Section 14:
Material Assets

14.1 INTRODUCTION

This chapter of the EIS document has been prepared by DBFL, Consulting Engineers, and addresses the impact of the development on water supply, drainage, electricity, communications and gas supply infrastructure. This chapter also addresses the more relevant issues in the context of this development site of man-made water channels such as the culverts and pipes associated with the public surface water drainage, foul water drainage and water supply networks together with the ducting and pipework associated with power supply and communication based infrastructure.

14.2 STUDY METHODOLOGY

The assessment of the potential impact of the proposed development on the site services infrastructure and man-made networks was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002) and the Advice Notes On Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).

Information on the existing services was assembled from the following sources;

- ESB
- Bord Gais
- Eircom
- Information on existing drainage and water supply networks was provided courtesy of Dublin City Council Water Services

14.3 RECEIVING ENVIRONMENT

The site is currently developed with 9 No. 16 unit blocks over four storeys, 4 No 32 Unit blocks over four storeys and 4 no 2 story terraced housing units. Access to the development from the north is via the North Circular Road and from the south via Infirmary Road. The link road between is referenced as O'Devaney Gardens. The majority of the infrastructure servicing the existing development follows the route of this link road.

This proposed scheme represents an updating of an existing development within an urban centre. Therefore, any modifications to the current service based infrastructure will be minimal when taken in the context of the North Quays Area to which the development area forms part and presented in the Masterplan.

Individual sections covering water supply, surface water drainage, foul drainage and utility based infrastructure are covered subsequently.

14.3.1 WATER SUPPLY

The water supply to O'Devaney Gardens is provided from a 12 inch public water main circling the development site and running along Infirmary Road and onto the North Circular Road. There is a 6 inch branch connection from the main on

Infirmary Road and a 4 inch branch connection from the main on North Circular Road. The valve connection at the North Circular Road is closed. Therefore, the site water supply derives from the 6 inch (150mm) branch main. This branch then feeds a 4 inch distribution network used to service the current housing and flat units.

14.3.2 SURFACE WATER DRAINAGE

With regard to the surface water receiving bodies we address the following receptors and the impact on them as a consequence of development works and upgrades to the water based infrastructure as proposed in the masterplan:

- Public Drainage Network for the foul water and residual storm water.
- Ground water in the bedrock and quaternary geology beneath the site for storm water filtration,
- River Liffey /Liffey Estuary approximately 0.5km south of the subject development site boundary

According to the existing drainage records there are no surface water sewers specifically servicing O'Devaney Gardens. It is further established that the surface water from this area is ultimately discharged to the an existing 450mm combined sewer on Infirmary Road via a system of combined sewers ranging from 225mm to 375mm at the south east corner of the proposed development site. The combined sewer on Infirmary Road discharges directly to an interceptor sewer on the North Quays.

There are surface water sewers in the vicinity of the subject site including a 225mm diameter sewer on Montpellier Gardens increasing to a 300 and 375mm diameter sewer through Montpellier Park and Drive. However, this ultimately discharges to the same 450mm diameter combined sewer on Infirmary Road. Another identified surface water sewer exists that runs through the Phoenix Park. It is understood to be a brick culvert. Again however, it discharges to the combined sewer on Infirmary Road.

The assumed discharge rates of surface water from the site entering the combined sewer on Infirmary Road are based on a site area of approximately 5.7 hectares. The peak rainfall intensity based on a time of concentration of 15 minutes and an Annual Exceedance Probability of 20% (ie1:5 year) is approximately 50mm per hour. The distribution of the land contribution of surface water to the combined sewer is assumed as follows:

Area of Development	Flow Rate
50% impermeable (roads, roofs, paths, active drainage) with an assumed run of rate of 80%	317 litres per second
50% permeable (green areas, passive drainage) with an assumed run off rate of 30%	118 litres per second
TOTAL	435 litres per second

Table 14.1 Current Surface Water Run Off

The figures presented above would suggest regular inundation of the combined sewer network during peak flows given that a 375mm sewer with a gradient of 1:22 is required to carry the flows in a pipe full state. In the absence of reports of flooding from the normal sources it would suggest that the majority of the current storm drainage ends up percolating into the local geology.

14.3.3 FOUL WATER DRAINAGE

The foul water drainage infrastructure supporting the existing site layout is the same as for the surface water, discharging to the 450mm combined sewer on Infirmary Road via the same distribution network.

Based on the simple assumption of 180 litres per head per day and a residential load of 700 PE, the dry weather flow from the site is approximately 2.2 litres per second with a peak flow of approximately 13 litres per second. This represents a small portion of the combined flow with the majority of the capacity taken up by surface water.

14.3.4 UTILITY INFRASTRUCTURE

Again, as for the water supply and sewer network the utility supplies for the subject site follow the link road between Infirmary Road and the North Circular Road. Spine connections are provided that follow the main O'Devaney Gardens Road with branches off to service the individual blocks.

The gas is typically 90 to 125mm Polyethylene (PE) low pressure mains. The electricity for the subject site is typically below ground in ducts with MV and LV circuits. There appears to be some overhead LV cabling through neighbouring areas. Communication ducts from Eircom are below ground.

14.4 CHARACTERISTICS OF THE PROPOSALS

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise.

The proposed re-development of the subject site will result in the abandonment, removal and diversion of water based and utility based services to accommodate the new road layouts and development pockets. All services will be installed below ground in accordance with the relevant specification of the local authority or individual utility provider.

A full description of the proposed development is provided in Section 2 of this EIS document. The masterplan for the area, for both phases cumulatively (Phase 1A,1B and 2), has identified the potential for 398 residential units accommodating 937 persons, 3160 square metres of community / commercial space and an allowance of 4680 square metres for a public park. This represents an increase in the number of residents from approximately 700 (subject to current occupancy figures) compared with the masterplan proposals of 937. This represents an

increase of 34% in the context of the O'Devaney Gardens site specifically, but only represents just over 5% of an increase on the Intermediate neighbourhood population associated with the Arran Quay Area Band D and just over 1% of the wider neighbourhood area covering all Arran Quay Census areas.

It is noted that Phase 2 of the proposed Masterplan is envisaged to accommodate either 240 units, which is incorporated within the 398 total, or a scheme with 120 residential and 8,000 sq.m. of commercial use. It is assumed that an entirely residential development within Phase 2 would yield a higher demand and is therefore assumed for the purposes of this assessment.

The increase in development size will result in the decanting of residents to alternative accommodation or the phasing of the scheme will be undertaken to generate the new residential accommodation first and allow transfer to the new accommodation.

14.4.1 WATER SUPPLY

Based on the development proposals in the current masterplan, the proposed demand placed on the public water supply will be as identified below.

Development Type	Measure	Demand based on Development Type	Total Daily Demand
Residential	937person	180 litres per head per day	169 cubic metres
Commercial/Community	3160 sq metres (211 person based on 15m2 per person allowance)	75 litres per head per day	15 cubic metres
		TOTAL	**184 cubic metres**

Table 14.1 Future Water Demand

**Figure is based on average consumption for a mixed use development assuming a conservative space allocation per person from the BSRIA Rules of Thumb Guidelines for Building Services (4th Edition)*

Given that the existing network is old and follows the route of the existing road layout, it is likely that the existing pipe work will be abandoned and removed or filled with a suitable filling grout. A new branch network will be provided that loops into to the existing 12 inch main on Infirmary Road and North Circular Road. The existing connections will be upgraded to accommodate a 200mm diameter loop connection. This will offer improved hydraulic characteristics to the existing network and benefit the surrounding developments also. Internally 100mm diameter loops/ connections to development pockets will be provided that also link with existing networks on the periphery of the subject site.

To further supplement these improvements, rain water harvesting will be recommended as part of the overall design solution to reduce the demand for treated water from the public supply for the purposes of toilet flushing or garden tap usage, etc.,

14.4.2 SURFACE WATER

As identified earlier there is no current provision for a separate surface water drainage system for the subject site. Surface water currently discharges to the combined sewer system. It is proposed that the a new sewer network be developed for the site taking full consideration of the Greater Dublin Strategic Drainage Study and the application of a Sustainable Urban Drainage ethos for an urban development that can easily be maintained using current local authority practice with limited additional training and budget.

To reduce the quantity and increase the quality of flows leaving the site, it is suggested that surface water be managed and treated prior to entering the

proposed water receptor with a significant allocation allowed to filter slowly to the underlying geology (Refer to section on Hydrogeology) with only residual flows entering the combined sewer network during extreme storm events with an Annual Exceedance Probability of 1%.

The main surface water pipe-work infrastructure will follow the core link road between the Infirmary Road and the North Circular Road. Flows will be curtailed from residential blocks through 'rain water harvesting' and the use of filter trench drainage in private residential areas.

Surface water from the community, commercial areas and shared public space will again be managed through rainwater harvesting and any additional volumes controlled under parking areas and released slowly to the underlying geology.

Surface water from public roads and amenity areas will be managed by off line low maintenance filtration tanks with silt and hydrocarbon interception provided prior to entry. These tanks will be located in public amenity areas such as car parking facilities and below green zones.

The residual surface water resulting from excessive storms will enter the existing combined sewer system but with greatly reduced rates.

14.4.3 FOUL WATER

Again the existing combined sewer network with the boundary of the subject site will be abandoned. A network of foul only sewers not exceeding 225mm diameter will follow the core link road and branch off to service individual development areas. Trapping facilities in accordance with Dublin City current practice will be provided prior to entry of the public sewer.

Modern water conservation methodologies will be applied to minimise discharge from private foul drainage such as low volume toilets with dual flush mechanism and cut off valves to prevent water wastage.

14.4.4 UTILITY INFRASTRUCTURE

A distribution network of core supplies will be provided to follow the route of the new link between infirmary Road and North Circular Road. All service connections and spurs to individual units will be metered and referenced. Individual layouts and details for the subject site will be prepared by the respective utility provider as the design progresses.

14.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

14.5.1 CONSTRUCTION PHASE GENERAL

The construction of the water and utility based infrastructure will require the removal or abandonment of the existing systems and the installation of new systems. The proposed works will be phased to reduce the impact of the works on access and the current function of the existing infrastructure. Minimal disruption will be imposed on the surrounding neighbourhood, in the context of current levels of access and service, beyond the extents of the subject site. The

impacts on specific aspects of the water and utility based infrastructure are discussed individually.

14.5.2 OPERATION PHASE GENERAL

When all new items of water and utility based infrastructure are in place and the development complete, the resulting impact on daily activities are as described under the individual headings.

14.5.3 WATER SUPPLY

Construction Phase

Provision of a new water main distribution network would involve construction activities within the subject lands mainly involving trench excavations conducted in parallel with the other services. The potential impact on the local public water supply network would be short term and imperceptible.

Given that the development is phased, the network design would take account of this to limit any loss in service during construction.

Operational Phase

The impact of the operational phase of the proposed development on the public water supply, based on simple like for like usage statistics, is an increase of approximately 58m3/day, based on simple like for like usage statistics. However, this figure will be significantly reduced through rainwater harvesting, grey water recycling and utilisation of modern improvements in fixtures and fittings. A conservative estimate would be a 33% reduction on the basic figure, reducing the increase demand to an additional 5 m3/day (equating to a Population Equivalent Increase, based on 180 litres per head per day, of 28). In the context of the Arran Quay census area, this equates to a less than 1% increase on water demand by population equivalent. This represents a small increase in demand.

To further offset this predicted increase in water demand, the provision of a new water supply network to current standards and tested to improved specifications would also reduce any current losses to leakage within the site which is believed to be up to 50% of the supply volume in most cases. Therefore, replacement of the old water supply network would reduce leakage to more sustainable quantity and offset entirely any increase in load as a result of the proposed development. This could be confirmed by regular meter readings taken as part of the ongoing maintenance of the network by the local authority as discussed in subsequent sections.

14.5.4 SURFACE WATER

Construction Phase

Construction of the proposed development will require the moving of topsoil and extensive earthworks to facilitate the construction of the required buildings, service provision, road construction, storage systems etc. Given the extent of disturbance there is potential for the surface water runoff from the construction phase to contain increased silt levels or become polluted from the construction processes. The discharge of these contaminants, such as concrete and cement, which are alkaline and corrosive, to the public sewer has the potential to cause pollute the Liffey estuary during excessive storm events. Accidental oil or fuel spillages or leaks from construction vehicles also have the potential to find their way into the adjacent water course. Both increased silt and contaminant levels have the risk of reducing water quality in the adjoining water courses.

The exposure of the underlying sub-soil, given its primarily clay make-up, from topsoil stripping may also cause the rate and volume of the run-off to increase during construction until the topsoil and vegetation are replaced. This could also lead to:

- Increased silt levels to the public sewer causing blockages and indirectly the Liffey Estuary
- Increased hydrocarbons from oil and diesel entering the public sewer
- Increased flood risk to site and surrounding neighbourhoods

Operational Phase

The completed development will result in a permanent change to the existing surface water processes on the current urban development. It is assumed from the masterplan that the proposed development site will be similar in scale, with regard to impermeable and permeable areas to that of the existing. Notwithstanding this, and based on the underlying ground conditions, groundwater recharge will be exploited in full by incorporating Sustainable Urban Drainage Systems (SUDS) to improve water quality, reduce discharge runoff rates to mimic that of greenfield rates and provide natural storage as part of a managed surface water network.

Direct surface water run-off rates from roads and parking areas under public control will be similar to those currently in existence. However, because of the application of ground water recharge and attenuation measures, the final discharge rate to the public sewer will be substantially reduced. The provision of catch pits and traps in gullies coupled with light liquid interceptors as appropriate will also improve the quality of surface water entering the public sewer.

Run-off from buildings will be reduced through harvesting and at source infiltration. Therefore, flows entering the public system will be notional.

Pluvial flooding events, resulting from 'deluge' rainfall intensities will be managed overground and use made of the natural topography and landscaped areas to attenuate the large volumes of water in the short term. These will complement the attenuation measures provided for the urban discharge reduction and will

need to be incorporated into the design to safeguard against storms throughout the lifetime of the development.

To summarise, the potential impact from the operational phase on surface water is likely to be long term and low.

14.5.5 FOUL SEWERAGE

Construction Phase

The installation of the foul sewers for the development will be conducted in parallel with the other services. This will mainly involve construction of pipes and manholes using trench excavation. The potential impact of the proposed development on the local foul sewerage network during the construction phase of the development would therefore be short term and minimal. This will be managed through the phasing process and any enabling works required will be undertaken in advance of any diversion or adjustment works.

Operational Phase

The impact of the proposed development on the public foul sewer pipe network will be to increase the peak flow quantity of wastewater discharging to the public sewerage network from the 13 litres per second peak flow based on present occupancy levels to 19 litres per second from the new proposals. Given that the worst case peak flow currently entering the public combined sewer is from surface water run-off, the increased foul only flows would be greatly offset in regard to the local pipework infrastructure, when surface water is reduced to more sustainable values.

In the context of treated 'load' volume, again there is an increase. Current foul water discharge is 700PE (Population Equivalent). This is combined with the surface water run off of 800mm per year across the area of the site. Based on the split earlier this represents approximately 400PE annually. Therefore the total load in need of treatment currently is approximately 1100PE. Based on the masterplan for O'Devaney Gardens, the foul only load from the proposed development based on 100% occupancy is 1022PE, a decrease of 7% based on current site figures. The utilisation of grey water recycling and modern low use fixtures and fittings is expected to reduce this load further by 25%, conservatively, to 767PE, a decrease of 30% below current loading figures. Therefore the impact is considered negligible with the potential for a positive impact.

There also exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in contamination of groundwater in the area. With proper installation, inspection and testing this risk is considered low

To summarise, the potential impact from the operational phase of this development, associated with foul water, is therefore likely to be long term and minimal.

14.5.6 UTILITY BASED INFRASTRUCTURE

Construction Phase

The O'Devaney site will be phased. During the works there will be inconvenience to the public associated with access during excavation and loss of service while new connections are made. By following site management procedures to ensure public safety and providing traffic management to standard the required level of access provision can be maintained. In regard to loss of service, this can be minimised by connecting services at low usage time periods and through discussion with the local residents.

Much of the work associated with the new services will be conducted within the curtilage of the phased works and within the hording line. However connections on the periphery of the site may require the trenching of existing roads that require reinstatement. There is the potential here for failure of pavements following reinstatement.

Operation Phase

All things being equal, there will be an increase in energy requirements for the site with the substantial increase in residents and community space. However, the proposal is likely to have a neutral effect on the receiving environment in the context of energy requirement, given that the increased consumer numbers will be offset by improved construction techniques and more energy efficient properties.

Form a sustainability perspective, the current networks will be upgraded to more efficient systems resulting in loss reductions. This coupled with ecologically aware building technologies, identified above, will balance any increase in load requirements.

No adverse effect on the telecoms environment is envisaged.

14.6 DO-NOTHING IMPACT

In order to provide a qualitative and equitable assessment of the proposed development, this section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.

Form a general standpoint; if the proposed development does not proceed there would be no additional impact on the local water or utility based systems. Nonetheless, in the context of existing infrastructure and receptors the following comments are made specifically:

- The current rate of surface water run-off would continue to enter the combined sewer.
- The waste water load requiring treatment would not increase. Although with an ageing network infiltration would continue to grow which would increase treatment flows.

- The existing combined infrastructure would continue to be at risk of flooding from peak storm flows.
- Pluvial flooding events would continue to be a risk.
- Groundwater status would remain unchanged if the current development and active drainage systems remained.
- Groundwater contamination would continue to be at risk due to ageing foul water infrastructure.
- Water demand due to ageing networks would continue to rise.
- Contamination of the Liffey Estuary would still remain a risk with the surface water contribution to the public sewer.
- Energy losses as a result of aging infrastructure would continue
- Safety aspects associated with old utility based infrastructure would continue to decrease with time.

14.7 REMEDIAL OR REDUCTIVE MEASURES

Remedial and mitigation measures describe any betterment or corrective measures that are either practicable or reasonable, having regard to the potential impacts. This includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified

Construction Phase

The following mitigation measures are proposed for the construction phase of the proposed development with reference to reduction of impact on existing water based and utility based infrastructure:

WT CONST 1: Temporary filtration should be provided prior to discharge to the public sewer. All levels of discharge to the public sewer are to be agreed with the local authority.

WT CONST 2: Existing surface channels drainage within the subject site that serve adjacent lands should be retained to prevent causing flooding impacts.

WT CONST 3: No flows shall enter the public sewer without the approval of the local authority

WT CONST 4: All surface flows shall be managed on site in a sustainable fashion and to the agreement of the local authority.

WT CONST 5: To minimise disruption to service, connections shall be made during low usage time periods and with the agreement of the utility providers and or local authority.

WT CONST 6: Full liaison should take place with local residents both within the subject site and around the periphery with regard to access and service loss. A fully detailed programme should be prepared with outages and loss of access identified.

Operation Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to reduction of impact on existing water based and utility based infrastructure.

OPERAT 1: A properly designed surface water system incorporating SUDS and designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) would minimise the overall impact of the development on the existing environment and water based infrastructure. The reduction in treatment and pumping of water entering the combined sewer would also reduce energy demand beyond the site extents

OPERAT 2: Surface water discharge rates should be reduced to past Greenfield run-off rates to prevent increased flood risk.

OPERAT3: Consideration should be given to at source management of surface water from roads using swales and filtration trenches.

OPERAT 4: It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded.

OPERAT 5: No remedial works would be required to the existing combined sewer pipe-work after the introduction of development generated foul flows.

OPERAT 6: Water conservation methods such as the use of low flush toilets and grey water reuse should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.

OPERAT 7: Building design should incorporate energy reduction measure to reduce the load on existing systems. Public Lighting systems should also seek to reduce consumption with at source generation.

OPERAT 8: Consideration should be given to the development of a power hub to the development and utilising green technologies to feed supplies back where generated or abstracted.

14.8 RESIDUAL IMPACT & MONITORING

14.8.1 SERVICE SUPPLY

With the benefits of green technology, renewable energy and energy efficient construction, the residual impact on the services network should be minimal.

The new services network will be monitored by the relevant utility service provider.

14.8.2 SURFACE WATER

Given that surface water from the development will be greatly reduced the residual impact will be beneficial to the existing combined sewer network.

The surface water system will be monitored by way of observation of any flooding events if such occur. A proper maintenance programme for all sewers /drains / SUDS elements, interceptors etc. will be established and agreed with the local authority.

14.8.3 FOUL SEWERAGE

By employing the use of grey water recycling and low water use technologies, the generated flows from additional occupation will be offset and the residual impact long term and low.

The foul drainage system which serves the proposed development will be monitored through visual inspection by maintenance personnel from the local authority and through flow meters within the downstream foul sewer network.

14.8.4 WATER SUPPLY

Again by utilising the benefits of rain water harvesting, grey water recycling and low water usage technologies; the increased occupancy load will be offset against the individual reductions in demand.

Ongoing water usage within the proposed development will be monitored by an overall area meters and individual development meters. Individual meters will also be provided at ground level for associated units.

The network as a whole is monitored by the local authority through district metered areas (DMAs) to which this development will remain part. Water usage will be continually monitored to avoid waste, leakage etc.

14.8.5 REMEDIATION

Any works involving excavation in existing public areas will be reinstated to meet the required specification and to the satisfaction of the local authority.