APPENDIX F – Waste to Energy Facility – Background Documents

(Excerpts from Feasibility Study for Thermal Treatment of Waste for the Dublin Region)

F1: Environmental and Cost Assessment – Draft Report (Chap 7), February 1999

F2: Development of Siting Criteria – Draft Report (Chap. 9) , February 1999

F3: Siting Criteria Applied –Report on Siting & Environmental Issue (Chap. 5 & 6), November 1999

7. ENVIRONMENTAL AND COST ASSESSMENT

7.1 ENVIRONMENTAL ASSESSMENT

7.1.2 Emissions Standards

The environmental aspect associated with the operation of thermal treatment is a key issue. Foremost among these is the issue of air emissions and solid residues requiring further treatment. Emissions standards have been set by certain European countries independently (of which the German 17.BimSchV are the most stringent) while at present Emissions Limits in the Proposal for Council Directive on Incineration of Waste (December 1998) are awaiting final approval. These Draft EU Limits will supersede the current Directive on Emissions from the Incineration of Municipal Waste 89/369/EEC and future waste combustion facilities should as a minimum be designed on the basis of the draft new standards or the German 17.BimSchV standard. In fact, the emissions limits set in the Draft EU standards are identical to the current German standard. While the new EU standards are currently only in draft form, it would be prudent when specifying new facilities to aim for tighter limits in anticipation of any potential changes.

The major difference between the present EU standard and the Draft EU standard is that in future there should be a limit value set for dioxins/furans. A more detailed discussion on the topic of dioxins/furans is contained in the appendices. A limit value for NOx is also expected in the new Directive where one was not set before and in general, limit values for other substances are significantly reduced. The Draft EU Emissions standard is shown on Table 7.1 below where it is compared to the current standard and to typical measurements from a modern WTE facility.

Component[1]	*Typical Measurement emissions*[2] *(mg/Nm*^{3}*)*	*89/369/EEC* *≥3 t/h new municipal waste plant limits*[3] *(mg/Nm*^{3}*)*	*Draft New EU Incineration of Waste Directive*[4] *(mg/Nm*^{3}*)*
Total Dust	2 to 13	30	10
TOC	2	20	10
HCl	1 to 20	50	10
HF	0.1 to3	2	1
SO_2	5 to 15	300	50
NO_x	70 to 300		200
Hg	<0.01 to 0.7	0.2	0.05
Cd + T1	<0.01 to 7.5	0.2	0.05
Other Heavy Metals	2.2	6	0.5
PCDD/F	<0.02 to 1.2	None	0.1
CO	2.5 to 94	100	50

Table 7.1: Atmospheric Emissions Limits – Combustion of MSW

1. *All values at 11% O_2.*

2. *Range of data reported in available published documents (see references).*

3. *Total dust and HCI are weekly averages (daily averages can exceed tabulated limits by up to 30%);CO hourly average; all other substances measured periodically.*

4. *All daily averages except heavy metals are for 0.5 to 8 hour sample period and PCDD/F average values for 6 to 16 hour sample period.*

Source: ETSU, 1997.

With a properly designed modern WTE plant the proposed EU emissions limits can be met and even bettered. Technically it is possible to improve on these standards by significant margins but in doing so the cost of the operation increases.

Licensing of new thermal waste treatment plants will be a function of the EPA which will as a minimum require that the Draft EU standards be met. In addition, future waste treatment facilities will be required by the EPA to apply Best Available Technology (BAT).

7.1.2 Alternative Technologies

In this report alternative thermal technologies have been compared. Waste combustion or incineration with energy recovery (WTE) is considered to be the most robust of all the thermal technologies but gasification appears to be very close to proving that it is a fully developed technology.

The main advantage associated with gasification and specifically the Thermoselect process is that the emissions can be very low and can exceed the Draft EU Emissions Limits by significant margins. Although the technology is more costly than WTE, this apparent environmental advantage requires that we should consider the technology carefully especially since a full scale plant has now recently been constructed at Karlsruhe in Germany.

The Thermoselect process uses oxygen rather than air in the main waste treatment process and therefore results in lower overall throughputs of flue gases than WTE. However the process yields a synthesis gas which is later combusted with air for energy production. As the final airborne emissions from the plant will be from the exhaust of either a boiler or gas engine, these are compared with the relevant air emissions standards. Thermoselect refer to the German 17.BimSchV standard where all limits are bettered by at least 50% and in the case of dioxins/furans, emissions levels are as low as 10% of the standard (0.1ng/Nm^3).

Waste combustion can also meet the most recent EU emissions standards. The recently commissioned facility at Pirmasens, Germany for instance has emissions which are at least 50% of the levels specified in the German standard. This compares quite well with the gasification process. In respect of dioxins/furans the margin is 50% of the limit value but this factor is exceeded for other components in the flue gases. This level of performance comes at a cost which can add 10% to the overall capital cost of the facility and increase operational costs associated with flue gas cleaning by as much as 80%.

7.1.3 Flue Gas Cleaning

Flue gas cleaning is an integral part of all thermal waste treatment facilities. Flue gases produced by thermal treatment need comprehensive cleaning before they can be released to atmosphere. The first step towards minimisation of harmful emissions is in the initial mixing and where necessary, shredding and examination of waste entering the plant. As the waste particles are reduced in volume, increased surface area is offered for better combustion. Mixing provides an averaging of the calorific value of the waste and so provides for steadier and more uniform combustion characteristics. Together with a properly designed combustion chamber, effective and complete combustion of waste can be achieved resulting in reduced demands on the flue gas cleaning equipment downstream.

With gasification, a synthesis gas is produced which itself requires treatment before it can be burned in gas engines for example. The actual flue gases from such a plant will come from the combustion of the synthesis gas. Gas cleaning in this case is therefore a pre-stage to combustion which is in contrast to WTE.

In this report WTE has been compared with gasification in the form of the Thermoselect process. Two options for flue gas cleaning are given. These are:

1. Wet Flue Gas Cleaning

2. Semi-dry Flue Gas Cleaning

Each of these will be described briefly below followed by a brief look at the synthesis gas cleaning process used by Thermoselect in its gasification process.

Waste Combustion - Semi-dry Flue Gas Cleaning

Semi-dry flue gas cleaning involves the injection of a wet slurry of hydrated lime ($Ca(OH)_2$) into the stream of the flue gases for the removal of acid components HCl, HF and SO_2. This is done from the top of a vertical reaction chamber which will be sized such that sufficient time is allowed for neutralisation of acid components in the flue gases. By introducing the lime as a fine mist very effective reaction can take place due to the large available surface area. Heat carried by the flue gases is dissipated to the lime slurry and by the time this reaches the bottom of the reactor the spent lime will be dry, hence the term spray-dryer absorber which is commonly used to describe this equipment.

Dry flue gas cleaning is a similar process where the lime is added to the flue gases as a powder. However, this system is not quite as effective as the semi-dry system where removal of SO_2 is up to 20% more efficient. Removal efficiency for HCl and HF is similar for both systems.

Dioxins and furans are removed by the addition of activated carbon to the flue gases. Heavy metals and dioxins/furans tend to adhere to dust particles hence the addition of this material which is effective at trapping these toxic substances. In a similar way heavy metals such as mercury can be removed from the flue gases.

Removal of the dried and neutralised particles from the spray-dryer absorber, dust and spent activated carbon is usually done using a fabric bag filter. Fabric filters are very effective at trapping fine particles and are cleaned by reversing the gas flow periodically. The residue collected from flue gas filters is fly ash and contains both heavy metals (which were in vapour form as the flue gas left the combustion chamber), entrained particles and activated carbon to which dioxins, furans and heavy metals adhere. Therefore this material is a hazardous waste and must be handled carefully.

Control of NOx emissions from WTE plants is effected firstly by controlling the combustion conditions, i.e. the air/fuel ratio but also by the addition of ammonia (NH_3) directly into the combustion chamber. This has the effect of reducing overall NOx emissions by approximately 60% and improving overall thermal efficiency of the boiler by 2-3%.

Substances and preparations used in the semi-dry flue gas cleaning process are shown below (with typical quantities used in kg per tonne of waste treated shown in brackets):

- $Ca(OH)_2$ (8.0)
- NH_3-water, 25% (3)
- Activated Carbon (0.4)

Waste Combustion - Wet Flue Gas Cleaning

Wet flue gas cleaning improves on the efficiency of semi-dry flue gas cleaning and involves the washing of flue gases in a scrubber with water to which reagents are added.

As a first step in the process dust is removed with the aid of an electrostatic precipitator. Electrostatic precipitators use high voltages to remove suspended solids from the flue gases. From here the flue gases are washed in a water scrubber where HCl and HF are removed. Addition of $CaCO_3$ to the washwater from this process neutralises these acids. Following the water scrubber, the flue gases pass to a basic scrubber where NaOH is used to remove and neutralise SO_2. Flocculating agents and other compounds are subsequently used to purify the process water in the system.

Activated carbon is injected for the removal of dioxins and heavy metals from the gases and the final step involves passing the gas through a fabric filter. Substances and preparations used in the process are shown below with typical quantities used shown in kg per tonne of waste as above.

- $Ca(OH)_2$ (8.0)
- $CaCO_3$ (8.0)
- NaOH (2.2)
- TMT (0.05)
- Flocculating Agent (0.01)
- Fe_2Cl_3 (0.1)
- Activated Carbon (0.4)
- NH_3-water, 25% (3)

The quantity of residuals from this process is approximately half that for a semi-dry system and SO2 removal efficiency is higher. However, the cost of installing a wet flue gas cleaning system will be approximately 10% greater than for the semi-dry process.

Thermoselect Synthesis Gas Cleaning

Synthesis gas produced from the gasifier is composed mainly of H_2, CO, CO_2, H_2O and exits the reactor at temperatures close to 1,200^{o}C. This gas also contains heavier elements such as hydrocarbons, vaporised metals and dust. As a first step towards using the gas to produce energy for example, it must be rapidly cooled. This condenses elements which may cause difficulties when the gas is finally burned. This process is carried out by passing the gas through a series of water jets. The cooling water used for this process is passed to sedimentation tanks where the material removed from the gas can be collected.

After shock cooling of the synthesis gas, it is passed to a fine cleaning section of the plant where sulphur is removed using a sulpherox system. This sulphur is recovered and a market is found for the material. However, the quality of the sulphur recovered is not very high. Other residual material is recovered here and sent to the sedimentation basins for collection. Activated carbon is used in the final stage of the synthesis gas cleaning process before the gas is used in a gas engine for example to generate electricity.

As part of the whole process of cleaning the synthesis gas, certain substances and preparations are required not only to clean the gas but also to clean the water used in the whole process. These materials, some of which are added to the cleaning water (with their consumption in kg per tonne of waste processed shown in brackets) are as follows:

- Sodium Hydroxide (12.0)
- Hydrochloric Acid (6.0)
- Hydrogen Peroxide (0.05)
- Iron Chelate (0.75)
- Active Charcoal (activated carbon) (1.3)
- Glycerine (0.15)
- Ion Exchanger Resin (0.07)

The cleaning of the process water yields mixed salts, after a reverse osmosis procedure and a metal residue which is composed of 40-50% zinc. The process water itself is cleaned and recirculated at the plant.

Once a clean synthesis gas is produced, it can be combusted in a gas engine or boiler directly with the necessary guarantees from the manufacturers of the equipment. Emissions from the engine will be controlled by monitoring the air/fuel ratio and a catalytic de-NOx reactor should be fitted in order to comply with the NOx emissions limits of 17.BimSchV/Draft EU standard.

7.2 RESIDUAL LANDFILL

7.2.1 Short-Medium Term

The procurement of a thermal treatment facility could take up to 8 years if similar procedures in other capital cities are typical. Much of the waste generated in Dublin in the meantime will go to landfill although recycling initiatives and public education should progressively reduce this quantity. Currently there are a number of deficiencies in the existing waste disposal infrastructure and these have been identified in the Dublin Waste Management Plan (December 1998) as follows:

- *The combined void space in currently approved landfills in the Dublin Region (including the new Arthurstown facility) equates less than 2.5 years of filling at current rates of disposal.*

- *The fact that the new Arthurstown landfill can only accept baled waste places a number of significant restrictions on the waste disposal system for the Dublin Region.*

- *The full utilisation of Arthurstown is dependent on sufficient baling capacity being available in the Dublin Region.*

- *Public baling capacity is currently being supplied by Ballymount Transfer Station.*

- *There is an urgent need for the immediate provision of unbaled waste capacity in the Dublin Region.*

- *There is an urgent need to divert certain wastes from Balleally landfill to recovery options wherever possible particularly construction/demolition wastes whose volumes are high and recycling potential are optimum in terms of readily usable products. These markets are best realised within the local authority structure for road construction, urban footways and cycle routes, parkways etc.*

These deficiencies have resulted in the following priority activities being identified in the Dublin Waste Management Plan (December 1998):

- "*Development of additional landfill capacity in the Dublin Region by year 2000 with capacity range 10-11 million tonnes to meet the essential end disposal of substantial quantities of residual waste*

- *Development of appropriate bulk transfer arrangement to service the needs of the four authorities. Plans are already underway to supplement the baling station at Ballymount (220,000t/an) with baling/transfer station at Ballyogan (120,000t/an)."*

The situation with regard to available void space has improved somewhat recently as much of the construction and demolition waste which formed the majority of the waste being disposed of at Balleally landfill is currently being recycled or reused and current disposal rates are likely to be significantly less than for 1997/1998. However significant additional landfill capacity is still required and a study is currently underway to find a long-term replacement to Balleally together with short term options.

In addition, it must be realised that any delays in putting the recommended thermal treatment facility in place will result in the need for increased landfill disposal. Such a delay may even result from a decision to phase in the introduction of thermal treatment by constructing two smaller plants rather than one larger plant.

7.2.2 Long-Term

Thermal treatment does not eliminate the need for a landfill but merely reduces, albeit by a significant amount, the quantities of waste needing to be disposed of in a landfill. Typically waste to energy will result in an 80% reduction by weight (and up to 95% by volume) in the amount of waste. The 20% clinker remaining at the end of the process contains metal (ferrous and non-ferrous) and also other materials which are not combustible such as stone and glass fragments. Much of the clinker including the metal can be recycled with the majority of the clinker being crushed and used as aggregate for road construction.

The other main residue left from the treatment process are flue-gas cleaning residues and the exact constituents of this material will depend on the type of cleaning plant used at the treatment facility. This material is dealt with in several different ways elsewhere including being bound up in concrete and used in the construction of concrete 'side-berms' in landfill construction. In some countries this material does however have to be landfilled.

Regardless of the disposal method for these residues, there will also be other waste types which are not combustible such as residues from composting and recycling activities, non-combustible household refuse, non-combustible refuse from commercial enterprises and building activities, street sweepings, lightly contaminated soil and general residues from recycling and recovery schemes. These will also need to be landfilled.

The Dublin Waste Management Plan (December 1998) has identified the following residues which will require disposal in the year 2005 after thermal treatment has been introduced.

Mixed waste from Recycling Stations	3,200 tonnes/year
Mixed waste from Commerce	40,100 tonnes/year
Mixed waste from Industry	168,900 tonnes/year
Mixed waste from Construction and Demolition Activities	174,000 tonnes/year
Sorting/Screening Residues from Recycling Stations	11,700 tonnes/year
Screening Residues from Garden Waste Composting	5,600 tonnes/year
Screening Residues from Biological Treatment	7,200 tonnes/year
Sorting/Screening Residues from other Recyclers	40,300 tonnes/year
Screening Residues from Crushing Plant	69,400 tonnes/year
Residues from Thermal Treatment	25,000 tonnes/year
Total	**545,400 tonnes/year**

In the initial years after construction of a thermal treatment plant if a combustion plant with energy recovery is built, there will also be an additional 150,000 tonnes per annum of ash and clinker residues from the treatment for which a recycling market will have to be found. In the interim, and until these markets have been developed, the required disposal capacity will be up to 700,000 tonnes per annum.

On the other hand, if a gasification plant is built, this will have lower residues with greater recycling capabilities. There will however always be a residual to landfill. No thermal process is free of the flue gas cleaning residues while recycling possibilities for bottom ash from combustion plant and mineral and other residues from gasification continue to be developed.

7.3 FACILITY SIZE AND COSTS

The maximum demand for thermal waste treatment in the Dublin Region is estimated at 450,000 – 600,000 tons. The capacity to meet this demand can be provided in one facility with two fully independent processing lines, but sharing a common waste bunker, ash and clinker pit, auxiliary facilities including workshop, personnel rooms, administration offices etc., as well as access roads and utility services. Alternatively, it can be provided in two separate facilities at different locations. Also, depending on the phasing of plants, different technologies may be used at each plant e.g. combustion or alternative thermal treatment.

Modern waste-to-energy units offer a high availability, and the necessary capacity is based upon 8,000 hours on-line time per annum for each unit (out of a total 8,760 hours in the year). On this basis the budget prices for process plants with capacity 2 x 16 t/h (256,000 t/a), respectively 2 x 20 t/h (320,000 t/a) have been calculated.

In both cases the lower heat value of the waste is assumed to be 11 MJ/ton and the plants will produce steam for electricity generation, only. If the supply of district heating to neighbouring housing areas or offices/institutions is feasible, then the cost of the district heating pipe system and circulation pumps, etc. should be added to the basic plant costs.

The flue gas cleaning equipment will meet the requirements of the EU Directive, expected to be in force soon after year 2000. This specifies the removal/reduction of particulates, HCl, SO_2 and SO_3, as well as NO_x reduction and reduction of heavy metals and dioxins.

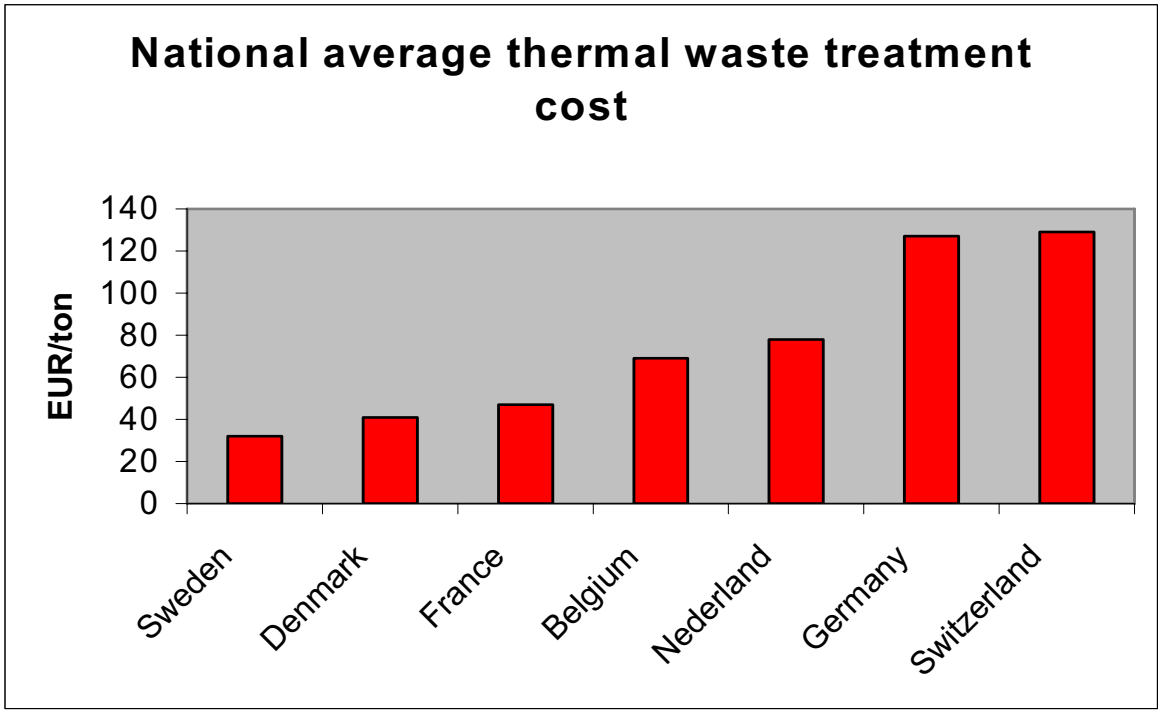
Budget costs in mio. EUR (Euro) (1999 prices)

Item	*2 x 16 t/h*	*2 x 20 t/h*
Furnace/boiler plant	31	34
Turbine/generator and auxiliaries, condenser and cooling system	18	20
Flue gas cleaning plant	17	22
Miscellaneous, including weigh bridge, waste and ash cranes, monitoring and control system, emergency power supply	4	6
Total	***70 (IR£55m)***	***82 (IR£65m)***

The process plant prices do not include building and civil costs, consultants fees, financing costs, and V.A.T. When these costs are added, the total cost of 250,000 t/an and 320,000 t/an combustion plants are IR£70m and IR£80m respectively. A comparable capital cost for a 250,000 t/an gasification plant is IR£80m.

Average municipal solid waste (MSW) thermal treatment costs

The average national MSW thermal treatment cost varies in Europe from about 30 to 130 EUR/tonne with Sweden and Denmark representing the lower level and Germany and Switzerland being at the top.



The reasons for the substantial differences in national thermal waste treatment cost can be ascribed to differences in development stage, market situation, design traditions and technology preferences, facility standards and capacity, energy markets, environmental requirements and approval process, and finally plant ownership, operation and finance.

Development stage

All of the countries mentioned above have used thermal waste treatment for several decades, and most have a base of existing plants for which the original capital costs are largely repaid. Due to inflation the remaining debt for these plants is small in today's money.

New plant investment has in recent years been relatively high in Denmark, Germany, Switzerland and Netherlands with the effect of increasing the average capital service cost in these countries. New plants are also built to higher standards and therefore cost more per tonne throughput capacity.

Market situation

The markets of Switzerland and Germany were practically closed, at least until an EU Directive opened the markets of the transport and utility sectors in 1993. The closed markets contributed to high capital costs for thermal treatment capacity compared to the other countries, which for several years have been wide open to competition.

Design traditions/technology

The conservative design tradition prevailing in Germany and to some extent in Switzerland is a contributing factor to high capital costs and consequently to high total cost per tonne waste treated. One aspect of this tradition is the tendency to design for all and every eventuality of future development in waste composition and treatment. This has resulted in more complex plants with higher capital and operation costs.

Furthermore, German and Swiss technologies have historically subscribed to the counter flow or central flow furnace design, whereas Scandinavian and American technologies have used the co-flow design. These choices are a result of the prevalent waste compositions in the different countries at the time of technology development. Today, counter flow or central flow designs in most cases require the use of a catalytic NO_x-control system in order to meet the new emission standards. This involves high investment cost and high operating costs. In contrast the co-flow technologies are usually able to meet the requirements for NO_x abatement with a simple and much cheaper SNCR-system.

Facility standards and capacity design

In all of the countries mentioned, facility standards will meet the rather demanding requirements specified by national environmental standards, union agreements and sound design practice. Therefore, modern waste-to-energy plants are usually very attractive facilities regardless of nationality. However, plant capacities reflect different philosophies in the countries concerned.

In Germany there has been a strong reluctance to accept responsibility for waste from neighbouring communities with the result that most plants have been designed with ample spare treatment capacity. The result of this is lower utilisation of the capacity installed and consequently a higher capital service cost per tonne of waste treated. The problem was exacerbated by the way in which the German legislation, prohibiting combustible waste from being deposited on landfills, was administered by the federal government. The necessary capacity to handle the extra waste was constructed by the municipalities, following which the implementation of the legislation was delayed, leaving the municipalities with large investments in unused capacity.

Scandinavia, and in particular Denmark, has relied upon extensive co-operation between waste-to-energy plants located near each other, thus minimising the necessary stand-by capacity of each plant. Also, legislation similar to that in Germany, prohibiting the landfill of combustible wastes, was implemented without damaging delays.

Energy markets

Energy sales can represent a substantial source of revenue, dependant upon national policies and technical/institutional traditions. In most countries the generation and sale of electricity is possible, but there are large differences in the sales prices for the electricity, depending on alternative sources of power. The availability of cheap hydropower or nuclear power will result in lower payments to the waste-to-energy plants for the electricity they produce, unless national policy dictate otherwise.

Denmark and Sweden have extensive district heating systems which are near perfect recipients of the energy produced from the incineration of MSW. This is particularly true for small and medium sized waste-to-energy plants because the capital investment in plant and equipment is lower than for a power producing plant.

In France and Germany several plants sell electricity and district heating or steam, but a large number of plants operate without any energy sales at all.

Switzerland has only limited district heating or steam sales for industrial purposes, and the electricity generated from MSW must compete against cheap hydro power.

Environmental requirements and approval process

The new EU Directive will to a large extent standardise the required performance of pollution control equipment in waste-to-energy plants throughout Europe. However, the current national standards as well as their enforcement vary from lax to very stringent. New plants in the Netherlands, Germany and Switzerland employ very sophisticated flue gas cleaning equipment in order to meet national standards, but also existing plants have had to upgrade their pollution control equipment to meet current requirements.

In contrast, several French plants still depend upon electrostatic precipitators, only, for gas cleaning.

The Danish and Swedish plants employ full particulate removal and flue gas scrubbing, but dioxin and NO_x removal is only partially in use.

The approval process is thorough, but well organised and relatively fast in the Scandinavian countries, mainly because of a very open dialogue between the owner/operator of the plants and the general public.

Germany has on the other hand seen many examples of prolonged debate with, and pressure from the public, resulting in additional investments in flue gas cleaning equipment, bottom ash treatment or vitrification, etc. This has added to the already high capital costs of German waste-to-energy plants and the time consuming process has delayed the time when the proposed plant could start to make a return on the investment.

Ownership, operation and finance

Most plants in the countries mentioned are owned and financed by the municipalities, either directly or in several cases through the utility companies.

Denmark has several examples of joint municipal ownership, mainly in the form of limited partnerships.

Generally, the plants are operated by the owner.

However, France has a tradition of municipal ownership with operation by private companies, and this concept may be applied in other countries in the future.

Germany has a couple of privately owned and operated facilities, but there is no evidence of any cost savings from private operation compared to public operation.

One reason for this is that waste-to-energy plants are capital intensive, not staff intensive. Where private operators may have an edge is in plant maintenance, if rigid municipal budget and procurement procedures stand in the way for a flexible and preventive maintenance strategy.

Conclusion

The European waste-to-energy situation is still a long way from presenting a uniform picture, but the EU Directive will help remove some of the great differences in operating standards and costs. This will no doubt reduce cross border traffic in search of cheaper and possibly sub-standard disposal facilities. However, the renewed competition “on a level field” will also put pressure on those plant suppliers and operators, who have in the past been protected by national procurement preferences and/or low national environmental standards.

The next chapter will deal with financing and procurement issues in the light of these considerations of thermal treatment in a European context.

9. SITING CRITERIA

9.1 GENERAL APPROACH

Despite the established environmental sustainability of thermal treatment as a means of treating waste and the relative consensus that there has been to date with regard to the need for such a facility, public opposition is likely to develop with such a proposal once a site has been identified. The identification of a potentially suitable site for a proposed thermal plant therefore must have regard to a number of criteria, not just physical and environmental but also social and economic.

The primary aims of the siting process could be considered to be as follows:

- *To minimise environmental impacts*
- *To maximise acceptability of the project by the local community*
- *To minimise the cost of the development*

It is proposed that these objectives be achieved through an integrated approach involving the establishment of siting criteria, environmental assessment and public involvement each running in parallel with each other. These are discussed in more detail below.

9.2 SITING CRITERIA

9.2.1 Identification

The criteria for the identification of a suitable site for a proposed thermal treatment plant will depend on the potential impacts both real and, to a lesser extent, perceived which arise from such a facility. It is necessary that the assessment of these potential impacts and the subsequent development of the siting criteria be seen as logical, transparent and above all defensible in the public arena. It is proposed therefore that a staged process be carried out which progressively excludes unsuitable areas before identifying and shortlisting potentially suitable sites based on agreed criteria. The procedure to be adopted is as follows:

Step 1*: define the study area by reference to the special limits of waste collection and transportation. Define the site requirements for the project proposed including the size of site and services required.*

Step 2*: define the site selection and exclusionary criteria with relevant interested parties.*

Step 3*: identify areas for potential sites by application of agreed objectives and any exclusionary criteria.*

Step 4*: sieve and screen the sites identified in Step 3 to identify possible sites against agreed criteria.*

Step 5*: compare the shortlisted sites using agreed criteria*

Exclusionary factors

Exclusionary factors are factors which by their nature preclude the consideration of a site from the development of a thermal treatment plant. These include but are not necessarily limited to the following:

- *Proposed Natural Heritage Areas*
- *Areas of high amenity or high archaeological interest*
- *Areas excluded by the County Development Plan*

Apart from the above there are a number of baseline factors which are relevant to all thermal treatment facilities and which allow an initial identification of 'preferred areas'. The absence of such factors could, in fact be considered to be deemed as 'exclusionary'. These are that such a facility should be situated close to where the waste is produced, that transport links to the site should be good from the rest of the region and that the plant should be sited close to users of heat and/or electricity so as to maximise the potential from the facility.

- *Proximity to origin of waste*
- *Transport links with surrounding region*
- *Proximity to potential energy users*

(*i) Proximity Principle*

This principle adopts the notion that waste should be treated or disposed of close to its source of generation but with proper regard to protection of the environment.

(*ii) Transportation Links*

The transportation of waste is a significant issue for a number of reasons:

- *The accessibility of the plant can affect the operational cost of the transfer*
- *The transport of waste is often perceived by the public to be undertaken in a less competent and professional manner than the transport of other materials*

(iii) Proximity to Users of Heat/Electricity

The various thermal treatment technologies all produce heat and electricity and therefore to maximise the efficiency of the operation it is desirable to site the plant close to industry which can utilise the heat and energy produced.

Siting Criteria

The criteria for establishing the preferred site will be developed in tandem with a Community Involvement Programme which is discussed in more detail in Section 9.3. The obvious and most likely concerns of people such as impact on human health, visual impact and traffic will be considered in specialist environmental 'support' studies which are discussed in more detail in Section 8.4 below. In addition to these however are other factors that may be important in the establishment of the criteria. These could include but again be not limited to the following:

- *Site Zoning*
- *Proximity to Waste Centre*
- *Traffic*
- *End-Market Use possibilities*
- *Site size and availability*
- *Availability of residual landfill*
- *Water supply for cleaning system*
- *Transfer Stations*
- *General planning and environmental considerations (visual, ecological, archaeological etc.)*

These are described in more detail below

Traffic

All studies on thermal treatment provision show that traffic and the public perception of traffic are key issues in terms of the acceptability of a treatment site. The type of vehicle using the site is a further issue to be considered.

End-Market Use Possibilities

Each of the potential thermal treatment technologies produce a variety of output products which require to differing degrees, a market to make the technology economically viable. Waste combustion produces energy in the form of electric power and/or heat which can be supplied to industry, district heating or to drying of different materials such as sludges. The metals reclaimed can be sold to the scrap metal market while clinker can be used as aggregate for road construction following further limited processing.

Gasification also produces a low calorific gas which can also be used in kilns or combusted directly for power/heat generation. Pyrolysis produces a gas which is suitable for kilns, power/heat generation while the char residue has potential use as a fuel for kilns also or for the production of activated carbon for wastewater and flue gas treatment. Potential consumers of these products would be local industry, district heating companies, power plants, cement companies and possibly waste water treatment plants.

In summary therefore, the type and density of existing industry in a particular location will determine the potential supply of end users for the output products from each technology.

Site Size and Availability

A number of factors could impact on the availability of land for a thermal treatment plant. Firstly an adequate site size is required. Footprints for thermal treatment plants vary between 3.5 and 7 hectares depending on plant size. These include:

- *Zoning designation (e.g. industrial)*
- *Socio-economic status of the location*
- *Attitude and degree of involvement of key decision makers*

The above factors are related in that the specific location of a proposed site and hence its precise zoning (e.g. whether it is in an industrial area) will have an impact on the socio-economic status of the community around the site. This in turn will influence the key decision makers as to how ‘welcome’ such a facility is. Benefits to an area can include:

- *Employment generation, with knock-on effect to the expenditure in the surrounding community*
- *Reduction in waste transport costs for local firms*
- *Increase in house purchases because of increased demand*

Adverse impacts can include:

- *Impact on tourist or recreational income*
- *A decrease in property values*
- *Deterrent to investment from high-technology industry*

Availability of residual landfill

Any thermal treatment process will still have the need for a landfill to dispose of the residual waste left over from the process. In the current context of Dublin which has limited available landfill capacity this could be a significant issue. Therefore the siting of a thermal treatment plant will have to take due regard of the remaining life of the existing Dublin Local Authorities landfills and also the landfill site selection studies currently ongoing.

Water supply/outlet for cleaning system

The availability of a water supply for use in the flue-gas cleaning processes required in a modern waste to energy plant and also potential outlets for the residual discharges could have an influence on the siting of a new facility. This however would not be considered to be too significant a factor given that, in the absence of such a supply and outlet, a dry or semi-dry process could be used.

Transfer Stations

The desire to minimise the impact of traffic carrying waste to a thermal treatment facility means reducing not just the haul distance to the facility from the rest of the region but also the number of trips. The most effective means of ensuring this is to bulk transfer the waste from a network of transfer stations located at the main waste 'hubs'. This in effect means a transfer station at a number of key strategic locations distributed throughout the region transferring the waste via large containers by road to the thermal treatment plant.

In reality the capital and operational costs of a network of transfer stations together with the corresponding transport costs from those stations to the treatment plant will not be significant compared to the overall cost of the development of the treatment facility.

General Planning and Environmental Considerations

The siting of a thermal treatment facility should have regard to local development policy as outlined in the Development Plans of each county. The future landuse in the vicinity of each facility should be assessed with regard to the various zonings and their likely presumption for or against the siting of a facility. The detail and criteria in each City/County Development Plan will vary in relation to the industrial, environmental and socio-economic objectives of that county. In general however, the following criteria could be assumed to be fairly representative across the region:

- *The plant should not be sited very close to any major residential areas*

- *The preferred location will be a site within or adjoining an industrial area provided that the development will not appear unduly prominent or visually intrusive or that the development will not prejudice existing industries for example food manufacturing*

- *The site should have good access to the principal transportation network*

5. DEVELOPMENT OF SITING CRITERIA

5.1 SITE SELECTION GUIDELINES

The need for thermal treatment as a means for maximising landfill diversion has already been established in the Dublin Waste Management Plan. As with all waste management facilities the identification of areas suitable for a thermal treatment plant needs to be undertaken according to a systematic selection process having regard to technical, environmental, social and economic criteria. The aims of the selection process are as follows:-

- To minimise environmental impacts
- To protect the health and well being of the local community
- To minimise the cost of the development

5.1.1 Legislation and Official Guidelines

As thermal treatment of municipal waste is not an established technology in Ireland there are no national guidelines regarding the selection of areas suitable for the location of thermal treatment facilities. There are however Draft EPA Guidelines for Landfill Site Selection. In the absence of specific documents guidance must be taken from relevant legislation. The primary pieces of legislation are:-

- 89/369/EEC Air Pollution from New Municipal Waste Incinerators
- Proposal for a Council Directive on the Incineration of Waste 1998
- The Waste Management Act, 1996

The Waste Management Act is an enabling piece of legislation being brought into law through a series of Regulations. There is no specific guidance regarding siting of thermal facilities, however the broad thrust of the Act supports thermal treatment in that it supports the EU waste hierarchy of reduction, reuse, recovery including energy recovery and finally landfill of residual wastes. The proposal for a Directive on the Incineration of Waste aims to reduce as far as possible negative effects on the environment. In particular the effects on air, soil, surface water and groundwater and the resulting risks to human health from the incineration and co-incineration of waste, and to that end to set up and maintain appropriate operating limit values for waste incineration and co-incineration plants within the community.

The site selection process has been made using all available guidelines and information within the parameters of the legislation. A proactive public involvement process outlined in Chapter 4 informed the process and was instrumental in the formulation of guidelines for future site selection processes.

5.2 SELECTION PROCESS

5.2.1 Methodology

The general procedure for the Study is a sieving process whereby exclusionary factors are first examined. These are factors, which preclude the siting of a Thermal Treatment plant and include the following:

- Proposed Natural Heritage Areas
- County Development Plans
- Areas of High Amenity or Archaeological Interest

These factors are classed as "*Group 1*" criteria. By excluding these, generally suitable areas emerge. "*Group 2*" criteria are then considered. These are more significant criteria, which may have serious financial implications for the development of a Thermal Treatment Plant and include the following:

- Road Access
- Traffic
- End-Market Use
- Site Size and Current Land Use
- Proximity to Residential Areas
- General Planning and Environmental Considerations

Using this set of criteria the generally suitable areas were narrowed down to 4 generally suitable/possible sites. The suitability of 4 shortlisted sites was further assessed resulting in a preferential ranking for the siting of a Thermal Treatment facility.

5.3 GROUP 1 CRITERIA – EXCLUSIONARY ZONES

5.3.1 City & County Development Plans

The siting of a Thermal Treatment Plan in the Dublin Region should have regard to local development policy as outlined in the following Development Plans:

- Dublin City Development Plan 1999
- Dun Laoghaire/Rathdown County Development Plan 1998
- Fingal County Development Plan 1999
- South Dublin County Development Plan 1998

These are legal documents prepared by each local authority to provide a framework for the guidance and control of development within the Dublin Region. The site selection process should have regard to the Plans as existing and future landuse in the vicinity of proposed sites needs to be determined. Population trends, development plan zoning, designated industrial areas, end market users and proposed changes in the transportation network need to be evaluated.

Development plan zoning objectives may vary between local authority areas. Objectives may be included to provide for natural assets or amenities specific to that area such as the protection of the Dublin Mountains or areas of urban renewal.

5.3.1.1 Dublin City Development Plan 1999

The siting of a Thermal Treatment Plant in the Dublin City area would have to have regard to the Dublin City Development Plan (1999). The plan is one of a number of corporate policy documents, which have key influence on the control of development in the City. The Plan deals with the comprehensive planning of the city for the next five years while taking account of longer term trends and objectives. The City Development Plan divides the city into a number of zones listed from Z1-Z15 each having a zoning objective, as listed in Table 5.1 and illustrated in Figure 5.1. This table also illustrates the acceptability of the siting of a Thermal Treatment plant in the various zones.

The Plan addresses the most commonly encountered activities within the City and indicates the acceptability or otherwise of the proposed land use. The guidelines as suggested in this plan are as follows:

- **Permissible Use**

Is one which is generally acceptable in principle in the relevant zone, but which is subject to normal planning consideration including policies and objectives outlined in the Plan.

Open for Consideration Use

Is one which may be permitted where the Planning Authority is satisfied that the proposed development would be compatible with the overall policies and objectives for the zone, would not have undesirable effects on the permitted uses, and would otherwise be consistent with the proper planning and development of the area.

Thermal Treatment is accounted for in the Plan under the landuse, 'Incineration.' This use is classed as 'permitted in principle' in objective Z7, while this land use is not permitted under any other zoning objective.

Table 5.1 Land Use Zoning Objectives in Dublin City

Zone	Zoning Objective	Thermal Treatment Acceptability
Z1	To protect and/or improve residential amenities	Not Permitted
Z2	To protect and/or improve the amenities of residential conservation areas	Not Permitted
Z3	To provide for and improve neighbourhood facilities	Not Permitted
Z4	To provide for and improve mixed-services facilities	Not Permitted
Z5	To consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and protect its civic	Not Permitted

Zone	Zoning Objective	Thermal Treatment Acceptability
	design character and dignity	
Z6	To provide for the creation and protection of enterprise, and facilitate opportunities for employment creation	Not Permitted
Z7	To provide for the protection and creation of industrial uses and facilitate opportunities for employment creation	Permitted in Principle
Z8	To protect the existing architectural and civic design character, and to allow only for limited expansion consistent with the conservation objectives of the Development Plan of primarily residential and compatible office and institutional uses	Not Permitted
Z9	To preserve and provide recreational amenity and open space	Not Permitted
Z10	To be developed in accordance with approved mixed-use action area plans	Not Permitted
Z11	To protect and improve canal, coastal and river amenities	Not Permitted
Z12	To ensure that existing environmental amenities are protected in any future use of these lands	Not Permitted
Z13	To seek the social, economic and physical rejuvenation of an area	Not Permitted
Z14	To seek the social, economic and physical rejuvenation of an area with mixed use, of which residential and 'Z6' would be the predominant uses	Not Permitted
Z15	To provide for institutional and community uses	Not Permitted

Source: Dublin City Development Plan (1999)

It is the high level of urbanisation and its associated high residential population, which particularly distinguishes this local authority area from the other three study areas. This factor is reflected in the zoning objectives and land use designations.

The zones Z1, Z2 and Z8, the main residential zoned areas, create exclusionary zones for a vast area of the City. The amenity potential of the area is protected by the zoning objectives Z9 and Z11, which provide for the preservation and improvement of waterways and open space. These areas are also exclusionary to Thermal Treatment development.

The main areas that create exclusionary zones are objectives Z1, Z2, Z3, Z4, Z5, Z6, Z8, Z9, Z10, Z11, Z12, Z13, Z14, and Z15 (Figure 5.2). These zones include the greater plan of Dublin Corporation area. Areas that contain sections of land not in an exclusionary zone include:

- Ashtown
- Coolock
- Darndale
- Dublin Port/Docklands Area
- Inchicore
- St. James's Gate

5.3.1.2 Dun Laoghaire-Rathdown County Development Plan 1999

The Development Plan consists of a number of zoning objectives, which are illustrated in Figure 5.3 and listed in Table 5.2. The table also illustrates the acceptability of 'Industry Special' which is the use class under which Thermal Treatment would fall.

This local authority is distinguished from the other study areas by its maritime association. This link is mirrored in the zoning objectives where categories are in place to protect both coastal and harbour related activities.

The Development Plan addresses the most commonly encountered activities within the county and indicates the acceptability or otherwise of the proposed land use. The guidelines are as follows:

- **Permitted in Principle**
  Is subject to compliance with relevant policies, standards and requirements set out in the Development Plan

- **Open for Consideration**
  Uses which could not be considered acceptable in principle in all parts of the relevant use zone. They will only be accepted where the Council is satisfied that the use would not have undesirable consequences for the permitted uses. Uses, which are temporary by nature, are open for consideration in all zones.

- **Not Permitted**
  Activities which are not indicated as "Permitted in Principle" or "Open for Consideration" will not be considered.

Table 5.2 Land Use Zoning Objectives for Dun Laoghaire-Rathdown

Zone	Zoning Objective	Thermal Treatment Acceptability
A	To protect and/or improve residential amenity	Not Permitted
A1	To provide for new residential communities in accordance with approved action area plans	Not Permitted
B	To protect and improve rural amenity and to provide for the development of agriculture	Open for Consideration
LC	To protect, provide for and/or improve local centre facilities	Not Permitted
DC	To protect, provide for and/or improve district centre facilities	Not Permitted
TC	To protect, provide for and/improve town centre facilities	Not Permitted

Zone	Zoning Objective	Thermal Treatment Acceptability
E	To provide for industrial and related uses	Permitted in Principle
E1	To provide for the development of a science and technology park	Open for Consideration
F	To preserve and provide for open space and recreational amenities	Not Permitted
G	To protect and improve high amenity areas	Not Permitted
GB	To protect and enhance the open nature of lands between urban areas	Not Permitted
H	To provide for harbour related amenity, recreational, light industrial and commercial development	Not Permitted
J	To protect and improve coastal amenities	Not Permitted

Source: Dun Laoghaire-Rathdown County Development Plan (1998)

The main areas which create exclusionary zones come under zones A, A1, LC, DC, TC, F, G, GB, H and J(Figure 5.4). These zones include the areas of:

Ballinteer	Ballybrack	Blackrock	Booterstown
Cabinteely	Carrickmines	Churchtown	Corklittle
Cornelscourt	Dalkey	Dun Laoghaire	Foxrock
Galloping Green	Glasthule	Glencullen	Glendoo
Goatstown	Killiney	Kill of the Grange	Kilmashogue
Loughlinstown	Marley	Milltown	Monkstown
Mount Merrion	Newtown	Old Connaught	Sallynoggin
Shankill	Stepaside	Stillorgan	Tibradden
Ticknock	Windy Arbour		

Areas that contain small sections of land not in these zones include:

- Churchtown
- Deans Grange
- Jamestown
- Kingston
- Loughlinstown
- Leopardstown
- Marlay
- Milltown
- Old Connaught
- Sandyford

5.3.1.3 Fingal County Development Plan 1999

The County Development Plan aims to achieve the sustainable development of Fingal County. The Plan consists of a number of zoning objectives, which are illustrated in Figure 5.5 and listed in Table 5.3. The table also illustrates the acceptability of the siting of a Thermal Treatment facility in the various zonings. In order to achieve sustainable development in Fingal, the County provides guidelines for development in both its urban and rural communities. The guidelines are as follows:

- **Acceptable**

  Uses that will be considered acceptable

- **Open for Consideration**

The use is generally acceptable except where indicated otherwise and where specific factors which may be associated with the use (e.g. scale) would result in the proposed use being contrary to the zoning objective

- **Not Acceptable**

  Uses that will not be acceptable

Table 5.3 Development Plan Zoning Objectives for Fingal

Zone	*Zoning Objective*	*Thermal Treatment Acceptability*
A	To protect and improve residential amenity in established residential areas	Not Acceptable
A1	To provide for new residential communities in accordance with approved action area plans and subject to the provision of the necessary social and physical infrastructure	Not Acceptable
NC	To protect, provide for and/or improve local/neighbourhood centre facilities	Not Acceptable
NCB	To protect, provide for and/or improve neighbourhood/local centre facilities in Ballymun	Not Acceptable
MVC	To protect and enhance the special physical and social character of major village centres and provide and/or improve village facilities	Not Acceptable
C4	To provide for the County Hall and ancillary uses	Not Acceptable
D	To provide for major town centre activities in accordance with approved action area/structure plans and subject to the provision of the necessary physical infrastructure	Not Acceptable

Zone	*Zoning Objective*	*Thermal Treatment Acceptability*
E	To facilitate opportunities for general industrial employment and related uses in established industrial areas	Open for consideration*
L1	To facilitate opportunities for light industrial employment in a high quality landscaped environment in accordance with approved action area plans and subject to the provision of the necessary physical infrastructure	Not Acceptable
ST	To facilitate opportunities for science and technology based employment in a high quality landscaped environment in established science and technology parks	Not Acceptable
ST1	To facilitate opportunities for science and technology based employment and associated and complimentary uses in a campus style environment in accordance with approved action area plans and subject to the provision of the necessary physical infrastructure	Not Acceptable
MU1	To provide for an appropriate and compatible mixture of uses in accordance with approved action plans and subject to the provision of the necessary social and physical infrastructure	Open for consideration*
RV1	To protect and enhance the special physical and social character of rural villages and provide and/or improve village facilities to serve local needs in accordance with approved action area plans and subject to the provision of the necessary social and physical infrastructure	Not Acceptable
B	To protect and provide for the development of agriculture and rural amenity	Open for consideration**
B1 (Rush only)	To protect and provide for the development of horticulture and to provide for the housing needs of persons native to the area in accordance with an approved action area plan	Not Acceptable
F	To preserve and provide for open spaces and recreational amenities	Not Acceptable
G	To protect and improve high amenity areas	Not Acceptable
H	To provide for a Green Belt and to provide for urban and rural amenities	Not Acceptable

Source: Fingal County Council Draft Development Plan 1998

* *Where the use is subject to the overall zoning objective and specific objectives within that zone*

** *Where the use is subject to the overall zoning objective and specific objectives within that zone and not to be permitted in areas designated as Sensitive Landscape Areas*

The main areas in Fingal which create exclusion zones come under zoning objectives A, A1, NC, NCB, MVC, C4, D, L1, ST, ST1, RV1, B1, F, G, and H(Figure 5.6). These zones include the areas of:

Baldongan	Baldoyle	Blanchardstown	Carpenterstown
Clonsilla	Corduf	Donabate	Flacketstown
Garristown	Howth	Knockbrack	Lusk
Malahide	Malheney	Mulhuddart	Portmarnock
Portraine	Rush		

Areas not entirely classed as exclusionary zones include:

- Baldoyle
- Balbriggan
- Clonsilla
- Santry
- Swords

5.3.1.4 South Dublin County Development Plan 1998

The County Development Plan sets out the aims of the Council for the future planning and development of the County and provides guidelines on its development and conservation. The guidelines suggested are as follows:

- **Permitted in Principle**
  Land uses designated under each zoning objective as "Permitted in Principle" are, subject to compliance with the relevant policies, standards and requirements set out in the Plan, generally acceptable

- **Open for Consideration**
  This includes uses which may or may not be acceptable depending on the size or extent of the proposal and to the particular site location. Proposals in this category will be considered on their individual merits and may be permitted only if not materially in conflict with the policies and objectives of the Development Plan and if they are consistent with the proper planning and development of the particular area

- **Not Permitted**
  Uses listed as 'Not Permitted' are, except in exceptional circumstances as determined by the Planning Authority, not acceptable

The zoning objectives listed in the County Development Plan are illustrated in Figure 5.7 and presented in Table 5.4. The table also illustrates the acceptability of 'Industry Special' which is the use class under which the siting of a Thermal Treatment facility would fall.

Table 5.4 Development Plan Zoning Objectives for South Dublin.

Zone	Zoning Objective	Thermal Treatment Acceptability
A	To protect and/or improve Residential Amenity	Not Permitted
A1	To provide for new Residential Communities in accordance with approved Action Area Plans	Not Permitted
B	To protect and improve Rural Amenity and to provide for the development of Agriculture	Open for Consideration
LC	To protect, provide for and/or improve Local Centre facilities	Not Permitted
DC	To protect, provide for and/or improve District Centre facilities	Not Permitted
TC	To protect, provide for and/improve Town Centre facilities	Not Permitted
E	To provide for Industrial and related uses	Permitted in Principle
F	To preserve and provide for Open Space and Recreational Amenities	Not Permitted
G	To protect and improve High Amenity Areas	Not Permitted
GB	To preserve a Green Belt between Development Areas	Not Permitted
H	To protect and enhance the outstanding natural character of the Dublin Mountain Area	Not Permitted

Source: South Dublin County Development Plan 1998

The South Dublin County Council area is different to the other study areas in that quite a high proportion of the County is made up of mountainous terrain. Provision as been made in the County Development Plan to protect this resource by granting the Council control of any development above the 350m contour line. The objective of this development control is to retain the open natural character of the mountains and enhance outdoor recreational potential of the area while protecting and sustaining the environmental capacity of the upland landscape. The vast majority of the Dublin Mountains is therefore precluded from Thermal Treatment facility development.

Some of the main areas, which are excluded from Thermal Treatment facility development by zoning objectives A, A1, LC, DC, TC, F, G, GB and H(Figure 5.8) are as follows:

Ballyboden
Clondalkin
Greenhills
Newcastle
Palmerstown
Rathfarnham
Tallaght
Templeogue

Zone E, the zoning objective, which provides for industrial and related uses, lists 'Industry Special' as Permitted in Principle, examples of such areas are as follows:

- Ballyowen
- Clondalkin Area by the M50
- Cooldown Commons
- The Belgard/Cookstown/Monarch/Airton/Broomhill Industrial Parks north of Tallaght
- Walkinstown/Fox & Geese (east of the Red Cow M50 roundabout)

Zone B, the zoning objective, which provides for the protection and improvement of Rural Amenity and for the development of Agriculture, lists 'Industry Special' as Open for Consideration, examples of such areas are as follows:

- Ballybane
- Hazelhatch
- Newtown Lower/Upper
- Kiltipper

5.3.2 Proposed Natural Heritage Areas

The National Parks and Wildlife section of the Office of Public Works has prepared a list of proposed Natural Heritage Areas (pNHA's). A pNHA is an area deemed to be of special interest containing important wildlife habitat and often containing rare or threatened species. They may also be selected on the basis of their geology or geomorphology. pNHA's do not have any statutory protection yet but are protected under the Dublin City & each of the three County Development Plans. An amendment to the Wildlife Act (1976) has been proposed which will give legal backing to NHA's.

The Dublin Region also contains 2 Special Areas of Conservation (SAC's). These are protected under the Habitats Directive (92/43/EEC), which seek to protect wildlife and its habitats. SAC's are selected from NHA's on the basis of those which best meet the criteria of this directive. The species and habitats of these areas are protected making these areas sensitive to development of any kind.

Another group of sites under legislative protection are the Special Protection Areas (SPA's). These sites relate to the protection of birds and are covered under the European Bird Directive (79/409/EEC). Two categories of birds come under this:

1. Listed rare and vulnerable species

2. Regularly occurring migratory species

The EU Wild Birds Directive also obliges the conservation of wetlands of significance. The selection of SPA sites is based on scientific information and current EU standards. The SPA's are included in the pNHA's and may also overlap with the SAC's.

5.3.2.1 Dublin City

The pNHA's for Dublin City are illustrated on Figure 5.9. Under the Dublin City Development Plan, all pNHA's are regarded as exclusionary to the development of a Thermal Treatment facility. The pNHA's include the Royal and Grand Canals, Baldoyle Bay, Sandymount Strand, Dublin Harbour and Bay, and Feltrim Hills amongst others. The pNHA's include both SAC's and SPA's.

5.3.2.2 Dun Laoghaire-Rathdown County

The proposed natural heritage areas (pNHA's) are protected under the Dun Laoghaire-Rathdown County Development Plan (1998). A list of the NHA's and SAC's are included in the following table:

Site Name	Interest type and Importance Rating
Booterstown Marsh	Ecological; Local
South Dublin Bay*	Ecological; International
Dalkey coast and Killiney Hill (inc. Roches Hill & parts of Killiney Hill)	Ecological & Geological; International, National and Regional
Fitzsimon's Wood	Ecological; Local
Dingle Glen	Ecological; Local
Loughlinstown Wood	Ecological; Local
Shanganagh Coastline	Geological; National
Knocksink Wood	Ecological; International
Ballybetagh Bog	Ecological, Geological and Historical; International
The Scalp	Geomorphological; Regional
Ballyman Glen*	Ecological; International
Wicklow Mountain National Park (part of) *	Ecological & Geological; International

Source: Dun Laoghaire-Rathdown Development Plan (1998)

**These are also proposed Special Areas of Conservation (SAC's)*

Area No.7 'Shanganagh Coastline' and Area No. 10 'The Scalp' have not yet been designated.

All pNHA's as listed above are regarded as exclusionary to the development of Thermal Treatment facilities and have been identified on Figure 5.9.

5.3.2.3 South Dublin

The list of proposed NHA's are presented in the following table. It is the objective of the Council to protect those areas designated as such.

Table 5.6: pNHA's and SAC's in South Dublin

Site Name	Interest type
Liffey Valley	Ecological
Grand Canal	Ecological
Dodder Valley	Ecological
Lugmore Glen	Ecological
Slade of Saggart and Crooksling Glen	Ecological
Glenasmole Valley *	Ecological

Source: South Dublin Draft Development Plan (1998)

** This is also a proposed Special Area of Conservation (SAC).*

All pNHA's, as listed above, are regarded as exclusionary to the development of Thermal Treatment facilities and have been identified on Figure 5.9.

5.3.2.4 Fingal

The Fingal County Development Plan orders the protection and conservation of SAC's and SPA's. The pNHA's include both SAC's and SPA's, There was not a list of pNHA's and SAC's available in the Fingal County Development Plan, there areas are mapped on Figure 5.9. The pNHA's include the Bog of the Ring, Skerries Island, Loughshinny Coast, Rogerstown Estuary, Lambay Island, Malahide Estuary, Ireland's Eye, Howth Head, and the Liffey Valley amongst others.

5.3.3 Areas of Archaeological Interest

A list of Sites and Monuments of archaeological importance has been obtained through the National Monument section of the Office of Public Works (OPW) known as the Sites and Monument Records (SMR). This list has recently been updated to include a number of additional sites, although a number of sites have also been delisted. The revised list though not yet published, may be consulted in the OPW. All sites of archaeological importance in the Dublin Region are shown on Figure 5.10.

5.3.4 Airports

Guidelines relating to development near airports is provided by the Irish Aviation Authority (IAA) and the International Civic Aviation Organisation. When contacted, the Irish Civil Aviation Authority did not have guidelines regarding siting of Thermal Treatment Plants. The following three airports restrict development within the Dublin Region:

- Dublin Airport
- Casement (Baldonnel) Aerodrome, Co. Dublin – Military Aerodrome
- Weston Aerodrome, Co. Dublin – Privately operated

The Dublin County Development Plan (1993) created a horizontal height restriction of 45m within 4.8km radius of Dublin Airport thus preventing the development of a thermal treatment facility in that zone. The Plan also created restrictions on development within 6.8km radius of the airport. These restrictions apply particularly along the centre line of the runways and the proposed new runways and would not necessarily restrict development of a Thermal Treatment facility.

The South Dublin County Development Plan (1998) stipulates a 4km radius restriction on height, dependant on location, for the Baldonnel Airfield. These same restrictions apply to the Weston Aerodrome.

5.3.4.1 Dublin City

Parts of Dublin City are excluded as it comes within both the 4.8km and 6.8km exclusionary zones of Dublin Airport and its flight paths. The exclusionary area includes much of North Dublin City stretching from Finglas in the west to Darndale in the east. The exclusionary area is shown on Figure 5.11.

5.3.4.2 Dun Laoghaire-Rathdown

There are no airport exclusionary areas within the Dun Laoghaire-Rathdown area.

5.3.4.3 Fingal

Most of the southern section of Fingal County is excluded as it comes within both the 4.8km and 6.8km exclusionary zones of Dublin Airport and its flight paths. The exclusionary area is shown on Figure 5.11.

5.3.4.4 South Dublin

The South Dublin area comes within the 4km exclusionary zones of both the Casement (Baldonnel) Aerodrome and the Weston Aerodrome. The relevant zones around these two airports results in the exclusion of much of north-west South Dublin as shown on Figure 5.11.

5.5 CONCLUSION AND RECOMMENDATION FROM THE PRELIMINARY ASSESSMENT

The results of the preliminary assessment excluding the Group 1 criteria are as follows:

- The City and County Development Plans eliminate developed areas and areas designated for development as well as areas with Amenity Value. Amenity areas being in the East along the coast of the Fingal Area and in the southern sections of South Dublin and Dun Laoghaire/Rathdown

- Proposed Natural Heritage Areas. Of the three major areas, two are situated on the coast on either side of Dublin Harbour and one in the southern part of South Dublin and Dun Laoghaire/Rathdown. There are also three smaller areas at Dalkey, Howth and Baldoyle

- Areas of archaeology listed on the new National Sites and Monuments Records are excluded.

- Airport: Height Restriction within a 4.8km range for Dublin Airport and 4.0 for the Baldonnell and Western Aerodromes.

Figure 5.12 illustrates the combined exclusionary areas for all four local authority areas.

It should be noted that archaeological features do not necessarily exclude the area in question, this depends upon the archaeological importance of the site. During the siting process the "value" of the archaeological features will be assessed.

5.6 SELECTION OF POTENTIAL SITES FOR SHORTLISTING

5.6.1 Areas Suitable for the Development of Thermal Treatment

Having taken account of the Group 1 exclusionary factors, ten areas were identified as potential sites. These sites were visited and a preliminary assessment was carried out of their suitability for development as a thermal treatment facility. The sites are listed by local authority below.

Dublin Corporation:

A. The Poolbeg Peninsula in the Dublin Docklands area

B. The former Semperit factory off Killeen Road

Dun Laoghaire/Rathdown:

C. The Cherrywood area of Loughlinstown

D. Agriculturally zoned area of Glenamuck

E. The Tibradden section of Rockbrook

Fingal:

F. Industrial area west of Balbriggan

G. The Belcamp Area west of the Malahide Road

H. Agriculturally zoned land in Deanestown

South Dublin:

I. Vacant sites in the Walkinstown Industrial Park

J. Vacant industrial site in Newlands

These sites are identified on Figure 5.13.

6. SHORTLISTING OF SITES

6.1 SHORTLISTING PROCEDURE

6.1.1 Criteria for Preliminary Assessment

The preliminary assessment of the above stated shortlist of 10 sites was conducted by assessing each site according to the following siting criteria:

- Proximity to Waste Centre
- Road Access
- Traffic
- End-Market Use Possibilities
- Site Size and Current Land Use
- Proximity to Residential Areas

The criteria are discussed in more detail below:

6.1.2.1 Proximity to Waste Centre

One of the baseline factors in choosing preferred areas for thermal treatment facilities is the proximity of the site to the origin of waste. The majority of waste in Dublin is generated within the Dublin Corporation administrative area. The proximity principle adopts the notion that waste should be treated or disposed of close to its source of generation but with proper regard to protection of the environment. Sites in or relatively close to Dublin Corporation area would therefore be considered more favourable in terms of proximity to waste generation.

6.1.2.2 Road Access

The transportation of waste is a significant issue for a several reasons. The accessibility of the plant can affect the operational cost of the transfer. The transport of waste is often perceived by the public to be undertaken in a less competent and professional manner than the transport of other materials.

6.1.2.3 Traffic

The impact from traffic is always a serious concern to the local community in the siting of any waste treatment facility. Traffic impacts can include noise, vibration, dust, air emissions, visual intrusion and the potential for accidents. The perceived impact will depend on the number of dwellings the traffic passes and the relative increase in traffic on a particular road. It will also depend on the quality of the road along which the traffic must pass as a poor road will result in a greater perceived (and real) impact in terms of the intrusion on the local inhabitants and also in terms of the potential to generate accidents. In addition to the impacts on local inhabitants, traffic affects the general environment by causing adverse air quality and traffic congestion/disruption to other road users.

The major traffic impacts related to the siting of a thermal treatment facility will occur along the route from the point of the waste generation to the treatment facility. Each potential site will have a number of possible routes from the source of waste. In reality the most likely route will be that which is the quickest for the waste to be transported. This is in turn a function of the distance along a particular route combined with the quality of the road along that route such as the quality and road designation, national or regional etc. will affect the speed at which the waste transportation vehicle can travel.

The most likely route to be used by waste hauliers to the site has been assessed in terms of distance and the type of roads along the route. Although some sites may have longer haul distances, their proximity to the M50 or other major roads minimises their traffic related impacts by taking traffic away from residential areas. Thus, the routes have then been assessed relative to the other sites and a suitable rating allocated.

6.1.2.4 End-Market Use Possibilities

The end market possibilities have been discussed in detail in the "Feasibility Study for Thermal Treatment of Waste for the Dublin Region." Each of the potential thermal treatment technologies produce a variety of output products which require to differing degrees, a market to make the technology economically viable. Waste combustion produces energy in the form of electric power and/or heat, which can be supplied to industry, district heating or to drying of different materials such as sludge. The metals reclaimed can be sold to the scrap metal market while clinker can be used as aggregate for road construction following further limited processing.

Gasification also produces a low calorific gas which can also be used in kilns or combusted directly for power/heat generation. Pyrolysis produces a gas which is suitable for kilns, power/heat generation while the char residue has potential use as a fuel for kilns also or for the production of activated carbon for wastewater and flue gas treatment. Potential consumers of these products would be local industry, district heating companies, power plants, cement companies and possibly waste water treatment plants.

6.1.2.5 Site Size and Current Land Use

Ideally the area selected should be vacant land and of sufficient size to meet the requirements of and infrastructure required by a thermal treatment facility. The land use factor also takes into account the general impact on the area in terms of loss of open space or other use which in turn is reflected in the quality of the land and its current land use.

6.1.2.6 Proximity to Residential Areas

While there are no documented adverse impacts from living near to a thermal treatment facility the public perception may be otherwise. There is also concern in the public mind as to how the proximity to such a facility would impact on property value. None of the areas selected have residential zoning as it was considered inappropriate given the scale of the facility. However, there may be some benefits to a community close to the facility such as district heating capacity, employment generation with benefit to local community, reduction in waste transport for local industry and increase in house purchases due to increased demand. In terms of evaluation of suitable areas, those situated close to residential areas scored lower.

6.2 PRELIMINARY ASSESSMENT

A matrix of the ten potential sites was created in order to perform a qualitative evaluation of the individual site suitability. Through this process the 5 most suitable sites for development of a thermal treatment facility were attained. Below is a brief summary table of the criteria assessment on the sites, more detail of each individual site is located in Appendix A.

Table 6.1 Brief Description of 10 Shortlisted Sites

Site	Description	Relative Suitability
Site A **Poolbeg**	Located in Dublin Corporation, thermal treatment is considered a permissible use in the Development Plan zoning. The proximity to waste centre is very good and although currently just satisfactory, road access is set to improve in line with timescale for development of thermal plant. Traffic in the area is heavy at times, however industrial nature of the area is suitable for trucks coming to/going from facility. There are many options for end market use in the vicinity of the site and there are no residential dwellings within 1km.	More Suitable
Site B **Killeen Road**	Located in Dublin Corporation, thermal treatment is considered a permissible use in the Development Plan zoning. The proximity to waste centre is good and there is opportunity for end market use in the area. The local road network linking the site to the N7 is not sufficient for use by industrial vehicles. The site is a large factory adjacent to the rail line and located within 250m of the southwestern portion of Ballyfermot which is primarily residential.	Less Suitable
Site C **Cherrywood**	Located in Dun Laoghaire-Rathdown., Industry-Special is considered permitted in principle in the Development Plan Zoning. The proximity to waste centre at the site is fair in relation to other assessed locations. There is excellent possibility for end-market use as a science and technology park is currently under development adjacent to the site. The proposed extension of the M50 adjacent to the site will provide good road access. Currently the site is vacant and there are no residential dwellings within 500 meters of the site.	More Suitable
Site D **Glenamuck**	Located in Dun Laoghaire-Rathdown. Industry – Special is considered open for consideration under the agriculture zoning of this site. The proximity to waste centre of gravity is poor as the site is located at the southern end of the region close to the Dublin Mountains. The site provides easy access to the M50 however vehicles must pass through residential village en route. There are no possible end users located in the vicinity of the site. Currently the site is a rolling field in an agricultural area with moderately dispersed residential dwellings.	Less Suitable

Site	Description	Relative Suitability
Site E **Tibradden**	Located in Dun Laoghaire-Rathdown. Industry – Special is considered open for consideration under the agricultural zoning. The proximity to waste centre of gravity is poor as the site is located beyond the urban fringe of the county. The site provides easy access to the M50 however vehicles must pass through residential neighbourhood en route. There are no likely end users located in the vicinity of the site. Located in a predominately agricultural area with moderately dispersed residential dwellings	Less Suitable
Site F **Balbriggan**	Located in Fingal, thermal treatment is considered Open for Consideration under the Development Plan zoning for the site. The proximity to waste centre of gravity is poor as the site is located in the northern section of Fingal, far removed from the urban areas in the southern portion of County Dublin. Although road access to the site is good, vehicle traffic would have a long distance to travel which is not optimal for waste transportation. Located in a high-tech business park there are potential end users for energy. The site lies within 250m of a major residential area.	Less Suitable
Site G **Belcamp**	Located in Fingal, thermal treatment is considered Open for Consideration under the Development Plan zoning for the site. Proximity to waste centre and road access are good however, trucks would have to travel across city centre which is not optimal. The land is currently open space and there is a possibility for end market use. The site is in very close proximity to residential areas of Clare Hall and Darndale.	Less Suitable
Site H **Deanestown**	Located in Fingal, thermal treatment is considered Open for Consideration under the Development Plan zoning for the site. Located in fair proximity to the waste centre of gravity there are several potential end users located in business/commercial estates near the site. Although the M50 is located close to the site, travel through Blanchardstown village occurs en route. Although there are no major residential areas within 250m of the site there is a hospital located to the south of the area.	Less Suitable

Site	Description	Relative Suitability
Site I **Walkinstown**	Located in South Dublin, Industry – Special is considered 'permitted in principle' under the Development Plan zoning for the site. The site is in good proximity to the waste centre of gravity and provides easy access to the M50. Located within an industrial estate, there are several potential end users in proximity of the site. Traffic in the area is a mix of industrial/commuter and is not extremely heavy. Currently there are three potential sites which are all open fields within the Industrial Estate. Although there are moderately dispersed residential dwellings throughout the Estate the area is mostly removed from residential dwellings.	More Suitable
Site J **Newlands**	Located in South Dublin, Industry – Special is considered 'permitted in principle' under the Development Plan zoning for the site. Located along the N7 in close proximity to the M50, the site provides good road access. Traffic in the area is often heavy with a mix of Industrial and commercial vehicles. There may be potential for end market use, however there is none adjacent to the site. The site is an industrial zoned area surrounded by residential development.	More Suitable

6.3 FOUR SHORTLISTED SITES

The four sites (figure 6.1) which ranked as 'More Suitable' in the preliminary analysis were then subject to a much more detailed assessment of the above criteria as well as general planning and environmental issues surrounding the site. The results of this assessment are detailed below.

6.3.1 Cherrywood

This site is located west of Loughlinstown village in the local authority area of Dun Laoghaire/Rathdown County Council. The proposed South Eastern Motorway extension of the existing M50 ring road runs adjacent to the site on its south western side. The site is approximately 19.3 acres of open space zoned by the Dun Laoghaire-Rathdown Development Plan as Objective E : To provide for industrial and related uses. Industry – Special and Industry – General are both considered 'Permitted in Principle' as use classes related to the zoning objective. It is important to note that development of this land is contingent on the completion of the South Eastern Motorway as it is stipulated in the plan for the area that no development may occur until the Motorway is completed.

Adjacent to the site on its southeastern boarder is the proposed Cherrywood Science and Technology Park which has already begun development. This park has immense potential to serve as an end user of energy created by the thermal treatment process. The current development plan for the Cherrywood Science and Technology Park proposes the development of a golf course on the parcel of the park adjacent to the site. The golf course could be engineered to use the end products of the plant as energy for its upkeep and daily activities.

Located in the foothills of the Dublin Mountains the development of a thermal treatment facility would be mildly intrusive on the current landscape of the area. However, the development of the Cherrywood Park and the South Eastern Motorway will add to the industrial/commercial nature of the area and thus decrease the overall impact a thermal treatment facility would have on the area. In order for vehicles to gain access to the site from the M50 they would have to travel through the Cherrywood Science and Technology Park via the developments proposed road scheme which is detailed on Figure 6.1. The Carrickmines Golf Course is located 600m west of the site. Less than 1km north of the site there is an area of forest which would provide natural screening between the site and the village of Cabinteely.

A small tributary stream from the Loughlinstown River runs 50m from the extremities of the site and 160m from the centre of the suitable area. There are Megalithic Tombs located 700m south east of the site and 800m north of the site. The Tully Church and Graveyard (Ruins) and two Crosses are located 600m north east of the site. None of these factors should influence the development of the site as a thermal treatment facility as their respective exclusion zones do not infringe on the site boundaries.

Although the site is a good distance from the above people-oriented facilities, it is in close proximity to several residential dwellings. There is only 140m between the south eastern point of the site and its closest residential homes. From the centre of the site there is 325m from this same area.

The main advantages and disadvantages of the siting a thermal treatment facility at this site are summarised in the Table 6.2**.** A detailed map of the site is shown in Figure 6.2.

Table 6.2 Summary of Cherrywood

Advantages	**Disadvantages**
Zoned industrial	Development contingent on completion of South Eastern Motorway
Adjacent to South Eastern Motorway	Plant would be intrusive on visual quality of current landscape
Strong potential for end user	Within 150m of residential neighbourhood

6.3.2 Poolbeg

This site is located in the Poolbeg Peninsula area of the Dublin Docklands, which falls under the Dublin Corporation City Development Plan. Under this Plan, all of the Docklands area is zoned under Objective Z7: to provide for the protection and creation of industrial uses, and facilitate opportunities for employment creation. An incineration plant is listed as a permissible use under this zoning objective.

The Docklands Development Authority has created a Docklands Area Master Plan, which sets specific objectives for the Docklands area. Poolbeg Peninsula is sectioned off into three different zoning objectives under the Dockland Development Authority's Master Plan. The majority of the area is zoned under objective E2 which considers Industry – Light as normally permissible but does not allow for Industry – General which a thermal treatment plant would most likely fall under. The southern docklands is divided into two zoning objectives. A strip along the southern coast is zoned under objective K which does not permit Industry – Light or Industry – General. The section between these

two zones falls under objective E1 which considers Industry – Light and General as normally permissible.

This site is central in terms of proximity to the waste centre of gravity. Traffic in the Docklands area is considerable due to the large amount of industrial/ commercial activity as well as commuter traffic over the toll bridge. Road access at present is satisfactory. There are major roads projects planned that will increase access to this site significantly. The North Port Tunnel will connect the North Port section of the Docks to the M50 in Santry. The tunnel is planned to be completed in late 2003 which will allow for access previous to the completion of development for the thermal treatment plant. The Dublin City Development Plan call for the creation of an Eastern by-Pass Route which will link the North Port to the N11 in Merrion. There is no precise time frame for the creation of this route as the planning is subject to an EIS, however it can be expected within the timeframe for the City Development Plan (1999-2004).

The current landscape of Poolbeg Peninsula is predominately industrial with several high heat users and potential end users for energy produced by the plant. There are also a number of existing chimneys especially the twin stacks of Poolbeg Power Station which are 210m in height. Due to the existing industrial landscape in the area, the siting of a thermal treatment facility would be subject to the current landuse and have minimal visual impacts. It is possible that heat generated from the plant could be used to thermally dry sludge from the upgrading of the Ringsend Sewage Works under the Dublin Bay Project.

A major advantage of the Poolbeg site is the relatively large distance between the land and residential areas. The closest major residential neighbourhoods are all located greater than 1km from the site. There are 1.4km between the site and Ringsend, 1.5km between the site and Sandymount and 2.5km between the site and the beach in Clontarf. Another advantage of the site is that the prevailing wind is southwesterly which would bring the dispersion plume out to sea.

Adjacent to the eastern border of the site is the Irishtown park which is classed under the Docklands Area Master Plan as a Natural Habitat Area. This is a classification of terrestrial ecological importance. The site is bordered on the south by Sandymount Strand which is a proposed Natural Heritage Area. Development of the site would have to be in the context of the ecological and amenity importance of the area. There is no known archaeology on the site.

The main advantages/disadvantages to siting a thermal treatment facility at this site in the Poolbeg Peninsula are summarised in Table 6.4. A detailed map of the site is shown in Figure 6.3.

Table 6.3 Summary of Poolbeg

Advantages	Disadvantages
Zoned industrial	Traffic
Central in terms of proximity to waste production centre of gravity	Possibility of negative perception by local residents related to increase in existing industrial infrastructure
Road access will be good upon completion of several current projects	
No houses within 1km of site	
Would fit well with existing chimneyscape in industrial setting	
Prevailing south-westerly wind	
Potential for use of energy to dry sludge	

6.3.4 Newlands

The site is located along the Naas Road approximately 1km west of the Red Cow M50 roundabout in the local authority area of South Dublin County Council. The site is 7acres of open space and is currently for sale by public tender. The land is zoned by the South Dublin County Development Plan as Objective E: to provide for industrial and related uses. Industry – Special is permitted in principle under this objective.

Located along the northern side of the N7, there is potential for end market industrial/commercial use in the area. However, the majority of industrial/commercial properties in the area are located along or off of the southern side of the N7. There would be not potential end users adjacent to the plant. Traffic along the Naas Road is heavy during the morning and evening commuter periods. Proximity to both the N11 and the M50 creates good road access for industrial vehicles carrying waste to and from the site.

The site is within 50m of major residential neighbourhoods along all of its borders bar the southern border which faces the Naas Road. There is a small stream that is part of the Cammock River catchment which runs 1km south of the site. The Grand Canal is located 1.4km north of the site. There is a Mound Gate-Tower and two other areas of archaeological interest locate 1.15km south east of the site. A fire station along R113 is located 1km south of the site. The Newlands Golf Course is located 1.2km south west of the site. A Holy Well is located 700m west of the site and several areas of archaeological interest are located between 1-1.5km north west of the site in Clondalkin. There is a college located 450m north west of the site, a school 800m north west of the site and a third school located 1.35km south east of the site in the Kilnamanagh area.

The main advantages/disadvantages of siting a thermal treatment facility at Newlands are summarised in Table 6.5. A detailed map of the site is shown in Figure 6.4.

Table 6.4 Summary of Newlands

Advantages	Disadvantages
Zoned industrial	Relatively weak end-market potential
Good road access	Traffic
Good proximity to waste centre of gravity	Site is adjacent to major residential area

6.3.4 Robinhood

This site is located in the Walkinstown Industrial Estate in the local authority area of South Dublin County Council. The site is 16 acres of open space zoned by the South Dublin County Development Plan as Objective E: To provide for industrial and related uses. 'Industry Special' is permitted in principle in this designation.

There are good possibilities for end market use as the site is located within the Walkinstown Industrial Estate. Also with the M50 close by new industries may be located within the area in the future. There is opportunity for high heat users in the industrial estate as the Smurfit Paper recycling and other potential high heat users are located there. As the site is located within an industrial estate, the existing traffic is predominately cars and industrial vehicles. This site is located along Ballymount Road Lower, which is one of the more major roads for the industrial estate. The road access at site is very good as the site is in close proximity to two M50 roundabouts.

The site is located 100m south of a tributary of the Cammock river. The site is 1.7 km south of the Grand Canal. There is a holy well 750m east of the site. Drimragh Castle and a church in Bluebell are located approximately 1.5km north east of the site. There are no schools located within 1km of the site. The closest school is located in Walkinstown at a distance of 1.2km to the north east. There are moderately dispersed residential dwellings throughout Walkinstown Industrial Estate. The closest major residential neighbourhood is the northern portion of Greenhills which is 1km south of the site. The north western portion of Kilnamanagh lies 1.4km from the site and a residential portion of Walkinstown is 1.2km north east of the site.

The main advantages/disadvantages of siting a thermal treatment facility at Robinhood are summarise in Table 6.6. A detailed map of the site is shown in Figure 6.5.

Table 6.6 Summary of Robinhood

Advantages	Disadvantages
Zoned industrial	Traffic
Strong end market potential	Moderately dispersed residential dwellings throughout industrial estate
Road access	
No major residential neighbourhoods within 1km	

It should be noted that the site maps are diagrammatic and distances are approximate, as the selected area does not necessarily represent the area that would have to be purchased and developed for a thermal treatment facility.

6.4 SELECTION PROCEDURE

Based on the qualitative analysis of the shortlisted sites, the following four sites have been chosen as suitable for a thermal treatment facility in order of preference:

1. Poolbeg
2. Robinhood
3. Cherrywood
4. Newlands

6.5 SELECTED SITE AND CONCLUSION

The Poolbeg Site has been identified as the preferred site through a systematic assessment of areas suitable for thermal treatment development in City/County Dublin. Preliminary assessment of available land in the Poolbeg Peninsula shows suitable land available adjacent to the existing treatment works at Ringsend. The site offers strong potential for end market use, is not in close proximity to residential areas, and the new road developments will make the area accessible from every part of the Region. The site currently contains a large amount of existing power industry with chimneystacks so the facility will not be visually intrusive. It's location within the waste production centre of gravity for the region supports the proximity principle.

The next phase of development should take special note of the areas of ecological concern in close proximity to the site. The facility planning will need to satisfy the public concerns with ecologically sound engineering and development. In order to achieve success in siting any waste facility it is important to involve the public in the process, engender their trust and convince those most affected by the proposal that it is the best solution to the problem.

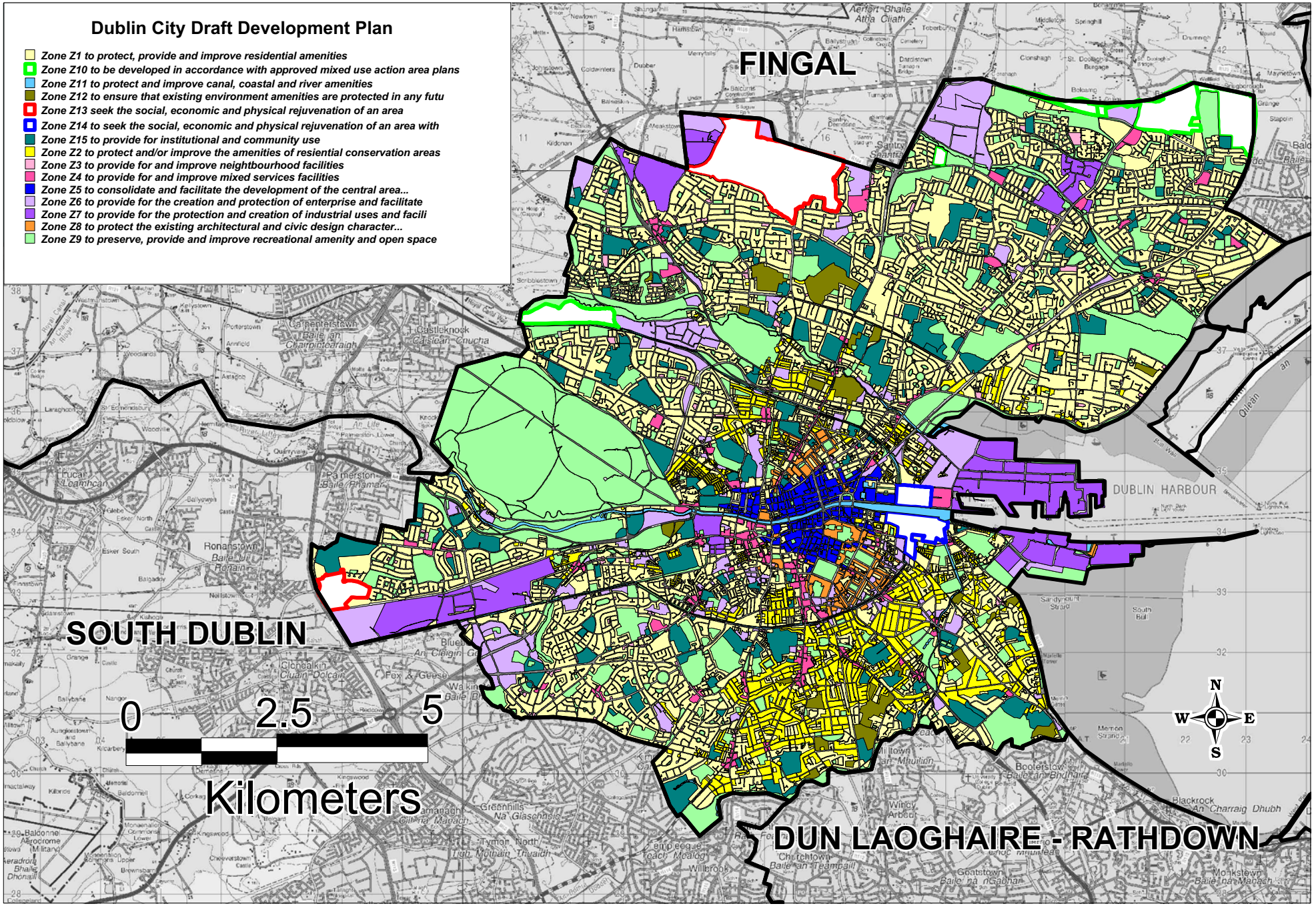


Figure 5.1 Dublin City Development Plan Zoning

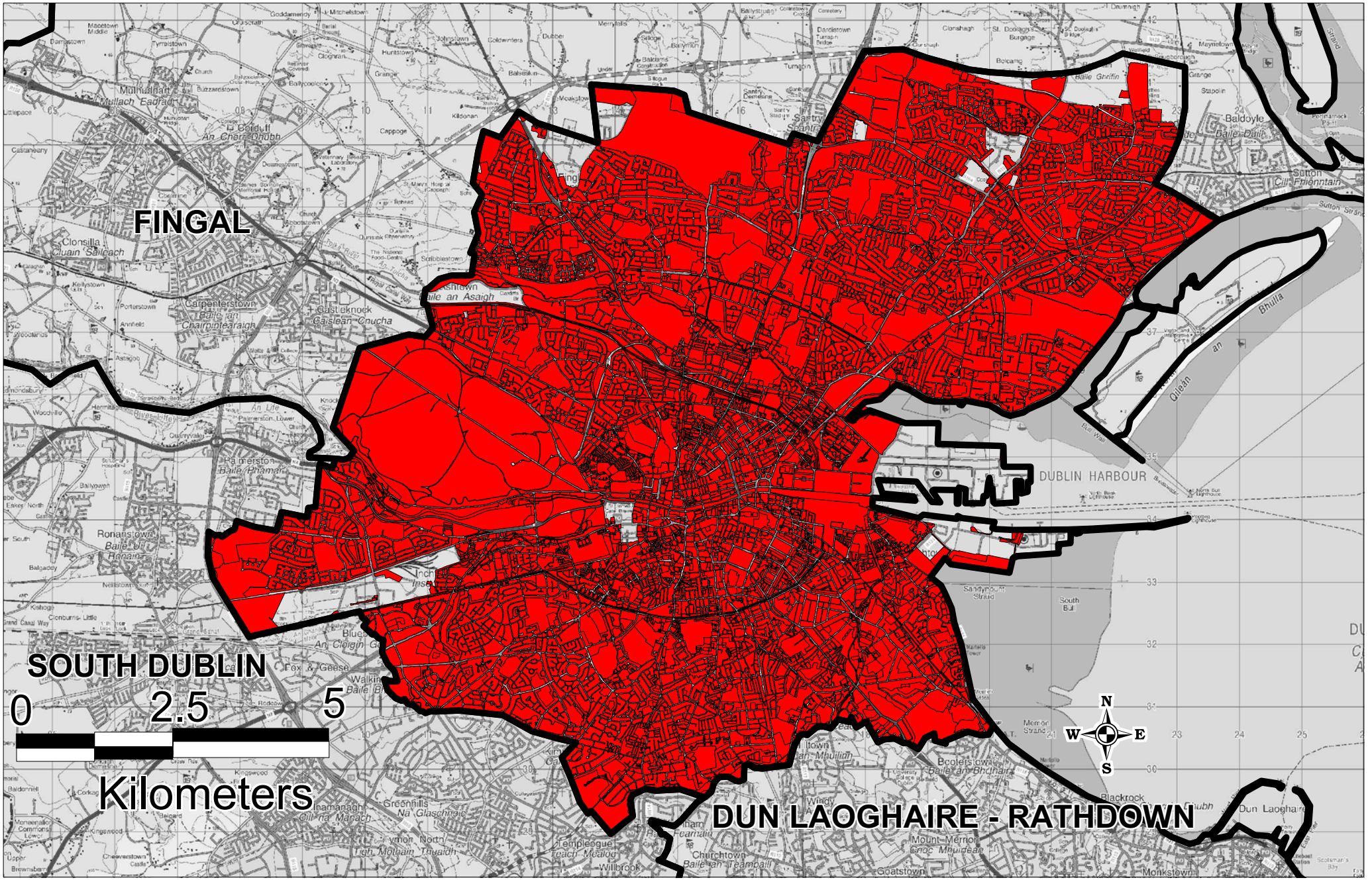


Fig. 5.2 Dublin City Thermal Treatment Exclusionary Areas

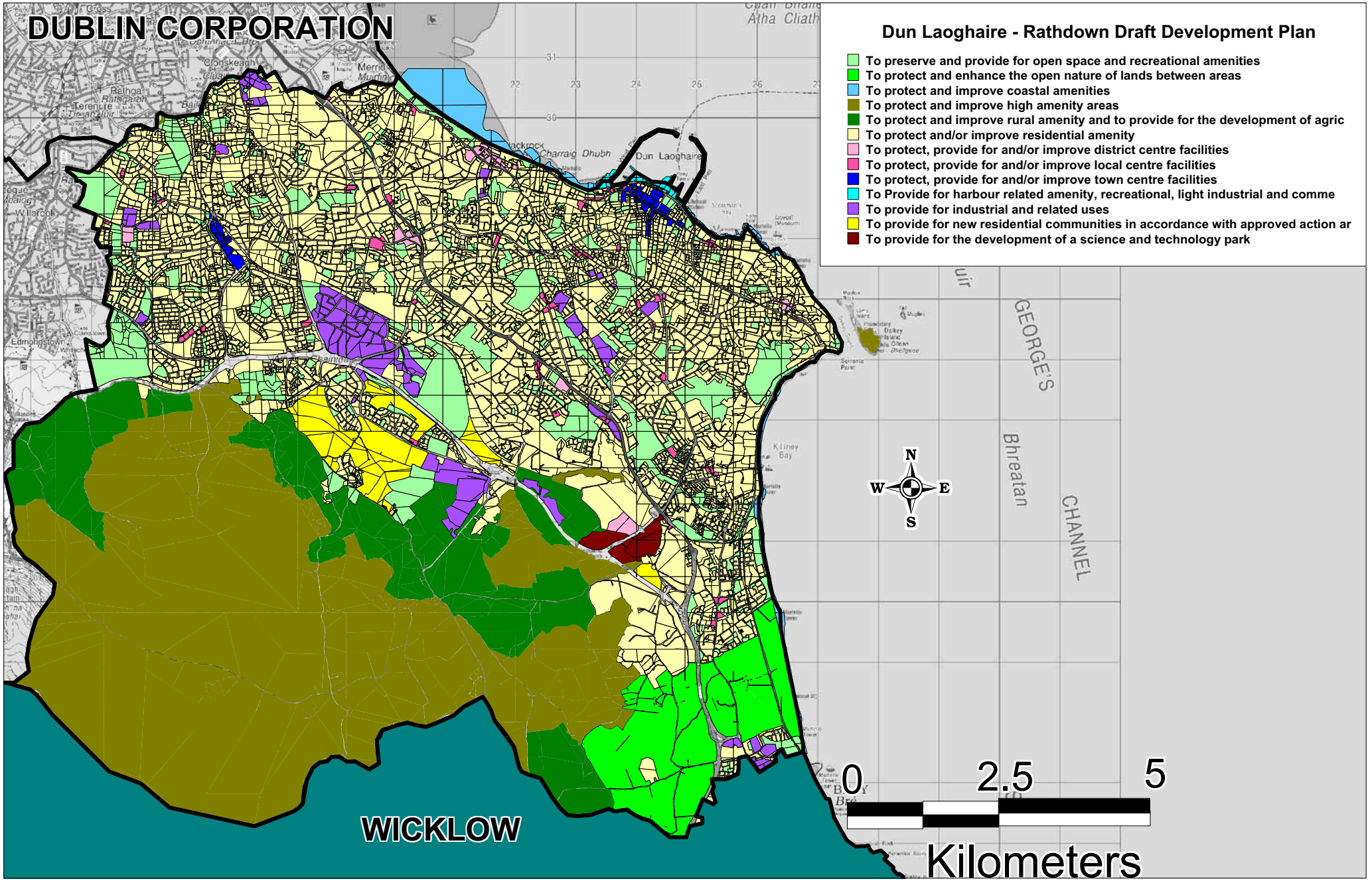


Figure 5.3 DLRCC Development Plan Zoning

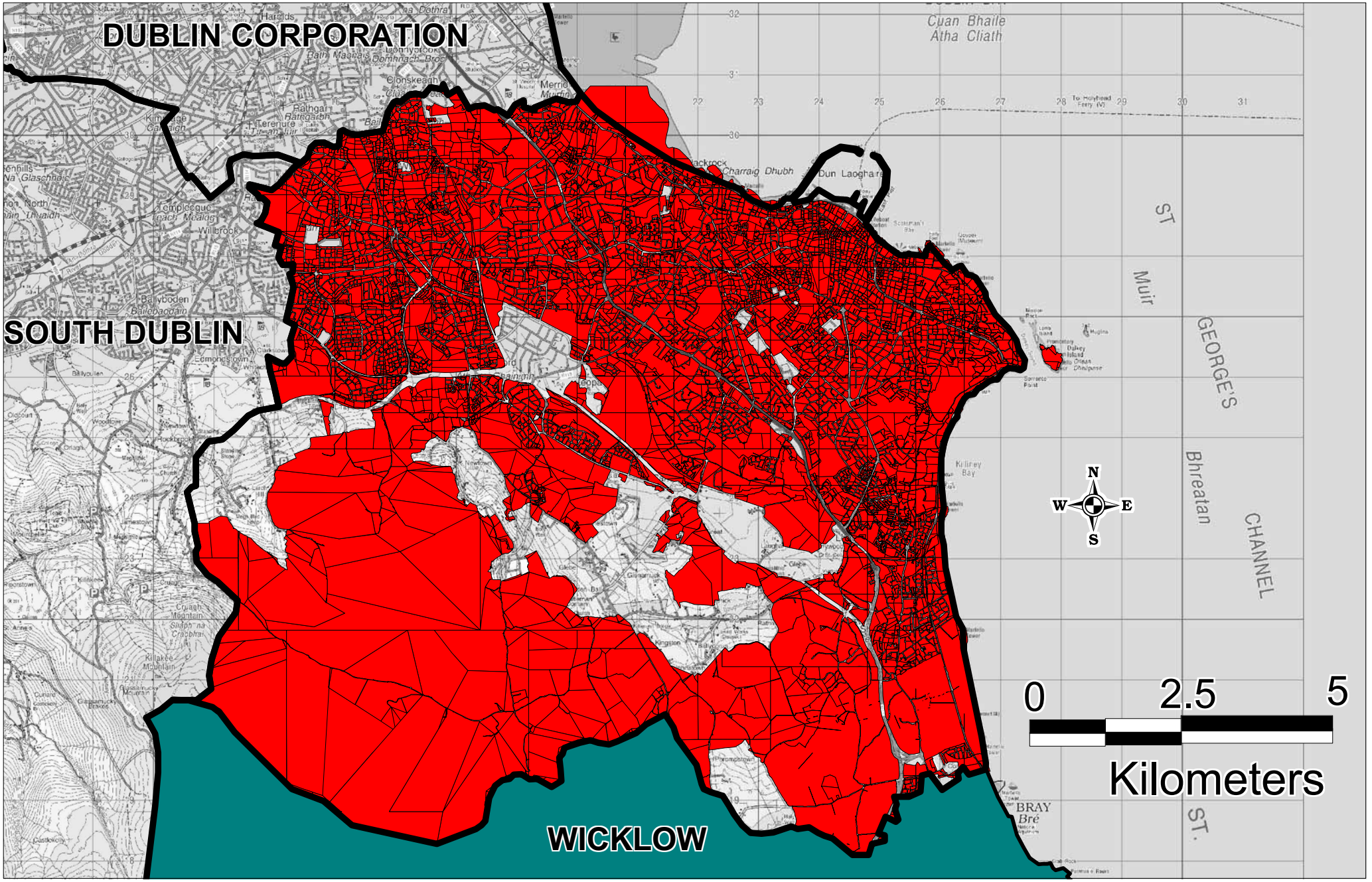


Figure 5.4 DLRCC Thermal Treatment Exclusionary Areas

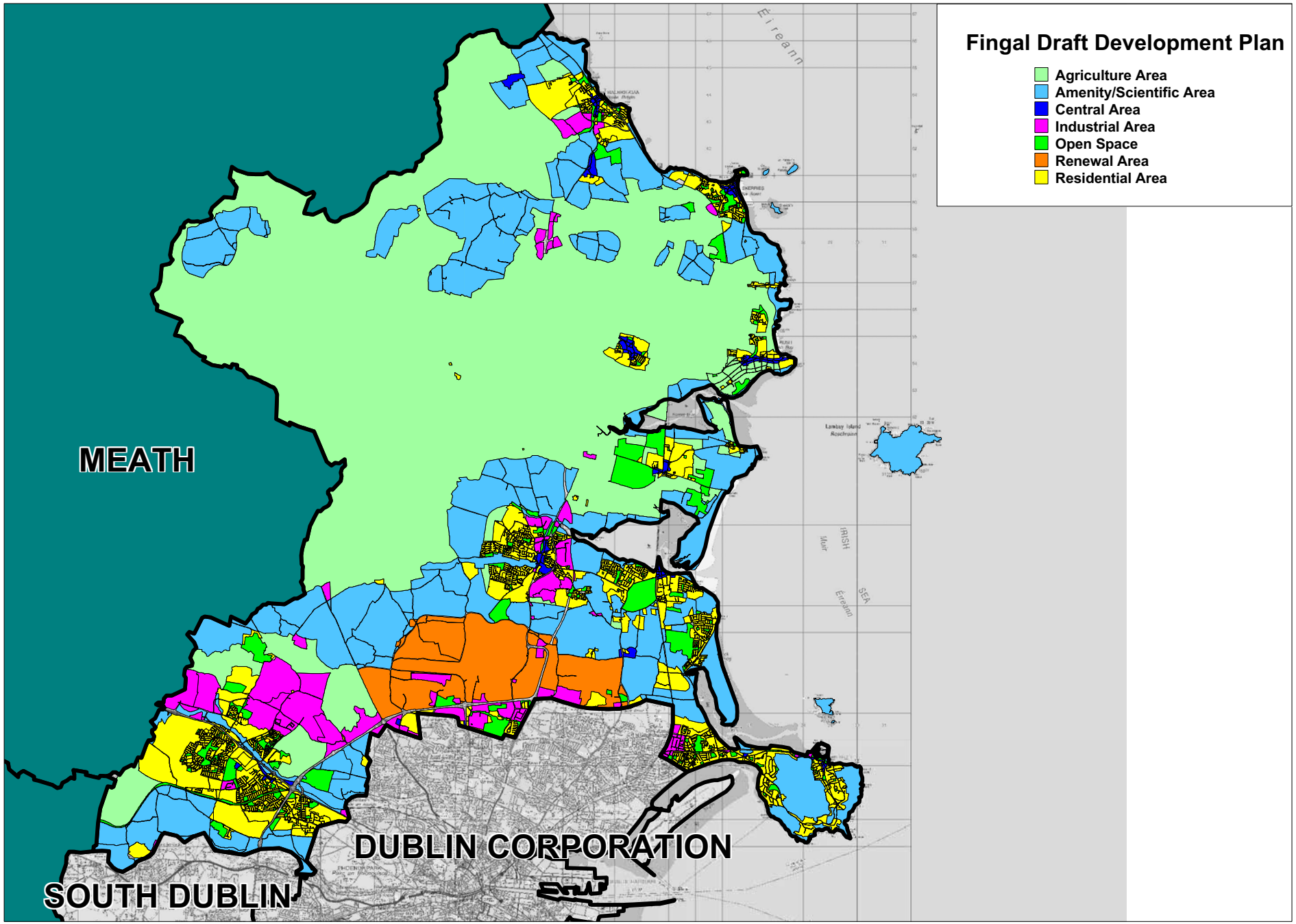


Figure 5.5 Fingal Development Plan Zoning

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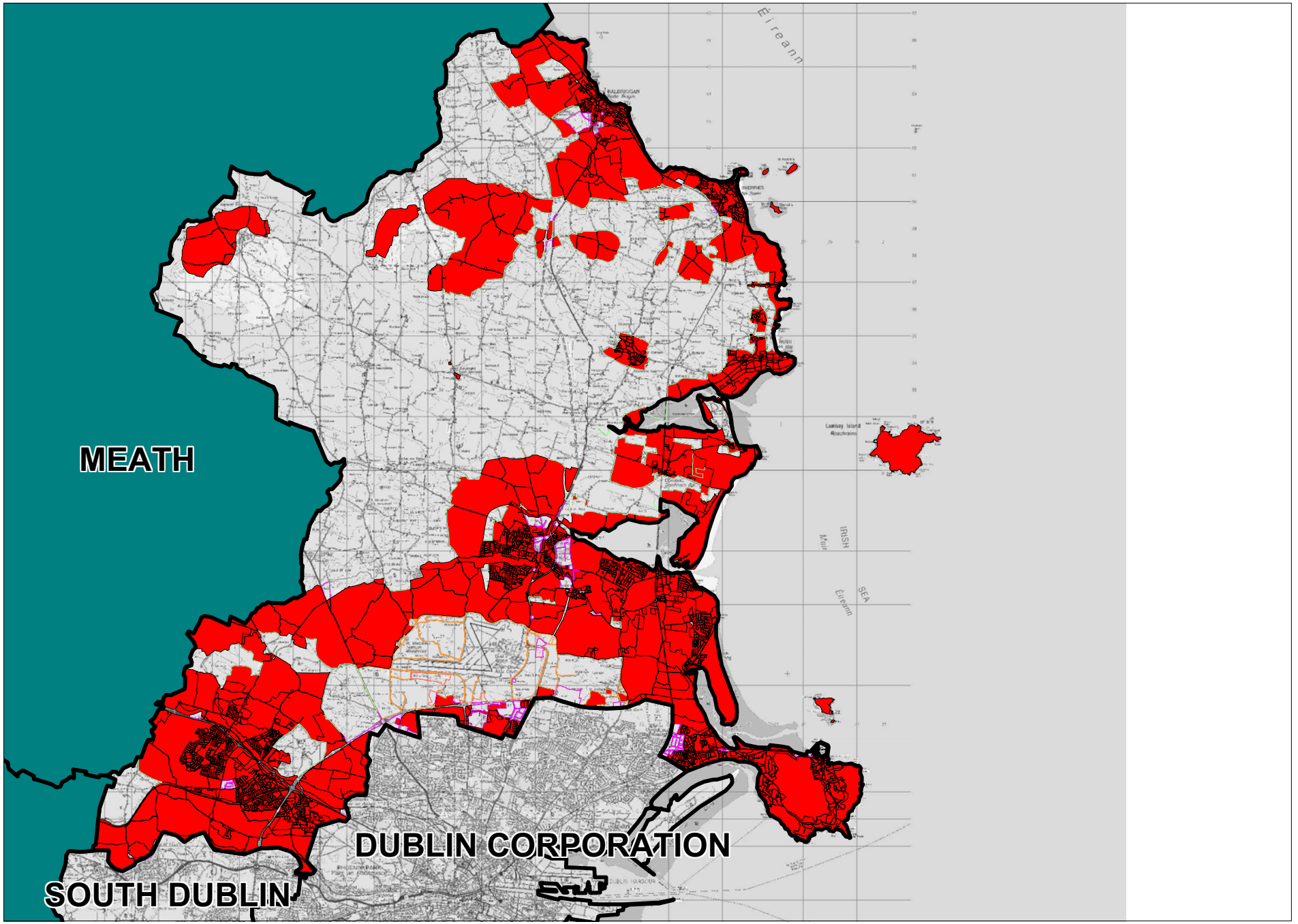

Figure 5.6 Fingal Thermal Treatment Exclusionary Areas

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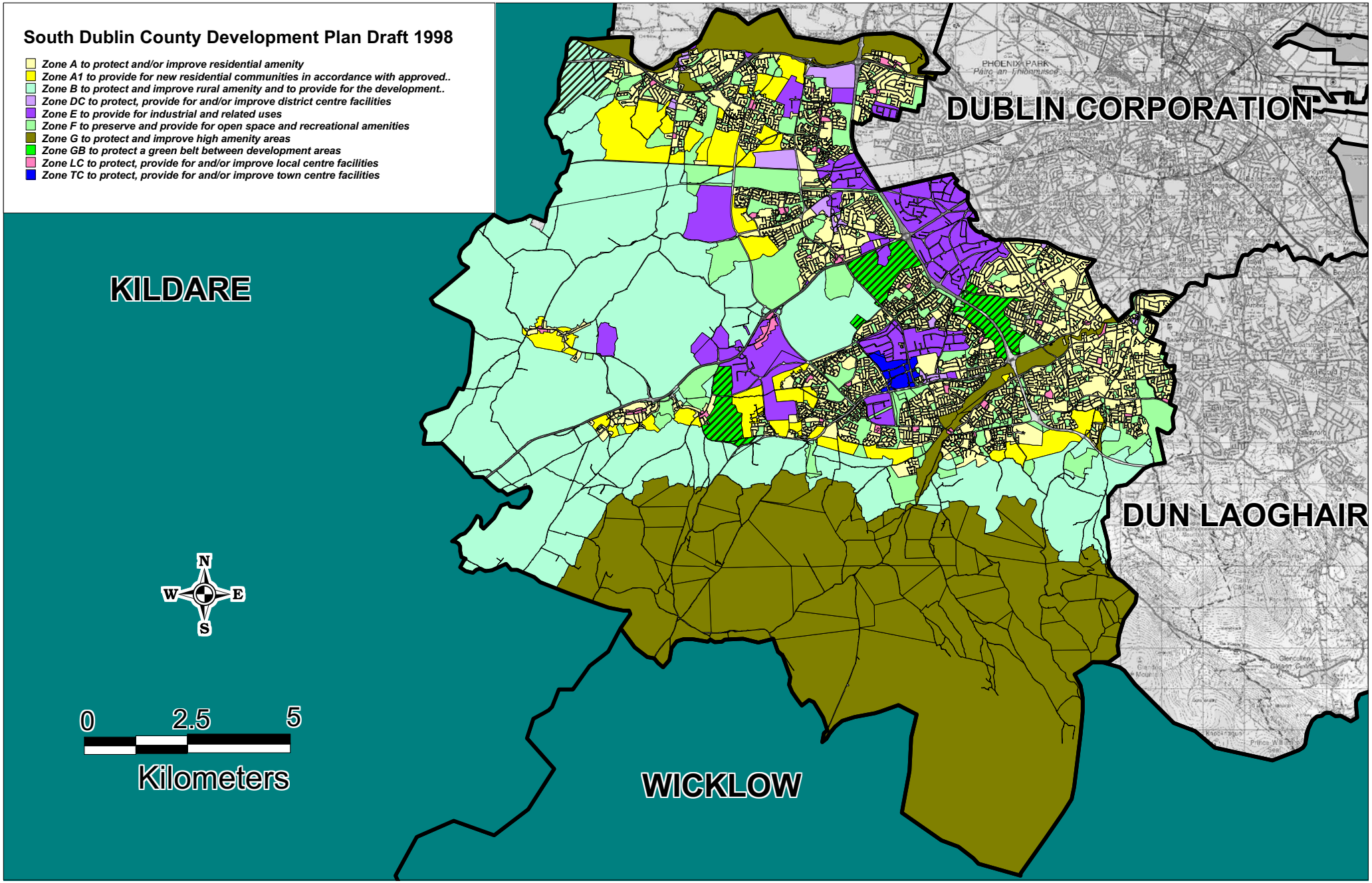

Figure 5.7 South Dublin Development Plan Zoning

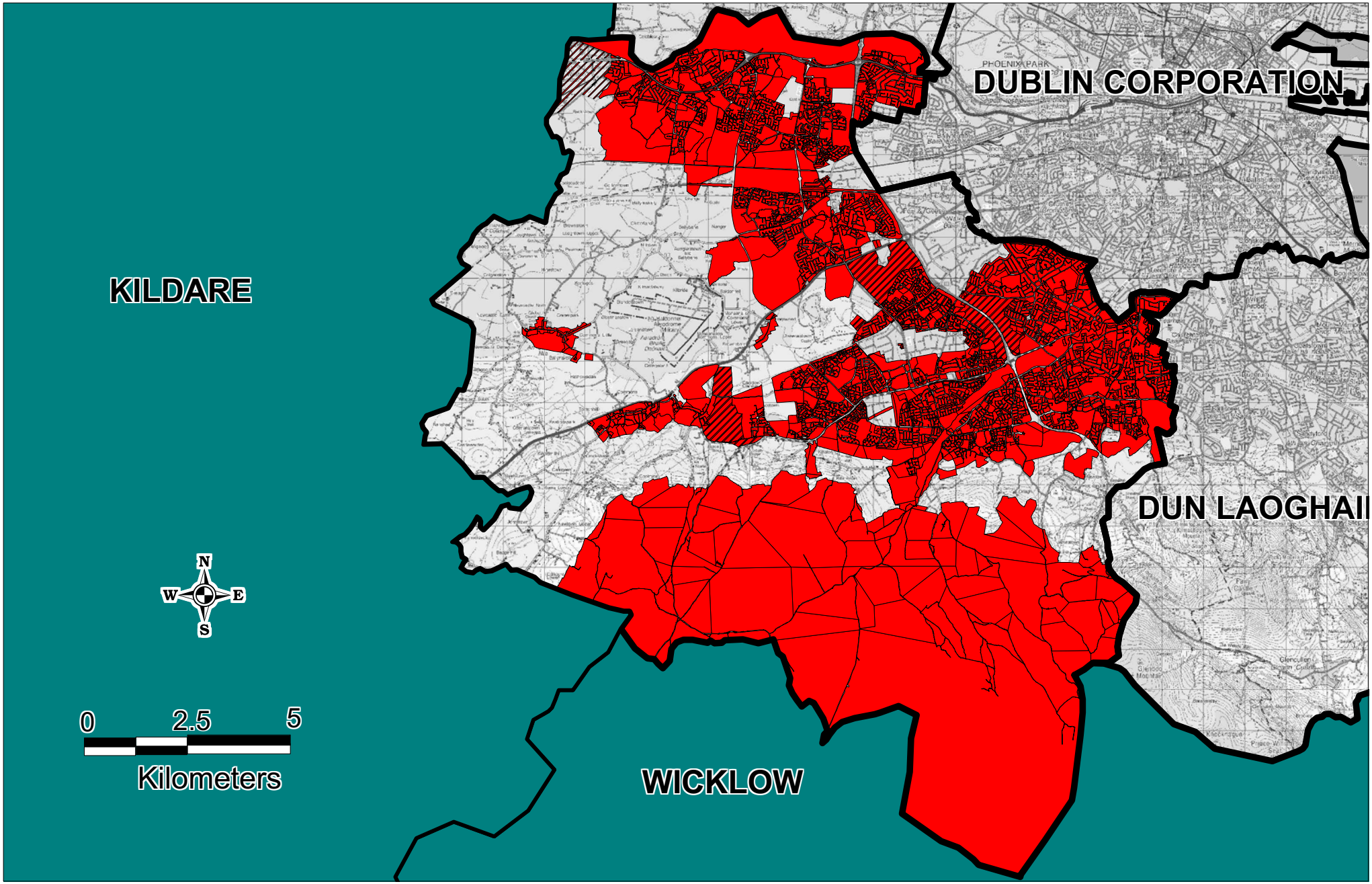

Figure 5.8 South Dublin Thermal Treatment Exclusionary Areas

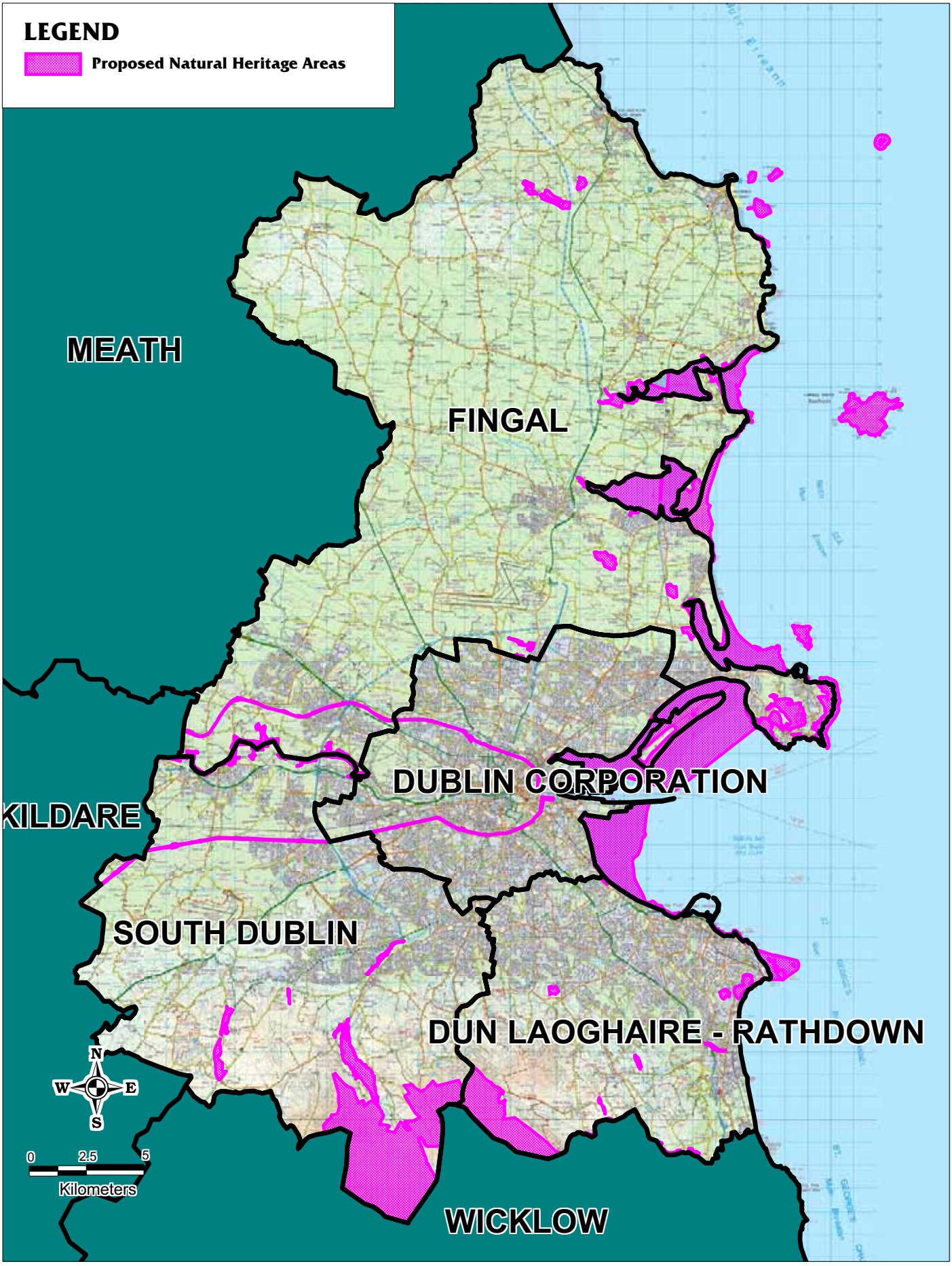

Figure 5.9 Proposed Natural Heritage Areas

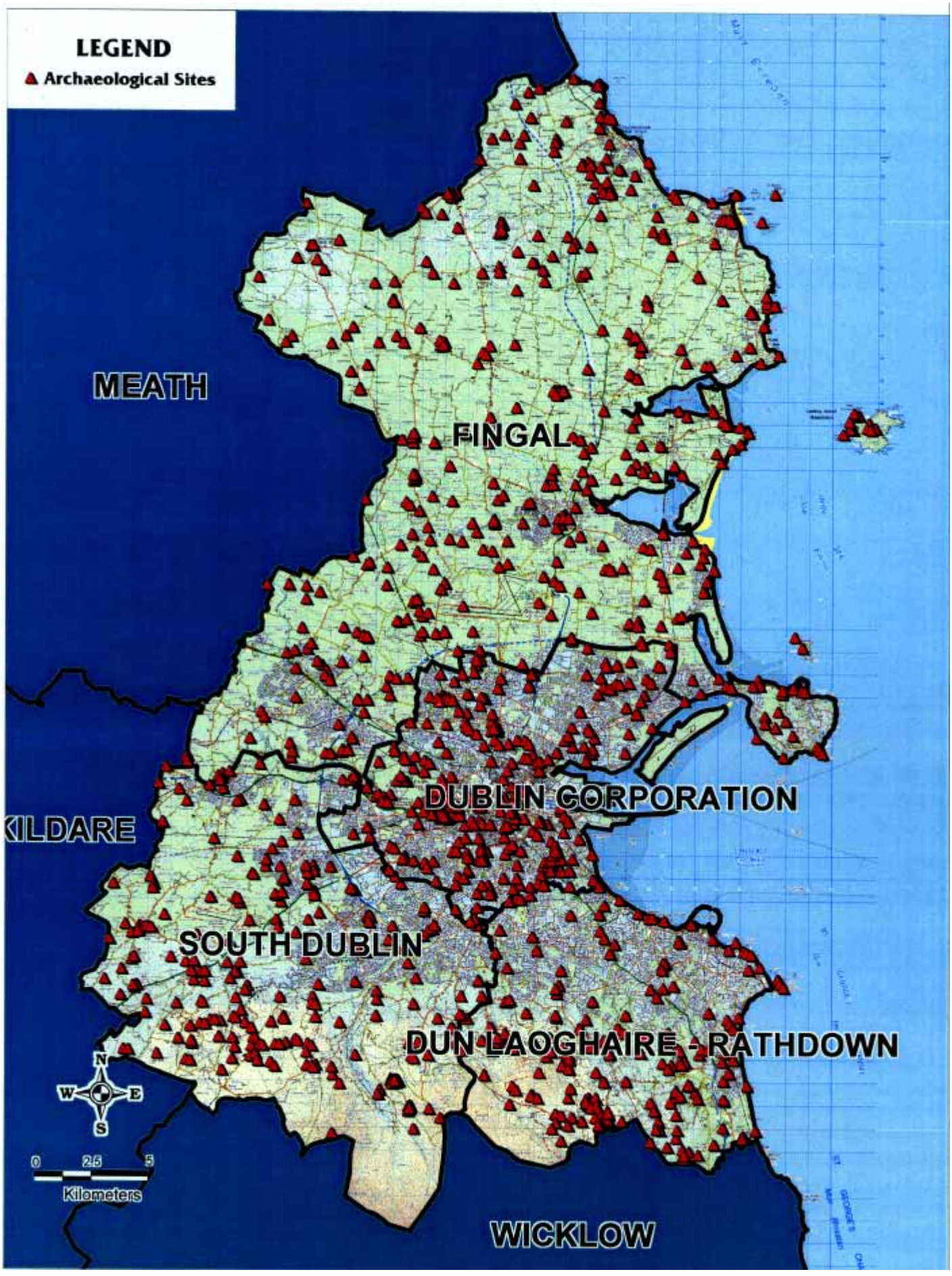

Figure 5.10 Areas of Archaeological Interest

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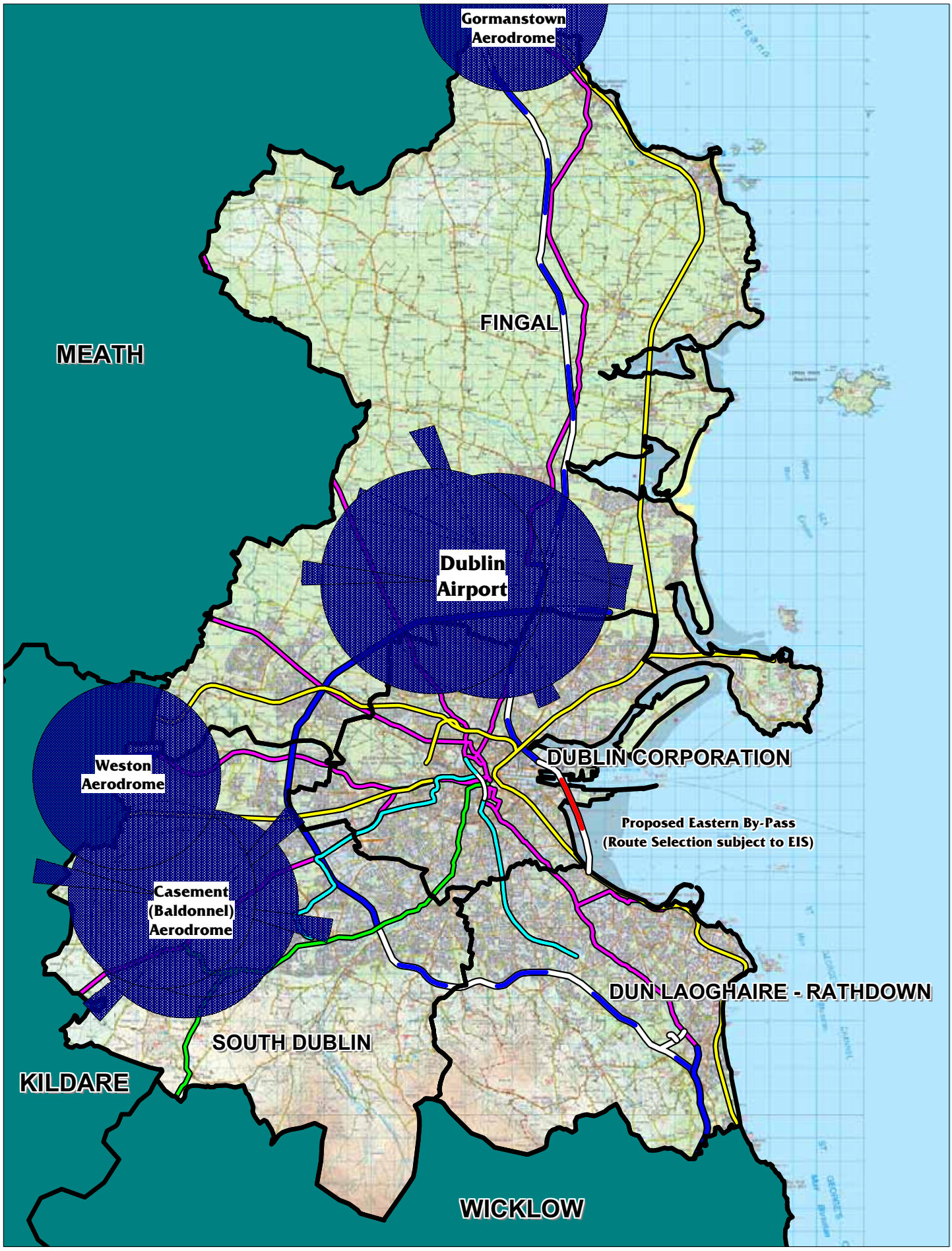

Figure 5.11 **Dublin Thermal Treatment Airport Exclusionary Areas**

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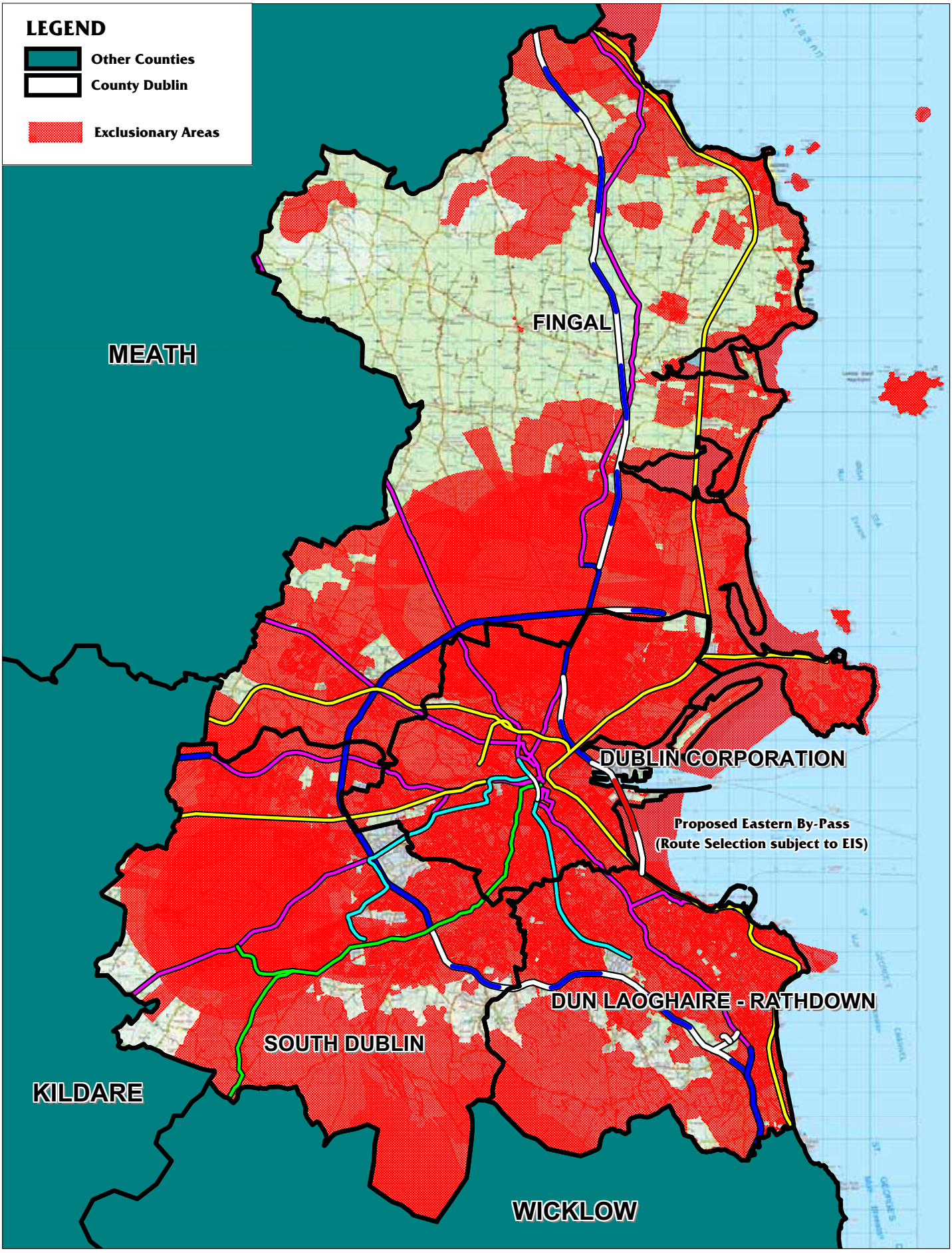

Figure 5.12 Combined Exclusionary Areas

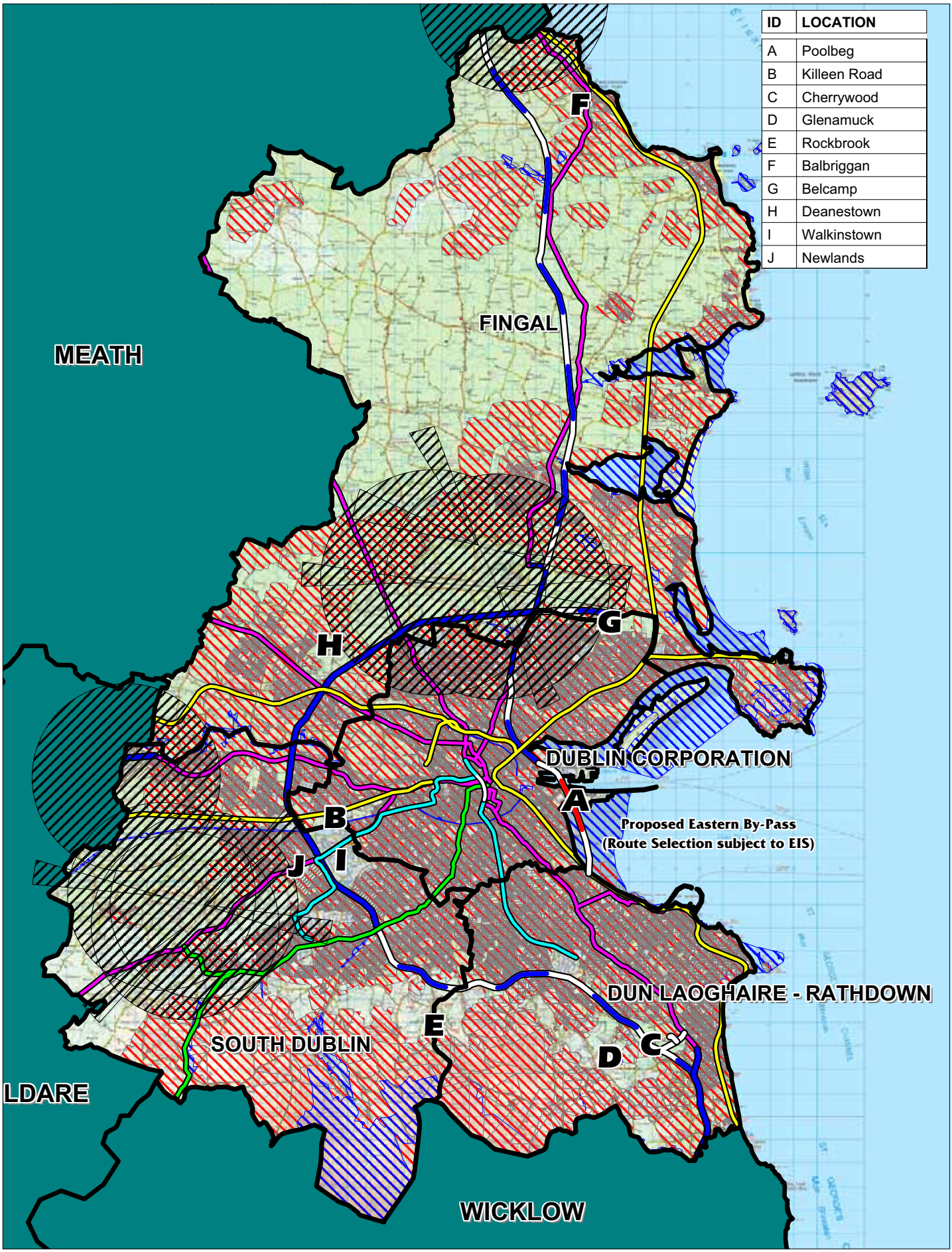

Figure 5.13 Dublin Thermal Treatment Shortlisted Sites

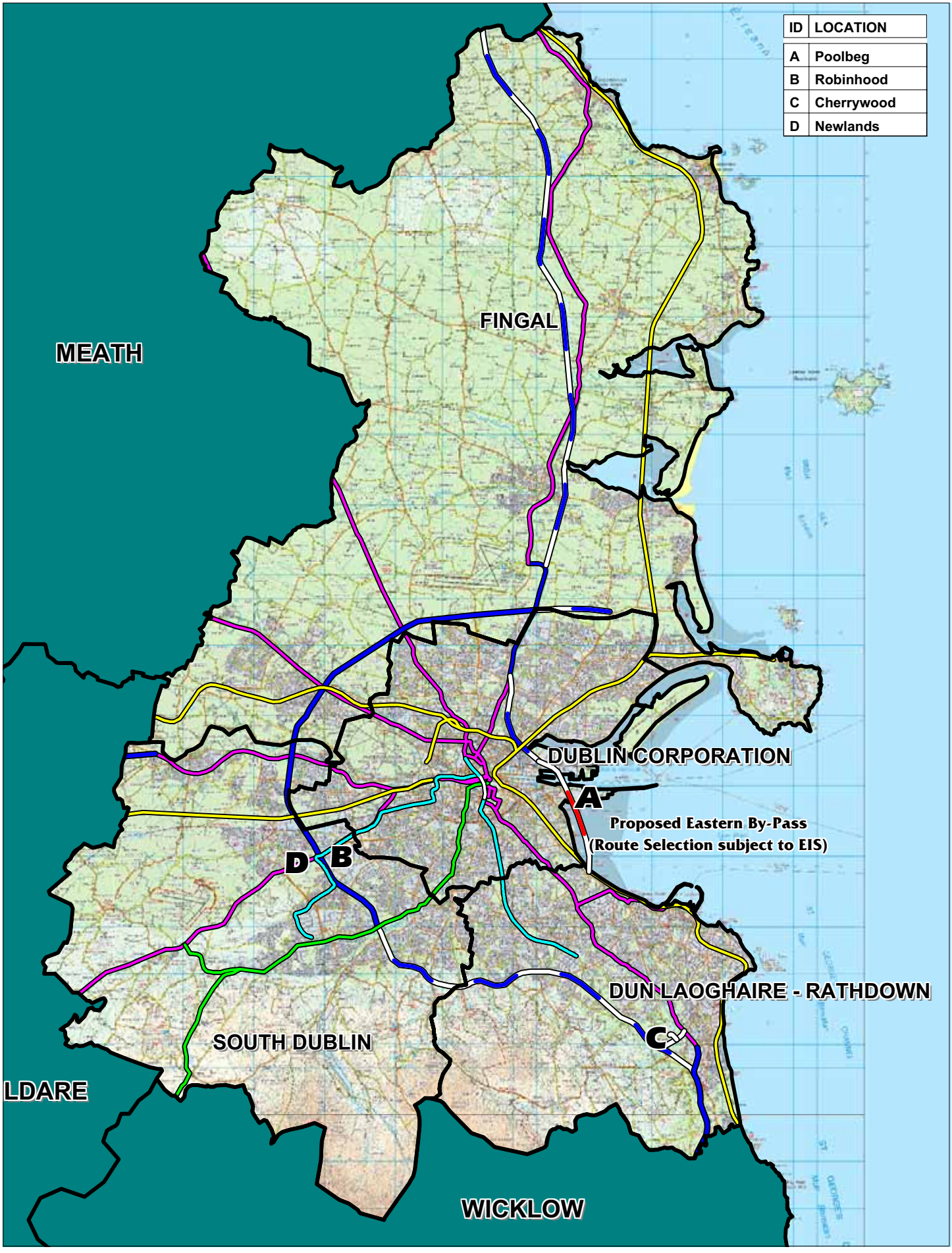

Figure 6.1 Dublin Thermal Treatment Final Shortlist of Sites

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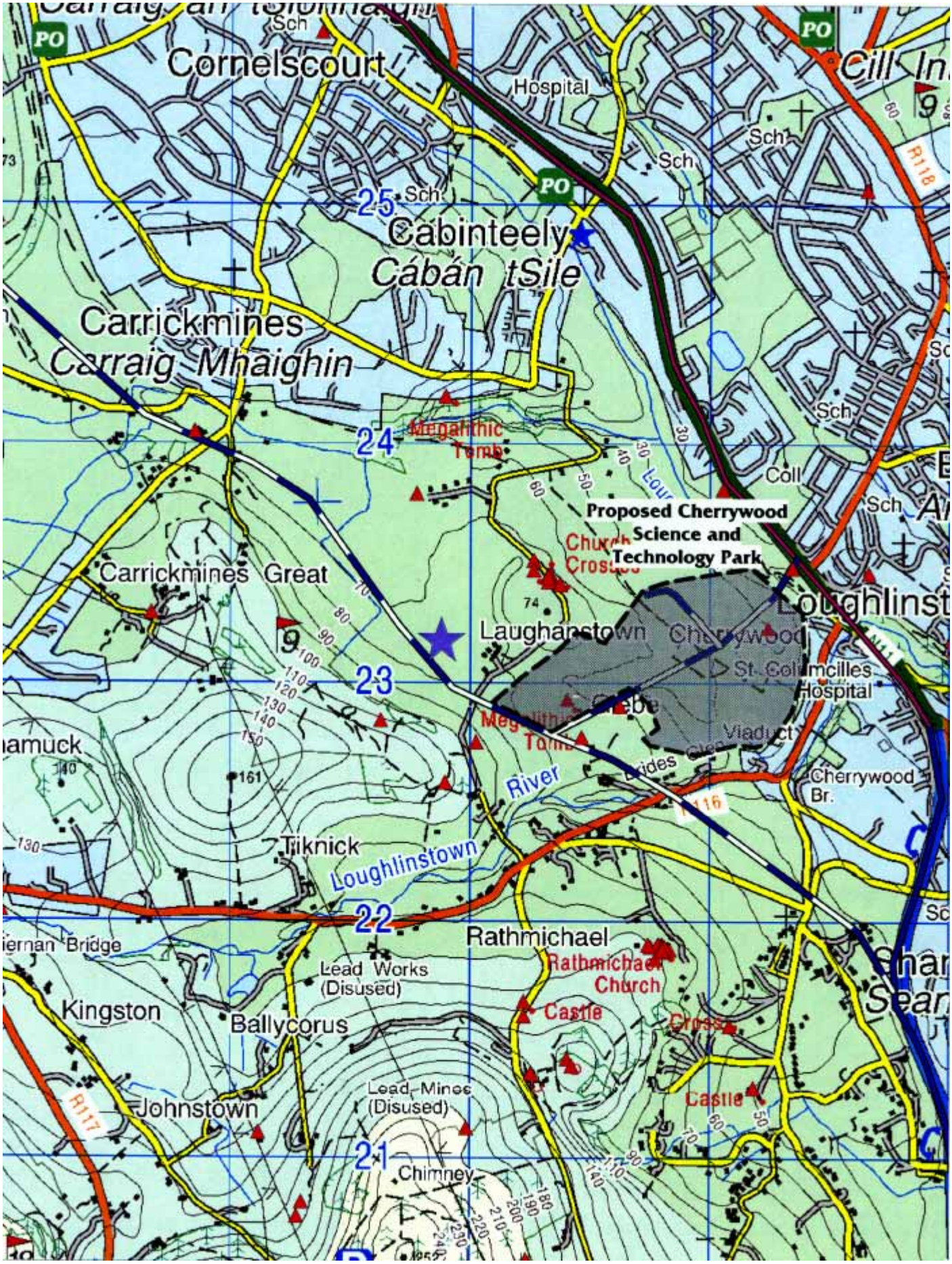

Figure 6.2 Cherrywood

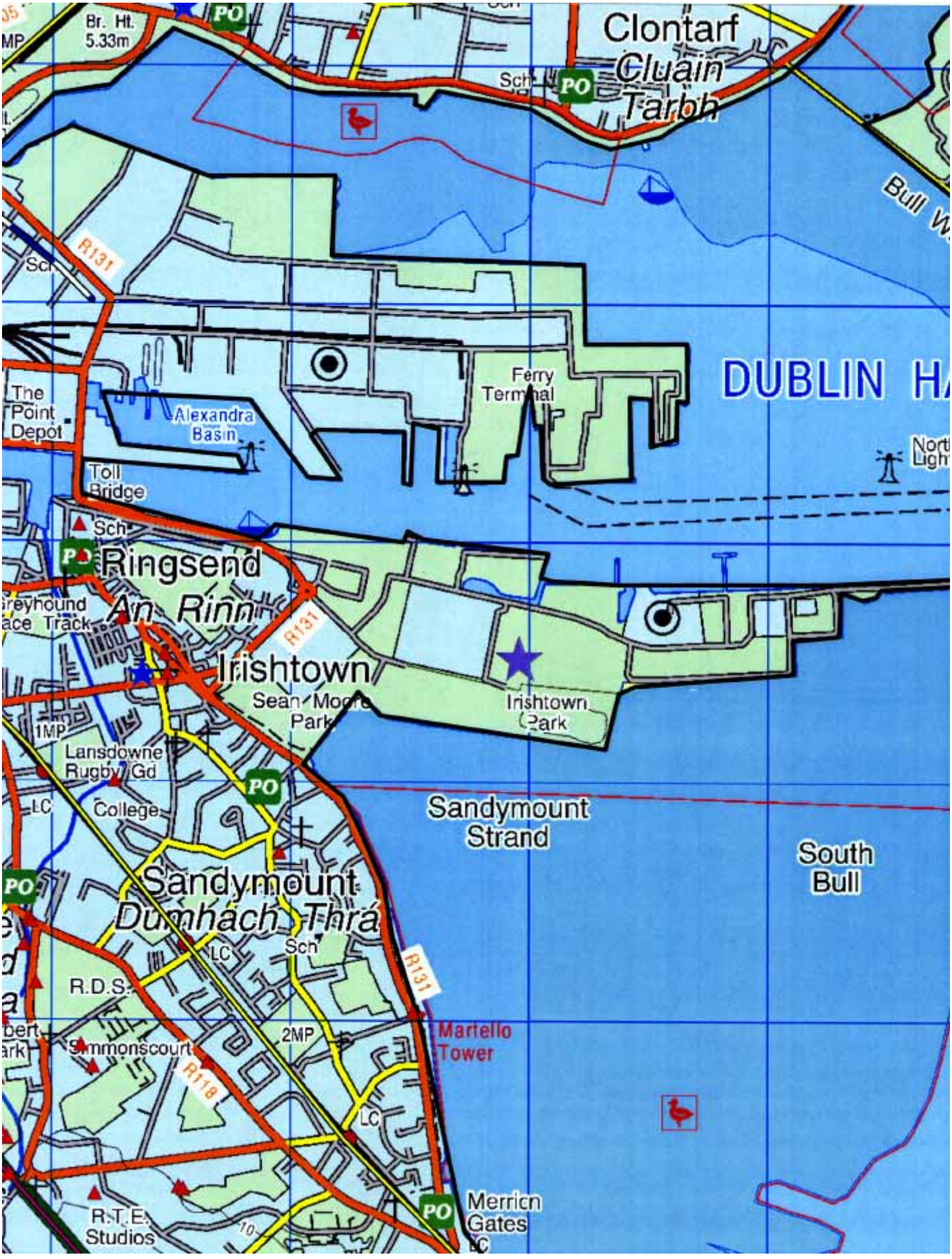

Figure 6.3 Poolbeg

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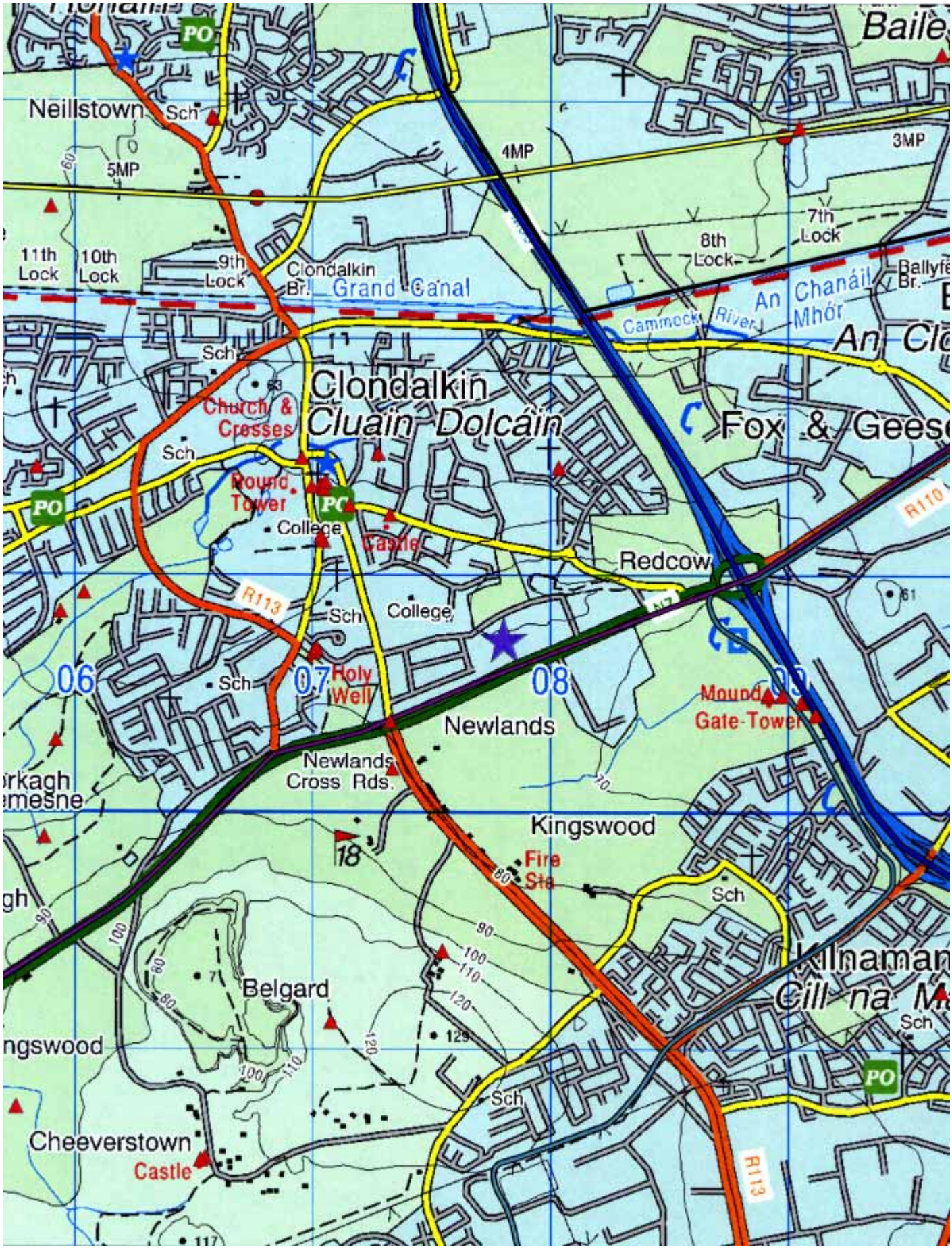

Figure 6.4 Newlands

Figure 6.5 Robinhood