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.

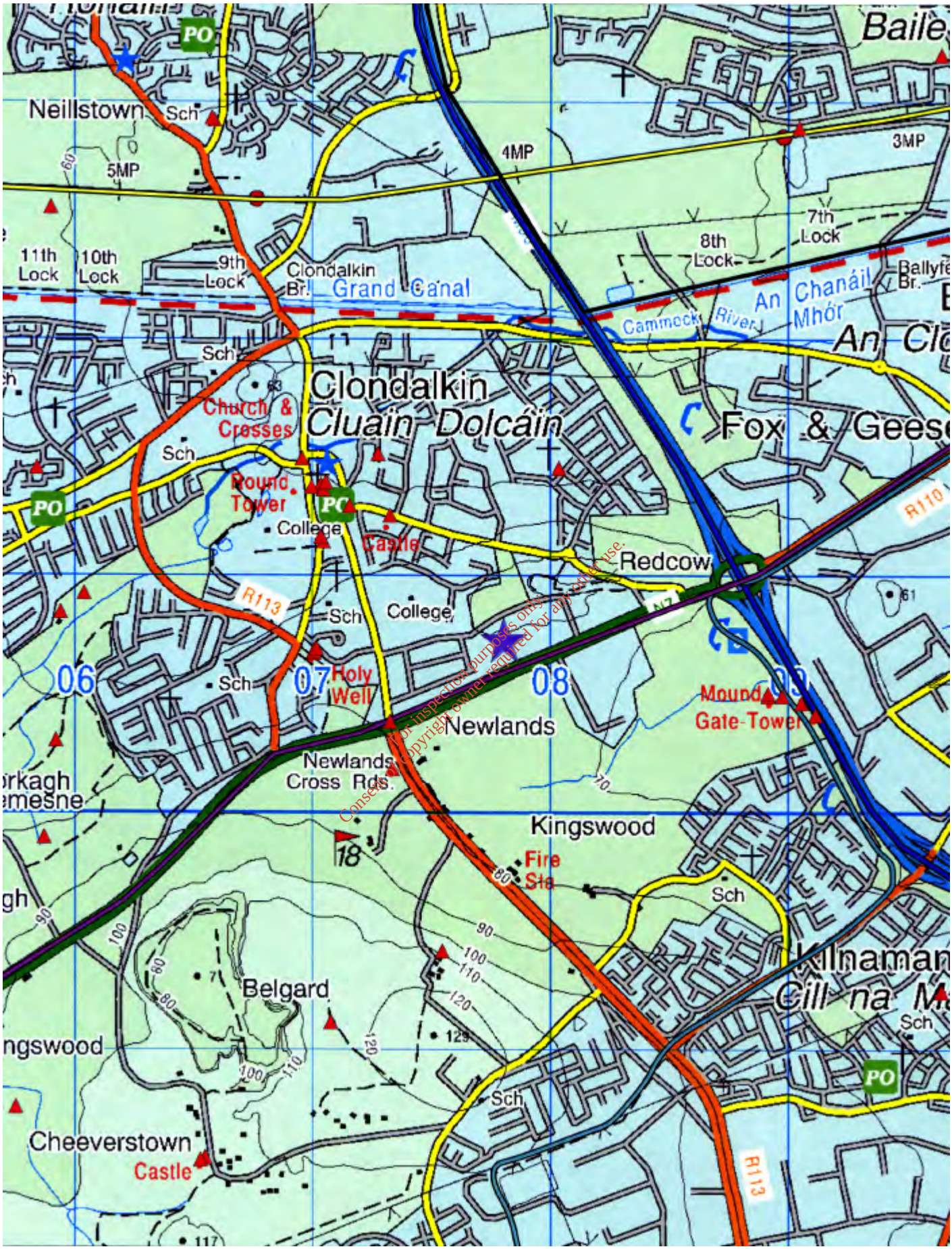


Figure 6.4 Newlands

MCOS
McCOLLIVAN
Consulting · Engineers
COWI

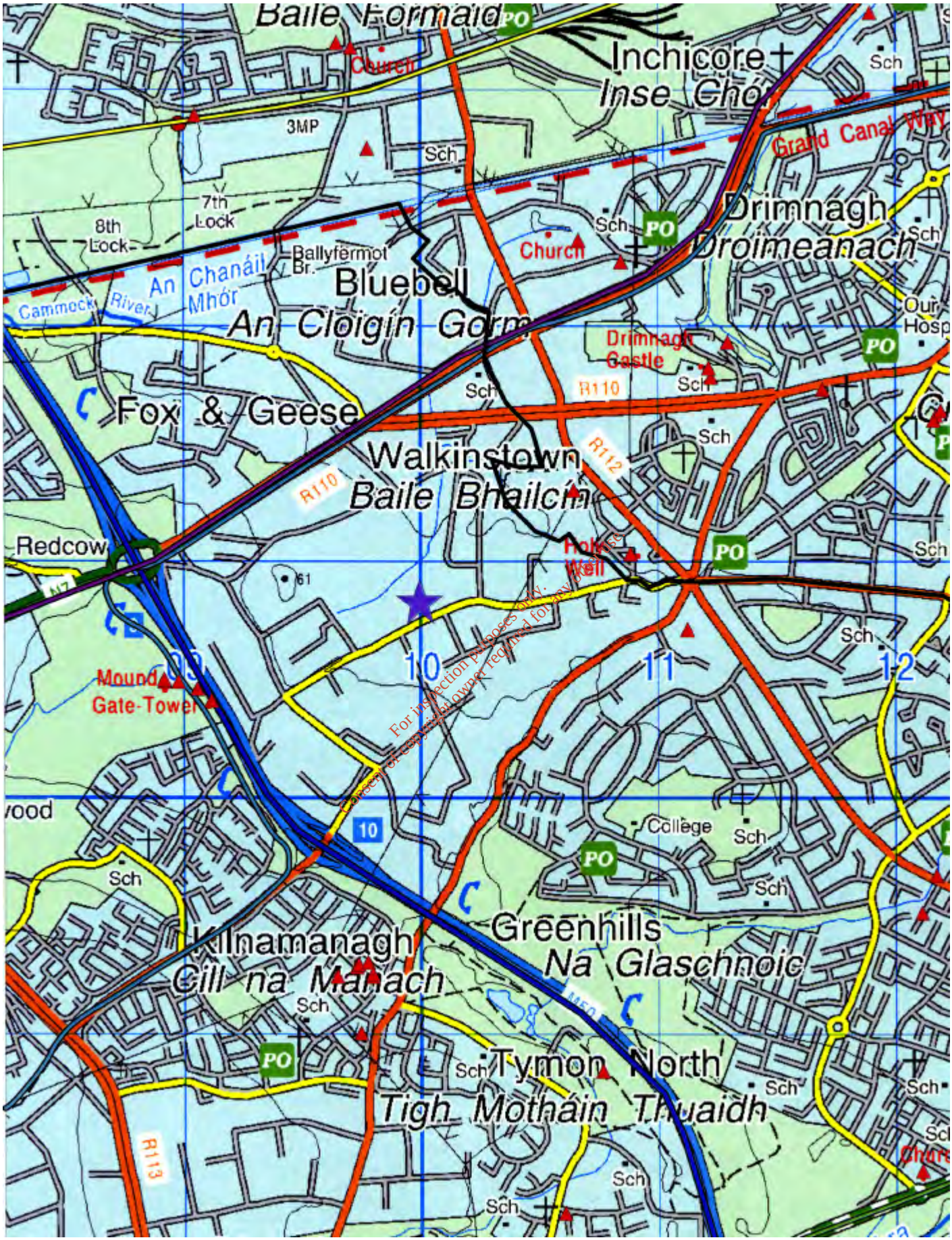


Figure 6.5 Robinhood

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.

7. PROCUREMENT AND PLANNING PROCEDURES

7.1 PROCUREMENT

The provision of the thermal treatment facility will likely involve some sort of public private partnership and will fall within the scope of the EU Procurement Directives and must be allocated on EU competitive procedures. All contracts for the provision of large facilities will fall within the scope of the EU Procurement Directives and must be allocated based on EU competitive procedures. These procedures must be followed for all engineering contracts with a value of 5,000,000 ECU or more, 200,000 ECU or more for service contracts and 400,00 ECU or more under the Utilities Directive for Supplies and Services.

The level of involvement of the private sector influences how the cost of services is relayed to consumers, the two main cost-recovery channels are :

- Public sector funding to be recovered under 'polluter pays principle' e.g. by waste charges
- Private sector funding to be recovered under 'polluter pays principle' by gate fees

7.2 OPTIONS FOR INCREASED PRIVATE SECTOR INVOLVEMENT IN MAJOR FACILITIES

Private sector participation can involve developers offering process plant design, supply and construction, offering operating services or offering a service including both of the above. In addition the developer may offer various degrees of financing and risk sharing between local authorities and developer. The ultimate "full service" approach entails getting the developer to accept total responsibility for design, construction, operation and financing of the facility for a predetermined period, in return for certain long term obligations from the local authority such as the provision of an agreed quantity of waste.

The degree of private sector participation can vary according to the type of arrangement reached between the service provider and the local authority. A wide range of options are available as regards the specific details of a contract. The main types of arrangement and their relative merits and drawbacks are outlined below.

7.2.1 Developer Provides Facility and Service (DBFO)

In this case the developer has total responsibility for the project under contract (design, finance, build, own, hire employees, operate, repair, sell energy). The developer pays all costs associated with the project including financing it. The local Authority makes payment to developer for service received on an incentive basis such as entering into contractual obligations to ensure waste is delivered to the facility.

7.2.2 Local Authority Owned and Financed, Developer Designs, Builds and Operates (DBO)

This option is part way between traditional local authority development, ownership and operation of a project and a ”privatised” full-service developer contract. In one common approach, a private developer will design, build, operate and maintain a project and assume many of the risks. The local authority will own and finance the project. This structure can be accomplished through:

- A design/operate contract with a developer.
- An installment purchase or lease from the developer (who builds and operates the project) to the local authority.
- A lease by the local authority to the developer who operates the facility for the local authority.

Table 7.1 Comparison of Possible Public-Private Arrangements

Arrangement	Advantages	Disadvantages
Developer provides facility and service (DBFO- Design, Build, Finance and Operate)	No capital outlay by local authorities Construction, financing and technical risk assumed by developer Specialist expertise of developer used Possibly greater efficiency through flexibility and profit motive Low managerial burden on local authority	Removal of control from LA may mean lack of responsiveness to public needs. Quality of service and all contractual eventualities over 10-20 year period difficult to guarantee
Local Authority Owns, developer designs, builds and operates (DBO)	Third partly expertise/ experience provided Some of risk accepted by private operator Developer responsible for providing successful facility Cheaper capital may be available to Local authority	Possibly higher cost since operator assumes some of risk Requires strong regulation by the Local Authority Profit motive may conflict with local authority serving public interest

7.2.3 Other Public Private Partnership

There are a number of other models for partnership between the local authorities and the private sector- which generally involve variations on the DBFO and DBO models described above. The duration of the contract and who eventually owns the facility are important considerations.

The participating local authorities equally recognise the need to ensure that full public accountability is maintained in the operation of waste services. The public interest must be guaranteed in all arrangements made with the private sector. The Waste Permit, Waste License, and Waste Collection Permit systems will be fully implemented in order to ensure regulation of private sector activities.

There are still a number of uncertainties regarding public private partnerships. This is currently being addressed by the Department of Environment and Local Government and a report is expected shortly. In particular clarification is needed on the planning and CPO procedures which will be involved. There will be a need for bye-laws or some other suitable mechanism to guarantee a waste stream to a particular facility.

7.3 RECOMMENDATION ON PROCUREMENT

There are many examples where the procurement of waste treatment facilities, including their development, construction, finance and operation, has been achieved both by the municipal and the private versions as outlined above. Denmark, which proportionally has the highest level of thermal treatment of MSW of any country, has been successful in establishing its facilities through "municipal partnerships", set up especially to develop and operate waste-to-energy facilities. In this way, small and medium-sized communities have co-operated to achieve the necessary managerial and financial strength to develop and operate the expensive and complex plants. Some of the latest projects have been able to use attractive loans from the European Investment Bank in addition to more traditional means of finance. However, the EIB loans are firmly based on the requirement that the project have a sound revenue basis, considered to be adequate to repay the loans.

In the Irish context however, there is no local authority experience of thermal treatment. If significant EU grant aid is forthcoming, a Design, Build, Operate (DBO) facility is recommended similar to the Dublin Bay Project at Ringsend. Otherwise, a Design, Build, Finance and Operate (DBFO) scheme is recommended.

In order to comply with the EU Directives and still make the procurement process manageable and effective it is recommended that the procurement process for thermal treatment be divided into three stages:

1. A pre-qualification stage, where potential developers must document their managerial capability, technical expertise and experience, and financial stability. It is important to announce in advance the criteria to be used in the selection of acceptable developers. This will reduce the risk of subsequent litigation from excluded companies. It is equally important to apply the right criteria, so that the resulting list of invited developers represents an optimal combination of the best technologies and the most competitive developers.

2. The actual invitation of detailed proposals based on a specification, which should state the selection criteria for the successful developer. This could be "the proposal, which offers the Local Authority the most advantageous benefits environmentally and economically". The specification should advise how guaranteed operating costs, energy revenue, environmental emissions, and plant availability, etc. will be capitalised and included, together with the bid price for the plant, in the evaluation of the most advantageous proposal. The specification should also state the penalties which will apply if guaranteed operating goals are not achieved.

3. An exploration and negotiation stage where the bids are examined in detail with a view to comparing them on an equal basis, and where the best final solution is found. The bids to be received will represent different technologies, and will vary in scope and performance as well as in contractual terms and exclusions. Therefore, proposals for a guaranteed performance, based on different proprietary technologies, require more in-depth examination than tenders for more traditional infrastructural projects such as roads, wastewater treatment works etc.

7.4 PLANNING PROCESS

It is likely that a two stage process will take place with regard to planing development of a new thermal treatment site.

- The carrying out of an Environmental Impact Assessment including full public consultation and having regard to siting alternatives

- Submission by the successful tenderer from the procurement process of an Integrated Pollution Control Licence to the Environmental Protection Agency

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 INTRODUCTION

A feasibility study has been carried out to evaluate the thermal treatment of waste in the Dublin region. The study which was conducted in two phases the first of which reviewed the technical issues in terms of technological options, end market, and procurement. The second phase detailed in this report focused on siting and environmental issues. The conclusions and recommendations below are based on the overall study.

8.2 CONCLUSIONS AND RECOMMENDATIONS

- The EU Waste Management Hierarchy should be respected with thermal treatment forming part of an integrated approach where waste reduction and recycling (incl. biological treatment) are given priority.
- Waste combustion with energy recovery (WTE) is a safe, tried and tested technology capable of meeting stringent EU environmental standards.
- Gasification and pyrolysis are emerging thermal treatment technologies which are continuing to be developed towards the required scale likely to be appropriate in the Dublin Regional context. Gasification in particular is a developing technology which needs careful monitoring over the coming year since commissioning of a full scale plant in Germany.
- Implementation of the Waste Management Strategy for Dublin Region will require prioritisation of waste reduction and recycling including biological treatment. The waste quantities available for thermal treatment are in the range 450,000 – 700,000 tonnes per annum having regard to the foregoing priorities.
- The environmental impacts of the preferred technologies i.e. waste combustion with energy recovery and a proprietary gasification system called Thermoselect are evaluated and compared. Furthermore a screening life cycle analysis is then carried out and an overall comparison made between the environmental impacts of the WTE and Thermoselect processes. The main advantage of waste combustion with energy recovery is the high quantity of electricity generated compared to the Thermoselect process, which helps reduce the need to use conventional energy sources. As a result, the global warming (and acidification) impact potential is lower for waste combustion compared to Thermoselect, despite the lower atmospheric emissions from the Thermoselect process itself.

  The main advantage of using the Thermoselect process is the lower emissions from the process itself, which will lead to a better air quality in the area surrounding the plant. However, from a life cycle perspective, Thermoselect results in higher impacts associated with the significantly lower amount of electricity generated. Environmental benefits may be associated with the residual solid waste produced by the Thermoselect process, as it may be easier to recover different fractions (e.g. salt, sulphur, metal compounds) and therefore easier to reuse them. Another advantage of the Thermoselect process relates to the absence of wastewater produced.

- The health impacts have been discussed with regard to the most commonly cited pollutants associated with thermal treatment. It was concluded that there is no evidence at present to associate thermal treatment with adverse health impacts.
- A public involvement programme was conducted to inform the study and ascertain the public attitude to waste management in general and thermal treatment in particular. This consisted

of community focus groups which were set up in each local authority and a public opinion survey among 500 participants. The results of the survey suggest that the general public are generally accepting of thermal treatment as part of an integrated waste management solution. Concerns were expressed with regard to emissions, safety standards, cost implications and appearance of the plant. It also highlighted the fact that information is needed on current waste management, future options and the thermal treatment concept. Public trust in the system is critical to the successful implementation of the Plan as there is currently as lack of trust in both central and local government.

- A detailed siting study was conducted informed by the public involvement programme. The general procedure for siting 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 these 4 shortlisted sites was further assessed resulting in a preferential ranking for the siting of a Thermal Treatment facility.

- The siting study resulted in four sites being identified as most suitable for thermal treatment in the following order:-

  - Poolbeg – located in Dublin Corporation administrative area
  - Robinhood – located in South Dublin administrative area
  - Cherrywood – located in Dun Laoghaire Rathdown administrative area
  - Newlands – located in South Dublin administrative area

- The plant should be procured using the Design, Build, Operate (DBO) procedure and preferably be owned by the four Dublin local authorities (similar to Dublin Bay Project) provided that EU Cohesion funding is secured. Otherwise, the Design Build Finance Operate (DBFO) route must be chosen. This procurement process should request proposals for "thermal treatment" to meet the most recently published Draft EU Directive on the Incineration of Waste (December 1998).

- Provision of thermal treatment will continue to require a safe disposal outlet for residuals and other non-recyclable waste which cannot be thermally treated. That means a certain degree of landfill in the Dublin Region to complement recycling and recovery.

- As endorsed by the Dublin Waste Management Plan, "the costs of future waste management in the Dublin Region shall be borne by the waste producers by the introduction of use related charges on a consistent basis across the Region, on industry, commercial organisations and on householders".

- The Dublin local authorities should apply for maximum EU Cohesion funding for the provision of thermal treatment and should also seek to put in place the necessary economic and regulatory mechanisms to assist the diversion of waste from landfill to waste recycling and recovery by thermal treatment as recommended in the strategy and adopted in the Regional Plan.

References

ATSDR – Testimony: Public Health Implications of Dioxins. Barry L. Johnson, Ph.D. 10/6/92 before the Subcommittee on Human Resources an Intergovernmental Relations Committee on Government Operations. United States House of Representatives. (http://www.atsdr.cdc.gov/test-06-10-92.html).

Christensen, T.H. (1998) Waste Technology, Teknisk Forlag A/S, pp. 871, *in Danish*.

Concannon, C. Dioxins in the Irish Environment – An assessment based on levels in cow's milk. EPA publication, April 1996.

Elliott, P., M. Hills, J. Beresford, I. Kleinschmidt, D. Jolley, S. Pattenden, L. Rodrigues, A. Westlake, & G. Rose. 1992. Incidence of cancers of the larynx and lung near incinerators of waste solvents and oils in Great Britain. The Lancet: 339, 854-858.

Elliott, P., G. Shaddick, I. Kleinschmidt, D. Jolley, P. Walls, J. Beresford & C. Grundy. 1996. Cancer incidence near municipal solid waste incinerators in Great Britain. British Journal of Cancer: 73, 702-710.

EPA Annual Report (1997) Air Quality Monitoring Annual Report, Environmental Protection Agency, Ireland.

IAWG (1997) Chandler et al, Municipal solid waste incinerator residues, Studies in Environmental Science 67, Elsevier Science, Amsterdam.

I/S Vestforbrænding (1998) Green Accounts 1998, *in Danish*.

United Nations Environment Programme. Dioxin and Furan Inventories: National and Regional Emissions of PCDD/PCDF. UNEP Chemicals, Switzerland. May 1999. (http://www.chem.unep.ch/irptc/Publications/pb0901.html).

APPENDIX A

ENVIRONMENTAL ASSESSMENT CRITERIA

INVENTORY

See also word document

Using information supplied by Reto M. Hummelshøj and Stig Gregersen unless otherwise mentioned

Abbreviations

WTE = Waste combustion with energy recovery with wet flue gas treatment and SNCR

TST = Thermoselect plant with steam turbine (27 or 32% efficiency)

Assumptions

Capacity and waste throughput do not affect emissions or residuals, only energy/electricity generated

Excess energy is used for electricity production only

Calorific value of waste = 9.1 and 11 MJ/kg to determine energy output

Most emphasis on outputs as opposed to inputs

INPUTS

	WTE	TST	Units	Comments
Energy (fossil fuels)				
Fuel oil for S/U + S/D	0.5		l/ton	Range 0,36-0,9 l/ton. Data from Niels-Ole Bruun (NOB).
Natural gas		15	Nm3/ton	
Water use	0.25	1.36	m3/ton	TST= recycled cooling water
Auxillary substances				
CaCO3	14		kg/ton	
NaOH	4	12	kg/ton	WTE= NaOH (25%)
TMT (100%)	0.2		kg/ton	
Polymer (100%)	0.01		kg/ton	
Iron compound	0.05	0.75	kg/ton	WTE= Fe2Cl3 (100%); TST= iron chelate
Activated C	0.5	1.3	kg/ton	C is carbon for WTE and coke for TST
NH3-water (25%)	3		kg/ton	
O2 (95%)		500	kg/ton	Produced on site using 175 kWh/ton electricity
HCl	0.1	6	kg/ton	
H2O2		0.05	kg/ton	
Glycerine		0.15	kg/ton	
Ion exchanger		0.07	kg/ton	

OUTPUTS

	WTE	TST	Units	Comments
Wastewater	0.1	0	m3/ton	TST - ww is cleaned and recycled/evaporated; WTE - ww is cleaned and to WWTP.
				Emissions for Vestforbrænding (also new DK limits)-from CPH County (1997)
Pb	0.01		g/ton	0.1 mg/l of ww
Cd	0.0003		g/ton	0.003 mg/l of ww
Hg	0.0003		g/ton	0.003 mg/l of ww
(Cl)	2200		g/ton	From Vestforbrændings Green Accounts 1998
(SO4)	400		g/ton	From Vestforbrændings Green Accounts 1998
(SS)	10		g/ton	From Vestforbrændings Green Accounts 1998

Emissions	**WTE**	**TST**	**Units**	**Comments**
CO2 from waste	273	273	kg/ton	Non-renewables contributing to GWP = 22% (from Søren, EA-Midlands)
CO2 from fossil fuels	2	33	kg/ton	For fossil fuels: Assume 57 kg CO2/GJ natural gas and 78 kg CO2/GJ fuel oil (Reto - "Beregningsforudsætninger for Danmarks Energifremtider" 1996)
				Assume 38.9 MJ/Nm3 Natural gas and 39.4 MJ/L fuel oil (Håndbogen)
Flue gas	5.5	3	kNm3/ton	

	Actual emissions			**WTE** Emissions according to limits	**TST** Emissions according to limits	
CO	0.138	0.030	kg/ton	0.275	0.150	kg/ton
SO2	0.138	0.030	kg/ton	0.275	0.150	kg/ton
NO2 [*1]	0.550	0.300	kg/ton	1.100	0.600	kg/ton
HCl	0.011	0.006	kg/ton	0.055	0.030	kg/ton
HF	0.001	0.001	kg/ton	0.006	0.003	kg/ton
Cd + Tl [*3]	0.000	0.000	kg/ton	0.000	0.000	kg/ton
Hg	0.000	0.000	kg/ton	0.000	0.000	kg/ton
Heavy metals [*4]	0.001	0.000	kg/ton	0.003	0.002	kg/ton
Dust	0.017	0.009	kg/ton	0.055	0.030	kg/ton
Dioxin (PCDD/F)	0.000	0.000	kg/ton	0.000	0.000	kg/ton
Organics (TOC)	0.028	0.006	kg/ton	0.055	0.030	kg/ton

17.BImSchV / EU limits[*2]	
50	mg/Nm3 flue gas
50	mg/Nm3 flue gas
200	mg/Nm3 flue gas
10	mg/Nm3 flue gas
1	mg/Nm3 flue gas
0.05	mg/Nm3 flue gas
0.05	mg/Nm3 flue gas
0.5	mg/Nm3 flue gas
10	mg/Nm3 flue gas
0.0001	mg/Nm3 flue gas
10	mg/Nm3 flue gas

Other comments re: emissions

Value for WTE from VVM-redegørelse af Vestforbrænding (Feb. 1999)

[*1] NOx assumed to be NO2

[*2] Given in Inception Report (Nov 1998) and White et al (1995) p.249

[*3] Assume emitted in ratio 1:1

[*4] Sum of Class III heavy metals = Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn. Assume emitted in equal fractions

Value for TST from Inception Report (Nov. 1998) Appendix B, Thermoselect p.5

Solid Waste	WTE	TST	Units	Comments
Residual waste	42		kg/ton	Disposal to landfill (assumed to include fly ash + sludge, gypsum)
Bottom ash	320		kg/ton	Potentially reusable (assumed to include slag/clinker)
Recovered metal	30	30	kg/ton	Potentially reusable
Vitrified granulate		344.6	kg/ton	Potentially reusable
Sulphur (70-80%DM)		2.7	kg/ton	Potentially reusable (assumed not to have much value)
Mixed salts (90-97%DM)		12	kg/ton	Potentially reusable (assumed not to have much value)
Heavy metals		7.5	kg/ton	Disposal to landfill (29-40%DM)
Waste from power plant		17-22	kg/ton	

Energy (Electricity production)

LHV	WTE	TST(27%)	TST(32%)	Units	Comments
9,1 MJ/kg	560	51	120	kWh/ton	TST to values for 27% and 32% efficiency
11 MJ/kg	677	193	289	kWh/ton	WTE: steam pressure= 44 bar; temp.= 380 deg C; feedwater temp.= 130 deg C; condensation temp.</= 50 deg C; own electricity consumption= 15%. I.e. WTE Equivalent to approx. 22% of LHV.

Surplus electricity production for WTE

LHV	TST(27%)	TST(32%)	Units	Comments
9,1 MJ/kg	509	440	kWh/ton	Use lowest and highest surplus values to calculate surplus pollution attributed to TST
11 MJ/kg	484	388	kWh/ton	

Outputs related to energy production

Data from Søren**

Data from TMP* - "Varedeklaration - el og varme for ELKRAFT (Sjælland)" 1995 - el værke type I

Assume 1 GJ = 277 kWh el (Christensen (1998) p.192)

Emission	Data from Søren**		TST(27%)	TST(32%)	Units
CO2	209	kg/GJ	384	293	kg/ton
SO2	0.655	kg/GJ	1.2	0.9	kg/ton

NOx	0.553	kg/GJ	1.0	0.8	kg/ton
CO	0.06	kg/GJ	0.1	0.1	kg/ton
	Data from TMP*				
Slag + ash	32	g/kWh el	16	12	kg/ton
Gypsum	11	g/kWh el	6	4	kg/ton
			22	17	

Comments

Emissions of heavy metals and dioxin from coal-fired power plants are not taken into consideration in this screening LCA because data are not readily available and no emission limits exist for these pollutants, for either the EU or Denmark. According to MST an EU Directive (88/609/EEC, plus corrections in Directive from 1995) sets limits for CO, SO2 and NOx from power plants, which is implemented in Bekendtgørelse nr. 689 af d. 15 oktober 1990 and nr. 518 af d. 20 juni 1995. Emission limits are now under revision.

Order of magnitude for heavy metals from EDIP…

ENVIRONMENTAL IMPACT ASSESSMENT

Impact potentials = Quantity of substance * Equivalency Factor (EF)
Where EF is given as (Mass reference substance)/(Mass given substance)

Global warming potential			GWP (kg CO2/ton waste)			
Substance	Formula	kg CO2/kg substance	WTE	TST(27%)	TST(32%)	
Carbon dioxide	CO2	1	274	690	599	
Carbon monoxide	CO	2		2	2	
		Total GWP	***274***	***693***	***601***	***kg CO2/ton waste***

Comments: Time scale is 100 years. CO2, CO from displaced pollution. Also CO2 from nonrenewable waste fraction and use of fossil fuels.
No CH4 is assumed to be emitted from the Thermoselect process, because a steam turbine is used at Karlsruhe and all natural gas (fossil fuel) burnt with synthesis gas (incl. CH4 in synthesis gas) is assumed to be converted to CO2. But 1-4% CH4 is emitted when a gas turbine is used as in the pilot plant in Italy that is now shut down (Reto).
check gas turbine

Photochemical ozone formation			PHOTO (kg C2H2/ton waste)			
Substance	Formula	kg C2H2/kg substance	WTE	TST(27%)	TST(32%)	
Carbon monoxide	CO	0.03	0.004	0.004	0.003	
VOC		0.4	0.011	0.002	0.002	Value taken from EDIP book p.254
		Total PHOTO	***0.015***	***0.007***	***0.006***	***kg C2H2/ton waste***

Comment: High background concentration of NOx assumed (> 0.02 mg/m3). I.e. urban area.

Acidification			ACID (kg SO2/ton waste)			
Substance	Formula	kg SO2/kg substance	WTE	TST(27%)	TST(32%)	
Sulphur dioxide	SO2	1	0.1	1.2	0.9	
Nitrogen oxides	NO2/NOx	0.7	0.4	0.9	0.8	
Hydrochloric acid	HCl	0.88	0.0	0.0	0.0	
Hydrofluoric acid	HF	1.6	0.0	0.0	0.0	
		Total ACID	***0.5***	***2.2***	***1.7***	***kg SO2/ton waste***

Nutrient Enrichment			NUTRIENT (kg NO3/ton waste)			
Substance	Formula	kg NO3/kg substance	WTE	TST(27%)	TST(32%)	
Nitrogen oxides	NO2/NOx	0.7	0.4	0.9	0.8	
		Total NUTRIENT	***0.4***	***0.9***	***0.8***	***kg NO3/ton waste***

Comment: Nutrient enrichment from atmospheric emissions

Human toxicity

Emissions to air [*1]			EF(hta)	EF(htw)	EF(hts)	EP(hta) in m3 air/ton			EP(htw) in m3w/ton		EP(hts) in m3soil/ton	
Substance	Formula	CAS no.	m3 air/g	m3water/g	m3 soil/g	WTE	TST(27%)	TST(32%)	WTE	TST	WTE	TST
Carbon monoxide	CO	630-08-0	8.3E+02	0	0	1.1E+05	1.2E+05	9.5E+04				
Sulphur dioxide	SO2	7446-09-5	1.3E+03	0	0	1.8E+05	1.6E+06	1.2E+06				
Nitrogen dioxide + o	NO2	10102-44-0	8.6E+03	0	0	4.7E+06	1.1E+07	9.2E+06				
Cadmium	Cd	7440-46-9	1.1E+08	5.6E+02	4.5	7.6E+06	8.3E+05	8.3E+05	3.9E+01	4.2E+00	3.1E-01	3.4E-02
Thallium	Tl	7440-28-0	5.0E+05	1.3E+04	10	3.4E+04	3.8E+03	3.8E+03	8.9E+02	9.8E+01	6.9E-01	7.5E-02
Mercury	Hg	7439-97-6	6.7E+06	1.1E+05	81	9.2E+05	1.0E+05	1.0E+05	1.5E+04	1.7E+03	1.1E+01	1.2E+00
Arsenic	As	7440-38-2	9.5E+06	7.4	1.0E+02	1.3E+06	1.4E+05	1.4E+05	1.0E+00	1.1E-01	1.4E+01	1.5E+00
Lead	Pb	7439-92-1	1.0E+08	53	8.3E-02	1.4E+07	1.5E+06	1.5E+06	7.3E+00	8.0E-01	1.1E-02	1.2E-03
Chromium	Cr	7440-47-3	1.0E+06	3.6	1.1	1.4E+05	1.5E+04	1.5E+04	5.0E-01	5.4E-02	1.5E-01	1.7E-02
Nickel	Ni	7440-02-0	6.7E+04	3.7E-03	0.12	9.2E+03	1.0E+03	1.0E+03	5.1E-04	5.6E-05	1.7E-02	1.8E-03
Dioxin (2,3,7,8-TCDD)		1746-01-6	2.9E+10	220000000	1.4E+04	8.0E+06	8.7E+05	8.7E+05	6.1E+04	6.6E+03	3.9E+00	4.2E-01
					Total EP (ht)	***3.7E+07***	***1.6E+07***	***1.4E+07***	***7.7E+04***	***8.4E+03***	***3.0E+01***	***3.3E+00***
										m3 compartment/ton waste		

[*1] EF= Equivalency factors; hta= human toxicity via air; htw= human toxicity via surface water; hts= human toxicity via soil

Emissions to soil and water - NONE

Toxicity to sewage treatment plants

Substance	Formula	CAS no.	EF(etp) m3/g	EP(etp) in m3/ton WTE	TST
Lead	Pb	7439-92-1	5.0E+03	5.0E+01	-
Cadmium	Cd	7440-46-9	1.5E+04	4.5E+00	-
Mercury	Hg	7439-97-6	1.0E+02	3.0E-02	-

Total EP (ht) ***5.5E+01*** ***-*** ***m3/ton waste***

Solid Waste Products

	WTE	TST	Units
Residual waste	42		kg/ton
Heavy metal compounds		8	kg/ton
Total waste to landfill	***42***	***8***	***kg/ton***
Bottom ash	320		kg/ton

Recovered metal	30	30	kg/ton
Vitrified granulate		345	kg/ton
Sulphur		2.7	kg/ton
Mixed salts		12	kg/ton
Total reuseable waste	***350***	***375***	***kg/ton***
Total solid waste	***784***	***779***	***kg/ton***

NORMALISATION

Normalised impact potential = (impact potential)/(normalisation reference)

Global warming potential — Normalisation reference (ER_{90}) = 8,700 kg CO2-eq/pers/yr

Substance	Formula	WTE	TST(27%)	TST(32%)	Units
Carbon dioxide	CO2	31.5	79.3	68.8	mPE/ton
Carbon monoxide	CO		0.3	0.2	mPE/ton
Total N-GWP		*32*	*80*	*69*	*mPE*yr/ton*

Photochemical ozone formation — Normalisation reference (ER_{90}) = 20 kg C2H2-eq/pers/yr

Substance	Formula	WTE	TST(27%)	TST(32%)	Units
Carbon monoxide	CO	0.2	0.2	0.2	mPE/ton
VOC		0.6	0.1	0.1	mPE/ton
Total N-PHOTO		*0.8*	*0.3*	*0.3*	*mPE*yr/ton*

Acidification — Normalisation reference (ER_{90}) = 124 kg SO2-eq/pers/yr

Substance	Formula	WTE	TST(27%)	TST(32%)	Units
Sulphur dioxide	SO2	1	10	8	mPE/ton
Nitrogen oxides	NO2/NOx	3	7	6	mPE/ton
Hydrochloric acid	HCl	0	0	0	mPE/ton
Hydrofluoric acid	HF	0	0	0	mPE/ton
Total N-ACID		*4*	*17*	*14*	*mPE*yr/ton*

Nutrient Enrichment — Normalisation reference (ER_{90}) = 298 kg NO3-eq/pers/yr

Substance	Formula	WTE	TST(27%)	TST(32%)	Units
Nitrogen oxides	NO2/NOx	1.3	3.1	2.5	mPE/ton
Total N-NUTRIENT		*1.3*	*3.1*	*2.5*	*mPE*yr/ton*

Human toxicity (local) — Normalisation reference (ER_{90}) = 9.2E+09 m3 air/pers/yr

NEP(ht) = NEP(hta)

Substance	Formula	CAS no.	WTE	TST(27%)	TST(32%)	Units
Carbon monoxide	CO	630-08-0	0.0	0.0	0.0	mPE/ton
Sulphur dioxide	SO2	7446-09-5	0.0	0.2	0.1	mPE/ton
Nitrogen dioxide + o	NO2	10102-44-0	0.5	1.2	1.0	mPE/ton
Cadmium	Cd	7440-46-9	0.8	0.1	0.1	mPE/ton
Thallium	Tl	7440-28-0	0.0	0.0	0.0	mPE/ton
Mercury	Hg	7439-97-6	0.1	0.0	0.0	mPE/ton
Arsenic	As	7440-38-2	0.1	0.0	0.0	mPE/ton
Lead	Pb	7439-92-1	1.5	0.2	0.2	mPE/ton
Chromium	Cr	7440-47-3	0.0	0.0	0.0	mPE/ton
Nickel	Ni	7440-02-0	0.0	0.0	0.0	mPE/ton
Dioxin (2,3,7,8-TCDD)		1746-01-6	0.9	0.1	0.1	mPE/ton
	Total NEP (ht)		*4.0*	*1.8*	*1.5*	*mPE*yr/ton*

Persistent toxicity (regional) Normalisation references (ER_{90})= 5.9E+04 m3 water/pers/yr

NEP(pt) = {NEP(etwc)+NEP(etsc)+NEP(htw)+NEP(hts)}/n 310 m3 soil/pers/yr

Substance	Formula	CAS no.	WTE (htw)	TST (htw)	WTE (hts)	TST (hts)	WTE	TST
Cadmium	Cd	7440-46-9	1	0	1	0	2	0
Thallium	Tl	7440-28-0	15	2	2	0	17	2
Mercury	Hg	7439-97-6	256	28	36	4	292	32
Arsenic	As	7440-38-2	0	0	44	5	44	5
Lead	Pb	7439-92-1	0	0	0	0	0	0
Chromium	Cr	7440-47-3	0	0	0	0	0	0
Nickel	Ni	7440-02-0	0	0	0	0	0	0
Dioxin (2,3,7,8-TCDD)		1746-01-6	1025	112	12	1	1038	113
			Total NEP (pt) = {NEP(htw)+NEP(hts)}/n =				***87***	***10***
					n=16		***mPE*yr/ton***	

Ecotoxicity (local) Normalisation reference (ER_{90})= 5.0E+05 m3 water/pers/yr

NEP(et) = {NEP(etwa)+NEP(etp)}/n

Substance	Formula	CAS no.	WTE (etp)	TST (etp)	Units
Lead	Pb	7439-92-1	0.1	-	mPE*yr/ton
Cadmium	Cd	7440-46-9	0.01	-	mPE*yr/ton
Mercury	Hg	7439-97-6	0.0001	-	mPE*yr/ton
		NEP(et) = NEP(etp) =	***0.1***	***0***	***mPE*yr/ton***

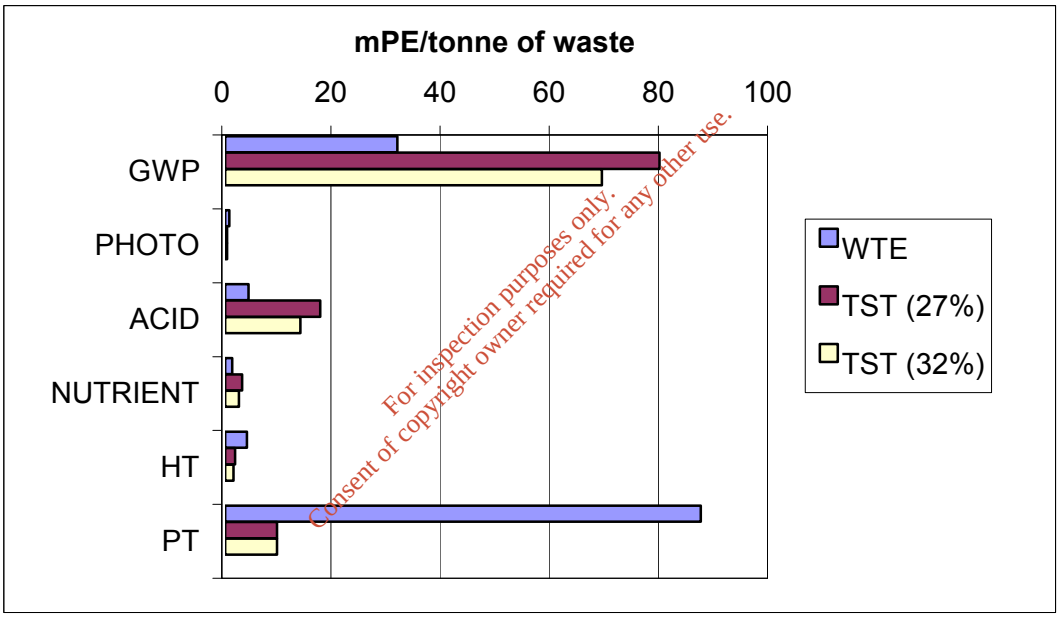
Solid Waste Products

	WTE	TST	Units
Residual waste	42		kg/ton
Heavy metal compounds		8	kg/ton
Total waste to landfill	***42***	***8***	***kg/ton***
Bottom ash	320		kg/ton
Recovered metal	30	30	kg/ton
Vitrified granulate		345	kg/ton
Sulphur		3	kg/ton
Mixed salts		12	kg/ton
Total reusable waste	***350***	***389***	***kg/ton***
Total solid waste	***392***	***397***	***kg/ton***

Summary tables of normalised environmental impacts

Description	Abbrev.	WTE	TST(27%)	TST(32%)	Units
Global warming potential	GWP	32	80	69	mPE*yr/ton
Photochemical ozone formation	PHOTO	0.8	0.3	0.3	mPE*yr/ton
Acidification	ACID	4	17	14	mPE*yr/ton
Nutrient Enrichment	NUTRIENT	1.3	3.1	2.5	mPE*yr/ton
Human toxicity	HT	4.0	1.8	1.5	mPE*yr/ton
Persistent toxicity	PT	87	10	10	mPE*yr/ton
Treatment plant toxicity	ETP	0.1	0	0	mPE*yr/ton

Description	Abbrev.	WTE	TST	Units
Waste to landfill	LANDFILL	42	8	kg/ton
Recovered waste products	RECOVER	350	389	kg/ton
Total Solid Waste	TSW	392	397	kg/ton



Normalised impact potentials assuming atmospheric emissions meet proposed EU limits

Description	Abbrev.	WTE	TST(27%)	TST(32%)	Units
Global warming potential	GWP	32	80	69	mPE*yr/ton
Photochemical ozone formation	PHOTO	1.5	1.0	1.0	mPE*yr/ton
Acidification	ACID	9	20	17	mPE*yr/ton
Nutrient Enrichment	NUTRIENT	2.6	3.8	3.2	mPE*yr/ton
Human toxicity	HT	8.0	5.5	5.2	mPE*yr/ton
Treatment plant toxicity	ETP	0.1	0.0	0.0	mPE*yr/ton
Persistent toxicity	PT	174	95	95	mPE*yr/ton

Summary tables of weighted environmental impacts

Impact	WF	WTE	TST(27%)	TST(32%)	Units
GWP	1.3	41	103	90	mPET*yr/ton
PHOTO	1.2	1	0	0	mPET*yr/ton
ACID	1.3	6	23	18	mPET*yr/ton
NUTRIENT	1.2	2	4	3	mPET*yr/ton
HT	2.8	11	5	4	mPET*yr/ton
ETP	2.3	0.3	0	0	mPET*yr/ton
PT	2.5	218	24	24	mPET*yr/ton

References

Copenhagen County (1997)
Københavns Amt (1997) VVM-redegørelse

MCOS et al (1998)
MCO Sullivan Consulting Engineers, COWI, TU and RuG (1998) Study into the Feasibility of Thermal Options for Waste Treatment/Recovery in Northe East and Mid West Regions, Inception Report, November 1998.

Christensen (1998)
Christensen, T.H. (ed.) (1998) Waste Technology, Teknisk Forlag, in Danish.

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 4x12,5 tonne/hour Thermoselect plant with steamturbine with 27% electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **380,000** tonne **11** MJ/kg

		Annual cost (IR£)	
Cost of Investment (IR£):	**121,600,000**	**13,719,570**	(12 years, 5 % p.a.)

Notes:
1. Cost of site excluded
2. Cost of oxygen producing plant included

Standard plant (IR£)	121,600,000
Factor for custom design	1.0

	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*	
Operating Cost:						
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)			
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3	570,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne	0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg	273,600	
Hydrochloric acid	6	kg/tonne	0.08	IR£/kg	182,400	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg	4,750	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg	228,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg	185,250	
Glycerine	0.15	kg/tonne	0.5	IR£/kg	28,500	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg	159,600	
Other consumables	1.8			IR£/tonne	684,000	
Residuals:						
Waste water	0	m3/tonne	1	IR£/m3		
Metals	30	kg/tonne	0	IR£/kg		
Mineral substance	329	kg/tonne	0	IR£/kg		
Sulphur	2	kg/tonne	0	IR£/kg		
Zinc concentrate	3	kg/tonne	0	IR£/kg		
Salt	11	kg/tonne	0	IR£/kg		
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg	85,500	for deposition
Staffing	48	persons	30000	IR£/person	1,440,000	
Maintenance, 2,5 %					3,040,000	
Administration, insurance etc.					400,000	
(Engine service)			0.009	IR£/kWh		
Total operating cost					**7,281,600**	

	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*	
Income from sales of energy:						
Electricity for export	193	kWh/tonne	0.025	IR£/kWh	1,833,500	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0	
Income from sales of residual prod						
Metals	30	kg/tonne	0.02	IR£/kg	228,000	**424,422**
Vitrified granulate, incl moist	344.6	kg/tonne	0.0015	IR£/kg	196,422	
Sulphur, 70-80% TS	2.7	kg/tonne	0	IR£/kg	0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg	0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne	0	
Resulting overall cost per year				IR£	**18,657,748**	
Resulting Plant Gate Fee*				IR£/tonne	**49**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**	
Capacity	tonne/h	**25**	**25**	**25**	
Waste input	MWt	63.2	76.4	83.3	
Natural gas input	MWt	4.1	4.1	4.1	
Total thermal input	MWt	67.3	80.5	87.5	
Selfconsumption & los	MWt	32.7	32.7	32.7	
Energy in syn-gas	MWt	34.6	47.8	54.7	
Turbine efficiency	%	**32**	**32**	**32**	-27
Gross electric power	MWe	11.1	15.3	17.5	
Elec. for oxygen prod.	MWe	4.4	4.4	4.4	
Elec. other consumptic	MWe	3.7	3.7	3.7	
Net. electric power	MWe	3.0	7.2	9.4	
Spec. net elec. power	kWh/tonne	120	289	378	

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 4x12,5 tonne/hour Thermoselect plant with steamturbine with 32% electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **380,000** tonne **11** MJ/kg

						Annual cost (IR£)	
Cost of Investment (IR£):	**121,600,000**					**13,719,570**	(12 years, 5 % p.a.)
Notes:							
1. Cost of site excluded				Standard plant (IR£)		121,600,000	
2. Cost of oxygen producing plant included				Factor for custom design		1.0	
	Quantity	*Unit*		*Unit Cost*		*Cost per Annum*	
Operating Cost:							
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)				
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3		570,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne		0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg		273,600	
Hydrochloric acid	6	kg/tonne	0.08	IR£/kg		182,400	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg		4,750	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg		228,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg		185,250	
Glycerine	0.15	kg/tonne	0.5	IR£/kg		28,500	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg		159,600	
Other consumables	1.8			IR£/tonne		684,000	
Residuals:							
Waste water	0	m3/tonne	1	IR£/m3			
Metals	30	kg/tonne	0	IR£/kg			
Mineral substance	329	kg/tonne	0	IR£/kg			
Sulphur	2	kg/tonne	0	IR£/kg			
Zinc concentrate	3	kg/tonne	0	IR£/kg			
Salt	11	kg/tonne	0	IR£/kg			
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg		85,500	for deposition
Staffing	48	persons	30000	IR£/person		1,440,000	
Maintenance, 2,5 %						3,040,000	
Administration, insurance etc.						400,000	
(Engine service)			0.009	IR£/kWh			
Total operating cost						**7,281,600**	
	Quantity	*Unit*		*Unit Price*		*Revenue per Annum*	
Income from sales of energy:							
Electricity for export	289	kWh/tonne	0.025	IR£/kWh		2,745,500	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh		0	
Income from sales of residual products:							
Metals	30	kg/tonne	0.02	IR£/kg		228,000	**424,422**
Vitrified granulate, incl moist	344.6	kg/tonne	0.0015	IR£/kg		196,422	
Sulphur, 70-80% TS	2.7	kg/tonne	0	IR£/kg		0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg		0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne		0	
Resulting overall cost per year				IR£		**17,745,748**	
Resulting Plant Gate Fee*				IR£/tonne		**47**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**	
Capacity	tonne/h	**25**	**25**	**25**	
Waste input	MWt	63.2	76.4	83.3	
Natural gas input	MWt	4.1	4.1	4.1	
Total thermal input	MWt	67.3	80.5	87.5	
Selfconsumption & loss.	MWt	32.7	32.7	32.7	
Energy in syn-gas	MWt	34.6	47.8	54.7	
Turbine efficiency	%	**32**	**32**	**32**	-27
Gross electric power	MWe	11.1	15.3	17.5	
Elec. for oxygen prod.	MWe	4.4	4.4	4.4	
Elec. other consumption	MWe	3.7	3.7	3.7	
Net. electric power	MWe	3.0	7.2	9.4	
Spec. net elec. power	kWh/tonne	120	289	378	

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 4x12,5 tonne/hour Thermoselect plant with steamturbine with **27%** electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **380,000** tonne **12** MJ/kg

					Annual cost (IR£)	
Cost of Investment (IR£):	**121,600,000**				**13,719,570**	(12 years, 5 % p.a.)
Notes:						
1. Cost of site excluded			Standard plant (IR£)		121,600,000	
2. Cost of oxygen producing plant included			Factor for custom design		1.0	
	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*	
Operating Cost:						
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)			
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3	570,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne	0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg	273,600	
Hydrochloric acid	6	kg/tonne	0.08	IR£/kg	182,400	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg	4,750	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg	228,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg	185,250	
Glycerine	0.15	kg/tonne	0.5	IR£/kg	28,500	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg	159,600	
Other consumables	1.8			IR£/tonne	684,000	
Residuals:						
Waste water	0	m3/tonne	1	IR£/m3		
Metals	30	kg/tonne	0	IR£/kg		
Mineral substance	329	kg/tonne	0	IR£/kg		
Sulphur	2	kg/tonne	0	IR£/kg		
Zinc concentrate	3	kg/tonne	0	IR£/kg		
Salt	11	kg/tonne	0	IR£/kg		
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg	85,500	for deposition
Staffing	48	persons	30000	IR£/person	1,440,000	
Maintenance, 2,5 %					3,040,000	
Administration, insurance etc.					400,000	
(Engine service)			0.009	IR£/kWh		
Total operating cost					**7,281,600**	
	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*	
Income from sales of energy:						
Electricity for export	268	kWh/tonne	0.025	IR£/kWh	2,546,000	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0	
Income from sales of residual products:						
Metals	30	kg/tonne	0.02	IR£/kg	228,000	**424422**
Vitrified granulate incl. moist	344.6	kg/tonne	0.0015	IR£/kg	196,422	
Sulphur, 70-80% TS	2	kg/tonne	0	IR£/kg	0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg	0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne	0	
Resulting overall cost per year				IR£	**17,945,248**	
Resulting Plant Gate Fee*				IR£/tonne	**47**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**
Capacity	tonne/h	**25**	**25**	**25**
Waste input	MWt	63.2	76.4	83.3
Natural gas input	MWt	4.1	4.1	4.1
Total thermal input	MWt	67.3	80.5	87.5
Selfconsumption & loss.	MWt	32.7	32.7	32.7
Energy in syn-gas	MWt	34.6	47.8	54.7
Turbine efficiency	%	**32**	**32**	**32**
Gross electric power	MWe	11.1	15.3	17.5
Elec. for oxygen prod.	MWe	4.4	4.4	4.4
Elec. other consumption	MWe	3.7	3.7	3.7
Net. electric power	MWe	3.0	7.2	9.4
Spec. net elec. power	kWh/tonne	120	289	378

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 4x12,5 tonne/hour Thermoselect plant with steamturbine with **32%** electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **380,000** tonne **12** MJ/kg

					Annual cost (IR£)	
Cost of Investment (IR£):	**121,600,000**				**13,719,570**	(12 years, 5 % p.a.)
Notes:						
1. Cost of site excluded			Standard plant (IR£)		121,600,000	
2. Cost of oxygen producing plant included			Factor for custom design		1.0	
	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*	
Operating Cost:						
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)			
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3	570,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne	0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg	273,600	
Hydrochloric acid	6	kg/tonne	0.08	IR£/kg	182,400	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg	4,750	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg	228,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg	185,250	
Glycerine	0.15	kg/tonne	0.5	IR£/kg	28,500	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg	159,600	
Other consumables	1.8			IR£/tonne	684,000	
Residuals:						
Waste water	0	m3/tonne	1	IR£/m3		
Metals	30	kg/tonne	0	IR£/kg		
Mineral substance	329	kg/tonne	0	IR£/kg		
Sulphur	2	kg/tonne	0	IR£/kg		
Zinc concentrate	3	kg/tonne	0	IR£/kg		
Salt	11	kg/tonne	0	IR£/kg		
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg	85,500	for deposition
Staffing	48	persons	30000	IR£/person	1,440,000	
Maintenance, 2,5 %					3,040,000	
Administration, insurance etc.					400,000	
(Engine service)			0.009	IR£/kWh		
Total operating cost					**7,281,600**	
	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*	
Income from sales of energy:						
Electricity for export	378	kWh/tonne	0.025	IR£/kWh	3,591,000	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0	
Income from sales of residual products:						
Metals	30	kg/tonne	0.02	IR£/kg	228,000	**424,422**
Vitrified granulate incl. moist	344.6	kg/tonne	0.0015	IR£/kg	196,422	
Sulphur, 70-80% TS	2	kg/tonne	0	IR£/kg	0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg	0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne	0	
Resulting overall cost per year				IR£	**16,900,248**	
Resulting Plant Gate Fee*				IR£/tonne	**44**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**
Capacity	tonne/h	**25**	**25**	**25**
Waste input	MWt	63.2	76.4	83.3
Natural gas input	MWt	4.1	4.1	4.1
Total thermal input	MWt	67.3	80.5	87.5
Selfconsumption & loss.	MWt	32.7	32.7	32.7
Energy in syn-gas	MWt	34.6	47.8	54.7
Turbine efficiency	%	**32**	**32**	**32**
Gross electric power	MWe	11.1	15.3	17.5
Elec. for oxygen prod.	MWe	4.4	4.4	4.4
Elec. other consumption	MWe	3.7	3.7	3.7
Net. electric power	MWe	3.0	7.2	9.4
Spec. net elec. power	kWh/tonne	120	289	378

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 2x12,5 tonne/hour Thermoselect plant with steamturbine with 27% electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **200,000** tonne **9.1** MJ/kg

		Annual cost (IR£)	
Cost of Investment (IR£):	**73,000,000**	**8,236,255**	(12 years, 5 % p.a.)

Notes:
1. Cost of site excluded
2. Cost of oxygen producing plant included

Standard plant (IR£)	73,000,000
Factor for custom design	1.0

	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*	
Operating Cost:						
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)			
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3	300,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne	0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg	144,000	
Hydrocloric acid	6	kg/tonne	0.08	IR£/kg	96,000	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg	2,500	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg	120,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg	97,500	
Glycerine	0.15	kg/tonne	0.5	IR£/kg	15,000	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg	84,000	
Other consumables	1.8			IR£/tonne	360,000	
Residuals:						
Waste water	0	m3/tonne	1	IR£/m3		
Metals	30	kg/tonne	0	IR£/kg		
Mineral substance	329	kg/tonne	0	IR£/kg		
Sulphur	2	kg/tonne	0	IR£/kg		
Zinc concentrate	3	kg/tonne	0	IR£/kg		
Salt	11	kg/tonne	0	IR£/kg		
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg	45,000	for deposition
Staffing	48	persons	30000	IR£/person	1,440,000	
Maintenance, 2,5 %					1,825,000	
Administration, insurance etc.					400,000	
(Engine service)			0.009	IR£/kWh		
Total operating cost					**4,929,000**	

	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*	
Income from sales of energy:						
Electricity for export	51	kWh/tonne	0.025	IR£/kWh	255,000	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0	
Income from sales of residual products:						
Metals	30	kg/tonne	0.02	IR£/kg	120,000	**223,380**
Vitrified granulate incl. moist	344.6	kg/tonne	0.0015	IR£/kg	103,380	
Sulphur, 70-80% TS	2.7	kg/tonne	0	IR£/kg	0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg	0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne	0	
Resulting overall cost per year				IR£	**12,641,875**	
Resulting Plant Gate Fee*				IR£/tonne	**63.2**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**	
Capacity	tonne/h	**25**	**25**	**25**	
Waste input	MWt	63.2	76.4	83.3	
Natural gas input	MWt	4.1	4.1	4.1	
Total thermal input	MWt	67.3	80.5	87.5	
Selfconsumption & loss.	MWt	32.7	32.7	32.7	
Energy in syn-gas	MWt	34.6	47.8	54.7	
Turbine efficiency	%	**32**	**32**	**32**	-27
Gross electric power	MWe	11.1	15.3	17.5	
Elec. for oxygen prod.	MWe	4.4	4.4	4.4	
Elec. other consumption	MWe	3.7	3.7	3.7	
Net. electric power	MWe	3.0	7.2	9.4	
Spec. net elec. power	kWh/tonne	120	289	378	

THERMOSELECT THERMAL WASTE TREATMENT

Calculated Cost per tonne

Evaluation of cost for a 4x12,5 tonne/hour Thermoselect plant with steamturbine with 32% electric efficiency.

Emissions guaranteed to 20% of 17 BImSchV, except dust 30%, NOx 50% and dioxin & heavy metals 10% here-off.
The synthesis gas generated is used as fuel for electricity production
Annual amount of treated waste: **380,000** tonne **9.1** MJ/kg

					Annual cost (IR£)	
Cost of Investment (IR£):	**121,600,000**				**13,719,570**	(12 years, 5 % p.a.)
Notes:						
1. Cost of site excluded				Standard plant (IR£)	121,600,000	
2. Cost of oxygen producing plant included				Factor for custom design	1.0	
	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*	
Operating Cost:						
Oxygen 95%	500	kg/tonne	(produced on-site using 175 kWh electricity/tonne)			
Natural gas, back-up	15	Nm3/tonne	0.1	IR£/Nm3	570,000	
Cooling water, recycled	1.36	m3/tonne	0	IR£/tonne	0	
Sodium hydroxide	12	kg/tonne	0.06	IR£/kg	273,600	
Hydrocloric acid	6	kg/tonne	0.08	IR£/kg	182,400	
Hydrogen peroxide	0.05	kg/tonne	0.25	IR£/kg	4,750	
Iron chelate	0.75	kg/tonne	0.8	IR£/kg	228,000	
Activated coke	1.3	kg/tonne	0.38	IR£/kg	185,250	
Glycerine	0.15	kg/tonne	0.5	IR£/kg	28,500	
Ion exchanger	0.07	kg/tonne	6.0	IR£/kg	159,600	
Other consumables	1.8			IR£/tonne	684,000	
Residuals:						
Waste water	0	m3/tonne	1	IR£/m3		
Metals	30	kg/tonne	0	IR£/kg		
Mineral substance	329	kg/tonne	0	IR£/kg		
Sulphur	2	kg/tonne	0	IR£/kg		
Zinc concentrate	3	kg/tonne	0	IR£/kg		
Salt	11	kg/tonne	0	IR£/kg		
Heavy metal compounds, 29-40% TS	7.5	kg/tonne	0.03	IR£/kg	85,500	for disposal
Staffing	48	persons	30000	IR£/person	1,440,000	
Maintenance, 2,5 %					3,040,000	
Administration, insurance etc.					400,000	
(Engine service)			0.009	IR£/kWh		
Total operating cost					**7,281,600**	
	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*	
Income from sales of energy:						
Electricity for export	120	kWh/tonne	0.025	IR£/kWh	1,140,000	
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0	
Income from sales of residual products:						
Metals	30	kg/tonne	0.02	IR£/kg	228,000	**424,422**
Vitrified granulate incl. moist	344.6	kg/tonne	0.0015	IR£/kg	196,422	
Sulphur, 70-80% TS	2.7	kg/tonne	0	IR£/kg	0	
Mixed salts, 90-97% TS	12	kg/tonne	0	IR£/kg	0	
Water (evaporated)	0	kg/tonne	1	IR£/tonne	0	
Resulting overall cost per year				IR£	**19,351,248**	
Resulting Plant Gate Fee*				IR£/tonne	**51**	

* Gate Fee does not include for transport costs etc.

Energy balance for a plant with 2 x 12,5 t/h lines and a yearly through put of 200.000 tonne
8000 yearly operation hours

Lower Heat Value	MJ/kg	**9.1**	**11**	**12**	
Capacity	tonne/h	**25**	**25**	**25**	
Waste input	MWt	63.2	76.4	83.3	
Natural gas input	MWt	4.1	4.1	4.1	
Total thermal input	MWt	67.3	80.5	87.5	
Selfconsumption & loss.	MWt	32.7	32.7	32.7	
Energy in syn-gas	MWt	34.6	47.8	54.7	
Turbine efficiency	%	**32**	**32**	**32**	-27
Gross electric power	MWe	11.1	15.3	17.5	
Elec. for oxygen prod.	MWe	4.4	4.4	4.4	
Elec. other consumption	MWe	3.7	3.7	3.7	
Net. electric power	MWe	3.0	7.2	9.4	
Spec. net elec. power	kWh/tonne	120	289	378	

WASTE COMBUSTION WITH ENERGY RECOVERY (WTE)

Calculated Cost per tonne

Evaluation of cost for a 3x16 tonne/h incineration plant with **wet fluegas treatment** and SNCR

Emissions in accordance with new EU-directive (agreed upon at the Council meeting on 24/25 June 1999)

Excess energy is used for electricity production only.

Annual waste throughput (tpa): **380,000** **11** MJ/kg

			Annual cost (IR£)
Cost of Investment (IR£):	**108,000,000**		**12,185,144** (12 years, 5% p.a.
Note:		Standard plant (IR£)	90,000,000
Cost of site excluded		Factor for custom design	1.2

Investment Breakdown:	%
Furnace/Boiler	40
Fluegas treatment	20
Turbine/generator	20
Civil work	20
Total	100

Operating Cost:

	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*
Water	0.25	m3/tonne	0.5	IR£/m3	47,500
CaC03	14	kg/tonne	0.06	IR£/kg	319,200
HCl (30%)	0.1	kg/tonne	0.2	IR£/kg	7,600
NaOH (25%)	4	kg/tonne	0.2	IR£/kg	304,000
TMT (100%)	0.2	kg/tonne	3	IR£/kg	228,000
Polymer (100%)	0.01	kg/tonne	3	IR£/kg	11,400
Fe2Cl3 (100%)	0.05	kg/tonne	1	IR£/kg	19,000
Activated carbon	0.5	kg/tonne	1	IR£/kg	190,000
NH3 (25%)	3	kg/tonne	0.16	IR£/kg	182,400
Fuel oil for S/U and S/D	0.5	l/tonne	0.15	IR£/l	28,500
Other consumables and services					50,000
Waste water	0.1	m3/tonne			
Residue products for deposition	42	kg/tonne	0.03	IR£/kg	478,800
Bottom ash for recycling	320	kg/tonne	0	IR£/kg	0
Variable operating cost per annum (IR£):					1,866,400
Staffing	40	persons	30000	IR£/person	1,200,000
Administration, insurance etc					600,000
Maintenance 2,5%					2,700,000
Total operating cost (IR£)					**6,366,400**

Income from sales of energy:

	Quantity	*Unit*	*Unit Price*		*Revenue per Annun*
Electricity for sales*	677	kWh/tonne	0.025	IR£/kWh	6,430,769
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0
Income from sales of residual products					
Metal	30	kg/tonne	0.02	IR£/kg	228,000
Resulting overall cost per year (IR£)					**11,892,775**
Resulting Plant Gate Fee** (IR£/tonne)					**31**

* Steam pressure, temperature and feedwater temp : 44 bar, 380 deg C and 130 deg C condensation temp. = 50 deg C and own electricity consumption ~ 15%

** Gate Fee does not include for transport costs etc.

WASTE COMBUSTION WITH ENERGY RECOVERY (WTE)

Calculated Cost per tonne

Evaluation of cost for a 2x12.5 tonne/h incineration plant with **wet fluegas treatment** and SNCR

Emissions in accordance with new EU-directive (agreed upon at the Council meeting on 24/25 June 1999)

Excess energy is used for electricity production only.

Annual waste throughput (tpa): **200,000** **9.1** MJ/kg

		Annual cost (IR£)
Cost of Investment (IR£):	**70,000,000**	**7,897,779** (12 years, 5% p.a.)

Note:
Cost of site excluded

Standard plant (IR£) 85,000,000
Factor for custom design 1.2

Investment Breakdown:	%
Furnace/Boiler	40
Fluegas treatment	20
Turbine/generator	20
Civil work	20
Total	100

Operating Cost:

	Quantity	*Unit*	*Unit Cost*		*Cost per Annum*
Water	0.25	m3/tonne	0.5	IR£/m3	25,000
CaC03	14	kg/tonne	0.06	IR£/kg	168,000
HCl (30%)	0.1	kg/tonne	0.2	IR£/kg	4,000
NaOH (25%)	4	kg/tonne	0.2	IR£/kg	160,000
TMT (100%)	0.2	kg/tonne	3	IR£/kg	120,000
Polymer (100%)	0.01	kg/tonne	3	IR£/kg	6,000
Fe2Cl3 (100%)	0.05	kg/tonne	1	IR£/kg	10,000
Activated carbon	0.5	kg/tonne	1	IR£/kg	100,000
NH3 (25%)	3	kg/tonne	0.16	IR£/kg	96,000
Fuel oil for S/U and S/D	0.5	l/tonne	0.15	IR£/l	15,000
Other consumables and services					50,000
Waste water	0.1	m3/tonne			
Residue products for deposition	42	kg/tonne	0.03	IR£/kg	252,000
Bottom ash for recycling	320	kg/tonne	0	IR£/kg	0
Variable operating cost per annum (IR£):					1,006,000
Staffing	40	persons	30000	IR£/person	1,200,000
Administration, insurance etc					600,000
Maintenance 2,5%					1,750,000
Total operating cost (IR£)					**4,556,000**

Income from sales of energy:

	Quantity	*Unit*	*Unit Price*		*Revenue per Annum*
Electricity for sales*	560	kWh/tonne	0.025	IR£/kWh	2,800,000
Energy for district heating	0	kWh/tonne	0.011	IR£/kWh	0
Income from sales of residual products					
Metal	30	kg/tonne	0.02	IR£/kg	120,000
Resulting overall cost per year (IR£)					**9,533,779**
Resulting Plant Gate Fee** (IR£/tonne)					**48**

* Steam pressure, temperature and feedwater temp : 44 bar, 380 deg C and 130 deg C
condensation temp. = 50 deg C and own electricity consumption ~ 15%
** Gate Fee does not include for transport costs etc.

APPENDIX B

PUBLIC INVOLVEMENT

APPENDIX B1

REPORT ON COMMUNITY FOCUS GROUPS

DUBLIN WASTE MANAGEMENT RESEARCH

Presentation to

MC O'SULLIVAN

By

Lansdowne Market Research

22nd October 1999
LoR/BE/ld
411-L9.

LANSDOWNE
MARKET RESEARCH

WHAT ARE WE GOING TO DISCUSS TODAY?

1 Background.

2 What are people's attitudes towards waste disposal?

3 What do people think about different waste treatment methods?

4 What do people think of Thermal Treatment?

5 What does this mean for MC O'Sullivan and Dublin Local Authorities?

1. BACKGROUND

1.1 WHY MC O'SULLIVAN COMMISSIONED RESEARCH?

- EU legislation regarding management of waste has resulted in the 4 Dublin Local Authorities - Dublin Corporation, Fingal County Council, South Dublin County Council and Dun Laoghaire/Rathdown joining forces to develop a waste management strategy.

- One of the objectives of the strategy is to reduce the levels of waste in landfill locations and to recycle or indeed generate energy from waste.

- Thermal Treatment is one of the options the Local Authorities are considering as part of their waste management treatment.

- Information was required by MC O'Sullivan and the 4 Local Authorities to ascertain public opinion about waste management and the criteria they should use when considering potential Thermal Treatment site locations.

- This presentation today providing a summary of our findings from Stage 1 of the research together with our recommendations for the way forward.

1.2 HOW LANSDOWNE CONDUCTED THE RESEARCH I

- **Two stage research approach.**
- **Stage one was qualitative in design and consisted of 8 group discussions, 2 in each of the Local Authority areas.**

Group	Age	Social Class	Sex	Local Authority
1	20-24	ABC1	Male	Dun Laoghaire/ Rathdown
2	20-24	C1C2	Female	Dublin Fingal
3	25-34	ABC1	Mix of men and women	South Dublin County Council
4	25-34	C2DE	Mix of men and women	Dublin Corporation
5	35-49	ABC1	Mix of men and women	Dun Laoghaire/ Rathdown
6	35-49	C1C2	Mix of men and women	South Dublin County Council
7	50-64	ABC1	Mix of men and women	Dublin Corporation
8	65+	C2DE	Mix of men and women	Dublin Fingal

1.2 HOW LANSDOWNE CONDUCTED THE RESEARCH II

- **Groups reflected broad socio-economic groups including**
  - **Housewives.**
  - **Full time employed.**
  - **Part time employed.**
  - **Retired.**
  - **Unemployed.**
  - **Students.**
- **The groups were conducted by Lorraine O'Rahilly and Bernadette Coyne of Lansdowne Market Research during September and October 1999.**

1.3 THE RESEARCH OBJECTIVES

- **The main objectives of the research were:**

  "To understand the publics attitude and behaviour towards waste management"

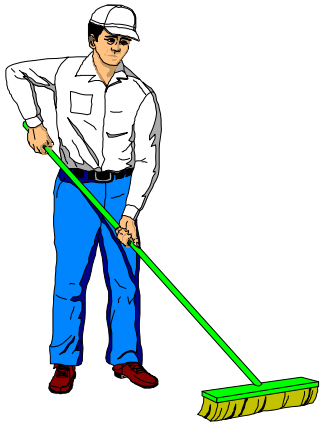
  "To identify the public's criteria for selecting sites for Thermal Treatment plants"

2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL?

2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL? - I

- There appeared to be three main groups of people when it comes to the disposal of household waste.

Active Disposers



Responsive Disposers

Dismissers

Take Responsibility ⟷ **Take No Responsibility**

2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL? - II

Active Disposers

- Minority in this research.
- More conscious of environmental issues.
- Feel they have a role to play in the future of the environment.
- Use initiative in disposal of waste.
  - May have compost heap.
  - Recycle as much in home.
  - May burn rubbish(?!).
  - Visit recycling banks.

Take Responsibility

Responsive Disposers

- 'Respond' to initiatives if made by others.
  - May use 'greenbins' 'Kerbside'.
  - May visit recycling bank if remember.
  - May recycle Christmas trees for compost.
- May lapse if becomes difficult.
- Parents clearly influenced by school children initiatives.
- Younger adults also influenced by parental example.
- Believe doing a 'bit' for the environment but could do more if encouraged/educated/made easier.

Take 'Some' Responsibility

Dismissers

- Rarely give much consideration to environmental issues.
- Life is just too busy.
- Certain degree of apathy/lazyness especially if young and not home owner.
- Believe waste disposal is somebody else's problem, responsibility.

Take 'No' Responsibility

2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL? - III

- The collecting of household waste is primarily taken for granted by most people.
- Once collected, few really give any real consideration to what happens to it or where it goes. It's really a case of 'out of sight, out of mind'.
- The over-riding consensus is that rubbish is brought to 'the tip' and buried. Some speculate it may be burnt!
- Others, especially the active and responsive disposers believe
  - Rubbish may be treated before disposal.
  - Rubbish may be segregated to gather recyclables.
- When it comes to recycling material (from bottle banks etc.) the less informed believe 'glass' 'tin' may be 'melted and recycled'.
- The more informed recognise recycling is a viable business often outsourced to private firms. (profit motive).
- Some also aware 'paper recycling' is not a viable business.

2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL? - IV

- **Whilst household waste disposal is not top of peoples priority there is an underlying awareness among some that 'waste disposal' is becoming an issue.**

- **This awareness has been created through.**

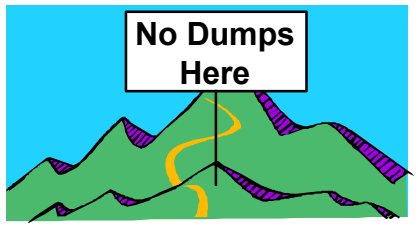
  - **'No dump here' signs spotted throughout certain parts of the country.**

  - **Growing unsightliness of dumps eg. Dunsink.**

  - **Provision of Kerbside 'green boxes'.**

  - **Local concerns, some LA areas take other LA rubbish.**

  - **Protests against 'incinerators'.**



2. WHAT ARE PEOPLE'S ATTITUDES TOWARDS WASTE DISPOSAL? - V

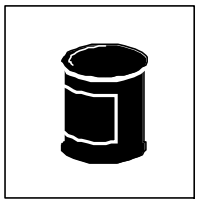
- Many people, (especially those who travel) believe Irish people are far less concerned about 'waste' than our European/American neighbours.
- The most obvious example is Irelands' dirty streets.
- They also believe Irish people are less aware of 'waste issues' and that the same emphases is not given to it in Ireland as in other countries (e.g. different coloured bins).
- Overall, there is a belief that Irish peoples' lack of concern about 'waste disposal' is exacerbated as 'waste disposal is a low priority for Irish Government.
- This is reflected through
  - Irish peoples lack of awareness of waste disposal issues.
  - Lack of effective facilities for recycling.
  - Lack of enforcement of policies.
- The 'absence' of any enforcement of waste disposal policies effectively means that only those who feel strongly about these issues feel any onus of responsibility and take initiative.

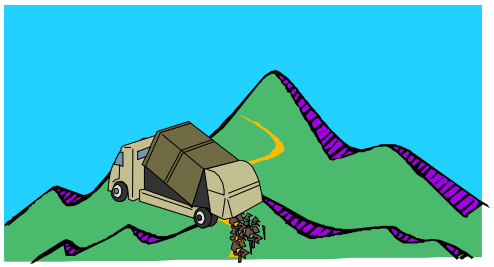
3. WHAT DO PEOPLE THINK ABOUT DIFFERENT WASTE TREATMENT METHODS?

3.1 WHAT DO PEOPLE THINK ABOUT DIFFERENT WASTE TREATMENT METHODS? - I

- **Reaction was sought to:**

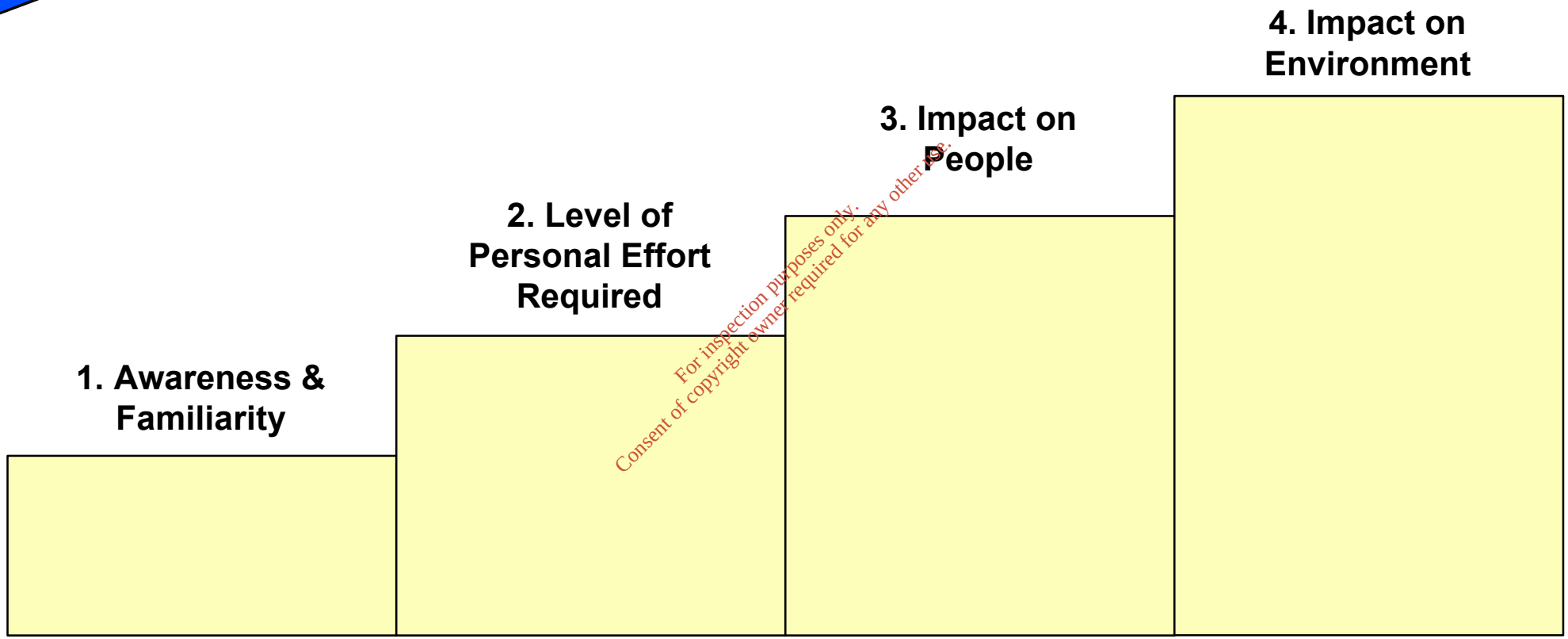
1. **Landfill.**
2. **Recycling Banks.**
3. **Kerbside Collection.**
4. **Facilities for**
   - **Kitchen waste disposal.**
   - **Construction/demolition waste.**
   - **Harmful household waste.**
5. **Thermal Treatment.**





3.1 WHAT DO PEOPLE THINK ABOUT DIFFERENT WASTE TREATMENT METHODS? -II

- **Multitude of factors influences people's attitude towards different waste treatment methods.**



Each of these factors represents BARRIERS which must be overcome for a waste treatment method to gain acceptance

3.1 WHAT DO PEOPLE THINK ABOUT DIFFERENT WASTE TREATMENT METHODS? - III

1. Awareness & Familiarity

- Tried & Tested
- Track record

2. Level of Personal Effort Required

- Minimum effort.
- Easy to do.
- Fits with normal behaviour

3. Impact on People

- Health.
- Quality of life.
- Financial.
  - No personal financial outlay.
  - No impact on property value.
  - Cost effective government outlay.

4. Impact on Environment

- Aesthetic appearance, in keeping with the environment.
- Minimise environmental damage.

BARRIERS which must be overcome in order for a waste treatment method to gain acceptance

3.1 WHAT DO PEOPLE THINK ABOUT DIFFERENT WASTE TREATMENT METHODS? - IV

- **Irrespective of people's attitudes towards waste disposal, everybody is concerned about what impact it has on them *personally* and their families.**

  Thereafter, the focus and factors which motivate people to 'accept' a particular treatment will vary.

Active Disposers	Responsive Disposers	Dismissive
↓	↓	↓
Environmental focus	Level of Effort focus	Awareness Issue

- **It is vital therefore that any new waste treatment methods satisfies the needs of different groups of people in order to gain acceptance.**

3.2 LANDFILL SITES - I

1 AWARENESS & FAMILIARITY.

- The fact that most household waste is disposed of in Landfill sites is no major surprise to people , after all where else would it go.
- Whilst many would not be totally familiar with the operations of Landfill sites, they have become accepted as part of 'the way we dispose of waste'.
- There is, however, criticism of our dependence on using Landfill sites for the disposal of household waste, especially as many items are not biodegradable.
- The inclination for many is to blame the business community initially given they provide so much of the raw material that becomes household waste.

2 LEVEL OF PERSONAL EFFORT REQUIRED.

- Minimum as far as the public is concerned given waste is collected and disposed of by a third party.

3.2 LANDFILL SITES - II

3 IMPACT ON PEOPLE

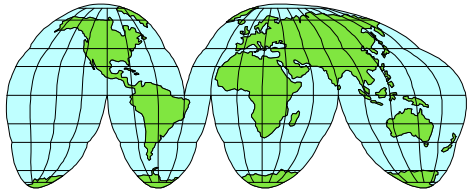
Financially

- Currently cost is part of taxes, therefore no personal financial outlay is perceived.
- Impact is felt mainly on value of property as ‘nobody wants to live beside a dump’.
- Land is ‘valuable’, not being maximised.

Health, Safety and Quality of Life

- Most at risk are those who live near by.
  - Smell.
  - Gas emissions.
  - Vermin.
  - Noise.
  - Transportation safety.
- If don’t live near dump less concern.

4 ENVIRONMENTAL IMPACT



- Ugly and unsightly.
- Damage to land (unusable immediate future).
- Contributes to long term environmental damage.

No benefits only drawbacks

3.2 LANDFILL - VERBATIMS 1

I drive by Dunsink practically every day on the M50 and I've noticed in the last year and a half that it is actually getting bigger. It borders on to the M50 where there's continuously trucks and things just regurgitating the land. It's inching closer to the road. It's definitely getting higher.

There has to be gases coming from it. That has to go into the environment for starters. If anybody is going to live near that area when it does start to come up to the top, obviously it's not going to come up to the top immediately, but eventually it will and anybody living in that area will be in trouble.

They took away the pitching course and built houses there (reclaimed land) and there's a friend of mine living in there and he said on a bright sunny day in the middle of summer the stink is just unbelievable.
That wouldn't be safe for children to play in.

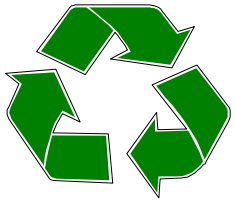
3.2 LANDFILL - VERBATIMS II

I'd say a lot of the stuff that's in landfills won't ever decompose or else it'll take a couple of million years. If you burn it or if you incinerate, no matter what way you look at it, even if there is a minute amount of gas that's harmful, its going to be a hell of a lot less. You're going to be reducing the risk a lot.

Nobody wants to give up land to have a dump in beside their house .. land is too valuable in Dublin

I'm sure it brings rats and it's not hygienic I don't know if it's true but in an area where there's a dump the prices of houses are affected

3.3 RECYCLING BANKS - I



1 AWARENESS AND FAMILIARITY.

- Most people were not surprised that the level of recycling of household waste is low in Ireland, given the lack of emphasis placed on it by government.
- Having said that 'recycle banks' are a familiar concept and effective if people can be motivated to use them.
- Education about what kind of recycling banks are available - paper, bottles, tins, clothes etc would help.
- So too, would information concerning how items should be disposed of at recycle banks.
- Recycling Banks unavailable include 'paper' and plastic'.

3.3 RECYCLING BANKS - II

2 LEVEL OF PERSONAL EFFORT INVOLVED.

- Visiting a Recycling Bank requires planning and effort, people have to make a conscious decision to visit.

- Recycle Banks therefore need to be:
  - Near where people live/shop.
  - Easily accessible.
  - Have storage capacity.
  - Be seen to make a difference (what exactly happens when the banks are emptied?)

3 IMPACT ON PEOPLE.

- In order for people to justify using a Recycling Bank, they need to feel.
  - They generate sufficient waste to warrant a trip.
  - They have space at home to store items.
  - The storage of items does not contribute to personal discomfort.
  - They have transport

4 IMPACT ON THE ENVIRONMENT.

- Poorly organised Recycling Banks result in being perceived as contributing to part of the environmental problem rather than helping alleviate it e.g. bags of bottles/plastic bags/paper lying around.

3.3 RECYCLING BANKS - VERBATIMS

You're not going to drive out of your way to find one. I'm not going to go to Blanchardstown centre and try and park for half an hour and then go and throw my bottles in as well. It's accessibility. I know we're coming across as being lazy here but at the end of the day we all are. Time is very important. When you're running here and running there you don't have time.

I have to say they could be collected more often than they are because I've gone up there and they were overflowing. I had to bring my stuff back home, because I'm conscious of that. Sometimes people just leave it there. They should be emptied more often.

You're not going to go down to the bottle bank if you've only one bottle so they're either going to pile up and you're going to get pissed off with that pile of bottles and then you're going to throw them in the bin or else you're going to take them down but you're not going to go down with one bottle

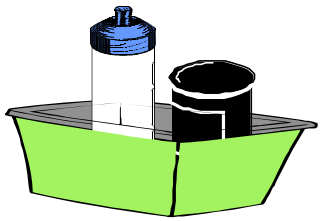
3.4 KERBSIDE COLLECTION - I

1 AWARENESS AND FAMILIARITY.

- Good awareness in many areas of Kerbside service, Fingal, South Dublin County Council etc.
- Once described to others, consensus is that it is a good idea.
- Not all aware of who runs it.

2 LEVEL OF PERSONAL EFFORT REQUIRED.

- Requirement for people to become more thoughtful about separating waste to begin with. Message to be communicated is that 'it's easy' 'no hassle involved'.
- Given 'bin' is supplied and 'collected' minimum of personal effort is required.



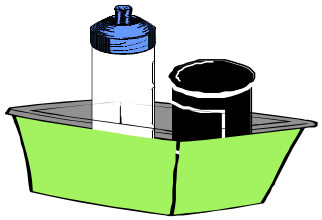
3.4 KERBSIDE COLLECTION - II

3 IMPACT ON PEOPLE.

- Brings recycling mentality to people. People feel doing their bit.
- Problems occur.
  - No storage space (inside/outside).
  - Box becomes too full (small) ® revert to black sacks!
  - No lid, messy.
  - Items are not accepted without explanation e.g. paper.

4 IMPACT ON ENVIRONMENT.

- None, items are collected and 'recycled' (?)



3.3 KERBSIDE COLLECTION - VERBATIMS I

Recycling is very important I think. I don't think about it now because I'm lackadaisical. I certainly would like to recycle. I think if the bins were there, if they gave you the green bin but a bit bigger because you wouldn't even get a few days out of it. If they were a bit bigger you would probably leave them out.

No, I don't know who gets it. I don't even know if you have to apply. I think they were sent out to certain areas. We've never been approached by anybody to say look would you like to do this. They look only tiny to me. They just left them outside. They just decided one day that this was the chosen area or whatever and that's it.

3.3 KERBSIDE COLLECTION - VERBATIMS II

There's not much room in it. It's only like one of these little plastic things you get in Woodies or whatever. It's basically filled up after about 2 days.
I always thought they looked every small. Everything must be folded. It's like a little mini skip the way you have to pack a skip in.

It's a brilliant idea. I'd say it would collect more than half the rubbish, plastic bottles, mineral bottles and tins. Because we have something there for us. It's there and we make use of it but we have to be educated about it.

3.4 PROVIDING RECYCLING FACILITIES FOR …….

Kitchen Waste Disposal

- Limited awareness of special composting facilities for household use.
- Food is biodegradable - are other facilities necessary??
- Any waste treatment methods which require people having to store or transport food is disliked.

Green Garden Waste Depot

- Most dump garden waste in bin or 'slip' a fiver to get collected.
- Some familiar with trading Xmas trees @ St. Mary's Park for cheap compost.
- In principal good idea, however, means people are required to make an effort and need to transport waste.

Construction/ Demolition & Harmful Household Waste

- The provision of these facilities once more means that people are required to take initiatives.
- Large demolition/ construction waste will require skip.
- Incidence of occurrence is minimal ® likelihood to visit facility is limited (in absence of rationale).
- Potential rewards may be motivational.
- Other suggestions include 'special clean ups' in neighbourhoods.

3.4 OTHER FACILITIES - VERBATIMS I

It all depends where they are – people aren't going to travel miles to dispose of their food or grass when they know it's going to decompose out their back anyway

Green Garden Depot.
That'd be a great idea. There isn't enough of them. The only one I know about is in St. Anne's Park. I used to live there. At Christmas you brought your tree there.

There are some bins where they actually use worms in them and it's a compost bin. You put everything in. The way it works, there's no smell. Then again you have to go out and get them, you have to buy them, you have to find out where they come from. It's like an upmarket thing. Food is biodegradable anyway so you're not aware of that as a waste problem. That's the least of your worries. You don't even care about it. That's not a problem. Somebody is going to eat it, dogs, cats, whatever.

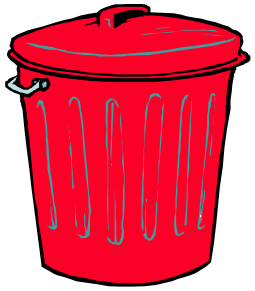
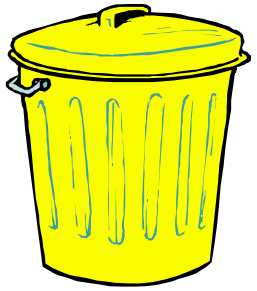
3.4 OTHER FACILITIES - VERBATIMS II

Yeah. It would be a good thing if people would use it (food composting) but I don't think they would because it's too much trouble and you have it too often. You have it 3 times a day maybe so you couldn't be running off every day with it.

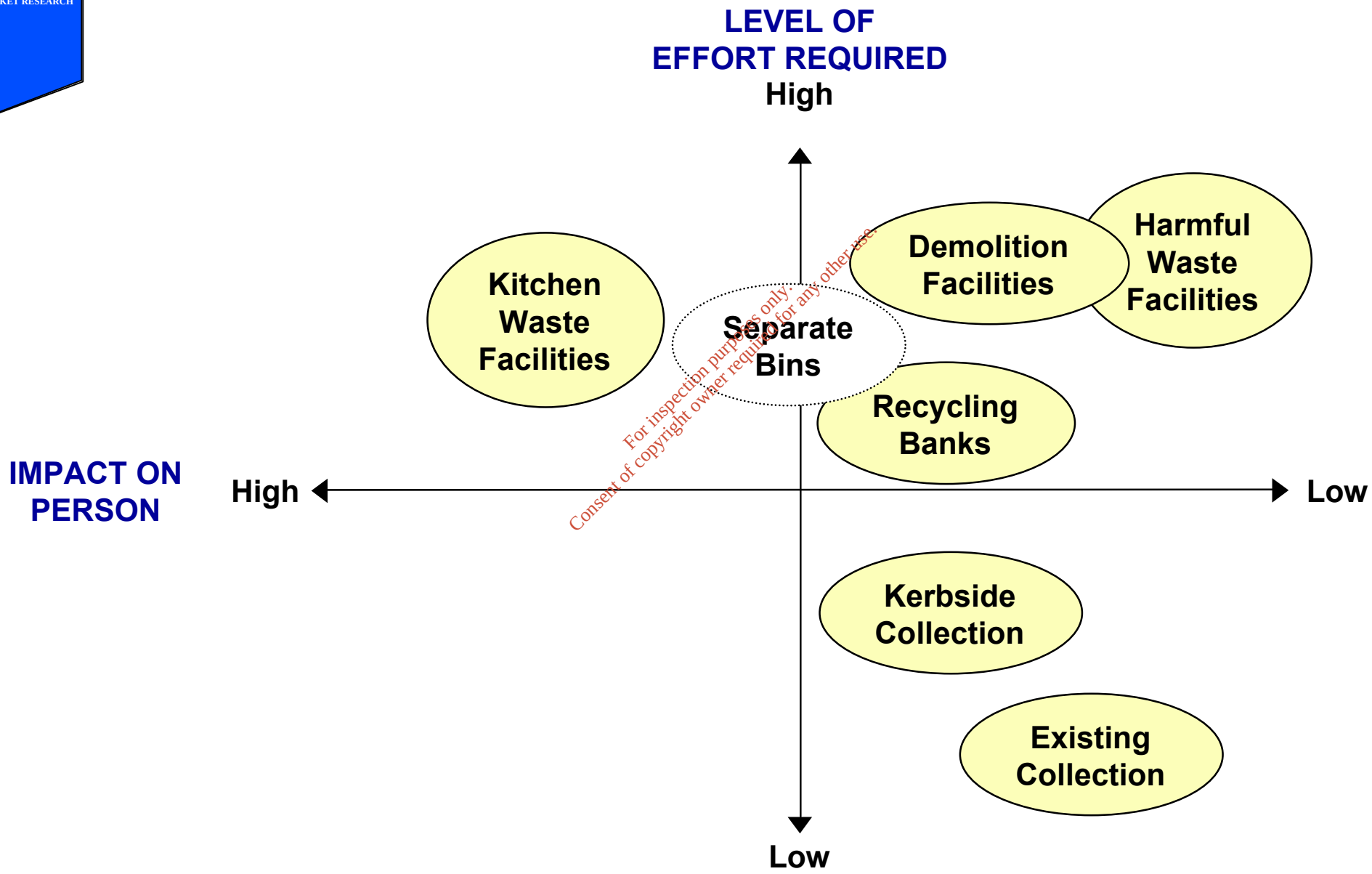
All of them sound great but people will look at this and say that's great but they have to be taught or given an incentive to actually do it. Who's actually going to start and say this is the way it's going to be, this is the way the waste is going to be managed.

3.5 OTHER SUGGESTIONS - DIFFERENT COLOURED BINS

- The concept of using different coloured bins for different kinds of waste is known, albeit not universally.
- Experiences in Germany and USA etc. were recounted throughout the groups.
- Whilst the initial reaction to the idea of separating waste at the outset is one of hassle, it does attract a certain amount of interest rationally - 'it makes sense to segregate waste at the outset'.
- However barriers similar to other recycling facilities also need to be addressed.

3.6 WHAT DO PEOPLE THINK OF DIFFERENT WASTE TREATMENT METHODS?



4. WHAT DO PEOPLE THINK OF THERMAL TREATMENT?

4. WHAT DO PEOPLE THINK OF THERMAL TREATMENT?

- **WE WILL EXAMINE**

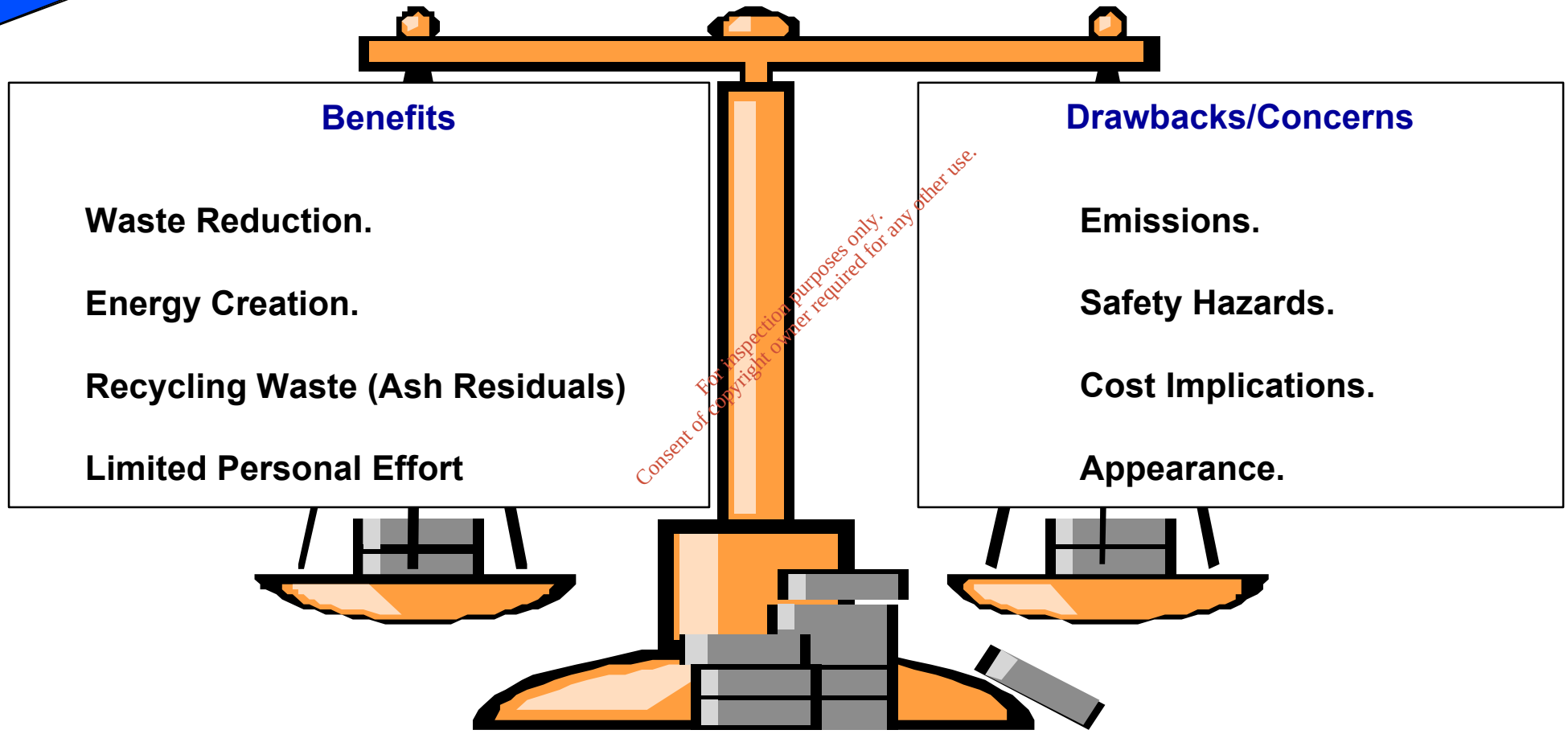
1. Initial Impressions (spontaneous).
2. Detailed reactions (to description).
3. Siting criteria.
4. Information needs.
5. Information providers.

4.1 INITIAL IMPRESSIONS (SPONTANEOUS)

- To the 'uninformed' 'Thermal Treatment' is not a phrase commonly understood in the treatment of waste disposal.
- For most it implies 'burning' or 'incinerating' rubbish.
- To the 'informed' there is an appreciation that 'burning rubbish' is a method employed in Europe and elsewhere and really is an option that Ireland has to consider in the future in order to manage its waste more effectively.
- 'Incinerating rubbish' has huge negative connotations implying
  - Huge chimneys, bellowing smoke.
  - Huge health implications (asthma and worse).
  - Huge environmental implications (smog, etc.).
- Dublin people's only real experience of 'incinerators' to date has been negative.
  - Protests in Kilcock.
  - Hospital waste.

4.2 DETAILED REACTION (AFTER GIVEN DESCRIPTION)

- Benefits and Drawbacks



4.2.1. BENEFITS OF THERMAL TREATMENT

- The concept of ***reducing*** the volume of waste by 90 - 95% is perceived to be very ***positive***.

- So too is the idea of turning a negative into a positive.
  - Electricity creation.
  - Ash residuals for road construction.

- There is some speculation about whether the amount of electricity generated is sufficient given the likely capital outlay.

- One of the key benefit of course is that there is potentially ***little effort*** required by people i.e. waste continues to be collected from their homes.

- Having said that it is important that 'Thermal Treatment' is seen as part of the solution and operates in conjunction with better recycling initiatives.

4.2.1 BENEFITS OF THERMAL TREATMENT - VERBATIMS

I think we're lucky in this country because as it happens in this country always we always pick up everything 10-15 years behind everyone else. They're in operation and they're proven and they have reduced various waste disposal and if it works why won't it work here. It will work here.

It seems to be the answer to all our problems

The idea of generating electricity is great. Would we get cheaper bills?

When you read that there's not much waste coming out of it. You're talking all the ash and using it on the roads so there you're saving landfill sites. If the gases are as good as they say there's not much going into the atmosphere

It sounds wonderful. It sounds too good. It sounds like it's the answer to the problem. It sounds as though it's going to reduce the volume of waste. It sounds nice, it sounds as though it's not going to be unsighty. I would wonder about the gas?

4.2.2. DRAWBACKS/CONCERNS ABOUT THERMAL TREATMENT - I

- **EMISSIONS**

- One of the key concerns is of course '<u>what</u> will be burnt'. There is concern that 'dangerous materials' will be burnt which will result in generating toxic emissions.

- There is understandably concern about what 'a strictly controlled quantity of gaseous emissions actually means and what exactly is used 'to clean the emissions' in the first place.

- The likely impact of flue gasses will have on people's health is the biggest concern. Many reflect on 'Sellafield' and its 'link' with increased cancer related diseases among those who live near there and indeed across the water!!

- Those who express less concern about the level of flue gasses take comfort from the fact:
  - The emissions are probably no worse than that from other industries.
  - The emission must meet EU standards.
  - Actual emissions are less than EU limits.

4.2.2 THERMAL TREATMENT DRAWBACKS - VERBATIMS I

Is that a threat to the environment? To me it sounds like a threat to the environment. If they're burning plastics it is a threat and that's equally as bad.

Is there enough of research gone into thermal treatment. People are saying that there's been a huge number of cancer cases and deaths from cancer in North County Dublin and running into East Meath and Louth and all up along there and they're blaming Sellafield

We were always told we'll either bury it or we can burn it. If we bury it it's obviously disgusting, if we burn it it just goes up there and ok it goes away for a while... next thing you know it gives us asthma or something else.

4.2.2 THERMAL TREATMENT DRAWBACKS - VERBATIMS II

Well I have a daughter with asthma and the reason she got it in the first place was from coal fires. I mean something as simple as coal fires can cause asthma and if something that simple can cause the chest she's got what would something like that cause. I mean you've people living in the north of this country that are suffering from cancers from Sellafield which is 30-40 mile away. To me it just smells dangerous.

Statistics, I would like to know all about what it causes to the environment. I'm not an authority on it. From small pebbles grow large boulders. Fingal may be a small area but if you have emissions from small areas, all the small areas become big areas. It's a combination of the whole lot with the result that you're going to have environmental problems. I don't know much about the whole thing either but in some years to come we're going to suffer.

4.2.2. DRAWBACKS/CONCERNS ABOUT THERMAL TREATMENT -II

- **SAFETY**
- In light of recent 'nuclear explosions (e.g. Japan) people also express concern about how safe Thermal Treatment plants actually are.
- Whilst many people speculate construction expertise will need to be 'brought in' they worry about who will actually 'run' and 'monitor' safety standards.
- A fully owned private enterprise finds disapproval given the motivation will be profit which may compromise safety standards.
- Some believe it should remain the domain of the Local Authority although others believe it should be 'private, public enterprise'.
- Strict monitoring of safety standards by an 'independent body' is highly desirable outside of government control (no hidden agendas).
- Unannounced spot checks akin to 'drug testing' are also desirable.

4.2.2 THERMAL TREATMENT DRAWBACKS - VERBATIMS III

They shouldn't be allowed to just renew their licence every year. They should have to renew it every year to prove that they're not putting any toxins into it Every year they should have to renew their licence.

Let's say they build one of these and the EPA come along and say your emissions are above what they should be. This is the only thermal plant in Ireland which is probably looking after a high percentage of waste. They can't just say ok we're going to shut it down to be sorted out because the waste has nowhere to go so they're going to get chance after chance. I'm sure so it's just a matter I suppose of keeping a tight rein on it.

You say the 4 LAs are going to collaborate on this. That sounds problematic to me. Do they all have to pay for it equally? And then if it's in one, it's going to be sited somewhere and if it's in Dun Laoghaire/Rathdown do they kick up and say hold on we're not going to pay a quarter of it?There is going to be blood spilt!

4.2.2 THERMAL TREATMENT DRAWBACKS - VERBATIMS IV

What we don't want is a semi state body running it.
You don't really want a private company running it either.
you'd want some sort of structure.
There are things called PPIs which are happening in Europe now with huge civic projects like building of motorway.

It would need to be a joint body maybe.
It'd bother me because what I've heard about the water companies and the gas companies in Britain, profit rules.
I think if they introduce thermal plants or whatever and say they are going to be privately run or owned, people are just going to run amok. Nobody would accept that because profit orientated companies just consider the profit aspect, economical balance sheet.
What happens when it doesn't comply?

4.2.2. DRAWBACKS/CONCERNS ABOUT THERMAL TREATMENT - III

- **COST IMPLICATIONS**

- **Naturally there is concerns about how much the construction and maintenance of the plant itself will cost.**

- **And whilst people can appreciate Thermal Treatment may be financially viable in Europe due to population density they wonder whether Dublin creates enough waste to sustain a plant.**

- **The prospect of Dublin 'importing' other counties waste or worse other countries waste is not a desirable prospect.**

£ £ £ £ £

4.2.2 THERMAL TREATMENT DRAWBACKS - VERBATIMS V

The theory sounds brilliant – but Ireland is a small economy compared to where these exist. Where are we going to get the money for these plants?

Would that be one of our main priorities or would it be down the list – There has to be a fault there somewhere – even they said that gas flues are comprehensively cleaned before they are released – I don't know –

How much waste do you have to burn to get that?

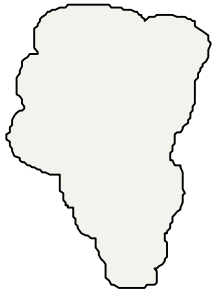
If you look at those cities they've got at least 3-4 million people. London is as high as 10. Would one of these massive expensive facilities in a city as small as Dublin be self sufficient?

4.2.2. DRAWBACKS/CONCERNS ABOUT THERMAL TREATMENT - IV

- **APPEARANCE**

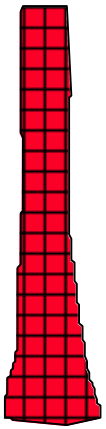
- The appearance of the plant itself is also critical to its likely acceptance. It's essential that its architecture is in keeping with Irish industry.

- It is essential that it communicates safety, and security but not not in a way that creates fear.



- Chimney's evoke fear and people were particularly critical of Spittelau in Vienna (size) and AVI Amsterdam (Smoke).

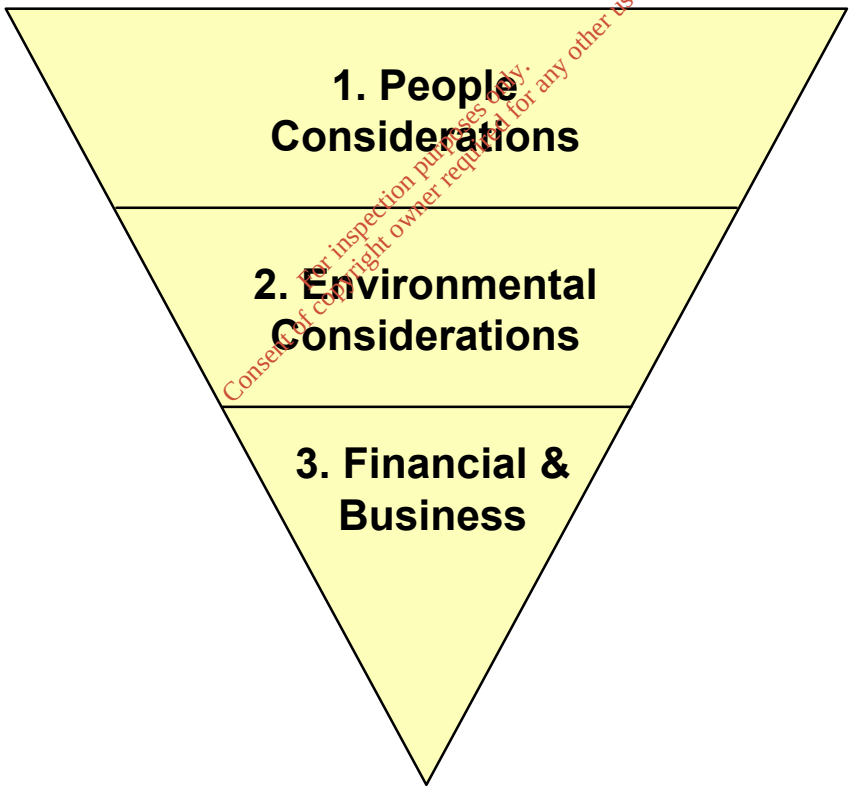
- Colour and style of construction is also important. Too modern and clinical evokes fear of 'what is going on behind the door!'



- The Lewisham plant was considered the best given its absence of a chimney and the fact it looked like a 'normal factory'.

4.3 SITE CRITERIA

- **The criteria people felt should be used for choosing a site was consistent across all demographic and Local Authority areas, and can be summarised as:**



4.3.1 SITE CRITERIA - PEOPLE CONSIDERATIONS

- Overall people felt the site should be located ***away*** from ***densely populated residential*** areas and areas frequented by ***school children*** e.g. schools.

- Whilst the primary concern is the impact the emissions will have on people's health, there is also concern that the plant will impact on the value of people's property ' who would want a Thermal Treatment plant in their back garden!'

- There is a desire that the area chosen is perceived to be 'fair' and the 'burden shared'. There is some resistance to the idea of solving other Local Authority areas problems.

- There is concern among some, that areas where people may hold less clout e.g. council areas, may end up 'victims'.

Transportation considerations also required include road safety issues.

4.3.2 SITE CRITERIA
- ENVIRONMENTAL & BUSINESS CONSIDERATIONS

- **ENVIRONMENTAL CONSIDERATIONS**
- **Good road network to the plant is perceived to be crucial given Dublin's road congestion troubles.**
- **Given it is likely the plant will operate 24 hours, consideration also needs to be given to noise and any potential smell implications.**
- **Above all, the plant must be in keeping with the other 'industries' and blend in with its environment. It must not be an 'eye sore'.**
- **If chimneys are essential, it is felt the plant should be located near other industries where it will 'blend in' with its environment.**
- **BUSINESS CONSIDERATIONS**
- **The cost of transporting the waste itself is also felt to be an issue, albeit expressed by a minority.**
- **So too is the ease with which the energy created can be recouped and passed onto 'the national grid' or other industries.**

4.3.3 SITE CRITERIA

- **In conclusion 3 different kinds of locations were chosen.**

  1 **Industrial Estates.**

  2 **Existing landfill sites - the land exists but can it be used?**

  3 **Areas where industrial chimney's already exist e.g. Ringsend.**

4.3.3 SITES CRITERIA - VERBATIMS I

But again, if it was in an industrial estate, it wouldn't be churning out anything worse than Smurfits or whatever.

I'd put it on the landfill sites. Actually, what you could do is you could say it's more beneficial because instead of all this toxic waste going into the actual land, it's now being regenerated in a positive way.

I'd put it at the Pigeon House because it already has two chimneys. Also there are no residents down there. It just out into the sea so you could build what you like there and nobody ever goes down there.

It could be located in the middle of an industrial estate. You wouldn't really notice it. Say it was right in the middle of the Sandyford Industrial Estate, you wouldn't notice it much there.

4.3.3 SITES CRITERIA - VERBATIMS II

Traffic problems because anything that's near to a residential area is not going to tolerate the increased truck traffic. It has to be near good roads because those trucks are so big. That cuts out a lot of areas.

The chimney is the worst big … otherwise it would look just like any other unit in an industrial estate. The chimney is the sinister bit. It reminds me of a concentration camp which brings us back to Pigeon House because there's chimneys there already… if you've grown up with them they're almost familiar and friendly … the chimney is the bit I find sinister.

They all look real tacky or something … they're all designed to make sure that nobody goes by too fast"

Put that in an industrial estate and you wouldn't know the difference.

4.3.3 SITES CRITERIA - VERBATIMS III

I think they would have to have a chimney. That one spire there looks pretty unattractive, (Vienna) but as long as you don't have a ganzy load of them sticking out like something from a movie and you expect Judge Dread 2000. When it looks very technological and spacey then you're daunted by its appearance but that's not bad (Lewisham) You can hide anything with a few trees. The one in Lewisham looks very nice. It looks like a normal sports centre.

It's very frightening looking. They're really hard looking. That looks like a real incinerator there (Germany) They look to me like a modern mosque (Vienna)

You'd have to have some kind of plant that would be near industry where they can supply the electricity. There's no point in having it out in Ballyboughal or out in the Naul or somewhere.

I think it's the Council's policy to dump all the waste from Dublin county and city into Fingal and I think a lot of people in Fingal are annoyed about it. They feel that it's not good enough, why should we be taking Dublin waste. You see posters and that in various places about it.

4.3.3 SITES CRITERIA - VERBATIMS IV

An industrial estate would be best … most industrial estates are out of the way … they're near enough that they can actually get there for people for work or whatever. They all have good roads … good link.

If the gasses are treated and that I can't see how it's different from any other factory.

I think it's needed in the suburbs because you don't want these big trucks causing traffic.

And then you don't have housing estates complaining about they don't want it in their area.

It can't be exclusive to Dublin, because that's not fair.

4.4 WHAT INFORMATION WOULD PEOPLE NEED TO RECEIVE?

- **Information is required on a whole host of issues as follows:**

1 **Current Waste Disposal Situation**

2 **Future Waste Management Options**

3 **Thermal Treatment**

4.4 WHAT INFORMATION WOULD PEOPLE NEED RECEIVE?

1 CURRENT WASTE DISPOSAL SITUATION

- People need to be educated about:
  1. The current status regarding waste disposal.
  2. The implications the current situation has on them/ families.
  3. How Ireland compares with other European countries.
  4. Priority is been given to resolve problems from Government and EU.
  5. They have a role to play and must take some responsibility.

2 FUTURE WASTE MANAGEMENT OPTIONS

1. Why 4 Dublin Local Authorities are joining forces.
2. What options exist for managing waste in the future.
3. The advantages and disadvantages of each approach.
4. Integrated approach is being taken.
5. New initiatives being considered.
6. What - People
7. - Businesses
8. - Government will be required to do.
9. When this will happen?

4.4 WHAT INFORMATION WOULD PEOPLE NEED TO RECEIVE?

3 THERMAL TREATMENT CONCEPT

- What is it?
- How does it work?
- Why is it being considered now?
- Where does it exist?
- Advantages and disadvantages relative to other waste treatment methods.
- Effectiveness.
- Case histories of places worked/ didn't work.
- Feedback from people who live near Thermal Treatment plants.

4 SITE CRITERIA

- Criteria selected.
- Potential places.

5 CONSTRUCTION & ADMINISTRATION

- Who will build it?
- How much will it cost?
- Who will run it?
- What safety standards exist.
- Who will maintain it?

6 POST IMPLEMENTATION

- Emission output.
- Implications if fail to meet emission standards.
- Long term impact on population.

4.4 INFORMATION NEEDS - VERBATIMS I

I think the whole idea is not just to advertise the plant because that will scare people, Make it as a whole new way of getting rid of waste as opposed to saying our plant is great, everyone is happy.

They should also compare it to London and Amsterdam and Copenhagen and stuff – and they say well Copenhagen has brought down their recycle and all their rubbish has gone done 50% in the last 5 years compared to ours which is 90% of rubbish and only 10% recycle – it's worked for them – why can't it work for us.

People from the other countries - the pros and the cons. Well is it worked in other countries - they must see the benefits it it's still working over there

4.4 INFORMATION NEEDS - VERBATIMS II

If they're thinking of building it in 3-4 years time you want information now.
... details of the plants that exist in Vienna and Copenhagen and Germany and Britain. We want lots more information, what do they actually achieve in emission levels.

To make sure it was running to standards. You'd like to know and get a report that everything is all right in it.

If it came to my area I would be fearful of it for health reasons because I don't know anything about it. Unless there was great research done into these other ones that are in European countries so that we could get feedback. If research has been done You want more knowledge about it. Do you know how long these are in operation?

4.5 WHO SHOULD PROVIDE THE INFORMATION? - I

- People need to feel the information they receive is provided by 'people/organisation' who
  - Have the publics welfare at heart.
  - Have no financial involvement in Thermal Treatment plants.
  - Have no hidden agenda.
  - Are well recognised.
  - Have experience in the area.
  - Can be trusted.

- Unfortunately people's trust in government officials has been damaged given the recent spate of revelations in various tribunals, hence information provided by the Government would be treated with a certain amount of suspicion.

- Many feel public education and involvement is the role of the Local Authority but some, especially younger people even have doubts about how impartial the Local Authorities would be.

4.5 WHO SHOULD PROVIDE THE INFORMATION? - II

- Information from the EU certainly found appeal especially among the young.
- Endorsement from 'environmental protection agencies' or environmental protection political groups was also deemed appropriate.
- The media was also perceived to be good vehicle for imparting information.

4.5 INFORMATION PROVIDERS VERBATIMS I

The EU. The Green Party, Children's groups - you know seen to be behind it and support it Do a leaflet drop as well – But not by the Government

You'd believe the EU. I think everyone has an attitude to the EU, very socially aware and innovative. Look at the regulations and directives introduced which have affected Ireland, we've a pretty good road structure. That's because we joined the EU. We got everything we have through the EU. We're highly funded. We will believe them because they're not indigenous. They're not Bertie Ahern and the boys down there. They don't lie. I suppose if they're the ones trying to tell us to pull up our socks they should be the ones who really should be telling us what the benefits are.

4.5 INFORMATION PROVIDERS- VERBATIMS II

If some group like the Green Party were somehow involved, a group that you could maybe trust, that'll give an objective and impartial view on it then I would feel happier about it.

I wouldn't trust anybody with a vested interest in it. I wouldn't trust the Local Authorities and I wouldn't trust the Engineering Company or the Design Company or any of those. I'd want to hear from the Green Party. I'd want to hear from somebody else.

4.5 INFORMATION PROVIDERS- VERBATIMS III

It could be appointed by the government but they would have an independent mandate. Their job would be to advise the councils who today I don't think are today run by the government. They should report back to the council.

I think there should be committees set up by the government to come up with a finding of all these points that we're talking about tonight and really educate us about the recycle and waste has become a problem and we've got to face up to the fact that it is a problem. It's up to the government to appoint some committee. They've appointed so many tribunals. This is more important because if we don't do something about it it's going to get worse.

I would think there should be an independent body. They shouldn't be under the control of the government and if they can give us feedback. They should be independent of everybody.

4.5 WHAT FORMAT SHOULD THE INFORMATION BE PROVIDED? - III

- A multitude of methods is required including:
  - Leaflet drops.
  - TV and radio programme.
  - Community meetings.

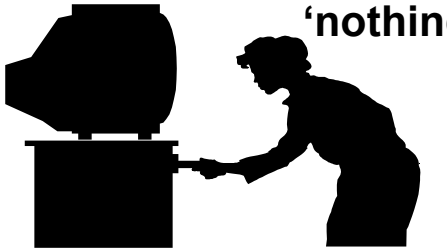
  In order to satisfy different groups of people e.g. younger people may be less likely to attend a community meeting.

- There is a desire for the information to be ***given*** to people rather than people having to ***actively search*** for it themselves.

- Hiding the information in public libraries is not sufficient!

- Post implementation, people need to be kept abreast of developments. Quality control checks should be published in the media as should daily emission reports vis newspapers, radio and TV.

- The emission board in Vienna is also worth considering as it shows there is 'nothing to hide'



4.5 INFORMATION PROVIDERS- VERBATIMS IV

Yeah. You can go and see plans but you have people who don't go to the libraries or their local authority offices just to see plans and who's got planning permission. Most people just can't be bothered with all that.

Open forums… presentations and questions and answers sessions. They do that if they're doing anything to do with power stations. They need posters and booklets and tv programmes. They'd need to have everything.

5. WHAT DOES THIS MEAN FOR MC O'SULLIVAN AND THE DUBLIN LOCAL AUTHORITIES

5. WHAT DOES THIS MEAN FOR MC O'SULLIVAN AND THE DUBLIN LOCAL AUTHORITIES - I

WASTE & RECYCLING

- Household waste disposal is not a priority for most people. In order for it to become a more important issue it is essential that people are better informed and educated about the consequences of their behaviour.
- A sense of responsibility needs to be be engendered among the public and this will only happen if the Government/Local Authorities facilitate it.
- Whilst there may be a willingness to recycle household waste, translating this into practice is a difficulty. People have to be motivated to do so.
- A combination of education, rewards and penalties may have to be used in order to encourage people to improve.
- In addition, the process has to be made simple with all the necessary equipment provided. Kerbside is clearly effective in this way, albeit not without it own problem.
- Options which operate in other countries such as separate bins for different waste is also an option worth considering given people are becoming more familiar with this concept.

5. WHAT DOES THIS MEAN FOR MC O'SULLIVAN AND THE DUBLIN LOCAL AUTHORITIES - II

THERMAL TREATMENT

- Thermal Treatment implies incinerating and incinerating evokes fear.
- Information needs to be communicated to people, explaining what Thermal Treatment involves, how it compares to other treatment methods and its impact on them and the environments.
- Toxic emissions are the primary concern. Information needs to be provided, using case histories from other cities and countries where Thermal Treatment plants already exist.
- Public information is crucial and transparency is essential.
- In addition people need to be shown pictures of plants in order to minimise their fear.
- It is also vital that the provision of information is perceived to be independent with the publics interest at heart.

5. WHAT DOES THIS MEAN FOR MC O'SULLIVAN AND THE DUBLIN LOCAL AUTHORITIES - III

SITING CRITERIA

- In choosing Thermal Treatment locations consideration needs to be given to:
  - Population density.
  - Good road network.
  - Safety.
  - Financial viability.
  - Energy recuperation
  - Appearance of plant.

- Industrial estates are felt to be appropriate as are existing landfill sites, if viable.

- It is important that the Thermal Treatment plant is built in keeping with its environment.

5. WHAT DOES THIS MEAN FOR MC O'SULLIVAN AND THE DUBLIN LOCAL AUTHORITIES - IV

- Thermal Treatment needs to be presented to people as one of the waste management methods in order to improve Dublin waste disposal situation.
- It cannot be seen to be the only course of action.
- It must be seen to be part of a package of options with recycling playing a large part.

APPENDIX B2

PUBLIC OPINION SURVEY

690-L9
1.11.99

Cols (1-5)
Cols (6-8)
CARD 1 (COL 9)

TOPICAL ISSUES SURVEY

Good morning, afternoon evening, my name is ……. from Lansdowne Market Research. We are conducting some research about some topical issues and would be very grateful if you would help us with this survey.

SHOWCARD '1'

Q.1 I would like you to use this card to tell me the extent to which you personally **are** or are **not** concerned about various issues I am going to read out. First of all……..

READ OUT ⇩	Very concerned	Slightly concerned	Not very concerned	Not at all concerned	
Traffic congestion	1	2	3	4	(10)
Genetically modified foods	1	2	3	4	(11)
Disposal of litter	1	2	3	4	(12)
Quality of the water	1	2	3	4	(13)
Disposal of household waste	1	2	3	4	(14)
Loss of wildlife areas due to development	1	2	3	4	(15)
Quality of the air	1	2	3	4	(16)

SHOWCARD '2'

Q.2 I am now going to read out some things that people have said or, do. As I read them out I would like you to tell me how much you agree or disagree each statement applies to you.

READ OUT ⇩	Strongly agree	Slightly agree	Neither disagree nor agree	Slightly disagree	Strongly disagree	
• I try to save water by **not** letting the tap run	1	2	3	4	5	(17)
• I often buy **environmental friendly** household products even if they are more expensive	1	2	3	4	5	(18)
• I often take part in local **environmental initiatives**, like cleaning the road, park, beach etc.	1	2	3	4	5	(19)
• I sort out certain types of household **waste** (glass, paper batteries etc) for **recycling**	1	2	3	4	5	(20)
• I am very interested in **environmental** issues	1	2	3	4	5	(21)

Q.3 How often is household waste or rubbish collected from your home?

More than twice a week	1	(22)
Twice a week	2	
Once a week	3	
Once every two weeks	4	**CONTINUE**
Once every three weeks	5	
Less often	6	
Never collected	7	**GO TO Q.5**

SHOWCARD '3'

Q.4 Which of the following ways is waste or rubbish collected from your home?

MULTI CODES POSSIBLE

• In a wheelie bin provided by private company/ County Council ..... 1 • In black sacks or plastic bags/bin which I provide ..... 2 • Kerbside collection – this is a green bin where waste which is recyclable is collected separate from your main collection ..... 3 • Other (specify _____ & code) 4	(23)

ASK ALL

Q.5 How often, if at all do you do any of the following? **(PROBE TO PRE CODES)**

READ OUT ⇩	Once a week	Once a every 2-3 weeks	Once a month	Every 2-3 months	Once or twice a year	Less often	Never	
• Visit the **tip** to get rid of household rubbish like old furniture/DIY material like bricks, wood etc	1	2	3	4	5	6	7	(24)
• Visit the **tip** to get rid of garden clippings etc.	1	2	3	4	5	6	7	(25)
• Visit the **tip** to get rid of harmful household waste like paint, oil, batteries etc.	1	2	3	4	5	6	7	(26)
• Visit a **recycling bank** to get rid of **bottles**	1	2	3	4	5	6	7	(27)
• Visit a **recycling bank** to get rid of **tins**	1	2	3	4	5	6	7	(28)
• Visit a **recycling bank** to get rid of **clothes**	1	2	3	4	5	6	7	(29)

SHOW CARD '4'

Q.6 I am now going to read out a list of things people have said about the disposal of household waste. As I read out each one I'd like you to tell me how much you **agree** or **disagree** with each statement.

↓ TICK START, ROTATE ORDER	Strongly Agree	Slightly Agree	Neither Nor	Slightly Disagree	Strongly Disagree	
☐ Most people **don't care** what happens to waste once its collected	1	2	3	4	5	(30)
☐ Its up to the **Local Authority** to worry about the disposal of household waste and not me	1	2	3	4	5	(31)
☐ The disposal of household waste is **low** on the Government priority list	1	2	3	4	5	(32)
☐ It **costs more** to **recycle** things than its worth	1	2	3	4	5	(33)
☐ People need to be **educated** better in order to fully understand the **benefits** of recycling	1	2	3	4	5	(34)
☐ I'd recycle more of my household waste eg. bottles/tins etc. if it was made **easier** for me	1	2	3	4	5	(35)
☐ I'd recycle more of my household waste if **more people** did it	1	2	3	4	5	(36)
☐ There are **not enough** recycling facilities available to encourage people to recycle	1	2	3	4	5	(37)
☐ I **like** to **recycle** as much of my household waste as possible	1	2	3	4	5	(38)
☐ I feel I do my bit for the **environment** when I recycle things	1	2	3	4	5	(39)
☐ Recycling is **not hygienic**	1	2	3	4	5	(40)

Q.7 How much or little do you know about what happens to your rubbish or waste once it has been collected from your house? **PROBE TO PRECODES**

Know a lot	1
Know a little	2
Know hardly anything	3
Don't know anything	4

(41)

Q.8 What in your opinion happens to the rubbish/waste once it is collected. **DO NOT PROMPT. PROBE** Anything else?

Dumped into the sea	1
Burned	2
Buried in landfill sites (non specific)	3
Buried in landfill sites Dublin area (specific)	4
Buried in landfill sites outside Dublin (specific)	5
Stored somewhere until a decision is made on its disposal	6
Items that can be recycled are separated by the council and the rest is buried in landfill sites	7
Other (WRITE IN _____ - _____ & code)	8
Don't know	9

(42)

SHOW CARD '5' AGAIN

Q.9 Which, if any, of these phrases best describes how you personally feel about the disposal of household waste/rubbish in <u>landfill sites</u>.

I'm very concerned about it	1	**CONTINUE**
I'm slightly concerned about it	2	
I'm not very concerned about it	3	**Go to Q.11**
I'm not at all concerned about it	4	

(43)

ASK ALL CONCERNED (CODES 1 OR 2 AT Q.9). ALL OTHERS GO TO Q.11

Q.10 Why do you say you are concerned about the disposal of household waste/rubbish in **landfill sites**? **DO NOT PROMPT. PROBE.** Any thing else?

Landfill sites are becoming full up	1
They generate unpleasant smells	2
They attract rats/vermin	3
They pose health problems	4
They use up valuable land	5
Cause the Price of property to drop	6
The Land cannot be used in the future	7
Other (specify _____ & code)	8

(44)

ASK ALL

Q.11 About how far is the nearest landfill site to your house?

Less than a mile	1
1 - 2 miles	2
3 – 5 miles	3
6 – 10 miles	4
11 – 20 miles	5
21 – 30 miles	6
30+ miles	7
Don't know	8

(45)

SHOW CARD '6 & 7'

Q12. I am going to read out a list of initiatives which your local authority is considering in order to help people minimise their household waste. For each one on this card, I would like you to say: a) Whether or not you have heard of this before and,
b) How likely or unlikely would you be to use it. **PROBE TO PRECODES.**

SHOW CARD '6' AND READ OUT	**Q12a) Aware** Yes (46)	No	**Q12b)** Very likely	Fairly likely	Neither likely nor unlikely	Not very likely	Not at all likely	Don't know	
• The provision to as many households as possible, of a **kerbside collection** which is a bin for people to put in plastic, glass and tins only (not other rubbish), which is collected weekly	1	X	1	2	3	4	5	6	(47)
• Provision of a **recycling bank** such as bottle, paper bank in local community	2	X	1	2	3	4	5	6	(48)
• Provision of **green garden waste depots** and composting facilities - to collect and treat waste from parks and garden water delivered by people to recycling centres.	3	X	1	2	3	4	5	6	(49)
• Collection of **kitchen waste** - which is organic like food for composting or other biological process	4	X	1	2	3	4	5	6	(50)
• Provision of facilities for sorting and recycling **construction/ demolition** waste e.g., DIY work e.g. bricks, wood metal etc.	5	X	1	2	3	4	5	6	(51)
• Provision of recycling facilities for the collection of **harmful** household waste e.g. batteries, oil, paint etc.	6	X	1	2	3	4	5	6	(52)
• The provision of a number of different **coloured** bins, where one bin might be for paper, plastic and cardboard, one for organic household waste, like food and another one for anything else	7	X	1	2	3	4	5	6	(53)

Q.13 Have you ever heard of **Thermal Treatment** as a means of treating the disposal of household waste/rubbish?

Yes	1	CONTINUE	(54)
No	2	Go To Q.15	

ASK ALL YES AT Q.13, (OTHERS GO TO Q.15)

Q.14 What is your understanding of Thermal Treatment. **DO NOT PROMPT. PROBE** Anything else?

	V X 0 1 2 3 4 5 6 7 8 9	(55
	V X 0 1 2 3 4 5 6 7 8 9	-57)
	V X 0 1 2 3 4 5 6 7 8 9	

SHOW CARD '8'
ASK ALL

Q.15 Based on what you know, how good or bad an idea do you think Thermal Treatment is as a method of disposing household waste?

It is a very good idea	1
It is quite a good idea	2
Neither good nor bad idea	3
It is quite a bad idea	4
It is a very bad idea	5

(58)

SHOW CARD ' 8' AGAIN & 9

Q.16 If household waste in Dublin were to be treated in a number of different ways as shown on this card, how good or bad an idea do you feel this would be?

It is a very good idea	1	
It is quite a good idea	2	**GO TO Q18**
Neither good nor bad idea	3	
It is quite a bad idea	4	**CONTINUE**
It is a very bad idea	5	

(59)

Q.17 **ASK ALL – EXCEPT THOSE SAYING GOOD IDEA (CODE 1 OR 2 AT Q.16)**
What are the main reasons why you do not feel this would be a good idea? **DO NOT PROMPT. PROBE.** Any thing else?

	V X 0 1 2 3 4 5 6 7 8 9	(60
	V X 0 1 2 3 4 5 6 7 8 9	- 62)
	V X 0 1 2 3 4 5 6 7 8 9	

ASK ALL

Q.18 In what way, if at all, would you be concerned if a thermal treatment site were to be built near your home? **PROBE.** Anything else?

	V X 0 1 2 3 4 5 6 7 8 9	(63-
	V X 0 1 2 3 4 5 6 7 8 9	65)
	V X 0 1 2 3 4 5 6 7 8 9	

SHOWCARD '10'

Q.19a And which, if any, of these issues would be of concern to you if a thermal treatment site were to be built near your home?

Q.19b And which, if any, would be of **most** concern to you?

	Q19a Some (66)	**Q19b Most** (67)
The noise from the site	1	1
The smell from the site	2	2
The emissions from the site	3	3
The amount of traffic to the site	4	4
The impact on my (my family's) health	5	5
The likelihood that the price of land/houses will drop in value	6	6
The impact on the environment	7	7
Who would be responsible for it	8	8
Safety standards to ensure it is run property	9	9
Other (STATE _____ _____ & code)	V	V

SHOW CARD '11'

Q.20 On this card are a number of things that people have said are **important** to them when considering the location of a thermal treatment plant, if there was one in Dublin. I would like you to read this list and tell me A) which issue you believe is the **most** important. B) which issue is the **second** most important and C) which is the **third** most important.

	Most Important (68)	2nd Most Important (69)	3rd Most Important (70)
• Good road network in order to avoid traffic becoming more congested	1	1	1
• Located away from areas of scenic beauty	2	2	2
• Located away from residential areas	3	3	3
• Located away from children's schools/playgrounds/ sports grounds etc.	4	4	4
• The cost of transporting the rubbish	5	5	5
• Easy access to other businesses/industries so that the energy generated can be passed on	6	6	6
• The volume of noise emitted from the site	7	7	7
• The smell emitted from the site	8	8	8
• The volume of emissions from the site	9	9	9
• The appearance of the plant itself	0	0	0
• How dangerous the emissions are	X	X	X

REPUNCH COLS 1-9
CARD 2

SHOW CARD '12'

Q.21 I am going to read out some a list of the different kinds of **information** that could be provided to people if a thermal treatment site was built in Dublin. For each one I read out I would like you to tell me how interested or not would you be in receiving this information **ROTATE ORDER, TICK START**

ROTATE ORDER, TICK START.	Very interested	Quite interested	Neither	Not very interested	Not at all interested	
☐ The **performance** of other thermal treatment plants in **other countries**	1	2	3	4	5	(10)
☐ The **cost** of building and running a thermal treatment plant	1	2	3	4	5	(11)
☐ Details about **who** would be **responsible** for running the thermal treatment plant	1	2	3	4	5	(12)
☐ **Safety** standards	1	2	3	4	5	(13)
☐ The impact the **emissions** will have on people's **health**	1	2	3	4	5	(14)
☐ The impact the **emissions** will have on the **environment**	1	2	3	4	5	(15)
☐ Details about **how** the site is **chosen**	1	2	3	4	5	(16)
☐ The impact the site will have on the **value** of properties/land near the site	1	2	3	4	5	(17)
☐ **How** energy is **converted** from thermal treatment	1	2	3	4	5	(18)
☐ Details about **what** is **involved** in thermal treatment	1	2	3	4	5	(19)

SHOW CARD '13'

Q.22 And who would you like to receive this information from?

MULTICODE ALLOWED

An independent environmental protection body/agency EPA	1
The European Union/E.U.	2
Local Authorities	3
Government department for the Environment	4
Independent medical experts	5
Media like TV, newspapers, radio etc.	6
Non government organisations	7
Other source (State_____ _____ & code)	8

(20)

CLASSIFICATION

NAME: .....

ADDRESS: .....

.....

.....

TELEPHONE NUMBER: .....

OCCUPATION OF HEAD OF HOUSEHOLD:

.....

SEX:

(21)

Male 1
Female 2

AGE: (State exact age _____ & CODE)

(22)

18-24 1
25-34 2
35-49 3
50-64 4
65+ 5

MARITAL STATUS:

(23)

Married 1
Living as married 2
Single 3
Widowed/Divorced/Separated 4

DEPENDENT CHILDREN:

(24)

Yes 1
No 2

HOUSEHOLD COMPOSITION X AGE

(25)

Aged under 12 months 1
Aged 1-2 years 2
Aged 3-5 years 3
Aged 6-10 years 4
Aged 11-14 years 5
Aged 15-17 years 6
Males aged 18-34 7
Females aged 18-34 8
Males aged 35+ 9
Females aged 35+ 0

SOCIAL CLASS:

(26)

AB 1
C1 2
C2 3
DE 4

LOCAL AUTHORITY AREA:

(27)

Dun Laoghaire/Rathdown 1
Dublin Fingal 2
Dublin Corporation 3
South Dublin County Council 4

WORK STATUS:

(28)

Housewife (full time) 1
At school 2
Full time student (3rd level) 3
Temporarily unemployed (actively seeking work) 4
Permanently unemployed 5
Retired 6
Full time (30 hours or more) 7
Part time (8hrs - 29hrs per week) 8
Self employed 9

NUMBER OF PEOPLE IN HOUSEHOLD

(29)

1 1
2 2
3 3
4 4
5 5
6 6
7+ 7

CHIEF INCOME EARNER

(30)

Respondent is chief income earner 1
Not chief income earner 2

DURATION OF INTERVIEW

(31)

Up to 10 minutes 1
11-12 minutes 2
13-15 minutes 3
16-18 minutes 4
20+ minutes 5

I hereby certify that this interview has been carried out strictly in accordance with your instructions.

SIGNED: _____ DATE: _____

Dublin
WASTE MANAGEMENT

A presentation to

MC O'Sullivan Engineering

in association with

Dublin Local Authorities

by

Lansdowne Market Research

November 1999
690-L9

Table of Contents

PRESENTATION STRUCTURE

Section 1. Background, Research Objectives & Methodology

Section 2. Waste Management - In Context

Section 3. Waste Collection Behaviour & Attitudes

Section 4. Attitudes Towards Landfill Sites

Section 5. Awareness & Attitudes Towards different waste treatment methods

Section 6. Awareness & Attitudes Towards Thermal Treatment

Section 7. Thermal Treatment - Site Criteria

Section 8. Thermal Treatment - Information needs

Section 9. Conclusions/Recommendations

LANSDOWNE
MARKET RESEARCH

SECTION 1.
Background

1.1 BACKGROUND

- **EU legislation regarding management of waste has resulted in the 4 Dublin Local Authorities - Dublin Corporation, Fingal County Council, South Dublin County Council and Dun Laoghaire/Rathdown joining forces to develop a Waste Management strategy.**

- **One of the objectives of the strategy is to reduce the levels of waste in landfill locations and to recycle or indeed generate energy from waste.**

- **Thermal Treatment is one of the options the Local Authorities are considering as part of their Waste Management treatment.**

- **Information was required by MC O'Sullivan and the 4 Local Authorities to ascertain public opinion about Waste Management and the criteria they should use when considering potential Thermal Treatment site locations.**

1.2 THE RESEARCH OBJECTIVES

- **The main objectives of the research were:**

  "To understand the publics attitude and behaviour towards Waste Management"

  "To identify the public's criteria for selecting sites for Thermal Treatment plants"

1.3 METHODOLOGY

- **Two stage research approach.**

- **Stage one was qualitative in design and consisted of 8 group discussions, 2 in each of the Local Authority areas in October 1999. A Separate report was prepared on this.**

- **A questionnaire was designed on completion of this phase and was followed by a quantitative stage.**

- **A total of 506 interviews were conducted in the 4 Local Authority areas.**

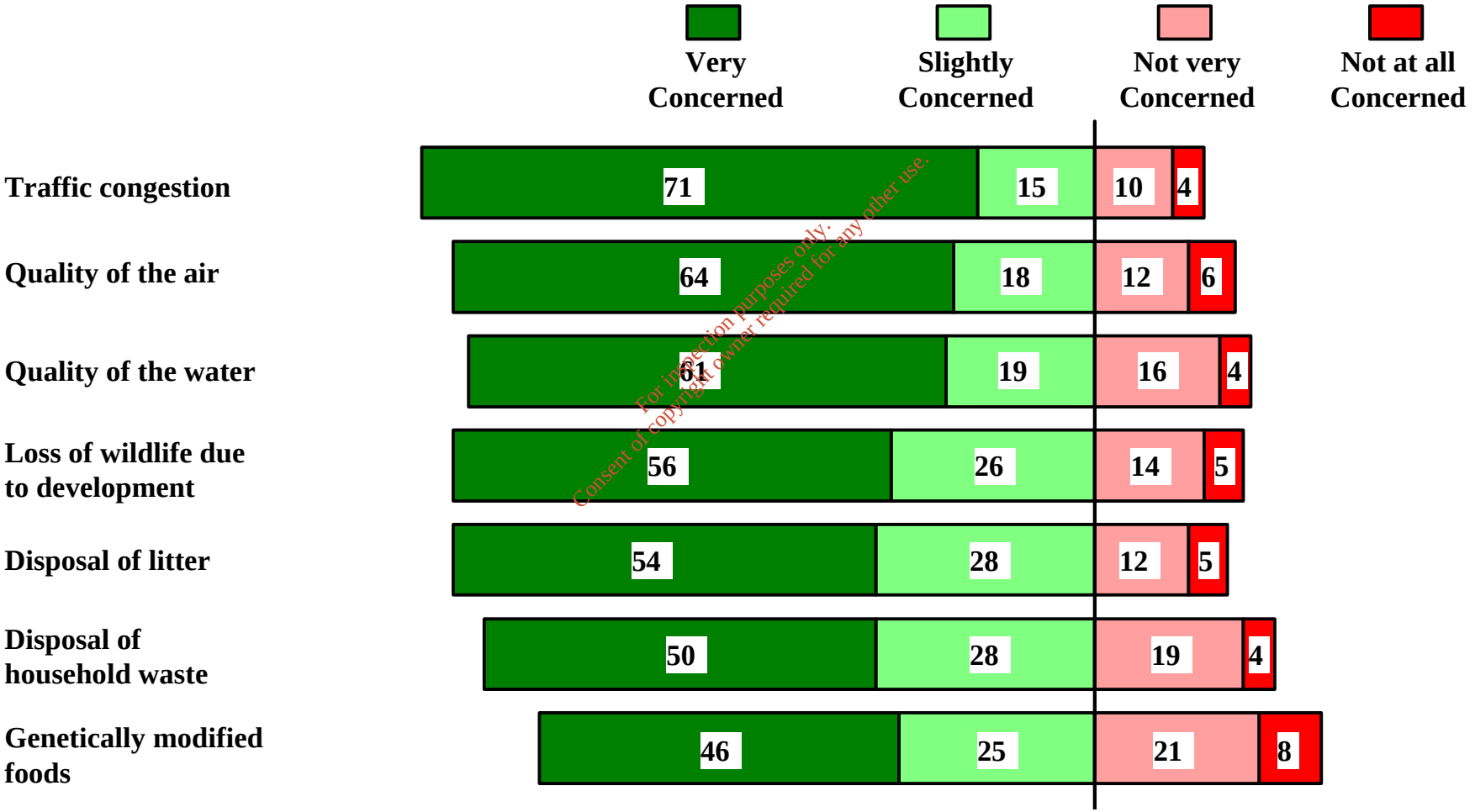
- **Quota was set to reflect the demographic composition of each local Authority area.**

- **The data was then weighted to reflect the total Dublin adult population (aged 18+).**

SECTION 2.
Waste Management

2.1 LEVEL OF CONCERN FOR TOPICAL ISSUES - I

(Base: All Adults 18+ - 506)



(Q.1/T.1)

LEVEL OF CONCERN FOR TOPICAL ISSUES - II

(Base: All Adults 18+ - 506)

% VERY CONCERNED

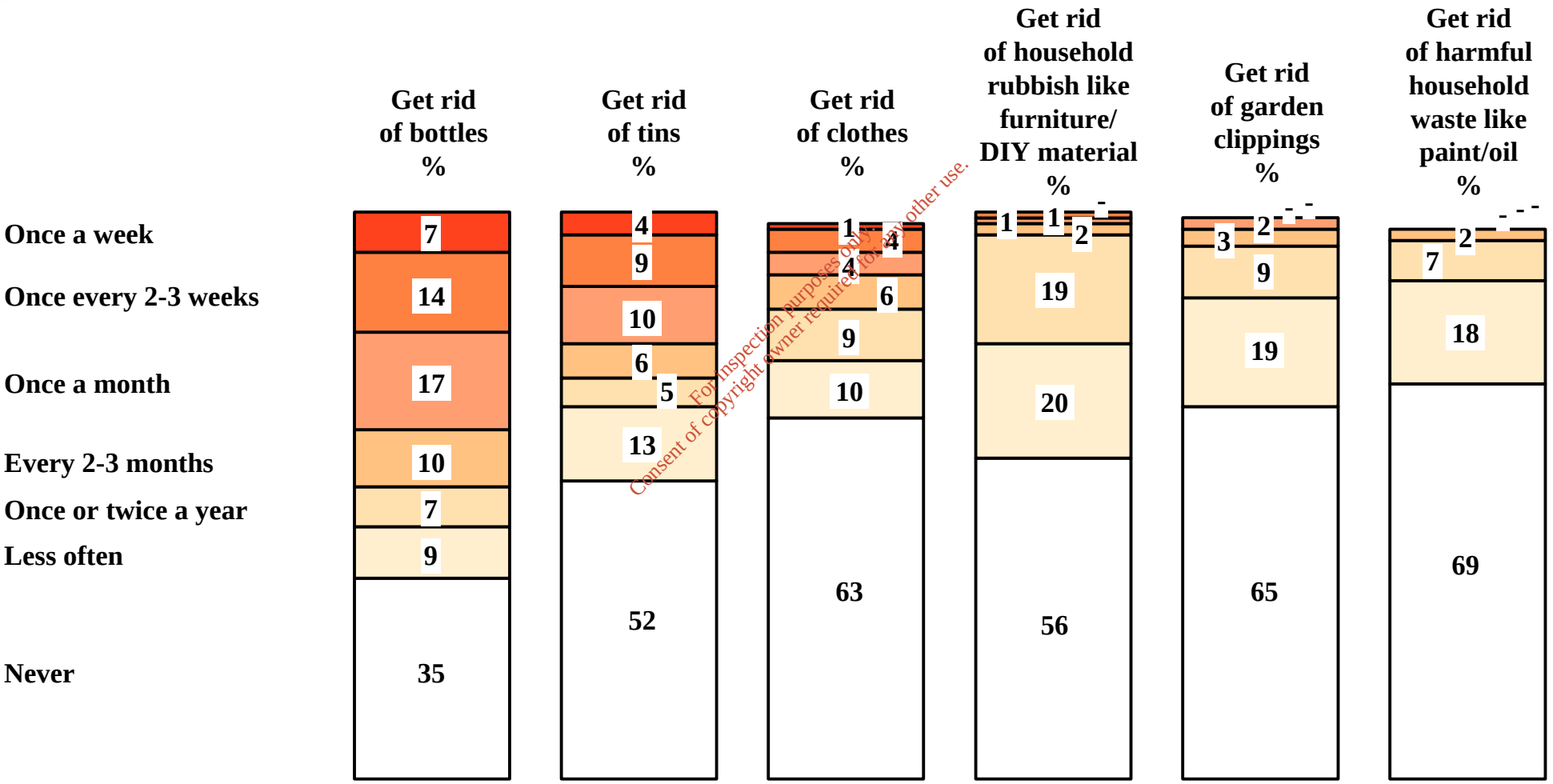
	Total %	LOCAL AUTHORITY AREA			
		Dublin Corporation %	Dublin Fingal %	South Dublin C.C. %	Dun Laoghaire/ Rathdown %
Traffic congestion	71	73	55	73	77
Quality of the air	64	66	52	69	63
Quality of the water	61	67	50	63	53
Loss of wildlife due to development	56	54	47	60	62
Disposal of litter	54	49	45	59	68
Disposal of household waste	50	46	44	56	55
Genetically modified foods	46	50	32	45	47

(Q.1/T.2-8)

SECTION 3.
Waste Collection Behaviour

3.3 FREQUENCY VISIT RECYCLING BANK/TIP TO.....

(Base: All Adults 18+)



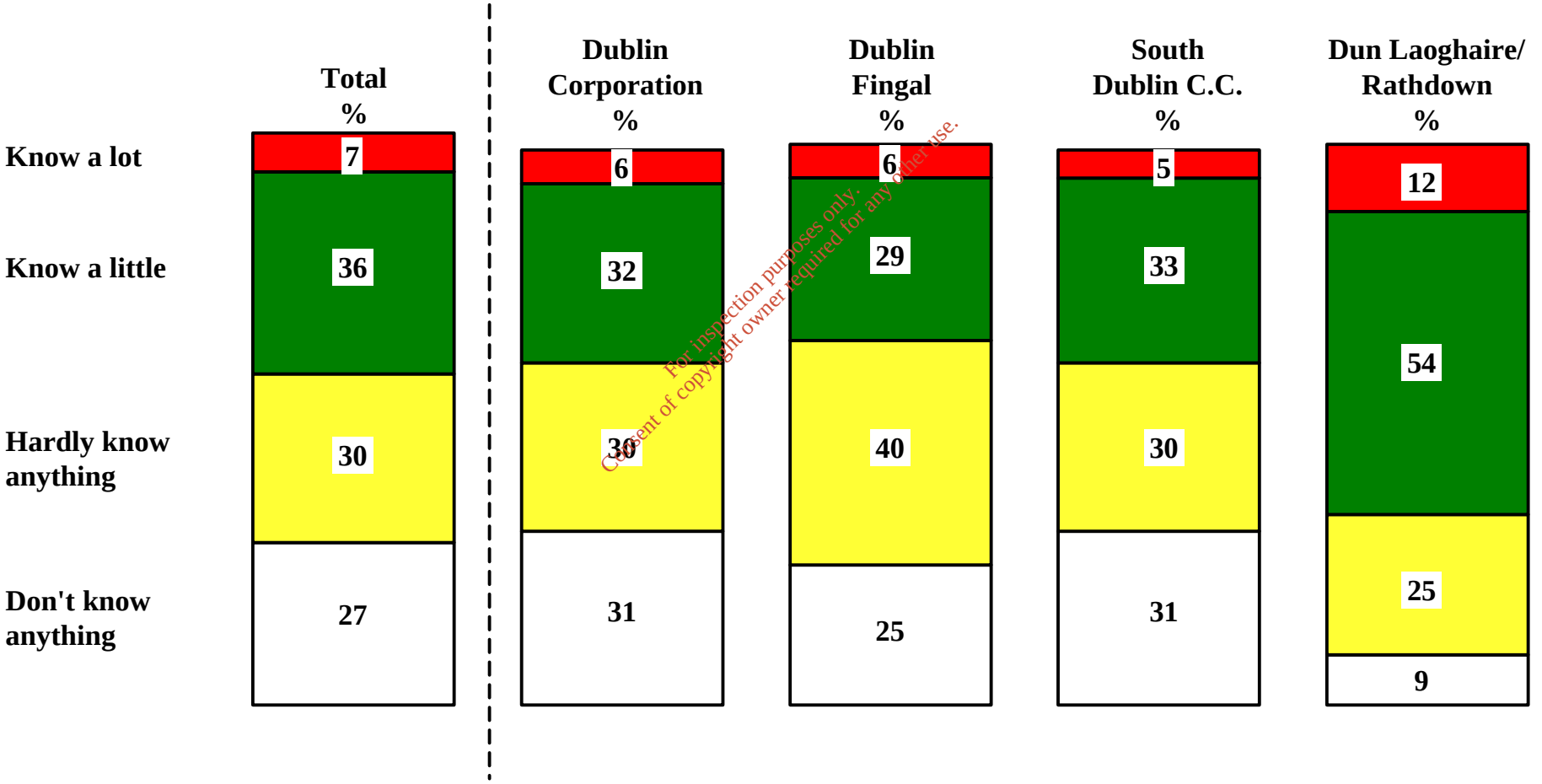
(Q.5/T.17)

LANSDOWNE
MARKET RESEARCH

SECTION 4.
Attitudes Towards Landfill Sites

4.1 LEVEL OF KNOWLEDGE ABOUT DISPOSAL OF HOUSEHOLD WASTE ONCE COLLECTED

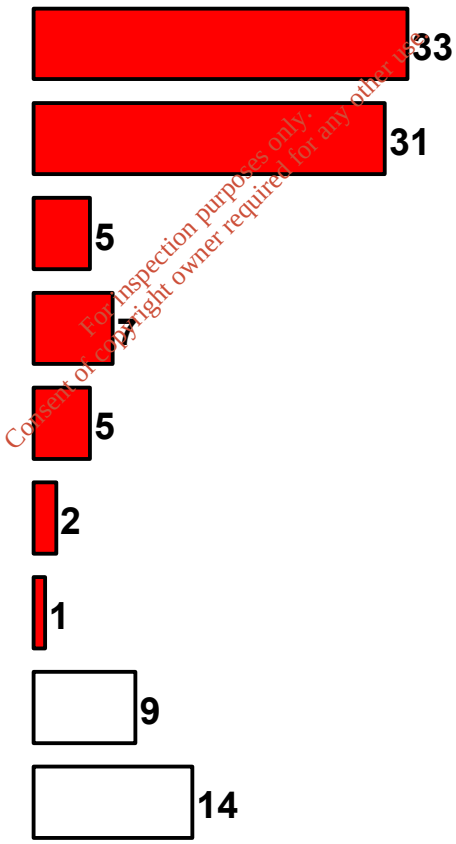
(Base: All Adults 18+)



(Q.7/T.35)

4.2 SPONTANEOUS OPINION ABOUT DISPOSAL OF HOUSEHOLD WASTE ONCE COLLECTED

(Base: All Adults 18+)

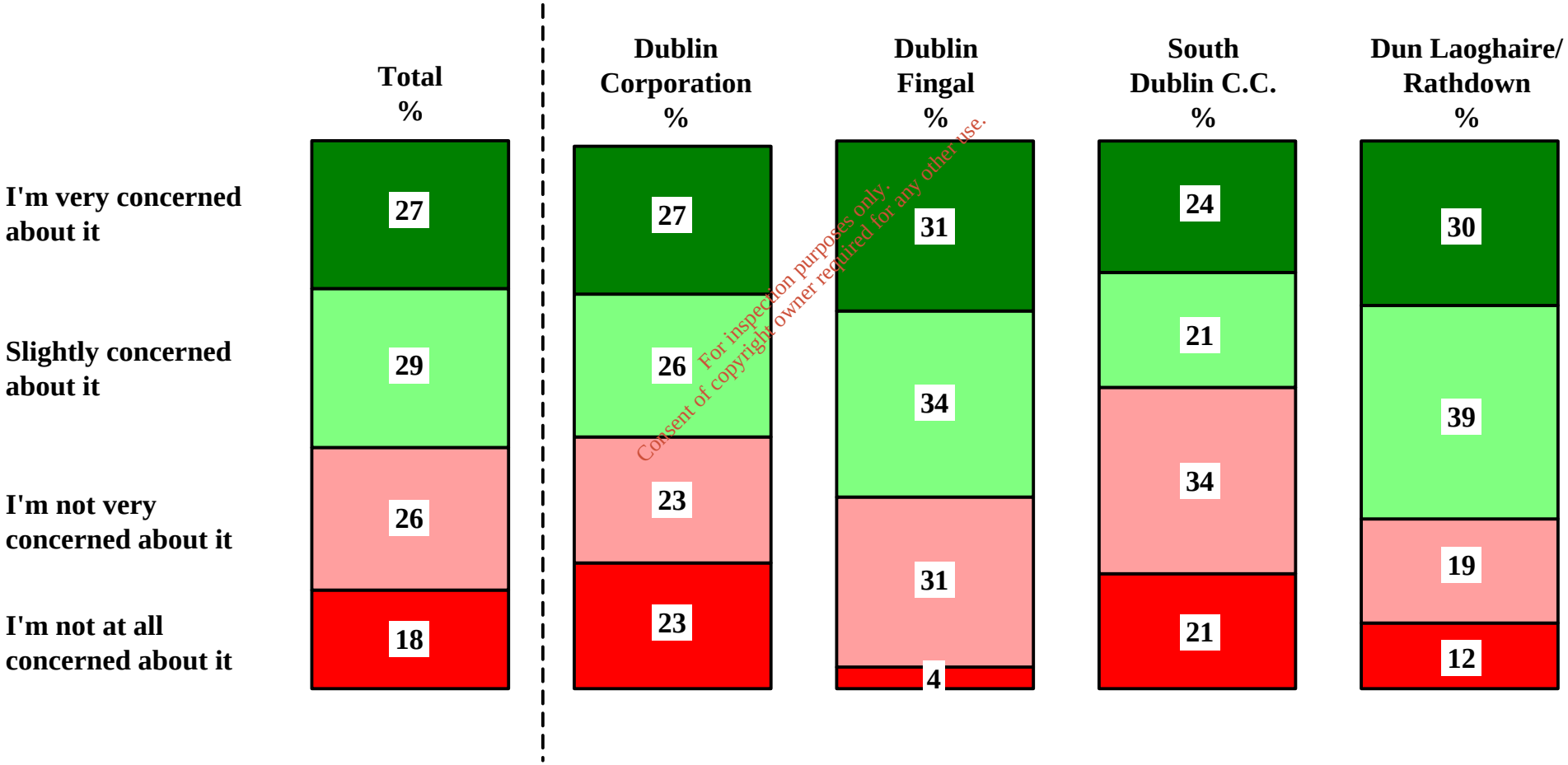


	LOCAL AUTHORITY AREA			
	Dublin Corp. %	Dublin Fingal %	South Dublin %	D.L. Rathdown %
Buried in landfill sites (non specific)	36	40	19	41
Buried in landfill sites Dublin area	32	22	25	44
Buried in landfill sites Outside Dublin	5	3	8	4
Burned	7	2	15	3
Items that can be recycled are separated by the council and the rest is burried in landfill sites	6	3	4	2
Dumped into the sea	4	1	1	-
Stored somewhere until a decision is made on its disposal	3	1	-	-
Other	3	19	24	1
Don't know	14	15	18	7

(Q.8 T.36)

4.3 LEVEL OF CONCERN ABOUT DISPOSAL OF HOUSEHOLD WASTE IN LANDFILL SITES

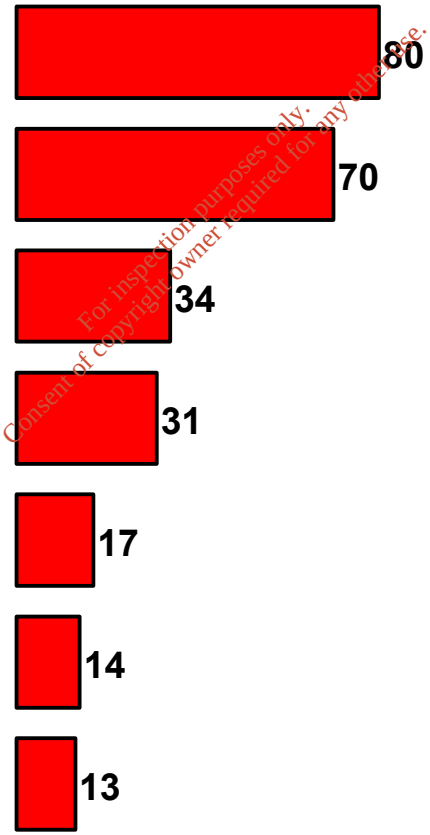
(Base: All Adults 18+)



(Q.9/T.38)

4.4 AWARENESS OF HOUSEHOLD WASTE TREATMENT METHODS

(Base: All Adults 18+)



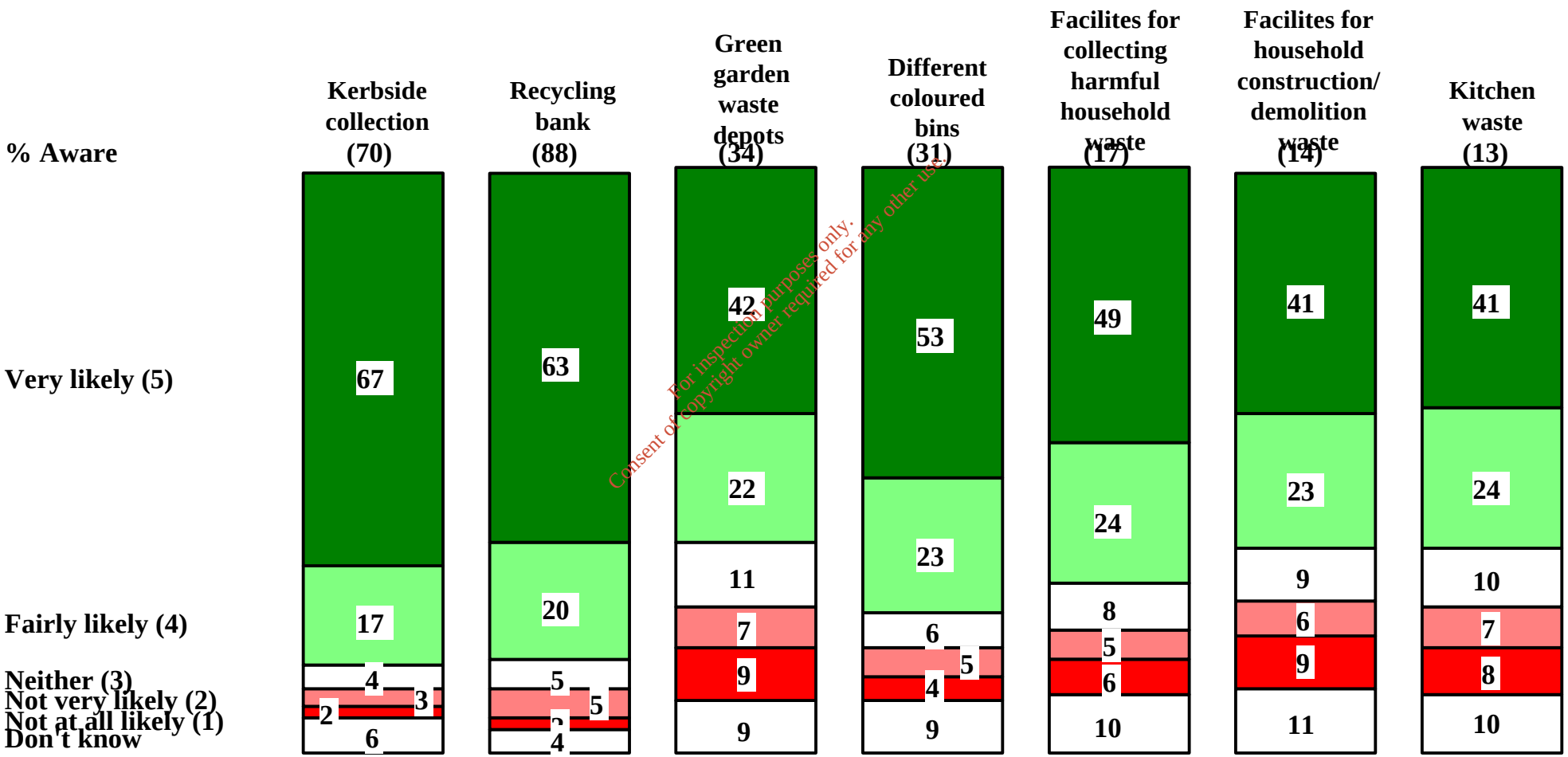
	LOCAL AUTHORITY AREA			
	Dublin Corp. %	Dublin Fingal %	South Dublin %	D.L. Rathdown %
Provision of a recycling bank such as bottle, paper bank in local community	90	82	97	78
The provision to as many households as possible, of a kerbside collection which is a bin for people to put in plastic, glass and tins only (not rubbish), which is collected weekly	62	57	95	72
Provision of green garden waste depots and composting facilities - to collect and treat waste from parks and garden water delivered by people to recycling centres	43	45	21	20
The provision of a number of different coloured bins, where one bin might be for paper, plastic and cardboard, one for organic household waste, like food and another one for anything else	41	30	14	27
Provision of recycling facilities for the collection of harmful household waste e.g. batteries, oil, paint etc.	21	18	9	18
Provision of facilities for sorting and recycling construction/demolition waste e.g. DIY work, bricks wood metal etc.	17	20	6	10
Collection of kitchen waste - which is organic like food for composting or other biological process	15	14	10	12

(Q.12a T.41)

SECTION 5.
Awareness & Attitudes Towards Different Waste Treatment Methods

5.2 LIKELIHOOD OF USING DIFFERENT WASTE TREATMENT METHODS

(Base: All Adults 18+)

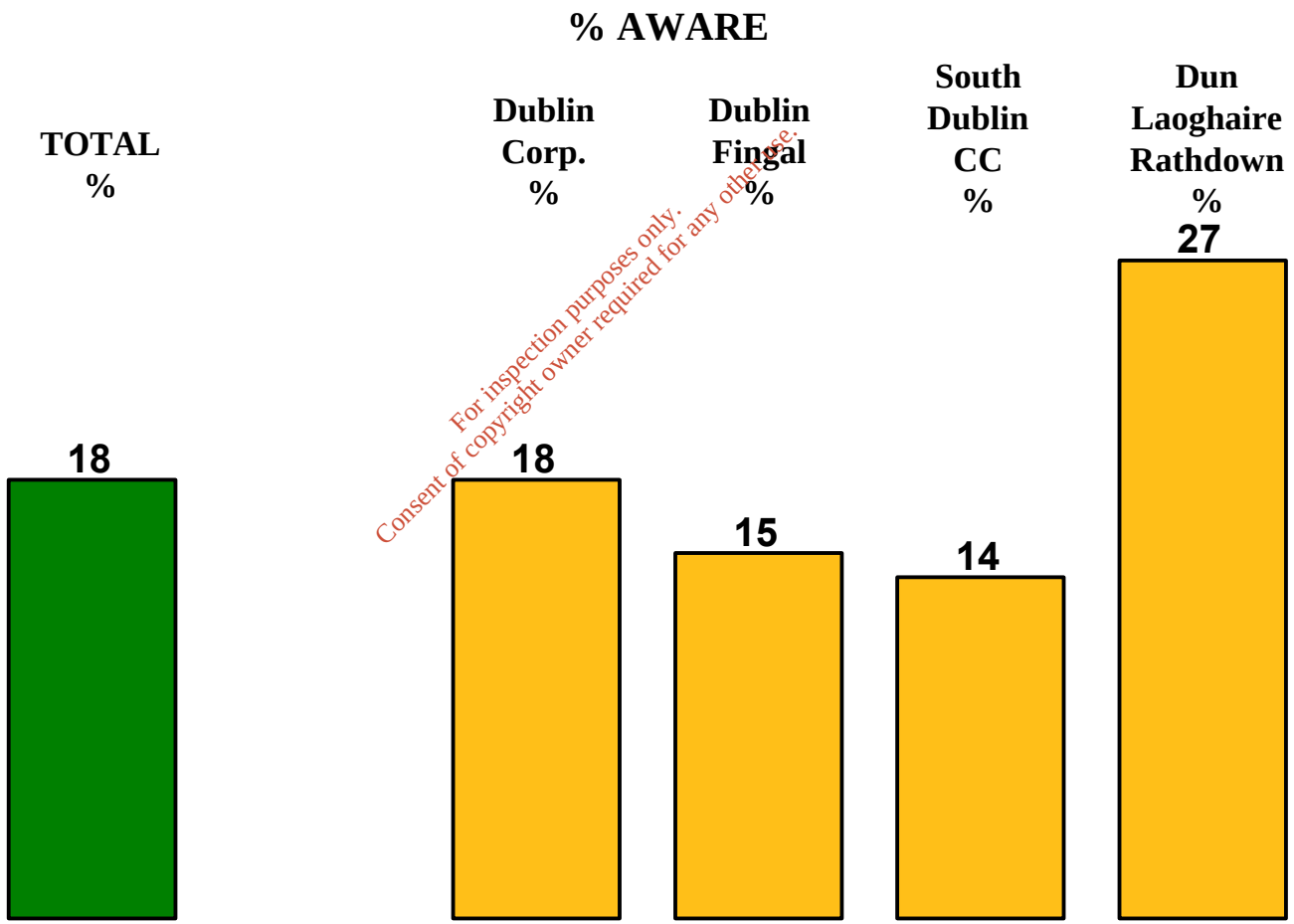


(Q.12b T.45)

SECTION 6:
Awareness & Attitudes Towards Thermal Treatment

6.1 AWARENESS OF THERMAL TREATMENT AS MEANS OF TREATING DISPOSAL OF HOUSEHOLD WASTE

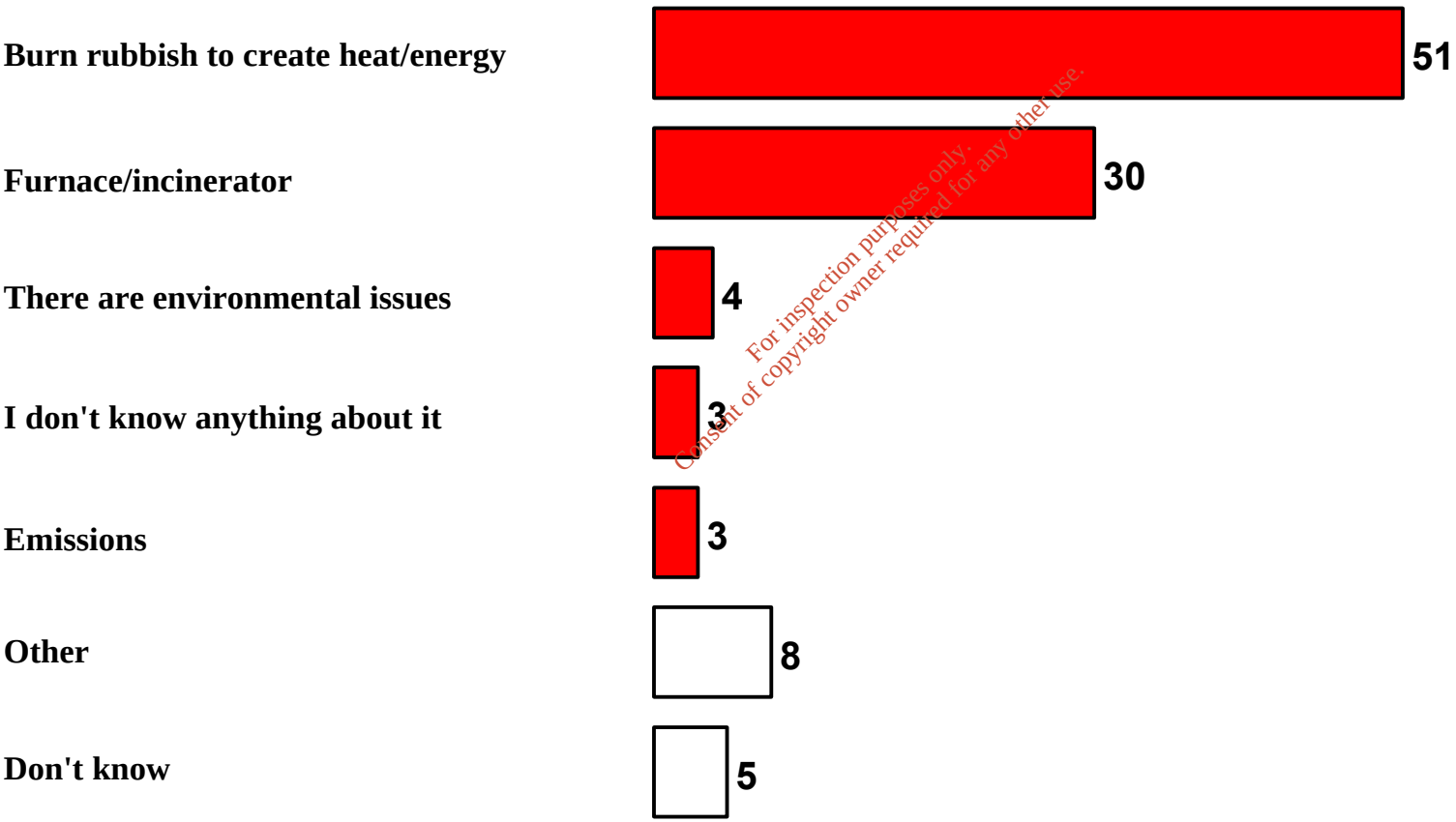
(Base: All Adults 18+)



(Q.13 T.53)

6.2 UNDERSTANDING OF THERMAL TREATMENT - SPONTANEOUS -

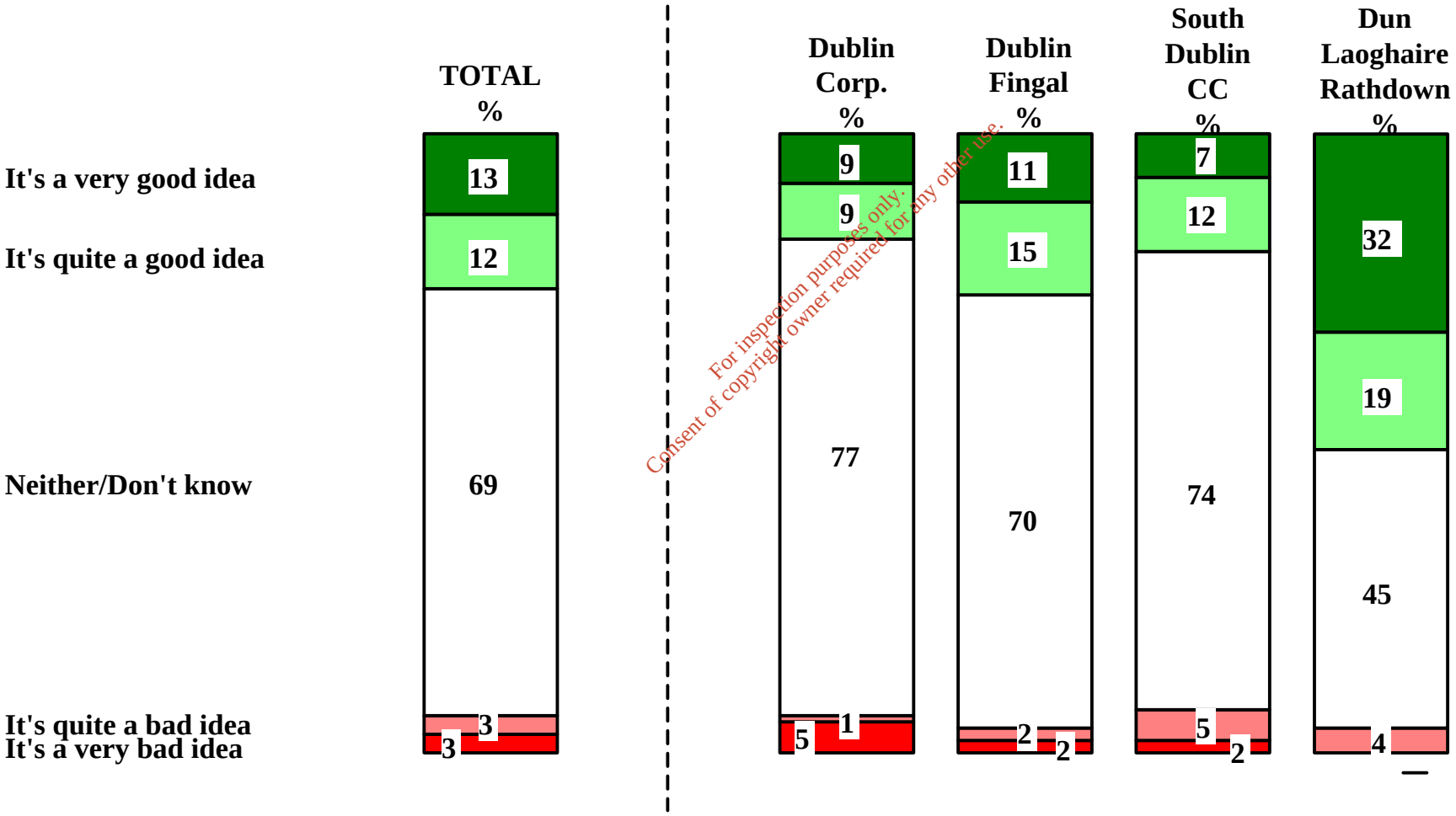
(Base: All Aware of Thermal Treatment - 18%)



(Q.14 T.54)

6.3 ATTITUDE TOWARDS THERMAL TREATMENT AS METHOD OF DISPOSING HOUSEHOLD WASTE

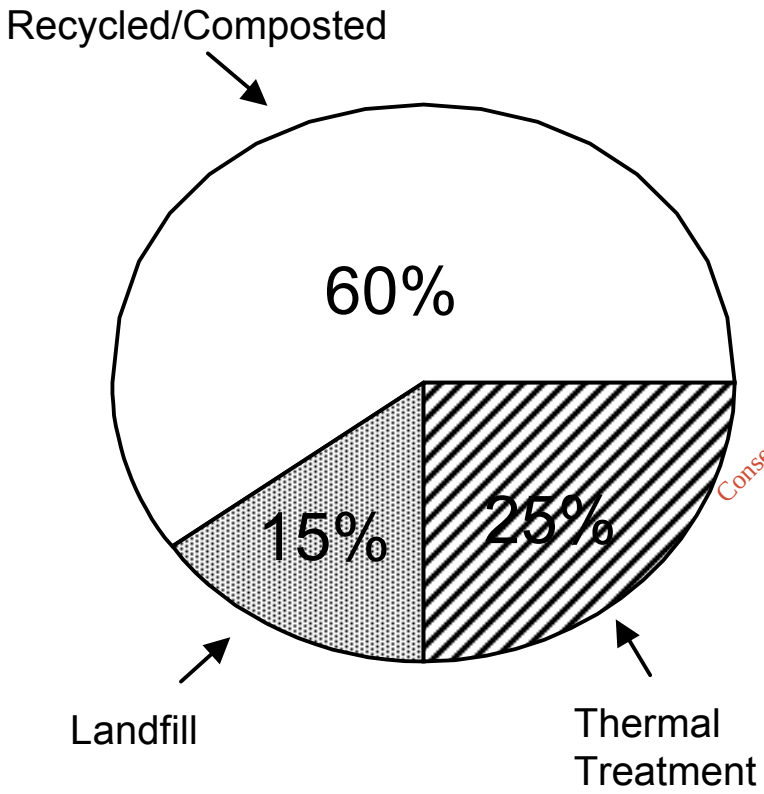
(Base: All Adults 18+)



(Q.15 T.52)

6.4 PEOPLE WERE ASKED HOW GOOD/BAD IDEA IT WOULD BE IF HOUSEHOLD WASTE IN DUBLIN WOULD BE TREATED AS FOLLOWS

12.

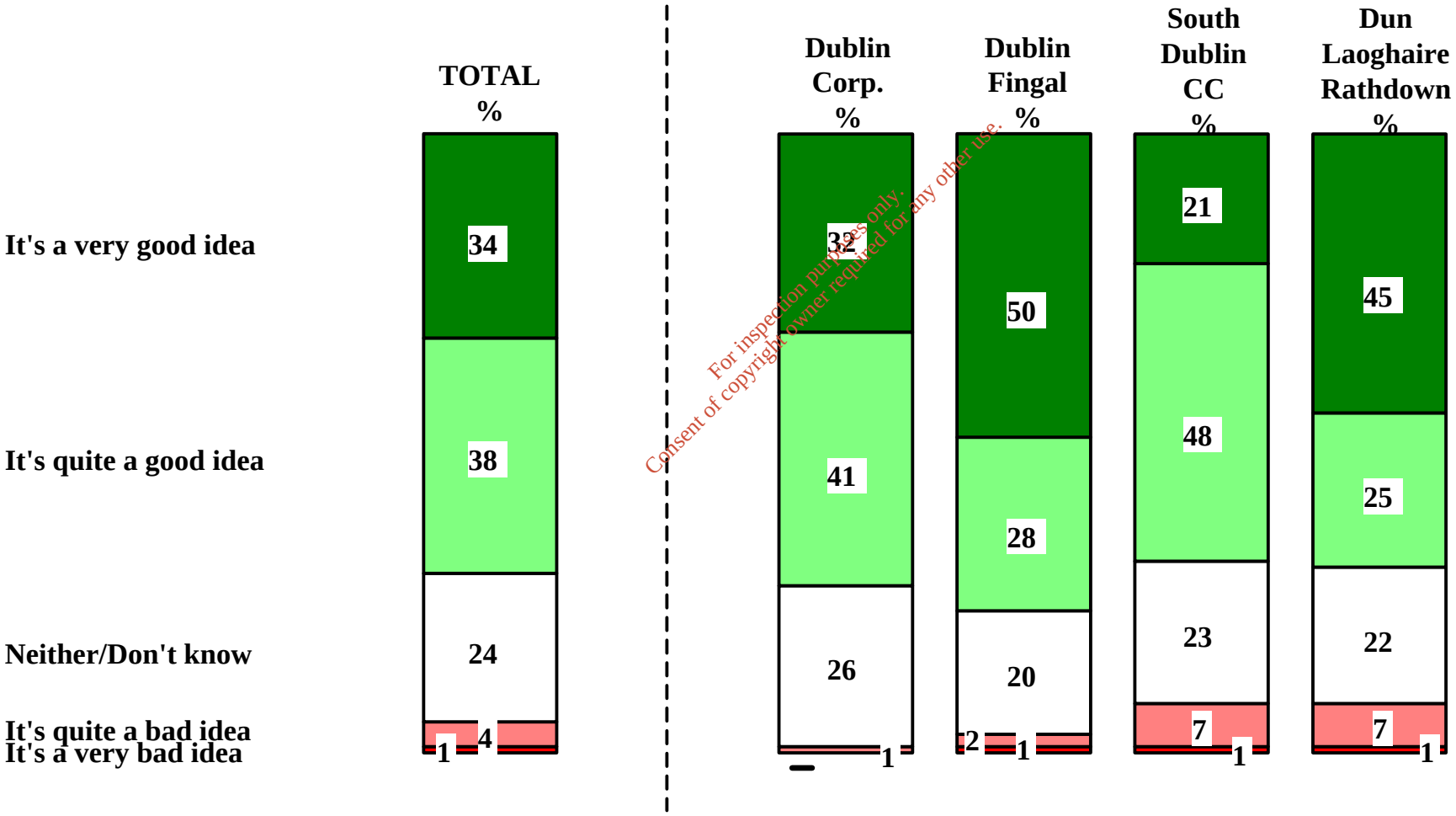


- About 60% - Recycled/ Composted
- About 25% (quarter) - Thermal Treatment
- About 15% - Landfill

(Q.16 T.53)

6.5 ATTITUDE TOWARDS THERMAL TREATMENT IF ACCEPTED FOR 25% TREATMENT OF THERMAL WASTE

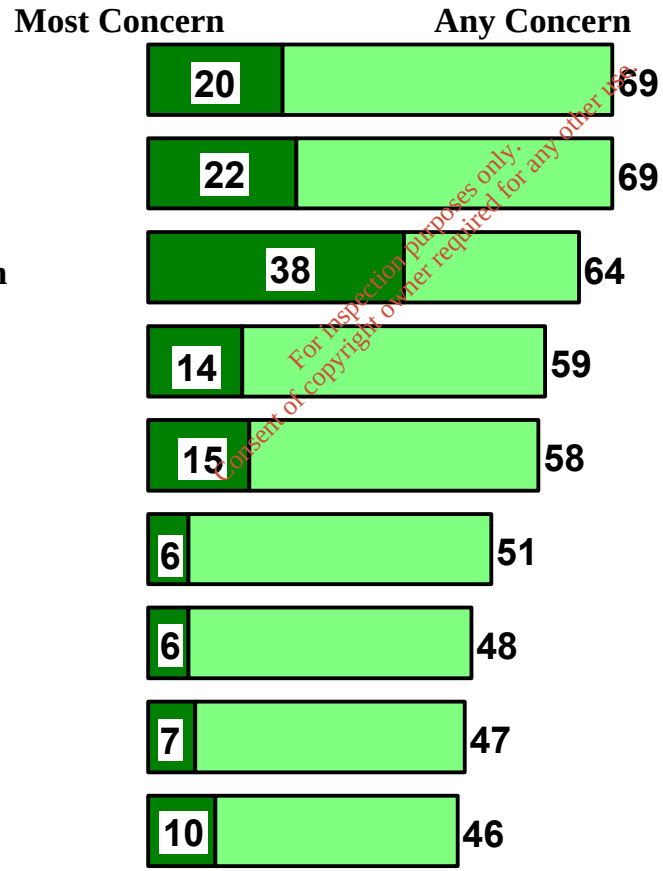
(Base: All Adults 18+)



(Q.16 T.53)

6.7 CONCERNS IF THERMAL TREATMENT PLANT WERE LOCATED NEAR HOME - PROMPTED

(Base: All Adults 18+)



% MOST CONCERN

	LOCAL AUTHORITY AREA			
	Dublin Corp. %	Dublin Fingal %	South Dublin C.C. %	D.L. Rathdown %
The smell from the site	29	21	11	9
The emissions from the site	23	17	22	23
The impact on my/(my families) health	44	49	31	25
The impact on the environment	16	12	13	14
Safety standards to ensure its run properly	21	18	11	6
The noise from the site	11	2	1	4
The amount of traffic to the site	9	4	-	6
The likelihood that price of land will drop in value	11	3	5	4
Who would be responsible for it	14	3	12	1

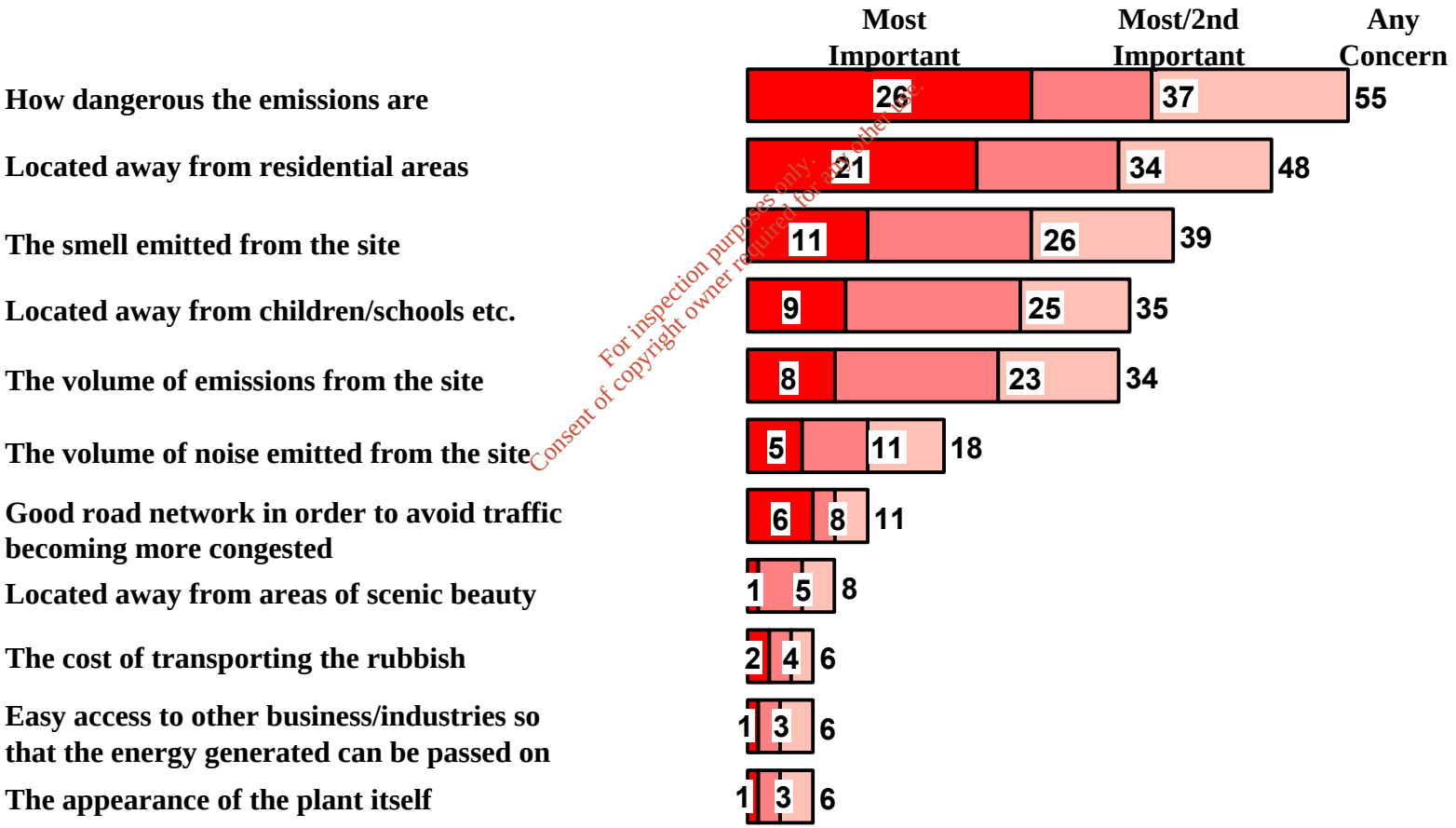
(Q.19a,b T.58)

LANSDOWNE
MARKET RESEARCH

SECTION 7:
Thermal Treatment:
Site Criteria

7.1 CONCERNS OF THERMAL TREATMENT PLANT WERE LOCATED NEAR HOME - PROMPTED

(Base: All Adults 18+)



(Q.20 T.60)

7.2 FACTORS CONSIDER IMPORTANT WHEN CHOOSING THERMAL TREATMENT SITE

(Base: All Adults 18+)

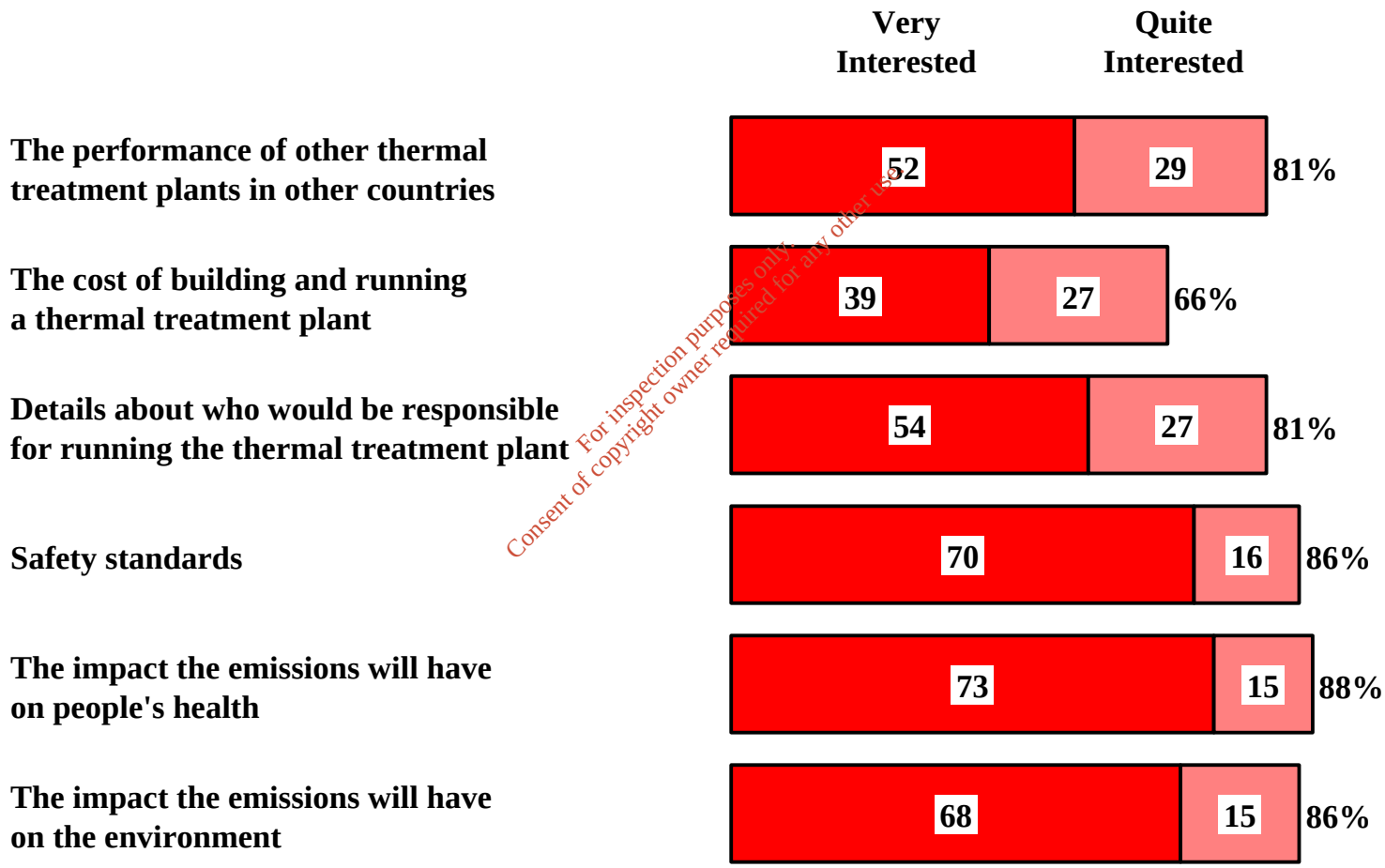
% MOST IMPORTANCE

	TOTAL %	LOCAL AUTHORITY AREA Dublin Corp. %	Dublin Fingal %	South Dublin CC %	Dun Laoghaire Rathdown %
How dangerous the emissions are	26	28	21	24	26
Located away from residential areas	21	21	19	15	(28)
The smell emitted from the site	11	13	(16)	11	3
Located away from children/schools etc.	9	6	(16)	10	6
The volume of emissions from the site	8	4	5	(18)	9
The volume of noise emitted from the site	5	6	4	3	4
Good road network in order to avoid traffic becoming more congested	6	9	7	2	5
Located away from areas of scenic beauty	1	2	-	-	2
The cost of transporting the rubbish	2	-	1	-	8
Easy access to other business/industries so that the energy generated can be passed on	1	1	-	-	2
The appearance of the plant itself	1	-	1	2	1

(Q.20 T.60)

8.1 THERMAL TREATMENT INFORMATION INTERESTED IN RECEIVING - I

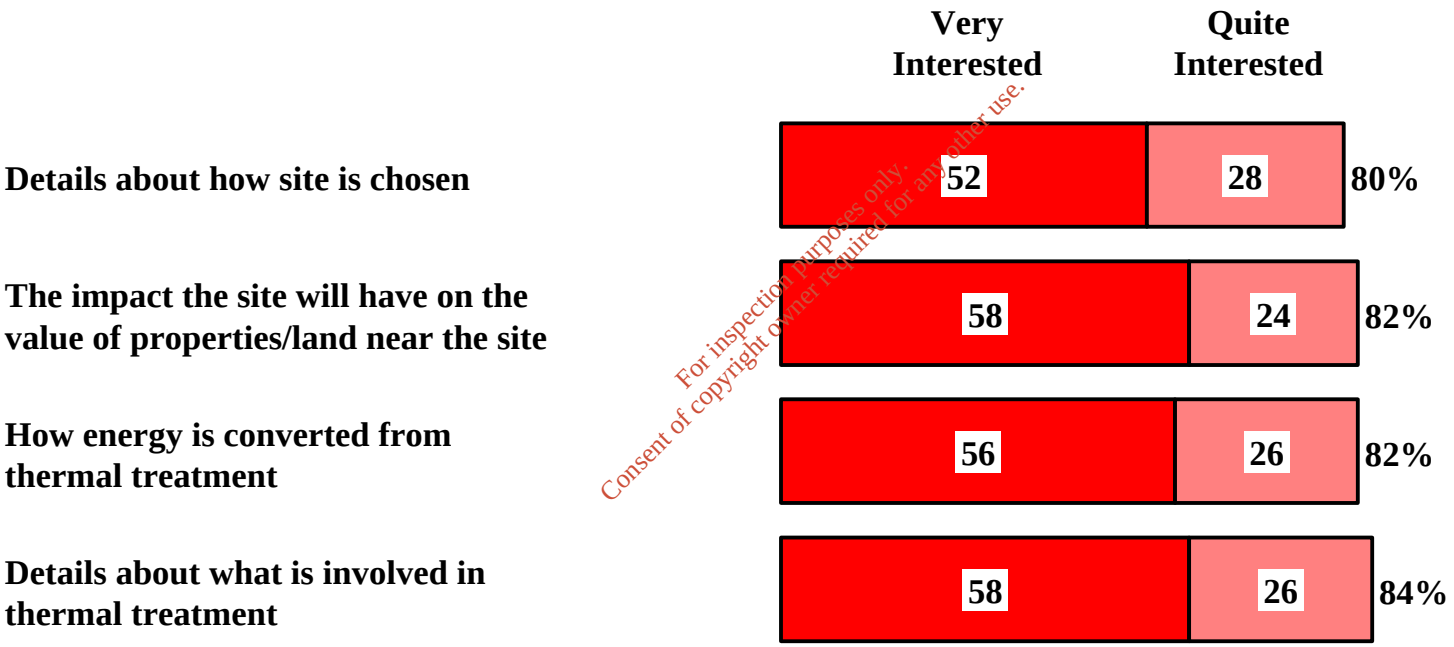
(Base: All Adults 18+)



(Q.21, T.63)

8.1 THERMAL TREATMENT INFORMATION INTERESTED IN RECEIVING - II

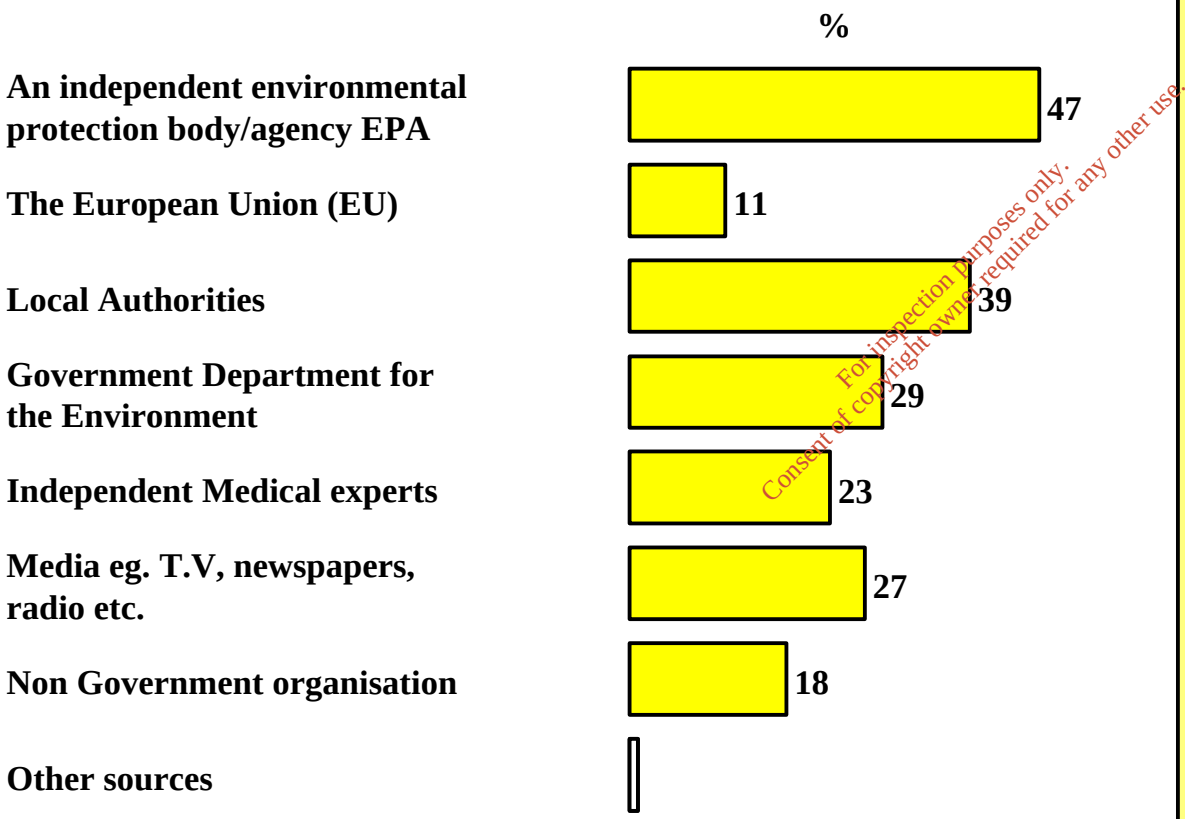
(Base: All Adults 18+)



(Q.21, T.63)

8.2 PREFERRED SOURCE OF INFORMATION

(Base: All Adults 18+)



	LOCAL AUTHORITY AREA			
	Dubli Corporation	Dublin Fingal	Sould Dublin County Council	Dun Laoghaire/ Rathdown
An independent environmental protection body/agency EPA	50	30	61	36
The European Union (EU)	7	13	24	6
Local Authorities	28	53	49	46
Government Department for the Environment	24	24	30	42
Independent Medical experts	21	14	40	14
Media eg. T.V, newspapers, radio etc.	28	23	25	30
Non Government organisation	26	7	19	6
Other sources	*	4	-	3

(Q.22, T.74)

APPENDIX C

DESCRIPTION OF SHORTLISTED SITES

Description of Potentially Suitable Sites

Site A – Poolbeg

Proximity to Waste Centre:
The site falls within the Dublin Corporation in a very central location east of the City Centre.

Road Access:
Road access at present is satisfactory. While difficult from some directions at present, road access will be improved upon on completion of several proposed roadworks projects. The Docklands Development Authority has labeled the area surrounding the site as having a poor road network. There is currently a plan to improve to the road network in the area. The North Port Tunnell will connect the port area to the M50 in Santry. The Eastern By-Pass Tunnell is also proposed which will connect the port to the Dun Laoghaire/Rathdown area.

Traffic:
Traffic in the Poolbeg Peninsula area is considerable due to the large amount of industrial/commercial activity as well as commuter traffic over the toll bridge. There is also likely to be local traffic from the city centre to the site. In addition, there will be increased traffic from the point of waste production to the M50 throughout County Dublin.

End-Market Use Possibilities:
There is very strong potential for end market use in the area. Poolbeg Peninsula is a very industrial area and there are potential users of high heat surrounding the site. Nearby industry includes Electricity, Scrap Metal and Water Treatment Works.

Site size and Current Land Use:
Sites of sufficient size appears to be available in Poolbeg Peninsula. The land use in the potential sites is mainly vacant space.

Proximity to residential areas:
The closest residential areas are located approximately 1km from the site.

Site B – Killeen Road

Proximity to Waste Centre:
Good

Road Access:
Road access to this site is good. The land is approximately 600 meters east of the Kylemore Road which leads to the Naas Road. The site is adjacent to the Kileen Road which also leads to the Naas Road. However, access via the Kileen Road would be limited due to a small bridge over the Grand Canal which would cause problems for large industrial vehicles. Rail access to this site is excellent as it is located just south of the Cherry Orchard rail station.

Traffic:
The traffic in this area is light/moderate and may be an issue along the more major routes in the vicinity.

End-Market Use Possibilities:
There are many industrial and commercial facilities in the area which are possible end users.

Site size and Current Land Use:
From visual inspection the site appears to be of suitable size for the facility. The land is currently occupied by the Sempernit factory.

Proximity to residential areas:
The site is located within 250m of the southwestern portion of Ballyfermot, namely Cherry Orchard Ave. and Clover Hill Road.

Site C – Cherrywood

Proximity to Waste Centre:
The site falls within the Dun Laoghaire-Rathdown Local Authority area. The location is in fair proximity to the centre of waste production in Dublin Corporation.

Road Access:
Road access to the site is very good. The land is adjacent to the M50 ringroad making it very accessible to all of Dublin County.

Traffic:
Traffic close to the site is not currently heavy as the area is now being developed and is a big construction site. Upon completion of the Cherrywood Science and Technology Park the traffic will increase with mainly commuter vehicles.

End-Market Use Possibilities:
This site has very strong potential for end-market use in either the commercial or industrial sectors. As the Cherrywood Science and Technology Park is currently under construction, the buildings could be designed to use the energy created by the plant.

Site Size and Current Land Use:
The available site is 18 acres and is currently open space.

Proximity to residential areas:
The closest residential dwellings are >500 meters from the site. There is an area zoned as residential that is 300 meters from the site.

Site D - Glenamuck

Proximity to Waste Centre:
This site is located in the Dun Laoghaire/Rathdown local authority area in the foothills of the Dublin Mountains. There is a large distance between the site and the centre of gravity for waste production is making the site rank poorly on this criteria.

Road Access:
There is easy access to the M50 from this site. Road access from the site to the M50 is not good as the traffic must travel through a residential area.

Traffic:
Traffic at the site is mainly residential/agricultural and light. There would be an increase in traffic surrounding the site as well as an increase in local traffic from waste source to M50 access.

End-Market Use Possibilities:
Due to the large amount of residential/agricultural land use in the area there are no end users likely near the site.

Site Size and Current Land Use:
The site is of sufficient size and is currently in partially vacant and partially in use for agricultural proposes.

Proximity to residential areas:
There are moderately dispersed residential dwelling on and surrounding the site.

Site E - Tibradden

Proximity to Waste Centre:
This site is located in the Dun Laoghaire/Rathdown local authority area in the foothills of the Dublin Mountains. There is a large distance between the site and the centre of gravity for waste production is making the site rank poorly on this criteria.

Road Access:
Road access to the site is poor. Although the M50 is in close proximity, the road from the site to M50 goes through a village.

Traffic:
Traffic would be increased at both the waste source and in the site area. The main access route to the site is the M50, thus there would be increased traffic from the waste source to the M50 access. Upon exiting the M50, the trucks would have to travel through a primarily residential area to the site. The vehicles would pass through a village en route to the site.

End-Market Use Possibilities:
Due to the large amount of residential/agricultural land use in the area there are no end users likely near the site.

Site Size and Current Land Use:
There are several possible sites in the area that are of sufficient size and currently in partially vacant and partially in use for agricultural proposes.

Proximity to residential areas:
There are moderately dispersed residential dwellings on and surrounding the potential sites.

Site F - Balbriggan

Proximity to Waste Centre:
This site is located in the northern most section of Fingal. The area is in very poor proximity to the waste centre of gravity.

Road Access:
The site is located off of the N1 and close to the M1. These roads create a good road network for waste travelling from the southern portions of the county. The site is located in an industrial area with a good local road system with frequent industrial vehicle use.

Traffic:
There is likely to be an increase in local traffic from the city centre to the M50 access. There will be additional travel for the vehicles due to the long journey from source of waste to treatment site.

End-Market Use Possibilities:
As the site is located in a predominately industrial area there is strong possibility for either industrial or commercial use.

Site Size and Current Land Use:
Currently the site is a large vacant field. The site is available for purchase and development, a posted sign on the land lists the development potential as high-quality and high-tech business and light industrial.

Proximity to residential areas:
There are a minimal amount of residential dwellings located within 50m of the site. A housing estate begins within 250m of the site.

Site G – Belcamp

Proximity to Waste Centre:
The site falls in southern Fingal on its boarder with Dublin Corporation. There are approximately 6km between the site and the start of the Malahide Road near Fairview Park. This puts the site in a central location in regards to its proximity to the centre of gravity for waste production in the region.

Road Access:
Road access to the site is very good. The site will eventually be along the M50, currently it is located just west of the Malahide Road and approximately 3km east of the current M50.

Traffic:
Traffic close to the site is considerable and should be noted. There is also likely to be local traffic from the city centre to the site. In addition there will be increased traffic from the point of waste production to the M50 throughout County Dublin.

End-Market Use Possibilities:
Site A is located to the west of the Malahide road between the Darndale area on the south and St. Doolagh's Bridge area on the north. Located within the Northern Cross Industrial Park, this site will be adjacent to the M50 upon completion of the proposed Northern Cross Route..

Site Size and Current Land Use:
By visual inspection the site appears to be of suitable size for the facility. The site is available for purchase however, the current zoning would be an issue.

Proximity to residential areas:
This site is in close proximity to residential areas. There is <250m between the southwest boarder of the site and the Darndale neighborhoods of Buttercup Park and Snowdrop Walk. Approximately 250m east of the site is the Clare Hall residential area (east of the Malahide Road). Slightly greater than 250m north of the site are the grounds of Belcamp College. Located to the west of the site is Darndale Park. It is an objective of the Dublin Corporation in their development plan to develop Darndale Park. The Darndale area is also included in the Dublin Corp. URBAN program which tackles the causes of social and economic exclusion in disadvantaged areas of the city.

Site H - Deanastown

Proximity to Waste Centre:
Located in the Fingal area this site is in fair proximity to the centre of waste production in Dublin Corporation.

Road Access:
The road access close to the site is poor for use by industrial vehicles. The primary access route to the M50 would require the vehicles to travel through Blanchardstown Village. The distance from the site to the M50 is not large, it would benefit the site to investigate the creation of a new access ramp to the M50 which would divert traffic from having to travel through Blanchardstown Village.

Traffic:
The site is located near a business park with considerable traffic in the area. The majority of traffic flow appears to be cars/light trucks/vans. The facility would cause heavy industrial traffic through Blanchardstown Village as well as increase local traffic from the source of waste production to M50 access.

End-Market Use Possibilities:
Given the close proximity of the site to several business parks there is potential for end-market use in the industrial/commercial/hospital sectors. There does not appear to be a large amount of industrial activity in the area, however with the close proximity to the M50 the amount of industrial activity could possibly be on the increase in future years.

Site Size and Current Land Use:
The land is currently vacant, open space.

Proximity to residential areas:
The section of the site located in the northwestern corner of the area appears to be the most suitable for development. This area is bordered on the north and west by business parks and on the southeast by the Veterinary Research Laboratory. The closest residential neighborhoods are located in the Corduff area. There is a hospital located 1km south of the site.

Site I - Walkinstown

Proximity to Waste Centre:
Located in South Dublin, this site is in good proximity to the centre of waste production in the Dublin Corporation.

Road Access:
Road access to this site is good. There are two M50 roundabouts within 1km, the Naas Road is also very close to the site. The site is located within the Walkinstown Industrial Estate with quality roads and a fair amount of industrial traffic.

Traffic:
As the site is located within an industrial estate the traffic can be heavy at times with both cars and industrial vehicles. The industrial vehicle traffic would be increased by the plant traffic. There would also be an increase in local traffic from the waste source to the closest M50 access.

End-Market Use Possibilities:
There is strong potential for industrial energy (heat and electricity) use in the area of the site. The Smurfit Paper recycling and other potential high heat users are located within the Walkinstown Industrial Estate.

Site Size and Current Land Use:
There are three potential sites within the Industrial Estate. All are currently vacant, open space and of suitable size for development.

Proximity to residential areas:
The site contains moderately dispersed residential dwellings throughout. The are no major residential housing estates within 250m of the centre of the Industrial Estate.

Site J - Newlands

Proximity to Waste Centre:
Located in South Dublin this site is in good proximity to the Dublin Corporation and thus the centre of gravity for waste production in Dublin County.

Road Access:
The site is located along the Naas Road approximately 1km from the Red Cow M50 roundabout. This creates very good road access for the site.

Traffic:
Although the road access to the site is ideal, the Naas Road experiences heavy traffic (mainly commuter). The industrial traffic along the road would be increased by the site. Also, the local traffic from the waste source to the M50 access would be increased by the site.

End-Market Use Possibilities:
There is potential for industrial/commercial end-market use in the general area of the site but there are not possibilities adjacent to the land. The closest end users are located on the opposite side of the Naas Road.

Site Size and Current Land Use:
The site is 7acres (2.183) hectares and is currently vacant, open space. The land is listed as for sale by public tender.

Proximity to residential areas:
There are residential neighbourhoods adjacent to the site on all sides bar the one which borders the Naas Road.