

# **Chapter 4:** Physical Infrastructure

# 4 Physical Infrastructure

The Physical Infrastructure for Cherrywood is broken down into 5 distinct types:

- 1) Environmental infrastructure – water and drainage.
- 2) Transportation – public transport, cycling, walking and car.
- 3) Utilities and ICT – electricity, gas and telecoms.
- 4) Energy.
- 5) Waste management.

Whilst the majority of the lands in the Planning Scheme area are undeveloped, Cherrywood is part of a larger catchment area for infrastructure and this needs to be considered when proposing future plans for the growth of Cherrywood. To plan for future development, the carrying capacity of the area was established. This has informed the required network of infrastructure and services and the phasing of the same. General Infrastructure includes the provision of Green Infrastructure. This is dealt with in detail in Chapter 5.

## 4.1 Environmental

The Minister for the Department of the Environment, Community and Local Government (DECLG) is considering proposals relating to the establishment of Irish Water. While a decision has yet to be made around the format of the new entity, it is envisaged that responsibility for strategic planning and investment for water services infrastructure will be transferred from the DECLG and Local Authority to Irish Water.

### 4.1.1 Water Supply

#### General

As with all major developments in the Dublin region, the availability of a supply of water is a regional strategic issue which may be a constraining factor on future growth. This is outside the ability of the SDZ area to resolve and will require continual review by Dún Laoghaire-Rathdown County Council.

In terms of local infrastructure, the Planning Scheme benefits from having an existing reservoir nearby at Rathmichael which is at a suitable elevation and could provide adequate local storage to service the full development.

However, the supply to this reservoir is currently inadequate primarily because of its total reliance on Roundwood Water Treatment Works. The solution to the supply difficulties are outside the direct control of Dún Laoghaire-Rathdown County Council and will require the active involvement of Dublin City Council and the Department of the Environment, Community and Local Government.

The local water distribution network within the zone will need to be installed in a co-ordinated manner to facilitate orderly development. The proposed water supply infrastructure is shown on Map 4.1.

#### Source Considerations

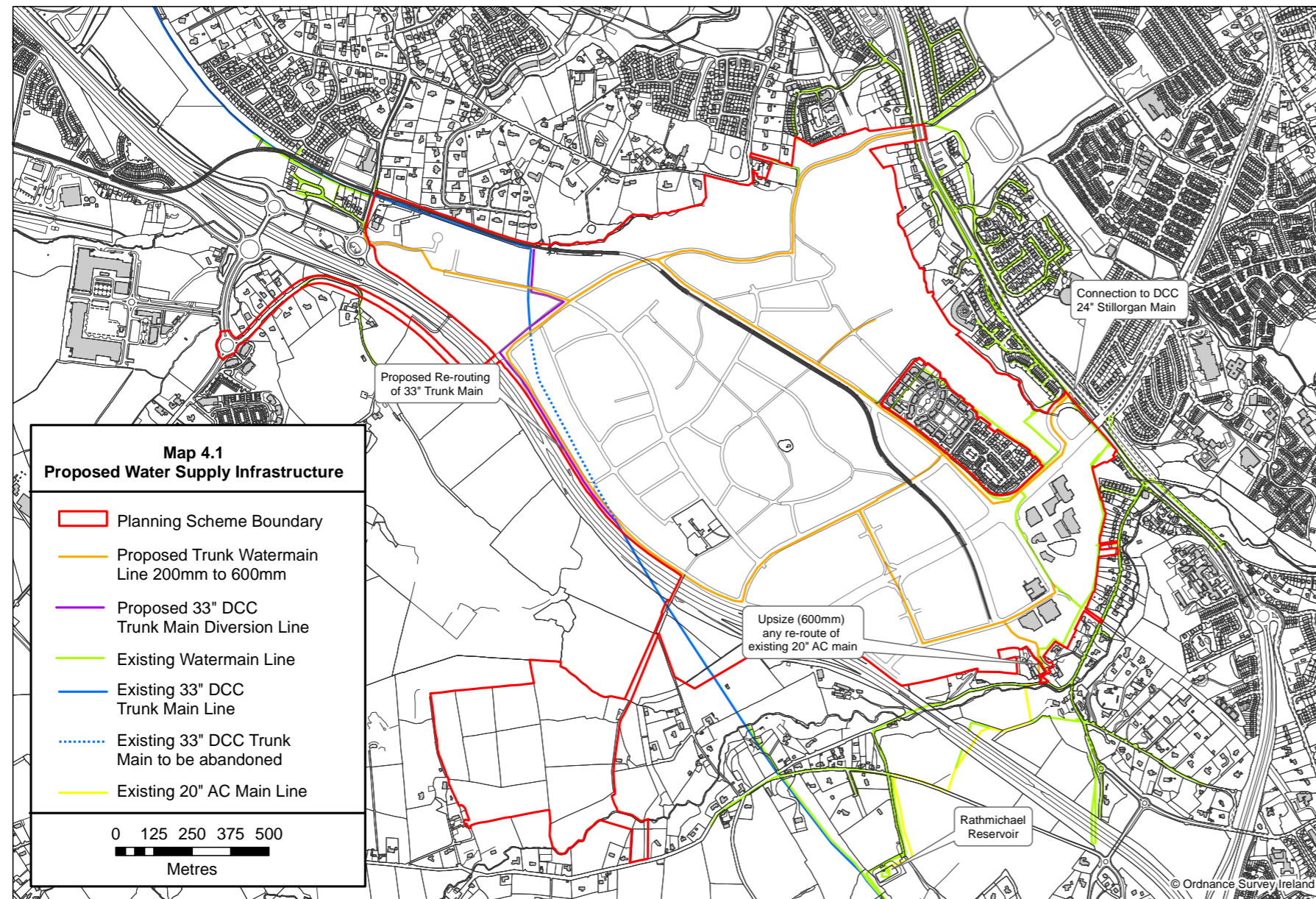
The need to provide water supply to the Cherrywood Planning Scheme is taken account of and relies upon elements of the following:

- i The Dublin Supply Project – Major Source.
- ii Dublin Water Supply Storage Study 2007.
- iii The Old Connaught Woodbrook Water Supply Scheme (OCWWSS).

The 2007 Dublin Water Storage Study outlined infrastructural requirements for water supply to the south east of the Dublin Region, including the Cherrywood area. The area is totally reliant on Roundwood Water Treatment Works which delivers water into Stillorgan reservoir for Dublin City while supplying much of the coastal area of North Wicklow and Dún Laoghaire-Rathdown County Council en-route through two of Dublin City Council's arterial watermains.

The Study envisions that progressively less water will reach Stillorgan as future development in north Wicklow and the south-east of Dublin Region (including Cherrywood) abstracts more water from these watermains. Eventually, it will be necessary to pump water back up one or both watermains to supply the additional demand.

Since the completion of the Storage Study, the Roundwood source has suffered a reduction in output and may be further reduced. As a result, the security of supply to the area is currently unsatisfactory and Rathmichael reservoir is particularly badly affected. There is no alternative source and additional development of any significance could not be serviced until this difficulty is remedied.



There are measures which would improve the situation for Cherrywood by prioritising water from Dublin City Council's arterial watermains into Rathmichael at the expense of water delivery to Stillorgan reservoir for supply to Dublin City. These measures can only be progressed in consultation with Dublin City Council. Their Water Services Division is aware of the current supply problem and future planning difficulties for Dún Laoghaire-Rathdown County Council and are currently exploring solutions, especially in the context of contingency plans in the event of major failure of the Roundwood supply. The resolution of this constraint is thus outside the direct control of Dún Laoghaire-Rathdown County Council and must be progressed in a regional water supply context.

A secondary approach could include measures to provide alternative supplies for areas currently supplied by Roundwood. One such measure identified is the laying of a strategic watermain from the Council's Church Road Reservoir to Shankill. The preliminary design of the Old Connaught Woodbrook Water Supply Scheme (OCWWSS) includes this watermain. This could enable the coastal strip to be taken off the Roundwood supply thus improving supply security and holding the prospect of improved development potential south of Shankill. However, it would not directly enable supply to Cherrywood and, of itself, is insufficient to secure supplies for development there.

### Local Storage Considerations

A preliminary design for a major water storage and distribution scheme, the Old Connaught Woodbrook Water Supply Scheme (OCWWSS), has been prepared by Dún Laoghaire-Rathdown County Council and covers the local supply requirements for all development in the South East of Dún Laoghaire-Rathdown County Council area including Cherrywood. The Scheme design takes account of the 2007 Storage Study and was submitted to the DEHLG in 2008. The full development of the Planning Scheme would require completion of this scheme. However, a significant proportion of the development might progress with a phased implementation of the water scheme.

The scheme proposes extensive network reconfiguration which would enable Rathmichael reservoir to be dedicated primarily to the supply of the Planning Scheme. Some of that reconfiguration has now been implemented. Were it not for the source constraints outlined above, up to c. 4ML/day would be immediately available for development at Cherrywood or its environs. This is equivalent to c.70% of the current maximum development forecast of 7,736 residential units and 350,000 sq.m commercial or a lesser quantum if other new developments are progressed in the supply area (Shankill, Woodbrook, Shanganagh etc.)

For development beyond that quantum, it will be necessary to construct the OCWWSS so that the remaining areas of Shankill and Mullinastill can be transferred to a new reservoir at Ballyman.

The trunk mains from Rathmichael reservoir to the Planning Scheme are adequate. However, a short (150m) length of 20" AC main from Bride's Glen Road. should be renewed with DI or PE piping at an early stage as it is in a restricted wayleave and is critical to the development.

The OCWWSS scheme also includes an outline of the water distribution network within the Planning Scheme. The network design may need to be updated as the overall design evolves but it will be essential that a planned approach is taken to ensure co-ordinated development within the zone.

### Specific Objectives:

- PI 1** In common with all development in the Dublin region, development in the county is dependent on an adequate supply of water for the Dublin region. It is an objective to liaise with the Department of Environment Community and Local Government (DECLG) and Dublin City Council on regional water supply availability.
- PI 2** It is an objective to reach agreement with Dublin City Council on measures to reprioritise water allocation to Rathmichael reservoir. This may also involve installation of a new strategic watermain to Shankill to reduce over-reliance on Roundwood Water Treatment Works.
- PI 3** Development beyond 4ml/day capacity in the Planning Scheme and other new developments in the supply area (including Shankill, Shanganagh and Woodbrook) will require construction of the Old Connaught Woodbrook Water Supply Scheme. It is an objective to progress this scheme which is currently awaiting approval of the DECLG.
- PI 4** It is an objective to ensure a planned approach is taken to the local distribution network within the zone to facilitate co-ordinated development. To support the use of water saving systems and landscaping. Where national standards are adopted, under the Water Services Act 2007 or otherwise, for rainwater harvesting and/or greywater recycling for use within buildings, these will be incorporated to the maximum practicable extent.
- PI 5** It is an objective to replace a short portion of critical trunk main from Bride's Glen Road at an early stage to secure supply.

## 4.1.2 Surface Water Drainage

### Development Stormwater Management

Urbanisation disrupts natural soil profiles, increases impervious surfaces and decreases vegetation cover. These disruptions increase stormwater runoff resulting in downstream flooding. In addition the disruptions impair groundwater recharge, degrade water quality and impair aquatic habitat.

Map 4.2 illustrates the proposed stormwater network for the Planning Scheme. The outline network design proposed in this section incorporates the recommendations of the Greater Dublin Strategic Drainage Study 2005 (GSDSDS), Regional Drainage Policies – Volume 2 New Development.

For the purpose of establishing the outline layout of the stormwater network to serve the Planning Scheme, the area was sub-divided into a number of sub-catchments based generally on existing land topography.

The sizes of the secondary surface water sewers were established by applying the GSDSDS design principles to an hydraulic model of the area and the sewers were routed along the primary roads. The sewer levels have been established by assuming that the development ground floor levels will be broadly similar to existing ground levels.

### Specific Objective:

- PI 6** It is an objective to promote Sustainable Urban Drainage Systems (SuDS) to manage surface and groundwater regimes sustainably. The following measures are the key elements of the SuDS solution proposed for the Planning Scheme area in the public realm areas, i.e those areas not within private developments. Measures within private development sites are also listed below.

These SuDS requirements are to be read in tandem with GI15, GI16, GI55 and GI60 in Chapter 5 Green Infrastructure.

### Measures in Public Realm Areas:

- **Ponds** located at several major outfall locations. These will provide storage to meet attenuation requirements for the 1 in 100 year criterion. Ponds will provide the final stage of treatment for water runoff prior to discharge to the watercourses. The ponds, which are located in open space areas will also provide amenity and biodiversity benefits in accordance with best design practice.
- **Detention basins** adjacent to existing and proposed roads. These are vegetated surface storage basins that provide flow control through attenuation of stormwater runoff. They also facilitate some settling of particulate pollutants. They are normally dry and in most cases can accommodate soft landscaping and contribute to local amenity.
- **Infiltration basins** located at carefully selected locations in the detention basins. These are vegetated depressions designed to store run off and infiltrate it gradually into the ground. These are very effective at pollutant removal and contribute to groundwater recharge.
- **Infiltration trenches and engineered swales** located throughout public realm spaces and along selected routes including green routes and cycle routes. These are narrow excavations (1 to 2m depth) filled with selected stone that create temporary subsurface storage for infiltration of stormwater runoff.
- **Underground Modular systems** with a high void ratio (e.g. Stormtech system or similar) will be used subject to agreement with the Local Authority in any suitable locations of open spaces and parks subject to level and ready access to provide below ground storage and infiltration.
- **Tree Root Structural Cell Systems** (e.g. Silva Cell) are subsurface tree and stormwater systems that hold large soil volumes while supporting traffic loads beneath paving and hardscapes. It is proposed that these will be used throughout the Planning Scheme area to assist with attenuation and groundwater recharge.

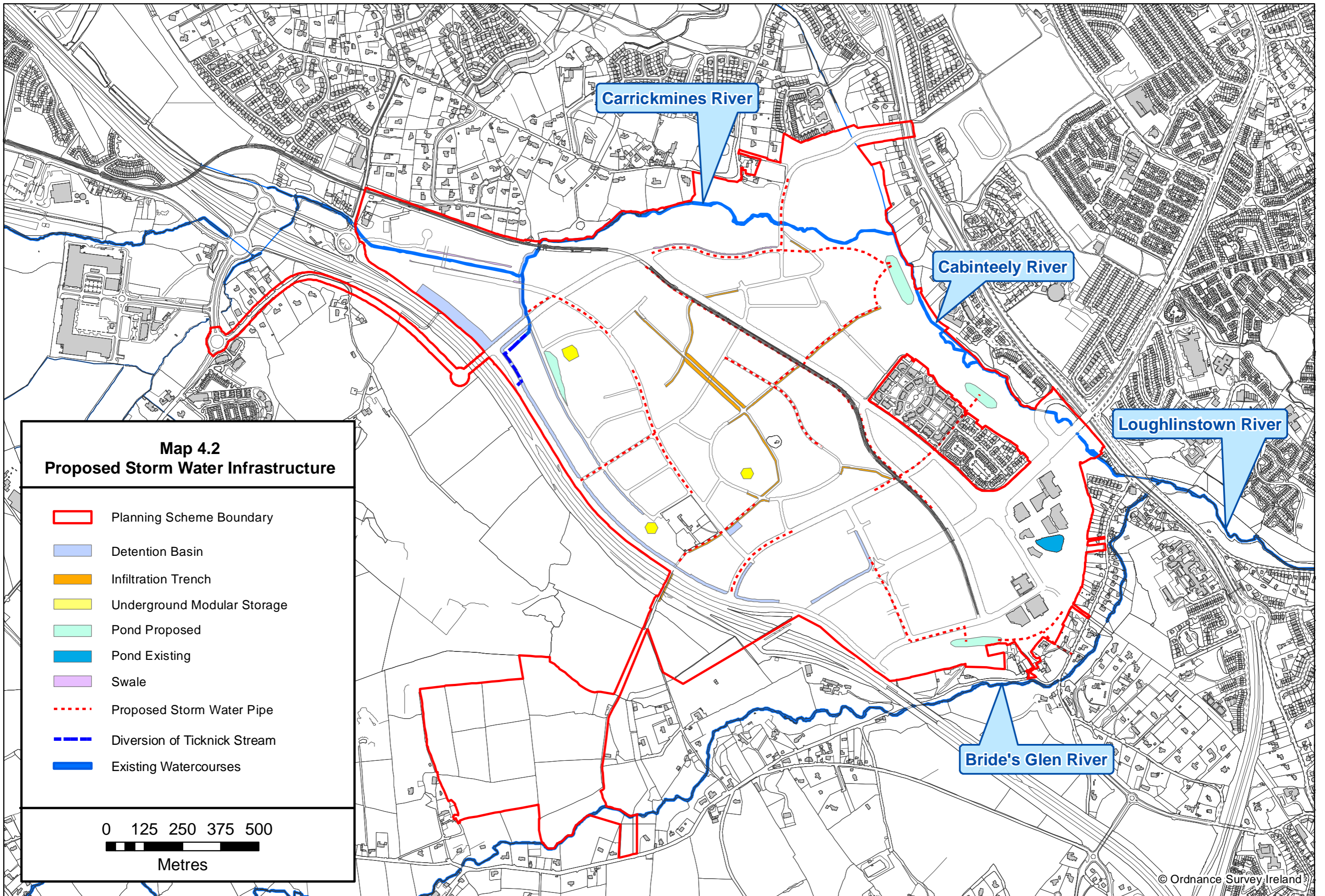
The size of the existing Town Centre pond – both treatment storage and flood attenuation storage – needs to be confirmed, to check suitability and available capacity prior to permitting further stormwater runoff into it (see Map 4.2).

### Measures within Private Development Site Boundaries:

The Stormwater Management Guidelines for the Cherrywood Rathmichael Development Area 2009 list various SuDS measures that are required for different development types. These include:

- Green Roofs
- Pervious Paving (proposals where surface water accesses the underground storage via gaps in interlocking paving will not be permitted – grilles, gullies, or similar, that are easily maintained are only permitted.
- Infiltration Trenches – if ground conditions permit.
- Detention Basins.
- Swales.
- Water Butts.
- Tree Root Structural Cell Systems.
- Rainwater Harvesting.

Runoff from all sites must pass through at least one level of treatment using a SuDS component prior to the final level of treatment in the public realm areas.



In view of the need to ensure strict adherence to the drainage requirements / of the Building Regulations, a system of drainage design and construction audit procedures will be implemented throughout the Planning Scheme area as outlined in the Stormwater Management Guidelines.

The increasing frequency and intensity of significant rainfall events in the County since the completion of the Stormwater Management Guidelines in 2009, has resulted in Dún Laoghaire-Rathdown County Council requiring that all developments allow for 'exceedance' in their internal surface water drainage design. In particular the design of all drainage systems shall allow for surface flood pathways, on-site low level storage in less vulnerable areas (car parks, planted areas, driveways etc), over and above the SuDS volumes required.

In addition given the severe impact downstream of the 2011 flood events (contributed in part by urban stormwater run off) it is necessary to restrict the run off from developments in the Planning Scheme area to 1 litre per second per hectare, unless otherwise agreed with Dún Laoghaire-Rathdown County Council. In order to assist in the implementation of this requirement it is necessary to limit the size of outlet surface water pipes within the boundary of private developments to a maximum diameter of 150mm per hectare unless otherwise agreed with Dún Laoghaire-Rathdown County Council.

**Specific Objectives:**

- PI 7 It is an objective to ensure that stormwater management, flood attenuation and Sustainable (Urban) Drainage Measures (SuDS), including a requirement to undertake Stormwater Audits, shall form part of the pre-planning, planning and post construction stages of any application.
- PI 8 It is an objective to ensure that SuDS measures shall be fully implemented on all sites to 1 litre per second per hectare runoff rates, unless otherwise agreed with Dún Laoghaire Rathdown County Council. In this regard solutions other than tanking systems shall be required for all developments. For larger applications Green Roofs shall be used in accordance with Dún Laoghaire-Rathdown County Council's Green Roofs Guidance Document.
- PI 9 It is an objective to ensure urban areas are designed to accommodate surface water flood flow at times of extreme events through the dual use of roads and pathways as flood conveyance channels and low value areas (parkland, car parks, large paved areas etc) used as temporary flood ponding areas.
- PI 10 It is an objective to ensure that all trees planted in/adjacent to hard paved areas (footpaths, parking areas etc) incorporate tree root structural cell systems.

**River Flooding**

Two rivers flow through the Planning Scheme area, namely the Carrickmines River and the Loughinstown (or Bride's Glen) River, prior to their confluence into the Shanganagh River at the N11. The Shanganagh River flows eastwards passing alongside Commons Road and then outfalls to the sea beside the Shanganagh Waste Water Treatment Plant.

Extensive hydraulic modelling was carried out on the above rivers in 2007/8 as part of the *Carrickmines/Shanganagh River Catchment Study Update, RPS, June 2008*, commissioned by Dún Laoghaire-Rathdown. Areas of river flooding for a 1 in 100 year storm were predicted using a hydraulic model of the entire river catchment. 'Out of bank' flooding was predicted to occur in six general locations in the Cherrywood Planning Scheme area and environs.

Four areas of predicted flooding do not pose a risk to existing or future development, as they are located in open space. These are: Carrickmines interchange, Lehaunstown Bridge, Foxrock Stream Confluence and the Cherrywood Valley.

Two areas of predicted flooding do pose a risk to existing or future development, namely at Priorsland and 'The Big Tree' at Loughinstown. Outline solutions were presented at these 2 locations to alleviate the predicted flooding.

The results of more detailed flood modelling at Priorsland indicate that the predicted floodwaters for the 1 in 1000-year event (including the impacts of climate change) can be contained within a bypass culvert. In addition significant flood resilience (the capacity to accommodate flood flows greater than predicted) required by the Flood Risk Management Guidelines is provided by allowing the floodwaters to spill over the river banks into a 'containment zone' approx 40m in width which extends from the environs of the existing twin culvert under the existing Luas car park access road down to the river's junction with the Ticknick Stream. This zone provides enough storage capacity for the predicted flood volume associated with a 1 in 1000-year event. It is proposed that ground levels at the edges of the containment zone be raised by approx 500mm.

The 'flood containment zone' is shown on Map 4.3.

**Specific Objective:**

- PI 11 It is an objective to ensure that predicted flooding in the Priorsland area does not pose an unacceptable risk to persons or property. In this regard a flood containment zone shall be constructed in the Priorsland area by raising adjacent ground levels approx 500mm and by incorporating a large diameter (1650mm) bypass culvert.

**4.1.3 Foul Water Drainage**

Foul sewerage within the Planning Scheme area discharges to the Shanganagh Wastewater Treatment Works (SWTW) which are located approximately 2km to the east. The SWTW has been upgraded as part of the Shanganagh Bray Wastewater Project, to cater for existing and all projected future catchment development flows.

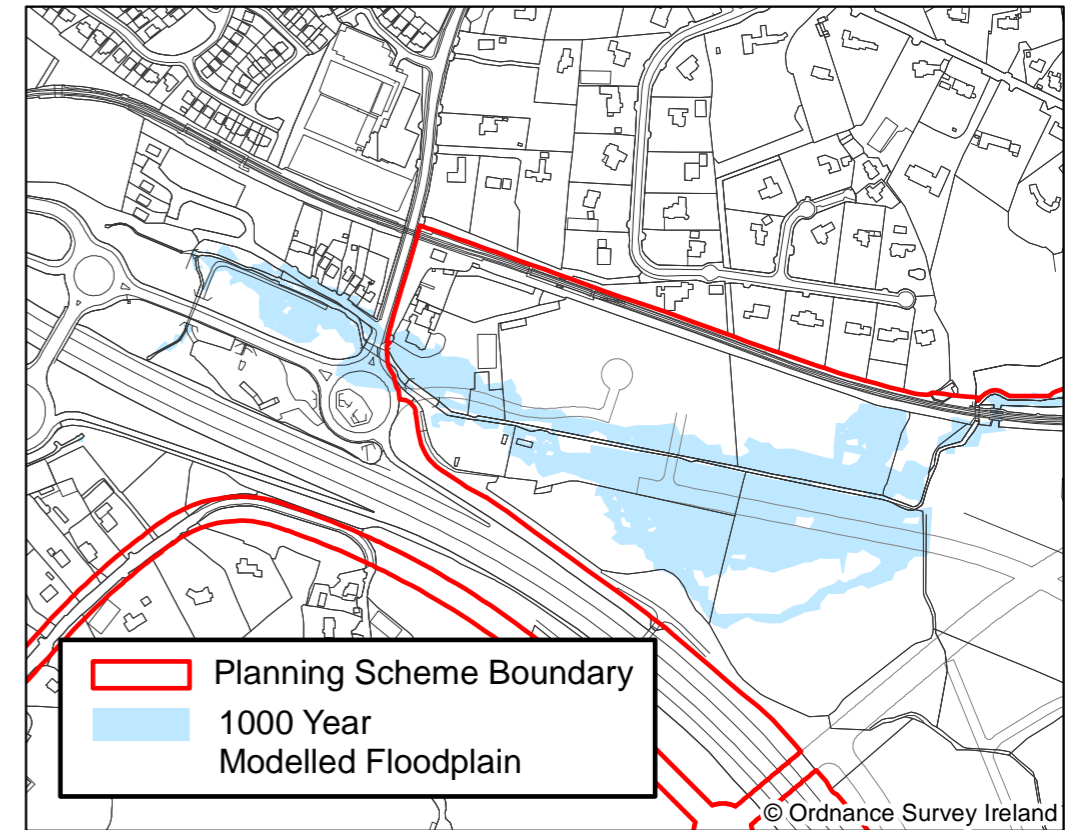
Both future development areas of Cherrywood and Rathmichael are serviced by the existing foul sewer network infrastructure. A trunk sewer known as the 'Carrickmines Trunk Sewer' was constructed along the valley of the Carrickmines River through the Cherrywood SDZ area in 1996. This sewer, which ranges in diameter from 600mm to 900mm in the Planning Scheme area, also serves Stepaside, Ballyogan, Carrickmines and parts of Cabinteely. This sewer is also designed to carry flows (existing and predicted flows) from the Glenamuck/Kiltiernan LAP area.

Map 4.4 shows the existing and proposed foul sewer network for the area.

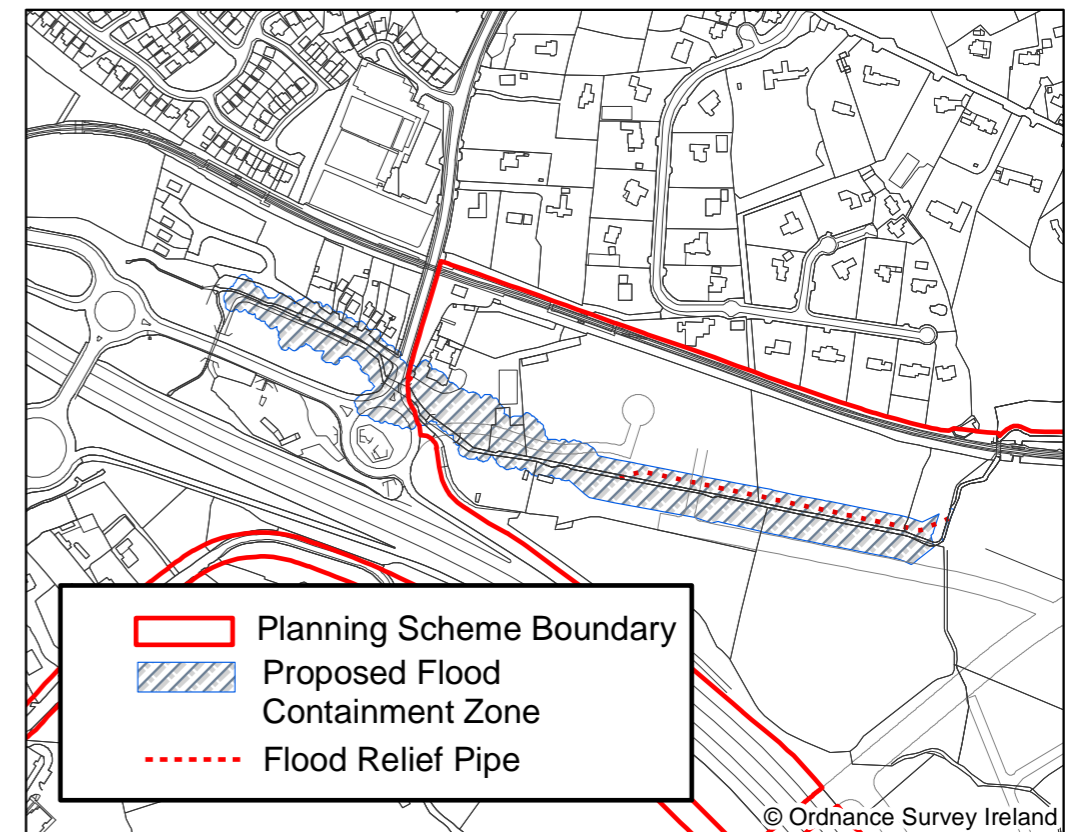
**Specific Objective:**

- PI 12 It is an objective that significant foul trunk sewer infrastructure is provided within the Planning Scheme area.

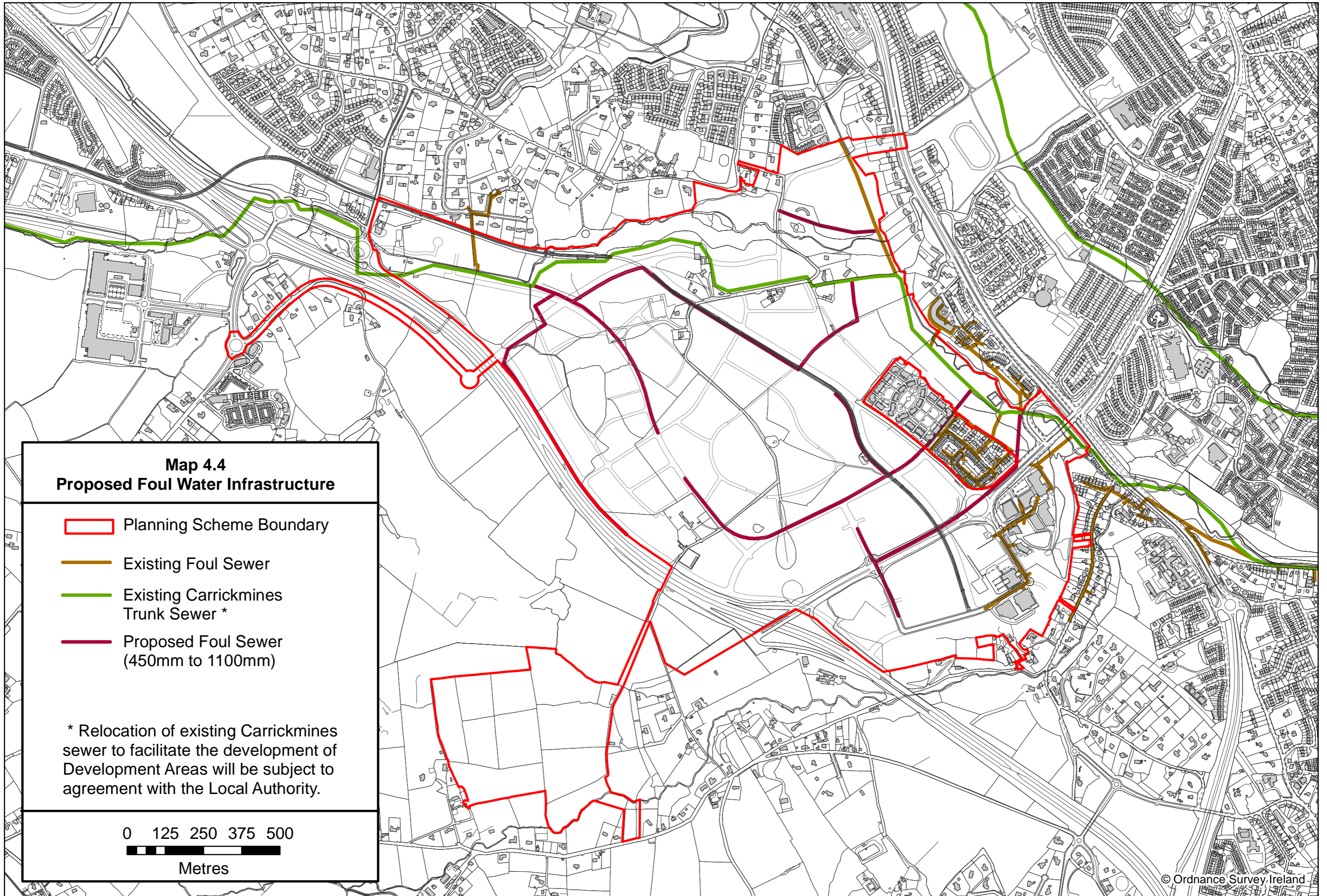
**Map 4.3 Flood Management - Priorsland**







**1000 Year Modelled Floodplain**



**Proposed Flood Containment Zone**



**Map 4.4**  
**Proposed Foul Water Infrastructure**

-  Planning Scheme Boundary
-  Existing Foul Sewer
-  Existing Carrickmines Trunk Sewer \*
-  Proposed Foul Sewer (450mm to 1100mm)

\* Relocation of existing Carrickmines sewer to facilitate the development of Development Areas will be subject to agreement with the Local Authority.

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Metres