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TECHNICAL REPORT

MODELLING OF BASELINE PCDD/F INTAKE AND PREDICTED IMPACT OF EMISSIONS FROM THE PROPOSED POOLBEG WASTE TO ENERGY PLANT ON PCDD/F INTAKE

FOR

Elsam

Report prepared by: **Dr Fergal Callaghan**
Our reference: FC/06/3018SR01_rev_1
Date: 24 May 2006

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EXECUTIVE SUMMARY

Soil sampling and ambient air monitoring data, and published data for Irish food, was used to establish a baseline for PCDD/F for a theoretical Maximum At Risk Individual (MARI) and a TARI (Typical At Risk Individual) in the Poolbeg area. The MARI was assumed to live at the point of maximum PCDD/F deposition from the proposed development and to be a person who obtained their vegetables from a 100m diameter site, upon which the maximum deposition flux impacted and who may be exposed to PCDD/F emissions from the WTE from inhalation, dermal contact with soil, ingestion of soil and ingestion of vegetables . It was assumed that the MARI spent 24 hours per day, 7 days per week on the site, and spent 16 hours per day outside.

The TARI was assumed to be a typical urban dweller who does not grow vegetables but relies on shops and supermarkets, supplying food grown outside the area, and therefore is only potentially exposed to PCDD/F emissions from the WTE facility through inhalation, ingestion of soil and dermal contact with soil.

The baseline PCDD/F intake for the MARI and TARI was modelled following US EPA Methodology and using the Dutch Government Approved Model RISC Human 3.2 (May 2005). The PCDD/F emissions under maximum operating conditions (assuming the WTE facility operated continuously at the process emission limits set by the Incineration Directive 2000/67/EC) were then used to model the increase in soil concentrations of PCDD/F over the operating life of the facility. The modelled soil and air values were then added to the existing background values for PCDD/F and input to the RISC HUMAN Model.

The model predicted that the PCDD/F intake for both the MARI and the TARI, even with the WTE operating at maximum licensed emission rates, was very low and was still significantly less than recommended guideline values for PCDD/F intake.

An accident scenario, where the WTE facility was assumed to operate for 48 hours at 10 ng/m^3 PCDD/F was also modelled to assess potential impacts on the MARI and the TARI.

The modelling predicted that the accident scenario led to PCDD/F intake levels that were still well below the recommended guideline values for PCDD/F intake.

It was therefore concluded that the proposed WTE facility will have no significant impact on PCDD/F intake for even the theoretical MARI or TARI.

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1.0 INTRODUCTION

AWN Consulting was instructed by Elsam to undertake a mathematical modelling study to assess the potential impact of PCDD/F emissions from the proposed waste to energy (WTE) facility at Poolbeg.

2.0 MODELLING PHILOSOPHY

It was proposed to model the impact of the emissions following the methodology described by the US EPA for hazardous waste facilities [1].

The modelling philosophy was as follows:

Develop a (Conceptual Site Model) CSM to assess the potential dietary intake of PCDD/F for the theoretical Maximum at Risk Individual (MARI) and the Typical At Risk Individual (TARI);

Select most appropriate background soil PCDD/F concentration;

Model PCDD/F intake using background concentrations in soil;

Obtain data on deposition rates for PCDD/F from proposed WTE facility;

Model impact of deposition rates on soil concentrations of PCDD/F over 30 year operating life of facility;

Model increase in ambient air concentrations;

Model impact of WTE facility-related PCDD/F deposition rates and increased ambient air concentrations on dietary intake of PCDD/F for the MARI and TARI.

Model impact of accident at WTE facility and the related PCDD/F deposition rates and increased ambient air concentrations on dietary intake of PCDD/F for the MARI and TARI.

3.0 CONCEPTUAL SITE MODEL: MAXIMUM AT RISK INDIVIDUAL AND TYPICAL AT RISK INDIVIDUAL

3.1 Conceptual Site Model

The Conceptual Site Model (CSM) was developed as follows, using the methodology presented in the relevant US EPA Modelling Guidance [1].

Background concentrations of PCDD/F are transferred to a human receptor by the following pathways;

- Inhalation indoor air
- Inhalation outdoor air
- Ingestion of soil
- Dermal contact with soil
- Inhalation of soil dust
- Ingestion of drinking water
- Dermal contact with shower water
- Inhalation of water vapour in the shower
- Ingestion of meat (this pathway was eliminated as the area of land in question is not agricultural and PCDD/F exposure from known levels in Irish produce was used to model this component of PCDD/F intake)
- Ingestion of milk and dairy products (this pathway was eliminated as the area of land in question is not agricultural and PCDD/F exposure from known levels in Irish produce was used to model this component of PCDD/F intake)
- Ingestion of vegetables
- Ingestion of surface water

- Ingestion of suspended matter in water

- Dermal contact with surface water

The CSM assumes all PCDD/F is deposited on the ground and is available for uptake, apart from the fractions which are removed through volatilisation, surface water run off, erosion and degradation. These elements are calculated for each of the 17 PCDD/F congeners.

The CSM then assumes the remainder of the PCDD/F deposited is available for uptake through the pathways listed above.

The group of 17 PCDD/F congeners vary widely in molecular weight and chemical characteristics and behave quite differently with respect to the fraction which absorbs to soil, dissolves in water or is present in the vapour phase. It is therefore not valid to model the PCDD/F concentrations as a total I-TEQ as 2,3,7,8 PCDD/F value or to only model the chemical characteristics of PCDD/F intake as 2,3,7,8 PCDD/F and each congener must therefore be modelled separately.

3.2 The Maximum At Risk Individual (MARI)

In order to conduct a conservative assessment of the potential impact of PCDD/F emissions on a theoretical individual, a number of assumptions, which are listed in this Section of the report, were made for the MARI (these assumptions are based on the MARI as used by the US EPA for hazardous waste facility assessment) [1].

The methodology for selection of the MARI also follows the UK recommended methodology "Risk Assessment of Dioxin Releases from Municipal Waste Incineration Processes, HMIP/CPR2/41/1/181, London 1996". This document recommends that all likely pathways for dioxin and furan intake in a human be considered and the impact of the dioxin and furan deposition rate on soil dioxin and furan concentrations and subsequently food dioxin and furan concentrations, be examined.

The UK methodology uses the concept of the Hypothetically Maximum Exposed Individual (HMEI), in which the individual is assumed to live in the area of predicted maximum impact from the WTE facility and whose food intake is also assumed to be from this area (worst case scenario), this is the MARI concept.

The assumptions made were as follows:

- The MARI lives at the point where the highest deposition rate, for emissions from the proposed WTE facility occurs.
- The MARI is an individual, who spends 16 hours per day, 7 days per week, 50 weeks per year outside in the field where the deposition occurs;
- The MARI spends 6 years as a child and 60 years as an adult living on the site;
- The MARI only eats vegetables grown on this soil (milk and meat are obtained off site as the environment in question is an urban environment and cattle raising is not practised in this area)

3.3 The Typical At Risk Individual (TARI)

The following assumptions made for the TARI:

- The TARI lives at the point where the highest deposition rate, for emissions from the proposed WTE facility occurs.
- The TARI is an individual, who spends 16 hours per day, 7 days per week, 50 weeks per year outside in the area where the deposition occurs;
- The TARI spends 6 years as a child and 60 years as an adult living on the site;
- The TARI does not eat any food produced in the area in which they live.

4.0 SOIL BACKGROUND CONCENTRATIONS

AWN Consulting Ltd previously carried out a programme of background soil sampling and monitoring (ref FC/03/2008SR01).

The results of this survey and the location of the monitoring points are summarised in Tables 4.1 - 4.3.

AWN Sampling Point	Sampling Point Location	Position	Sampling Date
A	Sean Moore Park	53^{0} 20.169' N 006^{0} 12.923' W	5th November 2003
B	Irishtown Nature Park	53^{0} 20.161' N 006^{0} 11.757' W	6th November 2003
C	Ringsend Park	53^{0} 20.520' N 006^{0} 13.258' W	3rd November 2003
D	Sandymount (grassed area along the sea front)	53^{0} 19.584' N 006^{0} 12.456' W	7th November 2003
E	Clontarf (grassed area along the sea front)	53^{0} 21.476' N 006^{0} 11.605' W	29th October 2003
F	Bull Island Nature Reserve	53^{0} 21.962' N 006^{0} 09.223' W	31st October 2003

Table 4.1 Location of AWN Sampling Points

Sampling Point	Sampling Point Location
A	SW of site, peak area from dispersion model
B	Adjacent and to the South of site, peak area from dispersion model
C	West of site, closest residential community
D	SW of site, residential community (downwind of NE winds)
E	North of site, residential community
F	NE of site (downwind of SW winds)

Table 4.2 Rationale for choosing AWN sampling locations

Sample	Site Location	PCDD/F (ng/kg) [1]
A	Sean Moore Park	10
B	Irishtown Nature Park	5.7
C	Ringsend Park	3.2
D	Sandymount Promenade	23
E	Clontarf Promenade	3.9
F	Bull Island Nature Reserve	0.54

Table 4.3 Analysis results

1 NATO/CCMS I TEQ (Toxic Equivalent) (2,3,7,8 – tetrachloro dibenzo-p-dioxin)

The highest PCDD/F value recorded (NATO CCMS TEQ OF 23 ng/kg)was for the sample from the road side location at Sandymount, Sample D from the soil monitoring report. However, this is a road side location and is subject to localised PCDD/F emission sources such as traffic fumes and hence would not be a realistic background soil concentration for the MARI.

The next highest PCDD/F value, recorded for Sean Moore Park, which was also at the point of maximum ground level concentration as predicted using the US EPA approved ISC modelling software package (and as presented elsewhere in this EIS). This source is not close to significant traffic emissions and therefore is not likely to be significantly affected by the PCDD/F component of such emissions, unlike the Sandymount sample.

It was therefore decided that the soil concentration for the background on the site inhabited by the MARI and the TARI would consist of a soil PCDD/F contribution of 9.5 ng/kg WHO TEQ. The ambient air concentrations used were those measured by AWN (and presented elsewhere in the EIS Document) in Winter 2004 which are considerably higher than those measured in Summer 2003 and hence it was felt that the use of these figures was suitably conservative.

5.0 BASELINE MODELLING OF INTAKE OF PCDD/F

5.1 Model Selection and Set up

The RISC Human Model Version 3.2 (May 2005) package was chosen to model intake of PCDD/F. The model was developed by the Dutch National Institute of Public Health and Environmental Protection (RIVM)., on behalf of the Dutch Ministry for Spatial Planning, Housing and the Environment and has been used to model the Dutch Soil standards for protection of human health [2].

The model consists of series of equations which allow each of the pathways listed in Section 3.1 to be modelled mathematically. The principal model variables used to calculate total exposure are presented as Attachment A.

The equations used to calculate each variable are presented in Attachment B.

The values selected for the model variables and the justification for selecting these values is presented as Attachment C.

The model data base contains many of the necessary chemical parameters such as the octanol-water coefficient, Henry's coefficient and the water solubility, which are necessary to model the behaviour of substances in soil and water environments. Where these parameters were not available from the model database, The Handbook of Physical Chemistry [3] and Appendices A – J of the US EPA Human Health and Ecological Risk Assessment Report [1] were used.

5.2 Model Results

The Model Output Reports for the MARI and the TARI for PCDD/F for each intake pathway, are presented as Attachment D. The modelled WHO TEQ intake value for the MARI, in pg/kg body weight/day, is presented in Table 5.1 and for the TARI, is presented in Table 5.2.

The model predicted a baseline PCDD/F intake for the MARI of 1.4 pg/kg body weight/day using the WHO TEF values and a baseline intake for the TARI of 0.0849 pg/kg body weight/day using the WHO TEF values . Both values are much less than the EC TWI (Tolerable Weekly Intake) of 14 pg WHO-TEQ/kg body weight/wk (from Update to "Opinion of the Scientific Committee on the Risk Assessment of Dioxins and Dioxin-like PCBs in Food 22/11/2000", adopted 30th May 2001 (SCF/CS/CNTMDIOXIN/ 20 Final))

PCDD Congeners	**pg/kg/d**
	WHO TEQ
2,3,7,8-TCDD	1.66E-01
1,2,3,7,8-PeCDD	7.26E-01
1,2,3,4,7,8-HxCDD	3.28E-02
1,2,3,6,7,8-HxCDD	1.21E-01
1,2,3,7,8,9-HxCDD	7.01E-02
1,2,3,4,6,7,8-HpCDD	7.52E-02
OCDD	1.08E-02
PCDF Congeners	0.00E+00
2,3,7,8-TCDF	7.70E-03
1,2,3,7,8-PeCDF	4.89E-03
2,3,4,7,8-PeCDF	8.50E-02
1,2,3,4,7,8-HxCDF	3.60E-02
1,2,3,6,7,8-HxCDF	1.97E-02
1,2,3,7,8,9-HxCDF	9.90E-03
2,3,4,6,7,8-HxCDF	9.38E-03
1,2,3,4,6,7,8-HpCDF	1.64E-02
1,2,3,4,7,8,9-HpCDF	1.40E-02
OCDF	1.81E-03
WHO TEF	**1.40668**

Table 5.1 Modelled baseline PCDD/F intake for MARI– using WHO TEF

PCDD Congeners	**pg/kg/d**
	WHO TEQ
2,3,7,8-TCDD	2.65E-03
1,2,3,7,8-PeCDD	5.28E-03
1,2,3,4,7,8-HxCDD	1.43E-03
1,2,3,6,7,8-HxCDD	1.47E-03
1,2,3,7,8,9-HxCDD	1.69E-03
1,2,3,4,6,7,8-HpCDD	3.48E-03
OCDD	2.90E-04
PCDF Congeners	
2,3,7,8-TCDF	3.10E-03
1,2,3,7,8-PeCDF	1.18E-03
2,3,4,7,8-PeCDF	4.53E-02
1,2,3,4,7,8-HxCDF	5.52E-03
1,2,3,6,7,8-HxCDF	3.89E-03
1,2,3,7,8,9-HxCDF	4.02E-03
2,3,4,6,7,8-HxCDF	2.09E-03
1,2,3,4,6,7,8-HpCDF	3.24E-03
1,2,3,4,7,8,9-HpCDF	3.01E-04
OCDF	3.45E-05
WHO TEF	**0.08492**

Table 5.2 Modelled baseline PCDD/F intake for TARI– using WHO TEF

It is interesting to note the significant PCDD/F contribution associated with the additional PCDD/F intake from vegetables grown and consumed by the MARI.

However, in order to determine a PCDD/F total contribution for the MARI and TARI, it is necessary to include PCDD/F exposure from meat and milk, based on milk sourced in the Dublin area and meat sourced in Ireland. The input values for this calculation (for meat, milk, and vegetables) are given in Attachment C. The calculation procedure and calculated values are shown in Tables 5.3 and 5.4

MARI						
		PCDD/F	**PCDD/F**	**PCDD/F**	**Adult**	**PCDD/F**
	kg/day	**ng/kg**	**ng/day**	**pg/day**	**Body Wt**	**pg/kg/day**
Meat	0.157	0.067	0.010	10.458	60	0.17
Milk	0.238	0.022	0.005	5.232	60	0.09
Sum						0.26

Table 5.3 Calculated PCDD/F from off-site Meat and Milk Intake for MARI

TARI						
		PCDD/F	**PCDD/F**	**PCDD/F**	**Adult**	**PCDD/F**
	kg/day	**ng/kg**	**ng/day**	**pg/day**	**Body Wt**	**pg/kg/day**
Meat	0.157	0.067	0.010	10.458	60	0.17
Milk	0.238	0.022	0.005	5.236	60	0.09
Leafy Veg	0.118	0.012	0.001	1.416	61	0.02
Tuber Veg	0.225	0.017	0.004	3.825	62	0.06
Sum						0.35

Table 5.4 Calculated PCDD/F from off-site Meat, Milk and Vegetable Intake for TARI (vegetable data from German Data, from Task 4, Annex 1 of EU Dioxin Inventory, published by the EU and Compiled by AEA,1999)

The predicted MARI and TARI baselines, for the modelled site related PCDD/F dose from exposure to PCDD/F in the area and for the PCDD/F dose from food sources are shown in Table 5.5.

	A	**B**	**C**	**D**
	pg/kg/d	**pg/kg/d**	**%**	**%**
MARI	0.26	1.4066	16	84
TARI	0.35	0.0849	80	20

Table 5.5 Calculated total MARI and TARI Baselines and percentage of PCDD/F from outside area

Where:

A = Food sourced outside area pg/kg bw/day

B = PCDD/F intake from area pg/kg bw/day

C = % PCDD/F from outside area

D = % PCDD/F contribution from area

It is of interest to note that the strongly conservative modelling assumptions used to generate the MARI intake figures lead to a relatively high baseline dose for the MARI, when compared with the more realistic TARI, where the baseline dose from the area is shown to be quite low.

However, even the TARI is somewhat conservative, as it is assumed that the receptor in question spends all of their time (for 16 hours per day) in the environment where the soil value used in the modelling study was measured.

6.0 MAXIMUM DEPOSITION RATE OF PCDD/F FROM WTE EMISSIONS AND CALCULATION OF PREDICTED SOIL AND AIR CONCENTRATIONS

Air emissions from the proposed WTE facility were modelled by AWN Consulting and are presented in the Air Chapter of this EIS. Emissions were modelled using the ISCST3 dispersion model which is the USEPA's regulatory model used to assess pollutant concentrations associated with industrial sources. Emissions were assessed assuming the unrealistically worst case scenario that the plant operated continuously under the maximum emission limits of EU Directive 2000/76/EC.

The annual deposition rate under maximum operating conditions for each of the 17 PCDD/F congeners is shown in Table 6.1 (which is considered to be an extremely conservative modelling assumption as it assumes the plant operates at maximum capacity throughout the year).

Congener	Total flux
	ng/m2/yr
2,3,7,8-TCDD	0.03791
1,2,3,7,8-PeCDD	0.18560
1,2,3,6,7,8-HxCDD	0.06570
1,2,3,4,7,8-HcCDD	0.13249
1,2,3,7,8,9-HxCDD	0.15956
1,2,3,4,6,7,8-HpCDD	0.11678
OCDD	0.01787
2,3,7,8-TCDF	0.13198
1,2,3,7,8-PeCDF	0.01621
2,3,4,7,8-PeCDF	0.44050
1,2,3,4,7,8-HxCDF	0.26981
1,2,3,6,7,8 HxCDF	0.08940
2,3,4,6,7,8-HpCDF	0.01807
1,2,3,7,8,9-HxCDF	0.30027
1,2,3,4,6,7,8-HpCDF	0.04953
1,2,3,4,7,8,9-HpCDF	0.01513
OCDF	0.00668

Table 6.1 Predicted annual average PCDD/F flux at WTE facility (facility assumed to be operating continuously at maximum operating conditions)

	max gaseous conc fg/m3	max particle conc fg/m3	predicted air conc. fg/m3	predicted air conc ug/m3	Baseline air conc ug/m3	Baseline + predicted ug/m3
2,3,7,8-TCDD	0.012443503	0.040598457	0.053042	5.3042E-11	1.69E-09	1.74E-09
1,2,3,7,8-PeCDD	0.007959351	0.198759133	0.2067185	2.06718E-10	6.77E-09	6.98E-09
1,2,3,4,7,8-HxCDD	0.000559896	0.070358963	0.0709189	7.09189E-11	3.16E-08	3.17E-08
1,2,3,6,7,8-HxCDD	0.001129111	0.141889053	0.1430182	1.43018E-10	6.21E-09	6.35E-09
1,2,3,7,8,9-HxCDD	0.001359754	0.17087274	0.1722325	1.72232E-10	2.88E-08	2.90E-08
1,2,3,4,6,7,8-HpCDD	0.000247314	0.125066278	0.1253136	1.25314E-10	2.43E-07	2.43E-07
OCDD	9.44515E-06	0.019134298	0.0191437	1.91437E-11	3.95E-07	3.95E-07
2,3,7,8-TCDF	0.046488626	0.141337902	0.1878265	1.87827E-10	2.48E-08	2.50E-08
1,2,3,7,8-PeCDF	0.001550524	0.017360423	0.0189109	1.89109E-11	2.54E-08	2.54E-08
2,3,4,7,8-PeCDF	0.023984302	0.471739462	0.4957238	4.95724E-10	2.14E-07	2.14E-07
1,2,3,4,7,8-HxCDF	0.005226144	0.288942251	0.2941684	2.94168E-10	8.46E-08	8.49E-08
1,2,3,6,7,8-HxCDF	0.001731694	0.095741639	0.0974733	9.74733E-11	7.33E-08	7.34E-08
1,2,3,7,8,9-HxCDF	0.000212345	0.019347999	0.0195603	1.95603E-11	1.02E-07	1.02E-07
2,3,4,6,7,8-HxCDF	0.003529159	0.321562611	0.3250918	3.25092E-10	3.27E-08	3.30E-08
1,2,3,4,6,7,8-HpCDF	0.000262997	0.053038865	0.0533019	5.33019E-11	4.34E-07	4.34E-07
1,2,3,4,7,8,9-HpCDF	4.16822E-05	0.016204575	0.0162463	1.62463E-11	5.36E-08	5.36E-08
OCDF	3.53101E-06	0.007153231	0.0071568	7.15676E-12	2.43E-07	2.43E-07

Table 6.2 Predicted airborne concentrations of PCDD/F (including background) – annual average under maximum operating conditions

The deposition flux data from Table 6.1 was used to predict the average soil concentration over the exposure duration period, by applying the model used by the US EPA for Assessment of Hazardous Waste Facilities [1].

The model enables increases in soil concentrations due to aerial deposition of PCDD/F to be calculated, over a set time period and includes for natural processes such as volatilisation and sediment removal by surface water run-off, which reduce PCDD/F concentrations in soil.

The model equation to predict the increase in soil concentration of PCDD/F, resulting from aerial deposition is:

$$Sc_1 = \frac{Ds}{ks \cdot (Tc - T_1)} \left[\left(Tc + \frac{\exp(-ks \cdot Tc)}{ks} \right) - \left(T_1 + \frac{\exp(-ks \cdot T_1)}{ks} \right) \right] for\ 0 < T_1 < Tc$$

Equation terms are defined in Attachment E.

Ks, the soil loss constant due to all processes, is calculated using the following equation;

$$ks = ksl + kse + ksr + ksg + ksv$$

Equation terms and the equations used to calculate each of the "Ks terms", are defined in Attachment F and definitions of terms used in equations to calculate Ks are given in Attachment G.

Ds, the PCDD/F deposition term, expressed in terms of mg/kg/yr, is calculated as per Attachment H.

A radius of 50m was used to calculate the Ds values used in the modelling study. This assumes that the deposition occurs over a 100m diameter area, inside which the MARI spends all their time.

Tc, the time period over which the emissions occur, has been set at 30 years, as it has been assumed that the facility will have a 30 year operational lifetime.

The calculation of predicted soil concentration over the exposure period is presented as Attachment I.

7.0 MODELLING OF IMPACT OF WTE EMISSIONS ON PCDD/F INTAKE

The predicted ambient air concentrations and predicted soil concentrations were used to model the impact of WTE Emissions on PCDD/F intake for the MARI.

7.1 Normal Operation of WTE facility

The predicted increase in soil and air concentrations is given in Table 7.1.

	Background	Sc	Sc	Background + Sc	Background + Sc	Predicted Air conc
	ng/kg	mg/kg	ng/kg	ng/kg	mg/kg	ug/m3
2,3,7,8-TCDD	0.690	5.44879E-09	5.45E-03	0.695	6.95E-07	1.74E-09
1,2,3,7,8-PeCDD	0.980	1.30663E-07	1.31E-01	1.111	1.11E-06	6.98E-09
1,2,3,6,7,8-HxCDD	4.200	1.87636E-07	1.88E-01	4.388	4.39E-06	6.35E-09
1,2,3,4,7,8-HcCDD	1.100	8.00299E-08	8.00E-02	1.180	1.18E-06	3.17E-08
1,2,3,7,8,9-HxCDD	2.400	1.12286E-07	1.12E-01	2.512	2.51E-06	2.90E-08
1,2,3,4,6,7,8-HpCDD	88.000	1.66158E-07	1.66E-01	88.166	8.82E-05	2.43E-07
OCDD	930.000	2.5405E-08	2.54E-02	930.025	9.30E-04	3.95E-07
2,3,7,8-TCDF	7.500	2.69666E-08	2.70E-02	7.527	7.53E-06	2.50E-08
1,2,3,7,8-PeCDF	5.000	7.86238E-09	7.86E-03	5.008	5.01E-06	2.54E-08
2,3,4,7,8-PeCDF	5.400	2.65648E-07	2.66E-01	5.666	5.67E-06	2.14E-07
1,2,3,4,7,8-HxCDF	8.700	1.70817E-07	1.71E-01	8.871	8.87E-06	8.49E-08
1,2,3,6,7,8 HxCDF	4.500	8.57827E-08	8.58E-02	4.586	4.59E-06	7.34E-08
2,3,4,6,7,8-HpCDF	3.200	2.31892E-07	2.32E-01	3.432	3.43E-06	3.30E-08
1,2,3,7,8,9-HxCDF	1.700	1.39526E-08	1.40E-02	1.714	1.71E-06	1.02E-07
1,2,3,4,6,7,8-HpCDF	58.000	3.35853E-08	3.36E-02	58.034	5.80E-05	4.34E-07
1,2,3,4,7,8,9-HpCDF	3.900	1.02634E-08	1.03E-02	3.910	3.91E-06	5.36E-08
OCDF	87.000	9.46815E-09	9.47E-03	87.009	8.70E-05	2.43E-07

Table 7.1 Predicted increase in soil concentrations over the lifetime of the facility and predicted increase in ambient air concentrations (facility assumed to be operating at maximum licensed emission rates over 30 year period)

The intake modelling methodology was as for the baseline intake modelling.

The Model output, for each of the 17 PCDD/F congeners and for mercury for each intake pathway is presented as Attachment J. The modelled PCDD/F WHO TEQ intake value for the impact of WTE Emissions on PCDD/F intake for the MARI and the TARI, in pg/kg body weight/day, are presented in Tables 7.2 and 7.3.

PCDD Congeners	mg/kg/d	WHO	mg/kg/d	pg/kg/d
	PCDD/F	**TEQ**	**WHO TEQ**	**WHO TEQ**
2,3,7,8-TCDD	1.68E-10	1	1.68E-10	1.68E-01
1,2,3,7,8-PeCDD	8.15E-10	1	8.15E-10	8.15E-01
1,2,3,4,7,8-HxCDD	3.51E-10	0.1	3.51E-11	3.51E-02
1,2,3,6,7,8-HxCDD	1.27E-09	0.1	1.27E-10	1.27E-01
1,2,3,7,8,9-HxCDD	7.33E-10	0.1	7.33E-11	7.33E-02
1,2,3,4,6,7,8-HpCDD	7.54E-09	0.01	7.54E-11	7.54E-02
OCDD	1.08E-07	0.0001	1.08E-11	1.08E-02
PCDF Congeners				0.00E+00
2,3,7,8-TCDF	7.75E-11	0.1	7.75E-12	7.75E-03
1,2,3,7,8-PeCDF	9.80E-11	0.05	4.90E-12	4.90E-03
2,3,4,7,8-PeCDF	1.75E-10	0.5	8.75E-11	8.75E-02
1,2,3,4,7,8-HxCDF	3.67E-10	0.1	3.67E-11	3.67E-02
1,2,3,6,7,8-HxCDF	2.01E-10	0.1	2.01E-11	2.01E-02
1,2,3,7,8,9-HxCDF	1.01E-10	0.1	1.01E-11	1.01E-02
2,3,4,6,7,8-HxCDF	9.98E-11	0.1	9.98E-12	9.98E-03
1,2,3,4,6,7,8-HpCDF	1.64E-09	0.01	1.64E-11	1.64E-02
1,2,3,4,7,8,9-HpCDF	2.00E-11	0.01	2.00E-13	2.00E-04
OCDF	1.81E-08	0.0001	1.81E-12	1.81E-03
			1.50E-09	**1.50004**

Table 7.2 Modelled WTE + baseline PCDD/F intake for MARI

PCDD Congeners	mg/kg/d	WHO	mg/kg/d	pg/kg/d
	PCDD/F	**TEQ**	**WHO TEQ**	**WHO TEQ**
2,3,7,8-TCDD	2.68E-12	1	2.68E-12	2.68E-03
1,2,3,7,8-PeCDD	5.71E-12	1	5.71E-12	5.71E-03
1,2,3,4,7,8-HxCDD	1.45E-11	0.1	1.45E-12	1.45E-03
1,2,3,6,7,8-HxCDD	1.53E-11	0.1	1.53E-12	1.53E-03
1,2,3,7,8,9-HxCDD	1.76E-11	0.1	1.76E-12	1.76E-03
1,2,3,4,6,7,8-HpCDD	3.48E-10	0.01	3.48E-12	3.48E-03
OCDD	2.92E-09	0.0001	2.92E-13	2.92E-04
PCDF Congeners				0.00E+00
2,3,7,8-TCDF	3.12E-11	0.1	3.12E-12	3.12E-03
1,2,3,7,8-PeCDF	2.38E-11	0.05	1.19E-12	1.19E-03
2,3,4,7,8-PeCDF	9.13E-11	0.5	4.57E-11	4.57E-02
1,2,3,4,7,8-HxCDF	5.60E-11	0.1	5.60E-12	5.60E-03
1,2,3,6,7,8-HxCDF	3.92E-11	0.1	3.92E-12	3.92E-03
1,2,3,7,8,9-HxCDF	4.06E-11	0.1	4.06E-12	4.06E-03
2,3,4,6,7,8-HxCDF	2.17E-11	0.1	2.17E-12	2.17E-03
1,2,3,4,6,7,8-HpCDF	3.24E-10	0.01	3.24E-12	3.24E-03
1,2,3,4,7,8,9-HpCDF	1.86E-11	0.01	1.86E-13	1.86E-04
OCDF	3.45E-10	0.0001	3.45E-14	3.45E-05
			8.61E-11	**0.08607**

Table 7.3 Modelled WTE + baseline PCDD/F intake for TARI

The increase in PCDD/F dose associated with the WTE facility, for both the MARI and TARI, is shown in Table 7.4.

	Baseline	Inc. Dose	Predicted Dose	% increase	Predicted Dose
	pg/kg/d	pg/kg/d	pg/kg/d		pg/kg/wk
MARI	1.4066	0.0938	1.5004	6.67	10.5028
TARI	0.0849	0.00117	0.08607	1.38	0.60249

Table 7.4 Increase in PCDD/F dose associated with WTE facility

The baseline PCDD/F dose, from food sourced outside area of the WTE facility and within area, is shown in Table 7.5 to allow for comparison with the predicted PCDD/F dose when the WTE facility is operational, which is shown in Table 7.6

	A	B	C	D	E	F
	pg/kg/d	pg/kg/d	%	%	pg/kg/d	pg/kg/wk
MARI	0.26	1.4066	16	84	1.67	11.7
TARI	0.35	0.0849	80	20	0.4314	3.0196

Table 7.5 Baseline PCDD/F dose from within and outside site

	A	B	C	D	E	F
	pg/kg/d	pg/kg/d	%	%	pg/kg/d	pg/kg/wk
MARI	0.26	1.5004	15	85	1.76	12.3
TARI	0.35	0.08607	80	20	0.4325	3.0278

Table 7.6 Predicted PCDD/F dose when WTE plant operational

Where:

A = Food sourced outside area pg/kg bw/day

B = PCDD/F intake from area pg/kg bw/day

C = % PCDD/F from food from outside area pg/kg bw/day

D = % PCDD/F contribution from area pg/kg bw/day

E= Combined Dose pg/kg bw/day

F= Combined Dose pg/kg bw/day

It can be seen that the increase in PCDD/F dose, for both the MARI and TARI, is very low, and both MARI and TARI PCDD/F intake is still well below the recommended value of 14 pg/kg bw/week.

7.2 Modelling of Accident Scenario at WTE facility

It was also considered prudent to model the impact of a credible accident scenario, on PCDD/F intake, this was accomplished as follows.

It was assumed that the facility operated at 10 ng/m^3 PCDD/F I-TEQ for 48 hours and the impact of this event was assessed, in terms of PCDD/F intake, in pg/kg bw/day.

The results of this exercise are presented in Tables 7.7 and 7.8.

PCDD Congeners	mg/kg/d	WHO	mg/kg/d	pg/kg/d
	PCDD/F	TEQ	WHO TEQ	WHO TEQ
2,3,7,8-TCDD	1.68E-10	1	1.68E-10	1.68E-01
1,2,3,7,8-PeCDD	8.59E-10	1	8.59E-10	8.59E-01
1,2,3,4,7,8-HxCDD	3.60E-10	0.1	3.60E-11	3.60E-02
1,2,3,6,7,8-HxCDD	1.29E-09	0.1	1.29E-10	1.29E-01
1,2,3,7,8,9-HxCDD	7.48E-10	0.1	7.48E-11	7.48E-02
1,2,3,4,6,7,8-HpCDD	7.54E-09	0.01	7.54E-11	7.54E-02
OCDD	1.08E-07	0.0001	1.08E-11	1.08E-02
PCDF Congeners				0.00E+00
2,3,7,8-TCDF	7.76E-11	0.1	7.76E-12	7.76E-03
1,2,3,7,8-PeCDF	9.81E-11	0.05	4.91E-12	4.91E-03
2,3,4,7,8-PeCDF	1.77E-10	0.5	8.85E-11	8.85E-02
1,2,3,4,7,8-HxCDF	3.70E-10	0.1	3.70E-11	3.70E-02
1,2,3,6,7,8-HxCDF	2.02E-10	0.1	2.02E-11	2.02E-02
1,2,3,7,8,9-HxCDF	1.01E-10	0.1	1.01E-11	1.01E-02
2,3,4,6,7,8-HxCDF	1.02E-10	0.1	1.02E-11	1.02E-02
1,2,3,4,6,7,8-HpCDF	1.64E-09	0.01	1.64E-11	1.64E-02
1,2,3,4,7,8,9-HpCDF	2.00E-11	0.01	2.00E-13	2.00E-04
OCDF	1.81E-08	0.0001	1.81E-12	1.81E-03
			1.55E-09	**1.55008**

Table 7.7 Modelled WTE Accident + baseline PCDD/F intake for MARI

PCDD Congeners	mg/kg/d	WHO	mg/kg/d	pg/kg/d
	PCDD/F	TEQ	WHO TEQ	WHO TEQ
2,3,7,8-TCDD	2.72E-12	1	2.72E-12	2.72E-03
1,2,3,7,8-PeCDD	5.93E-12	1	5.93E-12	5.93E-03
1,2,3,4,7,8-HxCDD	1.46E-11	0.1	1.46E-12	1.46E-03
1,2,3,6,7,8-HxCDD	1.56E-11	0.1	1.56E-12	1.56E-03
1,2,3,7,8,9-HxCDD	1.78E-11	0.1	1.78E-12	1.78E-03
1,2,3,4,6,7,8-HpCDD	3.48E-10	0.01	3.48E-12	3.48E-03
OCDD	2.92E-09	0.0001	2.92E-13	2.92E-04
PCDF Congeners				0.00E+00
2,3,7,8-TCDF	3.13E-11	0.1	3.13E-12	3.13E-03
1,2,3,7,8-PeCDF	2.38E-11	0.05	1.19E-12	1.19E-03
2,3,4,7,8-PeCDF	9.20E-11	0.5	4.60E-11	4.60E-02
1,2,3,4,7,8-HxCDF	5.63E-11	0.1	5.63E-12	5.63E-03
1,2,3,6,7,8-HxCDF	3.93E-11	0.1	3.93E-12	3.93E-03
1,2,3,7,8,9-HxCDF	4.06E-11	0.1	4.06E-12	4.06E-03
2,3,4,6,7,8-HxCDF	2.21E-11	0.1	2.21E-12	2.21E-03
1,2,3,4,6,7,8-HpCDF	3.24E-10	0.01	3.24E-12	3.24E-03
1,2,3,4,7,8,9-HpCDF	1.87E-11	0.01	1.87E-13	1.87E-04
OCDF	3.45E-10	0.0001	3.45E-14	3.45E-05
			8.68E-11	**0.08683**

Table 7.8 Modelled WTE Accident + baseline PCDD/F intake for TARI

A comparison with the predicted PCDD/F intake under normal operating conditions and the % increase in PCDD/F dose resulting from an accident are shown in Table 7.9.

	Normal Operation	Increase	Accident Scenario	% increase
	Predicted Dose	in Dose	Predicted Dose	
	pg/kg/d	pg/kg/d	pg/kg/d	
MARI	1.5004	0.04968	1.55008	3.31
TARI	0.08607	0.00076	0.08683	0.88

Table 7.9 Comparison with predicted PCDD/F intake and percentage increase

It can be seen from Table 7.9 that the accident scenario described above is predicted to lead to an increase in PCDD/F dose for the MARI of 3.3% and of 0.88% for the TARI.

Again, these dose levels are insignificant when compared with EU weekly intake guideline values.

8.0 CONCLUSIONS

It was concluded that the predicted impact of the emissions from the proposed WTE facility, for both maximum operating conditions and an accident scenario, on the MARI and the TARI is not significant.

The predicted PCDD/F intake for the MARI and the TARI was modelled to be well below the EC TWI of 14 pg/kg body weight/wk.

9.0 REFERENCES

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3. Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals, Volume II, Polynuclear Aromatic Hydrocarbons, Polychlorinated Dioxins and Dibenzofurans, Mackay, D., Ying Shiu, W. and Chimg Ma, K., Lewis Publishers, Ann Arbor, Tokyo and London, 1995.

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TECHNICAL REPORT

UPDATE OF SOIL PCB MONITORING PROGRAM FOR PROPOSED POOLBEG WASTE TO ENERGY FACILITY

FOR

Elsam Dublin Waste to Energy Ltd

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Our reference: BT/06/3118SR01
Date: 20 June 2006

EXECUTIVE SUMMARY

1.0 INTRODUCTION

AWN Consulting Ltd was instructed by Elsam Dublin Waste to Energy Ltd. to undertake the additional soil sampling at Sean Moore Park and Clontarf Promenade. This was as a result of recommendations in a report dated 2003 which indicated baseline PCDD/F-like PCBs were somewhat elevated at sampling locations in Sean Moore Park and Clontarf Promenade, when compared with other locations around Dublin Bay.

2.0 SAMPLING SITES

The sampling programme was conducted during the months of March and April, 2006 by AWN Consulting Ltd. The sampling programme was designed to establish the exact location of the elevated PCDD/F-like PCB concentrations at both sampling locations. 5 separate areas at each location were sampled.

3.0 SAMPLING METHODOLOGY

The original sampling areas at both Clontarf Promenade and Sean Moore Park were divided into 4 separate rectangular areas to isolate the exact location of the elevated PCDD/F-like PCB concentrations. An additional sample was taken at each location in an area that was not sampled previously in order to determine the background concentration at an alternative part of the same sampling location.

Samples were thoroughly mixed in a clean plastic basin and then a 1 kg aliquot extracted from the mixed sample. The 1 kg sample was placed in an amber glass jar (supplied by Scientific Analysis Laboratories Ltd. in the U.K. an analytical laboratory used by AWN Consulting Ltd.).

5.0 RESULTS

At Clontarf Promenade locations 2-5 recorded a value of 0.02 µg/kg or less for the 8 mono-ortho PCBs and <0.01 µg/kg for the 4 non-ortho PCBs, whereas the sample taken at Location 1 had higher PCB concentrations of 0.46 µg/kg (8 mono –ortho), <0.01 µg/kg (4 non-ortho). It can be concluded that Location 1 has the highest concentrations of PCBs for the sampling area. This indicates that the high concentration measured during the previous event is confined to location 1.

At Sean Moore Park there was a varied concentration of PCDD/F-like PCBs at each location. Values for the 8 mono-ortho PCBs ranged from a low of 0.71 μg/kg at location 5 to a high of 2.45 μg/kg at location 3. For the 4 non-ortho PCBs, concentrations varied from a low of 0.01 μg/kg at location 1 to a high of 0.04 μg/kg at location 3. It can be concluded that Location 3 has the highest concentrations of PCBs for the sampling area.

In comparison with the results from the sampling events undertaken in 2003, results were significantly lower. This is most evident for Pentachloro, BZ#118, where a concentration of 4.4μg/kg was recorded at Clontarf Promenade in 2003 but a maximum of only 0.03μg/kg was recorded during the current monitoring programme. At Sean Moore Park the concentration of Pentachloro, BZ#118 was 0.51μg/kg in 2003 whereas the maximum concentration in 2006 was 1.3 μg/kg at location 3.

Pentachloro, BZ#126 is the most important of the 12 PCDD/F-like PCBs because it has a high WHO-TEF value of 0.1. It is one of the major congeners contributing to the total WHO toxicity equivalent. Results of the sampling programme show that Pentachloro, BZ#126 levels were below the limit of detection (0.01μg/kg) for all locations in Clontarf and locations 1, 4 and 5 in Sean Moore Park. Locations 2 and 3 in Sean Moore Park had Pentachloro, BZ#126 levels of 0.01μg/kg.

6.0 DISSUSSION OF RECENT STUDIES

There are a number of sources of these PCBs in the environment. Combustion sources are believed to be the main source of PCB 126, 169 and 189. Soils and sediments which have been contaminated in the past may release low concentrations back into the atmosphere over extended periods of time, therefore areas where industrial activities have taken place in the past, are likely to contain concentrations of PCDD/F-like PCBs.

Studies in Belgium showed the presence of PCDD/F-like PCB concentrations in scrap yards, metal yards and shredder plants. This led to the investigation of the contribution of PCDD/F and PCDD/F-like PCBs to diffuse emission sources, showing the importance of such sources at particular plants, mainly in the non-ferrous metal and scrap metal industries. Results from a recent soil sampling programme in Germany indicated that there were higher levels of PCCD/F-like PCB concentrations in the upper soil layer (0-10cm) than in deeper layers (0-30cm), indicating that the major source is atmospheric deposition.

Very little research has been done in Ireland in relation to the levels of PCDD/F-like PCBs in the Irish Environment. Studies by the Irish EPA and the Food Safety Authority of Ireland have investigated levels of dioxins, furans, PCBs and PBDEs in Irish Food and have found these levels to be low; however there is no direct reference to the levels of PCDD/F-like dioxins in Irish soils. No Irish guidance is currently available for PCB contamination in soils.

7.0 CONCLUSIONS

Further sampling was undertaken at Sean Moore Park and Clontarf Promenade to determine if a source of PCB contamination is present on the surface, or if the measured value is representative of the maximum concentrations present. Results have shown that there are low levels of PCDD/F-like PCBs at both sites however the levels are elevated in some locations at each site more than others. Sean Moore Park location 3 has elevated levels in comparison to the others. In Clontarf Promenade all locations show the majority of PCDD/F-like PCB levels below the limit of detection, location 1 at Clontarf Promenade has slightly elevated levels in comparison to the others.

Definitions:

PCDD: Polychlorinated dibenzo-*p*-dioxins
PCDF: Polychlorinated dibenxo-*p*-furans
PCB: Polychlorinated Biphenols
PBDE: Polybrominated Diphenylethers

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Appendix 1: *Sampling Locations*
Appendix 2: *Field Notes*
Appendix 3: *Laboratory Analysis Report*

1.0 INTRODUCTION

Monitoring undertaken by AWN Consulting in 2003 indicated that baseline PCDD/F-like PCBs were somewhat elevated at sampling locations in Sean Moore Park and Clontarf Promenade, when compared with other locations around Dublin Bay.

The report recommended the following:

"It would be prudent to carry out additional soil sampling at Sean Moore Park to determine if a source of PCB contamination is present on the surface, or if the measured value is representative of the maximum concentrations present. Similarly, the PCB concentration recorded at Clontarf was also elevated when compared with the other samples measured and it would be prudent to conduct further sampling at this location also".

AWN Consulting Ltd was instructed by Elsam Dublin Waste to Energy Ltd. to undertake the additional sampling; this incorporated the following scope of work:

- Surface soil sampling,
- Laboratory analyses for PCDD/F-like PCBs
- Reporting including an interpretation and significance assessment,

2.0 LOCATION OF SAMPLING SITES

The details of the soil sampling locations are described in Table 2.1. The sampling programme was conducted during the months of March and April, 2006 by AWN Consulting Ltd.

Table 2.1 – Soil Sampling Locations

Location No.	***Sampling Point Location***	***Position (Grid Ref.)***	***Sample Date***
A	Sean Moore Park	53^0 20.169' N 006^0 12.923' W	3rd April 2006
B	Clontarf (grassed area along the sea front)	53^0 21.476' N 006^0 11.605' W	30th March 2006

The sampling programme was designed to establish the exact location of the elevated PCDD/F-like PCB concentrations at both sampling locations. 5 separate areas at each location were sampled.

3.0 SAMPLING METHODOLOGY

The aim of the sampling programme at each site was to establish baseline topsoil PCDD/F-like PCB concentrations for each particular sampling location and to try to isolate the previously measured elevated concentrations.

US EPA guidance, as presented in the US EPA EISOPQAM, was followed in the selection and design of the sampling methodology[1]. The EISOPQAM Areal Composite Methodology was selected as the method most applicable for determining background soil concentrations for an area[2]. This method ensures the sample collected is representative of an area. Briefly, the methodology consists of taking a number of samples in an identical manner and of an identical size and then combining these samples to form a composite sample, which is then thoroughly mixed. A sample of this composite material is then sent for analysis.

The original sampling areas at both Clontarf Promenade and Sean Moore Park were divided into 4 separate rectangular areas to isolate the exact location of the elevated PCDD/F-like PCB concentrations. An additional sample was taken at each location in an area that was not sampled previously in order to determine the background concentration at an alternative part of the same sampling location.

3.1 Sampling Depth

The investigation was designed to measure background contaminant concentrations in surface soils, which has been defined by EISOPQAM as soils between the ground surface and up to 6 - 12 inches (15 – 30 cm) below the ground surface [3]. Other authors, such as Hendriks *et al* [4] have taken samples of cores, which are 0 – 5 cm thick, whereas the team that has been working for many years on assessing the impact of the Seveso accident near Milan, Italy, has used samples of 7 cm thickness[5].

As the aim of this study was to assess the impact of surface deposition of contaminants, it was felt that the depth used by the Seveso study team (who were studying airborne deposition and were among the first teams to actively study the impact of dioxin deposition on soil concentrations) was the most appropriate. Therefore, soil samples of 7 cm thickness (from the surface to 7 cm below the surface) were taken.

3.2 Sampling Pattern

The sampling on each site was carried out in a "W" Pattern or a series of "W" patterns (where the site area was confined). Following the EPA EISOPQAM sampling methodology, samples were taken at 10 m centres.

The field records for each sampling site can be seen in Appendix 3. The layout of the sampling grid at each sampling location can be seen from the plates in Appendix 4.

3.3 Sample acquisition and Handling

The field records note that between 15 - 20 soil samples were taken at 10 m intervals, using a 2 cm diameter corer extended to a depth of 7 cm, at the sampling sites, with the sample number and sampling interval being determined by the area available for sampling.

Samples were thoroughly mixed in a clean plastic basin and then a 1 kg aliquot extracted from the mixed sample. The 1 kg sample was placed in an amber glass jar (supplied by Scientific Analysis Laboratories Ltd. in the U.K. an analytical laboratory used by AWN Consulting Ltd.). All soil samples were labelled samples A-F, and the analysis required for each sample was listed on a Sampling and Chain of Custody Record.

The samples were collected in one batch by Indn City Express, on 3rd April 2006, and couriered overnight to Scientific Analysis Laboratories Ltd. in the U.K., for analysis.

3.4 Analysis suite

Scientific Analysis Laboratories Ltd. (SAL) are a UKAS 1549 Group accredited laboratory and were instructed to undertake the analysis of PCDD/F-like PCBs (WHO 12) by AWN Consulting Ltd. SAL holds UKAS accreditation for these tests.

4.0 RESULTS OF LABORATORY ANALYSES

The analysis results for PCDD/F-like PCBs at Clontarf Promenade and Sean Moore Park are shown in Tables 4.1 and 4.2. See Appendix 2 for the sampling locations 1-5.

Table 4.1 PCDD/F-like PCBs – Clontarf Promenade

Determinand	Method	Units	Sampling Locations				
Ortho PCB's [1]			**1**	**2**	**3**	**4**	**5**
Pentachloro, BZ#105	GC/MS	µg/kg	0.11	0.02	<0.01	0.02	<0.01
Pentachloro, BZ#114	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachloro, BZ#118	GC/MS	µg/kg	0.21	0.03	0.02	0.03	0.02
Pentachloro, BZ#123	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloro, BZ#156	GC/MS	µg/kg	0.08	0.01	<0.01	<0.01	<0.01
Hexachloro, BZ#157	GC/MS	µg/kg	0.02	<0.01	<0.01	<0.01	<0.01
Hexachloro, BZ#167	GC/MS	µg/kg	0.04	0.02	<0.01	<0.01	<0.01
Hepachloro, BZ#189	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Non Ortho PCB's							
Tetrachloro, BZ#81	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrachloro, BZ#77	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachloro, BZ#126	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloro, BZ#169	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01

1. Limit of Detection is 0.01 µg/kg unless otherwise stated

Table 4.2 PCDD/F-like PCBs – Sean Moore Park

Determinand	Method	Units	Sampling Locations				
Ortho PCB's [1]			**1**	**2**	**3**	**4**	**5**
Pentachloro, BZ#105	GC/MS	µg/kg	0.25	0.26	0.72	0.11	0.2
Pentachloro, BZ#114	GC/MS	µg/kg	0.03	0.03	0.07	<0.01	0.02
Pentachloro, BZ#118	GC/MS	µg/kg	0.45	0.54	1.3	0.21	0.39
Pentachloro, BZ#123	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloro, BZ#156	GC/MS	µg/kg	0.08	0.09	0.15	0.04	0.06
Hexachloro, BZ#157	GC/MS	µg/kg	0.02	0.03	0.05	<0.01	0.02
Hexachloro, BZ#167	GC/MS	µg/kg	0.07	0.06	0.16	0.02	0.04
Hepachloro, BZ#189	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Non Ortho PCB's							
Tetrachloro, BZ#81	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrachloro, BZ#77	GC/MS	µg/kg	0.01	0.03	0.03	0.02	0.03
Pentachloro, BZ#126	GC/MS	µg/kg	<0.01	0.01	0.01	<0.01	0.01
Hexachloro, BZ#169	GC/MS	µg/kg	<0.01	<0.01	<0.01	<0.01	<0.01

1. Limit of Detection is 0.01 µg/kg unless otherwise stated

5.0 RESULTS

7.1 Analysis of measured PCDD/F-like PCBs.

7.1.1 Clontarf Promenade

It can be seen from Table 4.1 that Locations 2-5 recorded a value of 0.02 µg/kg or less for the 8 mono-ortho PCBs and <0.01 µg/kg for the 4 non-ortho PCBs, whereas the sample taken at Location 1 had higher PCB concentrations of 0.46 µg/kg (8 mono –ortho) and <0.01 µg/kg (4 non-ortho).

See Figure 5.1 for a graphical representation of the results. It can be concluded that Location 1 had the highest concentrations of PCBs for the sampling area. This indicates that the high concentration measured during the previous event is confined to location 1.

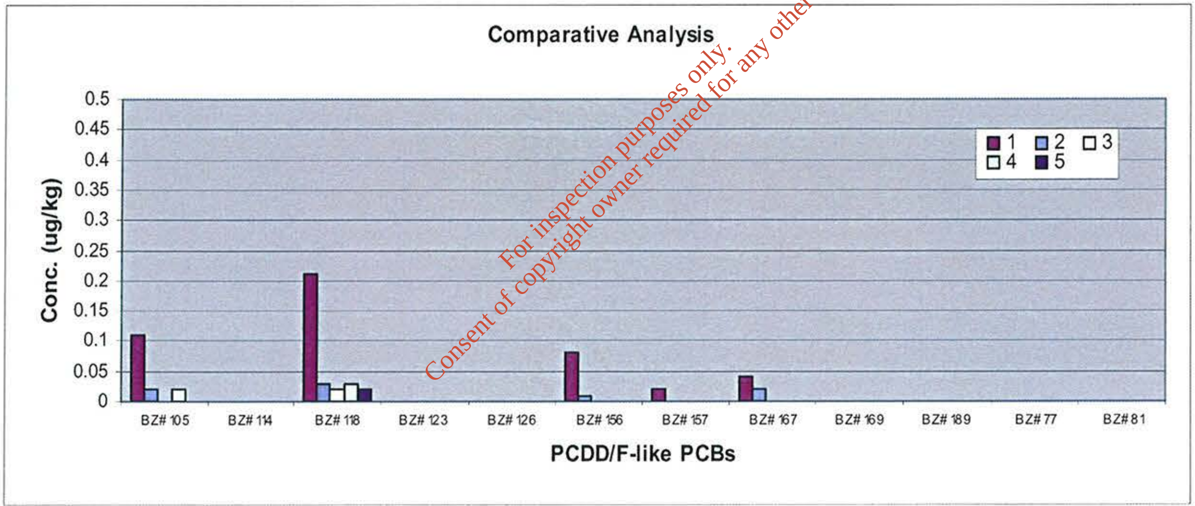

Figure 5.1 Comparative Analysis: PCDD/F-like PCBs – Clontarf Promenade

7.1.2 Sean Moore Park

It can be seen that from Table 4.2 that there was a varied concentration of PCDD/F-like PCBs at each location. Values for the 8 mono-ortho PCBs ranged from a low of 0.71 µg/kg at location 5 to a high of 2.45 µg/kg at location 3. For the 4 non-ortho PCBs, concentrations varied from a low of 0.01 µg/kg at location 1 to a high of 0.04 µg/kg at location 3. It can be concluded that Location 3 had the highest concentrations of PCBs for the sampling area. See Figure 5.1 for a graphical representation of the results.

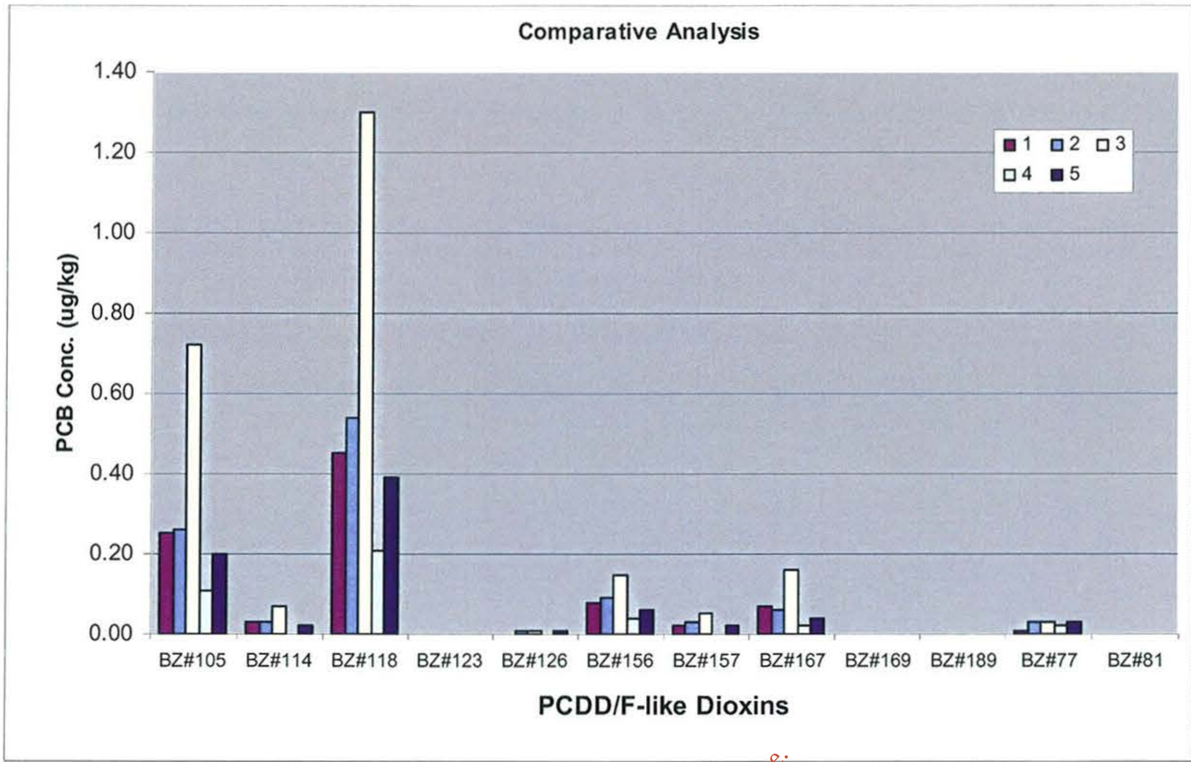

Figure 5.2 Comparative Analysis: PCDD/F-like PCBs – Sean Moore Park

7.2 Comparison of measured PCDD/F-like PCBs with data from previous sampling event

Table 5.2 shows the results of the PCDD/F-like PCB soil sampling that took place in November 2003 at Clontarf promenade and Sean Moore Park.

Table 5.1 PCDD/F-like PCBs – Clontarf Promenade & Sean Moore Park, November 2003

Determinand	Method	Units	Clontarf Promenade	Sean Moore Park
Ortho PCB's [1]				
Pentachloro, BZ#105	GC/MS	µg/kg	1.9	0.27
Pentachloro, BZ#114	GC/MS	µg/kg	0.09	<0.05
Pentachloro, BZ#118	GC/MS	µg/kg	4.4	0.51
Pentachloro, BZ#123	GC/MS	µg/kg	<0.05	<0.05
Hexachloro, BZ#156	GC/MS	µg/kg	0.62	0.08
Hexachloro, BZ#157	GC/MS	µg/kg	0.17	<0.05
Hexachloro, BZ#167	GC/MS	µg/kg	0.27	<0.05
Hepachloro, BZ#189	GC/MS	µg/kg	<0.05	<0.05
Non Ortho PCB's				
Tetrachloro, BZ#81	GC/MS	µg/kg	<0.05	<0.05
Tetrachloro, BZ#77	GC/MS	µg/kg	0.14	<0.05
Pentachloro, BZ#126	GC/MS	µg/kg	<0.05	<0.05
Hexachloro, BZ#169	GC/MS	µg/kg	<0.05	<0.05

It can be seen from Table 5.1 that the results were significantly higher that the results recorded in Table 4.1. This is most evident for Pentachloro, BZ#118, where a concentration of 4.4µg/kg was recorded at Clontarf Promenade in 2003 but only reached a maximum of

0.03µg/kg at the recent monitoring event. At Sean Moore Park the concentration of Pentachloro, BZ#118 was 0.51µg/kg in 2003 whereas the maximum concentration in 2006 was 1.3 µg/kg at location 3. The comparison between the 2003 levels and the 2006 levels can be seen in Figure 5.3.

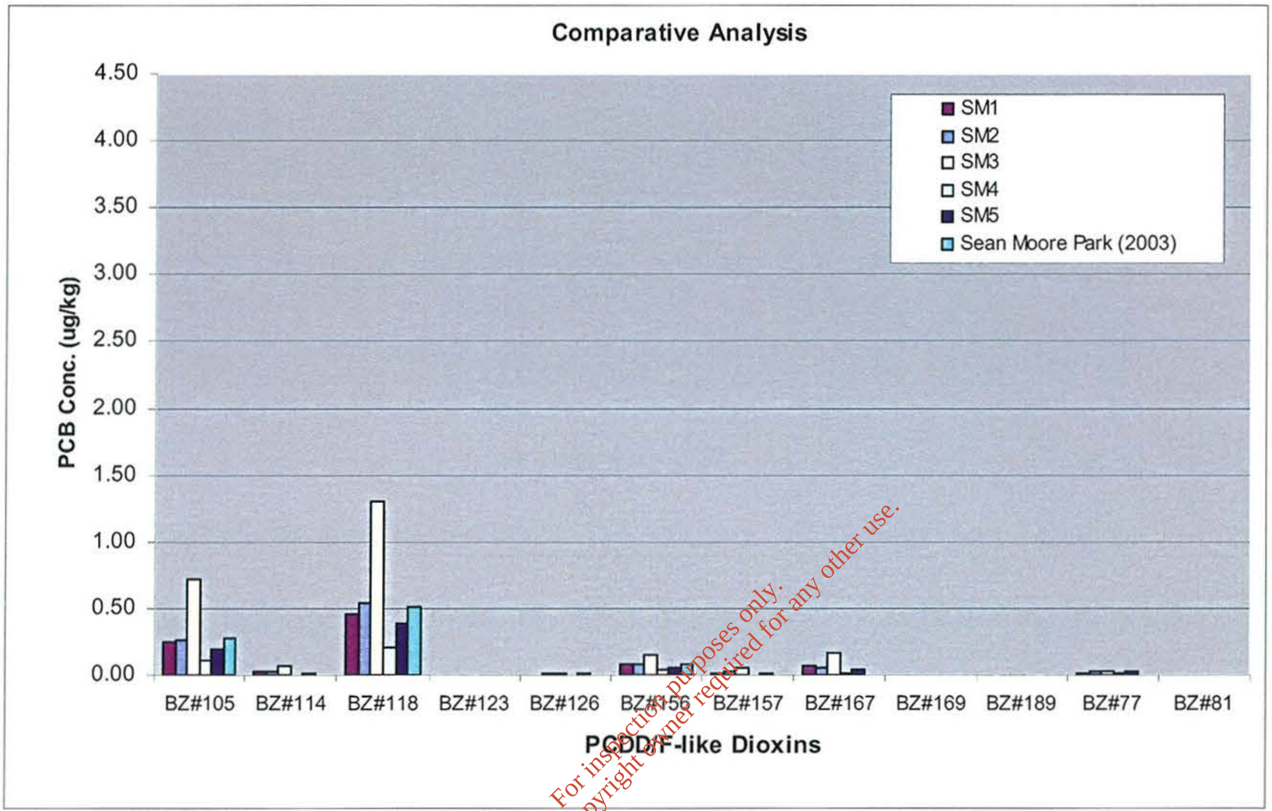

Figure 5.3 ***Comparative Analysis: PCDD/F-like PCBs – 2003 Monitoring Event & 2006 Monitoring Event(Sean Moore Park)***

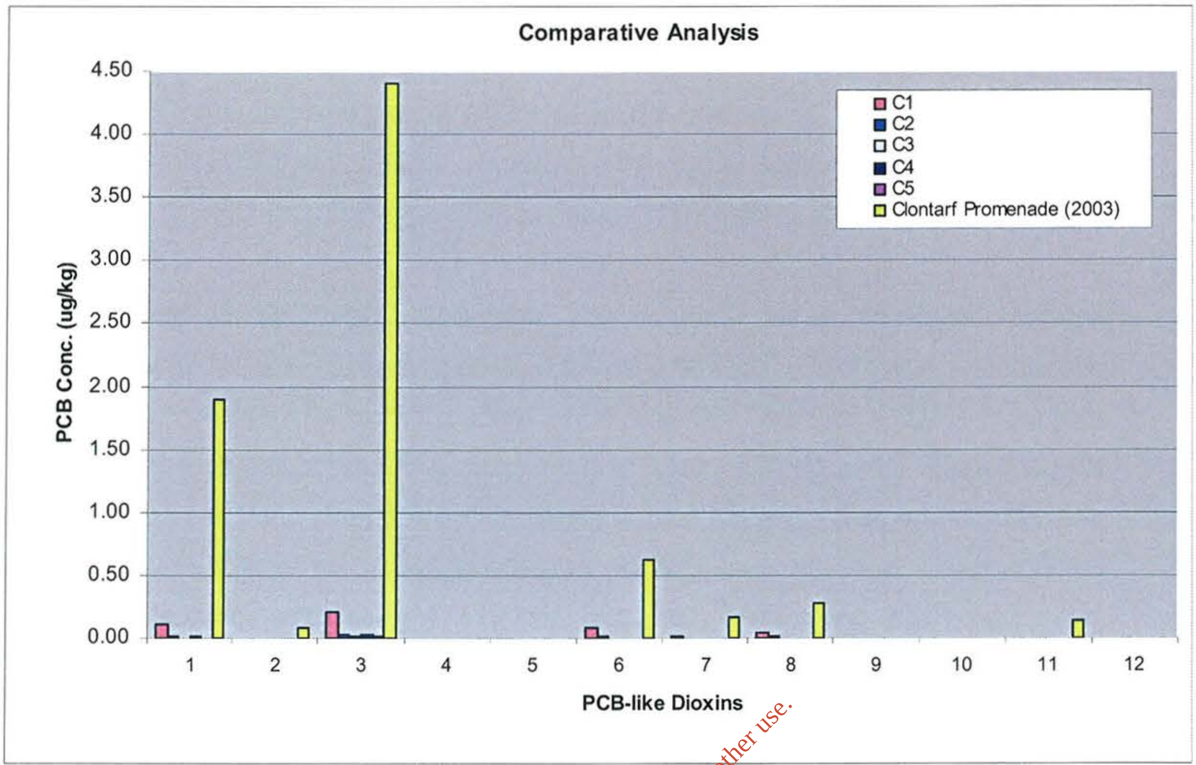

Figure 5.4 ***Comparative Analysis: PCDD/F-like PCBs – 2003 Monitoring Event & 2006 Monitoring Event (Clontarf Promenade)***

Pentachloro, BZ#126 is the most important of the 12 PCDD/F-like PCBs[13] because it has a high WHO-TEF (it has a value of 0.1). It is one of the major congeners contributing to the total WHO toxicity equivalent. Results of the sampling programme show that Pentachloro, BZ#126 levels are below the limit of detection (0.01µg/kg) for all locations in Sean Moore Park and locations 1, 4 and 5 in Sean Moore Park. Locations 2 and 3 have Pentachloro, BZ#126 levels of 0.01µg/kg.

6.0 DISSUSSION OF RECENT STUDIES

There are a number of sources of these PCBs in the environment. Combustion sources (this is combustion of non-PCB materials – that is it is the *de novo* synthesis of PCB) are believed to be the main source of PCB-126, 169 and 189[6,7].

Aroclor, the trade name under which Monsanto Corp. sold commercial PCB formulations (specifically formulations 1221, 1232 and 1242) is likely to be the major source of PCBs 156, 105, 118 and 77 in the environment[6]. Aroclor was used in industry as a heat transfer fluid and in hydraulic lubricants, flame retardants, plasticisers, and as a dielectric fluid in electronic components such as capacitors and transformers[8]. It will be seen that the majority of the PCBs recorded in the current study are in this group (156, 105, 118 and 77), whereas the combustion derived PCBs are generally not represented. Therefore, it can be concluded that the source of the mono-ortho and non-ortho PCBs measured was most likely to be Aroclor related sources.

Research work in the UK and USA has found that PCB-156, 126 and 118 accounts for 70 – 90% of the PCB TEQ burden in human breast milk[9]. This pattern is reflected in the PCB profile of the samples with PCB-156 and 118 being the dominant congeners recorded for the soil samples.

Soils and sediments which have been contaminated in the past may release low concentrations back into the atmosphere over extended periods of time[10], therefore areas where industrial activities have taken place in the past, are likely to contain concentrations of PCDD/F-like PCBs. A study conducted in 1994 measured urban mono-ortho and non-ortho PCB concentrations at a number of locations in the US and Japan and found that concentrations ranged from 0.8 – 9.9 ng/kg I-TEQ[11].

Studies in Belgium showed the presence of PCDD/F-like PCB concentrations in scrap yards, metal yards and shredder plants[12]. This led to the investigation of the contribution of PCDD/F and PCDD/F-like PCBs to diffuse emission sources, showing the importance of such sources at particular plants, mainly in the non-ferrous metal and scrap metal industries.

A monitoring programme was undertaken in 2003 in Germany[13] to assess the levels of PCDD/F-like dioxins in the environment, the results of the soils sampling programme correlated with the ambient air and deposition samples. Results from the soil sampling indicated that there were higher levels of PCCD/F-like PCB concentrations in the upper layer (0-10cm) than in deeper layers (0-30cm), this is a result of the atmospheric deposition.

Very little research has been done in Ireland in relation to the levels of PCDD/F-like PCBs in the Irish Environment. Studies by the EPA and Food Safety Authority of Ireland have investigated levels of dioxins, furans, PCBs and PBDEs in Irish Food[14]; and have found these levels to be low, however there is no direct reference to the levels of PCDD/F-like dioxins in Irish soils. No Irish guidance is currently available for PCB contamination.

8.0 CONCLUSION S

Further sampling was undertaken at Sean Moore Park and Clontarf Promenade to determine if a source of PCB contamination is present on the surface, or if the measured value is representative of the maximum concentrations present. Results have shown that there are low levels of PCDD/F-like PCBs at both sites however the levels are elevated in some locations at each site more than others. In Sean Moore Park location 3 has elevated levels in comparison to the others. In Clontarf Promenade all locations show the majority PCDD/F-like PCB levels below the limit of detection, location 1 has slightly elevated levels in comparison to the others.

REFERENCES

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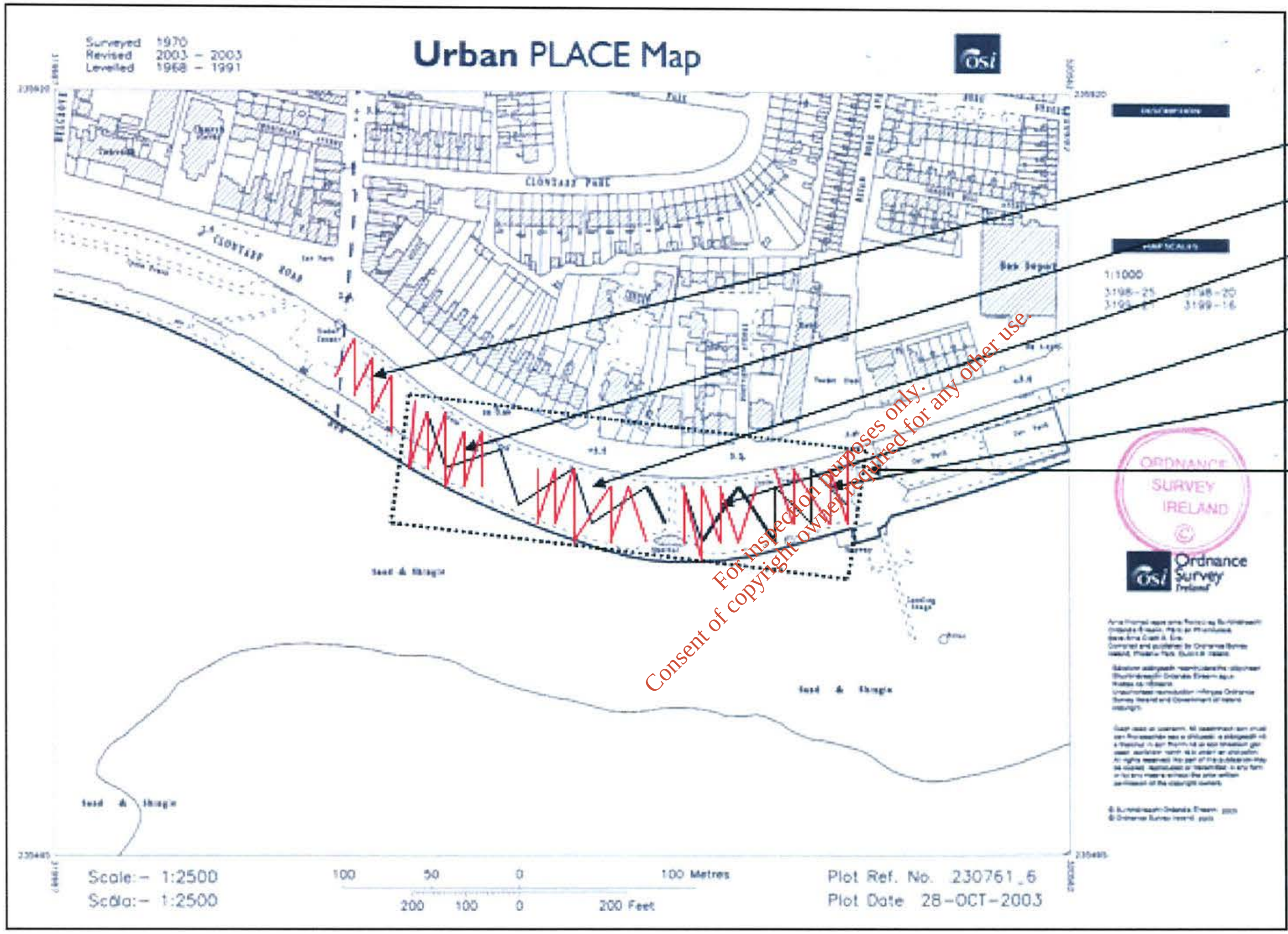
Appendix 1

Sampling Locations



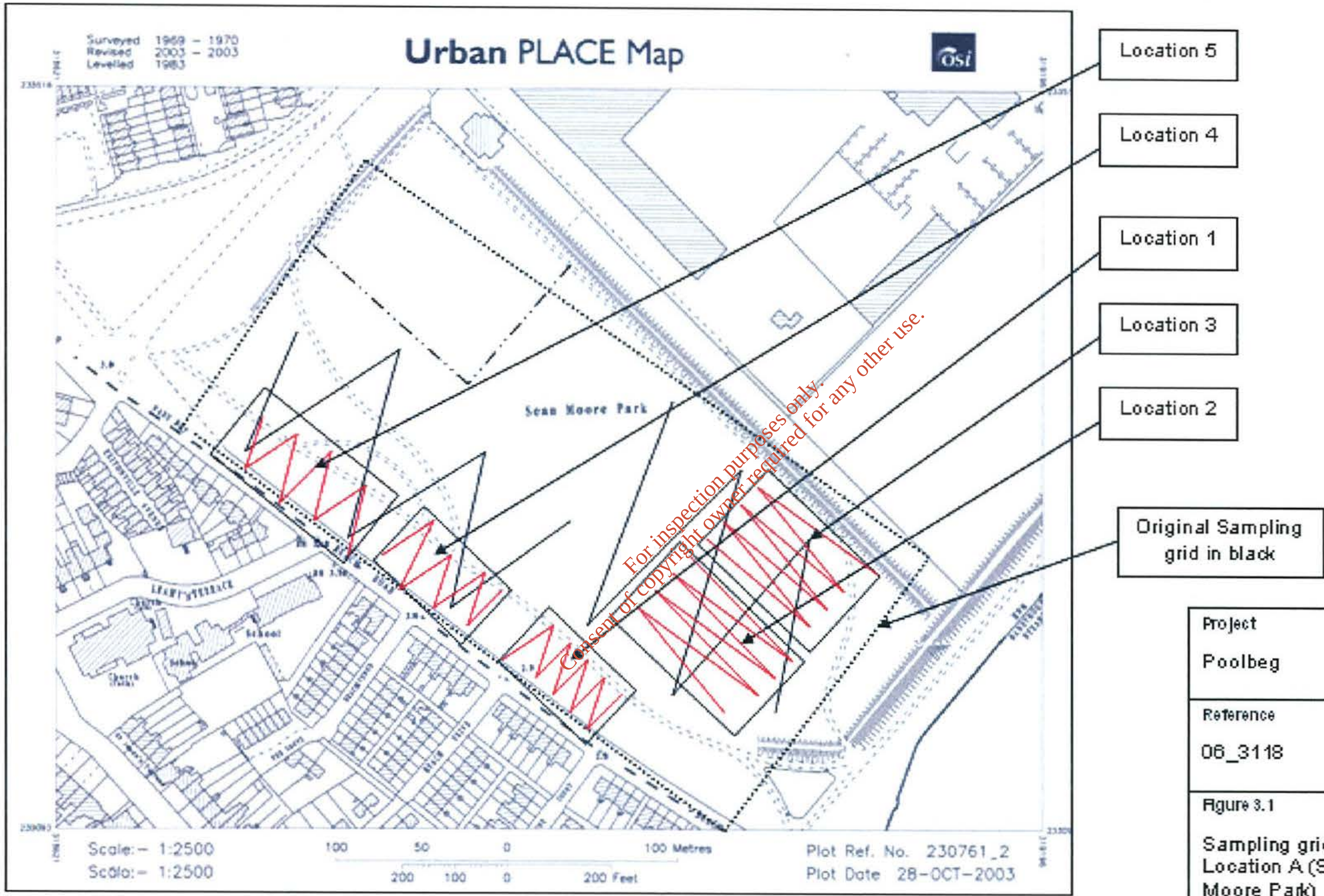
Project
Poolbeg

Reference
06_3118

Figure 3.5
Clontarf Promenade

Scale 1:2500

awn consulting
The Tecpro Building, Clonshaugh Industrial Estate, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257



Project

Poolbeg

Reference

06_3118

Figure 3.1

Sampling grid at Location A (Sean Moore Park)

Scale 1:2500

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Appendix 2

Field Notes

Clontarf Promenade

Location: 1

Sampling conducted by: Heidi Hopper (AWN Consulting)

Sampling area: 1428.16m^2

Transect length: 190m

19 samples taken @ 10m intervals

Project

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Reference

06_3118

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Clontarf Promenade

Location: 2

Sampling conducted by: Heidi Hopper (AWN Consulting)

Sampling area: 3840.51m²

Transect length: 350m

35 samples taken @ 10m intervals

Project

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Reference

06_3118

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Clontarf Promenade

Location: 3

Sampling conducted by: Heidi Hopper (AWN Consulting)

Sampling area: 1829.0m^2

Transect length: 210m

21 samples taken @ 10m intervals

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Reference

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Clontarf Promenade

Location: 4

Sampling conducted by: Heidi Hopper (AWN Consulting)

Sampling area: 1590.88m²

Transect length: 200m

20 samples taken @ 10m intervals

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Reference

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Clontarf Promenade

Location: 5

Sampling conducted by: Heidi Hopper (AWN Consulting)

Sampling area: 972m^2

Transect length: 200m

20 samples taken @ 10m intervals

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Reference

06_3118

awn consulting

The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Sean Moore Park

Location: 1

Sampling conducted by: Brian Tiernan (AWN Consulting)

Sampling area: 582.32m²

Transect length: 162m

16 samples taken @ 10m intervals

Project

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Reference

06_3118

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Sean Moore Park

Location: 2

Sampling conducted by: Brian Tiernan (AWN Consulting)

Sampling area: 1134.2m^2

Transect length: 194m

19 samples taken @ 10m intervals

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Reference

06_3118

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Sean Moore Park

Location: 3

Sampling conducted by: Brian Tiernan (AWN Consulting)

Sampling area: 11187m²

Transect length: 184m

18 samples taken @ 10m intervals

Project
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Reference
06_3118

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Sean Moore Park

Location: 4

Sampling conducted by: Brian Tiernan (AWN Consulting)

Sampling area: 537m²

Transect length: 158m

15 samples taken @ 10m intervals

Project

Poolbeg

Reference

06_3118

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Sean Moore Park

Location: 5

Sampling conducted by: Brian Tiernan (AWN Consulting)

Sampling area: 605m²

Transect length: 181m

18 samples taken @ 10m intervals

Project
Poolbeg
Reference
06_3118

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17. Tel: +353 (0)1 847 4220 Fax: +353 (0)1 847 4257

Appendix 3

Laboratory Analysis Results

Scientific Analysis Laboratories

Report Number: 75290 compiled

Date of Report: 18/04/05

Client: AWN Consultants,
Tecpro Building,
Clonshaugh Industrial Estate,
Dublin 17.

Client Contact: Brian Tiernan
Client Job Reference: 05-3115

Date Job Received at SAL: 05/04/05
Date Analysis Started: 05/04/05

The results reported relate to samples received at the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs

Key to symbols used on this report:
W: Analysis was performed at another SAL laboratory
S: Analysis was subcontracted
N: Analysis is not UKAS accredited
U: Analysis is UKAS accredited

Report written by: Amanda Bailey
Assistant Customer Service Manager

Report checked and authorised by: Helen Ashpool
Senior Project Manager

UKAS TESTING 1549 Group

Report Number: 75290 compiled

Client Job Reference: 06-3118

Determinand	Method	Units	LOD	SAL Ref: / Client Ref: / Type: / Symbol	75290 001 / CLONTARF-1 / Soil	75290 002 / CLONTARF-2 / Soil	75290 003 / CLONTARF-3 / Soil	75290 004 / CLONTARF-4 / Soil	75290 005 / CLONTARF-5 / Soil	75290 006 / S.MOORE PARK-1 / Soil
Polychlorinated biphenyl BZ#105	GC/MS (HR)	ug/kg	0.01	U	0.11	0.02	<0.01	0.02	<0.01	0.25
Polychlorinated biphenyl BZ#114	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
Polychlorinated biphenyl BZ#118	GC/MS (HR)	ug/kg	0.01	U	0.21	0.03	0.02	0.03	0.02	0.45
Polychlorinated biphenyl BZ#123	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#126	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#156	GC/MS (HR)	ug/kg	0.01	U	0.08	0.01	<0.01	<0.01	<0.01	0.08
Polychlorinated biphenyl BZ#157	GC/MS (HR)	ug/kg	0.01	U	0.02	<0.01	<0.01	<0.01	<0.01	0.02
Polychlorinated biphenyl BZ#167	GC/MS (HR)	ug/kg	0.01	U	0.04	0.02	<0.01	<0.01	<0.01	0.07
Polychlorinated biphenyl BZ#169	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#189	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#77	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Polychlorinated biphenyl BZ#81	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Organic Carbon	OX/IR	%	0.1	N	4	4.4	3.9	5.9	4.4	5.3
pH	Probe			U	7.5	7.4	7.4	7.6	7.6	7.5

Report Number: 75290 compiled

Client Job Reference: 06-3118

SAL Ref:	75290 007	75290 008	75290 009	75290 010
Client Ref:	S.MOORE PARK-2	S.MOORE PARK-3	S.MOORE PARK-4	S.MOORE PARK-5
Type:	Soil	Soil	Soil	Soil

Determinand	Method	Units	LOD	Symbol	S.MOORE PARK-2	S.MOORE PARK-3	S.MOORE PARK-4	S.MOORE PARK-5
Polychlorinated biphenyl BZ#105	GC/MS (HR)	ug/kg	0.01	U	0.26	0.72	0.11	0.2
Polychlorinated biphenyl BZ#114	GC/MS (HR)	ug/kg	0.01	U	0.03	0.07	<0.01	0.02
Polychlorinated biphenyl BZ#118	GC/MS (HR)	ug/kg	0.01	U	0.54	1.3	0.21	0.39
Polychlorinated biphenyl BZ#123	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#126	GC/MS (HR)	ug/kg	0.01	U	0.01	0.01	<0.01	0.01
Polychlorinated biphenyl BZ#156	GC/MS (HR)	ug/kg	0.01	U	0.09	0.15	0.04	0.06
Polychlorinated biphenyl BZ#157	GC/MS (HR)	ug/kg	0.01	U	0.03	0.05	<0.01	0.02
Polychlorinated biphenyl BZ#167	GC/MS (HR)	ug/kg	0.01	U	0.06	0.16	0.02	0.04
Polychlorinated biphenyl BZ#169	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#189	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01
Polychlorinated biphenyl BZ#77	GC/MS (HR)	ug/kg	0.01	U	0.03	0.03	0.02	0.03
Polychlorinated biphenyl BZ#81	GC/MS (HR)	ug/kg	0.01	U	<0.01	<0.01	<0.01	<0.01
Total Organic Carbon	OX/IR	%	0.1	N	2.6	5.3	4.5	5.3
pH	Probe			U	7.5	7.5	7.5	7.5

WASTE TO ENERGY ENVIRONMENTAL IMPACT STATEMENT COMMUNITY GAIN PROPOSALS

Dublin City Council is proposing to implement the following Community Gain initiatives if granted planning approval for the Waste to Energy Plant on the Poolbeg Peninsula:

1. **A Community Gain Fund that will be used to finance facilities/services for the benefit of the local community**

2. **District Heating to be generated by the Waste to Energy Plant.**

3. **The refurbishment / redevelopment of the former Pigeonhouse Powerstation, Hotel and adjacent site (circa 5 acres), for appropriate uses, in partnership with the local community.**

1. THE COMMUNITY GAIN FUND

Introduction

It is proposed that the fund will include a once-off capital sum and a revenue sum to be paid annually over the lifetime of the plant. It is being established to provide facilities/services in the residential areas closest to the proposed plant (Ringsend/Irishtown/Sandymount) that will enhance that area and make it a better place to live and work. It is proposed that the projects to be supported by the fund would provide "additionality" to the local community i.e. that they will be over and above what the local community would have expected by way of social and community infrastructure.

Catchment Area

The proposed catchment area is outlined on attached map i.e. within the black line on the map.

Background to Community Gain

The principle of Community Gain was first introduced in the policy statement "Changing our Ways" (1998) - Section 9.2 Public Support and Participation, as follows:

Local authorities, working closely with local communities, should utilise a proportion of income from waste charges and gate fees to mitigate the impact of……facilities on these communities through appropriate environmental improvement projects.

The concept of Community Gain was further articulated in Section 4.14 of the government policy statement "Taking Stock and Moving Forward" (2004), as follows:

The agreed Programme for Government includes a commitment in relation to developing further the concept of community gain in association with the delivery of major infrastructure projects under local authority waste management plans. In the period since the Programme was published, it has become standard practice for a condition to be attached to the grant of planning permission for major pieces of waste infrastructure requiring the operators to contribute (generally on the basis of the volume

of waste accepted at the facility) to a special fund which is used to support certain initiatives in the local area.

Key point 20: *As a valid instrument in terms of the delivery of major waste facilities, Government policy in relation to the concept of community gain will be applied by the relevant authorities in their decisions on applications for planning consent for such facilities.*

Community Gain conditions have been imposed by An Bord Pleanala in relation to the two previous decisions to grant permission for incinerators at Carranstown and Ringaskiddy and the City Council is proposing that such a condition be imposed in relation to the Waste to Energy project proposed for the Poolbeg Peninsula.

Proposed Scale of the Community Gain Fund
Dublin City Council is proposing that the fund should comprise a once-off capital contribution of 3% of the capital cost of the facility and an annual revenue contribution of 0.5% of the amount of revenue generated by gate fees at the facility during its lifetime, subject to maximum annual contribution of €500,000. Based on the estimated construction cost of €266m, the capital contribution will be of the order of €8m. Based on a throughput of 600,000 tonnes per annum, the annual revenue contribution will be of the order of €265,000.

Assessment of Community Needs
In order to ascertain the needs of the local area and to identify facilities/services that would enhance it, Dublin City Council commissioned a Market Research Survey (by TNS MRBI) and a Social and Community Infrastructural Audit (by Trutz Haase, Social and Economic Consultant in association with Brady Shipman Martin). The results of the Market Research Survey were taken into account in the preparation of the Social and Community Audit report.

The Market Research Survey included the following:
- An indepth face to face interview with 1000 residents in the catchment area
- A postal survey involving special interest groups in the area.

The interviews/surveys were primarily designed to ascertain the views of the local community on the facilities/services that should be supported by a Community Gain Fund. They were also designed to ascertain their views on preferred representation on the body that would administer the fund and to obtain local attitudes to a range of issues including the Waste to Energy project and the quality of existing services, including waste management services, being provided by the City Council.

The Terms of Reference of the Social and Community Infrastructural Audit included the following:
- Identifying the existing social and community infrastructure in the catchment area
- Identifying social and community infrastructure existing in similar communities to those in the catchment area that enhance people's lives
- Identifying gaps in the existing social and community infrastructure in the catchment area.
- Recommending in order of priority the facilities/infrastructure that would achieve the overall objectives of the audit including (a) project opportunities that might

exist due to the nature of the Waste to Energy Plant (b) existing projects in the area that require support and (c) projects resulting from the audit.

Summary of the Findings of the Market Research Survey
The following is a summary of the main findings regarding the facilities/services that should be supported by a Community Gain Fund:

Type of Facility	Residents	Special Interest Group
Young people's facilities	26%	21%
Sports facilities	11%	23%
Parks	11%	14%
Transport facilities	11%	16%
Community (General)	9%	9%
Street Cleaning/maintenance	7%	9%
Services for the elderly	6%	9%
Arts/entertainment facilities	5%	5%
Tackling pollution/environmental problems	5%	5%

A summary of the full findings of the Market Research Surveys is attached.

Summary of Community Infrastructural Audit Report
The audit report was completed following the carrying out of the physical audit of facilities/services in the area (now available in GIS format); a comparison of facilities/services in the area with those in similar communities elsewhere; the identification of gaps in those facilities/services; and key recommendations which included the identification of priority areas and projects that should be supported by the Community Gain Fund.

As part of the assessment process, the consultants engaged in an extensive consultation process with local residents and special interest groups over a period of 3-4 months.

The report recommends a consultation/negotiation/consensus building process between the City Council, the local community, the developers of the Waste to Energy Plant and other appropriate stakeholders. It also recommends the preparation of an integrated plan for the area that would address much broader issues that the Community Gain Fund and that would take as its starting point the visions and aspirations of existing communities.

The City Council is already addressing these issues at various levels and will continue to engage in a meaningful way with the local community. In particular, there has been extensive public consultation/awareness building in the local area by the City Council over the last 5 years. This process is outlined in detail in Chapter 2.8 of the EIS.

The report identifies five priority areas which should be supported by a Community Gain Fund:

- More sports facilities for young people
- More playgrounds
- Better community services for elderly people
- Better community health services
- Improving the environment

In developing those facilities/services the report makes the following recommendation:

Taking account of the suggested priorities, the social and economic priorities, a fair geographical distribution, and lack of structures for effective community representation, the consultants believe that the Community Gain Fund should largely be used for the development of two flagship projects; firstly a large scale re-building of the Ringsend and Irishtown Community Centre, and secondly, a Community Centre for the Sandymount Area.

In each case, the centres would act as a centre of community supports along the five priorities identified. The fund would be able to cater both for the associated capital costs, as well as covering the ongoing costs associated with the initiatives. Of equal importance would be that the centres would act as a focus for developing better structures of community representation and towards a process by which the communities can enter effective consultation and negotiation with the respective authorities.

The Executive Summary and Key Recommendations of the report are attached.

Administration of the Community Gain Fund
For a fund to be of maximum benefit for the community at large, it needs to be distributed in an equitable fashion on projects that are sustainable and varied enough to meet the needs of all sectors of the community. For these objectives to be met, there is a need for an innovative process that will ensure the interests and needs of the wider community are reflected not just in what the money is spent on but also in how the spending decisions are made. Previous Community Gain conditions imposed by An Bord Pleanala required the setting up of a Community Liaison Committee consisting of a minimum of eight representatives (two officials from the planning authority, two local residents, two representatives from the developer and two elected members of the local authority) with the following function:

- To provide for appropriate ongoing review of waste disposal/recycling operations in conjunction with the local community
- As a body to be consulted by the local authority when identifying projects to be supported by the Community Gain Fund.

<u>Establishment of a Community Gain Fund Board</u>
The City Council proposes the establishment of a Community Gain Fund Board, along similar lines as the Community Liaison Committees conditioned by An Bord Pleanala for the Carranstown and Ringaskiddy facilities. The Board would have the following functions:

- Decide on the projects to be supported by the Community Gain Fund, subject to each project satisfying independent sustainability and community benefit assessments, and following a consultation process with local communities.
- Carry out an ongoing review on the operations of the Waste to Energy Plant and report to the wider community.

<u>Membership of the Community Gain Fund Board</u>
It is proposed that the membership of the Board would be broadly in line with that set down by An Bord Pleanala for the Community Liaison Committees but we are proposing that it be chaired by an independent person with no direct connection to the City Council, the developers or local interest groups. That person to be agreed by the other members of the Board at its inaugural meeting.

It is also proposed that the Board would have a stronger representation from the local community and elected members of the local authority than is the case with the Carranstown and Ringaskiddy Liaison Committees. It is proposed that it has three community representatives and three elected members of the City Council. We do not see a need to have any more than one representative from the developers.

It is, therefore, proposed that the Board would consist of the following:

An Independent Chair
3 local community representatives
3 elected members of Dublin City Council
2 officials from Dublin City Council
1 representatives from the developers.

For the Board to be effective it must be sustainable over the period of the operation of the plant. This is likely to be in excess of 20 years so the group must have a built in renewal process that is robust enough to keep the group active and does not see it lose all members at once and thus losing continuity. The length of time that members serve on the Board, therefore, will vary so that in any given year only a small number of members need to be replaced. This procedure also means that in a longer time frame the Board will be renewed but continuity will be maintained.

Selecting the community representatives on the Board

If the community representatives on the Board are to be truly reflective of community interests, it is essential that a selection system be put in place to ensure that this occurs and that the interests of a large section of the community are not excluded.

It is not proposed that members be selected at a public meeting but that an Independent Selection Committee be established to oversee the selection process, similar to the process adopted in establishing the Community Interest Group – see Section 2.8 of the EIS. Individuals will be selected from the community, based on their ability to reflect community interest. The Selection Committee will define the desired profile of the community representatives to ensure that they reflect the needs of the community.

Decisions on projects to be supported by the Community Gain Fund

The MRBI Survey identified the facilities/services most favoured by residents and special interest groups in the area. The Social and Community Audit Report identified five priority areas which should be supported by a Community Gain Fund and, taking account of these and other issues, recommends the provision of two flagship community centres for the area.

The City Council is, however, proposing that the final decision in relation to the provision of facilities/services be made by the Community Gain Board, subject to each project satisfying independent sustainability and community benefit assessments. In the case of proposals regarding significant projects, it is proposed that there will be a consultation process with local communities.

Administration of funds

In order to ensure accountability and transparency, it is proposed that a special Community Gain Fund account be set up by Dublin City Council on behalf of the Board to which all contributions to the fund would be lodged. The disbursement of funds from the account on behalf of the Board and the day to day management of the account would be carried out by Dublin City Council. This account would be subject to periodic independent audits.

Summary of Proposal

The following is a summary of the proposal regarding a Community Gain Fund:

1. A Community Gain Fund would be established comprising:
   (a) a once off capital contribution of 3% of the capital cost of the facility, which is estimated at €8m
   (b) an annual revenue contribution of 0.5% of the revenue generated by gate fees, subject to a maximum annual contribution of €500,000. This is estimated at €265,000 per annum.

2. A Community Gain Fund Board will be established to:
   (a) decide on the projects to be supported by the fund, subject to each project satisfying independent sustainability and community benefit assessments. Significant projects to be subject to a consultation process with local communities.
   (b) Carry out an ongoing review on the operations of the Waste to Energy Plant and report to the wider community.

3. The Board will consist of:

   An Independent Chair
   3 local community representatives
   3 elected members of Dublin City Council
   2 officials from Dublin City Council
   1 representatives from the developers.

4. The Community members will be selected by an independent selection process

5. A special Community Gain Fund account will be established and audited periodically. The City Council will be responsible for the actual disbursement of funds and the day to day management of the account.

2. COMMUNITY GAIN - DISTRICT HEATING TO BE GENERATED BY THE WASTE TO ENERGY PLANT

Vision

The primary purpose of the proposed thermal treatment plant on the Poolbeg Peninsula is to treat the residual part of Dublin's municipal solid waste (MSW) and thus reduce the Region's environmental problems.

However, MSW may also be seen as a (renewable) fuel with a heat value that in Western Europe is equal to approximately 1/4 of oil. This is an important factor in these days of increasing prices for fossil fuels.

Consequently, most new waste-to-energy plants are designed with a view to high energy efficiency. The plant proposed for Dublin will, like all large new Waste-to-Energy plants, produce electricity from the outset and the guaranteed electricity recovery efficiency is high for this type of power plant. As in any thermal power plant, the steam turbine will as a by-product produce waste heat that will be expelled to the environment, if it cannot be used for heating purposes. The energy content in the waste heat is approximately double the energy content in the electricity from the plant.

The optimal solution is combined heat and power (CHP) generation at the plant, and a district heating network to distribute thermal energy to public and private offices, institutions, shops and private homes. Based on non-fossil fuels this would have an enormous potential for the reduction of CO_2 emission to the atmosphere. It will also improve the local environment as district heating produced in a central plant will reduce the combustion of fuel for heating purposes in the local neighbourhoods. Finally, CHP will substantially increase the overall energy efficiency of the operation.

As a capital city, Dublin - like many other large cities in Western and Eastern Europe - has the size and concentration of large buildings to host a large district heating and cooling system. Despite the mild Irish climate, heating is necessary for around seven months of the year and domestic hot water is needed year round. In addition, there is a demand for cooling of hotels, offices and shopping malls during the summer season.

The construction of the Dublin Waste-to-Energy Plant on the Poolbeg Peninsula is a chance to introduce a modern district heating and cooling system, which will be able to deliver up to 95% of the present energy consumption for heating and cooling in its service area. Energy that would otherwise be wasted will instead replace fossil fuel based energy with energy, mainly produced on bio-mass.

Definitions and background

District Energy or District Heating and Cooling (DHC) systems are thermal energy networks that distribute hot water, chilled water, or steam through insulated double pipe lines to serve commercial, residential, institutional, and industrial energy needs for space heating, domestic hot water, space cooling, and industrial purposes. DHC systems permit energy, as distinguished from fuel, to be bought and sold as a commodity.

District heating started in USA in the late 1800's and district heating systems are today common in Northern and Eastern Europe and are particularly popular in the Scandinavian countries. Recently district heating systems have been developed in several Italian cities. District cooling systems are widespread in USA and are gaining ground in Europe, in combination with district heating.

District heating permits the utilisation of various low-grade energy sources, which would otherwise be wasted. This reduces the use of fossil fuels in individual boilers. Combined heat and power (CHP) generation is one such source. Municipal solid waste (MSW) is another potential energy source being increasingly used.

An opportunity for Dublin

The Dublin Waste-to-Energy Plant in the Poolbeg area will be on the doorstep of the city. The design of the proposed facility to recover the waste heat from the electricity generation will allow the use of this energy in a local district heating and cooling system. The use of the waste heat from the electricity generation process will increase total energy recovery efficiency from approximately 31% for electricity generation only to more than 85% in combined heat and power (CHP) production.

The recovery and utilisation of heat in addition to electricity is a requirement for achieving status as an 'energy recovery plant' under the proposed revision of the European Waste Management Hierarchy.

The proposed waste-to-energy plant will handle 600,000 tonnes of waste per year. If designed for combined heat and power generation the annual output will be in the range of 460,000 MWh of electricity and 970,000 MWh of heat. This equals the annual electricity consumption of *45,000* Irish homes and the annual heating demand for *60,000* Irish homes. If the plant produced electricity only, as it will at the outset, the output would meet the annual electricity demand of approximately *50,000* homes.

The thermal output of the Dublin Waste-to-Energy Plant is similar to the capacity of the combined heat and power plant in the town of Randers, Denmark, which covers the major part of the heating and hot water demand for some 60,000 inhabitants. Much larger district energy schemes exist in cities like Stockholm, Copenhagen, Paris and Vienna, and large pipelines have been installed in these cities in recent years despite the heavy traffic in these cities.

An initial district heating network, installed to distribute the heat from the Dublin Waste-to-Energy Plant, may later be expanded to utilize the waste heat from e.g. the ESB Poolbeg Power Plant, Synergen, and various production industries with latent waste heat. This will expand the scheme from servicing a sector of the city only to become a true city-wide district heating service.

In 2002 RPS/COWI carried out a feasibility study on district heating for the Dublin Docklands Development Area. The study concluded that the ample supply of waste heat from the Waste to Energy Plant combined with the high heat load density of the area would result in excellent feasibility for a district heating scheme serving the Docklands Area and its vicinity.

The feasibility study also recommended to investigate the possibility of connecting the adjacent areas of Ringsend Housing etc to the district heating scheme. This would increase the community gain from the scheme.

In addition, it would be relevant to study the possibility of adding a district cooling service to the system. This service would use the energy in the hot district heating water as a source for absorption cooling in local air conditioning units for offices and hotels. The feasibility study concluded:

District Heating can offer to Dublin:-

- **local community gains – uses excess energy for home heating and domestic hot water**
- **heat available 'on tap' – safe, clean and reliable energy supply**
- **environmentally beneficial – reduces greenhouse gases**

- **replaces fossil fuels**
- **offers a heating cost saving compared to natural gas**
- **assists Docklands development**

The 2002 district heating feasibility study is currently being updated.

Advantages of District Heating

The application of district heating will have advantages in several areas, of which the most important are the environmental gains and the potential reduction of fossil fuel imports.

If the waste-to-energy plant's potential is fully exploited district heating would have the following benefits:

For the Environment:

- Conserves fossil fuels - equal to approximately 175,000 tonnes/year of oil imports
- Uses biodegradable fuel – reduces greenhouse gases
- Emission control - reduces overall emissions from space heating of the Dublin Area
- NO_x emissions reduced by 2,200 tonnes/year
- CO_2 emissions reduced by 140,000 tonnes/year

For Ireland:

- Reduces dependency on oil and gas

For Dublin City Council Area:

- Reduces costs to local businesses, public buildings and housing estates
- Local community gains
- Assists Dublin Dockland development
- Enhances Dublin's environmental status

For Customers:

- Heat 'on-tap' – available when you need it
- Reliable and safe form of heating
- Competitive cost - not susceptible to fluctuating oil or gas prices
- You pay only for what you use – inefficiencies not your problem

For Building Owners/Occupiers:

- Reduced maintenance cost
- No need for boiler operator/janitor
- Space saving in building
- Lower capital investment
- No need for flue stack or oil tank
- Potentially an energy source for air conditioning

Comparative Energy Recovery Efficiencies

A. Fully condensing turbine

600,000 tonnes MSW per year

Electricity generation:

550,000 MWh/yr (60 MW) - net

Cooling needs:

915,000 MWh/yr (heat) (120 MW_{th})

B. Combined heat and power (CHP)

600,000 tonnes MSW per year

Electricity generation:

460,000 MWh/yr (55 MW) - net

Useable heat for sale:

970,000 MWh/yr (128 MW_{th})

District Heating Network

The redevelopment of the Docklands area offers an interesting potential for the introduction of a new district energy network in Dublin because of its proximity to the proposed Poolbeg plant.

Expressions of interest and/or preliminary commitment to become customers have been received from one large developer in this area and in the Merrion Gate area.

It is expected that also the Poolbeg peninsula in the future will be developed for industrial, commercial or residential purposes. Therefore, this area will eventually develop a heat demand, which can be supplied from the Waste-to-Energy plant.

District Cooling

The demand for cooling in Dublin will be less than for heating. However, a number of shopping centres, international hotels and office buildings will already have a cooling demand today, and others will need this service in the future.

A building will have a peak demand for cooling in the summer almost as high as for heating in the winter. However, the cooling season is usually only a couple of months compared to the heating season, which normally lasts for up to seven months a year.

Absorption chillers using heat from the district heating system may generate cooling for buildings, or other technical options may be developed.

Promotion of District Heating in Dublin

Dublin City Council, in conjunction with RPS COWI and CODEMA (City of Dublin Energy Management Agency) has now formalized arrangements to promote District Heating in Dublin City in anticipation of the project coming on stream. The City Council is also seeking assistance to promote District Heating through the National Development Plan.

Concluding comments

Installation of an underground district heating network is a large effort demanding comprehensive construction work. The work will entail some temporary inconvenience to traffic in the area studied, but this effect is short term and manageable.

The replacement of conventional fuels for heating with district heating would improve both the local and the global environment. The initial district heating system supplied from the proposed Dublin Waste-to-Energy Plant could reduce annual CO_2 emission in Dublin by *140,000 tonnes* in addition to its other environmental benefits.

The inclusion of district heating/cooling as a service provided by the waste-to-energy plant will ensure that this is placed higher in the waste management hierarchy as an 'energy recovery plant'.

District energy customers in Continental Europe and the U.K. appreciate thermal energy being supplied as a commodity. This saves them both the investment and the space for their own boiler equipment and its operation and maintenance. District energy is a fully controllable and reliable service on par with electricity, gas and water supply.

The coincidence in the timing of the proposed waste-to-energy plant at Poolbeg and the Docklands Area redevelopment, as well as other major developments, provides a good basis for the development of a district energy system in Dublin.

3. COMMUNITY GAIN – REFURBISHMENT / REDEVELOPMENT OF PIGEONHOUSE POWERSTATION AND HOTEL

Introduction

Dublin City Council purchased the Pigeonhouse Powerstation and Hotel on a site of c.2.5 hectares from the ESB in 2005. (See attached Map). The acquisition means that all of the historic Pigeonhouse precinct, including the Harbour and the Military Fort, is now in the ownership of the Council, thus providing the opportunity for its regeneration for purposes that would primarily benefit the local community. The powerstation and hotel have significant potential for new uses, due to the location at the mouth of the River Liffey, the character of the existing buildings and harbourside setting, and the many cultural and historic associations of the precinct.

Prior to consideration of potential projects for the powerstation complex, a number of surveys and studies have been carried out to assess the suitability of the existing structures for redevelopment.

Site Description

The Great South Wall and Pigeonhouse Harbour were constructed in the mid-eighteenth century, and the Pigeonhouse Hotel (1793) was built to provide refreshment for travellers. The precinct was taken over and fortified after the 1798 rebellion. In 1902 on the site of the magazine stores of the Pigeonhouse Fort, the Powerstation was constructed to provide electricity for the rapidly expanding city and remained in operation until 1971.The sewage outfall tanks for Dublin City were located within the Harbour c.1900. A report by David Slattery, Architect and Historic Buildings Consultant, in January 2004, describes and assesses the Poolbeg Peninsula and its structures for the Dublin Waste to Energy Project Baseline Monitoring.

Conservation

The Pigeonhouse Harbour environs have a conservation area designation in Dublin City Development Plan Development Plan Map F, and a number of the buildings in the precinct are protected structures. The Hotel, Powerstation and Fort are included in the record of Protected Structures. In order to clarify the extent of structures to be protected, David Slattery has further reported on Buildings and Features on the Powerstation site which should be afforded Protected Structure status:

- The Pigeon House Hotel constructed c.1793
- Remnants of the Pigeon House Fort and Harbour including the West Gate. A more detailed investigation is required to define the extent of the remnants, and to fully determine their significance
- The Powerstation building constructed c.1902, excluding later extensions
- The setting of the Powerstation and Hotel, including views and vistas to and from the Hotel and Powerstation

Condition of Structures

The existing powerstation (main redbrick buildings) has a footprint of c.3000sq.m. Located parallel to the harbour wall, there are two main bays, the tallest being the boiler house with a range of steel hoppers for coal. The engine room alongside is flanked on the eastern side by the control room and offices. At the southern end the octagonal redbrick chimney has been reduced from its original 60metre height.

Barrett Mahony, Consulting Engineers have carried out a structural survey of the Powerstation. Their report concludes (in Section 4.0 Assessment / Suitability for Redevelopment) that the Powerstation is suitable for retention and possible future redevelopment.

Planning Context - Dublin City Development Plan 2005 – 2011

Zoning –Z8

The Powerstation, Hotel and that part of the site lying to the east of the powerstation are zoned Z8 – *to protect the existing architectural, and civic design character, to allow only for limited expansion consistent with the conservation objective. To allow primarily residential and compatible office and institutional uses.*

• Permissible Uses

Childcare facility, Cultural/recreational building and uses, Education, Embassy, Guest house, Home-based economic activity, Hostel, Hotel, Medical and related consultants, Office (maximum 50% of unit and excluding retail branch bank/building society), Open space, Residential.

• Open for Consideration Uses

Buildings for the health, safety and welfare of the public, Nightclub, Place of public worship, Pub

Zoning Z9

The Harbour environs and old Pigeonhouse Fort lands are zoned Z9 - *To preserve, provide and improve recreational amenity and open space*

• Permissible Uses

Club house and associated facilities, Municipal golf course, Open space, Public service installation which would not be detrimental to the amenity of Z9 zoned lands.

• Open for Consideration Uses

Car park for recreational purposes, Caravan park /Camp site (holiday), Community facility, Crèche, Craft centre/craft shop, Cultural/recreational building and uses, Golf course and clubhouse, Kiosk, Tea room.

Southbank/Poolbeg Framework, FDA 13

The regeneration of the historic Pigeonhouse Harbour, Powerstation, Hotel and Fort, is an important objective of the Southbank/Poolbeg Framework and of the Dublin Docklands Area Masterplan. The complex is recognised as potentially an attractive destination for visitors. Finding appropriate uses for the complex is to be the subject of further assessment and consultation, and it is intended to promote activities which will reflect and complement its maritime history.

Special Contributions Scheme

The Poolbeg Framework has identified 44 projects, of which 26 are landscape and infrastructure projects in the public realm. A Special Contributions Scheme will levy contributions for the public realm projects from development sites. The amount of contribution is based on estimates of development capacity on the various sites. It is also intended that new or expanding utilities will contribute, particularly towards environmental upgrading within and around their sites.

Access

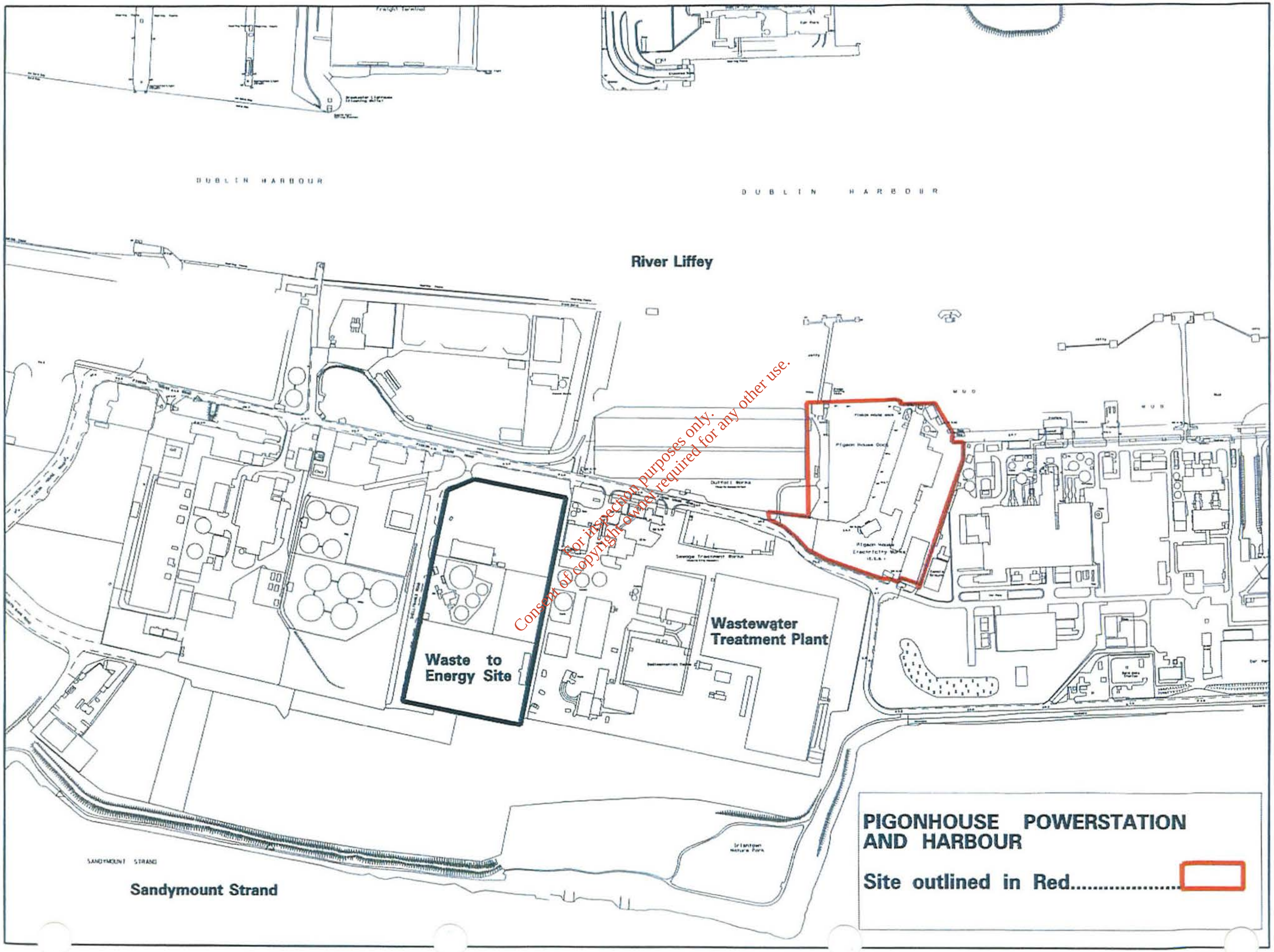
The existing access is from Pigeonhouse Road, the original causeway to the harbour, and passes through the remnants of the 19th Century gatehouse to the Fort. This access is the main route for access to the utilities and is currently visually degraded and unattractive. The road is to be upgraded as the 'Poolbeg Procession' under the Poolbeg Framework implementation. An alternative potentially more attractive access is to be created in the bayside / nature park recreational route which would approach the powerstation from the south.

Potential Development For Community Gain

To date the development potential of the site has not been evaluated, as it was considered premature until the various surveys and reports were complete. However the feasibility of redevelopment has been established and a number of possible projects could be considered in the context of community gain. The harbour has potential to be developed as a marina, with leisure and amenity uses linked to the recreational walks, the beaches and nature park on the southern side of the peninsula.

Dublin City Council, **in partnership with the local community**, will be seeking proposals from the private sector for the refurbishment/redevelopment, as appropriate, of the buildings on the site for appropriate uses.

Community Gain Fund Catchment Area


DUBLIN HARBOUR
DUBLIN HARBOUR
River Liffey
Waste to Energy Site
Wastewater Treatment Plant
Sandymount Strand
SANDYMOUNT STRAND
PIGONHOUSE POWERSTATION AND HARBOUR
Site outlined in Red..................

CONFIDENTIAL REPORT

Community Gain Survey Dublin City Council

Summary of Findings

May 2006

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REF: TNS mrbi/134511/06

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1. INTRODUCTION

Dublin City Council engaged TNS mrbi to carry out market research surveys in the Ringsend / Irishtown / Sandymount area to ascertain the views of the community with the purpose of identifying the projects and facilities that could be supported by a Community Gain Fund (CGF). The CGF is being established by the City Council in conjunction with the proposed Waste to Energy (incinerator) Plant on the Poolbeg Peninsula. The surveys included face-to-face interviews with 1,000 residents and a postal survey among businesses and special interest groups.

As well as identifying projects and facilities to be supported by the CGF, the surveys also identified the preferred local representation on the body that would administer the CGF; attitudes to City Council services in the area; attitudes to waste management facilities; awareness of the proposed Waste to Energy project; and issues of concern to the local community.

2. *RESEARCH METHODOLOGY*

Two phases of quantitative research were undertaken:

1. Residential Survey
2. Special Interest Group Survey

2.1. Residential Survey

1,000 interviews were conducted in home with residents aged 15+ years in the catchment area. The catchment area is outlined below:

Fieldwork was conducted between 12th January – 8th March, 2006.

2.1.1. *Sampling Procedure*

In order to ensure a representative geographical spread of interviews, the sample was stratified by the following electoral wards:

- Pembroke West A ('Pembroke West)
- Pembroke East A ('Ringsend/Irishtown)
- Pembroke East B ('Sandymount North')
- Pembroke East C ('Sandymount South')

In addition, one third of the South Dock district ('Charlottes Quay') was included.

Within each electoral ward the starting address for each sampling point was randomly drawn from the Register of Electors. 50 sampling points were used. At each sampling point the interviewer worked to a quota assignment sheet – controlled on age & marital status within gender (derived from the CSO small area population statistics for the electoral ward in question). From each starting address at each sampling point, the interviewer followed a random route procedure. Interviewers were provided with a street map, which highlighted the boundaries of each sampling point, so as to ensure there was no overlap of sampling points within each electoral ward. Closed apartments were covered by intercepting respondents at the main entrance to their home.

2.2. *Special Interest Group Survey*

For this phase, a quantitative postal self-completion approach was undertaken.

This methodology entailed TNS mrbi mailing a questionnaire complete with a cover letter to businesses, schools and special interest groups (e.g. residents' associations, youth, sports clubs community groups etc.) in the local catchment area.

In total the questionnaire was mailed to the following Special Interest Groups:

- 184 local businesses
- 68 local interest and sports groups

A total of 43 questionnaires were returned, broken down as follows:

- 19 local businesses
- 24 local interest/sports/unspecified groups

This total response rate of 17% compares favourably with similar self-completion studies conducted by TNS mrbi over the years.

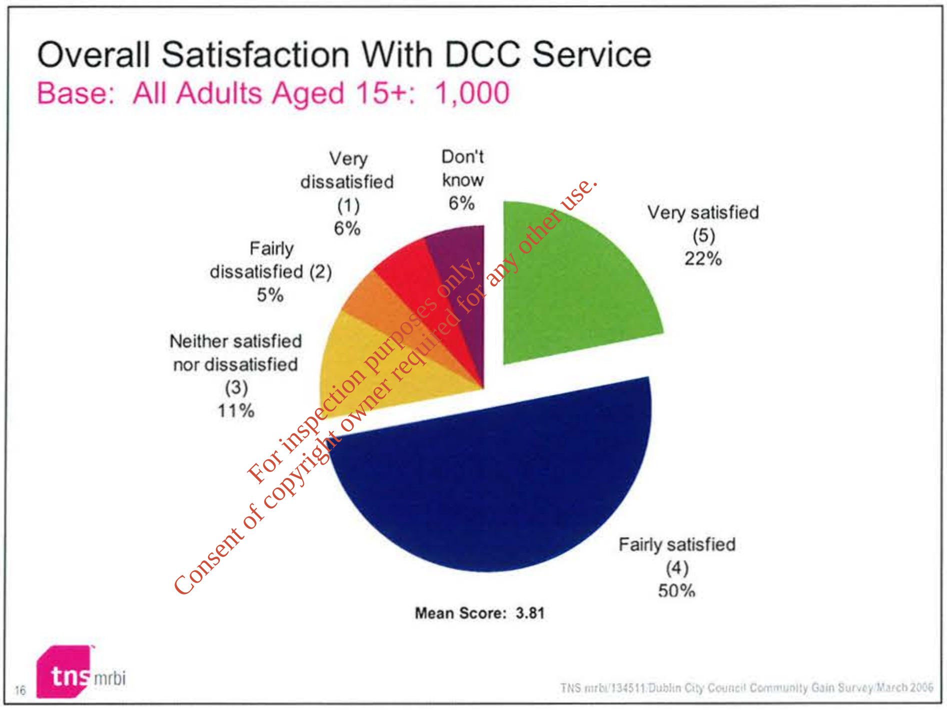
Fieldwork was conducted between 12th January – 8th March, 2006.

3. FINDINGS

3.1. Residential Survey

3.1.1. Satisfaction With DCC Services

Overall satisfaction with the service received from Dublin City Council is notably high, with 72% stating they are either very or fairly satisfied in this regard.



In terms of specific services, satisfaction levels are highest for refuse collection, library services and recycling facilities. Services generating highest levels of dissatisfaction include litter control (28% dissatisfied), the development of leisure facilities in the area (27%), the maintenance of local amenities and leisure areas (24%), and street cleaning (22%).

Respondents were also shown a list of potential areas of concern. Not withstanding the fact that most people will be concerned to some degree with each of these areas, the relativities do indicate that volume of traffic (78% concerned), pollution/air quality (75%), water quality (67%) and impact of re-development in the area (55%) are highest on their agenda.

3.1.2. Important Facilities (In General) The Local Area Lacks

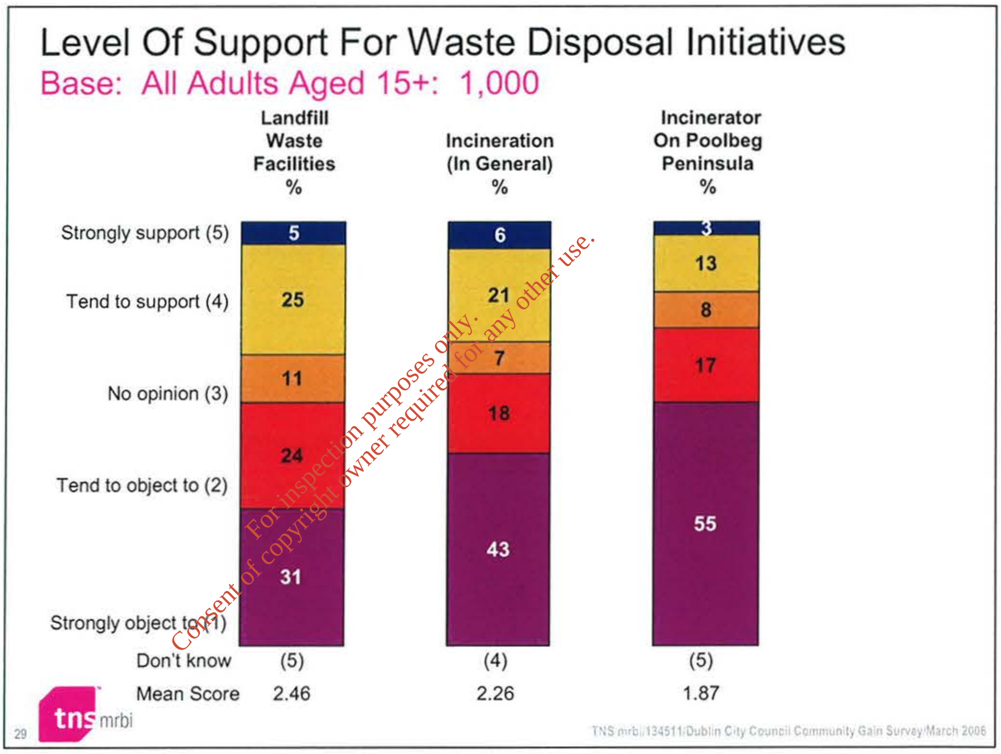
On a spontaneous basis, almost three in ten (28%) of all adults surveyed cited facilities/services for young people as lacking in the area, with almost half of these specifically calling for more/improved childrens' playgrounds. Young people's facilities were of particular concern for those in the Ringsend/Irishtown area. It was also of concern amongst the lower socio-demographic groupings.

The next most frequently mentioned gaps in service related to transport at 18% (parking facilities and an easing of traffic congestion); sports and leisure facilities at 10% (rising to 18% of all 15-24 year olds); street cleaning/maintenance at 9% (primarily the cleaning of streets and paths) and the development of parks (7%).

Reactions to a prompted list of services/facilities elicited similar types of response as were generated at a spontaneous level, with support also emerging in relation to the provision of better community health services and services for the elderly.

3.1.3. Waste Management

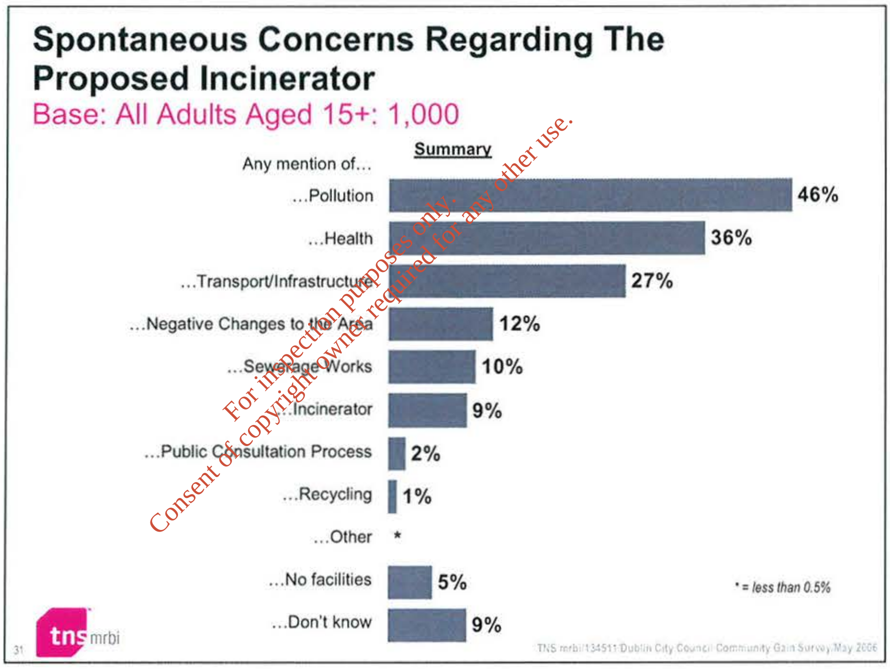
In total, 30% of all residents interviewed claimed to support landfill waste facilities as a means of disposing of waste, with 55% objecting to it. Support for incineration in general stood at a similar level (27%), with 61% objecting to this means of disposal. 16% of residents support an incinerator on the Poolbeg Peninsula, with 72% objecting.



Regarding the Dublin Waste to Energy Project, while 5% have never heard of it, 30% have at least a fair level of knowledge about it with a further 44% knowing just a little about it.

3.1.4. Concerns Regarding Incinerator

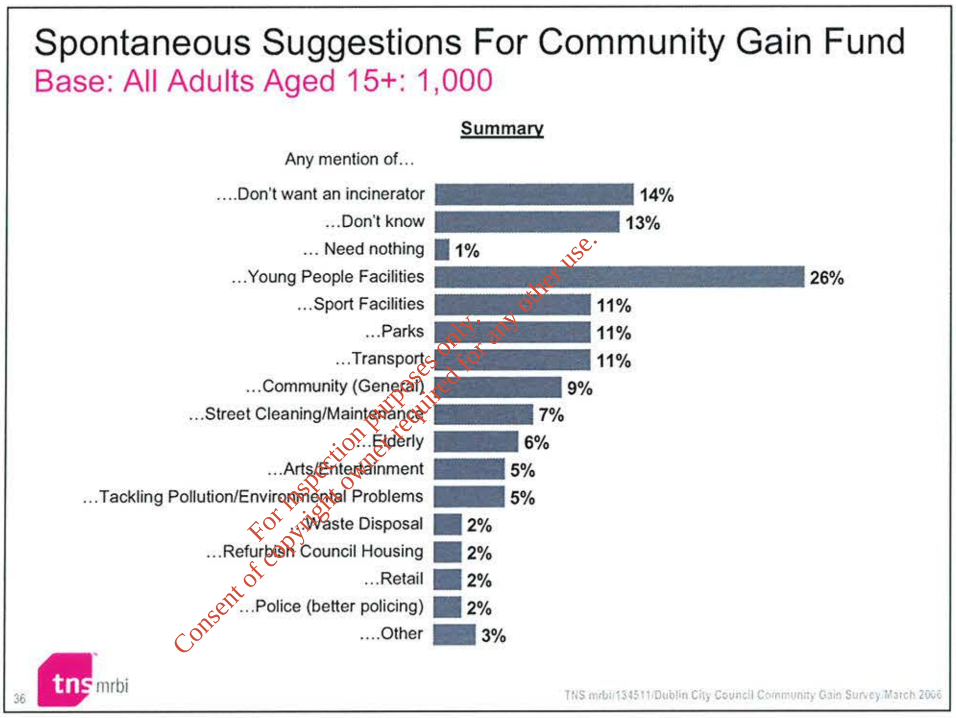
At a spontaneous level, air/toxic emission pollution emerged as the greatest concern in relation to the incinerator, with 46% of all adults citing this without any prompting. Note also the fact that 35% of those who support the incinerator are still concerned in relation to pollution. Other concerns mentioned most often include general health concerns (36%) and increased traffic (25%). Negative changes to the Area (12%) included the proximity of the incinerator to residential and heritage areas, turning residential into industrial areas, the appearance of the area and reduced property values.



Prompted with a list of five potential areas of concern, air quality, effective monitoring of incinerator operation/emissions and health (in general) were all of importance to 85%+ of residents. The other areas in order of importance were traffic and ecology (e.g. marine life, flora and fauna).

3.1.5. *Community Gain Fund Suggestions*

When asked how they, the residents, felt the Community Gain Fund should be spent the most commonly mentioned areas were young people's facilities (26%); sports facilities (11%); parks (11%); transport (11%); community centres (9%); street cleaning/maintenance (7%); services for the elderly (6%); arts/entertainment facilities (5%).

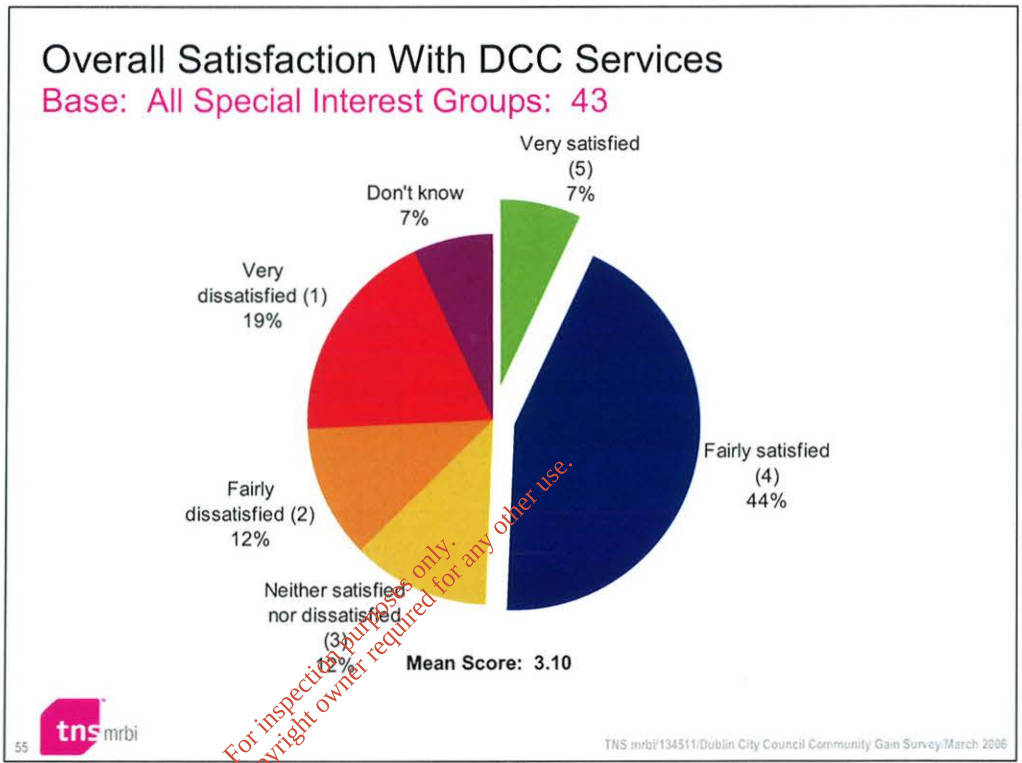


It is likely that Dublin City Council and nominees of the incinerator operator will be on the Community Gain Fund Administration Body. A large majority (79%) believe people from the local community should also be on the Administration Body. Other groups mentioned are local business people (39%) and elected councillors (35%)

3.2. *Special Interest Groups*

3.2.1. *Satisfaction With DCC Services*

51% of Special Interest Groups are satisfied with DCC services

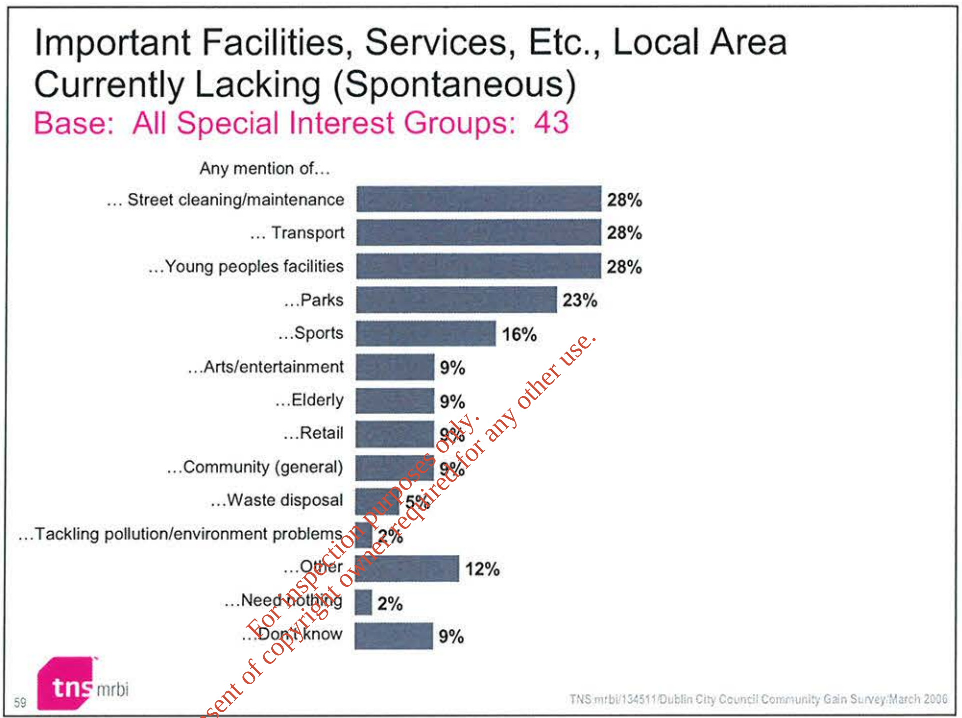


In terms of services, DCC is mainly held in high regard for: refuse collection, street lighting, library services and recycling facilities. The strongest levels of dissatisfaction occur for: litter control, street cleaning and developing leisure facilities in the area.

Special Interest Groups were shown a list of potential areas of concern. Again, not withstanding the fact that most people will be concerned to some degree with each of these areas, the relativities do indicate that water quality in the bay and impact of re-development in the area were of primary concern. Relatively, pollution/air quality and volume of traffic in the area generate similar levels of concern compared to levels of litter and anti-social behaviour.

3.2.2. *Important Facilities (In General) The Local Area Lacks*

The top 4 facilities/services spontaneously mentioned as lacking by special interest groups were: street cleaning/maintenance, transport, young peoples facilities and parks.

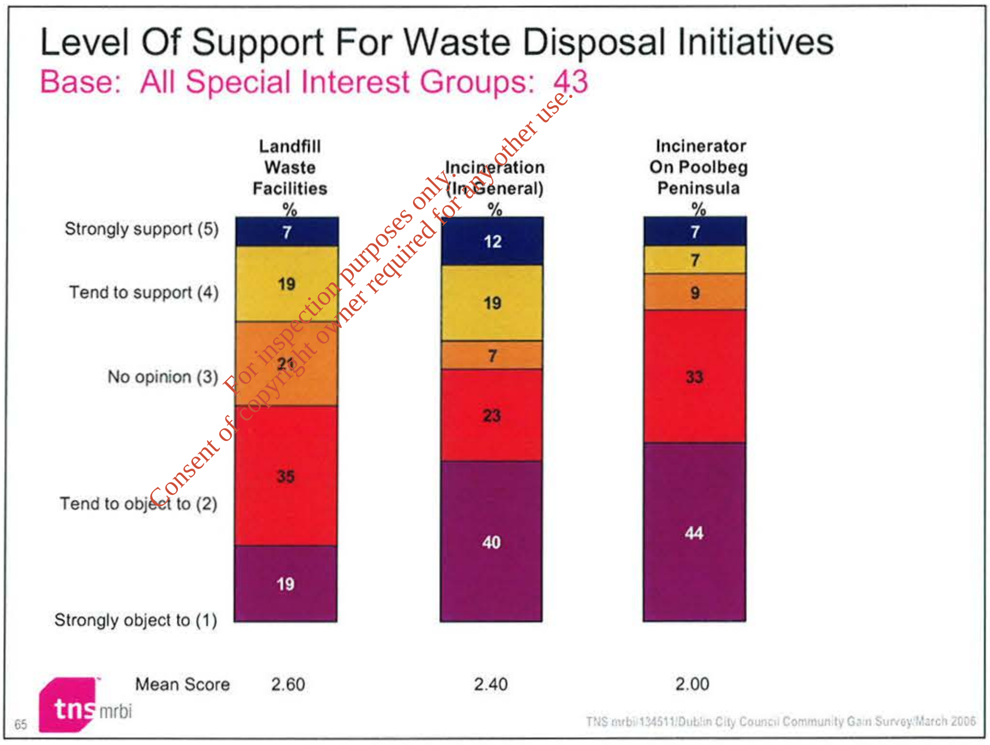


When prompted with a list the top 3 areas of focus were on; improving landscaping in the area, more sports facilities for young people/teenagers and better community services for the elderly people. Note, landscaping was only 5th choice for local residents.

3.2.3. *Waste Management Initiatives*

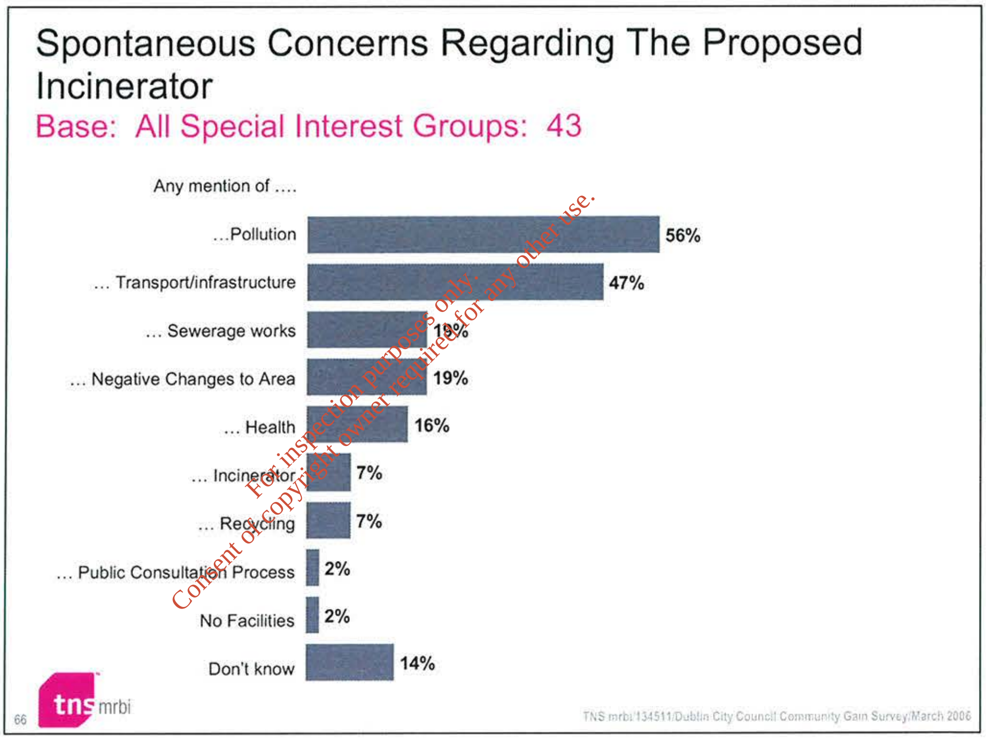
Just 2% of Special Interest Groups have never heard of the "Dublin Waste to Energy" project, with 44% having at least a fair amount of knowledge about it, and a further 37% knowing just a little about it.

Support is low for the proposed incinerator on Poolbeg, and for the concept of incineration in general. In addition, support for landfill waste facilities is also low.



3.2.4. *Concerns Regarding Incineration*

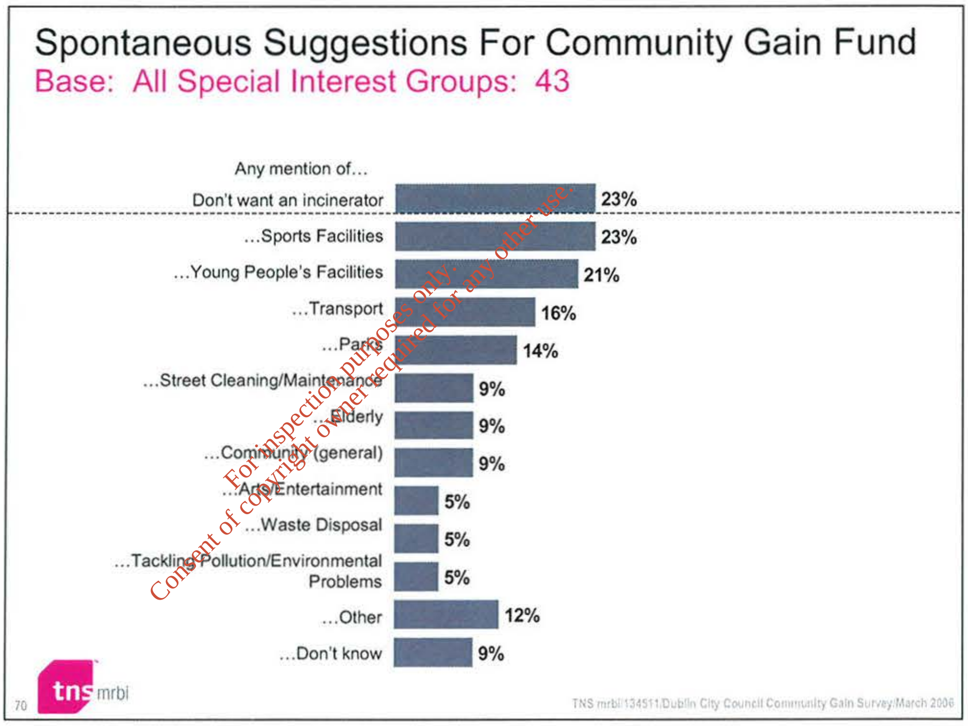
The key concerns for special interest groups are slightly different to residents in the area. The focus of the special interest groups is primarily on pollution and transport/infrastructure. They are also more likely to mention; sewerage works and negative changes to the area in general e.g. reduced quality of life, appearance of the area and the development of the area from residential to industrial.



3.2.5. *Community Gain Fund Suggestions*

Special interest groups were more likely to spontaneously cite that they did not want an incinerator (1 in 4).

The top spontaneous suggestions for a fund included; sports facilities, young people's facilities and transport.



Prompted suggestions from the list included; more sport facilities for teenagers/young people, more playgrounds, better community services for the elderly, better community health facilities and improved landscaping in the area.

Finally, special interest groups are more likely to want local business people on the Fund administrative body.

TRUTZ HAASE

Social & Economic Consultant

Community Gain

A Social and Community Infrastructure Audit in the Ringsend, Irishtown and Sandymount Area

Trutz Haase
in association with
Brady Shipman Martin

May 2006

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