

19.0 MITIGATION AND MONITORING

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This chapter summarises the mitigation measures proposed in the various chapters throughout this Environmental Impact Assessment Report.

The *draft EPA Guidelines (2017)* describe mitigation measures as follows:

'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.'

Full details of mitigation measures are included within each individual chapter of this EIAR.

19.1 Population and Human Health

The mitigation measures incorporated in Chapter 6 of the EIAR have been broken down under the following headings:

Population

We consider that the development will have a long term positive impact on population due to the provision of a diverse range of housing units to satisfy different elements of housing demand and to ensure that the development is attractive to a varied cross section of the population. As such the development provides for studio, 1, 2 and 3 No. bed units. In addition, the development also complies with its Part V obligations and thus ensures a strong socio-economic mix.

As noted, during the construction phase the local population will be impacted during the construction period due to the influx of construction traffic, noise and dust. However, we note that these impacts are short-term and mitigation measures will be put in place to minimise such impacts which are discussed in other sections of this EIAR such as the implementation of a dust minimisation plan, a Mobility Management Plan and Parking Strategy. Please see further details in Chapter 11 (Air Quality and Climate), Chapter 14 (Traffic and Transportation) in addition to the Infrastructure Report and Preliminary Construction Management Plan submitted as separate documents.

Housing

It is considered that the proposed development of 564 No. units will be a positive addition to the availability of housing in the area by providing a wide choice in tenure for a range of persons. The short-term impacts associated with the construction stage are associated with any new development and will not be significant once the mitigation measures outlined in other sections of this EIAR such as the Noise and Vibration chapter (Chapter 12) and the Traffic and Transportation chapter (Chapter 14) in addition to the Infrastructure Report and Preliminary Construction Management Plan submitted as a separate document. These mitigation measures include the implementation of a Dust Minimisation Plan, Mobility Management Plan and Parking Strategy.

Employment and Commuter Patterns

The proposed development will have a significant positive impact on economy and employment of the area due to the influx of jobs that will be created at construction and operation stage. As a result of the construction of the proposed development, c. 450 – 500 No. workers will be directly employed during the construction period in addition to c. 170 No. indirect workers (e.g. marketing, suppliers etc.). During the construction phase local businesses will benefit from workers utilising their services. During the operation stage there will be increased population at the subject lands which will support the local economy.

As such, due to the positive and long term impacts that will occur on employment and the local economy, no mitigation measures are proposed.

Local Services and Amenities

The proposed development will benefit the local economy as local shops and other amenities will benefit economically from the construction stage and operational stages.

The proposed crèche (354 sq m) has the capacity to cater for c. 120 No. children which will serve the subject development and surrounding residential areas if necessary. The Schools and Creche Demand Assessment enclosed as a separate document prepared by Future Analytics concludes that there is capacity in the primary and post-primary schools in the area to absorb the limited demand predicted to arise from the subject development.

The provision of a crèche in addition to café will ultimately ensure that the area has sufficient services and amenities to cater for this increase in population. In addition, the provision of open space and the pedestrian link proposed will be an attractive addition to the area that will compliment and increase accessibility to existing services.

Health and Safety

As set out in the Preliminary Construction Management Plan, the Contractor shall be responsible for overall management of the site for the duration of the proposed works and must progress their works with reasonable skill, care, diligence and to proactively manage the works in a manner most likely to ensure the safety and welfare of those carrying out construction works. The Contractor shall comply with all relevant Statutory requirements such as the 2005 Safety Health and Welfare at Work Act, The Construction Regulations (SI 291 of 2013), the General Application Regulations (SI 299 of 2007), etc. (and any amendments thereof). In addition, the Contractor shall comply with all the reasonable safety requirements of the Client, the Project Supervisor for the Design Process and the Project Supervisor for the Construction Stage. To negate any potential impacts during construction stage, a Dust Minimisation Plan is proposed to be implemented.

As set out in Chapter 14 of this EIAR 'Traffic and Transportation', the mitigation measures proposed during the operational stage include the implementation of the Mobility Management Plan and the Parking Strategy which will encourage the use of sustainable transport modes which will ultimately reduce the potential impacts on the health and safety of the population in relation to traffic safety. The scheme is fully in accordance with the *Design Manual for Urban Roads and Streets* which is set out in the DMURS Design Statement prepared by O'Connor Sutton Cronin Consulting Engineers.

Traffic and Commuter Patterns

The promotion of sustainable modes of transport from the site during the operational stage will mitigate against any potential impacts that may arise on traffic in the area. Please refer

to Chapter 14 of this EIAR and the separately enclosed Preliminary Construction Management Plan which details the proposed development further in relation to potential traffic impacts and mitigation measures.

The scheme will be developed in line with the Traffic and Transport chapter (Chapter 14 of this EIAR) and the separately enclosed Preliminary Construction Management Plan to ensure any impacts on local traffic is minimised during the construction stage. The Preliminary Construction Management Plan notes that a large quantum of the on-site employees will arrive in shared transport therefore reducing the potential for associated temporary negative impacts on the surrounding road network.

As discussed, the promotion of sustainable modes of transport from the site during the operational stage will significantly mitigate against any potential impacts that may arise on traffic in the area. Please see Chapter 14 of this EIAR (Traffic and Transport) which details Strategy. We note that the scheme has been designed in line with the *Design Manual for Urban Roads and Streets (2009)*.

Human Health (Environmental)

A number of mitigation measures are set out in this Chapter which include the following:

- The filtering of surface water that is likely to be contaminated by soil particles in order to reduce the silting effects of these particles in the receiving downstream watercourse;
- Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse; and
- Locating existing services, methods statements, etc.

Air Quality and Climate

Chapter 11 details the mitigation measures to be employed to minimise any potential impacts in terms of Air Quality and Climate.

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. A Dust Minimisation Plan is provided in Appendix 11.3 which will be implemented throughout the construction stage.

Noise and Vibration

Chapter 12 sets out the following mitigation measures to be implemented during the construction phase:

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

- Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- Vibration monitoring should be conducted in accordance with BS 6472 for human disturbance and BS ISO 4866:2010 for building damage.

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

Landscape and Visual

The layout of the proposed development has positioned the highest forms at the least sensitive locations within the site. A Daylight and Sunlight Assessment has been carried out and is submitted as a standalone document with the proposed application. Block D, which provides the highest building form, is positioned to visually demarcate the entrance to the boulevard as viewed from the Luas station and Luas line. The provision of a pedestrian link through the site in addition to the landscaping proposals including functional areas of open space will contribute towards the successful integration of the subject development into the surrounding environment.

19.2 Archaeology and Cultural Heritage

19.2.1 Mitigation Measures

The main potential negative impact on surrounding cultural heritage features is visual impact from the proposed development. Though the proposed development will be visible from some (Vartry complex) there is a precedent in the existing partially constructed 14 No. storey building to the southwest of the subject site. The proposed development will be located in front of it.

Sensitive design of the proposed blocks should ensure that the proposed development results in no significant negative visual impact.

19.2.2 Monitoring

Though it is very unlikely that archaeology will be uncovered during the course of construction works, archaeological monitoring of any excavation works is recommended to address the possibility of any potential archaeological features being uncovered and to ensure that the appropriate course of action is taken.

19.3 Biodiversity

19.3.1 Mitigation Measures

This report has identified one impact that was assessed as 'moderate negative' and therefore mitigation is needed to reduce the severity of this potential effect. This may arise from habitat loss, where clearance works are undertaken during the nesting season. All birds' nests, eggs or hatchlings are protected under the Wildlife Act. Disturbance to any nest can only be done under licence from the National Parks and Wildlife Service (NPWS).

The following mitigation measures are proposed for the development:

Construction Phase

1: Disturbance of birds' nests

Deliberate disturbance of a bird's nest is prohibited unless under licence from the National Parks and Wildlife Service. If possible, site clearance works should proceed outside the nesting season, i.e. from August to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest.

2. Pollution during the construction phase

Best practice guidance from Inland Fisheries Ireland (2016) will be followed to prevent pollution. Dangerous substances such as oils and fuels will be stored at all times in a bunded area. Only clean water should enter public surface water sewers. Where necessary, silt traps will be used to remove sediment and solid matter prior to discharge to surface water sewers. The site manager will be responsible for ensuring that pollution does not occur and site personnel will be trained in the importance of pollution prevention.

After mitigation, no significant residual effects are likely to arise to biodiversity arising from this project.

19.3.2 Monitoring

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant. In this case no significant negative effects are likely to arise, and so additional monitoring is not required.

19.4 Landscape and Visual Impact

19.4.1 Mitigation Measures

Construction Phase

The building site including a site compound with site offices, site security fencing, scaffolding and temporary works will be visible during the construction phase. The provision of site hoarding along the property boundaries will substantially address many potential effects of construction operations during the delivery stage. Construction cranes (and of course, the emerging buildings) will become visible from neighbouring properties and also from a number of more distant vantage points as the development proceeds. The cranes and site facilities are generally viewed as a temporary and unavoidable feature of construction, particularly in urban settings.

Mitigation measures proposed during the construction stage of the development, revolve primarily around the implementation of appropriate site management procedures during the construction works – such as the control of lighting, storage of materials, placement of compounds, control of vehicular access, and effective dust and dirt control measures, etc. The Construction Management Plan for the project, submitted with the planning application,

sets out the basic measures to be employed in order to mitigate potential negative effects during construction. This is a working document which is refined and added to as the project proceeds.

Operational Phase

The designed scheme seeks to harmonise and integrate the development within the existing landscape and the broader urban environment. The design rationale and detail employed seeks to mitigate potential negative effects on the landscape character and visual amenity of the area by:

- Establishing an integrated relationship between the proposed development and surrounding buildings and the broader urban landscape, incorporating aspects of prevalent built forms, scale, texturing, colour and materials;
- The insertion, positioning and detailed modelling of the buildings, in order to assist in the visual assimilation of their mass;
- Appropriate architectural detailing to assist in the integration of the external building facades – including the modulation of openings and fenestration in a manner that harmonises with current local proportions and rhythms;
- Rationalisation of all service elements and any other potential visual clutter and its incorporation internally within building envelopes (as far as practically possible);
- Simplification and rationalisation of the proposed roof lines;
- Use of appropriate materials. The buildings' external envelopes will consist primarily of brick in subtle and complimentary tones with harmonious variation in colour between the individual blocks. Window frames, balustrades, copings and gates are in tonal greys to tie these elements into the broader materials strategy. This is in keeping with the broad range of materials and colouring found within the Business District;
- The provision of significant additional public space at the ground level entrance from Carmanhall Road, through the development at podium level and on down to link with Blackthorn Drive. The relationship between the buildings and the adjacent newly created public realm is fully considered; and
- The provision of communal/public uses within the development, in order to facilitate public access and permeability and to assist in activating public spaces.

19.4.2 Monitoring

The success of the proposed development is dependent on the proposals being properly executed as approved. Detailed agreement on finishes and materials to be employed needs to be ensured through the provision of and on-going adherence to reference samples provided on site for the duration of the construction works and defects period.

19.5 Lands, Soils and Geology

19.5.1 Mitigation Measures

Construction Phase

In order to reduce the impacts on the soils and geology environment a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of Soil Excavation and Export from Site;
- Sources of Fill and Aggregates for the Project;
- Fuel and Chemical Handling, Transport and Storage;
- Control of Water during Construction; and
- Incorporated Design Mitigation.

Control of Soil Excavation

Topsoil and subsoil will be excavated to facilitate the formation of the basement levels, ramp access, construction of a new sewer and water mains connections, roadways and all other associated services. The project will incorporate the; reduce, reuse and recycle approach in terms of soil excavations on site. The construction will be carefully planned to ensure only material required to be excavated will be excavated with as much material left in situ as possible. All excavation arisings will be reused on site where possible/ifsuitable.

Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur due to the design.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.

Export of Material from Site

Where material cannot be reused off site it will be sent for recovery/disposal at an appropriately permitted/licenced site. This is discussed further in the Construction and Demolition Waste Management Plan.

Site investigations have established that the majority of samples are suitable for an inert facility with the exception of two samples that indicated non-hazardous classifications due to elevated concentrations of selenium. All material will be managed according to the applicable Waste Management Acts and subsequent regulations. Nonetheless material which is exported from site, if not correctly managed or handled, could impact negatively on site human beings (offsite) as well as water and soil environments.

Additional Soil Classification may be required as part of the site development and regardless control of any material will be carried out in accordance with the Waste Management Act and

further details are included in the Construction Management Plan and the Construction and Demolition Waste Management Plan.

Sources of Fill and Aggregates

All fill and aggregate for the project will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the project;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

The use of fill and aggregate containing recycled or recovered materials shall be considered.

Fuel and Chemical Handling

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required);
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures will be taken:
 - Any flexible pipe, pump, tap or valve will be fitted with a lock and will be secured when not in use;
 - All bowsers to carry a spill kit and operatives must have spill response training; and
 - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

The aforementioned list of measures is non-exhaustive and will be included in the outline Construction Management Plan.

Construction Management Plan

In advance of work starting on site, the works Contractor will author a Construction

Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction Management Plan and Environmental Plan. The Construction Management Plan sets out the overarching vision of how the construction of the project will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CMP is a living document and it will go through a number of iterations before works commence and during the works. An outline version of the Construction Management Plan is submitted in support of this application under separate cover. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project.

Control of Water during Construction

Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of the prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Care will be taken to ensure that exposed soil surfaces are stable in order to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses.

During the basement's construction, after the Made Ground has been dug, it is possible water collection will occur and that a discharge licence will likely be required to enable discharge of water to sewer to keep the excavation dry. Should any discharge of construction water be required during the construction phase, discharge foul sewer will be regulated under a Discharge Licence obtained from the Regulator (Irish Water) issued under the Water Pollution Act. Attenuation, pre-treatment and monitoring of discharge water will likely be required under any Discharge Licence (Section 16 Licence). Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks) and hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits. Qualitative and quantitative monitoring will be implemented as per the Conditions of any Discharge Licence.

Incorporated Design Mitigation

In order to reduce the impact of the development on the lands and soils of the site, the proposed basement depth was optimised to keep the excavations required to a minimum, and hence this will reduce the amount of soils to be exported off-site and a reduction in machinery operation time. It is proposed that where soils are to be exported off-site, a local facility will be chosen where feasible, and hence reduce the carbon footprint associated with the transport and handling of the material.

Operational Phase

During the operational phase of the proposed development there will be an imperceptible impact on the geological environment from site activities.

The proposed scheme will have a combination of district and local heating systems all of which will be fuelled by mains gas. Therefore, there is no requirement for fuel oil storage removing any potential source of soil contamination.

19.5.2 Monitoring

Construction Phase

- Monitoring of the water discharged to sewer shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the Proposed Development.
- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act. Regular auditing of construction/mitigation measures will be undertaken (e.g. concrete pouring, refuelling in designated areas etc.).

No additional monitoring required as part of the Construction Phase.

Operational Phase

No monitoring required as part of the Operation Phase.

19.6 Water-Hydrology

19.6.1 Mitigation Measures

Construction Phase

The following mitigation measures shall be implemented with the construction of the surface water sewer network:

- The filtering of surface water that is likely to be contaminated by soil particles in order to reduce the silting effects of these particles in the receiving downstream watercourse;
- Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse;
- Locating existing services to ensure there is no conflict which could lead to a negative impact;
- Methods statements to ensure appropriate works methodologies.

It is proposed to implement the following mitigation measures for the surface water design for the operation phase in accordance with The Greater Dublin Strategic Drainage Study (GSDS). This requires that storm water is reviewed under four Criteria.

- (i) Criterion 1 – River Water Quality Protection;
- (ii) Criterion 2 – River Regime Protection;
- (iii) Criterion 3 – Level of Service (Flooding) site; and
- (iv) Criterion 4 – River Flood Protection.

Criterion 1 –River Water Quality Protection

The drainage system for this development will contain a range of treatment methods for surface water including;

- Green roofs and on podium storage will provide a first level of treatment and storage level of apartment blocks. The removal of pollutants or sediments, ecological value and a reduction of surface water runoff volumes and discharge rates for small events (Interception) will be provided;
- Raingardens & Basins will be provided downstream of the above SuDs components for attenuation during an exceedance event. All raingardens and basins are shallow and have been designed with a maximum top water level (TWL) of 150mm including 150mm freeboard to proposed ground level. Basins to be located in public areas and will be useable, maintainable and safe. Basins will be provided with a filter underdrain to enable use by the local community for non-extreme storm events;
- Infiltration to natural ground for surface water runoff will be facilitated underneath filter drains, raingardens, basins, landscaped areas and permeable paving outside of podium where practical. The scope for infiltration is limited on site due to the podium footprint and underlying rock below the surface;
- Filter drains underneath SuDS systems will likely provide attenuation, conveyance and treatment runoff;
- Swales will be used to convey and treat road runoff;
- Bio-retention Areas will be provided extensively throughout the site by tree pits and planters on podium and act as a first level of treatment for surface water run off around the site;
- Trees/planting within the soil filled tree pits / raingardens will collect, store and treat runoff for small events (Interception) while providing amenity and biodiversity;
- Permeable Paving / Open Graded Crushed Rock (OGCR) will be provided below hardstanding and landscaping on podium. The outfalls of each sub catchment will be limited / throttled to provide attenuation storage in the sub-base. The removal of pollutants at source and a reduction of surface water runoff velocities at source will be provided. The surface water flows through the stone medium at first level of treatment of runoff before controlled release to SuDS components downstream;
- Attenuation Storage will be provided to ensure that there is adequate attenuation storage for the required limited discharge of surface water volumes. The site has been divided into sub catchments to reduce flows, volumes and provide treatment of run-off, as part of the surface water management train. Attenuation will be provided for events up to, and including, the 1.0% AEP rainfall event of each sub-catchment SuDs component.;

- Limiting discharges from attenuation tanks will ensure that discharge rates are maintained below the greenfield runoff rate for SOIL Type 4;
- Catch Pits will remove sediments and silts upstream and downstream of all SuDS systems. The storm tech isolator row will capture any sediment which is not removed by catch pits upstream;
- A Petrol Interceptor will be provided for the treatment of all surface water runoff before it is discharged from site. A full retention oil separator (NSBA020) will separate oil and silts in accordance with EN858-1 and PPG3 from surface water before it discharges to the public surface water network;
- During the operational phase of the project trapped gullies will lessen debris discharging into the surface water system;
- SuDS components reduce urban runoff contamination; and
- Best management drainage policies in accordance with SuDS will be implemented and incorporated into the design of the surface water drainage.

All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753-SuDS Manual (2015).

An assessment of the potential pollutants was completed in accordance with CIRIA C753-SuDS Manual. The proposed development land use is residential with covered car parking, low traffic roads (e.g. cul de sacs, home zones, general access roads). The pollution hazard level from car parking and low traffic roads is very low for discharge to surface waters and groundwater, including coasts and estuaries. All discharge to surface waters and groundwater, including coasts and estuaries requires the removal of gross solids and sediments only and this will be provided with the above SuDS features and mitigation measures.

Criterion 2 – River Regime Protection

The existing site is drained at the north of the site via 300mm connection to the 900mm public surface water network on Blackthorn Drive. It is proposed to reuse this connection and discharge attenuated flow in accordance with the Local Authority requirements and the Greater Dublin Strategic Drainage Study (Dublin City Council, 2005). Discharge will be made to this existing public surface water sewer via the proposed attenuation and flow control device (Hydrobrake). The proposed Hydrobrake restricts discharge as specified. The limiting discharge will restrict the discharge to a rate of 8.1l/s for the site. The proposed discharge rate takes consideration for future development on site as discussed in Criterion 4 below. The GDSDS-RDP Volume 2, Appendix E Section E2.4 states that this ensures "that sufficient storm water runoff retention is achieved to protect the river during extreme events."

No extra measures are required for discharges as the receiving surface water network does not discharge directly into a protected resource.

Surface water runoff rates have been calculated in accordance with I.S. EN752: 2008 "Drain & Sewer Systems outside Buildings", the DOE 'Recommendations for Site Development

Works for Housing Areas', 'The Greater Dublin Region Code of Practice for Drainage Works' and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GSDSDS).

Criterion 3 – Level of Service (Flooding) Site

There are 4 sub-criteria for level of service, as set out in the GSDSDS-RDP Volume 2, Section 6.3.4 (Table 6.3):

- (i) No flooding on site except where planned (30-year high intensity rainfall event);
- (ii) No internal property flooding (100-year high intensity rainfall event);
- (iii) No internal property flooding (100-year river event and critical duration for site) and;
- (iv) No flood routing off site except where specifically planned, (100-year high intensity rainfall event).

Calculations for the design of storm drains have been compiled with the Micro Drainage Micro Drainage Program using the Modified Rational Method in accordance with EN752. Calculations for the Storm networks are included in Appendix B of the Engineering Service Report.

Sub-criterion 3.1

The proposed drainage system has been analysed for a 30-year return period storm event. The analysis show that no flooding will occur in 30-year return period storm events.

Sub-criterion 3.2

The proposed drainage system has been analysed for a 100-year return period storm event. The analysis show that no flooding will occur in 100-year return period storm events.

Sub-criterion 3.3

Existing ground levels around the site at Blackthorn Drive and Carmanhall Road are 80.45mAOD and 86.59mAOD respectively. An existing concrete slab covers almost the entirety of the site, with surface levels between 77.50 – 83.64mAOD. The site is not in the vicinity of coastal flooding. The maximum water level in the proposed attenuation will not pose a risk to the proposed buildings. In accordance with the requirements of Sub-Criterion 3.3, all buildings are a minimum of 500mm above the design 100-year water level off open attenuation facility.

Sub-criterion 3.4

The performance of the proposed drainage system in the 100-year return period storm events has been analysed. The analysis show that no flooding is expected in the 100-year return period storm event. No off-site overland flow is expected in the 100-year return period storm event, unless in specifically designated areas, i.e. detention basins.

Criterion 4 – River Flood Protection

Discharge for the development will be restricted to a rate of 8.1/s to the Greenfield Runoff for SOIL Type 4 (5.26l/s/ha). By limiting the runoff to this flow rate, the GSDSDS-RDP Volume 2, Appendix E Section E2.4 states that this ensures "that sufficient stormwater runoff retention is achieved to protect the river during extreme events." Attenuation storage is provided for the 100-year return period storm event in the proposed attenuation storage facility. Control of runoff rates will be achieved through the use of a vortex control device (e.g. Hydrobrake),

which reduces the risk of blockage present with other flow control devices. Calculations of attenuation volume are included in Appendix B of the Engineering Service Report, submitted as a standalone document.

No other mitigation measures are deemed to be necessary after completion of the development, other than normal maintenance of the surface water system.

Allowable surface water runoff from the development site has been calculated using the 'Greater Dublin Strategic Drainage Study', (GDSDS) and the Institute of Hydrology Report No.124 to estimate existing Greenfield runoff rates.

19.6.2 Monitoring

In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction Management Plan and Environmental Plan. The Construction Management Plan sets out the overarching vision of how the construction of the project will be management in a safe and organised manner by the Contractor with the oversight of the Developer. The Construction Management Plan is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. An outline Construction Management Plan is submitted as part of this application under separate cover.

The Construction and Demolition Waste Management Plan is included as Appendix 15.1 of Chapter 15 – Waste Management. Monitoring shall be carried out as specified in any Discharge Licence associated with the construction phase of the project.

19.7 Air Quality and Climate

19.7.1 Mitigation Measures

Construction Phase

A dust minimisation plan will be formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within 200 m of the construction area. A detailed Dust Minimisation Plan associated with a high level risk of dust impacts is outlined in Appendix 11.3. This Plan draws on best practice mitigation measures from Ireland, the UK and the USA in order to ensure the highest level of mitigation possible.

In summary some of 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 will be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads;
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions; and
- Hoarding or screens shall be erected around works areas to reduce visual impact. This will also have an added benefit of preventing larger particles of dust from travelling off-site and impacting receptors.

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 will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Operational Phase

Impacts to air quality and climate are predicted to be imperceptible for the operational phase therefore, no mitigation is required.

19.7.2 Monitoring

Construction Phase

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

Operational Phase

As the predicted impacts to air quality and climate will be imperceptible during the operational phase, no monitoring is proposed.

19.8 Noise and Vibration

19.8.1 Mitigation

Construction Phase

With regard to construction activities, best practice control measures from construction sites within *BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2* will be used to control noise and vibration impacts. 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 not significant. This will be particularly important during demolition, foundation construction including piling works which are likely to be the activities to have the highest potential noise and vibration impact.

Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- During construction, the contractor will manage the works to comply with noise limits outlined in *BS 5228-1:2009+A1 2014. Part 1 – Noise*;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- Limiting the hours during which site activities which are likely to create high levels of noise or vibration are permitted;
- Monitoring levels of noise and vibration during critical periods and at sensitive locations.

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 good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;
- Erection of barriers as necessary around items such as generators or high duty compressors, and;

- Situate any noisy plant as far away from sensitive properties as permitted by site constraints.

Temporary School

Specific mitigation measures apply to the temporary school on the east boundary. In this instance consideration of sensitive hours will be required when undertaking the works most likely to cause the highest impacts (e.g. piling and demolition works). It is recommended that these works, or any other works that have the potential to exceed the noise threshold, are only undertaken during less sensitive periods when within 50m distance to the school. We note that this only applies if the school (which is subject to a temporary permission) is still located beside the subject site when construction works begin.

Vibration

In terms of vibration management, it is recommended that the contractor is proactive in engaging with local sensitive receptors and should notify them of any works forecast to generate appreciable levels of vibration, explaining the nature and duration of the works. This will be of particular importance during periods of demolition or piling activities.

Operational Phase

As is the case in most buildings, the glazed elements and ventilation paths of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

Some facades have been highlighted in Figure 12.11 within Chapter 12 which will be provided with glazing and ventilation that achieves the minimum sound insulation performance as set out in Table 12.14 and Table 12.15 within Chapter 12. Other facades in the development have no minimum requirement for sound insulation.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Note that the façade specifications are also relevant to the creche located in BlockD.

19.8.2 Monitoring

Construction Phase

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

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

Vibration monitoring should be conducted in accordance with BS 6472 for human disturbance and BS ISO 4866:2010 for building damage.

Operational Phase

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

19.9 Wind

19.9.1 Mitigation Measures

Mitigation measures proposed as part of the subject development include:

- Landscaping: the use vegetation to protect buildings from wind;
- Sculptural screening (solid or porous): to either deflect the wind or bleed the wind by removing its energy;
- Canopies and Wind gutters: horizontal canopies are used to deflect the wind and redirect the wind around the building and above the canopy.

In particular, it is possible to summarise the different flow features and the corresponding mitigation options as follows:

- **Downwash Effects:** when wind hits the windward face of a tall building, the building tends to deflect the wind downwards, causing accelerated wind speeds at pedestrian level and around the windward corners of the building. This can occur when tall and wide building facades face the prevailing winds.
- **Downdraft Effects:** When the leeward face of a low building faces the windward face of a tall building, it causes an increase in the downward flow of wind on the windward face of the tall building. This results in accelerated winds at pedestrian level in the space between the two buildings and around the windward corners of the tall building.

An Example of Typical Mitigation Options:

- To mitigate unwanted wind effects, it is recommended to introduce a base building or podium with a step back, and setting back a tower relative to the base building, the downward wind flow can be deflected, resulting in reduced wind speed at pedestrian level.
- Landscaping the base building roof and tower step back, wind speeds at grade can be further reduced, and wind conditions on the base building roof can improve.
- **Funnelling Effects:** Wind speed is accelerated when wind is funnelled between two buildings. This is referred to as the "wind canyon effect". The intensity of the acceleration is influenced by the building heights, size of the facades, building separation distance and building orientation. Similar effect can be noticed when a bridge is connecting two buildings, the wind passing below the bridge is accelerated, therefore pedestrians can experience high uncomfortable velocities of wind.

19.10 Material Assets - Traffic and Transportation

19.10.1 Mitigation Measures

Construction Phase

The construction stage will be dealt with by the appointed contractor through the development and implementation of a Construction Management Plan. This plan will be agreed with the Local Authority prior to the commencement of construction and will ultimately include details on the following:

- Daily and weekly working hours;
- Agreed haul routes for incoming materials;
- Licensed hauliers to be used;
- Disposal sites, if necessary;
- Travel arrangements for construction personnel;
- Appropriate on-site parking arrangements for construction personnel to prevent overspill parking on the local road network;
- Temporary construction entrances to be provided;
- Wheel wash facilities if required;
- Road cleaning and sweeping measures to be put in place if required;
- Temporary construction signage to be put in place and maintained;
- Any proposed traffic management measures such as temporary traffic lights and signage on any public roads.

Operational Phase

A series of mitigation measures have been incorporated into the design of the development with respect to traffic & transportation while others have been identified as part of the detailed analysis of the local road network.

Car Parking

Car parking at the development has been reduced considerably from the *Dun Laoghaire Rathdown County Development Plan 2016-2022* standards based on the guidance set out in the *Design Standards for New Apartments, Guidelines for Planning Authorities, 2018*, particularly as a Build to Rent scheme which is specifically allowed for with the guidance.

These guidelines allow for "car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances", particularly in "highly accessible areas such as in or adjoining city cores or at a confluence of public transport systems such rail and bus stations located in close proximity". The site is highly accessible by different modes of transport other

than car such as the Luas Green Line and numerous Dublin Bus routes all within 100 metres walk. It is also in close proximity to a number of core facilities including various retail and supermarkets, cafes, restaurants, banks, gyms etc.

A rate of 0.51 spaces per residential unit is proposed based on this guidance which will encourage residents to travel by more sustainable means. This measure will be supported by the implementation of a parking management plan which will include:

- Early and ongoing engagement with residents with respect to the availability of car parking;
- Provision of 10 No. parking spaces dedicated to use by a car club which will facilitate access to more sustainable, infrequent car usage that doesn't support commuting by car;
- Strict control of access to car parking including on-site monitoring of car parking usage with associated control measures e.g. clamping. In addition, the apartments will be rented without spaces as standard with spaces provided at an additional cost.

Travel Plan

In addition to the above, a development specific Travel Plan will be implemented at the site which sets out a series of measures to facilitate and encourage a positive modal shift towards more sustainable modes of transport. These measures will be refined based on travel surveys conducted at the occupied development but typically include:

- Appointment of a site Mobility Manager to oversee the implementation of the plan;
- Ongoing liaison with relative bodies including public transport providers such as Dublin Bus and Irish Rail;
- Providing ongoing information with respect to existing, amended and proposed public transport, cycle and pedestrian infrastructure and services;
- Providing information with respect to technological advances which improve the use of public transport such as apps and integrated ticketing systems;
- Developing new or advising of existing databases to facilitate and promote car sharing, walking groups, cycle groups etc.;
- Organising learning opportunities which promote travel by sustainable means such as bike repair tutorials;
- Advising of and providing information with respect to available initiatives such as tax saver tickets and the Cycle to Work scheme which may be of benefit to residents.

Cycle Parking

To ensure travel by bicycle continues to be facilitated and encouraged, cycle parking considerably in excess of Development Plan standards is proposed. The Development Plan sets out a minimum of 1 space per apartment and an additional space per 5 units for visitors. It is proposed to provide 1 space per bedroom at the development and 1 visitor space for every

2 No. units, in line with the Design Standards for New Apartments. A total number of 1,175 No. cycle parking spaces are provided within the scheme. Segregated cycle parking access is also provided from both Carmanhall Road and Blackthorn Drive to provide safe and convenient access for cyclists.

Roads

A dedicated set down bay is proposed on both Carmanhall Road and Blackthorn Drive to facilitate general set down and servicing e.g. waste collection, taxi drop off etc. This will prevent any potential stopping of vehicles on the public road which could lead to a blockage of traffic and associated congestion.

The existing footpaths to the north and south of the site will also be widened significantly. On Carmanhall Road, this will see the footpath width increased from the current c. 1.9 – 4.0m to between c. 6.1 – 10.0m. Similarly, the Blackthorn Drive footpath will increase from the existing c. 2.6m to between c. 10.9 – 14.7m. This will considerably improve the space available to pedestrians both related and unrelated to the development.

The proposed north-south link through the site will also increase permeability in the local area and provide a more direct link to the Luas and bus stops. This will again increase accessibility to public transport services for residents at the development as well as those in the local area.

Junction Operation

The signal plan in operation at Junction 1 should be optimised to cater for the altered traffic flows in the future years, particularly the Do-Maximum scenario. This would be expected to occur naturally as part of the junction operation through the existing junction controller and on-site vehicle detection measures already present.

19.10.2 Monitoring

Monitoring will be required with respect to the parking management strategy at the development to ensure the appropriate usage of parking. This will be provided by the Build to Rent operator.

No further monitoring is required as a result of the proposed development. However, monitoring of the operation of Junction 3 is recommended as part of the Do Nothing scenario to identify if and when mitigation unrelated to the proposed development will be required in the future.

19.11 Material Assets – Waste Management

19.11.1 Mitigation

Construction Stage

A project specific C&D WMP has been prepared in line with the requirements of the requirements of the guidance document issued by the DoEHLG and is included as Appendix 15.1. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste

material generated during the demolition, excavation and construction phases of the proposed development. Prior to commencement, the contractor(s) will be required to refine/update the C&D WMP or submit an addendum to C&D WMP to DLRCC 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.

A quantity of soil, stone, gravel, clay and rock which will need to be excavated to facilitate the proposed development. Project Engineers have estimated that c. 10,100m³ of excavated material will need to be removed offsite. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

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 required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

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

Operational Stage

A project specific OWMP has been prepared and is included as Appendix 15.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021 and abiding by the DLRC waste bye-laws and draft waste bye-laws.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
 - Organic waste;
 - Dry Mixed Recyclables;
 - Mixed Non-Recyclable Waste;
 - Glass;
 - Waste electrical and electronic equipment (WEEE);
 - Batteries (non-hazardous and hazardous);
 - Cooking oil;
 - Light bulbs;
 - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
 - Furniture (and from time to time other bulky waste); and
 - Abandoned bicycles.
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

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, the EMR Waste Management Plan

(2015 - 2021) and the DLRCC waste bye-laws and draft waste bye-laws.. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

19.11.2 Monitoring

Construction Phase

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

Operational Phase

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

19.12 Material Assets – Site Services (Civils)

19.12.1 Mitigation Measures

Construction Phase

The following mitigation measures are recommended for the construction phase of the development:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and Chemical handling, transport and storage;
- Control of Water during Construction;
- Intrusive testing by the appointed contractor to establish the location of underground services in advance of works commencing on site;
- Consultation with relevant services providers in advance of works to ensure works are carried out to relevant standards and specifications including procedures to ensure safe working practices are implemented for works in the vicinity of services such as live gas mains, works in the vicinity of overhead electricity lines and live electricity lines and works to distribution watermains;
- Neighbouring sites are to be advised of construction methodologies in advance of works, in situations which may affect them;
- Protection in place of all underground services for which diversions are not required;
- All decommissioned infrastructure to be sent to a suitably licenced waste management facility;

- Construction methods used by the contractor are to be tailored to reduce, where possible, dust noise and air pollution; to minimise interference with the environment and the neighbouring areas;
- Any spoil or waste material generated from the construction process is to be temporarily stored at an approved location on site, before being removed to a suitably licenced waste management facility;
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines;
- Potable water supply networks and waste water infrastructure are to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with Irish Water Requirements;
- Connections to the service providers are to be carried out to the approval and / or under the supervision of the Local Authority or relevant utility service provider, prior to commissioning;
- All new sewers are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase;
- Prior to the commencement of excavations in public areas, all utilities and public services are to be identified and checked; to ensure that adequate protection measures are implemented to minimise the risk of service disruption;
- All excavations within the public area are to be back-filled in a controlled manner and surface re-instated to the satisfaction of the Local Authority.

With the implementation of these mitigation measures, the severity of the impact of the proposed development on the built services will be minimised, with tie-ins to existing services and installation of new services completed in a satisfactory manner for the relevant service providers.

Operational Phase

The design and construction of the required services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

Any additional mitigation measures required for the proposed built services, if required, during the operational phase will be as advised by the relevant service provider.

Potable Water

The following mitigation measures shall be implemented with the construction of the potable water network:

- Provide a potable water supply in accordance with Irish Water Code of Practice for Water Infrastructure;

- The potable site supply connection will be metered with ABB Magmaster electromagnetic flow meters or similar approved;
- The proposed network connection will be metered and provided with associated hydrants and valves as per Irish Water requirements;
- Provision of a water meter will be fitted on the incoming watermain into each block and individual properties will be fitted with a Talbot Matrix meter box for monitoring purposes;
- New water saving devices (low water usage appliances and aerated taps etc.) will be fitted as standard into the proposed new units;
- All new potable water networks will be tested by means of an approved pressure test during the construction phase and prior to connection to the public sewer system in accordance to Irish Water requirements;
- The connections to the public sewer will be carried out under the supervision of the Local Authority and will be checked prior to commissioning;
- Prior to commencement of excavations in public areas all utilities and public services will be identified and checked, to ensure that adequate protection measures are implemented during the construction phase;
- All excavations within the public roads will be back-filled in a controlled manner and the public road will be reinstated to the satisfaction of the Local Authority;
- Traffic Management Plans and Method Statements for all works to be carried out will be prepared and assessed prior to commencement of the works. All construction methods used will be tailored to reduce, where possible, dust and noise and interference with residents in neighbouring developments;
- All spoil and waste material will be removed to an approved location and storage of construction materials in public areas will be minimised;
- All oil/diesel stored on-site will be in suitable containers which will be located in a purposed built bonded area which will provide containment in the event of accidental spills;
- All plant will be maintained in a designated maintenance area.

The completed potable water network will not require further mitigation measured upon completion.

Foul Water

The following mitigation measures shall be implemented with the construction of the foul sewer network:

- All foul pipes to be designed and laid at gradients for self-cleansing velocities so drainage can be maintained under normal operating conditions;
- The proposed internal network pipes are to be slung to the underside of the podium slab

and will be in accordance with TGD H – Drainage specifications;

- All new foul sewers will be tested by means of an approved pressure test during the construction phase and prior to connection to the public sewer system in accordance to Dublin City Councils requirements;
- All foul sewers will be inspected by closed circuit cameras (CCTV) to identify possible physical defects;
- The connection of the new foul sewers to the public sewer will be carried out under the supervision of the Local Authority and will be checked prior to commissioning;
- Prior to commencement of excavations in public areas all utilities and public services will be identified and checked, to ensure that adequate protection measures are implemented during the construction phase;
- All excavations within the public roads will be back-filled in a controlled manner and the public road will be reinstated to the satisfaction of the Local Authority;
- Traffic Management Plans and Method Statements for all works to be carried out will be prepared and assessed prior to commencement of the works. All construction methods used will be tailored to reduce, where possible, dust and noise and interference with residents in neighbouring developments;
- All spoil and waste material will be removed to an approved location and storage of construction materials in public areas will be minimised;
- All oil/diesel stored on-site will be in suitable containers which will be located in a

purposed built bonded area which will provide containment in the event of accidental spills;
- All plant will be maintained in a designated maintenance area.

No other mitigation measures are deemed to be necessary after completion of the development, other than normal maintenance of the foul sewer system.

Surface Water

The following mitigation measures shall be implemented with the construction of the surface water sewer network:

- The filtering of surface water that is likely to be contaminated by soil particles in order to reduce the silting effects of these particles in the receiving downstream watercourse;
- Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse;
- Locating existing services, methods statements, etc.

The following surface water design measures will be implemented in accordance with The

Greater Dublin Strategic Drainage Study (GDSDS) will mitigation impacts during the operation phase to the receiving surface water network;

- The improved water quantity with reduced peak runoff rates and reduced runoff volumes for Interception / Large Events to the receiving downstream watercourse;
- Improved water quality to the receiving downstream watercourse;
- The provision of amenity; and
- The provision of increased biodiversity.

These measures are set out in detail in Section 10.5.2. of Chapter 10 – Hydrology and Hydrogeology.

No other mitigation measures are deemed to be necessary after completion of the development, other than normal maintenance of the surface water system.

19.12.2 Monitoring

In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction Management Plan and Environmental Plan. The Construction Management Plan sets out the overarching vision of how the construction of the project will be management in a safe and organised manner by the Contractor with the oversight of the Developer. The CMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIAR and

any subsequent conditions relevant to the project. The Construction Management Plan and the Construction and Demolition Waste Management Plan are included in the main submission. Monitoring shall be carried out as specified in any Discharge Licence associated with the construction phase of the project.

19.13 Material Assets – Site Services (Utilities)

19.13.1 Ameliorative, Remedial or Reductive Measures

Construction Phase

Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

A GPR utility survey (and slit trench investigation as required) will be carried out along Blackthorn drive and at Carmanhall Road in advance of commencing road works to confirm the location of the power and telecommunication infrastructure.

Operational Phase

On completion of the construction phase no further mitigation measures are proposed in

relation to the electrical, gas and telecommunications infrastructure.

19.14 Cumulative Impact

At the time of writing this Environmental Impact Assessment Report, it appears that there are no current projects in the vicinity of the site seeking planning permission. There has been one planning application 'Rockbrook Phase II' in close proximity to the subject site which has recently been granted permission for the construction of a Build-to-Sell mixed use scheme (Ref.: ABP-304405-19) This scheme has been reviewed and included within the enclosed EIAR chapters.

Therefore, it is not proposed to include any specific measures for monitoring or mitigation to be undertaken in relation to cumulative impacts.