6.3.2.1 Habitats and flora

Habitat classification is according to Fossitt (2000). Consideration was also given to the possible presence of habitats listed in Annex I of the EU Habitats Directive.

Particular emphasis was given to the possible occurrence of rare or legally protected plant species (as listed in Flora Protection Order 1999) or Red-listed plant species (Curtis & McGough 1985, Wyse Jackson *et al.* 2016).

6.3.2.2 Fauna

Observations were made for fauna species present or likely to occur on site. Emphasis was placed on mammals and birds, and especially for species listed in the respective Red lists, namely Gilbert et al. (2021) and Marnell et al. (2009).

For mammals, search was focused on signs of their presence, such as tracks, feeding marks and droppings, as well as direct observations. For bats, the main focus was on evaluation of the suitability of habitats to support roosting bats.

Bird species were recorded by sight and sound. However, as the survey was confined to one date, the likely presence in other seasons of bird species of conservation importance was assessed based on habitats present (e.g. winter wetland species such as swans and waders would require wetland habitats, such as estuary, lake etc., breeding woodland species would require woodland habitats, breeding upland species such as hen harrier and red grouse would require bog and heath habitats).

6.3.3 Ecological evaluation

The criteria used to assess the ecological value of features follows the NRA *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). Whilst the NRA guidelines were devised specifically for road schemes, they can be applied to general site evaluations. The NRA system uses the following five-point scale:

- International Importance
- National Importance
- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

6.3.4 Limitations / Data deficiencies

The habitat and flora assessment was carried out within the recommended period for botanical survey.

The optimum period for survey of ground mammals is late winter to early spring when vegetation cover is at a minimum. However, at this site, there is no natural or semi-natural vegetation cover to obscure signs of mammal species so survey in September is adequate.

As the bat survey was limited to visual inspection of habitats for potential roosts, full assessment (if such was deemed necessary) would require evening/night survey to detect roost sites and thorough daytime examination of any suitable buildings on site.

Survey for birds in early September includes resident species and summer migrants which may have bred locally. The likely presence of birds in other seasons can be assessed by the diversity of habitats present.

Overall, and taking the character of the site (i.e. built environment) into account, it is considered that there are no significant limitations to the present assessment of the ecological importance of the site.

6.4 Receiving Environment

6.4.1 Location and physical characters

The application site is situated at the northern end of the larger development site known as Heuston South Quarter (HSQ). The overall HSQ site is bounded principally by St. John's Road West to the north, Military Road to the east, and by the formal gardens of the Royal Hospital Kilmainham (RHK) to the west and south. The HSQ lands are in close proximity to Heuston Rail Station and the LUAS Red Line service.

The application site has a total area of approximately 0.62ha. It is a previously excavated and part-built site, with a concrete structure over approximately two-thirds of site area and some ground that has re-vegetated to a grassy sward over the remainder. It adjoins an open, landscaped area to the south, which is part of the overall HSQ site. Existing residential and commercial developments occur immediately to the east (also part of overall HSQ site). The OPW Kilmainham complex occurs to the west, with St. John's Road to the north.

There are no streams, open drains or natural habitats on site. Natural drainage of the site is towards the River Liffey, which is approximately 250 m to the north (with St John's Road and the Heuston Station facility occupying the intervening area).

Figure 6.4.1.1 Much of the site is already built upon. September 2020.

Figure 6.4.1.2 Part of the built concrete surface has been landscaped as an interim measure to improve aesthetics pending its redevelopment. September 2020.

Figure 6.4.1.3 View looking south over rank grass in eastern part of site. The boundaries of the grass plot had been planted with trees, mainly willow, as part of interim landscape works. September 2020.

Figure 6.4.1.4 View looking northwards over rank grass in eastern sector of site. Trees include planted willows as well as a few self-seeded sycamore. September 2020.

Figure 6.4.1.5 View of northern boundary of site alongside St. Johns's Road West. A strip of rowan trees had been planted here as part of the interim landscape works. Sept 2020.

6.4.2 Habitats and flora

As noted, much of the site has already been built upon and comprises concrete structures – this is classified as Buildings and artificial surfaces BL3 (after Fossitt 2000) (see Figures 6.4.1.1 & 6.4.1.2). An access road along the western margin of the site, leading into an underground car park associated with the overall HSQ complex, is also included in this habitat class.

The eastern sector of the site comprises an unmanaged grass sward (see Figures 6.4.1.3 & 6.4.1.4) – it appears that the grass was planted as part of interim landscape works (permitted under DCC Planning Ref. 2724/13. Based on the species present and absence of management, it is best classified as Dry meadows and grassy verges GS2. The sward is tall (up to 1 m in places) and has a coarse character, with weedy species such as thistles *Cirsium* spp., docks *Rumex* spp., nettles *Urtica dioica*, dandelion *Taraxacum* spp., and the grasses *Holcus lanatus* and *Dactylis glomerata.* Other species include meadow buttercup *Ranunculus acris*, narrow-leaved plantain *Plantago lanceolata*, bush vetch *Vicia sepium,* knapweed *Centaurea nigra*, red clover *Trifolium pratense,* yarrow *Achillea millefolium* and teasel *Dipsacus fullonum*. . Bramble *Rubus fruticosus* is developing in places. Willows (*Salix* spp.) occur along margins of the grass area and especially along the western margin – these had been planted as part of the interim landscape works. There are a few self-seeded small willows within the grass sward, along with sycamore *Acer pseudoplatanus*.

A strip of grassland (now rank but probably originally amenity grass) between the built concrete structure

and St. John's Road has been planted with rowan trees (probably Sorbus aucuparia) (see Figure 6.4.1.5).

There are no records of rare or scarce flora species associated with the site and the existing habitats would not be expected to support any such species. There were no observations made of rare or scarce plant species during the site survey.

6.4.3 Fauna

6.4.3.1 Mammals

Apart from brown rat *Rattus norvegicus* within the rank grassland, the site survey did not record any terrestrial mammal species on site. Red fox *Vulpes vulpes* may at times pass through the site as it is a widespread species in Dublin city (including the Heuston Station facility). Other small mammal species, such as pygmy shrew *Sorex minutus* and house mouse *Mus domesticus,* may occur at times in the rank grass sector of site.

It is noted that the site does not have habitats to support large mammals such as badger *Meles meles.*

The site offers no potential for roosting bats as there are no mature trees or suitable buildings on site. Similarly, the site has negligible potential for foraging bats. It is noted, however, that bats would be expected in the Royal Hospital complex to the south-west of the subject site.

6.4.3.2 Birds

On the day of survey, bird species recorded using the site was pied wagtail *Motacilla alba,* wren *Troglodytes troglodytes* and goldfinch *Carduelis carduelis*. The pied wagtails were perched on the concrete structure, while the wren and goldfinch were in the grass area, with latter species feeding on the seed heads of teasel. Feral pigeons and jackdaws were recorded flying over the site.

Due to the absence of suitable habitats, no bird species of conservation importance would be expected within the site at any other times of year (see section 6.3.2.2).

It is noted that herring gull *Larus argentatus* and lesser black-backed gull *Larus fuscus* are known to rest on the roof tops of the neighbouring EIR building as well as on other buildings in the area, including Heuston Station.

6.4.3.3 Amphibians and reptiles

The site does not have any habitat suitable for amphibian or reptile species.

6.4.4 Sites designated for conservation

The subject site is located approximately 8 km from the Dublin Bay system, with four European sites, as follows (see http://webgis.npws.ie/npwsviewer/):

- North Dublin Bay SAC (code 00206)
- South Dublin Bay SAC (code 00210)

- South Dublin Bay & River Tolka Estuary SPA (code 04024)
- North Bull Island SPA (code 04006)

It is located approximately 1 km north of the Royal Canal proposed Natural Heritage Area (code 002104) and approximately 3 km south of the Grand Canal proposed Natural Heritage Area (code 002013).

The Liffey Valley proposed Natural Heritage Area (code 00128) is located along the banks of the Liffey approximately 4.5 km west of the HSQ site.

6.4.5 Overview of conservation value of site

The subject site is a previously developed site, which mostly comprises a partly built structure and a patch of rank grassland. The site does not support any natural or semi-natural habitat. Fauna species associated with the site are all species commonly found in urban environments. The site is not part of, and does not adjoin, any designated site for conservation.

The site is considered to have an ecological rating of, at most, Local Importance (lower value).

6.5 Identification of Likely Significant Impacts

6.5.1 Habitats

The proposed development will result in the loss of the existing habitats on site.

All of the habitats on site have been created in the last decade and have negligible ecological interest. The effect by the loss of the habitats as a result of development is considered to be not significant.

During the construction phase the effect of the impact of the proposed development in respect of existing habitats is considered to be not significant.

During the operational phase the effect of the impact of the proposed development in respect of existing habitats is considered to be not significant.

6.5.2 Birds

The proposed development will result in the loss of the existing habitats on site.

While a very limited number of bird species may nest in the site (see section 6.4.3.2), these are all common and widespread species and the effect by the loss of habitat for these species is considered to be not significant (subject to appropriate mitigation for nesting birds).

During the construction phase the effect of the impact of the proposed development in respect of existing birds is rated as not significant (subject to appropriate mitigation for nesting birds).

During the operational phase, there is a risk that birds will collide with the buildings and especially the windows. Research in the United States has shown that building collisions are a major anthropogenic threat to birds and a second only to feral and free-ranging pet cats (Loss et al. 2014). By reflecting foliage or sky, birds simply continue to fly towards the glass and will invariably die from impact or injuries sustained. While the extent of bird collisions with buildings in Dublin is apparently unknown, it can be assumed that all modern buildings with extensive glazing cause some casualties.

For the subject site, potential casualties may include gulls associated with the local roof nesting population and birds moving along the Liffey corridor. Appropriate mitigation can minimise the risk of collision.

6.5.3 Mammals, Amphibians and Reptiles

The proposed development will result in the loss of the existing habitats on site.

The site has very limited potential to support mammal species, including bats, and has no suitable habitat for amphibians or reptiles.

During the construction phase, the effect of the impact of the proposed development in respect of existing mammal species is considered to be not significant.

During the operation phase, light derived from the buildings, and especially high intensity external lighting, could have a detrimental effect on bats foraging in the grounds of the neighbouring Royal Hospital complex (as bats are sensitive to light). Appropriate mitigation can minimise the risk of effects on foraging bats.

6.5.4 Protected Sites

6.5.4.1 European sites

Assessment of the hydrological environment allows Source-Pathway-Receptor (S-P-R) linkages to be identified. If no S-P-R linkages are identified, then there is no risk to identified receptors.

Surface and storm water drainage from the area of the HSQ site is to the River Liffey. The River Liffey flows for approximately 8 km from the Heuston/Islandbridge sector to Dublin Harbour and ultimately Dublin Bay.

During the Construction Phase, potential sources for water pollution from the construction site to local drains and watercourses include:

- Suspended solids derived from soil excavation and movement within site.
- Run-off from wet cement surfaces which can result in alkaline water with high pH.
- Leakages and spillages of hydrocarbons.

During the Operation Phase, there will be general run-off to the local surface drainage system from roofs

and hard surfaces, with potential for leakage of petrol/diesel fuel from vehicles.

For this project, a hydrological pathway from the proposed development site to the designated European sites associated with Dublin Bay has been identified (see Section 6.4.4). For a full assessment of the potential effects on European sites, reference is made to the NIS which forms part of the application.

In the absence of mitigation, the input of potential pollutants to the North Dublin Bay SAC and the South Dublin Bay SAC, via the River Liffey, could have potential effects on the following qualifying interests of the SACs:

- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1310 Salicornia and other annuals colonising mud and sand
- 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
- 1410 Mediterranean salt meadows (Juncetalia maritimi)

It is considered unlikely that input of potential pollutants could have any effect on the other qualifying interests for these two SACs as all are above the level of high tide.

In the absence of mitigation, the input of potential pollutants to the North Bull Island SPA and the South Dublin Bay and the River Tolka Estuary SPA, via the River Liffey, could have potential effects on the following Special Conservation Interests of the two SPAs:

- A160 Curlew (Numenius arquata)
- A149 Dunlin (Calidris alpina)
- A157 Bar-tailed Godwit (Limosa lapponica)
- A162 Redshank (Tringa totanus)
- A179 Black-headed Gull (Chroicocephalus ridibundus)
- A144 Sanderling (Calidris alba)
- A156 Black-tailed Godwit (Limosa limosa)
- A143 Knot (Calidris canutus)
- A169 Turnstone (Arenaria interpres)
- A054 Pintail (Anas acuta)
- A046 Light-bellied Brent Goose (Branta bernicla hrota)
- A048 Shelduck (Tadorna tadorna)
- A052 Teal (Anas crecca)

- A141 Grey Plover (Pluvialis squatarola)
- A056 Shoveler (Anas clypeata)
- A130 Oystercatcher (Haematopus ostralegus)
- A140 Golden Plover (Pluvialis apricaria)

The qualifying interest, A999 Wetlands, could also be potentially affected. However, it is unlikely that the three tern species list as SCIs for the South Dublin Bay and River Tolka Estuary SPA would be affected as the terns feed mainly offshore.

It is concluded that in the absence of mitigation, there is potential for contaminated water emanating from the HSQ development site to enter the River Liffey system and ultimately the aquatic and intertidal environment of Dublin Bay, during the construction and (to a lesser extent) operational phases of the proposed development. The significance of any subsequent effect on the qualifying interests/special conservation interests of the Natura 2000 sites would vary depending on the type of pollutant, as well as the magnitude and duration of the event. As the conservation objectives of the four identified Natura 2000 sites could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project (i.e. mitigation measures).

6.5.4.2 National sites

The subject site does not have any linkages with the three identified proposed Natural Heritage Areas (see Section 6.4.4) identified within the hinterland of the site and hence the proposed project could not have any impacts on these pNHAs.

During the construction phase the proposed development does not have potential to have impacts on any nationally important site.

During the operational phase the proposed development does not have potential to have impacts on any nationally important site.

6.5.5 Cumulative impacts

The principal potential in-combination effect to be considered is in the context of the overall HSQ development site of which approximately 60% has already been developed and is operational. As the proposed development is physically within the wider HSQ development footprint, which itself is within the built limits of Dublin City, a practical Zone of Influence for consideration of in-combination effects is the entire HSQ development site.

The planning history of this larger site dates back to September 2004 when the Parent Permission was granted (ABP Ref. PL29S.206528, SCC Ref. 2656/03) (details of each planning application within the HSQ development site have been compiled in Appendix 1A). The existing developed area is a mix of commercial, residential and retail uses. The proposed development provides a high degree of integration with the earlier completed built phases of the HSQ development to the east and south of the application site.

Of particular consideration is the adjoining site to the south, which is proposed to be developed for residential purposes. A planning application has been submitted to An Bord Pleanala (Planning Ref. TA29S.311591). The application was accompanied by an EIAR and a NIS.

As with the present commercial application, all existing and/or proposed developments within the HSQ development site have been subject to rigorous assessment by the competent planning authorities for potential impacts on the environment and particularly for significant environmental impacts on European sites.

Taking into account that all of the associated HSQ developments could only proceed on the basis that there would not be significant effects on any European site, it is concluded that in the context of the overall HSQ development, the present commercial application will not contribute to an in-combination effect on any European site.

In a wider context, the HSQ site is located in a long-established area of Dublin City, with a range of industrial, commercial, cultural and residential developments and activities. Construction, re-development and maintenance projects are on-going, with all subject to planning approval. As it can be objectively demonstrated that the proposed project at the HSQ site will not have any significant effects, direct or indirect, on any designated European site, it can be demonstrated objectively that when other projects are considered along with the proposed HSQ development there will not be any in-combination effect on the European sites as discussed.

Overall, the cumulative impacts during the construction phase are considered to be not significant.

Overall, the cumulative impacts during the operational phase are considered to be not significant.

6.6 Do Nothing Scenario

In the case that the proposed development was not undertaken, and the site was to remain as a part built site with some unmanaged grassland, from an ecological perspective little change would be expected other than the area of unmanaged grassland being gradually invaded by scrub (mostly brambles & willow/birch trees). If left indefinitely, low woodland would develop. Associated fauna species would remain more or less the same, though more bird species would be expected to use the developing scrub for nesting and feeding purposes. After several decades (probably up to 5 or more), the growing and maturing trees might become suitable for roosting bats as wood starts to rot and crevices and holes appear in the trunk and main side branches.

6.7 Mitigation Measures

6.7.1 Measures for birds

6.7.1.1 Construction Phase

To mitigate against impacts on bird species, the following mitigation measure is required during the

construction phase:

Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, restricts the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches during the nesting and breeding season for birds and wildlife, from 1 March to 31 August. The rank grassland on site, as well as the strip of planted rowan trees, have some potential, albeit low, to support nesting birds such as wren. Removal of grassland and trees will be done outside of the restricted period to comply with the Wildlife Acts.

6.7.1.2 Operational Phase

6.7.1.2.1 Measures for Birds

To minimise the risk of bird collision with glass, a bird friendly glazing strategy will be followed. This will be in accordance with Toronto's Green Standard (Version 3), which includes measures for Bird Collision Deterrence for Mid- to High-Residential and all Non-Residential Developments, This involves the use of strategies to treat a minimum of 85% of all exterior glazing within the first 16 metres of the buildings above ground, including clear glass corners, parallel glass and glazing surrounding interior courtyards. This can be achieved by a combination of the following:

- Use of low reflectance opaque materials
- Use of visual markers applied to the glass (which will have a maximum spacing of 50 mm by 50mm)
- Use of building integrated structures to mute reflections on glass structures

With this approach, the effect of collision risk on local birds, including nesting gulls, will be minimised.

6.7.1.2.2 Measures for Bats

To minimise the risk of effects by light on foraging bats, directional lighting will be used to prevent overspill into the neighbouring Royal Hospital complex. This can be achieved by the design of the luminaire and by the use of accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.

6.7.2 Measures for Protected Sites

A range of mitigation measures will be implemented during the construction and operation phases of the development to avoid or reduce potential harmful effects of the proposed development on local watercourses and ultimately the Dublin Bay system and the associated four European sites. These measures are summarised as follows:

6.7.2.1 Construction phase measures

All works carried out as part of construction will comply with all Statutory Legislation including the Local Government (Water Pollution) Acts, 1977 and 1990.

The Outline Construction Management Plan prepared by CS Consulting outlines the measures which will be in force for the duration of construction phase to ensure protection of surface waterbodies and the control of potential pollutants generated on site - it is noted that the Contractor must prepare a final Construction Management Plan and that the Plan will remain a live document and will be subject to updates as necessary for the duration of the project. A main purpose of the Plan is to ensure that storm water and wastewater runoff is managed and that there is no off-site environmental impact caused by overland storm water flows. A copy of this outline Construction Management Plan is in Appendix 6A of this report.

The following measures will be put in place by the Contractor during the construction phase to ensure protection of surface waterbodies.

Management of suspended solids in run-off

- Any temporary storage of spoil, hardcore, crushed concrete or similar material will be located as far as possible from any surface water drains and also stored in receptacles where possible. In order to minimise the risk of contamination, the stockpiled material will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar.

- There will be no direct pumping of silt-ladened water from the works to any watercourse or drain. All water from excavations must be treated by infiltration over lands or via settlement ponds, silt busters etc. It is imperative that all waters discharged from the site will have been treated beforehand to remove contaminants.

Concrete run-off

- No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Wash-outs will only occur in designated areas with an impervious surface. Wash-out units will be monitored on a continuous basis to prevent overflows.

Accidental spills and leaks

- No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks will be kept in the material storage area in suitable containers and will be appropriately bunded as required. Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated areas of the site, where possible, which will be kept away from surface water drains.

- Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event.

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

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:

- Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
- The pump 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.

Monitoring

- In addition to vigilance on a daily basis that all environmental planning conditions are being adhered to, weekly checks will be carried out on site by relevant personnel to ensure that the surface water drains are operating efficiently and that all dirty water is being treated appropriately prior to discharge from site.
- A regular written log of site inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not re-occur.

6.7.2.2 Operation phase measures

The following mitigation measures will be in place during the operational phase of the development to prevent impacts on protected sites.

Surface water

- Surface drainage arrangements for the operation of the development are outlined in the Engineering Services Report that was prepared by CS Consulting (see Appendix 6B). The report notes that there is an existing 375mm storm sewer to the north of the site along St. John's Road West. The proposed development will have a separate, attenuated storm water drainage system designed in accordance with the Greater Dublin Strategic Drainage Study and the Regional Code of Practice for Drainage Works. Stormwater collected within the proposed development shall be collected in pipes ranging in diameter from 225mm – 300mm and flow under gravity into a proposed storm water attenuation tank. It is proposed to pump the storm water from the attenuation tank to a standoff manhole located at the top of the existing basement carpark ramp adjacent to St. Johns Road. The proposed discharge rate will be 5.0l/sec. The proposed discharging of the storm water into the existing 375mm sewer at a controlled rate for all storm water events will aid in freeing up hydraulic capacity during high intensity storms.
- The proposed development has been designed in accordance with the principals of Sustainable Urban Drainage System (SuDS). The overall strategy aims to provide an effective system to mitigate the adverse effects of urban storm-water runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in storm-water, contributing to amenity, aesthetics and biodiversity enhancement and allow for the maximum collection of

rainwater for re-use where possible. In addition, SuDS features aim to replicate the natural characteristics of rainfall runoff for any site by providing control of run-off at source and this has been achieved by the current proposals. SuDS features proposed include:

- Water butts for local water rainwater reuse;
- Use of green roof technology – this allows the roof areas of the proposed apartments to use a Sedum type covering to absorb the first 'flush' from rainfall events. Typically, 5-10mm of rain can be retained on the sedum surface. As more intense rain is experienced the green roof can overflow from the roof through down pipes and into the schemes main drainage runs
- Low water usage appliances, to restrict potable water demand; and
- Attenuation tank with flow control device, sized to contain a 1-in-100-year storm event and increased by 20% for predicted climate change effects, to limit discharge from the site during extreme rainfall events. The development will require a dedicated system to contain the storm water flows generated during extreme storm events. It is proposed to drain all storm water runoff into 2no. attenuation tanks beneath the proposed basement, each with a storage volume of 170m^3. The storm water discharge rate from these attenuation tanks to the existing public storm sewer will be restricted to 2.27 l/sec.

- The proposed stormwater management plan requires that various stages of treatment are provided to surface water prior to its ultimate disposal.

Interception

- The proposed buildings will have sedum roofs to capture the first 5mm of rainfall. When greater volumes of rainwater are experienced, an overflow system takes this storm water to lower levels and into the treatment stage. The landscaped areas also act to capture the first 5mm of rainfall with a positive outfall to a perimeter drain.

Treatment

- As noted above, rainfall greater than 5mm will pass through the interception stage and into the treatment stage. Treatment will consist of a perimeter drain to allow water to filtrate into the subsoil. Due to the physical constraints of the site and the low porosity of the clays in this part of Dublin, the treatment stage will be limited to a section of the site; the proximity of the site boundary is also a restriction. When a volume of storm water is experienced that is greater than the infiltration capacity of the liner drain, an overflow system will allow this exceedance of storm water to overflow into the positive outfall, which ultimately connects to a dedicated storm water sewer which discharges to the combined sewer.

Attenuation

- Rainwater exceedances which cannot be dealt with by the interception treatment stages positively drain by gravity into the development's attenuation tanks. As noted above, this has been sized to

cater for the predicted 1-in-100-year storm event, increased by 20% for the predicted effects of climate change. The storm water flows from the development are released via a flow control device limited to 5.01/sec, as per Dublin City Council requirements.

- The treated water will ultimately be discharged to the River Liffey via the public drainage system.

Foul water

- There is an existing 300mm dedicated foul public sewer along St John's Road to the north with an existing connection from the subject lands to this combined sewer.
- The proposed development will require a new separate drainage network to collect and convey the effluent generated by the proposed development. The drainage network for the proposed development has been designed in accordance with:
    - The Regional Code of Practice Drainage Works,
    - The Greater Dublin Strategic Drainage Study,
    - Irish Water Code of Practice for Wastewater Infrastructure.
- The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications set out in the Irish Water Code of Practice for Wastewater.
- The proposed development is predicted to have a total employee population of 1,666 no. people, (comprising 1,570 no. office staff & 96 no. hotel staff)

For the purposes of estimating foul wastewater generation, it is assumed that the proposed hotel shall accommodate a maximum of 362no. guests at any one time (an average occupancy rate of 1.5 guests per bedroom).

Based on Irish Water guidelines, the foul effluent generated will be:

- 2.224 l/sec Average Flow
- 10.009 l/sec Peak Flow

All foul effluent generated by the proposed development at upper ground (podium) level and above shall be collected in pipes 225mm in diameter and flow under gravity to the existing public foul sewer in St. John's Road West. Foul effluent generated at basement and lower ground floor levels shall drain to 2no. pumping chambers beneath basement level (to serve the development's office and hotel elements, respectively), each providing 24-hour emergency storage. Effluent shall be pumped from these chambers via an 80mm rising main to a standoff manhole at street level, from which it shall also discharge by gravity to the existing public foul sewer in St. John's Road West. This existing foul sewer drains to the east and ultimately outfalls into the Regional Wastewater Treatment Plant at Ringsend. The proposed drainage infrastructure is shown in Figures 12.4.2.1 and 12.4.2.2 below.

Irish Water have issued a *Confirmation of Feasibility* response for the proposed development. They note

that investigation works are required by the applicant of the downstream network to guarantee that foul and stormwater are not interconnected. Irish Water has not indicated any restrictions with the local infrastructure network, and a such the proposed development can be accommodated.

Effluent generated in the greater Dublin area is drained via public drainage infrastructure to the Ringsend Regional Wastewater Treatment Plant (WwTP) for processing before final discharge to Dublin Bay. Ringsend WwTP, which is under the operational control of Irish Water, is currently undergoing an upgrade to increase the plant's capacity and to enhance the quality of the effluent to be discharged post treatment. A pre-connection enquiry submission has been made to Irish Water to ensure that the local physical infrastructure and the ultimate pre-disposal treatment have sufficient capacity for the proposed development.

6.7.3 Summary of Mitigation Measures

Table 6.7.3.1 Table of Mitigation Measures

Character of potential impact	
Construction Phase	
Disturbance of nesting birds	Remove trees and grassland outside of the restricted nesting season (March-August)
Protection of water quality	Implementation of Outline Construction Management Plan including the following provisions: • Management of suspended solids in run-off • Control of concrete run-off • Management of accidental spills and leaks
Operational Phase	
Bird collision with glass	Implementation of a bird friendly glazing strategy
Disturbance to foraging bats from light	Use of directional lighting to prevent overspill to neighbouring Royal Hospital.
Protection of water quality	Surface water drainage design in accordance with principles of SuDS is to be implemented as proposed.

6.8 Residual Impacts

With mitigation measures implemented as recommended, it is considered that the proposed project will not have any significant adverse residual impacts in terms of ecology and biodiversity.

6.9 Interactions Arising

Biodiversity interacts with several environmental factors including water & hydrology, soils & land, noise, air quality and climate, and Landscape and Visual Impacts chapters of the EIAR. Changes to these environmental factors could result in significant impacts on biodiversity such as the following:

6.9.1 Soils and land

Interactions between soils and land and biodiversity can occur through the spread of hazardous material/contaminated land which may occur during the construction stage. The spread of land contaminated with potentially hazardous material could result in degradation of habitats within the proposed development site and adjacent/downstream designated sites and their associated qualifying interests. However, following the implementation measures outlined within the preliminary Construction Environmental Management Plan, impacts to habitats, flora and fauna from soils and land interactions are not predicted to be significant. There are no interactions predicted for the operational phase of the development.

6.9.2 Water and hydrogeology

Interactions between water and hydrogeology and biodiversity including habitats, flora and fauna, can occur through impacts to water quality either arising from an accidental pollution event or increased sedimentation during the construction stage or an accidental pollution event during the operational stage. This interaction has the potential to result in significant negative impacts on hydrologically connected habitats and sensitive fauna that rely on these habitats. However, following the implementation of mitigation measures outlined in Section 6.7.2, relating to the protection of surface and ground waters during construction and operation, impacts to habitats, flora and fauna from water and hydrogeology interactions are not predicted to be significant.

6.9.3 Air quality

Interactions between air quality and flora and fauna in adjacent habitats and designated sites can occur during the construction stage due to dust emissions arising from construction works. This interaction has the potential to result in significant negative impacts on biodiversity. However, following the mitigation measures outlined in Chapter 9, impacts to flora and fauna from air quality interactions are not predicted to be significant during the construction or operational phase.

6.9.4 Noise

Interactions between noise and sensitive fauna, including birds, can occur and arise from increased noise levels during the construction and operational stages. This interaction has the potential to result in

significant negative impacts. However, as the site does not support sensitive species of fauna, impacts to fauna from noise interactions are not predicted to be significant during the construction or operational phase.

6.9.5 Landscape and Visual Impact

Interactions between landscaping works and sensitive fauna, including birds, can occur and arise from changes to habitats during the construction and operational stages. Given the existing nature of the site, i.e., having been cleared and excavated in the past there are no existing mature flora and fauna issues related to the site other than the existing ornamental trees, lawn grass and scrub area. Therefore, the interaction between Landscape and Biodiversity is not significant.

6.10 Major Accidents

It is considered that should a potential accident or disaster occur on site during the construction phase, the effects on biodiversity at the site would not be significant due to the low intrinsic ecological value of the site.

However, should a major spillage occur during construction or operational phases, full mitigation as discussed in this report would be required to prevent the entry of contaminants to the River Liffey and ultimately Dublin Bay and the associated European designated sites.

6.11 Monitoring

Mitigation as recommended will be monitored by the Environmental Officer working with the main Contractor. A written log of site inspections for environmental issues will be maintained during the entire construction phase and will be available for inspection by relevant third parties.

6.12 References

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7. LAND, SOIL & GEOLOGY

7.1 Introduction

This section of the EIAR has been prepared by Cronin and Sutton Consulting and describes the existing Land, Soil & Geology aspects of the proposed development site. An assessment is made of the likely impact arising during the demolition, construction and operational phases of the development on these elements, as well as the cumulative impacts arising.

This chapter was prepared by Darren Mullins of CS Consulting. Darren holds Bachelor of Science and Masters of Engineering degrees in Structural Engineering with Architecture from University College Dublin (UCD) and is a Chartered member of the Institute of Engineers of Ireland. Darren has 7 years' experience as a Consulting Engineer, working primarily in the design of commercial and residential developments. His experience includes the design of low-, mid- and high-rise concrete frame and steel frame structures, and the design of deep basements on varying foundation systems.

This assessment is based on a desktop study of the site including publicly available information and recent specific intrusive site investigation and environmental site assessment works undertaken by Byrne Looby Partners dated February 2006 and by Minerex Environmental Ltd dated October 2017, attached as Appendix 7A.

This chapter presents an assessment of the impacts of the Proposed Project on land, soils and hydrogeology (groundwater). It defines the study area, the methodology used for developing the baseline and impact assessment, provides a description of the baseline environment in relation to land, soils and groundwater, and presents the findings of the impact assessment.

7.2 Characteristics of the Proposed Development

A full description of the development is provided in Chapter 3 of the EIAR.

Briefly summarised, the development will comprise the construction of a 6-storey hotel and a 12-storey office block within the undeveloped north-western portion of the HSQ development. The construction of the sub-structures below both the hotel and office block will involve some localised demolitions of existing sub-structure elements.

The foundations of the office building (in the eastern part of the development) will consist of bored concrete piles. The piles will extend into the black boulder clay beneath the current site formation level. The proposed hotel building (in the western part of the development) will be constructed from traditional reinforced concrete pad foundations, bearing on the black boulder clay. A reinforced concrete basement slab and retaining wall will be constructed, and these will complete the entire "basement box" to the HSQ development, which was not completed during the initial phases of the development (see later sections). This completed basement box will ensure a watertight structure against groundwater movements.

7.3 Assessment Methodology

This chapter has been set out with reference to the specific criteria set out in the Environmental Protection Agency guidelines:

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2022),
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2015),
- EIA Directive 2014/EU/52, Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003),
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, (Dept Housing 2018).
- The Institute of Geologists of Ireland guidance document 'Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements' (IGI 2013).
- CIRIA C741: Environmental Good Practice on Site (2015, Fourth Edition) in relation to source of impact and mitigation.
- European Union Water Framework Directive (WFD) (2000/60/EC).
- European Communities (Water Policy) Regulations, 2003 (S.I. No 722 of 2003).
- European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009 as amended'), as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015) and 2019 (by S.I. No. 77/2019).
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010).
- European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 (S.I. No. 366 of 2016).
- EC, Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (2017).
- EPA, Towards Setting Guideline Values for the Protection of Groundwater in Ireland (2003), containing Draft IGVs for the Protection of Groundwater.
- Groundwater Directives (80/68/EEC and 2006/118/EC).
- Dublin City Council Development Plan 2016 – 2022

The draft guidelines have also been reviewed and have formed the basis for the development of this chapter.

Other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Interpretative Geotechnical Report for Site Investigation at Westgate, February 2006, prepared by Byrne Looby Partners Ltd.

- Heuston South Quarter Subsoil, Groundwater and Air Quality Investigation, October 2017, prepared by Minerex Environmental Ltd.

The site, which is the subject of this application, is developed. An assessment of the soils and bedrock geology underlying the study area was undertaken in the form of a desktop study (May 2021) using information from The Geological Survey of Ireland (GSI) such as the Bedrock Geology Map of Dublin. The site was also visited on a number of occasions from May 2020 to May 2021. An assessment of the existing groundwater underlying the study area was undertaken in the form of a desktop study using information available from The Geological Survey of Ireland (GSI).

Specific geological information was obtained from a preliminary site investigation which was undertaken at the proposed development site by Byrne Looby Partners. The corresponding Site Investigation Report by Byrne Looby Partners dated February 2006 and by Minerex Environmental Ltd dated October 2017 are attached in Appendix 7A. It is our opinion that the site investigation reports developed to date provide sufficient information to assess the soil, geology and groundwater aspects of the site.

7.3.1 Impact Assessment Methodology

The proposed development is to be built off existing levels within the boundaries of an existing secant pile wall constructed circa. 2003. As described in this chapter (sections 7.3.1.2, 7.3.1.3, and 7.3.1.5), the proposed development shall not result in any change to local groundwater flows or any impact upon neighbouring substructures. As such, a separate Basement Impact Assessment is not required.

7.3.1.1 Desk Study & Site Investigation

An assessment of the soils and bedrock geology underlying the study area was undertaken in the form of a desktop study using information from The Geological Survey of Ireland (GSI) such as the Bedrock Geology Map of Dublin. An assessment of the existing groundwater underlying the study area was undertaken in the form of a desktop study using information available from The Geological Survey of Ireland (GSI).

Specific geological information was obtained from an intrusive site investigation carried out in 2006 (Byrne Looby Partners) and in 2017 (Minerex Environmental Ltd), and these reports were assessed.

7.3.1.2 Ground Water

The development works in 2003, which are further detailed in Section 7.4.1, involved the installation of a perimeter secant pile wall around the entire site. The secant pile wall was embedded into the boulder clays. Following the installation of the cut-off wall, the site was excavated down to a formation level of approximately 0.5mOD throughout the entire site. This excavation to formation level was approximately 7.5m below ground level along the northern boundary, and approximately 15m below ground level at the southern boundary. A basement -2 level reinforced concrete slab at the 0.5mOD level, rising elements, and basement -1 slab were constructed below the northern section of the site (excluding the north-east section). Following the 2008 financial crisis, the site was hoarded off and exposed concrete dressed over with a temporary covering and the open excavations backfilled to a level of 2.42mOD. The proposed development is to be built off the existing basement -2 slab with the existing basement -1 slab being demolished and removed.

The Hydrogeology section 7.4.2 describes the likely effects on the ground water for the proposed site. An assessment is made of the likely effects associated with the construction and operation of the proposed development based on the history of the site and previous site investigations and soil sampling.

On the basis of the above, it is concluded that the proposed structure is not expected to impact on the ground water flow during or after construction, as the existing secant pile wall has been in place since 2003 and the proposed development is to be constructed off the existing site levels and will not extend below the secant pile formation levels.

7.3.1.3 Ground Movements

The existing secant pile wall was constructed to a level below 0.5mOD to suit the requirements of the 2003 developments as detailed in section 7.4.1. Given that the proposed development is to be developed from the existing 0.5mOD site level, it is concluded that ground movements in the vicinity of the site will be negligible.

7.3.1.4 Temporary Works

There will be no need for additional temporary works during the development of basement level -1 outside of the normal concrete shutters to facilitate the pouring of RC perimeter walls, columns and podium slabs. The existing secant pile wall has been installed as a retaining wall since 2003 and it is intended to be used as such during construction. The proposed development is to be built off existing site levels and localised reduced level digs for foundations will have embankments battered back to ensure stability during construction.

7.3.1.5 Effects on Neighbouring Structures

The Eir/AIB office building neighbours the development at its eastern boundary, and an existing substation neighbours to the north-west. There is no building at the site's southern boundary, as this is bounded by the existing HSQ podium and landscaped areas. There are no structures on the western boundary, as this is bounded by the gardens of the Royal Hospital Kilmainham, with ground movement being discussed in section 7.3.1.3.

Given that a secant pile wall has been constructed and remained in place on the site, acting as a retaining wall to the Royal Kilmainham Gardens since 2003, and the proposed development is to be built from the existing site levels, the risks relating to the proposed development are low with regard to impact on neighbouring structures, ground water and ground movements.

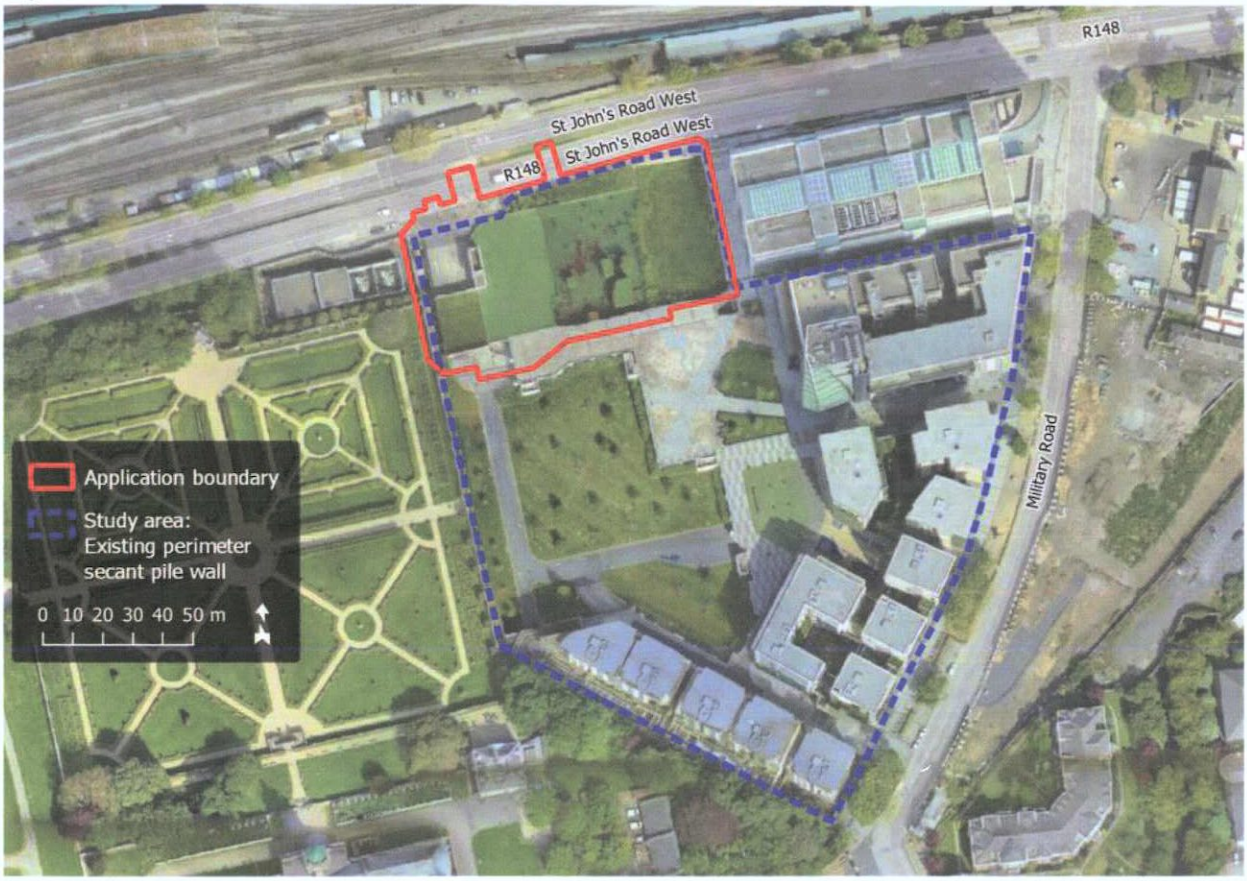
7.4 Receiving Environment.

The proposed development is located on St. John's Road West, at the Heuston South Quarter complex in Dublin 8. The site sits within the established communities of Kilmainham, between the Royal Hospital Kilmainham to the west and the Quays to the north, within the administrative jurisdiction of Dublin City Council. The planning application boundary encloses an area of 0.62ha. The site is bounded to the west by the gardens of the Royal Hospital Kilmainham, to the north by St. John's Road West, to the east by the Eir Group headquarters building, and to the south by internal roads and landscaping within the remaining

undeveloped portion of the HSQ complex.

The subject site comprises part of the undeveloped area of the site that has been landscaped as an interim measure to improve the aesthetics of the site pending its complete redevelopment. There is already an established road, pedestrian and cycle network in the vicinity of the site so as to allow for a high level of permeability.

Figure 7.4.1 Heuston South Quarter site



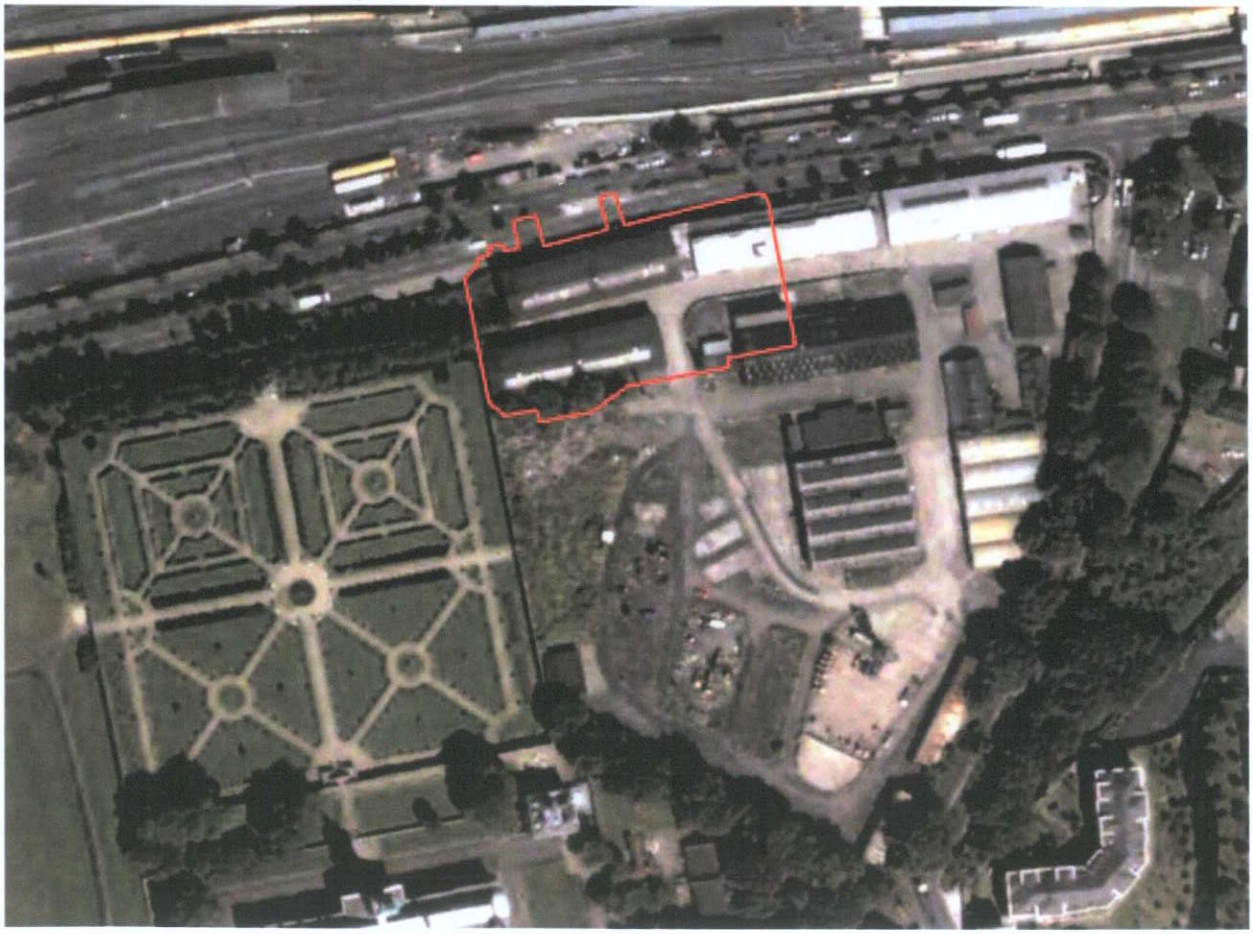
7.4.1 Geology & Land Use

The geology of the subject site and the surrounding area is interpreted from information from the Geological Survey of Ireland (GSI) and the Site Investigation carried out. The site and surrounding area are underlain by 'Calp' Formation comprising of Dark Grey to Black Limestone & Shale. The natural deposits are overlain with various thicknesses of made ground consisting of various fil material. The bedrock is also known as 'Calp' Limestone, which is a dark grey argillaceous limestone known as the Lucan formation encountered at depths of between 26.1-27.6m below ground level.

Prior to development of Heuston South Quarter from c2003, the site operated as a storage depot and yard for Eir (formerly Eircom), see Figure 7.4.1.2. The original site level prior to commencement of construction works varied from c7.1mOD along the northern boundary at St John's Road, to c14.2mOD at the southern boundary. A number of single-storey warehouse building were located along the northern and eastern boundaries.

Figure 7.4.1.1 Bedrock Geology (source: gsi.ie)

Figure 7.4.1.2 Satellite image of HSQ site in 2003 (pre-development), with indicative red line (source: Google)



The subsequent commencement of the development works in 2003 involved the installation of a perimeter secant pile wall around the entire site. The secant pile wall was embedded into the boulder clays. Following the installation of the cut-off wall, the site was excavated down to a formation level of approximately 0.5mOD throughout the entire site. This excavation to formation level was approximately 7.5m below ground level along the northern boundary, and approximately 15m below ground level at the southern boundary. The eastern portion of the development was constructed, with a double level basement and buildings ranging in height from seven to twelve stories.

The construction works ceased in 2008 as a result of the financial crisis. The lower levels to the buildings along St. John's Road West had been partially constructed up to underside of podium with the exception of the north-east section, and the overall site remained excavated to formation level until site remediation works in 2012. The site remediation works involved landscaping treatment, which remains in place to this day. The landscaping works carried out involved the demolition of the existing tarmac roads and ramps on site, the construction of new roads and ramps, the importation of soil material to landscape the open space, and the hoarding off of the northern section of the site along St. John's Road West.

The site currently is laid out with soft and hard landscaping as shown in Figure 7.4.1.4

Figure 7.4.1.3 Satellite image of HSQ site in 2013, following cessation of works (source: Google)

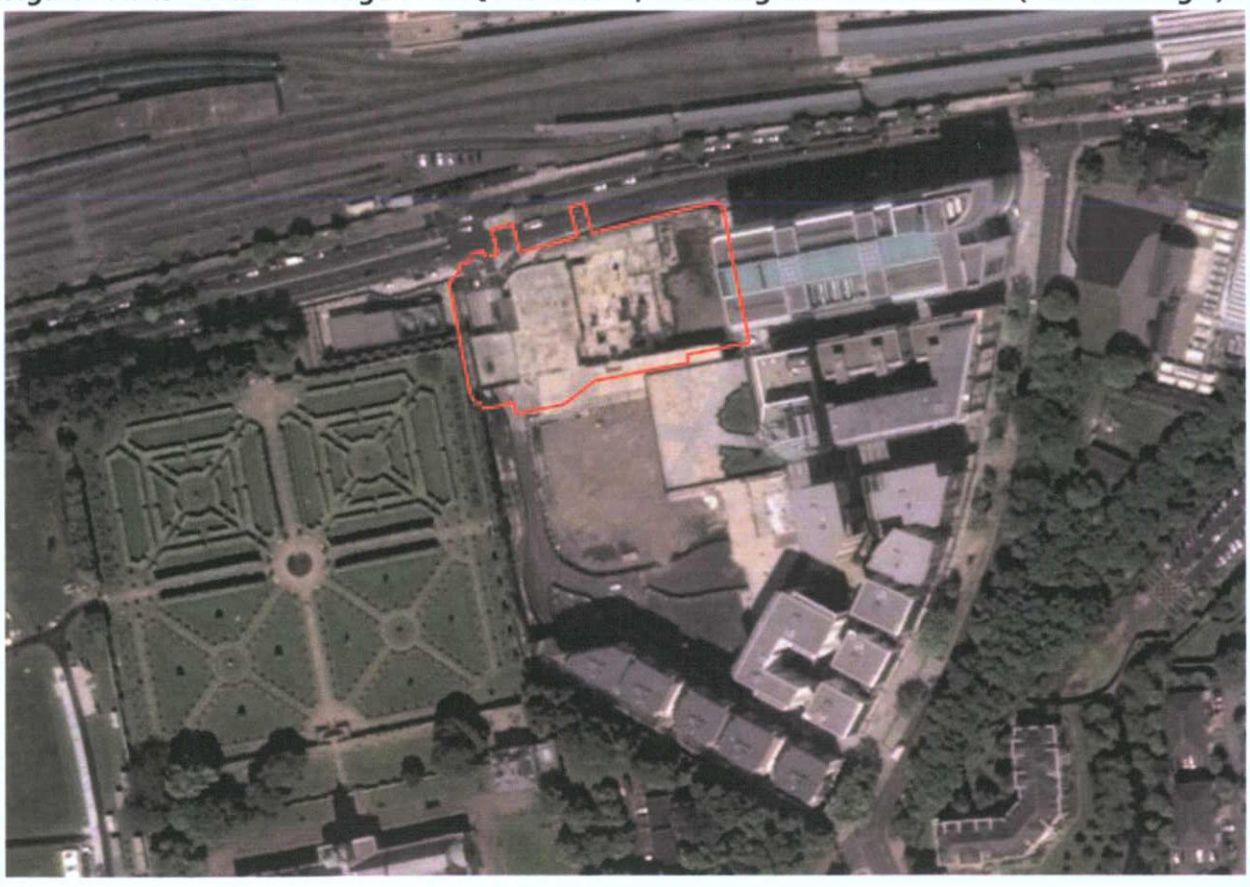
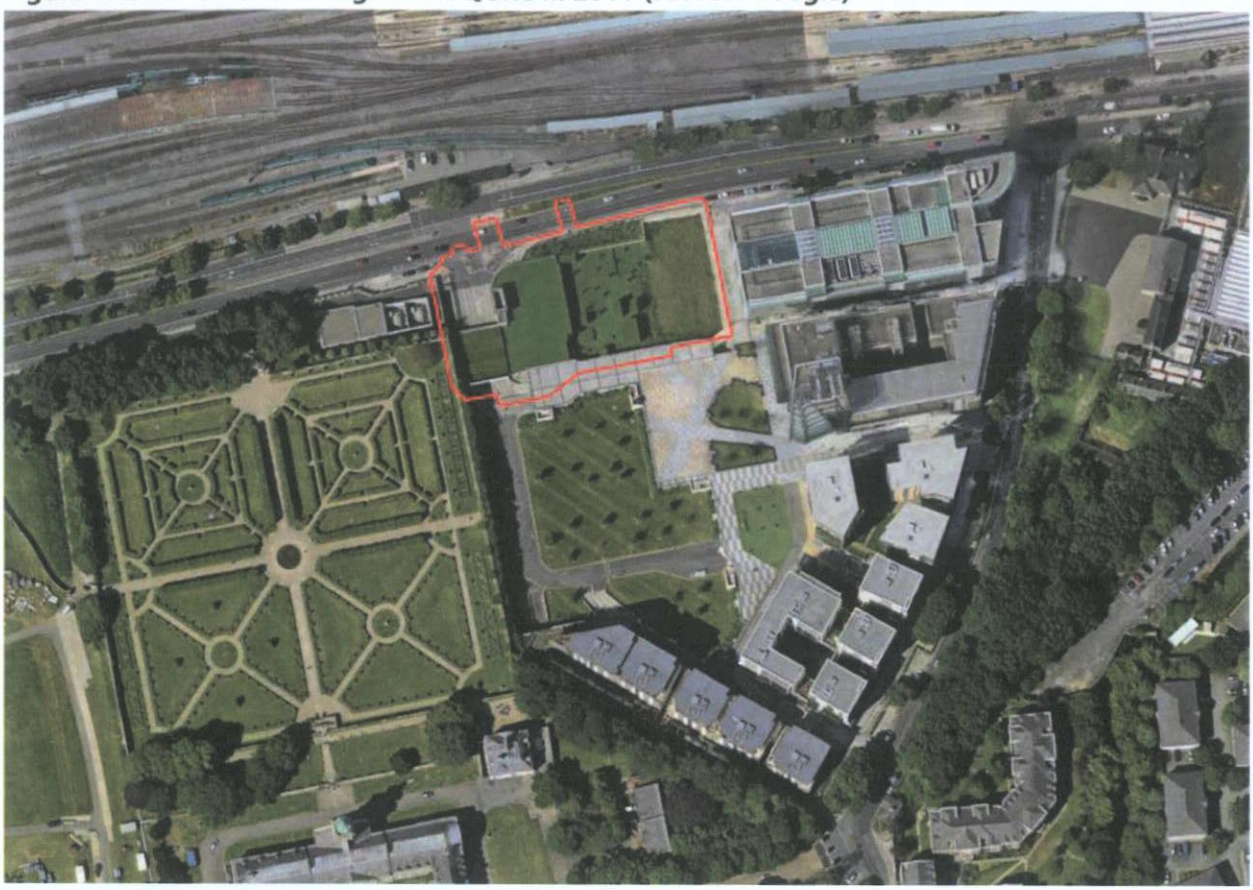


Figure 7.4.1.4 Satellite image of HSQ site in 2018 (source: Google)



A summary of the ground conditions encountered in the 2006 Byrne Looby Partners Site Investigation is outlined in Table 7.4.1.1 below:

Table 7.4.1.1 Baseline Ground Conditions

Stratum	Typical Depth (m BGL)
Made Ground: Hardcore fill, clay with rubble fill, medium dense grey and brown clayey sandy angular to sub-angular fine to coarse gravel with occasional cobbles, crushed concrete with red brick fill and occasional pockets of soft dark brown clay.	0 to 2.7m
Very dense sand GRAVEL with cobbles and boulders. A large quantity of cobble size material and occasional boulders.	2.7m to 4.8m
The upper layers consist of stiff brown boulder CLAY, over very stiff to hard black boulder CLAY.	0.8m to 26.1m
Strong Dark Grey and black LIMESTONE bedrock	26.1m

7.4.2 Hydrogeology

The subject site is within the Dublin Urban Groundwater Body as designated in the ERBD Management Plan. The groundwater body chemical and quantitative status of both of these groundwater bodies has been designated as 'good'. The Geological Survey of Ireland, GSI, has developed a classification system for aquifers based on the value of the resource and their hydrogeological characteristics. The bedrock aquifer is classified as a Locally Important Aquifer (Li) Aquifer which is designated as a productive aquifer in local zones. The GSI, vulnerability rating for pollution from the ground surface is Low. The groundwater flows in a northerly direction towards the River Liffey.

As noted, a perimeter secant pile cut-off wall was constructed in 2003, prior to commencement of excavations. A detailed Environmental Assessment, involving sampling, was carried out by URS. The site was then excavated to formation level, which was generally within the virgin black boulder clay. All made ground was excavated and removed off site. Therefore, any contaminated material from historic site uses has been excavated off site.

7.4.3 Soil

As noted, the site was excavated to formation level within the virgin boulder clays in 2003. Part of the site was built-out, and the western part remained undeveloped between 2008 and 2012. Landscaping works were carried out in 2012, which involved importing some landscaping fill material.

An updated test regime, including sampling, was carried out by Minerex in 2017. This involved sampling at five locations, with the samples sent for Waste Acceptance Criteria classification. The report is included in Appendix 7A. The findings indicated minor localised areas with elevated levels of materials which would require mitigation prior to the development being used for housing upon completion. As such elevated materials will be removed off site in accordance with statutory requirements during the re-development of the subject lands.

7.4.4 Geological Heritage

The GSI data base does not indicate any features of Geological Heritage at the proposed site. The closest geological feature is noted on GSI at the Guinness Brewery at St James's Gate, approximately 500m to the east of the subject site. The GSI database notes: *"two boreholes dug within the brewery complex. For historical, technical and cultural importance, the wells within Dublin City are unusual"*. The "Dublin City – County Geological Site Report – Guinness Wells – IGH 16 Hydrology" contained within "The Geological Heritage of Dublin City – An Audit of County Geological Sites in Dublin City" (2014) refers to a number of 19th century wells and boreholes which were constructed by Guinness to provide a sustainable water source. One well was constructed to a depth of c487m below ground level, but reported a relatively low yield. Only one well is still in use, the Cooperage Well to the north of the site, which currently produces a yield of 100 cubic metres per hour.

Figure 7.4.4.1 Geological Heritage Feature at St James's Gate (source gsi.ie)

7.4.5 Geo-Hazards

The GSI data base does not indicate any geo-hazards at the proposed site or in the local vicinity.

7.5 Potential Impacts

In this section the potential impacts arising from the proposed development on land, soil and geology are described.

7.5.1 Construction Phase

During the construction phase, it is proposed to remove approx. 2,400m^3 of demolished material from the site. It is proposed to excavate approx. 3,400m^3 of material to allow the proposed development to be constructed.

The demolition and excavations will result in disturbing materials and the risk of migration of dust pollution. Typically, soil moisture is sufficient to prevent contaminants becoming airborne, however where soil becomes dry there is likely a temporary negative/adverse effect, with an overall Significant significance occurring. These potential negative effects will need to be controlled by the contractor, using a number of measures outlined in later sections, and this reduce the impact of the effects to moderate and brief.

As noted in preceding sections, a secant pile wall was constructed around the entire site as part of the initial construction works in 2003. The secant pile wall is embedded into the impervious boulder clays below the proposed formation level and creates a cut-off wall to prevent groundwater movements into and out of the site. Therefore, the risk of contamination of the groundwater as part of the construction works is negligible. The significance of the effects would be imperceptible.

The perimeter secant pile cut-off wall was construction in 2003. The relatively long period of time since installation would have resulted in the groundwater level striking an equilibrium. In addition, the gravel lenses noted in the site investigation would facilitate the movement of groundwater around the secant pile wall structure. The significance of effects would be imperceptible. As with any construction works, there are risks of impacts arising from accidental spills or leaks, which can result in temporary / adverse effects. The contractor shall implement a number of measures, as outlined in later sections. Notwithstanding, the presence of a perimeter cut-off wall will prevent any risk of contamination of the adjoining soil and/or groundwater. The significance of effects would be imperceptible and short-term.

The need for dewatering of the site will require pumping of water from the site. The exposure the groundwater collection tanks could pose temporary / adverse effects as the ground and groundwater may contain contaminants. Therefore, the material will need to be tested and monitored during construction, which will reduce the impact of the effects to not significant and temporary. This is to facilitate the completion of the basement and therefore is unavoidable. The licencing agreement with the Council, may call for, subject to analysis of the groundwater, the groundwater water to pass through filtration system to remove sediment from the water and an oil separator prior to discharge to a designated sewer and at a controlled rate.

Moderate negative impacts during the construction phase will be short term only in duration. Implementation of the mitigation measures will prevent any significant long-term adverse impact.

7.5.2 Operational Phase

During the operational phase of the new development on the subject site, the completion of the basement structure will prevent contact with the underlying subsoil. This will have a permanent moderate positive effect on the subsoils beneath the site.

Run-off from hardstanding areas will pass through a closed drainage system, which will incorporate silt traps and oil/petrol interceptors, to reduce the possibility of potentially contaminated surface water from contaminating the soil and bedrock geology. This drainage system will then discharge into the Local Authority operated sewer system. This will have a permanent, moderate and positive effect on the public drainage network. It is not predicted that there will be any adverse effects on the soils and geology during the operational phase of the development.

The development will be supported by the underlying rock through either direct bearing or via the overburden. It is not envisaged that this will have any negative impact on the bedrock geology.

Overall, effects on land, soil and geology during the operational phase are considered to be permanent, positive and imperceptible.

7.6 Do Nothing Scenario

The "Do Nothing Impact" assesses the environmental impact of not redeveloping the proposed development site in respect of the existing impacts to land and soils, at the proposed site.

Under the "Do Nothing Scenario" there would be no change in the current land use of the site and

therefore the soil and bedrock geology environments would remain in their current state. It is noted that as the main construction works in the subject site ceased in 2012, the 'basement box' has remained incomplete. The proposed works complete the reinforced concrete basement structure, and thereby provide a fully sealed basement structure against the risk of groundwater ingress and/or the risk of contamination of the groundwater from the development. This is a neutral impact.

7.7 Mitigation Measures

7.7.1 Construction Phase

The main impacts identified are associated with the Construction Phase of the proposed development. Following construction there will be no long-term significant impacts with respect to soils and geology of the site.

Mitigation measures relating to impacts outlined in the previous section are outlined in the following table.

Table 7.7.1 Table of Mitigation Measures

Character of potential impact	Mitigation measure
Construction Phase	
Contaminated Soil	The excavated material will be monitored and assessed to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. This will entail carrying out soil analysis to determine the appropriate waste facility for disposal. Where applicable, material on site will be segregated and divided into material re-use, material re-cycling and waste material streams in accordance with current guidelines and best practice.
Demolition Material	The material generated from the demolition shall be segregated and divided into material re-use, material re-cycling and waste material streams in accordance with current guidelines and best practice.
Dust	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the excavation period. The provision of vehicle wheel wash facilities at site exits and implementation of a road sweeping programme will reduce effect on surrounding road network. Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust. In addition, water-based dust suppression systems (such as Dust Boss) shall also be used to greatly reduce the extent of dust and windborne particulates.
Noise and Vibration	During the demolition and excavating phase of the works monitoring will be ongoing for noise, vibration, gas & water levels as well as ground contamination as described in the section below on Monitoring. Noise monitoring shall be in accordance with Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 Noise and Vibration. Vibration monitoring shall comply

	with BS 5228-1:2009+A1:2014 & BS 5228-2:2009+A1:2014. Gas and water levels shall be monitored via installed Piezometers on site.
Disposal of Ground Water	The disposal of groundwater shall be in accordance with the licensed requirements of Dublin City Council and will be on a short-term basis. All conditions of this licencing agreement will be complied with.
Site Compound	The site compound will be temporary in nature and will be constructed on hardstanding, which will be removed upon completion of construction and disposed of to a licenced facility.

7.7.2 Operational Phase

No operational impacts have been identified in respect to the soils and geology aspects of the site.

7.8 Residual Impacts

7.8.1 Construction

The proposed development will result in excavated material being removed off site for disposal. The material may contain contaminants and therefore will need to be tested and exported to an approved licensed waste facility, as per the mitigation measures described above. The predicted impacts are noted as short term and moderate. Similarly, residual impacts arising from dewatering of the subject site, and the disposal of groundwater under licence by Dublin City Council are classified as short-term and imperceptible.

The demolition material generated on site will be segregated and assessed to establish the viability of material to be reused or recycled, as per the mitigation measures outlined above. The material may contain contaminants and therefore will need to be tested and exported to an approved licensed waste facility. The predicted impacts are noted as short term and slight.

The nature of the construction works will inevitably mean that waste material generated on site will not be suitable for re-use or recycling, and therefore will be required to be removed from site and disposed of in accordance with current legislation. The waste material taken from site deemed to be inert or non-hazardous, will be committed to a regional landfill. The impacts are noted as temporary and not significant.

7.8.3 Operation

There is no predicted long-term impact on the soil, geology and hydrogeology environments associated with the operational phase of the proposed development. The impacts are noted as neutral and imperceptible.

7.8.4 Cumulative Impacts

The proposed development works can be assessed cumulatively with the proposed future development of the commercial site to the north. The study area for this assessment is identified in Figure 7.4.1 as the

existing perimeter secant pile wall which was constructed around the entire site in 2003. This perimeter interlocking pile wall isolates both development sites in geotechnical terms from posing a risk of contamination to the external environment, causing adverse ground movements or damage to nearby structures. Similarly, the proposed construction work within the existing secant pile 'box' can proceed with neutral effect on existing or proposed development. The cumulative effects of the proposed development in conjunction with adjacent future planned development are therefore imperceptible.

A full schedule of existing and permitted developments in the vicinity of the subject development site is given in Appendix 1A to this EIAR, for the purposes of determining cumulative impacts of the proposed development in conjunction with other relevant developments. With regard to land, soil, and geology, none of these listed developments proposes significant earthworks sufficiently close to the subject development site to have a cumulative impact in conjunction with it.

7.9 Interactions Arising

The impacts described previously in this Chapter also relate to and interact with other chapters within the EIAR specifically, Population and Human Health, Water, Biodiversity, Air Quality, and Noise and Vibration. These impacts are described in more detail in the various corresponding chapters however some general points are described below:

During the construction phase there is potential for dust from demolition work and excavations or stockpiles to impact on air quality/human beings. This can occur during demolitions and excavations phases, when subsoils are being excavated, stockpiled and loaded into vehicles. The significance of effects would be deemed as moderate and short-term. Dust suppression measures will be implemented to minimise dust generation during extended dry periods such as water misting systems, wheel washes, tarpaulins to stockpiled materials etc. Dust monitoring will be conducted through the excavation period.

During the construction phase there is potential for interaction with Human Health. Construction workers will be exposed to any contaminants present in the underlying strata through direct contact and inhalation of dust and vapours. This would be during the bulk excavation stage, as excavated material is deposited into haulage trucks. The significance of effects would be deemed as imperceptible and short-term. All construction staff will wear suitable Personal Protective Equipment (PPE) during this phase of works. This interaction is considered to be negative and not significant.

As is stated in Chapter 6, interactions between soils and land and biodiversity can occur through the spread of hazardous material/contaminated land which may occur during the construction stage. It is noted that the site has undergone development since 2003 when the perimeter secant pile wall was first installed. There is some temporary landscaping provided to the centre of the subject site, but there is minimal biodiversity present in this area. However, following the implementation measures outlined within the preliminary Construction Environmental Management Plan, impacts to habitats, flora and fauna from soils and land interactions are not predicted to be significant. There are no interactions predicted for the operational phase of the development.

The construction of the development will complete the "basement box" and prevent any future groundwater ingress, or the risk of contamination from the development affecting the groundwater. The

drainage system associated with the proposed development is a fully 'closed' piped system which discharges to the appropriate existing foul and surface water sewers along St. John's Road West. There is therefore no surface water discharge to the groundwater.

Noise and vibration will be generated through the Construction Phase particularly during the demolition, pilling and excavation works. Some level of noise and vibrations are unavoidable due to the nature of the works which require large machinery and the associated breaking, boring and excavation of concrete and subsoils as part of the construction works. The significance of effects would be deemed as moderate and short-term. A strict monitoring regime will be implemented, adopting an early warning traffic light system.

7.10 Monitoring

It is recommended that the following are monitored in relation to the land, soil and geology during the construction and operational stages:

- Testing and monitoring of soil and Made ground that will be excavated for any potentially contaminated material to ensure adequate classification and disposal.
- Monitoring of the retaining wall using for example, inclinometers and monitoring of water movements either seepages or through control points.
- Monitoring of neighbouring structures immediate to the development site for the effects of any vibration, movement and settlement arising from the excavation works based on condition surveys carried out by the Contractor prior to the works.
- Monitoring of interrelated impacts such as noise and vibration levels, groundwater levels, dust emissions etc. dealt with in the other chapters in this EIAR. The Contractor will be required to produce an Air Quality and Dust Management Plan including Best Practice Measures to control dust and, in particular, measures to prevent dust nuisance.
- Testing and monitoring of water and gas during excavation works. It is not envisaged that any large scale groundwater pumping will be required during the construction works, but any run-off on excavated surface will be collected in settlement tanks and tested, before discharging under licence to the public sewer.

7.11 Reinstatement

Any temporary construction compounds will be removed from the site following the end of the construction phase. Reinstatement at completion of the works will involve removal of all materials that may have been deposited during construction works and restoring any areas within the public realm/pedestrian corridor with an appropriate and acceptable hard-wearing layer prior to landscaping works being undertaken.

7.12 Human Health

The predicted impacts on human health in relation to land, soils and geology have been considered with reference to the following:

- Land take; and
- Movement of soils during construction works.

7.12.1 Construction Phase

Development commenced at the site in 2003, with the construction of a perimeter secant pile wall. The excavation of the entire site followed soon afterwards, and construction of the existing buildings continued up to 2008/2009. A temporary landscape treatment was provided to the west of the site in 2012 under a temporary planning permission. The proposed development will remove the temporary landscaping, and complete the overall basement box and podium area.

There are no likely significant impacts to human health during the construction phase in terms of land, soils and geology due to the mitigation measures proposed. As such the predicted impact is considered to be short-term, imperceptible with a neutral impact on quality.

7.12.2 Operational Phase

The interim landscaping provided in 2012 as a temporary measure is a full storey below the publicly assessable podium level. The proposed development will complete the basement structure and provide a podium level which will be accessible to the public, across the full development.

There are no likely significant impacts to human health during the operational phase in terms of land, soils and geology due to the mitigation measures proposed. As such the impact is considered to be long term, imperceptible with a neutral impact on quality.

7.13 Risk of Major Accidents and Disasters

As noted in earlier sections, the perimeter retaining wall elements and bulk excavations have already been completed at the subject site, In addition, supplementary lateral restraint anchors were installed at the secant pile wall along the western boundary to extend the design life of this element to 2042. The construction of the basement box as part of this development will provide permanent restraint. Therefore, the works do not pose risks of large-scale civil works which could de-stabilise the surround ground or adjacent buildings. Similarly, whilst there will be localised excavations for foundations, there will be no large bulk excavation that would involve significant excavations or stockpiling.

In addition, the GSI online data base was consulted, which includes Landslide Susceptibility Mapping (See extract in Figure 7.13.1 below). The mapping provides information on areas which are predisposed to this type of Geohazard. The maps indicate data based on susceptibility banding or slope stability classification, areas ranging from a high susceptibility to landslide events to areas generally devoid of landslide events. As can be seen from Figure 7.13.1 below, the subject site has a Landslide Susceptibility Classification of "Low".

Figure 7.13.1 Landslide Susceptibility Map (data source: GSI)

7.14 Difficulties Encountered in Compiling

The soil and geology profiles described are extracted from available site investigation information which uses testing and observation of a sample within boreholes and trial pits to give an overall representation of the site. In this way, no difficulties were encountered in compiling the necessary information.

7.13 References

- National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Interpretative Geotechnical Report for Site Investigation at Westgate, February 2006, prepared by Byrne Looby Partners Ltd.
- Heuston South Quarter Subsoil, Groundwater and Air Quality Investigation, October 2017, prepared by Minerex Environmental Ltd.
- Dublin City Council Geological Site Report – Guinness Wells IGH 16 Hydrogeology. (Date Unknown)

8. WATER

8.1 Introduction

This chapter of the EIAR has been prepared by Cronin and Sutton Consulting and describes the existing surface water drainage and flood zoning aspects of the proposed development (note: potable water and foul drainage are assessed in Chapter 12, Material Assets). An assessment is made of the likely impact arising during the construction and operational phases of the development on these elements.

This chapter was prepared by Robert Fitzmaurice of CS Consulting. Robert is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over twenty years. Robert holds an undergraduate degree in Civil & Environmental Engineering, a postgraduate Diploma in Environmental Engineering, an advanced Diploma in Planning & Environmental Law and has a master's degree in Industrial Engineering.

8.2 Characteristics of the Proposed Development

8.2.1 Development Description

A full description of the development is provided in Chapter 3 of the EIAR.

Briefly summarised, the development will comprise the construction of a 6-storey hotel and a 12-storey office block within the undeveloped north-western portion of the HSQ development. The proposed development includes surface water, potable water and foul water infrastructure that is designed to minimise impacts on the surrounding environment. These have been described below.

Chapter-specific particulars of the development include that the proposed scheme will be constructed on top of an existing basement constructed previously. The subject lands are located approximately 200m to the south of the River Liffey. The current basement podium has an elevation of 7.50mAOD.

8.2.1.1 Proposed Attenuation Arrangements

The first aspect is to reduce any post development run-off to pre-development discharge rates. The development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1-in-100-year storm event, increased by 20% for predicted climate change factors.

To ensure an accurate calculation of the required attenuation for the site, Met Éireann was contacted to provide the information noted below. As per standard industry practice, the information is retrieved from the Met Éireann website (www.met.ie):

- The SAAR (Standard Annual Average Rainfall) for the area: 727mm/year.
- The sliding duration table for the site indicating the 1:100 year rainwater intensities to be used.
- Soil type value obtained from the Flood Studies Report (for the subject site, this has been established as soil type 4).

These parameters allow the Q-Bar greenfield runoff rate to be calculated. The Q-Bar value for the site is 5.05 l/sec/ha. As the storm water will connect into a public surface water sewer, and the development's effective positively drained impermeable area being approximately 0.45ha, the allowable discharge rate off site for any given storm event will be limited to 2.27 l/sec.

The proposed development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1-in-100-year storm event, increased by 20% for predicted climate change factors. The attenuation storage volume requirement is 340m^3 for a 1-in-100-year storm event. See CS Consulting's Engineering Services Report, attached herewith in Appendix 6B.

8.2.1.2 Proposed Sustainable Drainage Systems (SuDS)

The second aspect is the policy of the Local Authority is to include Sustainable Drainage Systems (SuDS) for all new applications. The aim is to provide an effective system to mitigate the adverse effects of storm water runoff on the environments, through enhanced quality systems and on local infrastructure to aid in preventing downstream flooding. The features proposed shall reduce run-off volumes, pollution concentrations and enhance groundwater recharge and biodiversity.

The proposed SuDS features shall consist of:

- Green roof – this comprises a Sedum type roof covering to absorb the first 'flush' from rainfall events. Typically, 5-10mm of rain can be retained on the sedum surface. As more intense rain is experienced the green roof can overflow from the roof through down pipes and into the schemes main drainage runs.
- Water butts – when the rain water from roofs is drained to ground floor it will be directed into rainwater storage units, commonly referred to as water butts. The retained rainwater can then be stored and re-used for local landscaping and maintenance purposes. It would not be envisioned that the captured rainwater would be reused within the proposed buildings, for public health reasons.
- Attenuation tanks – As noted above, the development will require a dedicated system to contain the storm water flows generated during extreme storm events. It is proposed to drain all storm water runoff into 2no. attenuation tanks beneath the proposed basement, each with a storage volume of 170m^3. The storm water discharge rate from these attenuation tanks to the existing public storm sewer will be restricted to 2.27 l/sec.
- Low Water Usage Appliances – It is also worth highlighting that low water usage appliances will also be utilised to aid in the reduction of water usage on the development.

The combination of the above noted elements will allow the proposed development to adhere to the principles of sustainable drainage practices while enhancing overall storm water quality. Interception Storage shall be provided via the use of the green roofs on the apartment buildings and by the use of local drainage into landscaped areas & tree pits where applicable. This will allow both interception & treatment volumes from the proposed development to be provided for.

8.2.1.3 Proposed Surface Water Infrastructure

Stormwater collected within the proposed development shall be collected in pipes ranging in diameter from 225mm – 300mm and flow under gravity into 2no. storm water attenuation tanks beneath the proposed basement, each with a storage volume of 170m^3. It is proposed to pump the storm water from these attenuation tanks to a standoff manhole at street level, from which it shall discharge by gravity to the existing public storm sewer in place along the southern side of St. John's Road West. The proposed discharge rate will be 2.27 l/sec. The proposed discharge of storm water to the public sewer at a controlled rate for all storm water events will aid in freeing up hydraulic capacity during high intensity storms.

Refer to CS Consulting drawings HSQ-CSC-XX-XX-DR-C-0201 and HSQ-CSC-XX-XX-DR-C-0202 for details of the proposed storm water system, contained in Appendix 8A. Note that a large-scale version of this drawing is included with the application.

8.2.2 Location

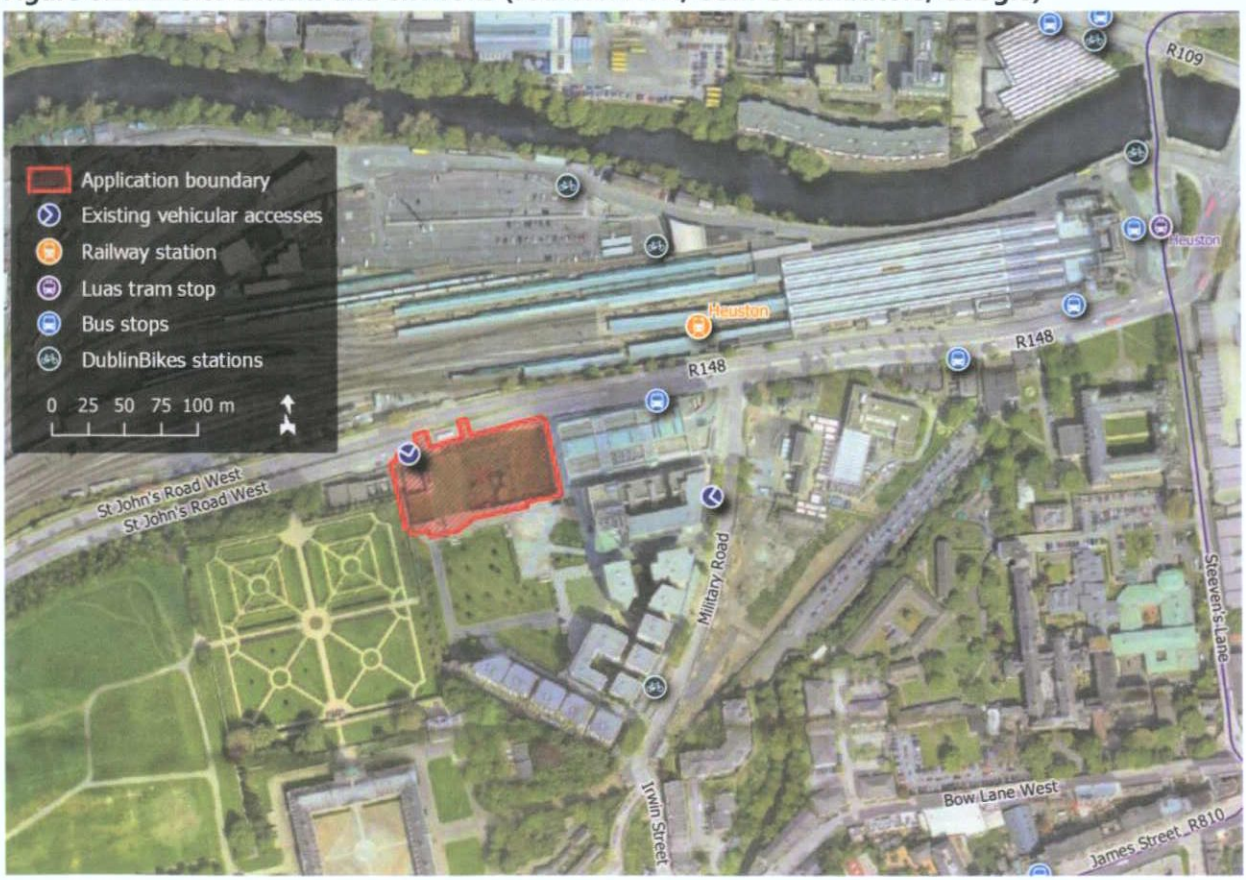
The proposed development is located on St. John's Road West, at the Heuston South Quarter complex in Dublin 8. The site sits within the established communities of Kilmainham, between the Royal Hospital Kilmainham to the west and the Quays to the north, within the administrative jurisdiction of Dublin City Council. The planning application boundary encloses an area of 0.62ha. The site is bounded to the west by the gardens of the Royal Hospital Kilmainham, to the north by St. John's Road West, to the east by the Eir Group headquarters building, and to the south by internal roads and landscaping within the remaining undeveloped portion of the HSQ complex. The location of the proposed development site is shown in Figure 8.2.2.1.

The subject site comprises part of the undeveloped area of the site that has been landscaped as an interim measure to improve the aesthetics of the site pending its complete redevelopment. There is already an established road, pedestrian and cycle network in the vicinity of the site so as to allow for a high level of permeability.

The indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 8.2.2.1.

Figure 8.2.2.1 Location of proposed development site (sources: EPA, OSM Contributors, Google)

Figure 8.2.2.2 Site extents and environs (sources: NTA, OSM Contributors, Google)



8.3 Assessment Methodology

This chapter has been set out with reference to the specific criteria set out in the Environmental Protection Agency guidelines, including the following:

- EPA (2022), Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR).
- Conservation and Amenity Advice service (CAAS) (2002), Guidelines on the Information to be contained in Environmental Impact statements.
- CAAS (2003), Advice Notes on Current Practice in the Preparation of Environmental Impact statements.
- EPA (2015), Advice Noted for Preparing Environmental Impact Statements Draft.
- Good Practice Guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, C532, 2001).
- The Greater Dublin Strategic Drainage Study, (GDSDS), 2005.
- Regional Drainage code of Practice, (DCC).
- CIRIA, C753 Sustainable urban Drainage Systems (SuDS) Manual.
- A Strategic Flood Risk Assessment prepared by CAAS for the Poolbeg West SDZ Planning Scheme.
- The National Planning Guidelines from the OPW & the Department of the Environment, Heritage and Local Government, November 2009, titled *The Planning System and Flood Risk Management Guidelines for Planning Authorities*.

8.3.1 Desktop Study

A desktop study was carried out on the local and regional surface water and drainage network. Information was obtained from documents including the following sources:

- Eastern River Basin District (ERBD) Catchment Characterisation Report (ERBDA, 2005)
- ERBD River Basin Management Plan 2009-2015 (ERBDA, 2010a)
- ERBD Programme of Measures 2009-2015 (ERBDA, 2010b)
- ERBD River Basin Management Plan - Strategic Environmental Assessment (ERBDA, 2011)
- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- Dublin City Council Water and Drainage Department record drawings and discussions with Drainage Division Engineers;
- Flood Risk Assessment Report completed by Cronin and Sutton Consulting which accompanies

this Planning Application.

- Dublin City Councils Development Plan, 2016 – 2022
- Dublin City Councils Strategic Flood Risk Assessment, Vol. 7 of the current Development Plan.
- Site Visits ; CS Consulting staff attended site in May 2020 & 2021.

8.3.2 Policies

At a national level the National Planning Framework (Project Ireland 2040) includes Objective 60, a National Policy to *"Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance"*.

As the subject lands are within the jurisdiction of Dublin City Council. Their current Development Plan, (2016–2022), also contains policy guidance to be adhered to.

Specific policies relating to surface water quality within the 2016–2022 plan include:

- GI20: To seek continued improvement in water quality, bathing facilities and other recreational opportunities in the coastal, estuarine and surface waters in the city, having regard to the sensitivities of Dublin Bay and to protect the ecology and wildlife of Dublin Bay.
- GI21: To support initiatives to reduce marine pollution in Dublin Bay in partnership with other organisations and to raise awareness by Bay users and the general public and also to have regard to the Marine Strategy Framework Directive (2008/56/EC).
- SI1: Policy to support Irish Water: provision of high quality drinking water and waste water treatment facilities.
- SI2: Policy to support Irish Water in upgrading of wastewater infrastructure and Greater Dublin Regional Wastewater Treatment Plant, and Marine Outfall and orbital sewer.
- SI3: Policy to ensure development is permitted in tandem with available water supply and wastewater treatment.
- SI14: To protect the Dublin City coastline from flooding as far as reasonably practicable, by implementing the recommendations of the Dublin Coastal Flood Protection Project and the Dublin Safer Project.
- SI15: To minimise the risk of pluvial (intense rainfall) flooding in the city as far as is reasonably practicable and not to allow any development which would increase this risk.
- SI16: To minimise the flood risk in Dublin city from all other sources of flooding, including fluvial, reservoirs and dams and the piped water system.
- SI17: To require an environmental assessment of all proposed flood protection or flood alleviation works.

- SI18: To require the use of Sustainable Urban Drainage Systems in all new developments, where appropriate, as set out in the Greater Dublin Regional Code of Practice for Drainage Works. The following measures will apply:
    - The infiltration into the ground through the development of porous pavement such as permeable paving, swales, detention basins.
    - The holding of water in storage areas through the construction of green roofs, rainwater harvesting, detention basins, ponds, wetlands.
    - The slow down of the movement of water.
- SI10: To have regard to the Guidelines for Planning Authorities on the Planning System and Flood Risk Management, and Technical Appendices, November 2009, published by the Department of the Environment, Community, and Local Government as may be revised/ updated when assessing planning applications and in the preparation of plans both statutory and non-statutory.

8.3.2 Legislative Background

The following legislation was referred to in compiling this chapter:

Water Framework Directive 2000/60/EC

The EU Water Framework Directive (WFD) 2000/60/EC came into force on 22nd December 2000, and enacted into Irish legislation through S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003. This legislation and regulation is a significant piece of legislation for water policy, as it provides a co-ordinated approach across Europe for all water policies, establishing a management structure for future water policy. A few key objectives of the Directive are to:

- Protect all waters, including rivers, lakes, groundwater, transitional and coastal waters.
- Achieve "good status" in all waters by 2015 or at the latest 2027, and maintaining "high status" where the status already exists.
- Have water management based on River Basin Districts (RBD).

The strategies and objectives of the Water Framework Directive in Ireland have been influenced by a range of National and European Union legislation and regulation including:

- Local Government (Water Pollution) Acts 1977 – 1990.

In turn the implementation of the Water Framework Directive and its associated policies has necessitated the introduction of new regulations in Ireland including, the European Communities Environmental Objectives (Surface Waters) Regulations 2009, which are discussed further in the following section.

European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No.272 of 2009)

These regulations have been devised as a more complete and stringent set of surface water quality regulations which covers the requirements of the Water Framework Directive and the Dangerous Substances Directive. These regulations came into effect on 30th July 2009 and have been adopted by the Government. These regulations supersede previous water quality regulations (both EU and national). This project is cognisant of previous regulations as they form the basis for a wide range of impact assessment and monitoring methodologies. It is envisaged that a detailed construction management plan which will include the management or disposal of surface water runoff will be prepared in advance of construction commencing on site. The construction & demolition management plan will be cognisant to take into account these new regulations and apply them throughout the construction phase.

European Communities Priority Substances Directive 2008

These regulations have been devised to assign a chemical status assessment for water bodies. Directive 2008/105/EC provides environmental quality standards in the field of water policy.

Local Government (Water Pollution) Acts 1977 – 1990

The Act is the main legislation for the prevention and control of water pollution, including the general prohibition of polluting matter to waters. While this act has largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998)

As part of the Water Pollution Acts, these regulations require water quality be maintained or improved, with reference to the biological quality river rating system (Q Rating) as assigned by the Environmental Protection Agency between 1995 to 1997. While this act has also largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

Pollution caused by certain dangerous substances discharged into the aquatic environment 2006 (Directive 2006/11/EC of the European Parliament And Of The Council)

Directive gives an indication of parameters which have to have their concentration values limited to ensure improvement of the aquatic environment.

European Union – Drinking Water Regulations 2017 (S.I. No. 464/2017)

Regulations pertain to the overall water quality & constituents allowable in potable water.

European Union – Environmental Objectives (groundwater) 2016 (S.I. No. 366/2016)

Regulations pertain to the overall water quality & constituents allowable in potable water.

8.3.3 Assessment of Existing Water Quality

An assessment of the existing water quality was also carried out in the form of a desktop study examining water quality data from the EPA from surveys predominately conducted by the EPA and local authorities. Various quality classes are used to establish and monitor the condition of rivers and streams in Ireland. Quality classes relate to the potential beneficial use of a water body, and can be effected by the quality of water discharged to surface water during construction and operation of a development.

Background Information on the local drainage network and water supply was obtained from documents from local authorities.

8.3.4 Flood Risk Assessment

A Site-Specific Flood Risk Assessment (SSFRA) for the proposed development was undertaken by Cronin & Sutton Consulting and is included as part of the planning application. This SSFRA report is provided in Appendix 8B of this EIAR.

The potential sources of flooding considered were:

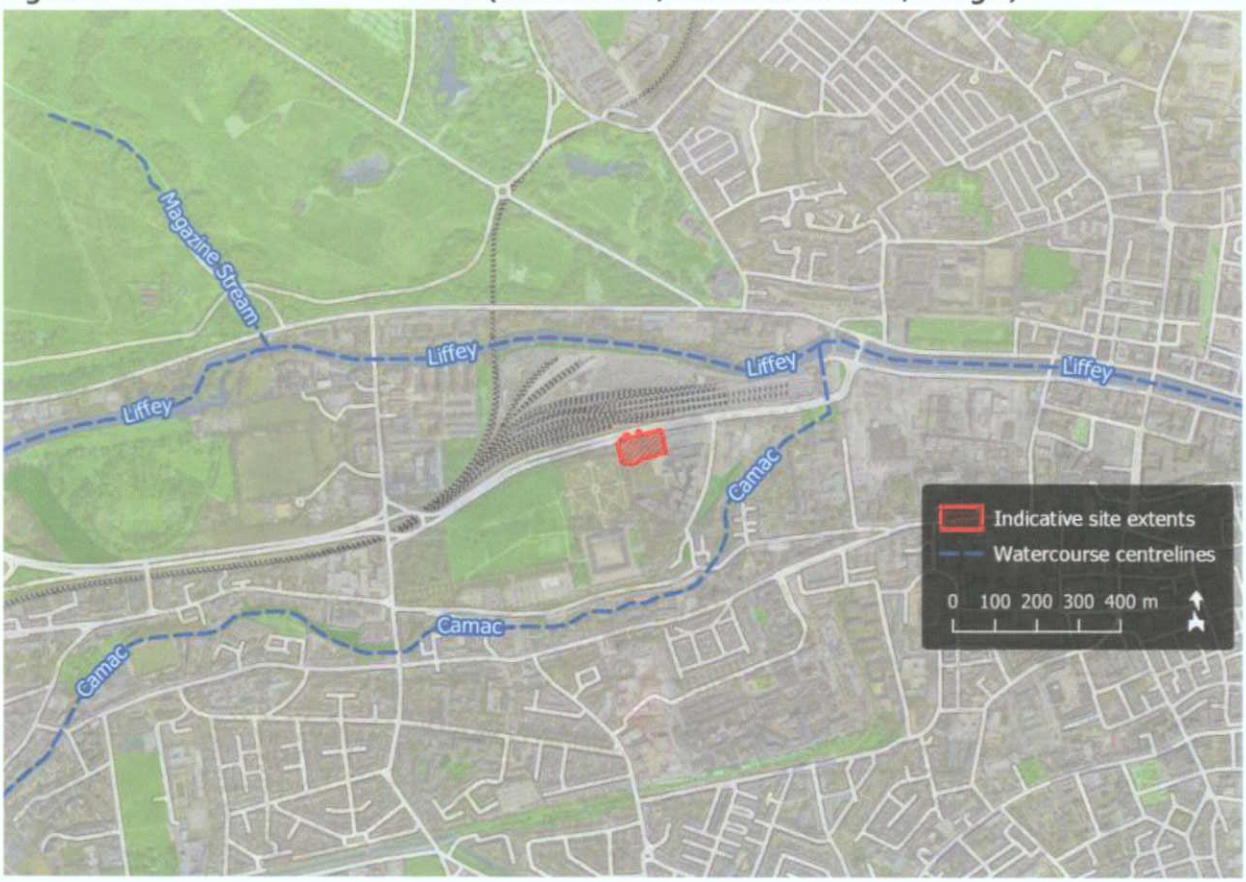
- Tidal/Coastal flooding;
- Fluvial flooding (from adjacent surface water bodies);
- Pluvial (direct rainfall);
- Groundwater flooding;
- Potential for offsite flooding due to infrastructure failure.

8.4 Receiving Environment

8.4.1 Surface Water Features

The main freshwater receiving environment within the vicinity of the proposed development is the River Liffey, which is located approximately 200m to the north of the site. The River Liffey flows in an easterly direction and discharges into the Irish Sea approximately 7km east of the site. The site is located within the Eastern River Basin District which is the Water Framework Directive designated catchment for the local area. The historical Camac River is culverted for some of its length but is un-culverted as it passes within 100m to the east of the subject site. The Camac is culverted as it passes beneath St. John's Road West and ultimately discharges into the River Liffey. See Figure 8.4.1.1 below for the surface water features close to subject lands.

Figure 8.4.1.1 Surface water features (sources: EPA, OSM Contributors, Google)



The WFD classification scheme for water quality includes five status classes: high, good, moderate, poor and bad. 'High status' is defined as the biological, chemical and morphological conditions associated with no or very low human pressure. This is also called the 'reference condition' as it is the best status achievable - the benchmark. These reference conditions are type-specific, so they are different for different types of rivers, lakes or coastal waters so as to take into account the broad diversity of ecological regions in Europe.

Assessment of quality is based on the extent of deviation from these reference conditions, following the definitions in the Directive. 'Good status' means 'slight' deviation, 'moderate status' means 'moderate' deviation, and so on. The definition of ecological status takes into account specific aspects of the biological quality elements, for example "composition and abundance of aquatic flora" or "composition, abundance and age structure of fish fauna. The River Liffey in the vicinity of the site is categorised on the EPA Water Quality Map as a transitional waterbody. EPA sampling of watercourses dating from 2010-2015 indicate that the River Liffey had a 'moderate' status.

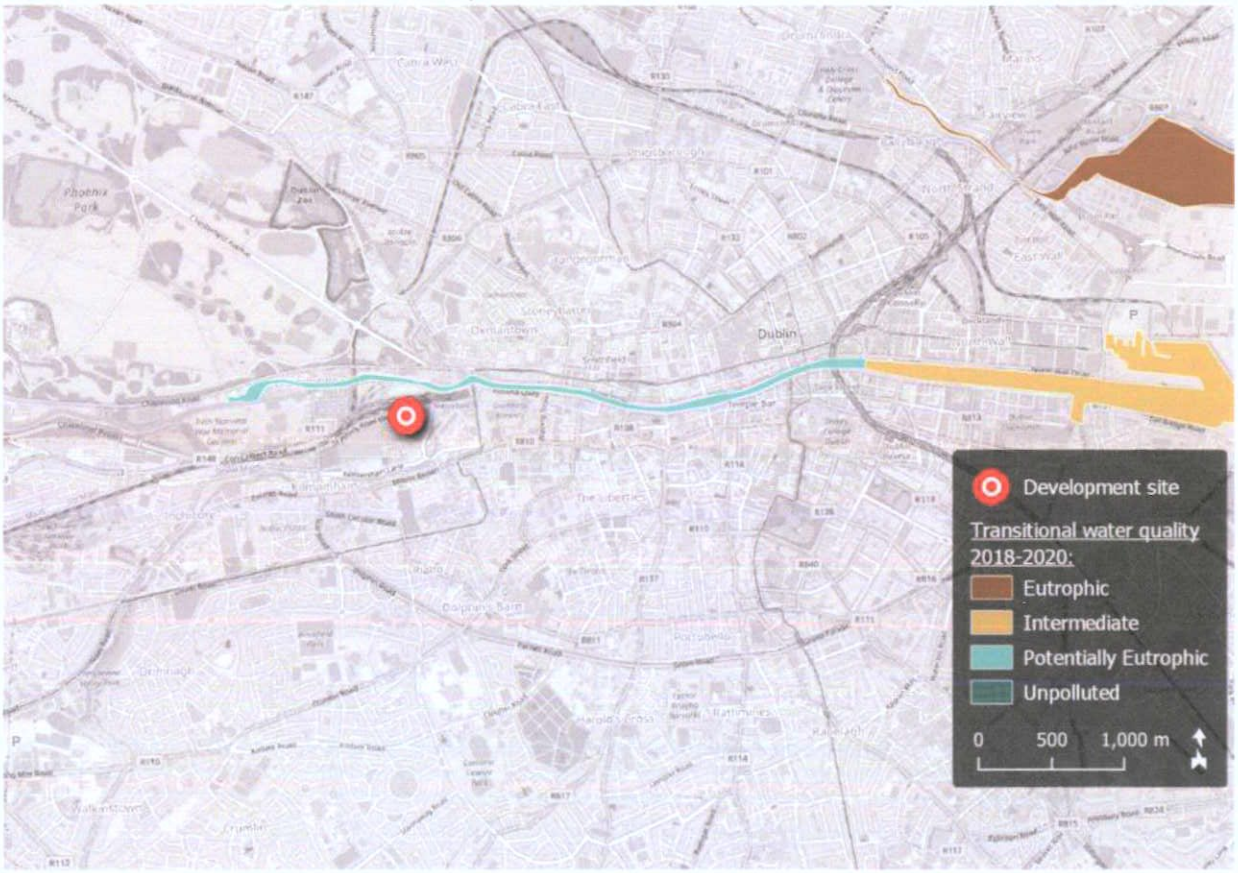
Information available from the EPA suggests that the River Liffey is "at risk of not achieving good water status" in terms of the WFD. The water quality within the designated water courses will be particularly affected by the quantity and quality of surface water run-off from the adjacent lands. Currently the lands in the vicinity of the site are classified as urban in use.

The most recent surface water quality data for the Liffey and Dublin Bay (2018-2020) indicate that they are 'Potentially Eutrophic'. Under the 2015 'Trophic Status Assessment Scheme' classification of the EPA, Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15 per cent of the relevant threshold value. Annual precipitation for this area is

approximately 727mm (2018 figures from Met Eireann website).

The Camac as a water body is both open and culverted in various stretches along its reach. There is no 'Q – status' designation for the River but it has been classified as having a 'poor' ecological status (2013 – 2018) under the WFD.

Figure 8.4.1.2 Water quality of Liffey and Tolka estuaries (sources: EPA, OSM Contributors)

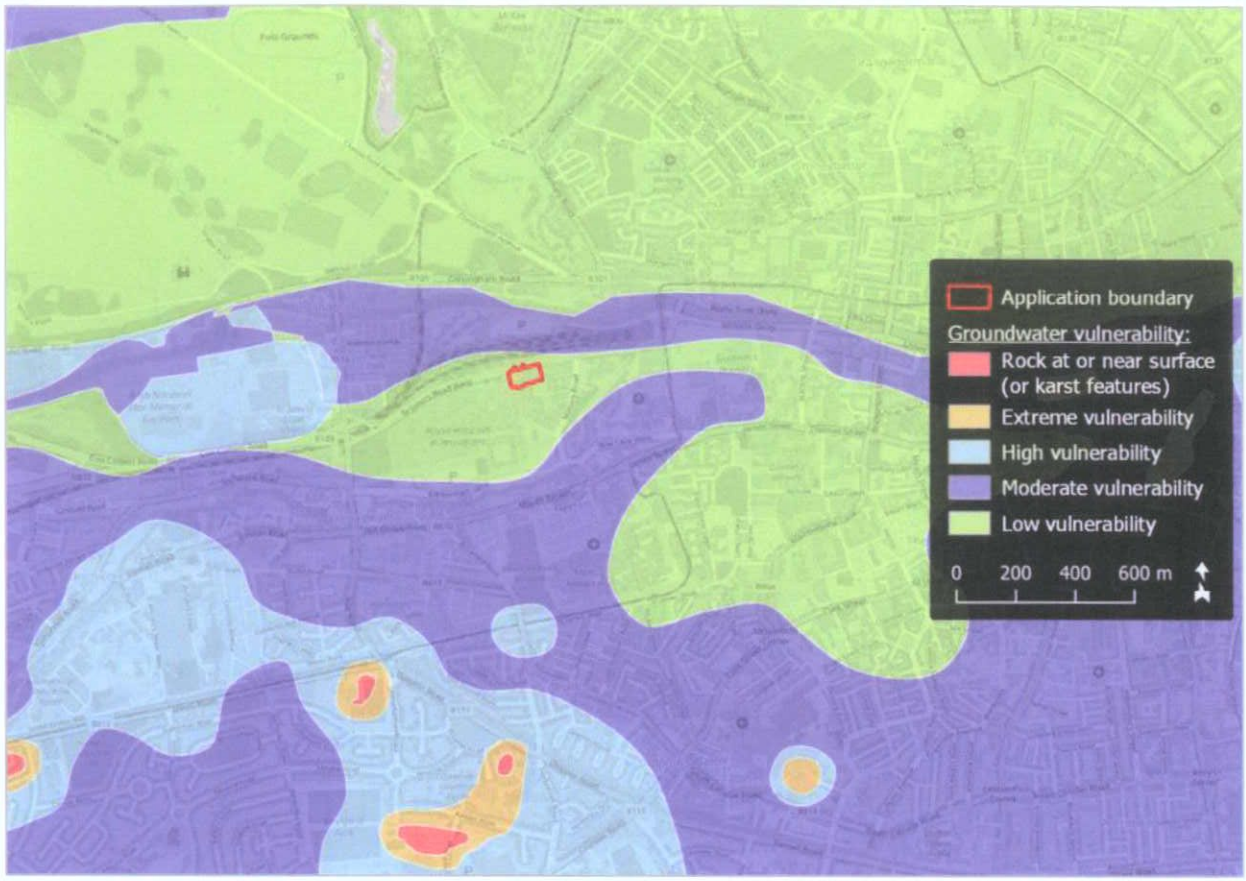


8.4.2 Ground Water

The subject site is within the Dublin Urban Groundwater Body as designated in the ERBD Management Plan. The groundwater body chemical and quantitative status of both of these groundwater bodies has been designated as 'good'. The Geological Survey of Ireland, GSI, has developed a classification system for aquifers based on the value of the resource and their hydrogeological characteristics. The bedrock aquifer is classified as a Locally Important Aquifer (Li) Aquifer which is designated as a productive aquifer in local zones. The GSI, vulnerability rating for pollution from the ground surface is Low. The groundwater flows in a northerly direction towards the River Liffey.

A perimeter secant pile cut-off wall was constructed in 2003, prior to commencement of excavations. A detailed Environmental Assessment, involving sampling, was carried out by URS. The site was then excavated to formation level, which was generally within the virgin black boulder clay.

Figure 8.4.2 Groundwater vulnerability (sources: GSI, OSM Contributors)



8.4.3 Flood Risk

In accordance with the National Flood Risk Guidelines & Dublin City Councils Development Plan Vol. 7 – Strategic Flood Risk Assessment the proposed development has be assessed for tidal, pluvial, fluvial, ground water & infrastructure failure flood risks.

A detailed assessment of the historical, current and proposed flood risks to the site are examined in the Site-Specific Flood Risk Assessment prepared by CS Consulting and provided as Appendix 8B.

Based on current Dublin City Council flood mapping and mapping prepared by the Office of Public Works, the subject land is adjudged to be in Flood Zone 'C'. This classification indicates that the site is located outside of the predicted 1-in-200-year tidal flood event and outside the predicted 1-in-1000-year fluvial storm water event, therefore the proposed development is deemed suitable for the location.

The analysis for the proposed development has found that the risk of onsite flooding or the potential to cause off site flooding from all possible mechanisms is deemed to be low. As such, the proposed development is in accordance with statutory guidelines. See Figure 8.4.3.1 for extract from OPW Fluvial Flood Map and Figure 8.4.3.2 for extract from OPW Tidal Flood Map.

Figure 8.4.3.1 Extract of OPW fluvial flood hazard Map (source: OPW)

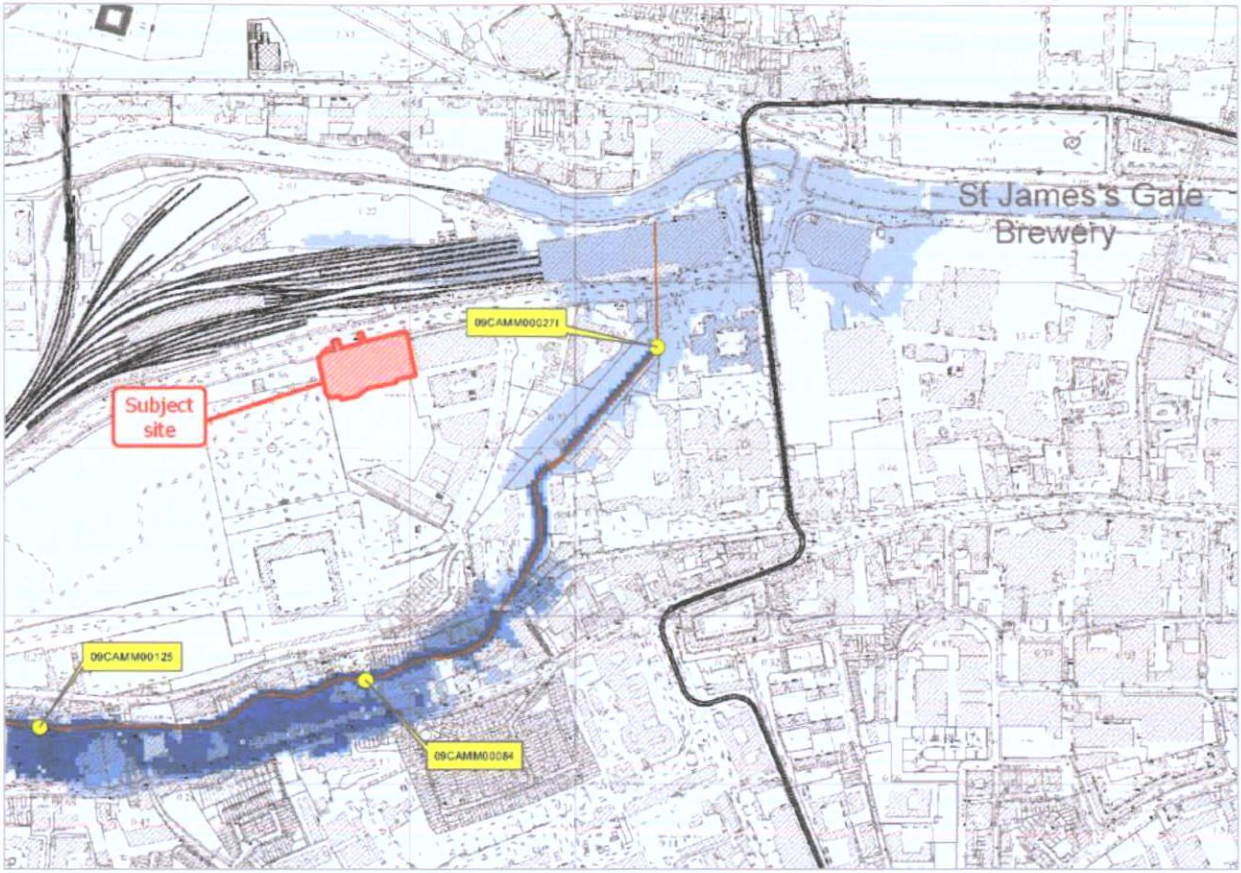
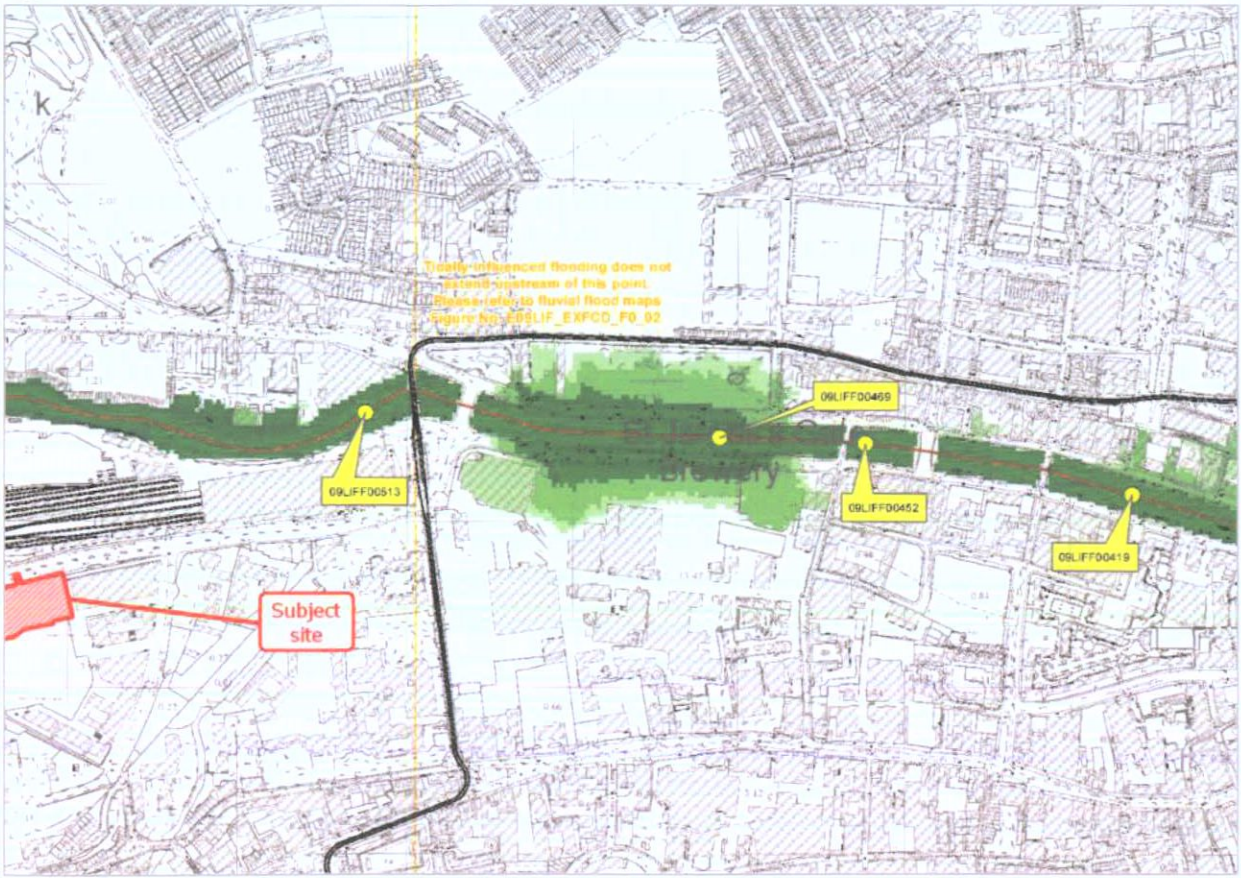


Figure 8.4.3.2 Extract of OPW tidal flood hazard map (Source: OPW)

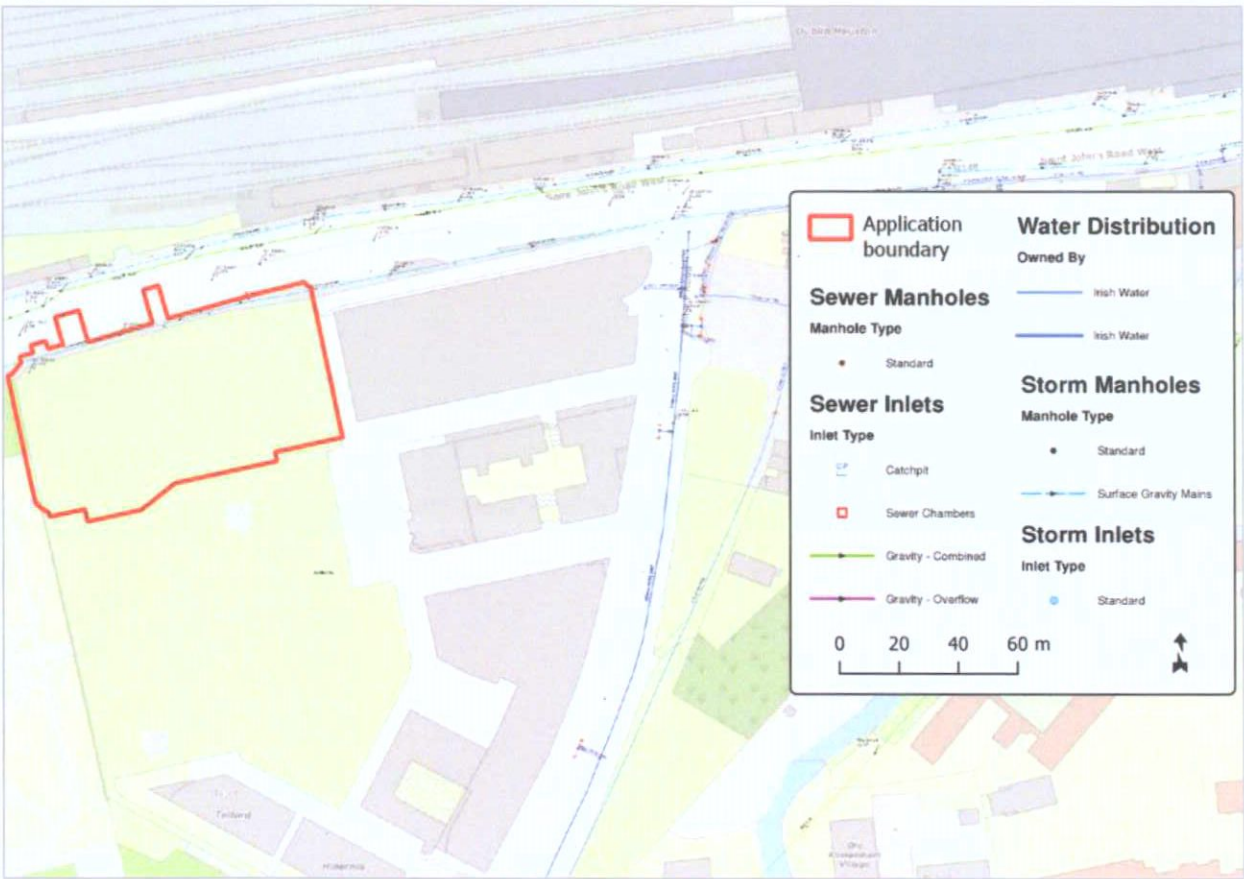


8.4.5 Surface Water Drainage Infrastructure

Irish Water records provided by Dublin City Council indicate a 375mm diameter dedicated stormwater sewer along St. John's Road West, north of the site, which flows west to east.

A review of the Local Authority hydraulic performance maps prepared by Dublin City Council as part of The Greater Dublin Strategic Drainage Study (GDSDS), for the 2031 hydraulic scenario indicates that the storm sewers on site are currently under hydraulic pressure, and flooding is predicated for storm events for return periods of less than 30 years. See below figure 8.4.5.1 for Irish Water records (note a full scale version of this map is in Appendix 8C).

Figure 8.4.5.1 Extract of Irish Water records (source: DCC)



8.5 Identification of Likely Significant Impacts

This section addresses the implications for the proposed development on the existing environment and looks at the possible affects the proposed development may have during the construction & operational phase. Potential issues were identified and assessed. The assessment looked at the time frame and magnitude of the potential issues & mitigation mechanisms to address. The methodology employed in compiling this Chapter of the EIAR incorporates the Guidelines on the Information to be contained in Environmental Impact assessment reports by the Environmental Protection Agency, (EPA 2022). The approach followed to derive effects significance from receptor value and magnitude of impacts is shown in Table 8.5.1. Where Table 8.5.1 includes two significance categories, reasoning is provided in the text if the lower of the two significance categories is selected. A description of the significance categories used

is provided in Table 8.5.2.

Table 8.5.1: Significance Matrix

	Magnitude of Impact (Degree of Change)				
		Negligible	**Low**	**Medium**	**High**
Environmental Value (Sensitivity)	High	Slight	Slight or moderate	Moderate or Large	Profound
	Medium	Imperceptible or slight	Slight or moderate	Moderate or large	Profound
	Low	Imperceptible	Slight	Slight	Slight or moderate
	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight

Table 8.5.2: Significance categories and typical description.

Significance Category	Typical Description
Profound	An effect which obliterates sensitive characteristics
Large	An effect which, by its character, magnitude, duration or intensity altered a significant proportion of a sensitive aspect of the environment.
Moderate	An effect that alters the characterises of the environment in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Imperceptible	An effect capable of measurement but without significant consequences.

Residual adverse effects of 'large' or 'profound' significance are considered to be 'significant' for the purposes of this assessment. Following the assessment of the level of effect significance, mitigation measures are presented that will be used to avoid, prevent or reduce the magnitude of the potential impact. The significance of the effect taking into account the mitigation is then assessed to give the residual effect significance. The effects of the Proposed Development are also considered cumulatively with those that could foreseeably result from other known developments in the assessment study area that are going through the planning process.

8.5.1 Construction & Demolition Phase

The principal risks associated with the Construction/demolition Phase are:

- Surface Water – (site runoff and contamination)
- Ground Water – (potential for site development works in affect groundwater quality)
- Flood Risk – (potential for excessive run off from site)

8.5.1.2 Surface Water

Surface water run-off will occur from hardstanding and roof structures during the construction period. As there is a small section of the existing structure to be removed there is the potential for detritus material to wash into the drainage network. This surface water run-off from construction/demolition activities has the potential to be contaminated with the following;

- Hydrocarbons from accidental spillage from construction plant and storage.
- Concrete/cementitious products: arising from construction materials.
- Vehicle wheel wash water.
- Runoff from exposed work areas and excavated material storage areas.
- Solid (municipal) wastes being disposed or blown into watercourses or drainage systems.

Surface water discharge from the proposed development during its construction phase shall have a short-term moderate negative impact on the surrounding environment.

8.5.1.3 Ground Water

As the proposed development is to 'build-out' the site, the basement has been constructed as part of the initial works to develop the site. As such the proposed works will not affect the groundwater beneath the constructed basement slab. Construction of the proposed development shall have a short-term imperceptible negative impact on groundwater at and adjacent to the development site.

8.5.1.4 Flood Risk

Surface water run-off has the potential to flood basement lower levels during the construction period. As the proposed construction of the site will require works prior to the storm water system being installed, there is a slight risk of flooding if the development were to experience an intensive storm event while under construction. Any such flooding would have a short-term moderate negative impact on the surrounding environment.

8.5.2 Operational Phase

The principal risks associated with the Operational Phase are:

- Surface Water – (site runoff and contamination)
- Ground Water – (potential for site development works in affect groundwater quality)
- Flood Risk – (potential for excessive run off from site)

8.5.2.2 Surface Water

The proposed development will be constructed on previous works carried out on site. The development is to 'build-out' works completed previously. The existing hardstanding, which changes the site's footprint from the original (pre-any onsite development) soft landscape, increases the percentage of storm water runoff leaving the site during extreme storm water events. It is noted that the previous development works have already converted the original site's profile from an undeveloped, low stormwater discharge rate to a semi-developed hardstanding site footprint. Overall, surface water discharge from the proposed development during its operational phase shall have a long-term moderate negative impact on the surrounding environment.

8.5.2.3 Ground Water

The proposed works will see the previous works which had commenced on site be completed. The works which have taken place previously on site included the construction of the basement. As the basement is fully completed and the proposed works will not require any further expansion of the basement on site, the proposed development shall have a long-term imperceptible negative impact on groundwater at and adjacent to the development site.

8.5.2.5 Flood Risk

The proposed development has been the subject of a *Site-Specific Flood Risk Assessment*, attached as Appendix 8B.

This assessment found that the operational phase of the development will not adversely affect the subject site's Flood Zone designation or alter same for the local environs. The proposed scheme will not increase the potential for localised or off-site flooding. In this way, the proposed development is predicted to have a long-term slight negative impact on flooding risk.

Table 8.5.3: Breakdown of Potential Impacts

	Potential Impact	Attribute Importance	Impact Duration	Impact Magnitude	Impact Significance	Stage
Environmental Management	Demolition & uncontrolled spillages, on/off site impacts	High	Short term	Moderate	Moderate	Construction & demolition
SW Runoff	On site batching or mixing activities	High	Short term	Moderate	Large	Construction
SW Runoff	On/off site pollution, due to washing down areas	High	Short term	Moderate	Moderate	Construction