dublin region

draft water service strategic plan

Dublin Region
Draft Water Services
Strategic Plan

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1.1 INTRODUCTION

The Water Services Act (2006) provides for the preparation of Water Services Strategic Plans by Sanitary Authorities and for their review at a minimum every 6 years. The Act provides that, where appropriate, a number of Sanitary Authorities may make a combined Plan for their areas or parts of their areas where a common approach is required.

In the Dublin Region, the four Dublin Local Authorities (Dublin City Council, Dun Laoghaire-Rathdown, Fingal and South Dublin County Councils) adopt a co-ordinated approach to the delivery of water services and this approach also applies to neighbouring areas in Counties Kildare, Meath and Wicklow (Figure 1). It follows that an Integrated Dublin Region Water Services Strategic Plan is appropriate to these areas and services.

Figure 1-1: Greater Dublin Region

This document details separate Strategic Plans in respect of

- Water Supply; where the Dublin Region Water Supply Area is defined by the combined areas served by the Dublin Region Water Supply Schemes (Figure 1-2), namely,
    - Liffey Water Treatment Plants at Ballymore Eustace (Dublin City Council) and Leixlip (Fingal County Council)
    - Vartry Plant at Roundwood (Dublin City Council)
    - Dodder Plant at Bohernabreena (Dublin City Council)
    - Bog of the Ring Groundwater (Fingal County Council).

- Urban Drainage; comprising the Ringsend Wastewater Treatment Works and its catchment, all of Fingal, Dun Laoghaire-Rathdown and South Dublin Counties, Bray / Kilmacanogue in Co. Wicklow (part of the Shanganagh-Bray Scheme), north and mid-Kildare covered by the Osberstown and Leixlip Wastewater Treatment Schemes and their catchments and an area in South-East Meath draining to the Ringsend Catchment including Ashbourne, Dunboyne and Clonee (Figure 1-3)

- Flood Risk Management; whereby a co-ordinated approach is adopted across the areas coinciding with the regional drainage catchment, including common policies for development control and sustainable storm water drainage.

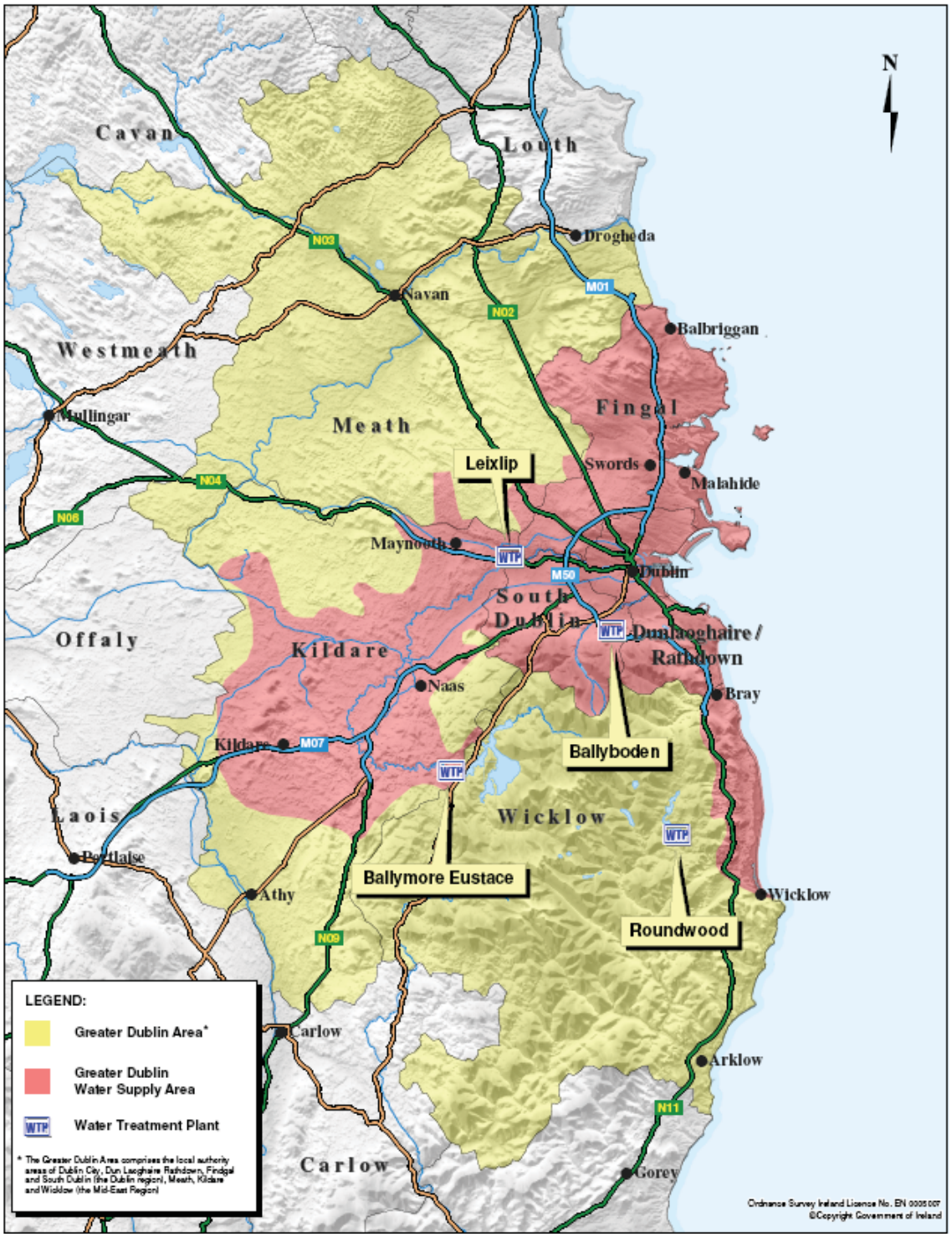


Figure 1-2: Greater Dublin Water Supply Area

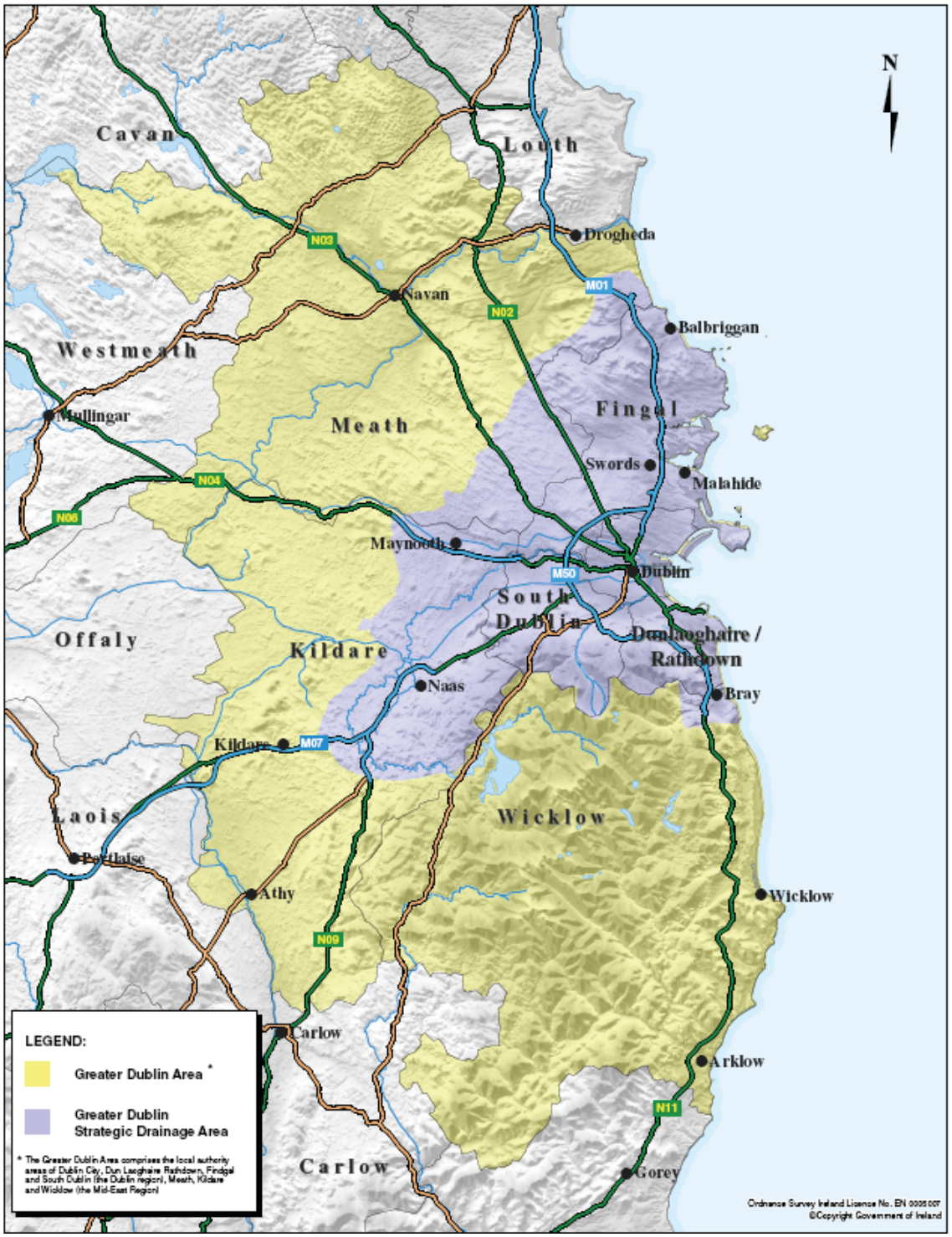


Figure 1-3: Greater Dublin Strategic Drainage Area

1.2 WATER SERVICES ACT, 2007

The Water Services Act, 2007, provides that each Water Services Authority make a Water Services Strategic Plan (WSSP) with regard to the provision of water services in its functional area with three primary objectives;

- Protection of human health and the environment
- Provision of sufficient water services
- Support proper planning and sustainable development.

The major legislative driver for action to improve water quality is the EU Water Framework Directive (2000/60/EC), being implemented in the Eastern Region (Figure 1-4) by the Eastern River Basin District Project. This project is developing measures to achieve "good" water quality in its river, coastal and transitional waters, to be achieved by 2015 at the latest. The management plans being developed within the ERBD Project will be reflected in the Water Services Strategic Plans.

Initially, the Water Services Strategic Plan (WSSP) will be developed from available system knowledge, assisted by available technical studies and having regard to current development policies and plans in the region. Arising from the adoption of the Plan, detailed monitoring will improve knowledge of the underlying condition and performance of water services assets. As a result, periodic reviews of the Plans, within a maximum 6 year timeframe, will provide for more detailed "bottom up" assessment of strategic needs to provide;

- Review of actual versus forecast out-turn
- Review of changes in standards and levels of service requirements
- Review of demand forecasts
- Prepare revised plan for approval.

In the case of the Dublin Region, this initial draft WSSP is prepared having regard to relevant major studies undertaken, in particular the following;

- Water Supply; the Dublin Region Water Supply Strategic Study (DRWSSS 1996 and 2000 Update), including revised assessments carried out in 2006 in the context of the Dublin Region – New Water Source Project and other technical studies, detailing the status and priority requirements for water supply across the region
- Urban Drainage; the Greater Dublin Strategic Drainage Study (GDSDS) completed in 2005 which examined the foul and storm water drainage systems, policies and future requirements of the region for foul and storm water drainage
- Flooding; report of the Flood Policy Review Group (OPW), recommendations from the EU Funded Strategies and Actions for Flood Emergency and Risk Management (SAFER) Project and the Dublin Coastal Flooding Protection Project (DCFPP) completed in 2008.

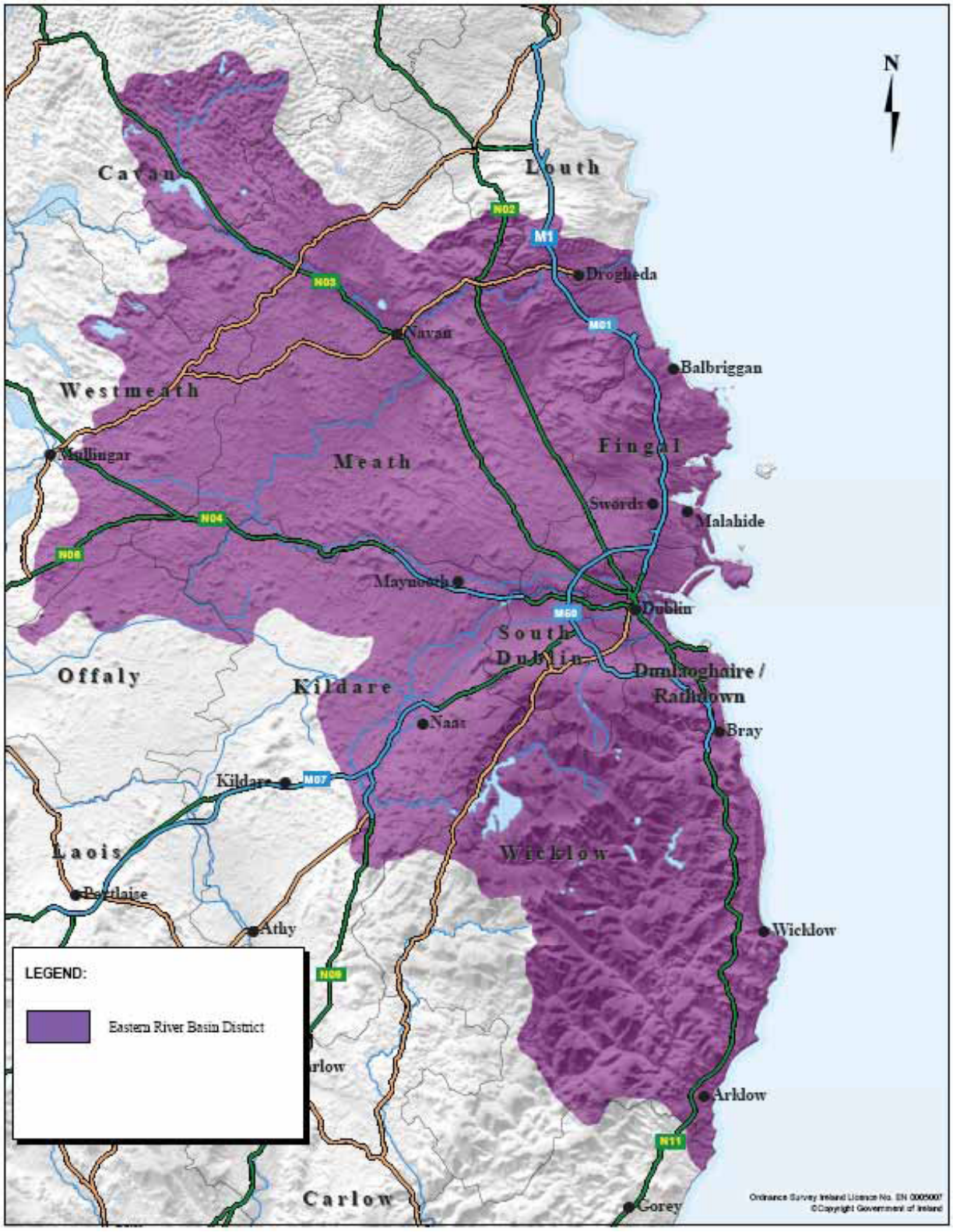


Figure 1-4- Eastern River Basin District

1.3 WATER SERVICES PLAN – REPORTS

The Water Services Plan is covered in the following hierarchy of reports;

- High Level Executive Summary; summary statement for regional adoption and national planning
- Dublin Region Local Authorities Water Services Strategic Plan (this document)- Detailed plan for management purposes by local authorities
- Water Services Plan – Technical Background Document; compiled from the existing technical reports available for the region, together with review and input from the individual Local Authority organisations.

1.4 SCOPE OF PLAN

For each of the three disciplines, water supply, drainage and flooding, the Plan is developed under a number of headings as follows;

- Vision
- Objectives
- Outline Service Standards and Levels of Service
- Strategic Measures
- Delivery.

These issues are addressed in the current Draft Plan by reference to available reports and system information. A key requirement of the Plan would be for monitoring and reporting on system performance, condition of the assets and security of the service at each review of the Plan. In this way, the assumptions would gradually become more robust, the investment needs would be more accurately defined and investments prioritised and overall service standards improved. A key requirement, therefore, is for a regional strategic planning function at the heart of water services delivery to monitor achievement against objectives and refine strategic needs on an ongoing basis.

2 WATER SUPPLY

2.1 WATER SUPPLY STRATEGIC PLAN - VISION

The vision for water supply services in the Dublin Region is:

> "To supply adequate drinking water to meet present and future demand in a sustainable manner to appropriate quality standards to all customers within the region".

There are three principal aspects to be considered:

- Quality; to meet all of the requirements for potable water set out in National and EU Standards for wholesome safe drinking water
- Quantity; To provide sufficient water to meet domestic and non-domestic requirements, including allowance for peak demand at present and into the future
- Sustainability; To be environmentally sustainable such that demands can be met without compromising "good" water quality of sources while minimising general environmental impact.

2.2 WATER SUPPLY STRATEGIC PLAN - OBJECTIVES

Delivery of this vision will require that a number of objectives are satisfied in respect of the following:

- Water Quality Management (protection of raw water sources)

- Sustainable availability of adequate quantity
- Management of Water Supply Assets
- System Resilience and Operational Flexibility.

2.2.1 Quality Objectives

The management of water quality, for the purposes of meeting drinking water quality standards in a sustainable manner, requires in the first instance that a holistic catchment based management approach is taken to protecting water resources, minimising risk of pollution and enforcing appropriate planning control of development. This requires that the concept of 'source to tap' water quality management is delivered in terms of:

- Best practice water resource management of the catchments as the primary means of protecting drinking water quality and reducing risk to public health
- Effective treatment of drinking water at each of the region's drinking water production facilities by expanding and operating the facilities in accordance with best practice. This requires:
    - Liffey works at Ballymore Eustace; To complete the upgrading of this plant to achieve sustainable output of 318Ml/day (at construction stage)
    - Liffey works – Leixlip; To upgrade this plant to produce a sustainable 225Ml/day (works at tender stage)
    - Vartry works at Roundwood; To complete the refurbishment and maintain high-quality operation of these works for the maximum sustainable output of the Vartry source (80Ml/day)
    - Dodder works – Bohernabreena; To complete the refurbishment of these works and to maintain satisfactory operation for their maximum sustainable output (18Ml/day)
    - Groundwater sources; To continue to develop groundwater potential in Fingal and Kildare, including monitoring of water quality and water treatment
- Distribution System; To protect water quality in distribution by an extensive ongoing monitoring programme and gradual reduction in risk factors in the supply system, in particular:
    - Eliminating uncovered storage in the supply through the provision of covered reservoirs at Stillorgan and Ballyboden
    - Monitoring pressure and avoiding as far as possible low service pressures, particularly where there is significant leakage risk

- Gradual rehabilitation of old cast-iron mains and lead service pipes, prioritising areas where monitoring indicates a risk of dirty water, elevated lead or iron concentrations..

2.2.2 Capacity Objectives

The objectives regarding sustainable adequate quantities of water for present and future needs will be delivered through the following planned objectives:

- Promoting maximum demand management and leakage reduction including pressure management, leak detection/repairs and priority mains replacement, allied to practical measures to promote demand reduction by consumers

- Completion of upgrading of existing plants to maximise the sustainable yield of existing sources. These works are in tandem with the upgrading required to ensure satisfactory water quality

- Strengthening of the distribution network, where necessary, to ensure that adequate capacity can be delivered to all points in the network, including provision for development needs in accordance with the Local Authority Development Plans

- Identification and advance planning for new water supply resources for the Dublin Region to ensure that the medium-to-long term needs of the region can be provided for, consistent with the National Spatial Strategy, the Water Framework Directive and the principles of sustainable development generally.

2.2.3 Asset Management Objectives

Achievement of capacity and quality objectives requires satisfactory performance of the water supply infrastructure. The plan objectives, therefore, include proposals with respect to asset infrastructure:

- To maintain accurate and up-to-date records of system assets and performance, covering the necessary information required to measure services standards and to identify deficiencies

- To maintain a programme of asset improvements sufficient to ensure the continued satisfactory performance of all assets including treatment plants, storage reservoirs, trunk and delivery mains and public supply pipes.

2.2.4 Resilient Supply and Operational Flexibility Objectives

This strategic plan aims to achieve a level of redundancy within the water supply system whereby an adequate level of resilience exists to cope with normal operational contingencies. This will be addressed through:

- Adequacy of treatment capacity to cater for water source contamination or treatment plant breakdown.
- Adequacy of treated water and supply side storage to protect against short term interruptions to supply (system failure, pump or treatment breakdown) and to meet short term peak demands on the system.
- To be capable of meeting reasonable requirements for fireflows throughout the network, taking account of the nature of development and local fire risk categories and the need to maintain water supply to customers.

2.3 SERVICE STANDARDS AND LEVELS OF SERVICE

In developing the plan, consideration has been given to current service standards and to good practice levels of service by reference to international experience. These standards include fundamental requirements for delivery of quantity and quality but also include reliability of supply, response time to customer complaints or operational contingency.

The following service standards have been considered in the plan together with the levels of service to be achieved:

- **Water Quality**; Monitoring indicates that the minimum statutory water quality standards are generally complied with in the supply. The Plan requires Local Authorities to aim for recommended Guideline Standards set out in the Regulations, representing good practice operating standards, which provide an acceptable margin against failure of mandatory standards
- **Capacity**; The Plan envisages target capacity standards to cater for normal operational and peak demands. This includes diurnal variation (morning and afternoon peaks), seasonal variations and provision for development. As far as practicable, the system should also met fireflow requirements while maintaining a basic capacity for average demand.
- **Supply Pressure**; In general, the Plan targets a minimum pressure at the supply pipe of 15 metres residual head. It also provides that negative pressures should not occur under peak conditions as a protection against groundwater entering the network.
- **Supply Interruptions;** Burst rate data is maintained for the network together with other unplanned interruptions to supply. The age of the network means that a guaranteed minimum frequency of interruptions would be difficult to achieve in the short term. However, Local Authorities are using burst rate data to target mains for rehabilitation and endeavour to provide a minimum response time and maximum outage period, in response to contingencies causing supply failure.

These are the basic service standards targeted by the Plan. Local Authorities also endeavour to meet good practice standards in terms of response to consumer complaints, advice to consumers on water conservation and demand management and advice to householders where chronic service pipe leakage is identified.

2.4 STRATEGIC MEASURES

The measures proposed in this Plan involve a combination of capital and operational steps.

In terms of operations, Water Services Authorities shall provide for the following:

- Effective monitoring and management of water supply operations to verify compliance with the specified standards of service and progress towards achieving overall objectives of the plan

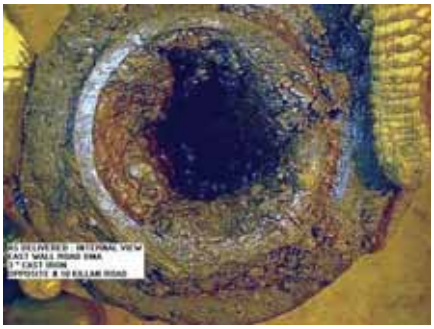
- Promotion of demand management through adoption of bye-laws to encourage best practice water management in new development and optimum water conservation among existing domestic and non-domestic users. This involves the adoption of appropriate bye-laws for new development, provision of information and appropriate technical assistance for consumers, based on best international practice. Pilot projects shall be promoted to target grey water re-use, water saving devices and rainwater recovery towards promoting reduced water demand by consumers

- Maintenance and where necessary upgrading of water conservation and leakage control systems and resources towards achievement of the medium-term goal of overall regional water losses of 25% (of water into supply) and long-term 20 year goal of achieving a 20% maximum rate of losses across the region

- To promote cost effective management of all aspects of the water supply service, from source to tap, through appropriate input to the Development Planning Process and the River Basin District (RBD) Plans, a representative sampling and analytical programme, constant review and where appropriate, improvements in the management and resourcing of water services.

Measures involving capital investment are required in accordance with current plans and programmes. These include:

- Current and planned projects to upgrade water abstraction and treatment, upgrading of storage, transmission and distribution systems to meet short and medium term supply needs. This includes projects to upgrade existing treatment, covered reservoir and new reservoir storage



- Major investment in water mains renewal (€108 million in current contracts) focussed on leakage reduction as a priority using the most cost-effective means to upgrade leaking pipes, optimise supply pressures and reduce unnecessary water use.

In addition to delivering this programme of works targeted at short to medium term needs, the Dublin Region Water Services Authorities will expedite the planning of new major water resources for the Dublin Region to meet the long term needs (20 to 25 years and beyond). This involves technical, environmental and socio-economic assessment of long terms strategic options including possible abstractions from the River Shannon, in conjunction with dry weather storage options, sea water abstraction and treatment by desalination and/or measures having regard to development requirements and climate change. These options are currently being examined through Strategic Environmental Assessment (SEA).

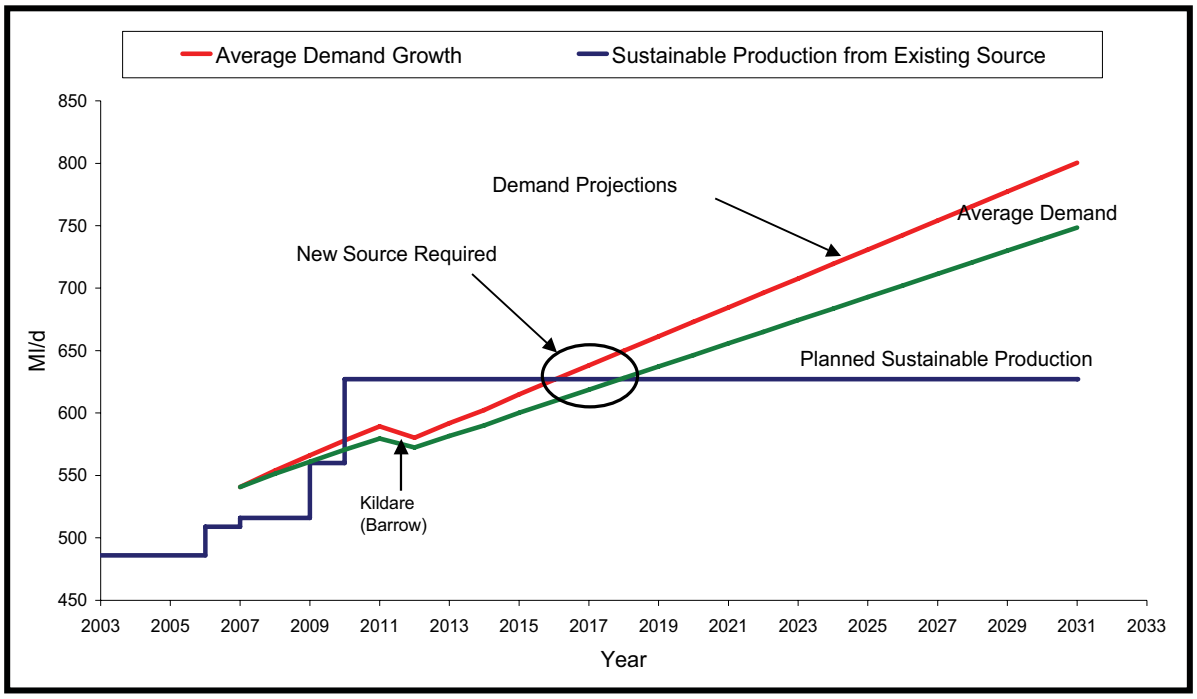


Figure 2-1: Future Needs-Demand Review

2.5 WATER SUPPLY SERVICES – PLAN IMPLEMENTATION

The delivery of the objectives of this plan requires a coordinated approach by the Dublin Region Water Services Authorities. This is achieved through strategic management and technical committees, coordinating delivery of capital and operational programmes, subject to the overall approval of the Department of the Environment, Heritage and Local Government (DEHLG). This includes:

- Integrated laboratory analysis, flow and pressure measurement and asset management information systems on behalf of the Authorities in the Region.

- Delivery of a capital programme of works, estimated to cost approx €500 million during the lifetime of the plan covering the investment needs for the short to medium term together with essential planning of long term strategic measures required to meet the needs beyond the period of the plan.

3 DRAINAGE

3.1 VISION STATEMENT

The vision for drainage services for the Dublin Region is to ensure and maintain good status of all receiving waters in the Dublin Region into the future.

This is consistent with the objectives of the Water Framework Directive and requires that the collection, transport and disposal of both foul and stormwater drainage flows are managed effectively to achieve this purpose.

3.2 DRAINAGE OBJECTIVES

The principal objectives for drainage services can be summarised as follows:

- To provide and maintain satisfactory drainage infrastructure having regard to new development. This requires that drainage system capacity is provided to meet future development needs while catering satisfactorily for existing load conditions

- To ensure that planning policies are adopted which are consistent with the Water Services Strategic plan. These policies provide for best practise design, management and operation of drainage services as developed in the Greater Dublin Strategic Drainage Study (GDSDS) and adopted in the Development Plans for the Dublin Region Local Authorities (Figure 3-1)

- To provide for effective wastewater treatment for present and future needs, to comply with requirements of the licensing authorities and in accordance with the water quality criteria set for the receiving waters. As part of this objective, to provide that new non domestic discharges (following appropriate treatment at source where necessary) should be at or below the standard equivalent to domestic sewage.

- To provide for sustainable urban drainage systems (SuDs) for all future stormwater drainage for new development with the objective of ensuring that stormwater discharges from such developments correspond in respect of both quality and quantity with the equivalent values from the undeveloped greenfield site

- To provide for effective asset management of drainage infrastructure to include maintaining up to date information systems (GIS sewerage system records) and system models capable of evaluating capacity and performance. To utilise these systems to develop asset management plans to maintain satisfactory performance of the assets.

Dublin Drainage
A Strategic Study for Greater Dublin

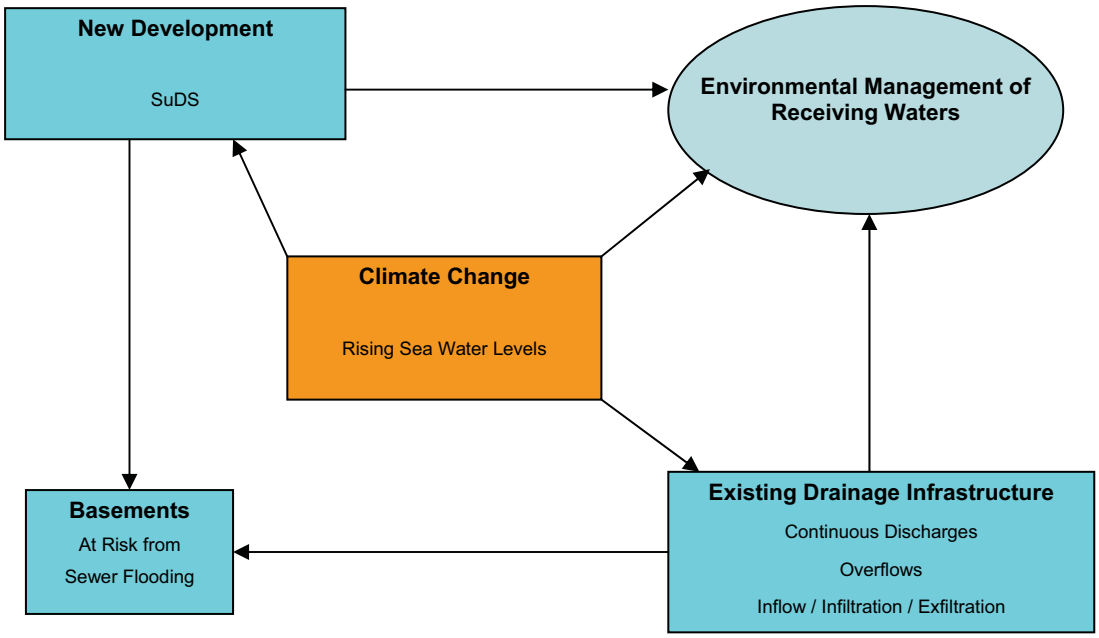


Figure 3-1: Regional Policies -GDSDS

3.3 DRAINAGE SYSTEMS AND LEVELS OF SERVICE

3.3.1 Foul, Combined and Stormwater Drainage

The existing drainage infrastructure comprises foul sewerage infrastructure (Figure 3-2) including pipe network, pumping stations, treatment plants and overflow structures which relieve overloading in times of heavy rainfall.

In older areas, combined sewers collect both stormwater and foul flows in a common pipe and rely on combined sewer overflows (CSO's) to divert excess flows to receiving rivers and streams when the downstream capacity of the pipe system is exceeded. Where such systems have become overloaded, there is a potential for pollution at CSO's.

At treatment plants, foul flows are treated having regard to prescribed effluent standards, while additional stormwater flows due to rainfall in the first instance overflow to storage for later treatment or when they exceed the storage capacity discharge directly to receiving waters.

Stormwater drainage provides for the collection of stormwater flows primarily from paved areas (roofs, roadways, paths etc) and these are generally conveyed to streams, rivers or coastal waters. Such systems have the potential to collect significant polluting matter which, when discharged, can cause environmental degradation in the receiving water environment.

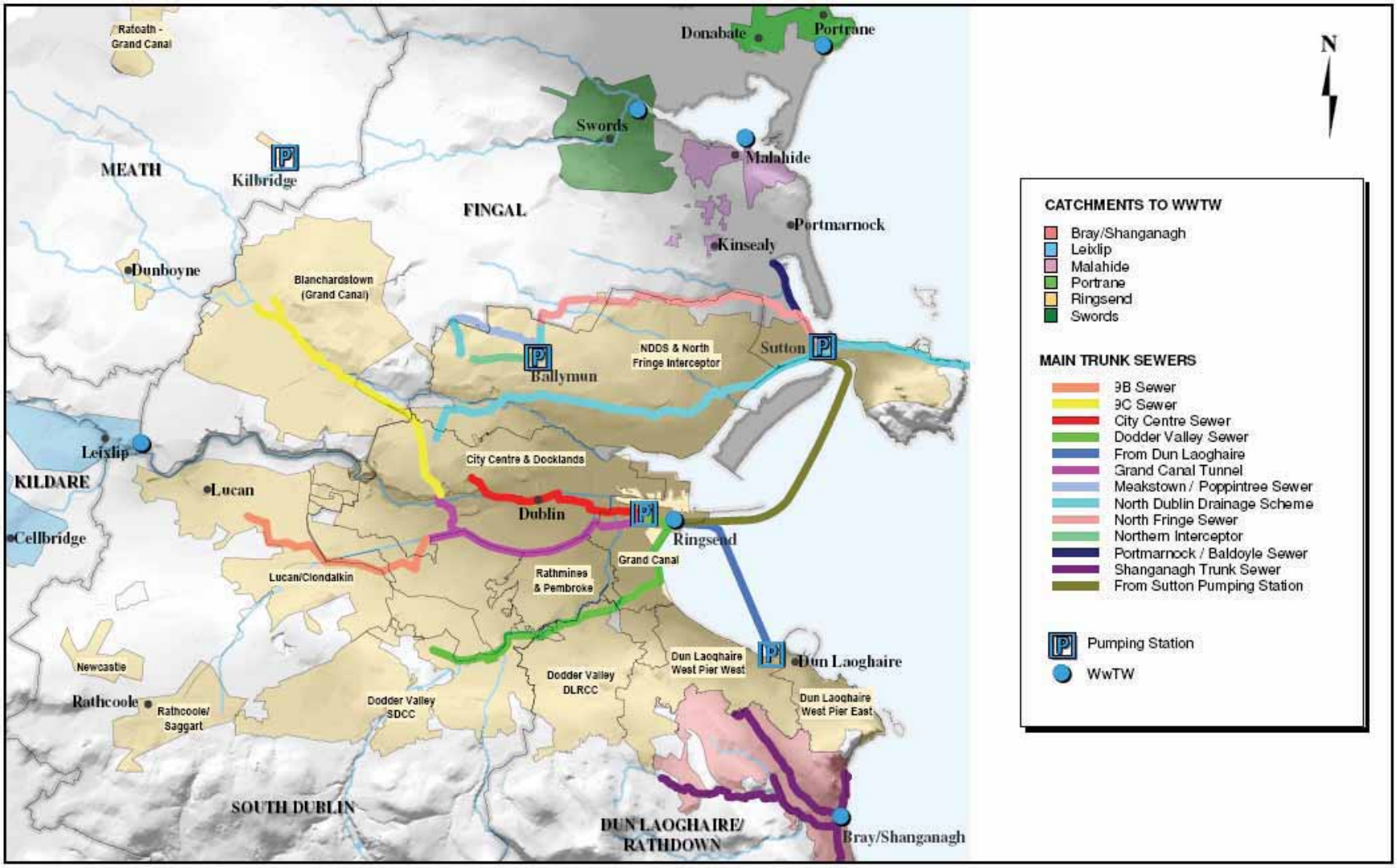


Figure 3-2: Existing Foul Sewer Treatment WWTW

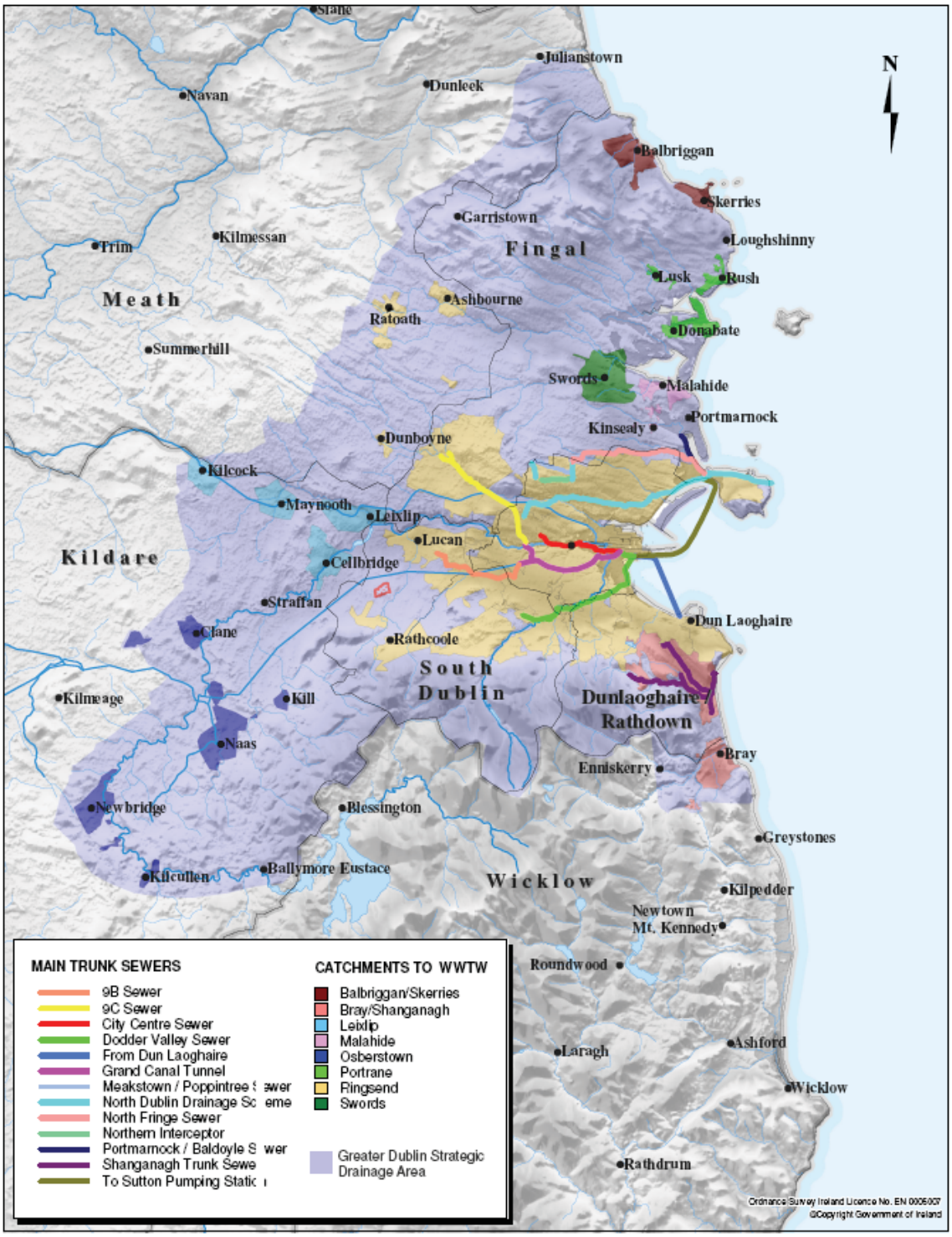


Figure 3-3: Foul/ Combined Sewer System

3.3.2 Foul Sewerage Systems-Service Standards and Levels of Service

Detailed studies of the existing Dublin region foul sewerage systems have highlighted a number of difficulties in terms of service standards. These include:

- **Quality;** all existing treatment plants are undergoing or will require upgrading to provide adequate capacity for medium term development needs. While most plants are operating satisfactorily, there is generally a capacity shortfall for projected short term needs and in some instances tighter effluent standards are required to meet water quality objectives, for example at Osberstown (Naas). It addition, excessive overflows are occurring in the combined sewer system (city centre and older urban areas) which result in occasional pollution of the receiving environment

- **Capacity**; the foul sewer network modelling has indicated significant surcharge and localised flood risk on a number of trunk sewers. When additional development is considered in the models, additional flood risk potential has been identified, generally associated with rainfall events and associated runoff to the sewer system. In addition, most of the treatment plants will require capacity upgrading for the additional volumes of sewage arriving at the works, in addition to treatment of organic and nutrient loadings

- **Asset Condition**; sewer surveys have identified areas of operational deficiency in the network in terms of;

    - Limited sections of sewers and culverts which are considered structurally deficient. These can be verified by CCTV surveys and analysis

    - Localised blockages and accumulation of sediment debris in foul sewers as identified by CCTV and hydraulic surveys is prevalent in many areas of the network and reflects unsatisfactory pipe gradients, artificial obstructions or inadequate maintenance. A continuing programme of CCTV surveys is required in order to maintain up to date asset condition records.

Level of service standards have been identified in the GDSDS studies and form the basis of this Water Services Strategic Plan for foul drainage systems. Key levels of services criteria are:

- Wastewater discharge standards to comply with the requirements of the Water Framework Directive (WFD) and the specific requirements of the licensing authorities (EPA)

- All new non domestic discharges to the foul sewer network to be pre-treated where necessary to characteristics similar to or less than normal domestic sewage

- For overflows to the receiving water, standards are required to be site specific and involve the following criteria:

    - to provide for a minimum retained flow in the foul sewer to ensure that any discharges are sufficiently diluted

    - to provide a minimum standard of screening to prevent an aesthetic nuisance (typically 6mm)

- to provide a maximum predicted frequency of spill appropriate to the receiving waters (for example, 3 times in a bathing season for bathing waters)

- to provide for appropriate limitations on spill volume and associated organic and nutrient loadings for discharges to sensitive waters

- Flooding risk from foul or combined sewers should be extremely low, not less than once in 20 years for on- street flooding and once in 30 years for property flooding

- Maintenance of sewerage systems to avoid excessive silt and debris retention, avoid stagnant flows and provide for acceptable health and safety conditions for maintenance

- For pumping stations, to ensure appropriate standby equipment, control and automation to protect performance in the event of an item of plant failure and for emergency call-out response in appropriate circumstances.

The information systems in place across the Dublin region should be used to evaluate service performance against these standards on an ongoing basis as demand increases and the system evolves. The strategic planning function should analyse and evaluate this performance in the formulation of strategic measures to be implemented.

3.3.3 Stormwater System – Service Standards and Levels of Service

Stormwater drainage comprises pipe networks, culverts and open channels required to convey runoff principally from paved areas to local watercourses following rainfall. Historically, such systems were designed for efficient transfer of rainfall runoff to the receiving environment by the shortest route. However, they suffer a number of disadvantages:

- As development extends, the rate of runoff from paved areas is generally much greater than from undeveloped lands with the result that downstream flows increase and flooding can occur. This phenomenon is evident throughout the network

- Storm drainage systems have often developed in an adhoc fashion, with the result that pipe and culvert sizes may be inadequate for the ultimate extent of the development. This can give rise to local obstructions and blockage risks which can increase flooding

- High intensity storm events following a dry spell result in suspension and transport of detritus and floating debris in pipes, culverts and channels. This gives rise to blockages particularly at screens or entrances to culverts and bridges, causing flooding

- These historic stormwater systems convey significant polluting matter from streets and other pavements to the watercourses. As a result, all of the streams in the Dublin conurbation exhibit disimprovement of quality from undeveloped catchment to developed catchment. This is evident in:

    - sediment covering the stream bed, causing loss of ecology

    - limited ecological species in the water environment indicative of occasional pollution shock loadings. This is indicated by the quality “Q” rating system of the EPA whereby

Q1 is highly polluted and Q5 is pristine. In general, urban streams receiving significant stormwater drainage discharges are Q2 or Q3 at best. These fall well short of the "good" water quality target I the Water Framework Directive

- As flows increase, it becomes necessary to upgrade the hydraulic capacity of stream channels with the result that they are frequently canalised or culverted, with complete loss of riparian ecology.

In respect of existing storm drainage systems, the criteria for flood risk management are similar to those applicable to foul sewer systems, namely a minimum of 1 in 20 year protection from street flooding and 1 in 30 year protection from property flooding. The modelling studies carried out in the GDSDS study demonstrated local areas at risk throughout the catchments. Site specific risk assessments are required at these locations to determine the likely risk to property and the corresponding need for relief measures.

The storm sewerage system data is accommodated in the same information (GIS) system containing foul sewerage data. The plan supports a common database and strategic evaluation of this information to assess performance and determine priority measures to meet the objective service standards.

3.4 DRAINAGE SERVICES – STRATEGIC MEASURES

3.4.1 Foul Drainage Measures

The key strategic measures proposed in respect of foul drainage infrastructure are:

- Upgrading of the existing Wastewater Treatment Plants as required to meet capacity and quality requirements consistent with current Development Plans. This work is required to be carried out in the medium term (within 5 years)

- Upgrading of foul sewer collection systems, in particular the trunk sewer systems to provide adequate capacity against flooding risk for present and medium term development needs and to mitigate discharges from overflows to acceptable environmental standards. These measures will involve new sewer-laying, provision of controlled overflow structures and storage tanks (to balance peak flows), upgrading of pumping and other ancillary measures

- Risk assessment and programme of measures to eliminate unacceptable risk of flooding in foul sewer networks in local catchments due to stormwater infiltrating to the foul sewer. The measures will include removal of storm flow from foul sewers (wherever practicable) and rehabilitation of sewers where infiltration can be reduced cost effectively

- Upgrading network capacity by new sewer-laying, provision of storage or a combination of both, where the previous measures will not suffice.

3.4.2 Storm Drainage Measures

In relation to storm drainage systems, the measures proposed involve catchment specific measures based on flood risk predictions derived from the modelling studies. These measures will need to be implemented on a catchment by catchment basis, following risk assessment and detailed evaluation of options. Measures will include:

- Removal of restrictions and improvement at critical capacity constraints (screens, inlets), combined with upgraded maintenance where necessary to limit obstruction risk

- Local upsizing of sewers to eliminate unacceptable risk of flooding to property

- Wherever possible, reinstatement of natural channels and attenuation storage in order to moderate urban runoff where downstream flood risk is significant or where environmental benefits would justify it.

For the purposes of the Plan, the primary measure for urban storm drainage is for the comprehensive use of SuDs systems for all new developments. This requires the provision of infiltration systems, storage (swales, ponds, underground storage and roof storage) and regional attenuation storage to moderate local runoff volumes and ensure that polluting sediments are trapped and removed before ultimate discharge. At the same time, the policy requires that river and stream channels are protected from development within their riparian areas (5-10 metres strip either side) in order to conserve and protect the existing river/stream environment and to minimise risk of accidental pollution from paved area discharges (spillages, washdown and paved area run-off, etc). This approach also helps to minimise risk of development in flood plains, which is a cornerstone of the Strategic Plan in respect of Flood Risk Management (Part 4).

3.4.3 Long term Wastewater Treatment

The Plan recognises that there is a need for a new strategic long term Wastewater Treatment Plant and outfall to serve the expanding environs of the Dublin Metropolitan area. This scheme would cater for new developments outside of the existing drainage network beyond the lifetime of the current Development Plans, would limit the flow to Ringsend wastewater treatment works to its limiting capacity (hydraulically and organically) and would facilitate diversion of some existing flows from the existing Dublin Region networks where capacity is exceeded.

The exact siting, sizing and configuration of such treatment (1 or more plants), with associated outfalls, needs to be determined as part of a strategic assessment of options and is currently the subject of Strategic Environmental Assessment (Fingal County Council project). The provision of this new treatment facility, outfall and associated collector network will be essential if new development post 2011 (approximately) is to be facilitated in the Dublin Region. Long-term development in South Dublin, Fingal, east Meath and in mid and north Kildare (in excess of the capacities of the Osberstown and Lexilip Wastewater Treatment Plants respectively) is dependent on a successful and sustainable long-term solution.

3.5 IMPLEMENTATION

The implementation requirements for Drainage infrastructure mirror those for water supply services and involve:

- Full implementation of new development and environmental management policies developed in the GDSDS project, including SuDs systems

- Improved operational practises, where necessary, to maintain operating efficiency of the sewerage system, including network rehabilitation where required to upgrade system integrity or divert storm, inflows from foul system

- Maintenance of the up to date asset management and network modelling systems and ongoing evaluation of the performance and requirements of the system to meet current and future needs

- The medium term proposals will involve capital expenditure in the order of €500-600m. It is recommended that consideration be given to framework procurement in order to implement the substantial programme of works required by the plan

- Strategic planning of long term infrastructure for needs beyond current Development Plans, particular long term treatment, outfall and associated collector sewers.

4 DUBLIN REGION STRATEGIC WATER SERVICES PLAN – FLOOD RISK MANAGEMENT

4.1 FLOOD RISK MANAGEMENT – VISION STATEMENT

To adopt and implement sustainable operational and infrastructural measures to reduce the risk of flooding of homes and businesses in the Dublin Region to an acceptable level, in accordance with the national standards, taking account of climate change and in adherence to the EU Floods Directive.

This Vision Statement is extremely challenging having regard to the range of climatic factors giving rise to extreme flood events, combined with the impact of climate change which is difficult to predict accurately but which is likely to increase the frequency and magnitude of extreme events. Flood defence is a contingency reaction to a flooding threat to community. Flooding and drainage are intimately linked and require an integrated approach.

4.2 FLOOD RISK IN THE DUBLIN REGION

In the context of the criteria for inclusion in the Water Services Strategic Plan, flooding in the Dublin Region is a potential source of risk to human health and the environment and requires to be managed and flood plans are consistent with the Water Framework Directive. The Floods Directive also states that "*in developing policies referring to water and land uses, Member states and the community should consider the potential impacts that such policies might have on flood risks and the management of flood risk"*. Flood risk arises from the following individually or in combination;

- **Pluvial flooding;** urban flooding caused by extreme high intensity storms in a local area, typically in summer time, influenced by both the drainage system and receiving river/stream infrastructure

- **Fluvial flooding;** caused by longer duration extreme rainfall events giving rise to flood conditions in rivers exceeding the capacity of channels and leading to inundation of properties. Notable examples have been the River Dodder (1986) and the River Tolka (2000, 2002).

- **Tidal flooding;** caused by a combination of factors (high spring tides, low barometric pressure and onshore south-easterly winds) resulting in extreme high tides for a period of hours in the Dublin Region causing inundation of low-lying coastal areas (example, Dublin City and Fingal County, 1st of February, 2002).

- **Inter-tidal flooding;** where the combination of tide levels and flood flow levels in rivers result in flood risk to low-lying properties in the vicinity of the river/tidal confluence.

The characteristics and causes of flood events are diverse and this Plan aims to minimise risk and moderate flood impacts on humans rather than eliminate flooding.

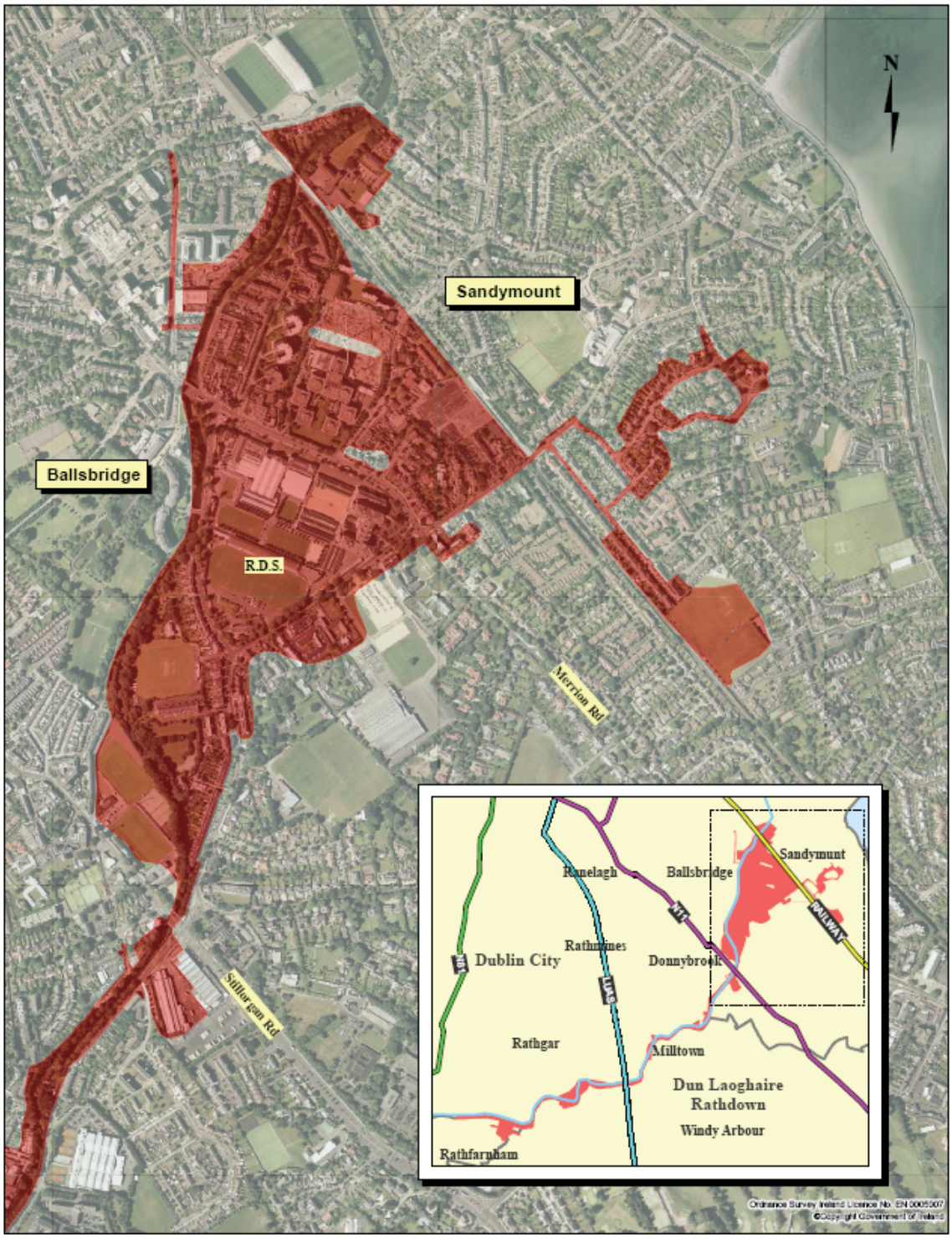


Figure 4-1: Extent of Flooding on the River Dodder, Hurricane Charlie, 1986

4.3 FLOOD RISK MANAGEMENT – OBJECTIVES

To meet the requirements of the Floods Directive, Catchment Flood Risk Management Plans (CFRMP's) are being developed for catchments in the Dublin Region and the key objective is to complete these plans for all catchments at risk. The OPW is the lead agency in the development of these CFRMP's. Flood Risk management plans focus on prevention, protection and preparedness. Within the Plans, a number of key objectives would be met as follows;

- Updating and completion of flood risk mapping in the urban areas to identify areas at risk and to inform the planning process in considering development in such areas
- To identify and protect flood plains so that flood storage and flood flow regimes are maintained
- To inform other development criteria, including minimum floor levels, and to address integrated operation of drainage and flooding systems to ensure that urban drainage systems operate effectively
- To develop and maintain an integrated warning system – coastal and river, as part of an overall operational response involving the Local Authority emergency plans, community response, rescue and recovery services
- To develop and implement according to priority necessary infrastructural measures to upgrade flood defences and to reduce flood risk- the development of a national defence asset database is currently being undertaken as part of the OPW's flood risk management plan programme.

These objectives are coincident with the Dublin Flooding Initiative (DFI) and the SAFER policies.

4.4 SERVICE STANDARDS AND LEVEL OF SERVICE

Levels of service should be aimed for to minimise risk of damage to human health, the environment, cultural heritage and economic activity as far as practicable. Flooding in the context of a Water Services Strategic Plan (WSSP) takes regard of different services to be provided for. These include;

- Water and drainage services, allowing for the provision of development
- Flood defence, a contingency service which is in reaction to, or else, in mitigation to some development.

At national level, the OPW is responsible for flooding policy in the Republic of Ireland, under the Arterial Drainage Act, 1945 in respect of river drainage and associated flood relief. As a result of the Flood Policy Review Group report commissioned by the Minister of State in November, 2002, the OPW was assigned responsibility as the lead Agency in the implementation of the new policy which is stated as *"to minimise the national level of flood risk to people, business and environment, through the identification and management of existing and particularly potential future flood risk, in an integrated, pro-active and catchment based manner*". In addition, the following Government Departments have key responsibilities:

- **Department of Agriculture, Fisheries and Food (DAFF);** have responsibility for coastal zone management;

- **Department of the Environment Heritage and Local Authority (DEHLG);** have responsibility for water services and the environment, including provision of funding for capital and in support of operational programmes (principally the domestic element). They are also responsible for fire services and Met Éireann.

Key National standards for flood defence schemes as set by the OPW are;

- **River Flood Protection Schemes**; to provide 1% annual average risk (1-100 year return period) minimum protection to residential and commercial property

- **Coastal Flood Protection Schemes**; to provide 0.5% annual average risk (1-200 year return period) protection against tidal flooding.

The national standards are in line with the FD European standards however there is no indication as to what the minimum standards the insurance industry is working to.

These levels of service are aspirational at this stage and the purpose of the Plan is to develop measures to reduce flood risk in areas historically affected or where studies show the risk to be significant.

A defence asset database identifying flood defences for each flood risk management plan is to be developed as part of the OPW programme. This will be a working database which will report on asset condition and will assist in the management and up-keep of flood defences.

Flood Warning System- Dublin City Council has lead the way in developing a new flood strategy for the City. Central to this strategy is the SAFER philosophy developed with International partners. Dublin now has a tidal flood early warning system, new investment in coastal protection and has an evolving methodology which can be employed to improve protection to communities from flooding.

2007 flood mapping for Dublin City has been produced. The Dublin City website is being upgraded to accommodate flood mapping including the designation of “residual risk areas” where definitive information is unavailable.

4.5 FLOOD RISK MANAGEMENT – STRATEGIC MEASURES

A number of pan European projects have been undertaken in the Dublin Region to develop flood response plans taking account of experience in comparable European cities. Considerable work remains to be done to complete an integrated flood warning system covering river, coastal and sewerage flooding and to complete flood response plans in conjunction with OPW and DEHLG.

Significant infrastructural measures have been carried out in response to recent flood events notably;

- The Baldoyle Flood Relief Scheme (stormwater pumping) by Fingal County Council

- The River Tolka Flood Relief Scheme (largely implemented) by Dublin City Council, Fingal County Council, Meath County Council and the OPW

- Flood Relief and Attenuation Works on the Camac and Griffeen Rivers by South Dublin County Council.

Currently, the Catchment Flood Risk Assessment and Management Study (CFRAMS) for the Dodder is in progress and a similar study has been commissioned for the Fingal East Meath Region (FEM FRAMS).

Medium term measures include;

- Monitoring and improvements to coastal flood defences
- Risk assessment of pluvial flood risk locations identified in GDSDS modelling studies
- Measures resulting from recent flood events (for example Whitechurch)
- Completion of the River Tolka Flood Relief Scheme and programme of measures arising from the Dodder Plan
- Completion of integrated operational response plans throughout each authority involving all the statutory and voluntary groups covering flood warning, notification, emergency response measures, relief measures and recovery assistance. An integral part of these plans is the updating and evaluation of information from flood events as they occur. Flood response plans are identified as a subset of the generic Major Emergency Management Plans which are currently being developed by the Department of the Environment, Heritage and Local Government.

- A prefeasibility study has been commissioned by DCC for a project called Project 2030 that will investigate the potential for tidal barrages to protect the city and region.

In the long term, climate change presents a substantial challenge to the Dublin Metropolitan Area. Dublin City Council and Fingal County Council have completed a major study of coastal flood risk between Portmarnock Beach and Merrion Gates, taking account of likely climate change scenarios (Figure4-1). This study has indicated the need for substantial measures in the medium to long term to protect the vulnerable areas from more severe and frequent flooding. Estimated capital cost for enhanced protection to these areas is in the order of €50-€90 million.

With the increasing implications of Climate change the OPW's role as the lead agency for flooding and the Department of the Environment, Heritage and Local Government's role in drainage will become increasingly more entwined. Pluvial and drainage models will need to be integrated. In turn, this will require an integrated response.

4.6 IMPLEMENTATION

Flood risk management involves joint actions by the local authorities, OPW, the Department of the Environment, Heritage and Local Government (DEHLG) and the Department of Agriculture, Fisheries and Forestry (DAFF), with responsibility for the marine environment. ESB are also likely to have a role in regard to their control of the River Liffey impoundments and riverflows at Poulaphoca, Golden Falls and Leixlip.

A coordinated approach between the various authorities would be required in regard to planning, implementation and funding of the appropriate measures to deliver the necessary improvements in flood risk management for the region.

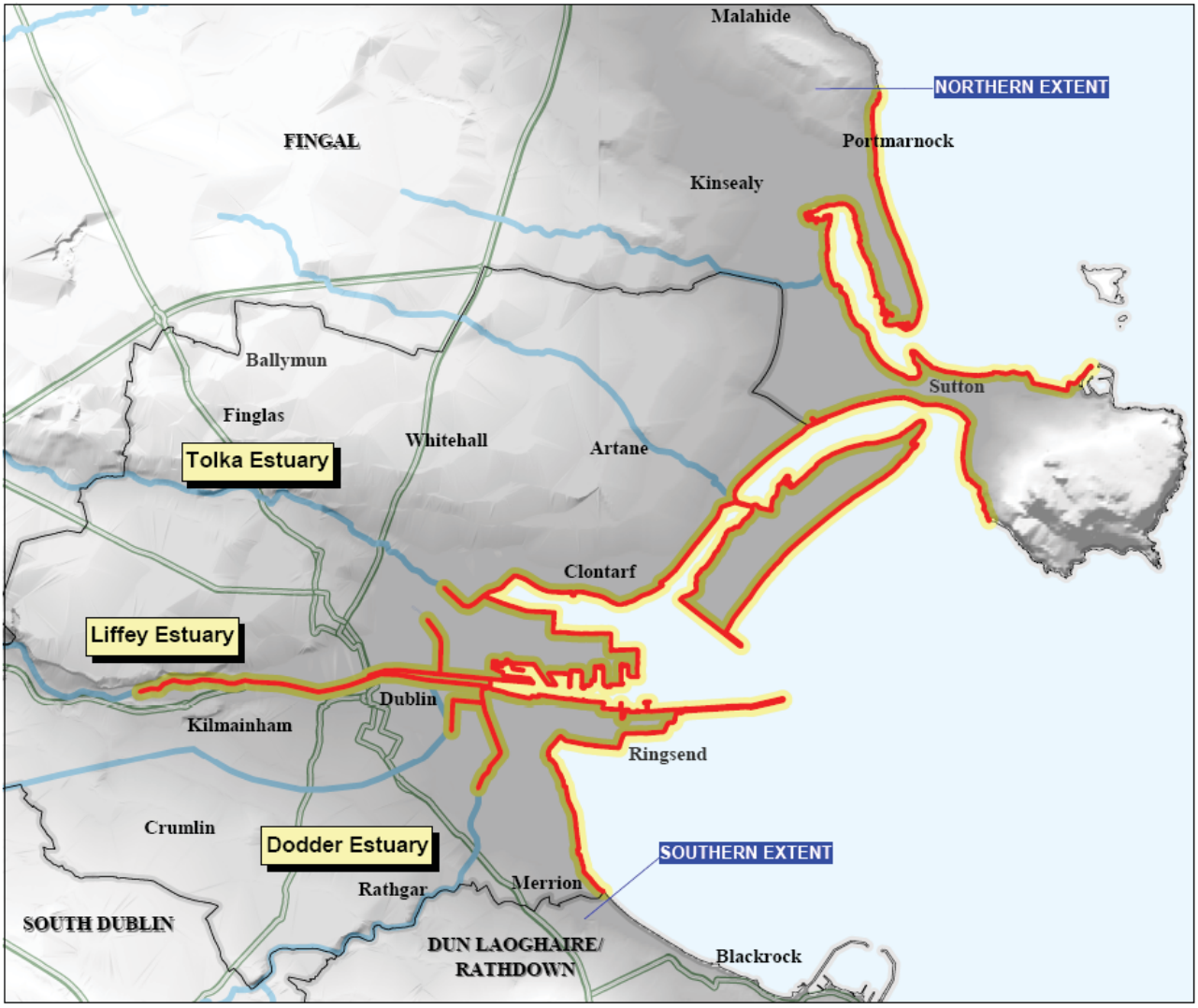


Figure 4-2: Dublin Coastal Flooding Protection Project – Project Extent

5 DUBLIN REGION WATER SERVICES STRATEGIC PLAN – DELIVERY CHALLENGE

The Plan recognises the challenge to deliver effective water services (water supply, drainage and flood risk management) in an integrated programme of measures across the Dublin Region. This programme comprises;

- Operational measures to meet level of service standards by optimising service management.

- Capacity upgrading requires substantial investment both in the medium term and in the longer term to provide the appropriate standards of service for current needs and to accommodate future needs in the region. This includes the measures required to satisfy the requirements of the Water Framework Directive (WFD) arising from the Eastern River Basin District (ERBD) Management Plan. A further key driver is the introduction of licensing regulations in respect of water and wastewater treatment facilities and the obligations of water services authorities to meet these requirements.

- Asset management planning and investment in asset upgrading is a major challenge for the region having regard to the scale, age, condition and current levels of performance of the existing assets.

Key challenges for the Region, therefore, are;

- Adequate funding of both operational and capital elements and streamlining of the planning and implementation process to achieve timely and effective programme implementation of the necessary measures.

- A coordinated approach to implementation across the region is required to deliver the planning, procurement and construction/commissioning of the key strategic measures required. This will include strategic environmental assessment (SEA) for the Plan including appropriate assessment under the habitat's directive. Following that, individual projects must comply with the relevant planning requirements including environmental impact assessment (EIA) where appropriate.