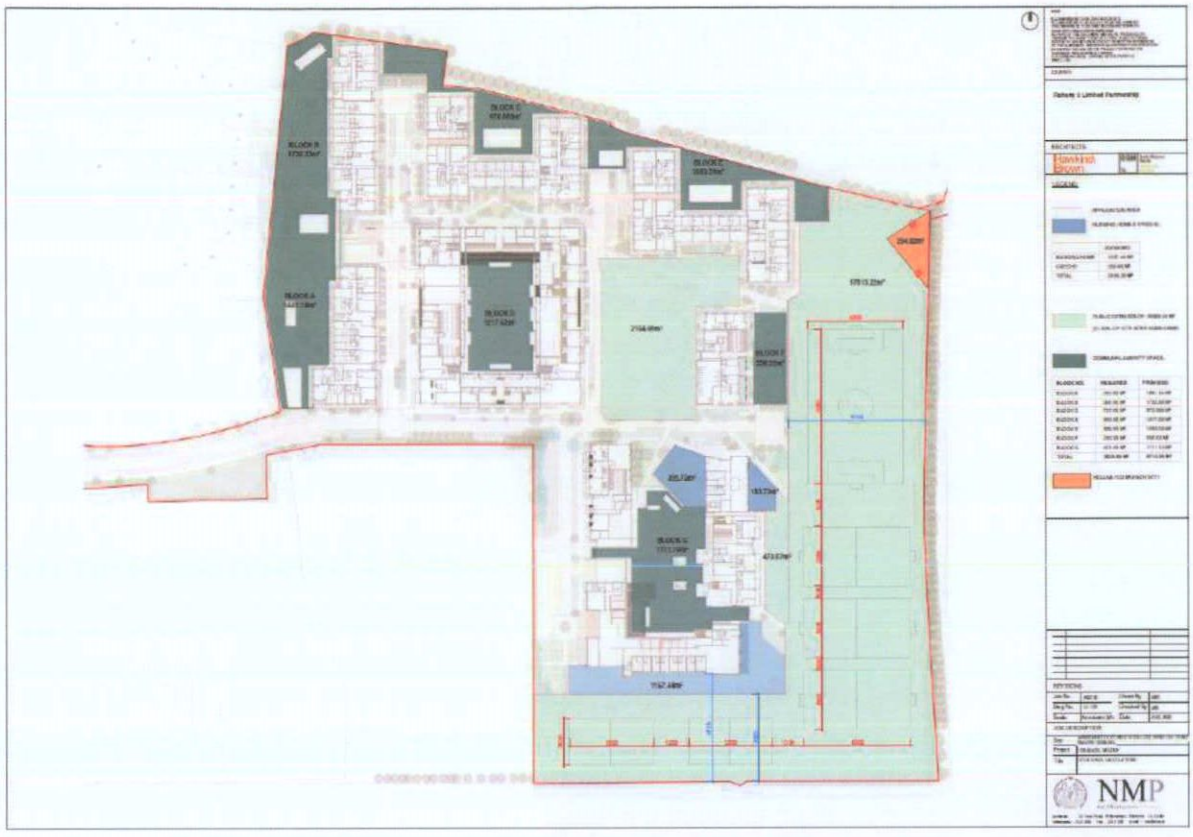

Figure 15-2. Image showing the location of the proposed artificial sett area within the north-eastern corner of the Site (Orange area).

Construction of the artificial sett must not place existing setts in danger. All construction equipment must remain a minimum of 30 metres (up to 50 metres where there is potential for chambers or tunnels) from all existing (naturally constructed) sett entrances during the creation of the new sett.

Artificial setts will be constructed several months in advance of the closure of a breeding sett. In this interval, the affected badgers should be encouraged to utilise the artificial sett by means of attractive food baits (peanuts etc.) and materials from the breeding sett added to the new sett (such as bedding and spoil). The construction of an effective artificial sett is an exercise best conducted by experienced personnel. The constructed tunnels and chamber system will be located in well-drained soils and be landscaped and planted to ensure adequate cover and lack of disturbance.

Recommending monitoring of badger activity is discussed in section 5.9.

Disturbance limitation

In order to minimise the potential for human and dog related disturbance of the new sett area and its surrounding vegetation, access to this portion of the site will be restricted and discouraged through landscaping (e.g., fencing, dense planting) and signage (e.g., 'Dogs to be kept on leads to protect wildlife').

15.2.2.2.1 Mitigation 3: Bat-friendly Tree Felling

Prior to the demolition of any site structure, and/ or the felling of any mature trees within the Site, it is required that a roost inspection survey is carried out at the appropriate time of year by a suitably qualified ecologist in order to determine the presence of any potential roosts.

Any potential bat roost trees, i.e., in particular those located within the north-western section of the subject lands, will be surveyed by a suitably qualified bat ecologist for bat emergence/activity **during the dusk and dawn immediately prior to felling**. If no bats are found to be roosting within these trees, then they will be section-felled under the supervision of an experienced ecologist/bat specialist.

Felling will take place, where possible, during the months of **September and October**, to avoid both the nesting bird season and the hibernation period for bats; in which rooting bats are most at risk of death or injury during tree felling.

Tree-felling will be undertaken using heavy plant and chainsaw. There is a wide range of machinery available with the weight and stability to safely fell a tree. Normally trees are pushed over, with a need to excavate and sever roots in some cases. In order to ensure the optimum warning for any roosting bats that may still be present, the tree should be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. Any affected trees should then be pushed to the ground slowly and should remain in place for a period of at least 24 hours, and preferably 48 hours to allow bats to escape.

Trees felled will not **under any circumstances** be cut up or mulched immediately after felling in case protected wildlife is present.

15.2.2.2.2 Mitigation 4: Bat-friendly Lighting

The impact of increased night-time lighting as a result of the Proposed Development will be mitigated through the incorporation of bat-friendly lighting measures into the project design and the lighting plan.

In order to minimise disturbance to bats commuting/foraging in the vicinity of the Site, lighting will be designed to minimise light-spill onto any hedgerows or treelines to be retained at the Site. This can be achieved by ensuring that the design of lighting adheres to the guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers *'Bats and Lighting in the UK - Bats and Built Environment Series'*, (ILP, 2018) the Bat Conservation Trust *'Artificial Lighting and Wildlife Interim Guidance'* and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*. Therefore, the lighting scheme will include the following:

- The minimisation of night-time lighting emitted during both the Construction and Operational Phases of the Proposed Development (once health and safety requirements are met).
- The avoidance of direct lighting of treelines and hedgerows at the Site, as well as areas of planting.
- Unnecessary light spill controlled through a combination of directional lighting and hooded / shielded luminaires.

- Where appropriate, luminaires on the site boundary will be fitted with light baffles to prevent light spill onto adjacent habitats.
- Areas around the perimeter should not be lit up nor lighting directed towards them. Lighting in these areas should not increase beyond existing night-time lux levels or 1 lux, whichever is the lesser.
- Movement sensor triggered lighting and low level bollards will be considered for paths around the perimeter of the Proposed Development, particularly areas of proposed tree planting.
- Vertical light spill at light sources will be below 3m to avoid potential bat flight paths.
- No floodlighting will be used – this causes a large amount of light spillage into the sky significantly impacting bats. The spread of light should be kept below the horizontal.
- Hoods, louvres, shields or cowls should be fitted on the lights to reduce light spillage.
- Lights will be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area.
- Narrow spectrum lighting should be used with a low UV component. Glass also helps reduce the UV component emitted by lights.
- The source of light will be Light Emitting Diodes (LEDs) as this is a narrow beam that is highly directional and a highly energy efficient light source.

Incorporation of the appropriate luminaire specifications as advised by a lighting professional can have a considerable input in mitigating the potential impact of night-time lighting on local bats.

Night-time lighting across the Site of the Proposed Development should be kept to a minimum during both the Construction and Operational Phases of the Proposed Development through the reduction of light spill from the building interior via windows/entrances, and the reduction of spill/glare from outdoor lighting in place on the building exterior and throughout the Site (see Figure 15-3).

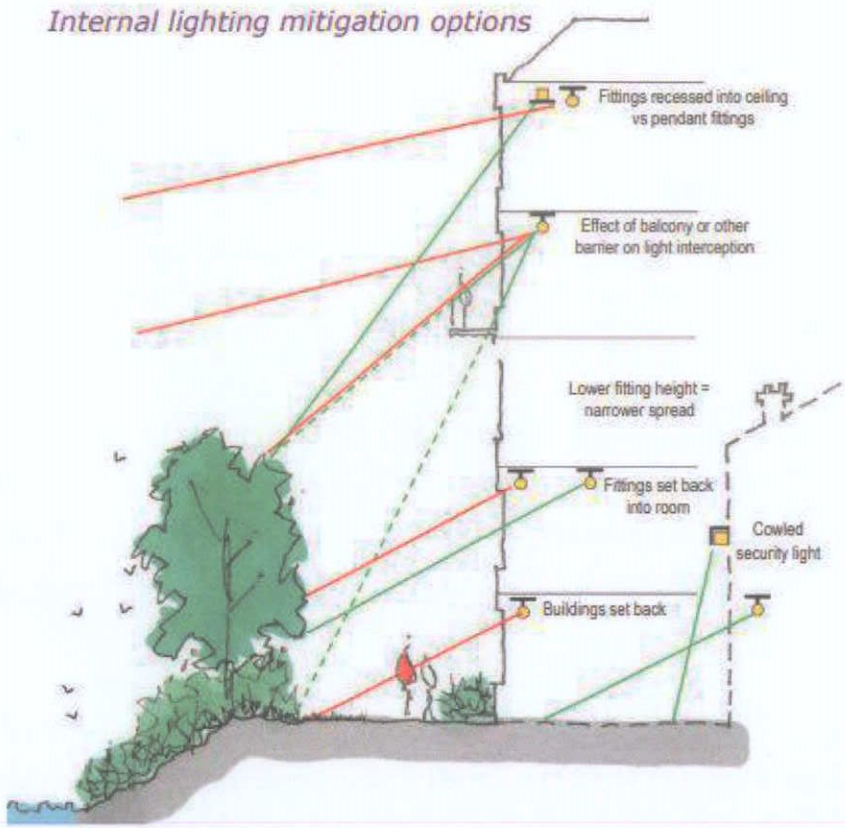

Figure 15-3. Internal Lighting Guidance Diagram adapted from ILP (2018).

It is noted that bat-friendly lighting measures as detailed above will have a similar positive effect with regard to commuting bird species flying at night. Further measures are outlined in '*Best Practices for Effective Lighting*' (City of Toronto, 2017).

15.2.2.2.3 Mitigation 5: Habitat Protection

There is a potential impact on identified habitats locally and associated fauna, as a result of surface water run-off containing silt, oil or other pollutants into the drainage ditch adjacent to the Proposed Development, with a potential connection with the Naniken Stream (100m north of the Proposed Development) which eventually flows into North Bull Island's south lagoon.

The CEMP will be implemented by the appointed Contractor that details the suitable precautions to be followed in relation to any potential pollution of watercourses from construction activities. The storage of materials, containers, stockpiles and waste, however temporary, must follow best practice at all times and be stored at designated areas away from watercourses.

The *Engineering Assessment Report* submitted with this planning application, details the comprehensive Sustainable Drainage System (SUDS) that is to be incorporated into the Proposed Development. Similarly, the *Arboriculture Report* completed by The Tree File Consulting Arborists, details the tree protection measures that will be implemented in order to protect trees that are to be retained as part of the Proposed Development.

15.2.2.2.4 Mitigation 6: Naniken Stream and European Eel

15.2.2.2.4.1 Construction Phase

The following is proposed to ensure that no potential adverse effects will arise from construction-related surface water discharges from the Proposed Development. All works adjacent to the Naniken River will be carried out in accordance with Inland Fisheries Ireland (IFI), "*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*". Contact will be made with IFI to ensure the works comply with the provisions of the Fisheries Act and Habitats Regulations, and in accordance with any detailed operational and construction requirements issued by IFI.

Best practise Construction measures for works within, or in the vicinity of watercourses will also be followed as per '*Guidelines for the crossing of watercourses during the construction of national road schemes*' (TII, 2008) and '*Control of water pollution from linear construction projects - CIRIA C648'* (CIRIA, 2006). The below measures will be included in the CEMP to prevent the release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters into the receiving surface water network:

- A suitably qualified Ecological Clerk of Works (ECoW) will be present on-site during the works being undertaken along the Naniken river bank i.e., the installation of the surface water outfall.
- Specific measures to prevent the release of sediment over baseline conditions to the Naniken River (and subsequently the Tolka Estuary) and Dublin Bay during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any works/upgrading to the surface and foul water drainage networks at the site of the Proposed Development.
- It will be ensured that all river protection measures will be **maintained in good and effective condition** for the duration of the proposed works and checked regularly to ensure that the silt fencing and other mitigation measures are operating effectively. Daily checks may be appropriate during the initial site clearance, during works in the vicinity of the watercourse, and during and after storm events. Weekly or bi-weekly checks may be appropriate at other times.
- Provision of exclusion zones and barriers such as silt fences between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the Naniken River and/or existing drainage systems and hence the downstream receiving water environment.
- Silt traps will not be constructed immediately adjacent to the Naniken River, i.e. a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges.
- Provision of temporary construction surface drainage and sediment control measures will be in place before the construction of the pipeline and/or earthworks commence.

- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the Site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to the Naniken Stream and/or surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to the Naniken Stream or existing surface water drainage systems. Concrete washout areas will be located remote from the Naniken Stream or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses.
- Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of into the Naniken Stream, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations.
- Temporary oil interceptor facilities will be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.
- All containment and treatment facilities are regularly inspected and maintained.
- All mobile fuel bowsers will carry a spill kit and operatives must have spill response training.
- All fuel containing equipment such as portable generators will be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked.
- Implementation of response measures to potential pollution incidents.
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- Water supplies will be recycled for use in the wheel wash. All waters will be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility will be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).

15.2.2.2.4.2 Operational Phase

With regard to the proposed discharge of treated operational surface water from the Proposed Development to the Naniken River, the potential for surface water generated at the Site of the

Proposed Development to cause significant effects to downstream sensitivities during the Operational Phase would be considered negligible due in part to the SUDS measures incorporated in the Project Design. Project specific SUDS measures are described below.

The following attenuation and SUDS measures will be incorporated into the Proposed Development as detailed in the Engineering Assessment Report (Waterman Moylan, 2021):

- Permeable paving
- Filter drains throughout Site
- Extensive green roofs on the buildings
- Tree pits located throughout the Site
- Underground attenuation tank
- Flow control device (Hydrobrake or similar) and
- Class 1 Bypass petrol interceptor located prior to outfall to Naniken River.

15.2.2.2.5 Mitigation 7: Noise Management

A number of measures will be included in the final CEMP as set out in *BS 5228-1: A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise,* that will be put in place during the Construction Phase of the Proposed Development. These will ensure that the level of noise caused by the proposed works will be controlled/reduced where possible so as to minimise the potential disturbance impact on local fauna species.

These measures will include but are not limited to:

- Selection of plant with low inherent potential for generating noise.
- Avoid unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Use of alternative reversing alarm systems on plant machinery.
- Where noise becomes a source of resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.
- Limiting the hours during which site activities likely to create high levels of noise are permitted.
- Appointing a site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

These measures will ensure that any noise disturbance to local birds or any other fauna species in the vicinity of the Site of the Proposed Development will be reduced to a minimum.

15.2.2.2.6 Mitigation 8: Reduction of Construction hazards

All construction waste with the potential to harm small mammals e.g., plastic sheeting, netting/mesh will be kept above ground; to reduce the risks to small mammal of suffocation/ entrapment.

To prevent mammals becoming trapped in excavations during the Construction Phase, a means of escape e.g., ramps, or objects such as planks will be placed in pits overnight.

15.2.2.3 Monitoring

15.2.2.3.1 Construction Phase

15.2.2.3.1.1 Bats

As a precautionary measure, it is recommended that the relevant potential bat roost trees, located within the north-western section of the subject lands, are section-felled under the supervision of an experienced ecologist. If bats are present, all works must cease, and NPWS contacted in order to obtain a derogation licence. The CEMP submitted with this planning application provides for a Project Environmental Consultant who will supervise or appoint a suitably qualified person to supervise any work that has potential to involve risk to the environment.

15.2.2.3.1.2 Surface water protection measures

The applicant will ensure that monitoring during the Construction Phase will be carried out by a suitably qualified person. This person will specifically ensure that mitigation measures set out in this report are fully implemented, particularly in relation to the protection of the Naniken Stream (i.e., silt fencing condition and supervision of works in or near the stream).

Surface water protection measures e.g., silt fences etc., will be monitored for their effectiveness for the duration of the works. Daily checks may be appropriate during the initial site clearance, during works in the vicinity of the watercourse, and during and after storm events. Weekly or bi-weekly checks may be appropriate at other times.

15.2.2.3.2 Operational Phase

15.2.2.3.2.1 Badger monitoring programme

Construction Phase

A suitably qualified Badger specialist will be employed prior to the commencement of works on site to survey the Site for badger activity and assess the status of the existing setts.

The specialist will be employed for the duration of the construction Phase and will supervise all works in the vicinity of the existing setts and the artificial sett once constructed. The construction of the artificial sett will also be carried out under the supervision of this specialist in consultation with NPWS.

The specialist will ensure no harm come to badgers during the Construction Phase e.g., exclusion fencing to prevent access to the construction site as required.

A schedule of checks will be drawn up by the specialist to cover the duration of the Construction Phase; to ensure that badger protection measures are in place and working effectively.

Post Construction

A post-construction monitoring programme is proposed for the Site to assess the success (or not) of the mitigation measures relating to badgers. The post construction monitoring will entail the assessment of badger activity at the Site post construction, and the assessment of the success of the artificial sett.

On completion of all works, an inspection of the artificial sett will be carried out to ensure it is accessible and in good repair. It is proposed that inspections be carried out six months and one year after the date of this initial inspection, using camera traps to determine whether the sett is being used and proposing any further remedial measures if relevant. All inspections, monitoring and license applications will be conducted by suitably qualified badger specialist, with reporting to the relevant authorities.

15.2.2.3.2.2 European Eel and operational surface water monitoring

A monitoring program will be put in place to survey the 'Duck Pond' for European Eel prior to the commencement of works, to establish a baseline of Eel usage of the pond. The pond will be surveyed again once construction has completed, and the Proposed Development is operational. The timing and frequency of this program of surveys will be agreed with Inland Fisheries Ireland and will be carried out by suitably qualified Ecologists with the appropriate licences from the NPWS as required.

The aim of this monitoring program will be to assess whether the operation of the Proposed Development is having an adverse effect on this European Eel population, through comparisons between the baseline survey results and those post development.

15.2.3 Land and Soils

15.2.3.1 Construction Phase

15.2.3.1.1 Mitigation

To reduce the quantity of soil to be removed from or imported into the site, the floor levels of the proposed buildings and roads are designed to match existing levels as closely as is feasible, to minimise the cut and fill balance. The number of vehicle movements offsite will be minimised by this optimisation. However, given that there are two large basements proposed, it is anticipated that there will be a surplus of soil to be removed from the site.

Surplus subsoil and rock that may be required to be removed from site will be deposited in approved fill areas or to an approved waste disposal facility. Surplus subsoil will be stockpiled on site, in such a manner as to avoid contamination with builders' waste materials, etc., and so as to preserve the materials for future use as clean fill. A Preliminary Construction and Demolition Waste Management Plan will include protocols for soil removal and should be implemented by the development's main contractor during the construction stage.

Soil samples taken from the site during the site investigations showed no evidence of contamination. However, any contaminated soils that are encountered during the works will be excavated and disposed of off-site in accordance with the Waste Management Acts, 1998-2006, and associated regulations and guidance provided in Guidelines for the Management of Waste from National Road Construction Projects published by the National Roads Authority in 2008.

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 therefore 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.

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 will be kept by the C&D Waste Manager.

The provision of wheel wash facilities at the construction entrance to the development will minimise the amount of soil deposited on the surrounding road network. The adjoining road network will be cleaned on a regular basis, as required, to prevent the build-up of soils from the development site on the existing public roads. Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses (in particular the Naniken River) from oil and petrol

leakages. Suitable bunded areas will be installed for oil and petrol storage tanks. Designated fuel filling points will be put in place with appropriate oil and petrol interceptors to provide protection from accidental spills. Refuelling will be restricted to these allocated re-fuelling areas. This area is to be an impermeable bunded area designed to contain 110% of the volume of fuel stored.

During excavation works, temporary sumps will be used to collect any surface water run-off thereby avoiding standing water within the excavations. If groundwater is encountered during excavations, mechanical pumps will be required to remove the groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

Silt traps, silt fences and tailing ponds will need to be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction stage. Surface water runoff and water pumped from the excavation works will be discharged via a silt trap / settlement pond to the existing foul drainage network. Straw bales will be used at the outfall to filter surface water to remove contaminants.

After implementation of the above measures, the Proposed Development will not give rise to any significant long term adverse impact. Moderate negative impacts during the construction stage will be short term only in duration.

A Construction Management Plan, Traffic Management Plan and Construction and Demolition Waste Management Plan will be implemented by the contractor during the construction stage to control the above remedial measures.

15.2.3.1.1 Monitoring

Monitoring during the construction phase is recommended, in particular in relation to the following:

- Adequate protection of topsoil stockpiled for reuse.
- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharging to existing watercourses, ditches and the Naniken River.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.
- Dust control by dampening down measures close to the boundaries of the site, when required due to unusually dry weather conditions.

15.2.3.2 Operational Phase

15.2.3.2.1 Mitigation

On completion of the construction phase and following replacement of topsoil, a planting programme will commence to prevent soil erosion. SuDS and filtration devices are proposed to be provided as part of the development. These will help to remove pollutants from rainwater runoff. The SuDS proposals will also encourage infiltration of surface water to the ground.

15.2.3.2.2 Monitoring

During the Operational Phase, the surface water network (drains, gullies, manholes, AJs, SuDS devices, attenuation system) will need to be regularly maintained and cleaned out. A suitable maintenance regime of inspecting and cleaning should be incorporated into the safety file/maintenance manual for the Proposed Development once Operational. A Building Lifecycle Report has been prepared for the Proposed Development by Aramark (2022), which states that rainwater drainage systems installed at the Proposed Development will be cleaned out bi-annually.

15.2.4 Hydrology

These avoidance, remedial and mitigation measures, will ensure that there will be no significant impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

15.2.4.1 Mitigation

15.2.4.1.1 Construction Phase

A Construction Environmental Management Plan (CEMP) and Construction and Demolition Waste Management Plan (CDWMP) will be implemented by the contractor to ensure, site-specific procedures and mitigation measures to monitor and control environmental impacts throughout the Construction Phase of the project and ensure that construction activities do not adversely impact the environment. The CEMP and CDWMP will take cognisance of the measures outlined in the EIAR and the Preliminary CDWMP (Waterman Moylan, 2022) and CEMP (Enviroguide Consulting, 2022) submitted under separate cover with the planning application for the Proposed Development.

The construction works will be managed with consideration of applicable regulations and standard international best practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- EPA (2004) IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities;
- CIRIA 697, The SUDS Manual, 2007;
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004;
- Construction Industry Research and Information Association CIRIA C648: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006);
- CIRIA C648: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006); and
- Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters

15.2.4.1.1.1 Control and Management of Water

There will be no discharges to groundwater or surface water during the Construction Phase. Water runoff to adjoining roads will not be permitted.

There is no anticipation for groundwater dewatering during the construction of the basement and management of water will include control of surface water runoff and pumping of water from excavations.

Where necessary the water will be treated onsite to remove sediment or other potentially contaminating compounds. The treated water will be tankered offsite or discharged to sewer only under licence from Irish Water as appropriate.

During earthworks there is the potential for suspended solids entrained in runoff to enter the gullies on the adjoining roads.

Silt fences will be appropriately located around earthworks areas as appropriate to manage runoff. The contractor is to ensure that no contaminated water/liquids leave the Proposed Development Site (as surface water and surface water run-off or otherwise), enter the local drainage system or direct discharge drainage ditches or water courses or springs in particular the Naniken Stream.

The quality of the discharge of water from excavations will be regularly monitored visually for a hydrocarbon sheen and suspended solids, as well as periodic laboratory testing.

Any erosion control measures (i.e., silt-traps, silt-fencing and swales) will be regularly maintained during the Construction Phase. Any required silt fences of silt-traps must not be places within 10m of any open water course of drainage ditch.

The flows of water into excavations are anticipated to be small and will be managed by sump pumping, which will be managed in accordance with best practice standards (CIRIA – C750) and regulatory consents.

15.2.4.1.1.2 In-stream Works and Protection of Water Courses

All open water courses adjacent to the site (namely the Naniken Stream) will be protected by a 10m constraint zone around the water course to avoid suspended sediment or other potential contaminants being released into the water course. Site vehicles will only be permitted within this 10m buffer to facilitate instream works to enable construction of the outfall to the Naniken Stream. Crossings of the Naniken Stream will not be required and will not be permitted except in an emergency scenario if required.

All instream works or works carried out at the Naniken Stream will follow the guidelines published by Inland Fisheries Ireland (IFI) 'Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters' (IFI, 2016) and The National Roads Authority (2018) (now Transport Infrastructure Ireland) 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' and other current best-practice standards at the time of construction.

Where instream works are required for the construction of outfalls, the following must be implemented in addition to other measures outlined in Section 7.6:

- Instream machine works will be avoided and if required any machines working in the watercourse must be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels.
- Instream earthworks must be executed so as to minimise the suspension of solids.
- Any over-pumping of temporary diversion of water required must include appropriate treatment of water before return to the water course

- Every care must be taken to insure against spillage of concrete or leakage of cement grout within cofferdams.

A suitably qualified Environmental Clerk of Works will be present on-site during the works being undertaken along the Naniken Stream in particular the construction of the surface water outfall.

Monitoring of all water protection measures and infrastructure (e.g., silt-traps, silt-fences and other operational controls) will be undertaken to ensure effective operation for the duration of the Construction Phase. Any damaged or defective infrastructure will be replaced immediately (within the same working day).

15.2.4.1.1.3 Control and Management of Soil and Bedrock

Prior to excavation, a detailed review of the final cut and fill model will be carried out to confirm cut and fill volumes. As the site is largely undeveloped contaminated soil is not expected to be encountered. Soil analytical data included in the site investigation report (Appendix I) indicates the general absence of contamination associated with anthropogenic sources at the Site. In the event that as yet unidentified contaminated soils or other contaminated materials are encountered during the works, these will be managed in accordance with relevant guidelines including EPA 'Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites' (EPA, 2013) and guidance and standards current at the time of construction works. Potentially contaminated soil to be excavated and removed and disposed of off-site in accordance with the Waste Management Acts, 1996 as amended, and associated regulations and guidance.

Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities.

15.2.4.1.1.4 Management of Stockpiles

Stockpiled soil and stone materials pending removal offsite or reuse onsite will be located in in designated areas only and there will be no storage of materials within 10m of any boundary, drains and watercourses. Where necessary, stockpiles will be surrounded with silt fencing to filter out any suspended solids from surface water arising from these materials (refer to Section 7.6.1.1).

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal will be stockpiled as follows:

- A suitable temporary storage area will be identified and designated;
- All stockpiles will be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings;
- Erroneous pieces of concrete will be screened from the stockpiled soils and segregated separately;
- Non-hazardous and hazardous soil (if required to be stockpiled) will be stockpiled only on hard-standing or high-grade polythene sheeting to prevent cross-contamination of the soil below; and

- Soil stockpiles will be sealed to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust.

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery; and
- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

15.2.4.1.1.5 Concrete Works

The use of cementitious grout used during the construction of the basement and other infrastructure will avoid any contamination of the ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

All ready-mixed concrete will be delivered to the Proposed Development Site by truck. Concrete mixer trucks will not be permitted to wash out onsite with the exception of cleaning the chute into a container which will then be emptied into a skip for appropriate compliant removal offsite.

There will be a requirement for in-stream and near stream works for the construction of the outfall to the Naniken Stream. Pre-cast structures will be used where technically feasible in accordance with the drainage design specification. Avoidance and mitigation measures for the in-stream works are detailed in Section 7.6.1.2.

15.2.4.1.1.6 Piling Methodology

The proposed piling methodology will minimise the potential for the introduction of any temporary conduit between any potential sources of contamination at the ground surface and underlying groundwater. The piling method will include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other piling/drilling fluids from entering the pile bores and surrounding formation. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will use water-based, biodegradable and non-hazardous compounds under controlled conditions.

15.2.4.1.1.7 Importation of Soil and Aggregates

Contract and procurement procedures will ensure that all aggregates and fill material required are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity and compliance standards and statutory obligations. The storage of imported materials will be located at least 10m away from any surface water features and surrounded with silt fencing to filter out suspended solids.

The importation of aggregates will be subject to management and control procedures which will include testing and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development including the suitability of material that may be imported in accordance with a By-Product Notification under Article 27

of the European Communities (Waste Directive) Regulations 2011. Therefore, any unsuitable material will be identified, avoided and not imported to the Site.

15.2.4.1.1.8 Handling of Fuels and Hazardous Materials:

Fuel, oils and chemicals used during construction are classified as hazardous.

- Storage of fuel and hazardous materials will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving land, soil and geology environment.
- Bulk quantities of fuel will not be stored at the Site.

There will be appropriate storage areas for any fuel, oils and chemicals. Storage will be within a clearly marked bund on an impervious base remote from any surface water features such as oil. Temporary oil interceptors will be installed for period of the construction phase. Fuel will only be stored in the quantities required for emergency use and re-fuelling. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will have regard to Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
    - 110% of the capacity of the largest tank or drum within the bunded area; or
    - 25% of the total volume of substance that could be stored within the bunded area.
- Only emergency maintenance will be carried out on site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed of off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with current industry best practice procedures and EPA guidelines;
- Site staff will be familiar with emergency procedures in the event of accidental fuel spillages; and
- All staff on-site will be fully trained on the use of equipment to be used on-site.

Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite and will be from a road tanker brought to site as required. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the contractor before the commencement of works onsite.

15.2.4.1.1.9 Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from Irish Water) which will be constructed in accordance with Irish Water guidelines or by tankering of waste offsite by an appropriately authorised contractor in compliance with all legislative requirements.

15.2.4.1.1.10 Wheel-Wash and Water Treatment Facilities

The use of wheel-wash and water treatment facilities and infrastructures will be used where necessary including where outlined in Sections 7.6.1.1 through to 7.6.1.9. The correct use and management of these will be undertaken by the appointed contractor to ensure that there is no harm or impact to the receiving water environment.

To prevent tracking of dust and debris on haul routes offsite the following will be undertaken:

- Implement a wheel washing system.
- Use of dedicated internal haul routes and set down areas that will be covered with hardcore or similar.

To prevent fugitive runoff from the Site the following will be implemented:

- Silt traps, silt fences and tailing ponds will need to be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction stage.
- Surface water runoff and water pumped from the excavation works will be discharged via a silt trap / settlement pond to the existing foul drainage network.
- Onsite water treatment system will be used if required to remove suspended solids and hydrocarbons.

All sludges and other waste from wheel-wash and water treatment infrastructure including silt fences will be removed from the Site by the contractor in accordance with all legislative requirements.

15.2.4.1.1.11 Decommissioning of Boreholes

Any site investigation and monitoring boreholes remaining at the Site that are no longer required will be decommissioned in accordance with the specifications outlined in EPA Advice Noted 14 (EPA, 2013) and current best-practice at the time of decommissioning. This will remove any potential direct conduit for contaminants to enter the groundwater directly and potentially migrate offsite.

15.2.4.1.2 Operational Phase

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures in accordance with CIRIA SuDS Manual C753 will be incorporated into the overall management strategy for the Proposed Development.

With regard to the proposed discharge of treated operational surface water from the Proposed Development to the Naniken Stream, the potential for surface water generated at the Site of

the Proposed Development to cause significant effects to downstream sensitivities during the Operational Phase would be considered negligible due in part to the SUDS measures incorporated in the Project Design. Project specific SUDS measures are described below.

There is no other requirement for mitigation measures for the Operational Phase of the Proposed Development

15.2.4.2 Monitoring

15.2.4.2.1 Construction Phase

During the construction phase the following monitoring measures will be considered:

- Monitoring and sampling of groundwater and surface water will be undertaken during critical stages of the construction works in particular during construction of the outfall at the Naniken and during bulk excavation works where groundwater may be encountered.
- Inspections and monitoring will be undertaken during excavations, piling and other groundworks to ensure that measures protective of water quality are fully implemented and effective.
- Discharges to sewers will be monitored in accordance with statutory consents (discharge licence).
- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Materials management and waste audits will be carried out at regular intervals

15.2.4.2.2 Operational Phase

Ongoing regular operational monitoring and maintenance of drainage and the SuDS will be carried out.

No other monitoring is required during the Operational Phase.

15.2.5 Air Quality

15.2.5.1 Mitigation

15.2.5.1.1 Construction Phase

It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, appropriate mitigation measures, as outlined within the Construction Environmental Management Plan (CEMP), will be employed as necessary to further prevent such impacts occurring:

- The roads in the vicinity of the Site are all surfaced and no dust is anticipated arising from unsealed surfaces outside the Site;
- 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;
- Footpaths immediately around the Site can be cleaned by hand regularly, with damping as necessary;
- 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;
- 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;
- Netting can be provided to enclose scaffolding in order to mitigate escape of air borne dust from the existing and new buildings;
- Vehicles and equipment will not emit black smoke from exhaust system, except during ignition at start up;
- 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;
- Servicing of vehicles and plant should be carried out regularly, rather than just following breakdowns;
- Internal combustion plant should not be left running unnecessarily;
- Where possible fixed plant such as generators should be located away from residential areas;
- 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;
- The transport of dusty materials and aggregates should be carried out using covered / sheeted lorries;
- Material handling areas should be clean, tidy and free from dust;
- Vehicle loading should be dampened down and drop heights for material to be kept to a minimum;
- Drop heights for chutes / skips should be kept to a minimum;
- Dust dispersal over the Site boundary should be minimised using static sprinklers or other watering methods as necessary;
- 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;
- Stockpiles where necessary, should be sheeted or watered down;
- Methods and equipment should be in place for immediate clean-up of spillages of dusty material;
- No burning of materials will be permitted on Site;

- Earthworks excavations should be kept damp where necessary and where reasonably practicable;
- Cutting on Site should be avoided where possible by using pre-fabrication methods;
- 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;
- 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;
- 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;
- Where possible pre-mixed plasters and masonry compounds should be used to minimise dust arising from on-site mixing;
- 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;
- The Main Contractor should allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.

15.2.5.1.2 Operational Phase

It has been determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are proposed.

15.2.5.2 Monitoring

The monitoring of construction dust during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the Site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations should be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges should be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in $mg/m^2/day$ in accordance with the relevant standard.

Due to the negligible impact on air quality and climate from the Operational Phase of the Proposed Development, no specific monitoring is recommended.

15.2.5.3 Climate

As negative climatic impacts associated with the Construction and Operational Phases of the Proposed Development are negligible, no mitigation measures are proposed. Best practice measures will be implemented to minimise exhaust emissions from construction and operational vehicles and machinery by avoidance of engines running unnecessarily, as idle engines will not be permitted for excessive periods. Furthermore, all proposals for development will seek to achieve the greatest standards of sustainable construction and design and will have regard to sustainable building design criteria.

15.2.6 Noise & Vibrations

15.2.6.1 Mitigation

15.2.6.1.1 Construction Phase

In order to control likely noise impacts caused by the Proposed Development, best available technology will be employed by the appointed Main Contractor to minimise noise from the construction operations and will comply with the mitigation measures as set out in *BS 5228-1: A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*:

- Selection of plant with low inherent potential for generating noise.
- Siting of plant as far away from sensitive receptors as permitted by site constraints.
- Avoid unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Use of alternative reversing alarm systems on plant machinery.
- Where noise becomes a source of resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.
- Limiting the hours during which site activities likely to create high levels of noise are permitted.
- Appointing a site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

The Construction Environmental Management Plan outlines the following proposed environmental noise mitigation measures:

General Considerations:

- All site staff will be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
- Site hoarding should be erected to maximise the reduction in noise levels.
- The contact details of the Main Contractor and site manager will be displayed to the public, together with the permitted operating hours, including any special permissions given for out of hours work.
- In the event that the Main Contractor gets a complaint about noise from a neighbour immediate action will be taken to remedy the situation.
- The site entrance will be located to minimise disturbance to noise sensitive receptors.
- Internal haul routes will be maintained, and steep gradients will be avoided.
- Material and plant loading and unloading will only take place during normal working hours unless the requirement for extended hours is for traffic management (i.e. road closure) or health and reasons (written approval, must be obtained from the planning authority prior to this activity being undertaken).
- Use rubber linings in chutes, dumpers and hoppers to reduce impact noise.
- Minimise opening and shutting of gates through good coordination of deliveries and vehicle movements.

Plant:

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

Vehicle activity:

- 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).
- Plan deliveries and vehicle movements so that vehicles are not waiting or queuing on the public highway, if unavoidable engines should be turned off.
- Plan the site layout to ensure that reversing is kept to a minimum.
- Where reversing is required use broadband reverse sirens or where it is safe to do so disengage all sirens and use banksmen.
- Rubber/neoprene or similar non-metal lining material matting to line the inside of material transportation vehicles to avoid first drop high noise levels.
- Wheel washing of vehicles prior to exiting the site will 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:

- Employ the use of acoustic screening; this can include planning the demolition sequence to utilise screening afforded by buildings to be demolished.
- If working out of hours for Health and Safety reasons (following approval by the competent authority) limit demolition activities to low level noise activity (unless absolutely unavoidable).
- Use low impact demolition methods such as non-percussive plant where practicable.
- Use rotary drills and 'bursters' activated by hydraulic or electrical power or chemically based expansion compounds to facilitate fragmentation and excavation of hard material.
- 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.
- 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:

- The following hierarchy of groundwork/piling methods should be used if ground conditions, design and safety allows;
  -Pressed in methods, e.g., hydraulic jacking
  -Auger/bored piling
  -Diaphragm walling
  -Vibratory piling or vibro-replacement
  -Driven Piling or dynamic consolidation
- The location and layout of the piling plant should be designed to minimise potential noise impact of generators and motors.
- 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.
- Consider concrete pour sizes and pump locations. Plan the start of concrete pours as early as possible to avoid overruns.
- Where obstructions are encountered, work should be stopped, and a review undertaken to ensure that work methods that minimise noise are used.
- 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.
- Prepare pile caps using methods which minimise the use of breakers, e.g., use hydraulic splitters to crack the top of the pile.

Communication and Liaison:

- 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 Dublin City Council and the residents/businesses and to handle complaints and communication of site information.
- All site staff should be briefed on the complaints procedure and mitigation requirements and their responsibilities to register and escalate complaints received.

The control measures are also to be implemented:

- Site Manager will monitor a likelihood of prolonged exposure to excessive noise and commission noise surveying/monitoring programme where necessary.
- Works Supervisor will assess risk arising from noise prior to each particular activity taking place and determine appropriate action. The aim will be to minimise the exposure to excessive noise levels.
  - If it is likely that the noise exposure exceeds Lower Action Value, then hearing protection must be made available.
  - If it is likely that the noise exposure exceeds Upper Action Value, then hearing protection is mandatory to be used. Work Supervisor will decide on the most suitable hearing protection to be used based on Exposure (see formula above) and worker's personal preference (earmuffs or earplugs).
- Works Supervisor will ensure proposed measures are put in place and that their effectiveness and suitability is evaluated on regular bases.
- Site management will minimise noise at work by looking for alternative processes and/or working methods, which would make the work quieter and/or exposure times shorter.

- Site Manager will liaise with all site contractors in order to effectively control noise exposure.
- Number of people working near source of the noise will be minimised.
- Plant and machinery will be compliant with current legislation and fitted with silencers where possible.
- Employees must use hearing protection where its use is made compulsory.
- Hearing protection zones will be identified where necessary.
- Spot checks on appropriate use of hearing protection will be carried out.
- Operators of rock breaking machines and workers nearby must wear adequate ear protection.

15.2.6.1.2 Operational Phase

During the operational phase of the development, noise mitigation measures with respect to the outward impact of the development are not deemed necessary.

15.2.6.2 Monitoring

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

15.2.7 Landscape & Visual

15.2.7.1 Mitigation

15.2.7.1.1 Construction Phase

A site hoarding will be erected at the commencement of construction for numerous safety and amenity reasons. One of the key landscape and visual benefits of this will be the screening of early stage ground works and ground-based activity throughout the course of the construction phase. There are no specific landscape and visual mitigation otherwise proposed during the construction phase.

15.2.7.1.2 Operational Phase

Specific landscape and visual mitigation measures are not considered necessary for the operational stage development. Instead, mitigation measures can be considered to be embedded into the multi-faceted design of the Proposed Development during the operational phase, particularly the landscape design, which will help to assimilate the built elements of the development and complement the parkland character of the surroundings.

15.2.7.2 Monitoring

No monitoring is required during the construction and operational phase, with regards to this Landscape/ townscape Visual Impact Assessment.