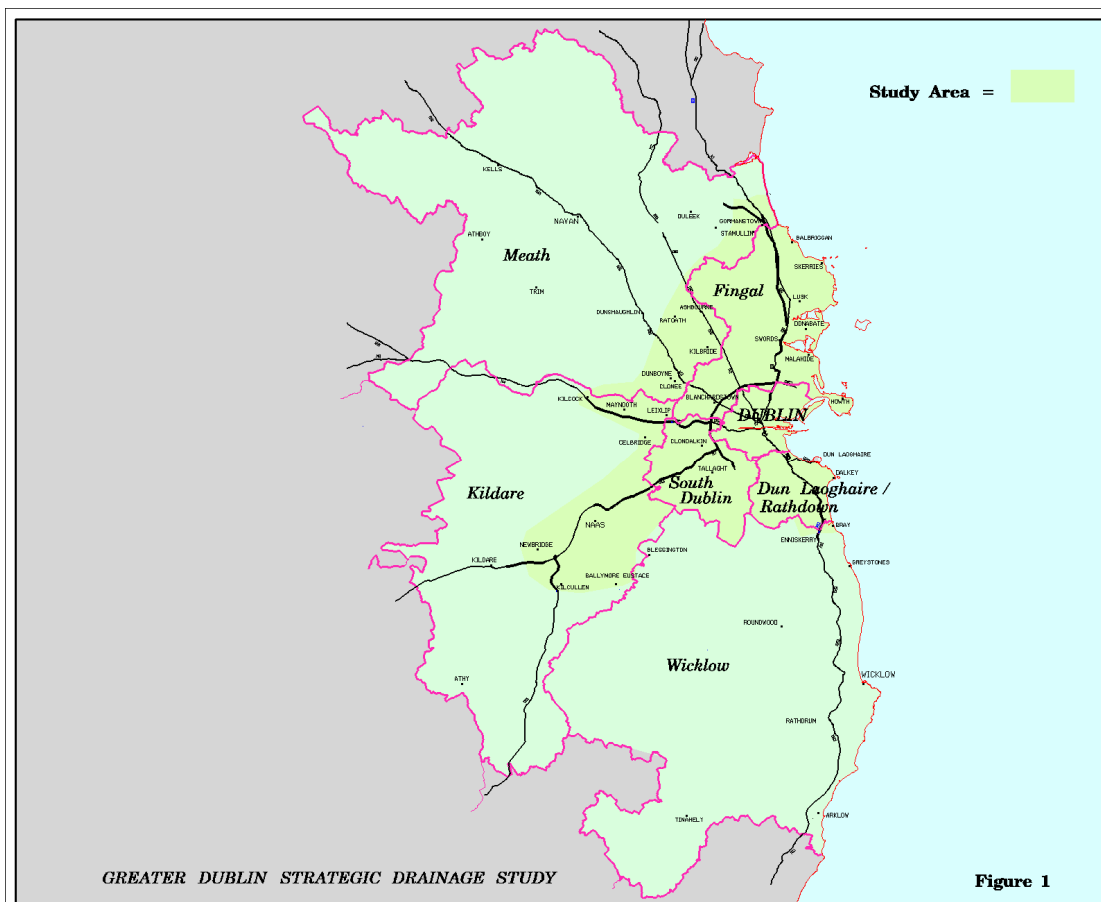


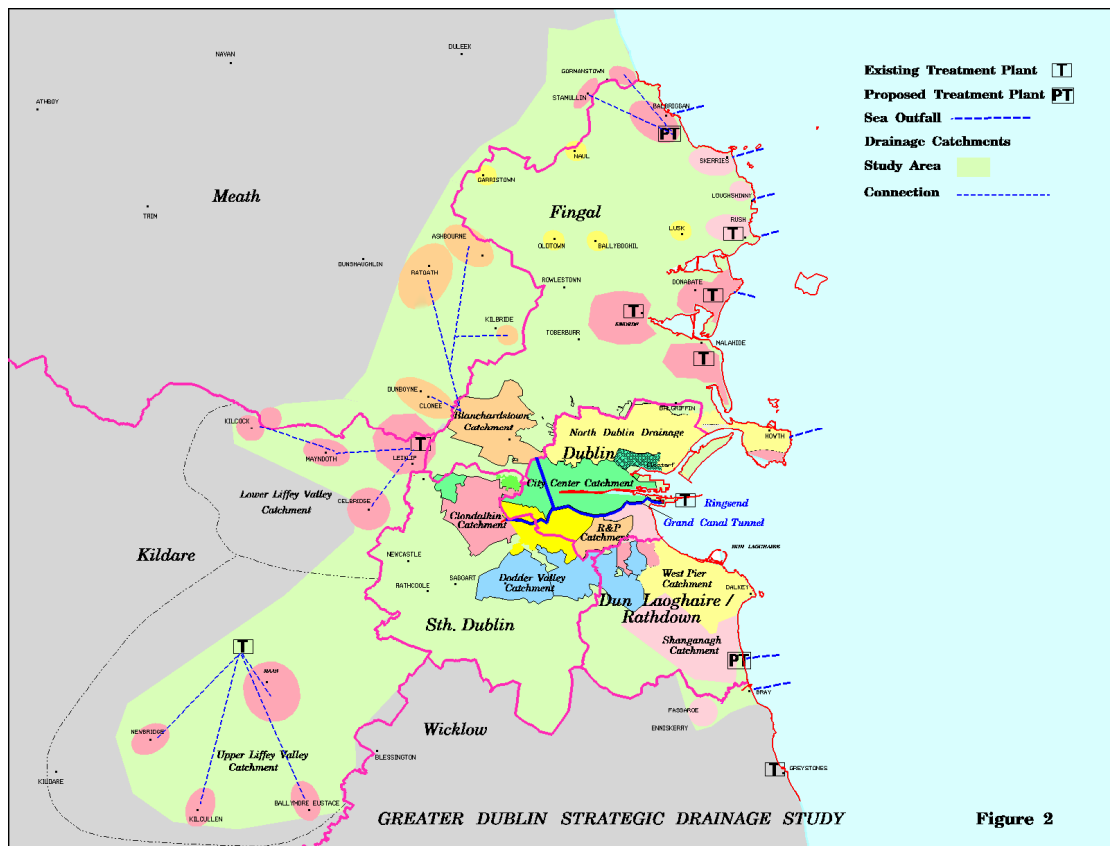
GREATER DUBLIN STRATEGIC DRAINAGE STUDY

INTRODUCTION TO GSDS

The €10 million Greater Dublin Strategic Drainage Study (GSDS) has now been completed for the Dublin Region. This study provides the blueprint to facilitate sustainable development and to facilitate future housing needs in the Region up to the year 2031 and beyond. Dublin City Council (DCC) was the Contracting Authority acting on behalf of Fingal, South Dublin, Dun Laoghaire-Rathdown, Meath, Kildare and Wicklow County Councils.

The Dublin Region drainage system consists of a network of 5,500km of foul and stormwater pipes and eight Wastewater Treatment Plants. These collect foul sewage, industrial effluent and rainwater, all of which must be discharged or treated while minimising flood risk or environmental impacts. All Regional drainage infrastructure and eight of Dublin's rivers were examined under the study. The study covered the entire functional areas of Dublin City Council, Fingal, South Dublin and Dun Laoghaire Rathdown County Councils and parts of the areas of Meath, Kildare and Wicklow County Councils. The approximate extent and population involved in this area are 150,000ha and 1.2 million respectively. The extent of the Greater Dublin Area is shown on Figure 1. The main drainage catchments together with the associated treatment plants and sea outfalls are shown on Figure 2.





The main conclusions of the study are:

- A major new Wastewater Treatment Plant is required on the North Dublin coastline in addition to the planned extension of the Ringsend Wastewater Treatment plant
- A 22km long orbital trunk sewer is required to link the new North Dublin plant with the South and West of Dublin and adjacent catchments in Meath and Kildare
- Upgrading works will be required at all of Dublin's existing Wastewater Treatment plants
- Very significant local infrastructure improvements are needed throughout the Dublin Region
- New drainage practices are required from developers and from industry

€2.4 Billion will be needed over the next quarter century with €1.3 billion of this being required by 2011. €220 million is required for the proposed orbital sewer and €140 million for the new North Dublin treatment plant. This investment will deal with existing drainage problems (flooding and environmental) and improve the system to meet the requirements of various EU directives and to facilitate future housing needs. Much of the infrastructure required is already included in the Department of Environment Heritage and Local Government's current investment programme. Each of the schemes will go through the normal planning and approval process.

The study also produced recommendations on best practice for drainage in the areas of:

- New Development
- Environmental Management
- Inflow/ Infiltration and Ex-filtration
- Climate Change
- Basement Protection

The core policy recommendations are now being included in the Development Plans of the seven local authorities in the region. These will immediately require major changes in the way local authorities, builders, developers and industry approach drainage. The implementation of these new policies is necessary to allow the region to develop in a sustainable manner while complying with all relevant EU directives.

The study was undertaken with reference to the Regional Planning Guidelines and the National Spatial Strategy. Its implementation will allow for future sustainable housing development in the Dublin Region while reducing flood risk and protecting our environment.

The Study was carried out by the Dublin Drainage Consultancy, a joint venture between Hyder Consulting, and Dublin based firms, PH McCarthy & Partners and RPS/ MCOS (in association with HR Wallingford) and was project managed by Dublin City Council. The study was funded by the Department of the Environment, Heritage and Local Government under the National Development Plan 2000-2006.

BACKGROUND

The topography of the region and existing infrastructure dictated that most of the sewage generated by new developments would be directed to the new wastewater treatment plant at Ringsend via the existing trunk sewers, none of which were designed to cater for the level of development now envisaged. There was concern about the capacity of the city centre sewerage systems and the Ringsend Wastewater Treatment Plant to deal with the increased flows. One of the consultant's findings is that the treatment plant will have to be expanded in the short term. Existing loads from industry will have to be reduced. The existing sewer system has serious problems including excess inflow and infiltration, frequent spills from Combined Sewer Overflows (CSOs) to streams, rivers and Dublin Bay and an increased probability of flooding due to inadequate sewer capacity.

The large number of CSO spills has obvious implications for pollution. Surface water sewers have also been shown to have significant potential for pollution of watercourses. This means that the drainage of the region has implications for the water quality of rivers and streams and for Dublin Bay. Given the amenity value of these areas and increased environmental awareness, these factors are becoming increasingly important. The European Union's Water Framework Directive will have major implications for the Dublin Region.

FUTURE DEVELOPMENT

One of the key deliverables of the study was recommendations for regional drainage infrastructure to cater for development up to the year 2031. The consultants prepared projections of likely population growth in the region up until that year, taking account of the Regional Planning Guidelines. They examined the current scenario and the likely situation at 2011 and 2031. This enabled estimates to be made of future sewage loads at these dates. The consultants estimate that the population of the region will exceed 2 million by 2031.

Hydraulic models were built for all major foul and stormwater drainage systems in the area. Assessment was made of the future capacity of the region's sewage treatment plants and of receiving waters. These were used to advise on what infrastructure is required to allow the Dublin area to continue to expand in an environmentally sustainable manner.

The existing drainage infrastructure of Dublin is a highly valuable, if under appreciated, asset. To replace the system today would cost billions and would cause

massive disruption in terms of traffic and other services. Every effort has been made to maximise the potential of existing infrastructure. Despite this, capital expenditure of €2.4 Billion will be required in the coming years to maintain and expand the drainage system.

The Rivers Mayne, Santry, Finglas, Camac, Poddle, Deansgrange and Carrickmines were studied in detail to assess their hydraulic capacities and methods for improving flood prevention.

Following the floods of 2000, the River Tolka Flooding Study was added to the GDSDS. A detailed hydraulic model representing the hydraulic characteristics of the River Tolka was constructed. This model was used to map flood risk areas. Using model output and taking account of current and future development, the technical and economic merit of various options for flood management were presented in the final report which was published in November 2003. Major flood alleviation works have been implemented in Meath and Dublin (including Fingal) and more are planned in the near future.

REGIONAL GIS

Access to comprehensive data in a geographical format is vital to model build and is also useful for day to day management of the sewer system. With this in mind, the GDSDS examined the issue of whether a full regional drainage GIS (Geographical Information System) should be provided for the Dublin Region.

This would include at a minimum, network data, Ordnance Survey maps, catchment maps and aerial photography. Ideally it should also include geographically referenced records of customer complaints, pollution and flooding incidents, maintenance and cleaning records. Central to the thinking behind a regional structure is that economies of scale could be achieved by having one regional GIS office. Equally importantly, a dedicated GIS team would be at less risk of being diverted to other duties based on short-term priorities.

A regional GIS already exists for water and the consultants have recommend that a new drainage GIS be provide as part of that system. It is also envisaged that the future drainage and water GIS could be linked to GIS systems for Planning, Roads and external utilities.

RECOMMENDATION OF DRAINAGE GUIDELINES

Before the advent of the GDSDS it was apparent to Dublin City Council's Design Division (Drainage) that their current practices were not necessarily in line with best practices internationally. New issues were arising on a daily basis, which needed to be examined. These included:

- New Development
- Environmental Management
- Infiltration and Ex-filtration
- Climate Change
- Basements

When the idea of a regional study was mooted it was decided to include a full examination of drainage practices in the region. The consultant was required to draw on their own resources as well as external expertise to advise on the way forward for drainage in the Dublin Region. The consultant was required to review existing practices and to recommend new practices for the Greater Dublin Area. The new

guidelines were to take account of all relevant European Union and Irish Law and be in line with best national and international practice.

The consultant has recommended new policies on all the relevant issues. Technical Guidance documents explaining these policies have also been produced. These are now available on Dublin City Council's website at:

http://www.dublincity.ie/shaping_the_city/environment/drainage_services/greater_dublin_strategic_drainage_study/

Some of the principal issues involved are:

New Development

The Dublin Region covers the full range from large green field developments where attenuation of surface water is possible to smaller infill developments connected to combined sewers that may already be overloaded. The relevant authorities have different rules in place as to how new development is carried out. This causes frustration and confusion for developers and their consulting engineers. It also means that best practice is not being followed in all areas and experiences and ideas are not being shared by the region's local authorities. A common document has now been produced that requires similar approaches in similar circumstances throughout the different local authorities.

The new practice includes stormwater control. Dublin City Council had its own policy on stormwater management. This was reviewed and a new regional policy has now been recommended. The unrestricted development of greenfield sites would lead to significant increases in stormwater runoff. The new policy seeks to ensure that runoff is kept to predevelopment levels to minimise the risk of flooding and excess spills from CSOs. The guidelines aim to maximise the use of SuDS (Sustainable Drainage Systems). This includes infiltration of stormwater via filter drains or porous paving and the use of swales and storage ponds, which can remove pollutants. The increased use of SuDS will improve water quality in the region.

Environmental Management

Much of Dublin's drainage is on a combined system with overflows to watercourses. This is a source of pollution. Surface water discharges to watercourses also carry possible pollutants and there is a risk of ex-filtration from foul sewers causing pollution of ground waters. In recent years these matters have not received the attention they deserve and the focus has been on hydraulic capacity more so than water quality. This is now changing with the advent of the European Union's Water Framework Directive.

New guidelines on environmental management have been developed. These address all environmental matters, particularly those associated with combined storm overflows, separate systems and treatment plants. Implementation of these guidelines will ensure that the Dublin Region can continue to develop without adversely affecting the quality of its surface waters.

Inflow, Infiltration and Ex-filtration

Infiltration is the leakage of groundwater into foul or combined sewers. This is recognised as a problem throughout the Greater Dublin Region. While this might be expected in the old combined sewers in urban areas it is also prevalent in newer, separate, suburban systems. In some cases infiltration flows can be as high as legitimate foul flows. This leads to reduced capacity to cater for legitimate flows, increased pressure on treatment capacity, increased spills at CSOs and possible

structural damage. There is an increased cost for treating what is effectively clean groundwater. Ex-filtration is also a problem with possible effects on ground water quality.

Removal of infiltration is highly problematic, as infiltration tends to migrate to other areas. If one leak is fixed the ground water level can rise and infiltration can occur in another area. Infiltration occurring via private drains is particularly difficult to deal with.

Inflow (connection of stormwater to separate foul sewers) is also a problem in many areas. This can be due to misconnections by the original builders or to new extensions, driveways etc. If inflow is removed from a sewer, provision has to be made to discharge the surface water elsewhere.

The new practice document outlines the extent of this problem and makes recommendations as to how it can be resolved. The implementation of the New Development document is vital to minimise new problems arising from infiltration in the future.

Climate Change

Large parts of the Dublin Area are below the average maximum high tide level. These do not normally flood because quay walls provide protection from the sea and large culverts store rain water until the high tide has receded. However these areas would be vulnerable to sea level rises associated with global warming. This issue was dramatically highlighted, during the lifetime of the study, by the tidal flooding of the 1st February, 2002. The tide level on that day was some 350mm higher than the highest tide previously recorded and caused extensive damage to homes and businesses. The new document recommends higher design levels for flood defences and for floors in new developments to mitigate the effects of climate change.

Apart from sea level rise, rainfall patterns are likely to change. Storms are likely to become more intense; winter rainfall amounts may increase while summer amounts may decrease. This will affect ground water levels and storm drainage. While it is important to recognise that considerable uncertainty exists in this area, practical recommendations were needed for development that is ongoing today. The focus of this document is to allow development to proceed without incurring unacceptable risk or unrealistic cost increases.

Basements

Many older properties in Dublin have basements with existing connections from basement level to old sewer culverts. These are prone to flooding during high flow or surcharge conditions. Even where there is no flooding history, this could become a problem with increased development and climate change contributing increased flows to existing sewers. The document on basements assesses the extent of this problem and recommends possible solutions.

CONCLUSION

The Greater Dublin Strategic Drainage Study is now completed. It included the construction and verification of hydraulic models for all piped drainage in the Dublin region and eight rivers including the Tolka. It recommends provisions that are necessary to allow the continued development of the region without compromising the environment or increasing the risk of flooding. Implementation of the study recommendations will require a major programme of works and capital funding of €2.4 Billion in parallel with full implementation of policies and operational

recommendations. Full implementation of these recommendations is necessary to allow the continued sustainable development of the Dublin Region into the future.

Signed:

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