

## **6 Summary of Mitigation Measures**

### **6.1 Introduction**

This Chapter of the EIAR collates and summarises the mitigation measures recommended for each of the environmental topics examined in Chapter 5: 'Aspects of the Environment Considered'.

These mitigation measures and any associated monitoring comprise would be implemented during the Demolition, Construction and Operational Phase to reduce the potential for significant adverse impact of the proposed development on the environment.

This Chapter does not expand on the reasoning or expected effectiveness of the proposed mitigation or monitoring measures. For such descriptions, we refer to each of the individual chapters of the EIAR.

It is expected that the recommended mitigation measures would be required to be implemented as a condition of any grant of permission by An Bord Pleanála.

### **6.2 Proposed Mitigation Measures**

#### **6.2.1 Population (Chapter 5.1)**

There are no Proposed Mitigation measures in relation to Population.

Mitigation measures proposed to minimise the potential impacts on humans arising in respect of the environmental topics examined under other Chapters of this EIAR are identified in those chapters, and further below.

## **6.2.2 Human Health (Chapter 5.2)**

There are no specific mitigation measures proposed for Human Health.

The impacts on the local population in terms of residents and businesses are mainly positive in the sense of renovating previously derelict buildings, the creation of a cultural quarter for public use and assertion of public services in the Dublin North City Centre area.

Mitigation measures proposed to minimise the potential impacts on Human Health in terms of landscape & visual impact, noise & vibration and air quality are discussed in the relevant sections of Chapters 5.5: Material Assets - Transportation, Chapter 5.10: Air – Noise & Vibration & Chapter 5.11: Climate & Climate Change - Air Quality, respectively.

Chapter 5.5: Material Assets - Transportation, addresses mitigation measures proposed to reduce the impact of additional traffic movements to and from the development.

## **6.2.3 Cultural Heritage: Architectural Heritage (Chapter 5.3)**

### **6.2.3.1 Demolition and Construction Phase**

The works to conserve, repair and adapt the buildings have been detailed on the basis of available knowledge from the analysis and assessment of the buildings in the context of the opening up that has been possible hitherto. Some of the methodologies are quite invasive, but they may or may not be required depending on the situation that pertains when full opening up is undertaken at pre-contract or construction stage.

Further opening up during the pre-contract stages is desirable. The information gained would permit more developed approach which could ameliorate the impacts. However, full information on the extant fabric and its condition can only be obtained when full opening up is possible, and this is during the construction phase. Therefore, the actual methodologies, and the various adaptations required for particular instances, can only be finalised during this phase.

Skilled conservation requires flexibility to change and adapt methodologies to suit individual instances and situation uncovered as the work progresses. A process of monitoring the opening up of the fabric and modifying details and methodologies proposed will be fundamental in achieving the best conservation, repair and

adaptation of the historic fabric and reducing impacts as far as possible.

Article 11 of the Venice Charter concludes: "Evaluation of the important elements involved and the decision of what may be destroyed cannot rest solely on the individual in charge of the work."

While this article of the Charter specifically refers to Restoration, the principal of separated oversight is vital. To be effective, this oversight should not be concerned with the day to day decisions that will be necessary. However, it should be an objective overview isolated from the demands of the day to day management and decision making that will be required.

A system of information and report submission to an appropriate authority for compliance agreement would satisfy these needs - basically a system of rolling compliance that has worked successfully on similar projects in the past. The appropriate authority best suited would be the Local Authority, Dublin City Council, and their Planning Department and Conservation Officer.

To ensure the minimum consequential damage and the proper conservation, repair and adaptation of the historic fabric, skilled and experienced conservators will be required, and such conservators are not normally part of a Contractors' workforce. The employment of such skilled conservators will mitigate any damage and reduce impacts. Conversely, their omission will result in additional damage and impacts. The involvement of skilled conservators will also mitigate impacts by ensuring that proper care is taken during the execution of the works and that the correct materials are used.

One of the greatest potentials for impacts during construction stage is inadequate time to undertake the works. Conservation works requires adequate time. Short timescales result in increased losses and damage to historic fabric and a reduction in the quality of the finish work. Major works, such as contemplated here, tend to be time driven to the detriment of the conservation, repair and adaptation of the building. Realistic programming, allowing sufficient time for the proper conservation, repair and adaptation works, will reduce the impacts of the works.

The upgrading of historic fabric to meet current regulatory requirements can and does cause significant negative impacts, but these are, in many cases, essential. There are a number incorporated in the proposals that will have profound negative impacts, such as the ramp and staircase installation proposed for No. 27, among others (see Table 5.3.4 of Chapter 5.3). It is clear

from consultations with the Design Team that such matters have been the subject of careful and extensive consideration before being finalised for planning design. It may be that they are unavoidable. Mitigation measures for all of the individual works cannot be proposed here, as the issues are far beyond the remit of this study. However, they should be subject to a review process to determine measures to reduce the potential impacts to the historic fabric.

The construction of the new building will result in alterations to the ground conditions, potentially affecting the foundations of the historic buildings, vibrations and the like, and the adjustment to the historic fabric associated with the connection between the two buildings. While these have been considered and appropriate measures taken to minimise the impacts at planning design stage, the works will require to be constantly monitored and adjusted as the work proceeds. A similar system of adaptation and modification as proposed above, involving consultation with a conservation professional or the Council's Conservation Officer, should be applied to this work during the construction stage. Similar concerns would apply at the interfaces between the historic fabric and the works to re-order Parnell Square North.

All eight Protected Structures have been vacant and unheated for some years and there has been water ingress, significant in some instances, with consequential damage. Significant works are required to repair the damage and also to stabilise vulnerable historic fabric such as plasterwork and joinery. The modification of the internal environment by the introduction of heat and / or air conditioning will return the buildings to sustainable functions, but the rate at which the modification is undertaken will be a factor in determining the level of impact. A sudden and sustained increase in temperature and / or reduction in relative humidity will cause shrinkage and damage whereas a controlled modification programme over extended time will minimise such damage. Given the fabric and the water ingress noted, the period for the modification must extend to at least nine months to include a summer season and possibly more.

### **6.2.3.2 Operational Phase**

The proposed functions of the Protected Structures vary from the high volume usage of some of the public spaces to the lower volume usage of the office and quiet rooms spaces.

The potential impacts that arise from the public use include wear on the historic fabric from numbers of people involved, assisting the passage of people and vandalism. Given the numbers of school children that previously used the buildings and the damage resulting

from that usage, it could be argued that this is not an issue for consideration.

However, the works will repair much of the damage caused, so it will be necessary to monitor and control how the building is to be used and where the greatest usage is causing damage. Areas such as the edges of stair treads, the doors and arises on the door cases etc. are vulnerable and improperly sited door hold open devices can warp a historic door. Monitoring is necessary to minimise such impacts.

Alterations to room functions should be the subject of a control system to ensure they remain within the usage types they were intended. For example, a change in function that involved additional weight on a floor may cause increased deflection and cause damage to a fragile ceiling below.

### **6.2.3.3 Monitoring – Operational Phase**

Conservation best practice requires a flexibility to be able to refine methodologies and materials to react to discoveries within a building. Seldom does a 'one fix for all' solution apply in conservation. Investigations and opening up at early stage yield considerable information, but this is never finite or consistent throughout the building or buildings. Particularly in this instance, as there are eight mid 18th century houses built by at least 3 differing builders and with very differing chronologies since first occupied. Therefore, even with the controlled opening up undertaken, situations will be uncovered that makes the designed solutions impossible or inappropriate.

In order to achieve the proper conservation of buildings as set out in the Guidelines 'Architectural Heritage Protection - Guidelines for Planning Authorities' and other charters and guidelines, it is necessary to ensure that a monitoring system is put in place to ensure that deviations from the procedure, methodologies and materials set out in the planning documents are appropriate.

This is normally contained in a condition of a Planning Permission granted that requires a compliance submission and / or a rolling compliance system to be activated for the particular project. It is essential that such a system is put in place for the conservation aspects of this project. To be effective, those monitoring should not be concerned with the day to day decisions that will be necessary, but should take an objective overview isolated from the demands of the day to day management and decision making that will be required. A system of information and report submission to an

appropriate authority for compliance agreement would satisfy these needs.

## **6.2.4 Cultural Heritage: Archaeology (Chapter 5.4)**

### **6.2.4.1 Demolition and Construction Phase**

While it is acknowledged that preservation in-situ of archaeological remains is the preferable option wherever possible, the archaeological remains identified within the proposed development area will be impacted upon by the construction of a new basement and associated extensive ground disturbances. As such preservation by record of all archaeological remains will be carried out.

The recommended mitigation measures may be further informed by a programme of additional archaeological testing that will be carried out within the proposed development area as part of an advance archaeological works contract. Testing would follow the demolition of the existing amharclann (theatre) building on site, as a separate works package, prior to the mobilisation of the main construction contractor.

All mitigation measures will be carried out in full consultation with the National Monuments Service of the DoCHG and the Dublin City Archaeologist.

The archaeological remains within Trenches 1 and 2, including the post medieval basements and the redeposit of human remains, will be excavated (preserved by record) within an open area measuring 250m<sup>2</sup> prior to the commencement of construction works (Figure 5.4.10). Post excavation analysis of the remains will include the isotopic analysis of suitable dental remains in order to analyse the geographical origin of the human remains.

The archaeological remains within Trench 3 and Test Pit 105 including the post medieval basement remains, will be excavated (preserved by record) within an open area measuring 195m<sup>2</sup> prior to the commencement of construction works (Figure 5.4.10).

The archaeological remains within Test Pit 104, which includes the post medieval cess deposit, will be excavated (preserved by record) within an open area measuring 95m<sup>2</sup> prior to the commencement of construction works (Figure 6.1, an extract of Figure 5.4.10).

A section at the rear of the proposed development area will be opened and graded down with a mechanical excavator in order to assess the nature and extent of the potential backfilled mews

structures. This section may be accompanied by excavation from the floor level in this part of the site (Figure 6.1, Figure 5.4.10, estimated area 150m<sup>2</sup> including exposed section). However, due regard will need to be given to the entrance to the site in order to allow continued vehicular access.

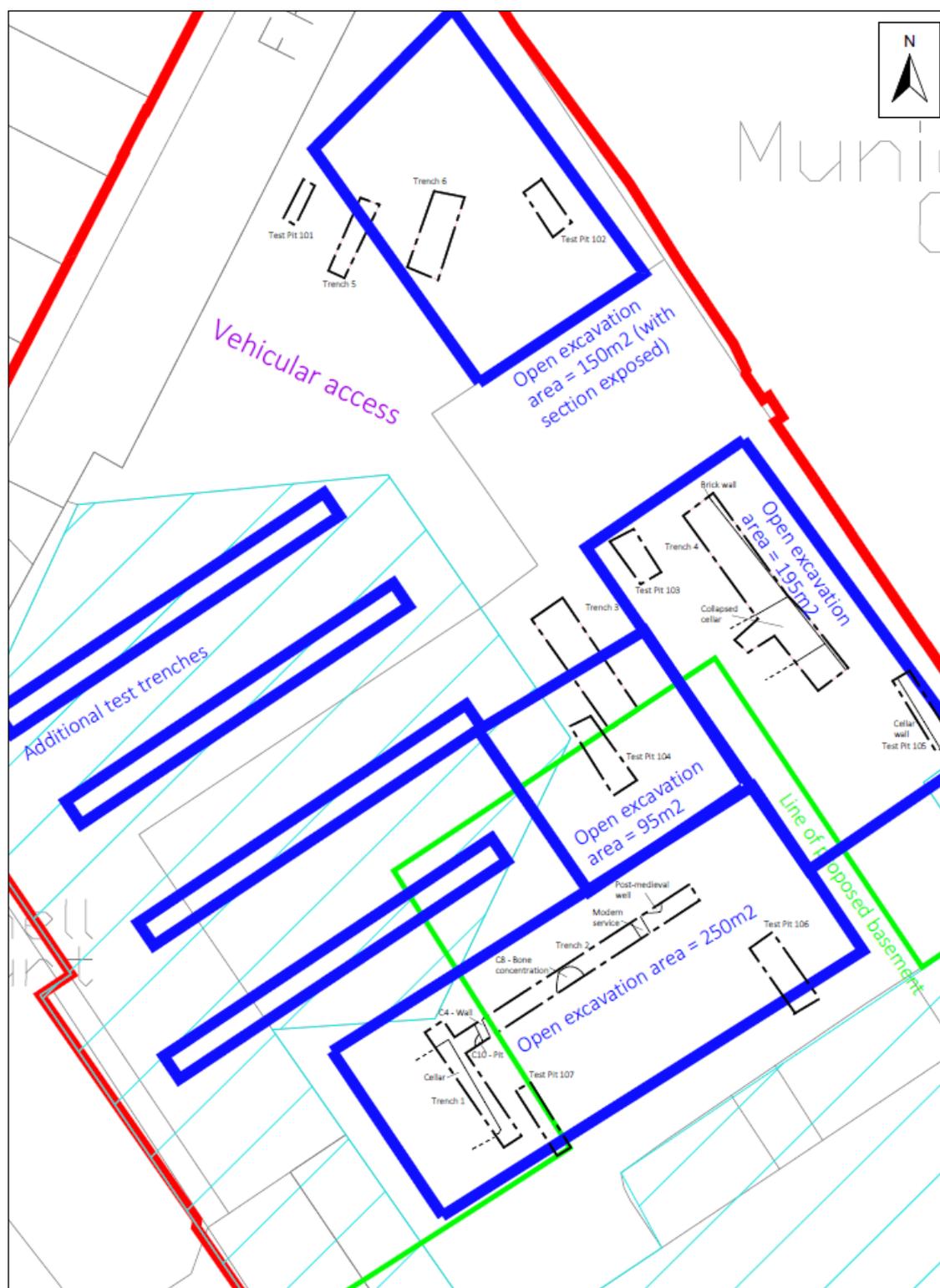
Overburden within these areas will be removed by a mechanical excavator under strict archaeological supervision. Mechanical excavation shall cease following the identification of archaeological levels. Recording of the archaeological features will then be carried out by hand by a team of archaeologists under the direction of a licence eligible archaeologist and in consultation with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht and the Dublin City Archaeologist.

If required the open excavation areas may be increased in size and all archaeological deposits will be recorded to the depth of the natural subsoils.

Full provision will be made available within the construction programme to allow for the resolution of all archaeological features on site.

A minimum of four additional test trenches will be excavated within the site, following the demolition of the gymnasium, in order to assess the nature and extent of any additional archaeological remains that may survive within the proposed development area. This will be carried out as part of the advance archaeological works contract and will be undertaken by a licence eligible archaeologist.

Dependant on the results of the testing exercise, further archaeological mitigation may be required, such as preservation by record and/or archaeological monitoring. As such, full provision within the construction programme will be made available in order to ensure works are completed prior to construction commencing.



**Figure 6.1:** Proposed archaeological advanced works locations. From Chapter 5.4, Figure 5.4.10.

#### 6.2.4.2 Operational Phase

There are no Proposed Mitigation measures during Operational Phase in relation to Cultural Heritage – Archaeology.

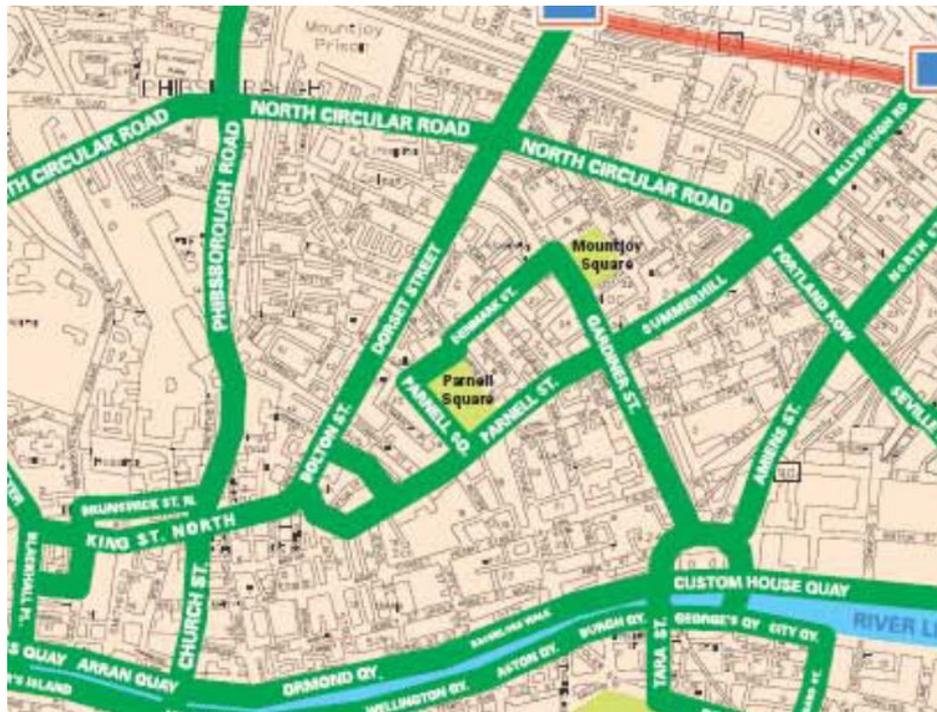
## 6.2.5 Material Assets: Transportation (Chapter 5.5)

### 6.2.5.1 Demolition and Construction Phase

The primary mitigation measure during the construction phase will be the implementation of the Construction Traffic Management Plan and the Construction Management & Waste Management Plan.

This will require all deliveries to and collection from the subject site to comply with the Dublin City Council requirements for Heavy Goods Vehicle movements including the use of the Designated Heavy Goods Vehicle movements routes illustrated in Figure 6.2, an extract of 5.5.14, Chapter 5.5: Material Assets: Transportation.

Two construction routes to the site have been identified. One will be to Parnell Square North from Parnell Square West and the second from Frederick Street North along Frederick Lane and Bethesda Place to Dorset Street Upper.



**Figure 6.2:** Extract from Figure 5.5.14 - Designated Heavy Goods Vehicle Routes in the City Centre, of Chapter 5.5: Material Assets: Transportation.

A site compound with offices, material storage areas and drive through route for construction related vehicles will be provided on Parnell Square North in front of Nos 23- 28. The southeast corner of the compound has been splayed to provide a minimum of two traffic lanes at this location during the construction stage of the buildings.

Ramp works to connect Frederick Lane to Bethesda Place will be carried out at the commencement of the construction phase so as to

facilitate construction related deliveries to the rear of the proposed development.

Traffic and other movements on Parnell Square North during the construction phase of the public realm will be managed by carrying out the works in a number of stages to a sequence to be prepared in conjunction with Dublin City Council and implemented by the main contractor.

In order to mitigate the impact on the physically challenged, it is proposed to provide the new disabled car parking spaces on Granby Row and Frederick Street North before the existing disabled spaces on Parnell Square North are occupied by the site compound.

### **6.2.5.2 Operational Phase**

The primary mitigation measure during the operational phase will be the implementation of the Travel Plan for the proposed development and in particular the Action Plan section of the Travel Plan which will implement the management of travel demand.

Should the transportation demand require additional facilities or alterations to existing facilities, consideration will be given to:-

1. The provision of disabled spaces on Parnell Square North close to the location of the three existing disabled spaces.
2. The provision of additional secure cycle parking within the PSCQ4 for staff who choose to cycle to work (8 spaces currently proposed for 8 staff).

Mitigation measures to limit the impact of the future intensification of public transport services, cycle facilities and pedestrian facilities on the transportation and environmental capacity of Parnell Square East are outside the control of the proposed development.

## **6.2.6 Landscape & Visual Impact Assessment (Chapter 5.6)**

The subject application proposes creation of a new national cultural institution by the major re-development of a backland site situated in an inner-city location characterised by high density development, and the refurbishment and alteration of 8 former Georgian houses. Extensive public realm improvement works are also proposed.

In the context of Landscape and Visual Impact Assessment, there are no proposed mitigation measures.

## **6.2.7 Biodiversity (Chapter 5.7)**

### **6.2.7.1 Demolition and Construction Phase**

#### **Measure 1**

In order to mitigate any potential impact on local bat populations, it is recommended that if bats are encountered during works undertaken within the buildings, the relevant activity will be suspended until the advice of a suitably qualified and licenced bat ecologist is sought. A derogation licence may need to be sought from NPWS in order to permit removal of bats and mitigate for the loss of any roosts on the site.

#### **Measure 2**

To limit the potential impact of construction on breeding birds, the refurbishment and associated works of the attic spaces and rooftops should take place in the non-breeding season (September to February, inclusive), where possible.

As the nests of all bird species are protected under the Wildlife Acts and there are a number of bird species likely to breed within the boundary of the proposed development site in those areas where vegetation will be cleared, a licence will be required from the NPWS to permit the destruction of nest sites and disturbance to breeding birds during the bird breeding season (i.e. 1st March to the 31st August).

### **6.2.7.2 Operational Phase**

No operational impacts are predicted and therefore, no mitigation measures are required.

## **6.2.8 Soils & Geology (Chapter 5.8)**

### **6.2.8.1 Demolition and Construction Phase**

The primary mitigation measure during the construction phase will be the implementation of the Construction Management & Waste Management Plan and the procedures described in Chapter 5.14: Material Assets - Waste Management, of this EIAR.

Three options have been considered to avoid the transfer of contaminated subsoil from the upper made ground layers into the groundwater layer during the construction of the substructures, as follows:

- Firstly, the installation of underpinning and temporary retaining walls together with the removal of contaminated subsoil prior to the commencement of piling will ensure piling through uncontaminated ground and avoid contamination of the underlying groundwater.
- Secondly, casing of piles over the upper 4 – 5 metres will isolate the contaminated ground from the piling operation.
- Thirdly, if shown to be feasible after the design stage site investigation, the piling option could be replaced by a raft solution which would not affect the underlying groundwater.

The provision of wheel wash facilities at the construction entrances to the development will minimise the amount of soils 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. Measures will be implemented throughout the construction phase to prevent contamination of the soil and adjacent watercourses 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.

During excavation works, temporary sumps will be used to collect any surface water run-off thereby avoiding of standing water within the basement and other excavations.

Surface water runoff and water pumped from the excavation works will be discharged via a silt trap / settlement pond to the existing combined drainage system which discharges to the Dublin Wastewater Treatment Plant at Ringsend. Straw bales will be used at the outfall to filter surface water to remove contaminants.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

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 phase will be short term only in duration.

Removal and Disposal of Contaminated Materials.

Excavated material from the PSCQ will be disposed of as set out in Chapter 5.14: Material Assets - Waste Management, of this EIAR.

Where contaminated soils are encountered during works on the public realm in Parnell Square North, they will be excavated and disposed of-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.

#### **6.2.8.2 Operational Phase**

No mitigation measures for soils or geology will required during the operational phase.

### **6.2.9 Water (Drainage, Supply, Flood Risk and Groundwater) (Chapter 5.9)**

#### **6.2.9.1 Demolition and Construction Phase**

The primary mitigation measure during the demolition and construction phase will be the implementation of the Construction Management & Waste Management Plan as outlined under Volume 2, Appendix 3.1. This would include the management by the Contractor of temporary local networks for water supply and drainage.

#### **6.2.9.2 Operational Phase**

In order to mitigate the impacts of the proposed development on the operation of the water environment at Parnell Square North, systems should be put in place to ensure that:

- The operation of low rate fittings to reduce water demand.
- The operation of SuDS measures to reduce the quantity and improve the quality of surface water runoff

- The ongoing attenuation of surface water to restrict the rate surface water discharge volumes from the development.
- The ongoing maintenance of the water supply and drainage systems.

## **6.2.10 Air – Noise and Vibration Chapter (Chapter 5.10)**

### **6.2.10.1 Demolition and Construction Phase**

#### **Noise & Vibration Management Plan**

The Contractor should compile a Noise and Vibration Management Plan (NVMP) which will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works.

The Plan will also define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.

The contractor will provide proactive community relations and will notify the public and vibration sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works.

The contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

With regard to potential mitigation measures during construction activities, the standard planning condition typically issued by Dublin City Council states:

“During the construction and demolition phases, the proposal development shall comply with British Standard 5228 “Noise Control on Construction and open sites Part 1. Code of practice for basic information and procedures for noise control.”

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;

- control of noise sources;
- screening;
- hours of work, and;
- liaison with the public.

Detailed comment is offered on these items in Volume 2, Appendix 5.10.1 Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work.

### Vibration Criteria

Any Construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in Table 5.10.2, as illustrated below:

**Table 5.10.2:** Transient Vibration Impact Criteria for Buildings (conservative criteria below which there is no risk of cosmetic damage).

Category of Building	Threshold of potential significant effect (Peak Particle Velocity - PPV - at building foundation) for Transient Vibration
Structurally sound and non-protected buildings	12 mm/s
Protected and / or potentially vulnerable buildings	6 mm/s

### Noise & Vibration Monitoring

Should the construction noise and vibration risk assessment identify the need for monitoring the following actions are recommended during demolition and construction.

Noise Monitoring Terminals (NMT), number and locations to be agreed, to be installed with the following specifications (or similar approved):

- Logging of two concurrent periods, e.g. 15-minute & hourly;
- Daily CIC automated calibrations;
- E-mail alert on threshold exceedance;
- E-mail alert on low battery and low memory;
- Remote access to measured data, and;
- Live display of noise levels.

Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.

The mounting of the transducer to the vibrating structure will need to comply with BS ISO 5348: 1998: Mechanical vibration and shock – Mechanical mounting of accelerometers. In summary, the following ideal mounting conditions apply:

- The transducer and its mountings should be as rigid as possible;
- The mounting surfaces should be as clean and flat as possible;
- Simple symmetric mountings are best, and;
- The mass of the mounting should be small in comparison to that of the structure under test.

In addition, it is recommended that spot check noise & vibration measurements are conducted on a monthly basis. These spot checks can be organized to coincide with works that have potential to generate high levels of noise or vibration on site in order to confirm the potential extent of impact.

A monthly noise & vibration monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes etc. Where remedial measures are required and identifiable these should also be clearly stated.

## 6.2.10.2 Operational Phase

### **Mechanical Plant**

The potential for noise impact associated with mechanical plant items has been taken into consideration at this stage of the design process.

Careful design has been carried out to ensure that the locations of external noise emitting plant will be screened off by vertical elements that will ensure that any noise emission will spread vertically mitigating hemispherical noise spread to adjacent properties. In addition, acoustic attenuation will be provided where required to keep within existing background noise levels in occupied, and in particular residential, surrounding areas.

The plant proposed has been designed and selected to run at low speeds to minimise noise emissions whilst maximising energy efficiency.

The limit values for plant noise emissions have been derived from the baseline noise levels during the more sensitive night-time period. In order to ensure that there will be no increase to the background noise levels due to plant noise emissions the following limits should be adhered to:

- Daytime (07:00 to 23:00 hours) 40dB LAeq,15min
- Night-time (23:00 to 07:00 hours) 35dB LAeq,5min

### **Additional Traffic on Adjacent Roads**

No measures are required with respect to traffic on adjacent roads.

## **6.2.11 Climate & Climate Change – Air Quality (Chapter 5.11)**

### **6.2.11.1 Demolition and Construction Phase**

#### **Dust Minimisation**

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan. These plans will be finalised once all construction details have been delivered. Provided the dust minimisation measures outlined in the plan (see Volume 2, Appendix 5.11.2) are adhered to, the air quality impacts during the demolition and construction phase will 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 kph, 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.
- Dust monitoring via Bergerhoff gauges are recommended for use during the construction period. This is discussed further in section 5.11.8.

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.

### **Dust Monitoring**

The site is within close proximity of a number of sensitive receptors, therefore it is recommended that dust monitoring (Bergerhoff Method) should be conducted during the demolition and construction phase as this will ensure the efficiency of the dust mitigation measures and will also highlight when more measures may need to be implemented.

Dust emissions resulting from site activities can potentially have a substantial temporary impact on local air quality. Dust emissions from this particular site would mainly be associated with demolition, earth excavation, loading/unloading of material and HGV traffic entering and leaving the site. Dust emissions often vary from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. Emissions from any single site can be expected to have a definable beginning and an end, and also to vary substantially due to varying site activity. Meteorological conditions significantly affect the level of dust emissions and subsequent deposition downwind of the source.

### **Dust Deposition Monitoring**

Sampling is proposed to be carried out using a number of Bergerhoff Gauges in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting

vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level.

Analysis of the samples will be conducted by Environmental Laboratory Services Ltd., Blackrock, Co. Cork, based on the German Standard VDI 2119. The collecting vessel contains dustfall and liquid following sampling. The liquid is evaporated in a drying chamber and the dustfall residue weighed using a calibrated balance. The daily dust deposition rate is then calculated using information on the dustfall mass, the sampling period and the area of the collecting surface.

#### **6.2.11.2 Operational Phase**

There are no Proposed Mitigation measures during Operational Phase in relation to Climate & Climate Chapter – Air Quality.

#### **6.2.12 Climate – Sunlight Analysis (Chapter 5.12)**

There are no Proposed Mitigation measures in relation to Sunlight.

#### **6.2.13 Climate - Daylight Analysis (Chapter 5.13)**

There are no Proposed Mitigation measures in relation to Daylight.

#### **6.2.14 Material Assets - Waste Management (Chapter 5.14)**

##### **6.2.14.1 Construction Phase**

A project specific Construction & Demolition Waste Management Plan (C&D WMP) has been prepared in line with the requirements of the guidance document issued by the Department of Environment Heritage and Local Government (DoEHLG).

A C&D WMP has been prepared by Arup, located under Volume 2, Appendix 3.1 for the proposed development. The plan will be updated and supplemented prior to commencement of the demolition phase of the development.

Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed development.

Prior to commencement of demolition, the contractor(s) will be required to refine/update this document to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

Arup has estimated that c. 9,000m<sup>3</sup> of excavated materials will be generated from the excavations required to facilitate construction.

It is anticipated that there will be limited or no opportunities for reuse of this material onsite and it will require removal for offsite reuse, recovery, recycling and/or disposal.

The contractor(s) will endeavor to ensure that material is reused or recovered off-site insofar as is reasonably practicable or disposed of at authorized facility.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;

- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011) as previously referred to Section 15.4 and detailed in the C&D WMP (Volume 2, Appendix 5.14.1).

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997 and the EMR Waste Management Plan (2015 - 2021). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

#### **6.2.14.2 Operational Phase**

All waste materials during operational phase will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the Dublin City Development Plan 2016 – 2022 (Policy SI20 and Objective SIO16).

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic/catering waste (including garden waste from landscaping activities);
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment;
  - Batteries (non-hazardous and hazardous)

- Fluorescent bulb tubes and other mercury containing waste (if arising); and
- Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); and
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997 and the EMR Waste Management Plan (2015 - 2021). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.