



20.0 MITIGATION MEASURES

The chapters contained within this Environmental Impact Assessment Report have been ordered in a grouped format by their relevant topic. This chapter summarises all mitigation measures proposed in order to provide a comprehensive overview of the full range of mitigation measures discussed within each chapter.

For clarity, the *EPA Guidelines (2017)* define mitigation measures as those;

“measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements.”

20.1 Archaeology, Architectural & Cultural Heritage

No mitigation measures are deemed to be necessary in association with the proposed development due to the previously excavated nature of the site, with a 3 no. storey basement car park already in-situ.

20.2 Population and Human Health

Population Impacts

A diverse range of housing types are provided to satisfy different elements of housing demand and to ensure that the development is attractive to a varied cross section of the population. As a result, the development includes studio apartments, 1, 2, and 3 bed units. In addition, the development also complies with its Part V obligations and thus ensures a strong socio-economic mix.

Housing Impacts

No negative impacts have been identified in relation to the increased provision of housing units in this location. Therefore, no further mitigation measures are required.

Employment Impacts

Given the positive employment characteristics of the subject site area and surrounding areas, no negative impacts are envisioned from the provision of residential units for the local labour market population. As a result, there are no mitigation measures necessary.

Traffic

At the construction phase of the development, a *Construction Management Plan* will be implemented in order to minimise the impact of an increase in commuter numbers. At the operational stage of the development, the design approach to access and layout ensures a high degree of connectivity; particularly in terms of sustainable transport modes via the proposed link to the nearby Luas stop.



With respect to traffic safety, the development has been designed in accordance with the principles and standards of the *Design Manual for Urban Roads and Streets (2009)*, which ‘designs in’ road safety. Evidence of DMURS informed design within the proposed scheme include the provision of traffic calming and control measures.

Further details of the implications of increased commuter flows in the area and proposed mitigation measures to minimise their impact are discussed in *Chapter 14 – Traffic and Transportation*.

Economy

No negative impacts have been identified in relation to the increased provision of housing units in this location. Therefore, no further mitigation measures are required.

Social Services and Amenities Provision

Arising from the likely increase in demand for social services and amenities, mitigation measures are proposed. In terms of social services, it is proposed to provide a crèche on site with capacity for some 73 no. children. In addition, it is also proposed to enhance the provision of quality public open space for the area as a whole.

Health and Safety

During the construction phase, the legal duties under the Construction Regulations (*Safety, Health and Welfare at Work (Construction) Regulations (2013)*) will be adhered to.

In accordance with these duties, a Project Supervisor Design Process (PSDP) will be appointed by the relevant contractor to co-ordinate the design effort and minimise the construction risks during the design period. In addition, a Project Supervisor - Construction Stage (PSCS) will be appointed to coordinate and supervise all safety aspects of the project.

Strict security measures will also be implemented to deal with all access to the site. These measures will require all vehicles and personnel visiting the site to be logged in and out.

At operational phase, proposed mitigation measures at the design stage are envisioned to reduce the risks associated with traffic safety. With respect to traffic safety, the development has been designed in accordance with the principles and standards of the *Design Manual for Urban Roads and Streets (2009)*, which ‘designs in’ road safety. Evidence of DMURS informed design within the proposed scheme include the provision of traffic calming and control measures.



20.3 Biodiversity

The following mitigation measures, as outlined in Chapter 7, are proposed to comply with legislation protecting birds and their nests:

BBM1: In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, all works involving the demolition of buildings and/or the removal of trees or hedgerows will be undertaken outside of the nesting season (1st March to 31st August inclusive).

Or where this seasonal restriction cannot be observed then:

BBM2: A breeding bird survey will be undertaken during the appropriate survey season (between early March and late June) by an ecologist with experience undertaking breeding bird surveys in order to assess whether birds are nesting within the subject lands. Should nesting birds be encountered during surveys, demolition of buildings and/or removal of trees or hedgerows will be delayed until after the nesting season (1st March to 31st August inclusive).

20.4 Land and Soils

The majority of soil stripping occurred in the previous phase of construction. However, any temporary storage of soil required will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment; the material will also be stored away from any surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination, such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred at the proposed development site.

Should it be determined that any of the soil excavated is contaminated, this will be managed according to best practice and disposed of accordingly by a licensed waste disposal contractor. There is no expected imported fill.

Construction traffic can be controlled through the use of stabilisation of soils to mitigate any significant effect on the ground. Works will need to be undertaken in accordance with DLRC requirements.

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/ container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.



Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area (or where possible off the site) which will be away from nearby surface water gullies or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment.

Guidelines such as “*Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors*” (CIRIA 532, 2001) will be complied with.

All ready-mixed concrete will be brought to site by truck. It is recommended that a suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. The pouring of concrete will take place within a designated area using a geo-synthetic material to prevent concrete runoff into the soil/ groundwater media. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility off site.

In the case of drummed fuel or other chemicals which may be used during construction containers should be stored in a dedicated internally banded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Potentially contaminated groundwater and polluted surface water generated during construction activities will not be discharged directly to ground or surface drainage. Welfare facilities will be provided for construction operatives but are only likely to comprise individual ‘portaloo’s with no connection to the foul sewer expected.

All drainage from within the basement car park will be collected by gullies and drainage pipelines to a fuel interceptor prior to discharge to the local surface water network.

The implementation of the operational phase mitigation measures highlighted above and in Chapter 8 will ensure that the soils geology and hydrogeological environment is not adversely impacted during normal or emergency conditions during the operational phase.

20.5 Landscape and Visual Impact

Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.



Operational Phase

Monitoring of the mitigation measures forms part of the landscape management plan. Replacement trees, replacement planting and pruning measures are captured in landscape management plans and are intrinsically linked to the proposed mitigation measures. All landscape works will be in an establishment phase for the initial three years from planting.

A landscape management plan accompanies the planning application. Prior to completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place.

20.6 Hydrology

The contractor will be required to implement best practice measures in accordance with DLRCC planning requirements during construction. Accidental spills and leaks are to be managed. This is outlined in greater detail in Chapter 8.

The impact of water supply and waste water has been assessed by Irish Water, and they have advised that the development is feasible without upgrade to their networks. Thus, no ameliorative, remedial or reductive measures are required. Low flow fixtures are intended throughout the development, and these will serve to reduce the potable water consumption, and thus reduce any foul water discharge.

Surface water from the proposed development will be reduced from current levels to match a greenfield equivalent rate using an attenuation tank. Surface water will be treated by proposed landscape areas on roofs and at ground floor level, as well as by infiltration into the ground below the attenuation tank.

Flood waters from the surrounding area have been assessed with allowance for the proposed development. The development is designed to prevent flood waters from affecting habitable areas, basements and other associated areas. Appropriate protection has also been provided to adjacent areas to prevent flooding of habitable areas, basements and other associated areas.

20.7 Air and Climate

Air Quality

Construction Phase

The greatest potential impact on air quality during the construction phase is from construction dust emissions, PM10/PM2.5 emissions and the potential for nuisance dust. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan.



Due to the sensitivity of the current residential receptors to the site, additional mitigation measures recommended in the Institute of Air Quality Management *Guidance on the Assessment of Dust from Demolition and Construction (2014)* for sensitive receptors have been included. Provided the dust minimisation measures outlined in the Plan (see Appendix 12.3) and construction management plan are adhered to, the air quality impacts during the construction phase should be not be significant.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic;
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 km ph, and on hard surfaced roads as site management dictates;
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Construction Phase

Construction vehicles, generators etc., may give rise to some CO₂ and N₂O emissions. However, due to the short-term and temporary nature of these works the impact on climate will not be significant.



Operational Phase

No additional mitigation measures are required as the operational phase of the proposed development as it is predicted to have an imperceptible impact on ambient air quality and climate.

There are a number of potential flooding impacts due to increased rainfall as a result of climate change. A site-specific Flood Risk Assessment has been carried out by Punch Consulting; this assessment ensures the design of defence mechanisms with respect to flooding can account for a rise of 50mm at the 1:1000 year. Any potential impacts as result of climate change have been assessed and mitigated during the design process and it is predicted that flooding will have an imperceptible impact.

Monitoring of construction dust deposition at nearby sensitive are outlined in greater detail in Chapter 12. There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

20.8 Roads, Transportation and Traffic

Construction Phase

During the construction phase the site will be accessed via Carmanhall Road. This will reduce the impact of the works on the surrounding previously constructed development and the surrounding road network. Additionally, the fact that the works for the basement construction will be utilising the same footprint as for the previously granted permission will reduce the need for excavation and disposal.

An *Outline Construction Management Plan* is required in accordance with *County Development Plan 2016-2022*, a preliminary version of which is set out as part of the planning pack. The Plan includes a section which covers the Preliminary Traffic Management Plan.

Operational Phase

Mitigation measures to be put in place will include the adoption of a travel plan to ensure consistency with the *County Development Plan* requirement to reduce dependency on private car transport. The provision of the requisite Travel Plan as required will be developed further prior to occupation of the site. The attached draft Travel Plan contained in Appendix 14.4 will form the basis for the operational phase plan. The draft Travel Plan will also form part of the Construction Traffic Management Plan and will be agreed with DLRCC prior to commencement of works on site. Further information in relation to this is provided for in Chapter 14.



Monitoring

During the ongoing construction phase there will be ongoing monitoring by the Contractor to ensure:

- Compliance with Construction Stage Management Plan;
- Adequacy of Site and External Control Measures and
- Compliance with requirements of DLRCC for any road opening licences.

During the operational phase of the development monitoring of the Travel Plan will be undertaken to ensure its compliance and ongoing relevance, and to update where necessary for new initiatives that may be relevant to the overall developments ongoing success in reducing reliance on car transport.

20.9 Noise and Vibration

Noise

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2*. Whilst construction noise and vibration impacts are expected to be within the criteria set out in this document for the majority of the time, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts to nearby residential noise sensitive locations are minimised. This will be particularly important during concrete/rock breaking which is the activity forecast to have the highest potential noise impact.

In this regard, various mitigation measures can be considered and applied during the construction of the proposed development, such as:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Monitoring levels of noise and vibration during critical periods and at sensitive locations;
- Maintaining site access roads even so as to mitigate the potential for vibration from lorries;
- Establishing channels of communication between the contractor/developer, Local Authority and residents, and;
- Appointing a site representative responsible for matters relating to noise and vibration.
- Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:



- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors;
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

The appointed contractor will be required to monitor levels of noise and vibration during critical construction periods at nearby sensitive locations and/or development site boundaries.

Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited given the works proposed and distances to nearby buildings. Rock breakers will be required however to remove existing concrete and rock at various locations across the site and the potential vibration impact of rock/concrete breaking is discussed below.

AWN have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator and
- 6 tonne hydraulic breaker on large Liebherr tracked excavator.

Vibration measurements were conducted during various staged activities and at various distances. This is outlined further in Chapter 15.

Considering the relatively low vibration levels that are expected from the concrete breakers (ref Tables 15.13 and 15.14), vibration levels at the nearest buildings are not expected to pose any significance in terms of cosmetic or structural damage. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings, although vibration emissions may be perceptible at nearby properties.

In this instance, taking account of the distance to the nearest sensitive off-site buildings, vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 15.5 to avoid any cosmetic damage to buildings. Vibration levels are also expected to be below a level that would cause disturbance to building occupants. Notwithstanding this, standard good-practice vibration mitigation measures are discussed in the relevant sections of this document.



Operational Phase Mitigation

Building and Mechanical Services Plant

During the detailed design stage, the selection of plant with the appropriate attenuation (where required) will ensure that the operational noise limits set in Section 15.6.1 will be achieved at the nearest noise sensitive locations both within and outside of the development site.

Calculations indicate that noise mitigation will be required to the 12th floor external plant area, to reduce noise emissions during night-time plant operation. An acoustic louvre is therefore proposed for the 12th floor external plant, with a minimum 'Insertion Loss,' as specified in Table 15.17. The calculated residual noise level at the nearby apartments comply with both the daytime and night-time design targets.

Car Parking on Site

During the operational phase of the development, noise mitigation measures with respect to car parking on site are not deemed necessary.

Additional Vehicular traffic on Public Roads

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

No additional monitoring is proposed for the operational phase of the proposed development.

20.10 Waste

The management of waste during the construction phase should be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the *Construction and Demolition Waste Management Plan (CDWMP)* including maintenance of waste documentation.

The management of waste during the operational phase should be monitored to ensure effective implementation of the *Operational Waste Management Plan (OWMP)* by the building management company and the nominated waste contractor(s).

Construction Phase

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



Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

Operational Phase

During the operational phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the waste storage areas, where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

Waste legislation should also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

20.11 Material assets- Drainage and Water Supply

Construction should be monitored to ensure compliance with relevant local authority requirements, and health and safety legislation. The operational phase of public works should be monitored by the local authority responsible for the respective asset.

The operational phase of private assets should be monitored by the Management Company for the building.

20.12 Material Assets- Electricity, Communications and Gas

No specific monitoring is proposed in relation to electrical, gas and telecommunications infrastructure.

20.13 Interactions

It is not proposed that any mitigation or monitoring will be undertaken specifically for cumulative impacts.