

**Original**



**ANNUAL ENVIRONMENTAL REPORT.**

**LISDEEN RECYCLING CENTRE & TRANSFER STATION,  
CEMETRY ROAD, LISDEEN, KILKEE, CO. CLARE**

**LICENCE REF. NO W0170-01**

Submitted by

**Environment Section,  
Clare County Council,  
New Road,  
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Co. Clare.**

**Date: March 2011**

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### 1) Reporting Period

1/01/10 – 31/12/10

### 2) Details of Activity

The principal waste activity of the Transfer Station is the compaction of solid waste into 30 m<sup>3</sup> closed containers for subsequent disposal to landfill in accordance with Class 12 of the Third Schedule of the Waste Management Act, 1996. Other waste activity is the storage of non-recoverable waste received at the facility, prior to disposal at an appropriate facility in accordance with Class 13 of the Third Schedule.

Other waste recovery activities include recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes) in accordance with Class 2 of the Fourth Schedule, recycling or reclamation of metals and metal compounds in accordance with Class 3 of the Fourth Schedule, and recycling or reclamation of other inorganic materials in accordance with Class 4 of the Fourth Schedule. This covers the acceptance of waste oils, cooking oils, beverage cans, white goods, other metals, and glass at the facility.

### 3) Volume and composition of waste received during the reporting period.

The quantity of municipal solid waste accepted at the facility during the reporting period(s) was as follows:

Public Domestic Waste delivered to site	691.98	tonnes
Recyclable material delivered to site	497.03	tonnes
Total	1189.08	tonnes

The quantity of waste materials accepted for subsequent recycling/recovery for 2010 is as outlined in Table 3.1 below

**Table 3.1**

1	2	3	4	5	6
Material Type	E.W.C. Code	No. of collections	Tonnage	% of overall total	W.C.S. <sup>Note 1</sup> 2001 % quantities arising
Domestic waste	20 00 00 20 03 01		691.98	58.19	
Metals for recycling	20 01 40		22.16	1.86	
Glass for recycling	20 01 02		184.66	15.53	4.0
Aluminium Cans	15 01 04		4.89	0.4	
Plastic bottles	20 01 39		10.16	0.9	
Steel cans	15 01 04		13.09	1.1	
Car Batteries	16 06 01*		1.76	0.2	
Newspapers	20 01 01		40.48	3.40	10.5
Waste Engine Oil	13 02 00		1.472	0.1	
Cardboard	20 01 01		34.36	3.06	7.3
Tetrapak	15 01 01		1.774	0.2	
Timber	20 01 38		60.14	5.06	
Textiles	20 01 11		3.84	0.32	4.5
WEEE	20 01 36		70.446	5.92	

Note 1: W.C.S. Waste Characterisation Survey 2001 See Appendix VIII

The quantities of waste allowed for acceptance the facility under Schedule A of the licence at are as outlined in Table 3.2 below:

**Table 3.2:**

Waste Type	Maximum (Tonnes per annum)
Municipal Waste	1,800
Wastes for recovery/recycling	200 <sup>Note4</sup>
Total	2,000

Note 4: The amount of wastes accepted for recovery/recycling may be altered as long as the total accepted at the facility does not exceed 2000 tonnes per annum.

#### **4) Summary report on emissions, including wastes from silt traps and interception sumps.**

No desludging of the septic tank has taken place since installation. Loading on the tank is quite small with one w.c. and sink as well as run-off from waste transfer area.

#### **5) Foul Water Emissions**

There is no direct foul water discharge. Foul water is diverted to a septic tank unit, which in turn is discharged to a reed bed. This foul water is collected from w.c., sink unit, the transfer station shed, from the compactor and the bin transverse area. It comprises wash water and rainwater falling on the contaminated areas.

#### **6) Surface Water Emissions**

Surface water runoff from site roads and uncontaminated surfaces discharges to the surface water drains. There are no other emissions of any environmental significance from the facility.

#### **7) Summary of Results and Interpretation of Environmental Monitoring.**

**Table 7.1. Lisdeen Transfer Station (WL170-1) Monitoring Schedule**

<b>Schedule D</b>	<b>Monitoring</b>
D.1	Monitoring Locations
D.2	Waste Water
D.3	Landfill Gas
D.4	Surface Water, Groundwater and Leachate

Monitoring was conducted at the specified locations and frequencies as indicated in each of the above referenced Schedules of the Waste Licence, unless otherwise noted in this report. Monitoring locations are shown in Appendix 1. Wastewater monitoring has not been carried out to date as the discharge from the septic tank is directly to a percolation area. The reed bed system is now commissioned; however due to the low flow, it was not possible to obtain a sample from the system.

## 7.1. Landfill Gas

During this reporting period, landfill gas monitoring was carried out on a monthly basis at landfill gas wells L1 and L2. Monitoring was carried out in accordance with Schedule D.3 of the waste licence. Gas monitoring locations are shown in Appendix 1. Completed landfill gas monitoring forms for the period is available for inspection at the facility and can be forwarded if required. Landfill gas results for L1 and L2 are graphed in figures 7.1 and 7.2 below:

**Figure 7.1:**

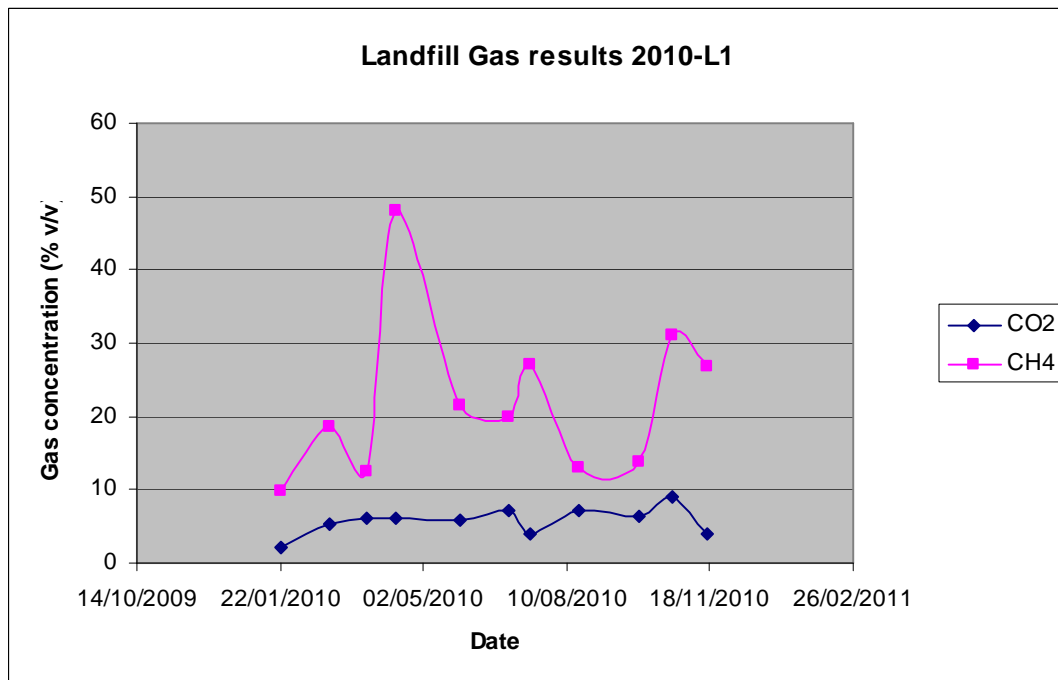
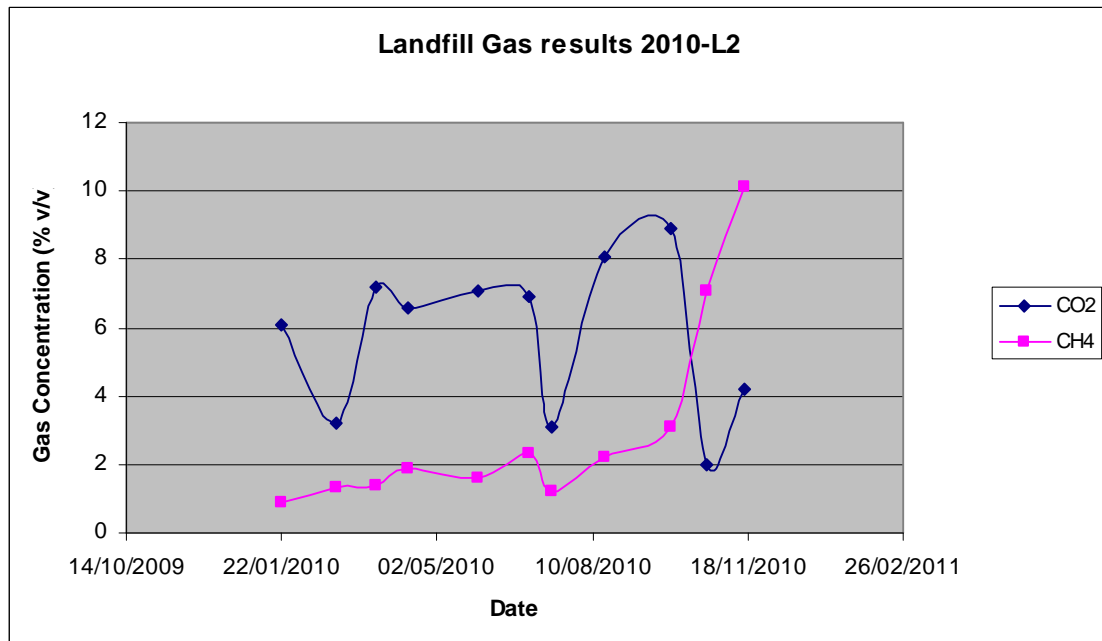


Figure 7.2:



Both leachate wells are located in waste; L2 is located in the centre of the waste body and L1 is close to the northwest site boundary

The methane concentration at L1 is significantly higher than at L2. Methane at L1 ranges from 9.9 to 48%v/v. However methane levels at L2 ranged at the low levels of 0.9 to 10.1%v/v.

Carbon dioxide levels for the majority of the year were similar at both locations with levels <10% v/v.

Landfill gas levels in the caretaker's office are continuously monitored using the online gas analyser. Periodic measurements using the GA 2000 landfill gas analyser are also carried out as a back up method. No methane or carbon dioxide was detected in the caretaker's office by either monitoring method during the 2010 and are within trigger levels as stated in Condition 6.4.1 of Waste licence 170-1.

## Surface Water, Groundwater and Leachate.<sup>1</sup>

*Note 1: Section 7.2-7.4 details comments made by TMS as part of their groundwater, Surface water and Leachate monitoring reports as sampled on 19<sup>th</sup> and 20<sup>th</sup> May 2010 combined with comments made by Clare County Council.*

### 7.2 Surface Water

#### 7.2.1a Water Quality Standards and Trigger values used for comparison

Although water is not abstracted for drinking water use from these surface water locations, it is useful to provide a benchmark for comparison of monitoring results and therefore the measured results are compared to the Water Quality Standards as presented below.

PARAMETER	WATER QUALITY STANDARDS			
	SURFACE WATER REGULATIONS [1]			[2]
	A1 MAC	A2 MAC	A3 MAC	SALMONID REGULATIONS
Conductivity, $\mu\text{S}/\text{cm}$ at 20°C	1000	1000	1000	
Temperature, °C	25	25	25	NS
pH	5.5 – 8.5	5.5 – 9.0	5.5 – 9.0	> 6 < 9
Dissolved oxygen, mg/L	NS	NS	NS	NS
Dissolved oxygen, % Saturation	> 60%	> 50%	> 30%	50%, > 9 mg/l O <sub>2</sub>
BOD, mg/L O <sub>2</sub>	5	5	7	< 5
COD, mg/L O <sub>2</sub>	NS	NS	NS	NS
Total Ammonium, mg NH <sub>4</sub> /L	0.2	1.5	4.0	1.0
Suspended solids, mg/L	50	NS	NS	<25
Chloride, mg/L Cl	250	250	250	NS
Phosphates, mg/L P <sub>2</sub> O <sub>5</sub>	0.5	0.7	0.7	NS
Sulphates, ml/L SO <sub>4</sub>	200	200	200	NS



[1] EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1988 [S.I. No. 294 of 1989]

[2] EC (Quality of Salmonid Waters) Regulations, 1988 [S.I. No. 293 of 1988]

### 7.2.1b Trigger Levels

Clare County Council has proposed trigger levels for ammonia and BOD concentrations for the surface water monitoring locations around the site. These trigger levels are considered to highlight a significant change in water quality compared to normal results and require corrective action to be taken. The proposed trigger levels, which are yet to be agreed with the EPA are presented below in Table 7.2.1.

**Table 7.2.1 Surface water trigger levels at Lisdeen Recycling Facility**

<b>Monitoring Location</b>	<b>SW1</b>	<b>SW2</b>	<b>SW3</b>	<b>SW5</b>	<b>SW5a</b>	<b>SW7</b>
<b>Ammonia Concentration (ppm)</b>	2.5	-	10	12.5	-	1.2
<b>BOD Concentration (ppm)</b>	38	-	10	36	-	10

### 7.2.2 Evaluation of monitoring results

Surface water samples were collected during a visit to the Lisdeen Site on the 19<sup>th</sup> and 20<sup>th</sup> May 2010. Samples were collected using a grab sampling technique from six sampling locations in the vicinity of the waste facility. Conductivity, pH, dissolved oxygen (DO) and temperature of all samples were measured on-site during sample collection. Results are presented in Appendix II

The proposed trigger levels for the ammonia and BOD concentrations at the Lisdeen recycling centre have not been exceeded at any of the surface water monitoring locations for the annual monitoring carried out by TMS Environment Ltd.

In order to provide a benchmark for comparison of monitoring results, the results obtained during this survey for relevant parameters are compared with the Quality Standards for Surface Water, EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1988 [S.I. No. 294 of 1989] and the EC (Quality of Salmonid Waters) Regulations, 1988 [S.I. No. 293 of 1988].

### **SW1**

SW1 is located on Stream 1, upstream of the facility. The water quality for this monitoring location is outside the quality requirements of the Category A3 parameters as specified in the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations. Results are elevated for COD (282mg/l), Chloride (2446ppm), conductivity (8610 $\mu$ S/cm) and suspended solids (160mg/l). All metal results at this location are within the expected concentration range.

*This location is upstream from the facility and therefore the source of the elevated results may be due to point sources and diffuse sources of pollution upstream from the monitoring point. The highly elevated and anomalous results obtained for Suspended solid level (160mg/l) may indicate cattle access or slurry spreading not in accordance with the EC GAP regulations 2009 upstream of the facility. The sampling was conducted during a warm dry spell in May 2010 (Met Eireann reported May 2010 to be the driest since 1991) and hence there was little dilution to this location. Water quality therefore may be poor at this location due to stagnant water gathering in the stream combined with upstream sources of point and diffuse pollution sources.*

### **SW2 & SW3**

SW2 and SW3 are located on Stream 2. SW2 is located upstream of the facility and SW3 is located immediately downstream of the surface water discharge from the facility. Water quality at SW2 and SW3 is generally good but monitoring location SW2 shows elevated results for COD (538mg/l), Chloride (5186ppm) and conductivity (13310  $\mu$ S/cm). SW3 shows elevated results for COD (1424mg/l), chloride (10127mg/l) and conductivity (42,500  $\mu$ S/cm) and to a lesser extent the alkali metals (sodium, potassium and magnesium). The historic data for the site shows similar results for these parameters at this location in the past and the elevated results are most likely due to saline intrusion from the nearby sea water and this theory is supported with the high sodium levels seen at SW3 (7194 ppm) and the low ammonia concentrations (<0.0129mg/l).

### **SW5**

SW5 is located on the southern boundary drain, where the drain rises. The results obtained for this location indicate an improvement in water quality in comparison to the historic data for this location with a drop observed in ammonia (0.0526mg/l) and suspended solids (32mg/l) levels. Typically, water quality has been poor at this location due to stagnant water gathering in the drain at the monitoring point.

### **SW5a**

SW5a is located on Stream 3, which flows outside the site perimeter, parallel to the southern boundary drain. Stream 3 receives the runoff from two land drains to the northwest and southwest of the site. Water quality at SW5a is good with the location meeting the quality requirements of the Category A1 parameters as specified in the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations for all parameters. Results obtained for this monitoring location are similar to the historic data available for the site.

## SW7

SW7 is located on the main channel feeding to Poulnasherry Bay, downstream of all surface water discharges from the facility. This channel is cleansed by the tidal influx of salt water from Poulnasherry Bay. Elevated conductivity (40,700  $\mu\text{S}/\text{cm}$ ) and sodium levels (18040 ppm) at SW7 indicated the presence of estuarine water and the results obtained here are similar to the historic data available for this location.

*Clare County Council began a river catchment survey of the Poulnasherry catchment in 2010, which the Lisdeen facility is located in, ensuring Good Agriculture practices are carried out in the area and therefore reducing point and diffuse sources of pollution into all water bodies in this catchment.*

### 7.3 Groundwater

Groundwater wells BH1, BH3s, BH3d, BH4s and BH4d were sampled on the 19<sup>th</sup> and 20<sup>th</sup> May 2010. Monitoring locations are shown in Appendix 1.

<b>Table 7.3.1 Groundwater water locations</b>	
<b>Location Reference</b>	<b>Description of location</b>
<b>BH1</b>	<i>Artesian bedrock well located outside the site, adjacent to the northeast boundary.</i>
<b>BH3d</b>	<i>Bedrock well located close to BH3s, downgradient of the main waste body.</i>
<b>BH3s</b>	Overburden well located within the landfill, close to the southern site boundary.
<b>BH4d</b>	Bedrock monitoring well located in waste and downgradient of the main waste body.
<b>BH4s</b>	Overburden well located within the landfill, close to the southern site boundary.

### 7.3.1 Water Quality Standards and Trigger Values used for comparison purposes

**Table 7.3.2** Extracted from E.C. (Drinking Water) Regulations, 2000 SI No. 439 of 2000

Parameter	Table [1]	Drinking Water Quality Standard	Deviations
Temperature	Not Listed	-	N/A
Conductivity	Table C	2500 $\mu$ S/cm @ 20°C	none
pH	Table C	6.5 $\leq$ pH $\leq$ 9.5	none
Ammonium	Table C	0.23 mg/l N (0.30 mg/l NH <sub>4</sub> )	See trigger levels below
Total Organic Carbon	Table C	No abnormal change	N/A
Cadmium	Table B	0.005 mg/l	none
Chromium	Table B	0.05 mg/l	none
Iron	Table B	0.2 mg/l	none
Lead	Table B	0.010 mg/l	none
Manganese	Table B	<b>0.05 mg/l</b>	none
Nickel	Table B	<b>0.020 mg/l</b>	none
<b>Sodium</b>	Table B	<b>200 mg/l</b>	none

[1] The notes above quote the Table in the regulations from which parametric or limit values were obtained

N/A Not applicable.

#### Trigger Levels

Clare County Council have proposed trigger levels for ammonia concentrations for the monitoring wells located around the site. These trigger levels are considered to highlight a significant change in water quality compared to normal results and require corrective action to be taken. The proposed trigger levels, which are yet to be agreed with the EPA are presented below in Table 7.3.3.

**Table 7.3.3** Groundwater trigger levels at Lisdeen Recycling Facility

<b>Monitoring Well</b>	<b>BH1</b>	<b>BH3</b>	<b>BH3s</b>	<b>BH4</b>
<b>Ammonia Concentration (ppm)</b>	0.5	1.7	1.0	0.5

### 7.3.2 Evaluation of results

The proposed trigger levels for the ammonia concentrations at the Lisdeen recycling centre have not been exceeded at any of the groundwater wells for the annual monitoring carried out by TMS Environment Ltd.

Limit values from the Drinking Water Regulations (Statutory Instrument No 439 of 2000) are shown in Table 7.3.2 above. Tables A and B of the Regulations contain parameter limit values which may not be exceeded. Table C contains limit values for indicator parameters. The groundwater wells monitored are not used for drinking water purposes and the standard of construction of a water supply well would be superior to the construction standard of monitoring wells. The water quality standards listed are shown for comparison purposes only. Some of the parameters monitored are presented in Table 2 above along with comments listing those parameters meeting with the maximum allowable concentration in drinking water.

#### Electrical conductivity and pH

All dissolved species contribute to conductivity. In Ireland the typical range is from about 300  $\mu\text{S}/\text{cm}$  to 1000  $\mu\text{S}/\text{cm}$ . All results for the boreholes tested are below the limit values as defined in Table C of the Drinking Water Regulations. The pH values for all the boreholes are approximately neutral and are very

consistent across the site with results ranging from 7.05 to of 7.51 pH units for all borehole locations.

#### Ammonia

The results for ammonia levels at all boreholes monitored are within the proposed trigger levels set for the groundwater wells. The ammonia results are also below the limit values as defined in Table C of the Drinking Water Regulations in all cases with the exception of BH1 where a result just above the 0.30 mg/l guide value for ammonia was recorded. The ammonia results are comparable to the 2009 monitoring data for these locations.

#### Chloride

The typical chloride concentration in Irish groundwater is about 20ppm Cl. The results for chloride for the groundwater boreholes indicate concentrations in this range. The highest chloride concentration measured was 74ppm at BH1 and BH4. All chloride results are significantly below the parametric limit value of 250ppm Cl as specified in Table C of the regulations. Chloride results were very consistent across the site ranging from 69 to 74 ppm and again are consistent with the recent historic data for the site.

#### Total Organic Carbon:

The results obtained for the TOC concentrations at the site ranged from < 0.3 ppm at a number of wells to 7 ppm measured at BH1. There are no limit values for TOC for comparison purposes but the results are generally consistent with the historical data available for the groundwater at the site.

#### Metals

All heavy metals were reported as being below the laboratory limit of detection for all groundwater wells across the site with the exception of boron and manganese. Both the boron and manganese levels measured are low and are well within the expected concentration ranges. Iron levels measured were also below

the limit values from the Drinking Water regulations (Statutory Instrument No 439 of 2000) in all cases.

## **7.4 Leachate**

### **7.4.1 Evaluation of monitoring results**

The leachate samples were collected from monitoring locations L1 and L2 on the 20<sup>th</sup> May 2010. Measurement results recorded for both L1 and L2 are very similar to the results obtained for these locations in 2009. Both samples are considered relatively clean for leachate and both samples are similar in content. The L2 sample does have higher concentrations of ammonia (231mg/l), chloride (435mg/l), some metals and alkalinity when compared to the L1 sample but this general trend is also noted in the historical data available. The BOD result for both L1 and L2 (31.6 mg/l and 11.9 mg/l respectively) are reasonably low and are also lower than previously recorded in 2009. For the remaining parameters the results recorded for both monitoring locations are within the expected concentration ranges for the various parameters.

The Leachate results are presented in Appendix IV Table IV.



## **8) Resource Consumption Summary**

### **Diesel**

800 litres of diesel was used to power the 3-phase generator on site.

### **Electricity**

It is estimated that approximately 3,647 units of electricity were used in 2010.

### **Water**

Water supply to the site is via a connection to the group water scheme. Water usage on site is mainly for power washing yards, transfer station apron and hopper. 190,000 litres was the estimated use for 2010. The reason for the figure being so high is due to the fact that there was a leak on the water supply pipe coming into the site. This was fixed in December 2010 and the average usage now approximates at 3,000 litres monthly.

## **9) Development works undertaken during the period and timescale for proposed works.**

Two new waste containers were purchased for the site in December 2010 to replace the existing containers.

A concrete base was installed in 2010 in the main recycling area so that all waste streams are now positioned on a smooth even surface.

New signage was installed in 2010 for all waste streams.

Clare County Council has received Part VIII Planning Permission to begin the remediation process. Clare County Council intend to begin works as soon as finances permit.

## **10) Full title and written summary of any procedures developed by the licensee during the previous year.**

No procedures were developed during the past year.

### **11) Drum, Tank and Bund Testing.**

In 2007 Clare Council purchased a new Bunded unit. The base of the Bund will be emptied and its contents disposed/recovered by an approved contractor before the next quarterly report.

An integrity test was carried out on the bund in March 2011 and all results have been submitted to the EPA.

### **12) Reported Incidents and Complaints Summaries.**

There were no complaints received during the year and no incidents recorded at the facility.

### **13) Review of nuisance controls**

No review of nuisance controls was carried out during 2010; no nuisances were noted at the facility during 2010 therefore a review was not considered to be necessary.

### **14) Schedule of Environmental Objectives and Targets**

#### **Objective 1**

Comply with all aspects of the licence.

Target 1.1 - Every effort will be made to comply with all conditions of the waste licence by the prescribed dates.

The Senior Engineer, Executive Engineer in charge, Deputy Site Manager, Executive Chemist and Environmental Patrol Warden have responsibility for implementing this objective.

#### **Objective 2**

Ensure that sufficient funds are available to comply with condition 12 of the licence.

Responsibility for ensuring compliance with this objective lies with the Finance Officer of Clare County Council.

#### **Objective 3**

Increase the quantity of waste collected for recycling at the facility.

Target 3.1-Increase the quantities of cardboard and newspaper collected at the Recycling Centre. Suitable containers for each waste type will be provided on site and the public will be informed by means of appropriate awareness campaigns.

Target 3.2-Increase the quantities of glass, aluminium cans, and steel cans collected at the Recycling Centre.

The Senior Engineer, Environmental Services has responsibility for implementing this objective with the assistance of the Executive Engineer in charge and the Environmental Awareness Officer in the Environment Dept.

#### **Objective 4**

Improve facilities at the facility.

Target 4.1 - Make facility more user-friendly by providing containers and providing clear instructions as to what these are for. This will allow for proper segregation of recyclable streams. All bulky wastes and hazardous wastes will be stored in one particular area of the facility and this area will be secured thus allowing for greater supervision when these recyclable streams are being deposited. This will also eliminate traffic hazards. On occasion there is difficulty with turning/reversing manoeuvres at the facility due to large stockpiles of white goods and large recycling receptacles.

Target 4.2 - Provision of additional recyclable streams by year-end.

The Executive Engineer in charge has responsibility for implementing this objective.

#### **Objective 5**

Improve correspondence with the E.P.A.

Target 5.1 - Council will make every effort to reply to letters of correspondence received from the Agency by the requested dates.

The Executive Engineer in charge and Senior Staff Officer have responsibility for implementing this objective.

#### **Objective 6**

Comply with condition 3.10.1

Target 6.1 - Install by mid-2008 an interceptor as per condition 3.10.1 of the waste license, as part of overall landfill remediation programme.

This will be installed in 2011 when funds become available.  
The Executive Engineer in charge will have responsibility for implementing this objective.

**Objective 7**

Advance the Restoration and Aftercare Plan.

Target 7.1 - Implement the first phase of the Restoration and Aftercare plan as agreed with the Agency.

The Senior Executive Engineer, Executive Engineer, Finance Officer and Senior Staff Officer have responsibility for implementing this objective.

Time scale

A requisition for funding is with the DOEHLG at present. When this funding becomes available details of the Restoration and Aftercare plan will be submitted.

Designation of Responsibilities

The Senior Engineer, Environmental Services Section of Clare County Council has overall responsibility for the implementation of these objectives. The specific responsibilities for each objective are outlined in the description.

**15) Progress of objectives and targets**

<b>Objective 1</b>	This is ongoing and mainly successful, the licensee will continue to aim for maximum compliance.
<b>Objective 2</b>	Funding has been made available and the licensee will continue to ensure funding is made available.
<b>Objective 3</b>	During 2010 collections of non-municipal wastes amounted to 42% of all material accepted onto site.
<b>Objective 4</b>	The licensee placed additional signage to improve user friendliness on the site. A new concrete base was installed in the main recycling area which improves greatly the safety and layout of the site. The licensee will continue to review the site layout in order to provide the best possible service. We introduced the following new waste streams: rigid plastics and fluorescent tubes (WEEE).
<b>Objective 5</b>	Correspondence with EPA as set out by EPA is an ongoing objective, the licensee will continue to progress this objective.
<b>Objective</b>	Installation of the oil Interceptor will form part of the remediation project.

<b>6</b>	
<b>Objective</b> <b>7</b>	This project will proceed when funding becomes available

### **16) Financial Provision**

A sum of €197,500 has been set aside in the 2011 Chre Co. Council Budget for the operation of the facility. Additional monies are being sought through grants from the Department of the Environment and Local Government for the capital works relating to the Restoration and Aftercare of the Site.

**Appendix I**  
**Location of Monitoring Points**



**Appendix II**  
**Summary of Surface Water Monitoring Results**



**Table II: Surface water results at Lisdeen facility (19<sup>th</sup> & 20<sup>th</sup> May 2010)**

Sample Type:	Surfacewaters					
Location:	Lisdeen Transfer Station					
Date:	19&20/05/2010					
Sampled By:	TMS Environmental					
Variables	SW1	SW2	SW3	SW5	SW5a	SW7
Biochemical Oxygen Demand (ppm)	2.72	<2	<2	13.9	<2	7.68
Boron (ppm)	0.62	0.95	3.2	0.23	0.05	2.9
Calcium (ppm)	102	121	355	90	102	377
Cadmium (ppb)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride (ppm)	2446	5186	10127	832	65	14383
Chemical Oxygen Demand (ppm)	282	538	1424	90	11	1630
Electrical Conductivity (uS/cm)	8610	13310	42,500	2990	421	40700
Chromium (ppb)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper (ppb)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Temperature (Celsius)	25.7	20.5	18	18.7	21.4	20.4
Iron (ppb)	2.4	0.0088	<.005	0.023	0.014	<.005
Potassium (ppm)	92	121	398	26	1.5	356
Magnesium (ppm)	80	320	456	57	12	222
Manganese (ppb)	0.0071	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium (ppm)	1213	2204	7194	400	35	18040
Ammoniacal Nitrogen (ppm)	0.0474	<0.0129	<0.0129	0.0526	<0.0129	0.0791
Nickel (ug/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (ppb)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH	7.55	8.08	7.52	6.75	7.97	7.52
Total Suspended Solids (ppm)	160	30	31	32	<5	58
Zinc (ppb)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

**Appendix III**  
**Summary of Groundwater Monitoring Results**

**Table III: Groundwater water results at Lisdeen facility (19<sup>th</sup> & 20<sup>th</sup> May 2010)**

Sample Type: Groundwater						
Location:	Lisdeen Transfer Station					
Date:	19&20/05/2010					
Sampled By:	TMS Environmental					
Parameter	BH1	BH3	BH3s	BH4	BH4s	Limits(1)
Alkalinity (ppm)	360	379	382	360	338	No abnormal change
Boron (ppm)	0.079	0.082	0.084	0.082	0.079	1
Calcium (ppm)	35	30	57	28	37	200
Cadmium (ppm)	<0.005	<0.005	<0.005	<0.005	<0.005	5
Chloride (ppm)	74	71	69	74	73	30
Cyanide (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Electrical Conductivity (uS/cm)	776	831	834	831	812	1000
Chromium (ppb)	<0.005	<0.005	<0.005	<0.005	<0.005	30
Copper (ppm)	<0.05	<0.05	<0.05	<0.05	<0.05	30
Iron (ppm)	<0.005	0.082	0.01	<0.005	<0.005	200
Fluoride (ppm)	0.169	0.14	0.153	0.163	0.168	1
Mercury (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	1
Potassium (ppm)	4.1	4.4	4.8	4	4.1	5
Magnesium (ppm)	23	23	24	17	17	50
Manganese (ppb)	<0.005	<0.005	<0.005	<0.005	<0.005	50
Sodium (ppm)	82	80	86	117	97	150
Total dissolved solids (mg/l)	388	454	411	400	455	Not specified
Temperature (Celsius)	15.2	16.5	17.1	14.7	15.2	25
Ammoniacal Nitrogen (ppm)	0.4752	<0.013	0.0525	0.027	0.46	0.15mg/l (ammonium)
Nickel (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02	20
Orthophosphate P ppm	<0.100	<0.100	<0.100	<0.100	<0.100	0.03 (Orthophosphate)
Lead (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	10
pH	7.51	7.1	7.05	7.5	7.44	6.5-9.5
Sulphate (ppm)	9.81	11.67	21.57	6.23	8.62	200
Total Organic Carbon (ppm)	7	1.1	4.5	<0.3	0.4	No abnormal change
Total Oxidised Nitrogen (ppm)	3.4	1.5	0.8	1.4	1.7	No abnormal change
Total phosphorus (ppm)	<0.01	0.041	0.049	0.045	0.022	
Zinc (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	100

Limits quoted are Interim Guidance Values from EPA document "Towards setting guidance values for protection of Groundwater in Ireland"

**Appendix IV**  
**Summary of Leachate Monitoring Results**

**Table IV: Leachate results at Lisdeen facility (20<sup>th</sup> May 2010)**

Sample Type:	Groundwater	
Location:	Lisdeen Transfer Station	
Date:	20/05/2010	
Sampled By:	TMS Environmental	
Parameter	L1	L2
Alkalinity (ppm)	273	2712
Biochemical Oxygen Demand (ppm)	31.6	11.9
Boron (ppb)	0.49	1.2
Calcium (ppm)	99	180
Cadmium (ppb)	<0.005	<0.005
Chloride (ppm)	14	435
Cyanide (ppm)	<0.01	<0.01
Chemical Oxygen Demand (ppm)	102	318
Electrical Conductivity (uS/cm)	643	5530
Chromium (ppb)	0.0088	<0.005
Copper (ppb)	2.2	9.4
Iron (ppb)	4.2	5.6
Fluoride (ppm)	0.124	0.122
Mercury (ppb)	<0.01	<0.01
Potassium (ppm)	7.9	158
Magnesium (ppm)	11	84
Manganese (ppb)	0.44	2.1
Sodium (ppm)	97	255
Ammoniacal Nitrogen (ppm)	<0.01	<0.01
Orthophosphate P	<0.1	<0.1
Lead (ppb)	0.034	<0.01
pH	6.66	6.76
Sulphate (ppm)	65	17.3
Total Organic Carbon (ppm)	5.5	19.6
Total Oxidised Nitrogen (ppm)	1.6	37
Total phosphorus (ppm)	0.6	0.58
Temperature C	13.8	12.2
Zinc (ppb)	1.1	1.1