

Attachment K. Remediation, Decommissioning, Restoration and Aftercare

SEHL prepared an Environmental Liability Risk Assessment (ELRA) and Decommissioning Management Plan (DMP) for the facility and these, along with a proposal for Financial Provision, were submitted to and approved by the Office of Environmental Enforcement (OEE) in December 2013. A copy of the ELRA and the DMP is included in this Attachment. SEHL revised and updated the costs of the ELRA and DMP for the installation in 2016 and these have been approved by the OEE.

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global environmental solutions

**Greenstar Materials Recovery Facility
Millenium Business Park
Ballycoolin
Co. Dublin**

Waste Licence No, W0183-01

Closure & Decommissioning Plan

Final Report

17th June 2013

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CONTENTS

1.0 INTRODUCTION AND BACKGROUND	1
1.1 Our Brief	1
1.2 About SLR Consulting.....	1
1.3 Site Description	1
1.4 Facility Operations.....	3
1.5 Site Monitoring.....	6
1.6 Bund Testing.....	9
1.7 Site Audits/Inspection	9
1.8 Other Notable Issues	10
1.9 Risk Category.....	10
2.0 CLOSURE & DECOMMISSIONING	11
2.1 Closure Scenario	11
2.2 Plant or Equipment Decontamination	11
2.3 Removal of Waste Materials.....	11
2.4 Removal of Other Potential Pollutants	12
2.5 Summary of Closure and Decommissioning Costs	16
2.6 Closure Plan Update and Review	16
3.0 CONCLUSIONS.....	16
4.0 CLOSURE.....	17

TABLES

Table 1-1 Waste Movement at Millennium Park MRF in 2010 and 2011	5
Table 1-2 Surface Water Quality: SW-1 and SW-2 Monitoring Results.....	6
Table 1-3 Wastewater Emissions: SE-1 Monitoring Results (2010).....	7
Table 1-4 Wastewater Emissions: SE-1 Monitoring Results (2011).....	8
Table 1-5 Recorded Noise Levels at Facility 2010 and 2011	8
Table 1-6 Recorded Dust Levels at Facility 2010 and 2011	9
Table 2-1 Estimated Cost of Decommissioning after Closure	16

FIGURES

Figure 1 Site Location.....	2
Figure 2 Aerial View of Site and Surrounds (from Google Earth).....	3
Figure 3 Aerial View of Site (from Google Earth).....	4

PHOTOS

Photo 1 – Greenstar’s Millenium Park Site.....	1
Photo 2 – Green Diesel and Waste Oil Tanks.....	12
Photo 3 – Diesel Tank at Back-Up Generator.....	13
Photo 4 – Drum Storage in Maintenance shed.....	14
Photo 5 – Waste Processing Building	15
Photo 6 – Main Site Yard	15

APPENDICES

Appendix A - Site Layout Drawings 19

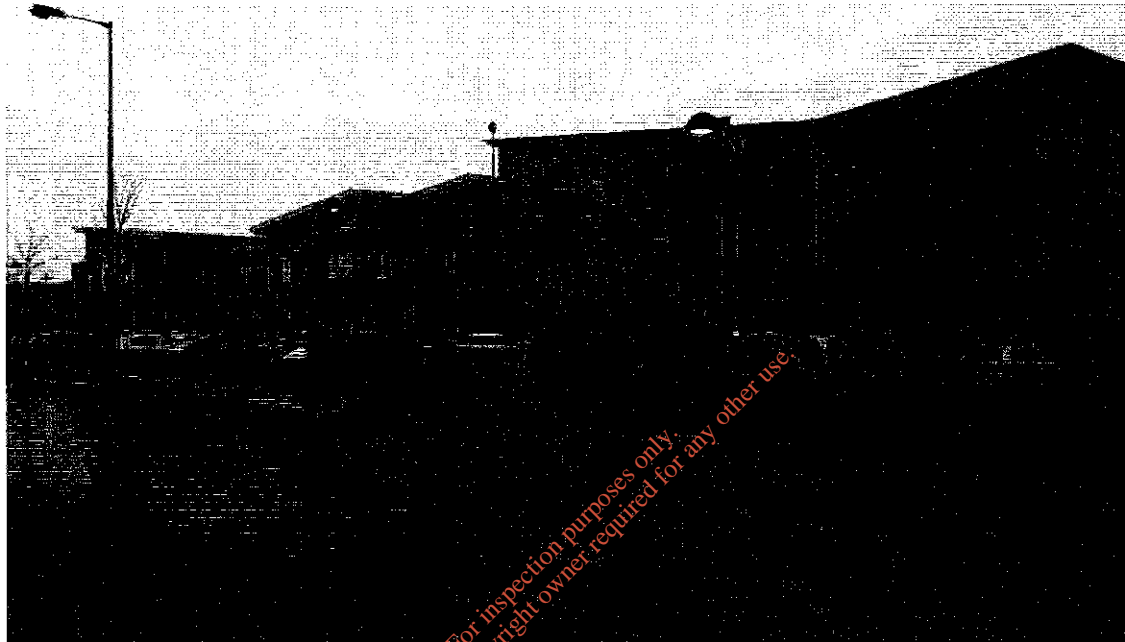
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1.0 INTRODUCTION AND BACKGROUND

1.1 Our Brief

SLR Consulting Ireland (SLR) has prepared this independent Closure and Decommissioning Plan (CDP) in relation to Greenstar's existing Materials Recovery Facility at Millennium Park, Ballycoolin, Dublin 11.

Photo 1 – Greenstar's Millenium Park Site



1.2 About SLR Consulting

SLR Consulting is a major international multi-disciplinary environmental consultant, employing 900 staff in Ireland, the UK, North America, Australia and South Africa. In Ireland, the company trades as SLR Consulting Ireland, and employs around 30 environmental specialists, engineers and support staff at offices in Dublin and Hillsborough.

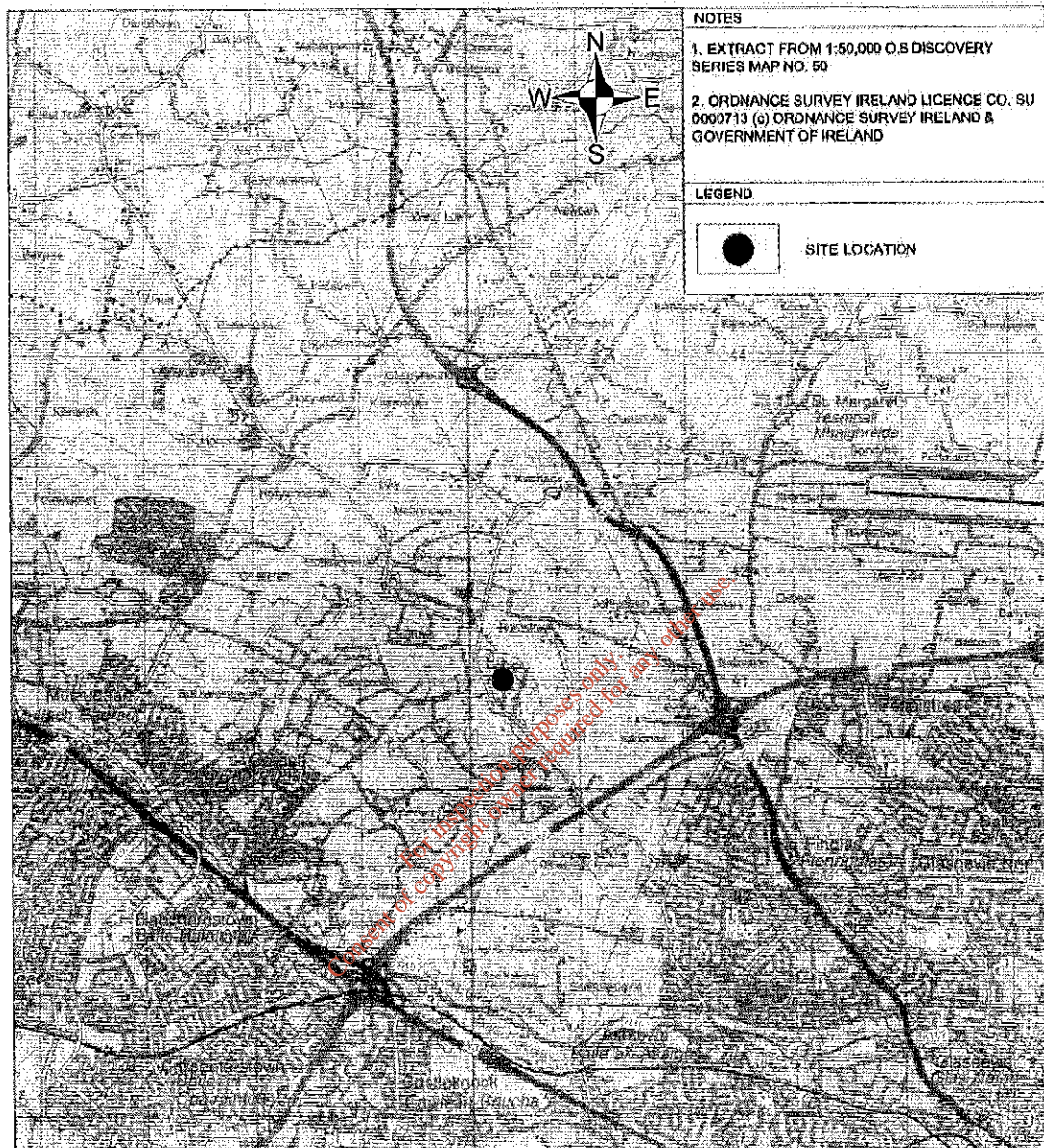
Recent Clients of SLR include the European Union, national governments, government departments, international lending agencies, UK and Irish regional and local authorities / agencies, waste treatment technology providers and private sector waste management companies.

SLR employs the largest team of waste management experts in the UK and Europe. The equivalent of 150 staff are employed on a full-time basis on waste management projects in Ireland and the UK. Specialist staff are employed across 30 separate technical disciplines.

1.3 Site Description

The existing facility at Millennium Business Park covers an area of approximately 4.45 hectares (10.7 acres). It is located entirely within the townland of Grange, approximately 3km north-west of Finglas and 1.5km north of the M50 motorway (see Figure 1 below).

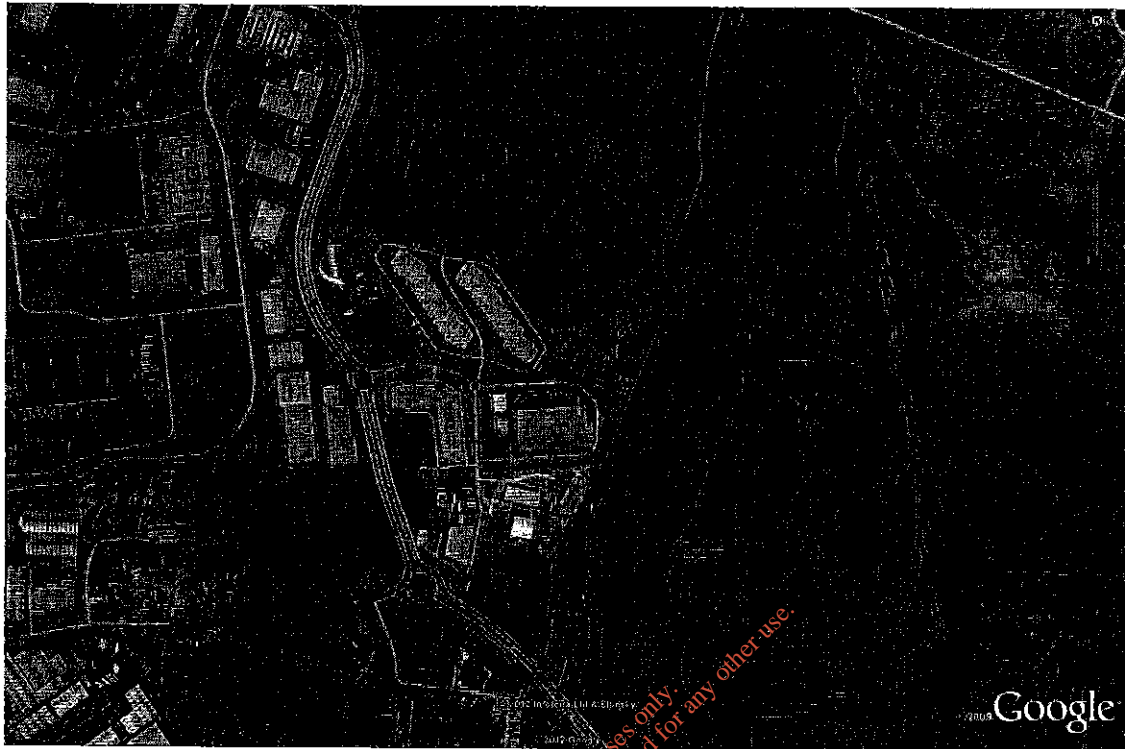
**Figure 1
Site Location**



The site is located within an existing industrial / business park. The site is bound to the north and east by a quarry operated by Roadstone Wood and to the west and south by other business premises within Millennium Business Park. The site is traversed from north-west to south-east by the Finglas to Woodlands high voltage (220kV) overhead power lines. The Finglas to Macetown high voltage (100kV) overhead power line runs from east to west along the southern site boundary.

Figure 2 shows an aerial view of the site and surrounds captured from Google Earth.

Figure 2
Aerial View of Site and Surrounds (from Google Earth)



1.4 Facility Operations

The existing Materials Recovery Facility (MRF) has been in operation since summer 2006. It is currently licensed to accept and process up to 220,000 tonnes of mixed non-hazardous, municipal, commercial, industrial and construction / demolition waste annually. This comprises

- 100,000 tonnes of Municipal Waste
- 90,000 tonnes of Commercial and Industrial (C&I) Waste
- 30,000 tonnes Construction and Demolition (C&D) Waste.

No hazardous waste (in solid or liquid form) is accepted or handled at the facility.

All waste acceptance, handling and processing is undertaken indoors, within the existing material recovery and transfer building, with the exception of storage of wrapped bales of Solid Recovered Fuel (SRF) in outdoor areas. In addition to the above, the EPA waste licence for the facility also provides for the treatment of up to 50,000 tonnes of biowaste annually in a separate biowaste treatment building which has yet to be constructed.

At the present time, the key activities undertaken at the Millennium Park facility include:

- Segregation of the C&I waste into different waste streams (paper, cardboard, glass, metal, organic, SRF, etc.)
- Baling and compaction of the (C&I) waste streams prior to removal to off-site waste disposal or recovery facilities and

- Screening and segregation of the C&D waste into different waste streams (concrete, brick, tiles, plasterboard, metal, timber etc.).

The layout of the existing facility, and of the proposed biowaste facility, is shown on O'Callaghan Moran (OCM) Drawing No 2.1 and Michael Punch and Partners Drawing 022-045-001, both reproduced in Appendix A. The drawings also shows the location and layout of waste storage areas, skip and vehicle parking areas, vehicle maintenance and refuelling areas, weighbridges and the overhead power lines in the vicinity of the site.

Figure 3 below shows an aerial view of the site from Google Earth.

Figure 3
Aerial View of Site (from Google Earth)



The waste licence allows acceptance of waste at the facility 24 hours per day, 7 days per week, following technical amendment issued by the Agency in 2006.

All commercial and industrial / construction and demolition wastes accepted at the facility are emptied at dedicated bays within the MRF building. Mixed wastes are emptied at separate bays to pre-segregated wastes. All waste intake is inspected for unsuitable material and if any is identified, it is transferred to a dedicated waste quarantine area. Following inspection, the initial sorting of the mixed waste streams involves removing larger and heavier items (such as timber and metal) using a mechanical grab and placing them in dedicated storage bays elsewhere within the MRF building. The remaining wastes are then segregated into different waste streams using automated processing equipment and some manual picking. The segregated wastes (paper, cardboard, plastic, metal cans, SRF, wood, timber and fines) are then stored separately pending transfer off-site to authorised recycling and recovery facilities. The residual waste is also stored separately pending transfer off-site to authorised disposal (landfill) facilities.

The waste tonnage accepted and consigned at the Millennium Park facility (broken down by European Waste Catalogue (EWC) Codes) reported in Annual Environmental Reports (AER) for the calendar years 2010 and 2011 are shown in Table 1-1 below.

**Table 1-1
Waste Movement at Millennium Park MRF in 2010 and 2011**

Commodity (EWC)	Description	Waste In 2011 (t)	Waste Out 2011 (t)	Waste In 2010 (t)	Waste Out 2010 (t)
07 05 13*	Potentially contaminated MSW				117
10 01 01	Bottom ash, slag and boiler dust	4		1	
10 03 05	LDF alumina	14		10	
13 02 08	Waste oil		3		
13 05 03	Interceptor sludge	9			
15 01 01	Segregated cardboard / paper packaging	258	276	769	659
15 01 02	Segregated plastic packaging	128	1	120	18
15 01 03	Segregated wood packaging	614	41	607	41
15 01 04	Segregated metal packaging (Al cans)	4			
15 01 06	Segregated mixed packaging	5,987	4,889	3,813	3,546
15 01 07	Segregated glass packaging	52		54	
16 01 03	Tyres	139	93	6	
16 05 04	Hazardous gas cylinders		3		
16 06 01	Hazardous lead acid batteries		1		
17 01 01	Concrete from C& D waste			7,000	
17 04 11	Cables from C&D waste (non-hazardous)			1	
17 05 04	Soil and stone from C&D waste	103	7,674	16	56
17 08 02	Gypsum based C& D waste-plasterboard	17			
17 09 04	Mixed C& D waste	5,284			
19 09 02	Sludge				2
19 09 05	Resin			6	
19 12 01	Paper / cardboard from mechanical treatment			25	
19 12 07	Wood (non-hazardous) from mechanical treatment		6,267	498	3,475
19 12 09	Minerals from mechanical treatment (Inorganic fines, sand and stones)	8	16,715	3	18,999
19 12 10	RDF combustible		3,213		51
19 12 12	Mixed municipal waste		20,247	21,318	1,067
20 01 01	Paper / cardboard from municipal sources	9		22	5
20 01 02	Glass from municipal sources	8		8	
20 01 08	Commercial food waste	1,116	6,078	1,068	2,686
20 01 10 /	Textile waste from municipal sources	38			

20 10 11					
20 01 35*	WEEE	1		0.5	
20 01 38	Wood waste from municipal sources	2,205	998	1,210	2,875
20 01 39	Plastic from municipal sources	3		4	
20 01 40	Metals from municipal sources	466	2,508	291	2,207
20 01 99	Other wastes (grease trap / gas cylinders)	1			2
20 02 01	Biodegradeable garden and park waste	7,032	41	4,809	2,424
20 03 01	Mixed residual waste (black bin)	18,163		4,723	
20 03 01	Mixed dry recyclables (green bin)	12,555			
20 03 03	Street cleaning residues	954	2,498		
20 03 07	Bulky waste	32,019	11,635	28,312	30,635
	Total Received	87,191		74,694	
	Total Consigned		83,181		68,869

1.5 Site Monitoring

The waste licence for the Millennium Park facility requires regular environmental monitoring of noise, dust, surface water and wastewater emissions (to sewer) at designated locations across the site (shown on OCM Drawing No. 2.1, reproduced in Appendix A). A review of the 2010 and 2011 monitoring data indicates that the site generally appears to be operating in compliance with emission limit values set in the waste licence.

1.5.1 Surface Water Monitoring

At the present time, only approximately 50% of the total site area has been paved or developed. There are currently two surface water monitoring locations (designated SW-1 and SW-2) located around the entrance to the facility, as shown on O'Callaghan Moran (OCM) Drawing No 2.1, reproduced in Appendix A.

Schedule D of the Waste Licence requires surface water monitoring to be undertaken at these locations at quarterly intervals. The results of quarterly monitoring undertaken in 2010 and 2011 are presented in Table 1-2 below. Quarterly data has not been provided for several quarterly periods, as there was no surface water flow off-site at the time sampling personnel visited the facility. With the exception of one notable exceedance at SW-2 in Q4 2011 (when a suspended solids concentrations of 488mg/l was recorded), tests results indicate that pre-set trigger levels for BOD, total suspended solids and mineral oils in surface water run-off were not exceeded.

Table 1-2
Surface Water Quality: SW-1 and SW-2 Monitoring Results

Parameter	Units	SW1		SW2			Trigger Level
		Q4 2010	Q4 2011	Q2 2010	Q4 2010	Q4 2011	
pH	pH units	7.63	8	8.14	8.07	8.31	N/A
Conductivity	mS/cm	0.334	0.436	0.177	0.364	0.569	N/A
Temperature	°C	13	11	12.2	13	10.8	N/A

Parameter	Units	SW1		SW2			Trigger Level
		Q4 2010	Q4 2011	Q2 2010	Q4 2010	Q4 2011	
BOD	mg/l	3	3	3	8	8	25
COD	mg/l	315	13	14	18	45	N/A
Ammoniacal Nitrogen	mg/l	1.64	2.13	0.15	5.49	1.85	N/A
Total Suspended Solids	mg/l	10	NDP	<10	15	488	35
Oil Fats and Greases	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	N/A
Mineral Oils	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	5

NDP – No detection possible

1.5.2 Wastewater Monitoring

Schedule D of the Waste licence requires wastewater emissions from the facility to be sampled and tested at two monthly (bi-monthly) intervals. Wastewater discharge from the facility primarily comprises wash down water from the waste intake and storage bays and vehicle washing. It is collected and discharged via a silt trap and petrol/oil interceptor to the public sewer network within Millennium Park. The location of the wastewater sampling point, designated SE-1, is shown on O'Callaghan Moran (OCM) Drawing No 2.1, reproduced in Appendix A.

The results of quarterly monitoring undertaken at SE-1 in 2010 and 2011 are presented in Tables 1-3 and 1-4 below. Tests results indicate that emission threshold limits set by the waste licence were not exceeded in either year.

**Table 1-3
Wastewater Emissions: SE-1 Monitoring Results (2010)**

Parameter	Units	Feb 2010	Apr 2010	Jun 2010	Aug 2010	Oct 2010	Dec 2010	Emission Limit
pH	pH units	7.63	7.84	8.44	7.42	8.08	Dry	6-10
Temperature	°C	13.5	8.7	13.4	15.1	14	Dry	42
BOD	mg/l	185	110	72	419	271	Dry	6,000
COD	mg/l	1010	460	21	2290	437	Dry	12,000
Ammoniacal Nitrogen	mg/l	1.46	1.42	1.87	34.97	77.76	Dry	100
Total Suspended Solids	mg/l	102	250	10	448	<10	Dry	2,500
Oil Fats and Greases	mg/l	<0.01	0.066	<0.01	<0.01	<0.01	Dry	100
Orthophosphate	mg/l	0.74	<0.06	0.42	11.28	9.02	Dry	100
Surfactants	mg/l	2.2	0.51	0.3	2.5	0.5	Dry	100
Sulphate	mg/l	257.4	147.9	93.46	85.1	41.58	Dry	1,000

**Table 1-4
Wastewater Emissions: SE-1 Monitoring Results (2011)**

Parameter	Units	Feb 20110	Apr 2011	Jun 2011	Aug 2011	Oct 2011	Dec 2011	Emission Limit
pH	pH units	7.26	8.12	7.72	7.72	8.12	8.32	6-10
Temperature	°C	12	13.1	13.3	13.2	14.8	10.2	42
BOD	mg/l	44	318	262	177	223	5	6,000
COD	mg/l	229	782	561	365	559	44	12,000
Ammoniacal Nitrogen	mg/l	2.47	2.52	41.42	4.55	10.97	1.89	100
Total Suspended Solids	mg/l	152	229	757	65	26	184	2,500
Oil Fats and Greases	mg/l	<1	0.23	<0.01	<0.01	2.78	<0.01	100
Orthophosphate	mg/l	<1	2.305	24.26	0.89	3.57	<0.06	100
Surfactants	mg/l	<0.21	2.3	0.4	0.9	0.6	<0.2	100
Sulphate	mg/l	104.5	201.3	13.0	95.0	97.9	217.4	1,000

1.5.3 Noise Monitoring

Schedule D of the Waste Licence requires noise monitoring to be undertaken at annual intervals at three discrete locations around the facility, designated N1, N2 and N3 (shown on OCM Drawing No. 2.1, reproduced in Appendix A). Noise was also recorded at the nearest noise sensitive location a residential property to the south of the site along Cappagh Road, designated NSL-1. A summary of recorded noise levels is presented in Table 1-5 below

**Table 1-5
Recorded Noise Levels at Facility 2010 and 2011**

Location	2010				2011			
	L _{Aeq,30min} dB	L _{A10,30min} dB	L _{A90,30min} dB	Specific Level dB	L _{Aeq,30min} dB	L _{AF10,30min} dB	L _{AF90,30min} dB	Specific Level dB
N1	52	55	46	46	55	57	49	55
N2	62	64	60	62	60	62	47	60
N3	73	72	68	73	70	72	69	70
NSL1	68	72	50	<50	70	75	48	<48

Specific Level – Sound pressure level considered to be contributed by waste facility

It is noted that the continuous equivalent A-weighted noise level (L_{Aeq}) recorded at the noise sensitive residence in both 2010 and 2011 was considerably in excess of the 55dBA limit set by the waste licence limit for the Millennium Road MRF. The elevated noise level at this residence is however principally attributable to the continuous flow of traffic along Cappagh Road and the AERs suggest that noise from the Greenstar site is barely (if at all) audible at this location.

It is noted that at the two noise monitoring locations closest to the MRF building (N2 and N3), both the recorded continuous equivalent and background noise levels are in excess of the emission limit of 55dBA set by the waste licence, but there are other noise sources in the vicinity of these monitoring points.

1.5.4 Dust Monitoring

Schedule D of the Waste Licence requires dust monitoring to be undertaken at the facility three times a year, with at least two of those monitoring periods being between May and September. Dust monitoring is undertaken using the Bergerhoff method at four discrete locations, designated DS-01, DS-02, DS-03 and DS-04, shown on OCM Drawing No. 2.1, reproduced in Appendix A. The threshold limit for dust emissions set by the waste licence is 350mg/m²/day. A summary of recorded dust levels is presented in Table 1-6 below

**Table 1-6
Recorded Dust Levels at Facility 2010 and 2011**

Location	Units	2010			2011			Emission Limit
		Feb 10	July 10	Aug 10	May11	June 11	July 11	
DS-01	mg/m ² /day	38.8	80.4	35.4	55.7	37.3	43.7	350
DS-02	mg/m ² /day	29.7	247.4	47.7	67.5	146.4	27.1	350
DS-03	mg/m ² /day	449.3	194.6	281.9	259.4	246.3	77.4	350
DS-04	mg/m ² /day	38.2	49.4	108.8	107.7	225.6	47.2	350

The only recorded exceedance of the dust emission limit occurred in February 2010 at location DS-03 along the southern boundary which is shared with an adjoining pre-cast concrete production facility. Given the generally low level of dust emissions around the facility, it was considered that some activities at the adjoining site around that time may have contributed to the elevated dust level recorded in February 2010.

1.6 Bund Testing

The Licence for the facility requires that tank, drum, pipeline and bund testing to be carried out every three years. In addition to this, bunds are inspected weekly and maintained / emptied as required. The bunds were tested in May 2009 and the drains in January 2010 and were passed fit for purpose. In the third quarter of 2012 integrity test reports were submitted in relation to five permanent material storage bunds on the site.

1.7 Site Audits/Inspection

A review of recent compliance files for the site has been carried out to identify any instances of non-compliance noted in Agency site audit and inspection reports which may have had an adverse environmental impact on the site. This review identified that site audits had been carried out in on the facility in 2010 and 2011 and that a site inspection had been carried out in November of 2012.

In the case of the 2010 Audit, the inspector identified one non-compliance relating to the maintenance of waste records and made five observations relating to the overall operation of the site. Each issue was subsequently addressed by the facility operators to ensure compliance.

In 2011, the audit identified three non-compliances and eight observations. The non-compliances related to waste records kept at the facility, the storage of waste outdoors and the operation of the waste transfer building doors. Each non-compliance was subsequently addressed to ensure that operations do not result in any adverse environmental impacts.

Most recently, an Agency inspector conducted a site inspection of the facility in November of 2012 which resulted in the identification of two non-compliances and seven observations. All non-compliance (relating to waste storage on site and litter management) and observation items were promptly addressed by the facility operators.

1.8 Other Notable Issues

In April 2010, there was a small fire in hopper area of the facility's construction and industrial waste shredder. On this occasion the fire containment system proved efficient and no significant consequential damage arose. The only emissions were airborne smoke and an estimated fire water volume of 3,000 litres which was captured by the foul water system.

1.9 Risk Category

As part of an Environmental Liabilities Risk Assessment for the site, SLR assessed the Risk Category for the site using the formula offered in the EPA Guidance manual - *Guidelines on Environmental Liability, Risk Assessment, Residuals Management Plans and Financial Provision*.¹ Our analysis concluded that the site falls into Category 2. Highest risk sites fall into Category 3 and lowest risk sites fall into Category 1.

The Risk Category is derived by consideration of the complexity of the site, the environmental sensitivity of the receiving environment and the compliance record of the operator of the facility.

The site scored the maximum score of 5 in terms of complexity. The receiving environment scored 1 in terms of environmental sensitivity, where the maximum score is 3. The operator scored 3 in terms of compliance record, where the maximum score is 5.

Multiplying these scores together gave a total score of 15, which falls in the middle of the Category 2 range, which is from 5 to 23.

¹ Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision, EPA (OEE), 2006.

2.0 CLOSURE & DECOMMISSIONING

2.1 Closure Scenario

The Millenium Park site is comprised of a waste transfer station / materials recovery facility in an industrial estate in Fingal, North Dublin. The fully decommissioned site would consist of a number of buildings and yards that would be suitable for a number of uses, subject to appropriate planning permission.

We consider that the most appropriate closure scenario for the site is 'Clean Closure', as there is no evidence of existing or residual contamination of soils or groundwater at the site.

Clean decommissioning of the MRF / transfer station involves removal of all waste materials and all potential pollutants such as diesel and other hydrocarbon oils or other potentially polluting materials.

After full clean decommissioning, there is no requirement for aftercare management for environmental protection purposes. There is also no requirement for demolition of the buildings or other infrastructure as the site can be sold or leased for similar or alternative uses.

The following sections address the costs associated with clean closure of the site.

2.2 Plant or Equipment Decontamination

The operation at the site employs standard waste processing plant that has significant second-hand value and is unlikely to be abandoned on site for an extended time period.

The scrap metal value of this equipment is also attractive, so even obsolete or damaged pieces of equipment will have a re-sale value. Mobile plant will generally contain fuel tanks, but we expect that any residual fuel will be handled in an appropriate manner at a waste licensed or waste permitted site, where such scrap metal is recovered.

There is the possibility that some plant and equipment could have no re-sale value and a low metal content (e.g. damaged porta-cabin), so we suggest a contingency of €1,000 for removal and disposal of unwanted plant and/or equipment.

2.3 Removal of Waste Materials

In line with EPA guidance, this closure / decommissioning plan addresses known liabilities associated with future planned closure of the facility. In this scenario, waste will be removed over a shut-down period of a week or more, so no wastes will remain on site at the time of closure. Greenstar have a good track record of such orderly closure at other Transfer Stations / MRFs² so we suggest that this is the most realistic closure scenario for the company.

Greenstar is currently in receivership and continues to trade in a manner that strives for full compliance with all licences and permits. It is inconceivable that a single site such as this one, could be abandoned with waste on site, whilst the holding company continues to trade and operate other waste facilities.

² e.g. Cookstown site in Dublin (W0079-01), Forge Hill site in Cork (W0173-01), Waterford Utility site (W0116-02), South East Recycling, Pembrokestown, Wexford (W0111-01).

The unlikely scenario where all Greenstar sites could be abandoned with waste materials left on some or all sites is addressed outside of this report and is subject to agreement between Greenstar and the EPA, as this is considered a company-wide issue, rather than a site-specific issue.

2.4 Removal of Other Potential Pollutants

Effluent

Upon decommissioning of the site, the hydrocarbon interceptor and the silt trap should be cleaned out by an appropriately permitted company and the sludges disposed appropriately. We estimate that this would cost a maximum of €2,000.

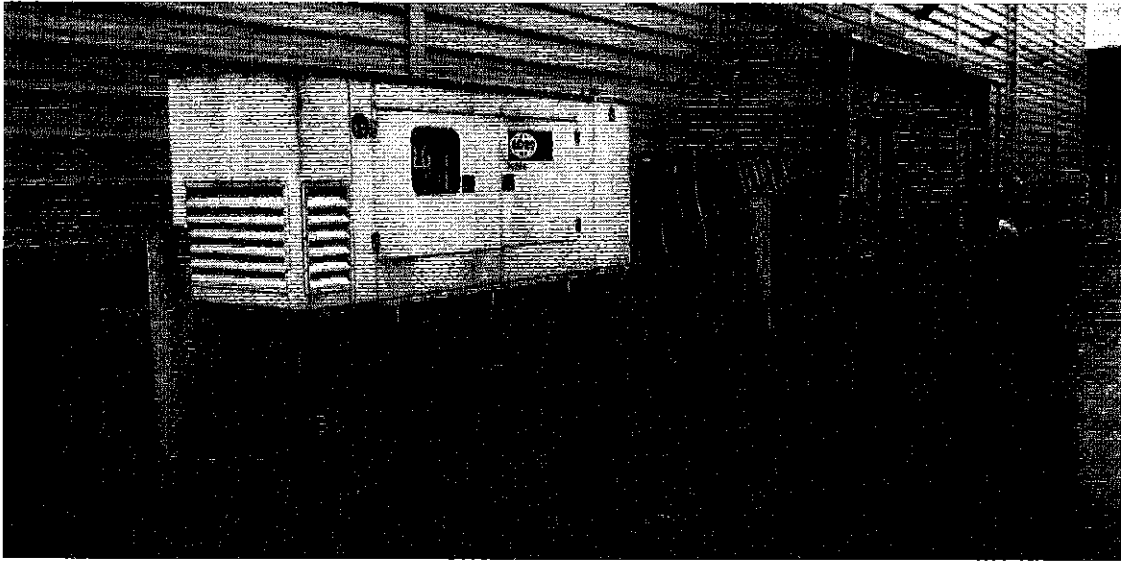
Marked Diesel Storage

The Millenium Park site contains 2 (No.) x 2,500 litre self-bunded plastic tanks containing marked (green) diesel as seen on Photos 2 and 3 below.

Photo 2 – Green Diesel and Waste Oil Tanks



Photo 3 – Diesel Tank at Back-Up Generator



Upon decommissioning of the site, the diesel should be removed from these tanks. We suggest that the positive value of the diesel would outweigh the cost of its removal, so we do not attach a cost to this potential pollutant

Waste Oil Storage

The site contains a double-skinned 2,500 litre waste oil tank located in the large concrete bund at eastern boundary of the site as shown in Photo 2 above. Upon decommissioning of the site, the waste oil tank should be removed from the site. We have confirmation from Enva that they collect waste oil free of charge. The empty tank should have second hand value so we do not see this as a liability. If the tank cannot be sold and has to be disposed, we suggest that the 'Sundries' item below would cover this cost.

Drum Storage

Relatively small volumes of chemicals and hydrocarbons are stored on site, such as paints or white spirit for maintenance purposes, drums of hydraulic oils for maintenance of machinery, engine oils and anti-freeze for vehicles, etc. These materials are stored on banded pallets in the maintenance shed as shown in Photo 4 below.

Photo 4 – Drum Storage in Maintenance shed



Upon decommissioning, these potentially polluting materials should be removed from site. However, the materials are not specific to the waste industry and can be used in many businesses. For this reason, we consider that most will have a positive value and unusable materials, such as open paint cans or out of date chemicals could be removed and appropriately disposed for **€500** or less.

General Clean-up

When all plant, machinery and waste materials are removed from the site, the floors of the buildings and the yard areas should be cleaned with a roadsweeper (See Photos 5 and 6 below). We estimate that this can be achieved at a cost of less than **€2,000**.

Photo 5 – Waste Processing Building



Photo 6 – Main Site Yard



Sundries

Upon closure, there may be a number of additional costs such as disconnection of electricity supply and sealing of the site. There is also likely to be waste items such as concrete blocks or end of life plastic tanks, etc. We suggest allowance of an additional **€1,500** to cover such sundry items.

Closure Validation Report

A site inspection and validation report prepared by an independent consultant may be required by the EPA to validate clean closure of the site. As the potential for contamination

of soil and groundwater is low, we do not envisage an intrusive investigation in this scenario. We therefore expect that the report would be completed for a fee of c. **€3,000**.

2.5 Summary of Closure and Decommissioning Costs

Our estimates of the costs of decommissioning the site upon closure is as follows:

Table 2-1
Estimated Cost of Decommissioning after Closure

Item	Estimated Cost
Removal of Unwanted Plant & Equipment	€1,000
Cleaning Hydrocarbon Interceptor & Silt Trap	€ 2,000
Removing Unusable Chemicals / Hydrocarbons	€ 500
Road Sweeping of Floors and Yards and hosing down of walls	€ 2,000
Sundries	€ 1,500
Site Inspection & Validation Report	€ 3,000
Total	€ 10,000

2.6 Closure Plan Update and Review

The Closure Plan should be updated and reviewed regularly to take account of site activities and relevant costs. The costs estimated in this report are based on assumptions of current site activities and current market conditions.

3.0 CONCLUSIONS

We expect that the site will be closed in an orderly planned manner rather than in a sudden or unforeseen manner. In this scenario, the parent company would be expected to remove waste materials in advance of site closure.

In this scenario, provision should be made for an expected liability of **€10,000** to cover closure and decommissioning costs.

4.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and data supplied by Greenstar and has been accepted in good faith as being accurate and valid.

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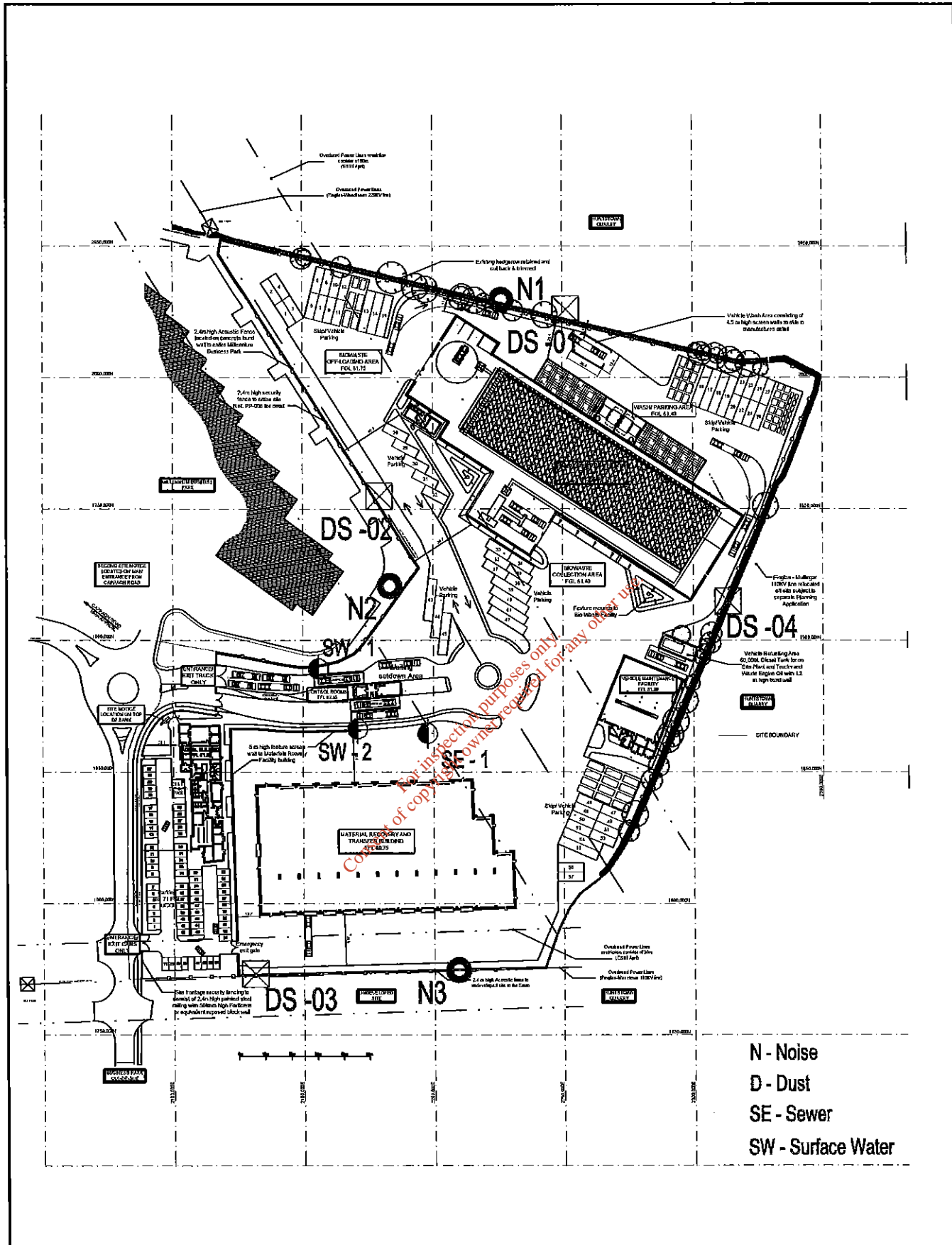
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**Appendix A -
Site Layout Drawings**

OCM Drawing No. 2.1

Michael Punch & Partners Drawing 022-045-001

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N - Noise
D - Dust
SE - Sewer
SW - Surface Water



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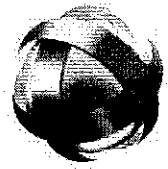
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SLR



global environmental solutions

Greenstar Materials Recovery Facility

Millenium Business Park

Ballycoolin

Co. Dublin

Waste Licence No. W0183-01

Environmental Liabilities Risk Assessment

Final Report

17th June 2013

SLR Ref: 130617_501.00303.00001.001_Rev3

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CONTENTS

1.0	INTRODUCTION AND BACKGROUND	1
1.1	Our Brief	1
1.2	About SLR Consulting.....	1
1.3	Site Description	1
1.4	Facility Operations.....	3
1.5	Site Monitoring.....	6
1.6	Bund Testing.....	9
1.7	Site Audits/Inspection	9
1.8	Other Notable Issues	10
2.0	INITIAL SCREENING AND OPERATIONAL RISK ASSESSMENT.....	11
2.1	Introduction.....	11
2.2	Complexity	12
2.3	Environmental Sensitivity	12
2.4	Compliance Record of the Facility	14
2.5	Risk Category.....	14
3.0	SITE SPECIFIC ELRA	16
3.1	Objectives and Scope.....	16
3.2	Risk Classification and Identification.....	16
3.3	Assessment of Risks.....	22
3.4	Risk Matrix	26
3.5	Identification and Assessment of Mitigation Measures	27
3.6	Risk Reduction.....	31
3.7	Mitigated Risks	36
3.8	Risk Management Programme.....	36
4.0	ASSESSMENT OF POTENTIAL LIABILITIES.....	37
4.1	Best Case Scenario	37
4.2	Worst Case Scenario.....	37
4.3	Most Likely Scenario	38
5.0	CONCLUSIONS.....	39
5.1	All Identified Liabilities.....	39
5.2	Worst Case Environmental Liabilities	40
6.0	CLOSURE.....	41

TABLES

Table 1-1	Waste Movement at Millennium Park MRF in 2010 and 2011.....	5
Table 1-2	Surface Water Quality: SW-1 and SW-2 Monitoring Results.....	6
Table 1-3	Wastewater Emissions: SE-1 Monitoring Results (2010).....	7
Table 1-4	Wastewater Emissions: SE-1 Monitoring Results (2011).....	7
Table 1-5	Recorded Noise Levels at Facility 2010 and 2011	8
Table 1-6	Recorded Dust Levels at Facility 2010 and 2011	9
Table 2-1	Risk Category	11
Table 2-2	Environmental Sensitivity of the Millennium Park Site	13
Table 2-3	Risk Category for Millennium Park Site	14
Table 3-1	Project Risk Register.....	23
Table 3-2	Risk Classification Table.....	23
Table 3-3	Risk Assessment Table for Unmitigated Risks	24
Table 3-4	Risk Matrix of Unmitigated Risks	27
Table 3-5	Risk Reduction due to Existing Mitigation Measures	32
Table 3-6	Risk Matrix of Mitigated Risks	36

Table 4-1 Most Likely Scenario 38
Table 5-1 Worst Case Environmental Liabilities 40

FIGURES

Figure 1 Site Location..... 2
Figure 2 Aerial View of Site and Surrounds (from Google Earth)..... 3
Figure 3 Aerial View of Site (from Google Earth)..... 4

PHOTOS

Photo 1 – Greenstar’s Millenium Park Site..... 1
Photo 2 – Green Diesel and Waste Oil Tanks..... 18
Photo 3 – Diesel Tank at Back-Up Generator..... 18
Photo 4 – Drum Storage in Maintenance shed..... 20
Photo 5 – Production of Solid Recovered Fuel (SRF) at the Facility 21
Photo 6 – Highly Automated Mechanical Treatment at Millenium Park Facility 25
Photo 7 – Truck and Bin Wash Area 28

APPENDICES

Appendix A - Site Layout Drawings 43

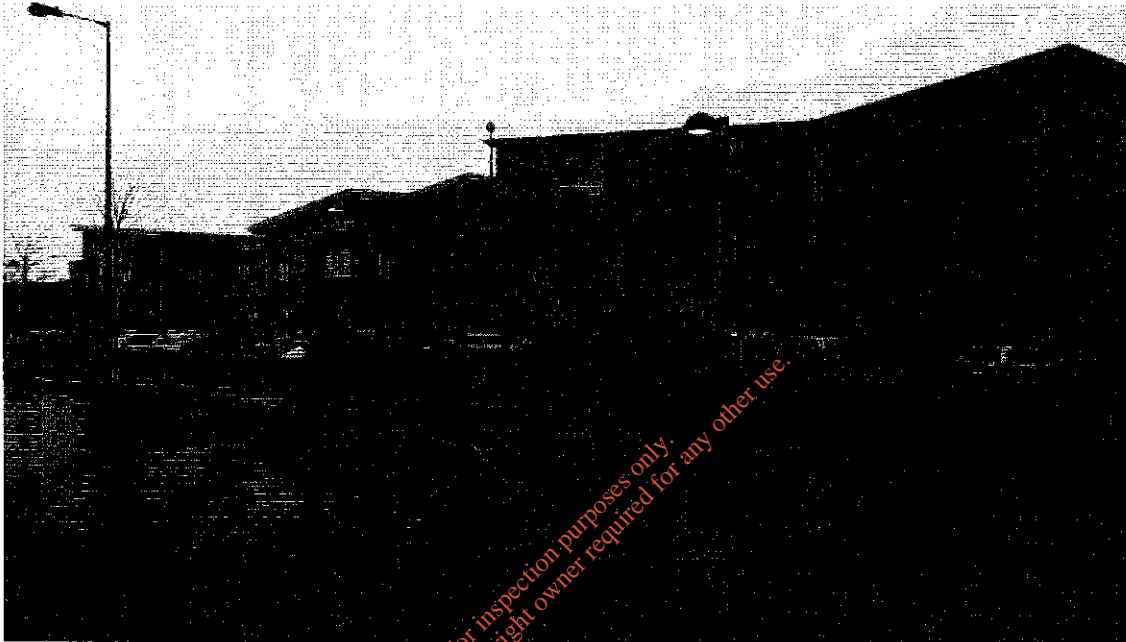
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1.0 INTRODUCTION AND BACKGROUND

1.1 Our Brief

SLR Consulting Ireland (SLR) has prepared this independent Environmental Liabilities Risk Assessment (ELRA) in relation to Greenstar's existing Materials Recovery Facility at Millennium Park, Ballycoolin, Dublin 11.

Photo 1 – Greenstar's Millennium Park Site



1.2 About SLR Consulting

SLR Consulting is a major international multi-disciplinary environmental consultant, employing 900 staff in Ireland, the UK, North America, Australia and South Africa. In Ireland, the company trades as SLR Consulting Ireland, and employs around 30 environmental specialists, engineers and support staff at offices in Dublin and Hillsborough.

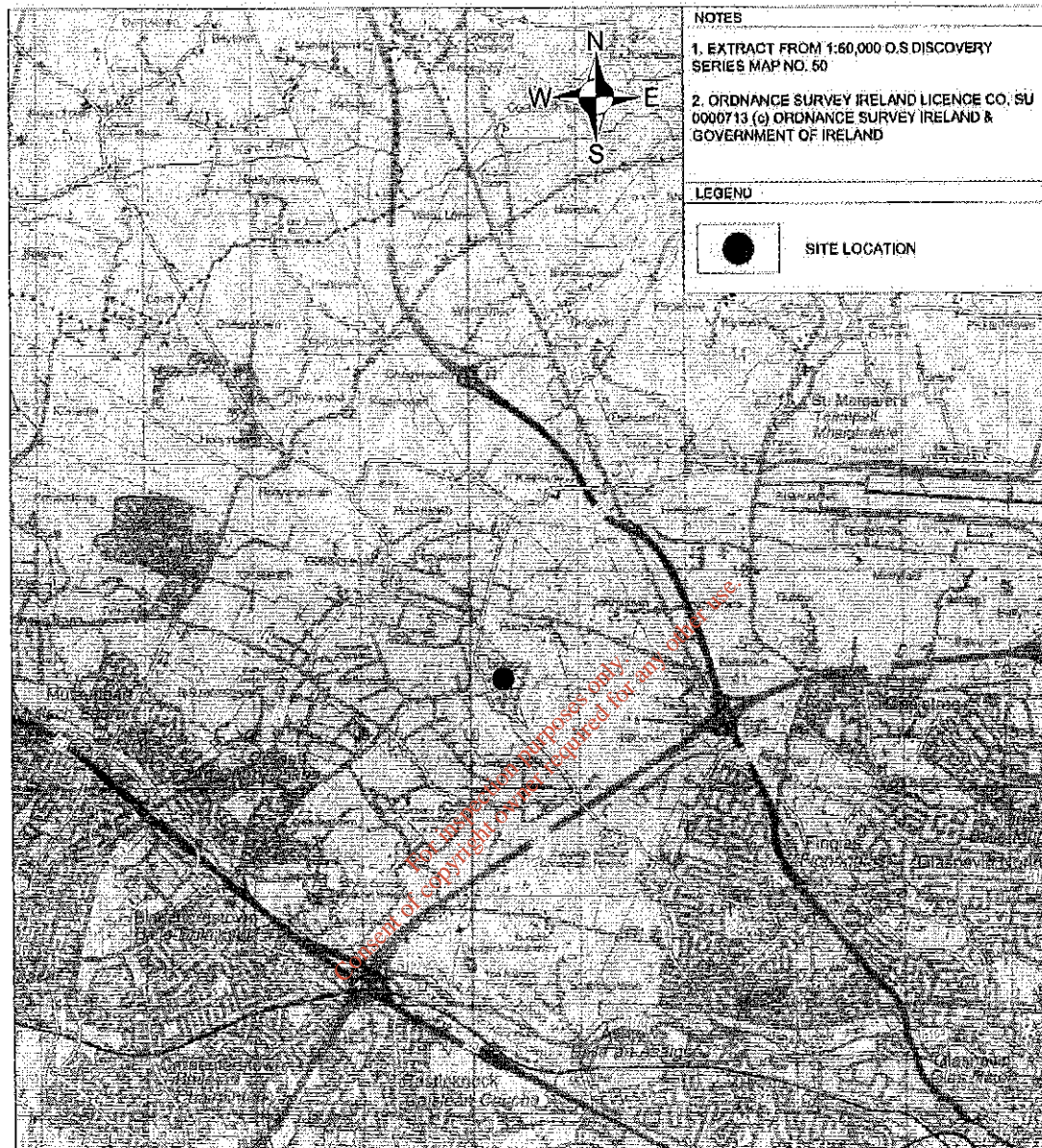
Recent Clients of SLR include the European Union, national governments, government departments, international lending agencies, UK and Irish regional and local authorities / agencies, waste treatment technology providers and private sector waste management companies.

SLR employs the largest team of waste management experts in the UK and Europe. The equivalent of 150 staff are employed on a full-time basis on waste management projects in Ireland and the UK. Specialist staff are employed across 30 separate technical disciplines.

1.3 Site Description

The existing facility at Millennium Business Park covers an area of approximately 4.45 hectares (10.7 acres). It is located entirely within the townland of Grange, approximately 3km north-west of Finglas and 1.5km north of the M50 motorway (see Figure 1 below).

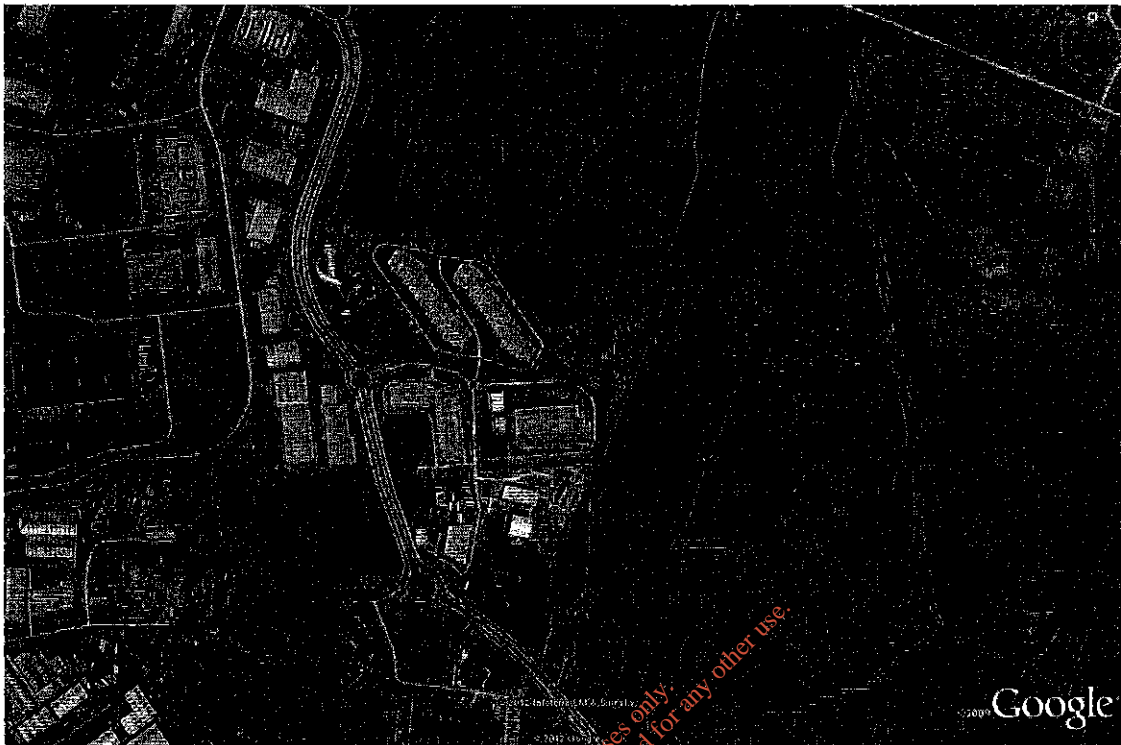
**Figure 1
Site Location**



The site is located within an existing industrial / business park. The site is bound to the north and east by a quarry operated by Roadstone Wood and to the west and south by other business premises within Millennium Business Park. The site is traversed from north-west to south-east by the Finglas to Woodlands high voltage (220kV) overhead power lines. The Finglas to Macetown high voltage (100kV) overhead power line runs from east to west along the southern site boundary.

Figure 2 shows an aerial view of the site and surrounds captured from Google Earth.

Figure 2
Aerial View of Site and Surrounds (from Google Earth)



1.4 Facility Operations

The existing Materials Recovery Facility (MRF) has been in operation since summer 2006. It is currently licensed to accept and process up to 220,000 tonnes of mixed non-hazardous, municipal, commercial, industrial and construction / demolition waste annually. This comprises

- 100,000 tonnes of Municipal Waste
- 90,000 tonnes of Commercial and Industrial (C&I) Waste
- 30,000 tonnes Construction and Demolition (C&D) Waste.

No hazardous waste (in solid or liquid form) is accepted or handled at the facility.

All waste acceptance, handling and processing is undertaken indoors, within the existing material recovery and transfer building, with the exception of storage of wrapped bales of Solid Recovered Fuel (SRF) in outdoor areas. In addition to the above, the EPA waste licence for the facility also provides for the treatment of up to 50,000 tonnes of biowaste annually in a separate biowaste treatment building which has yet to be constructed.

At the present time, the key activities undertaken at the Millennium Park facility include:

- Segregation of the C&I waste into different waste streams (paper, cardboard, glass, metal, organic, SRF, etc.)
- Baling and compaction of the (C&I) waste streams prior to removal to off-site waste disposal or recovery facilities and
- Screening and segregation of the C&D waste into different waste streams (concrete, brick, tiles, plasterboard, metal, timber etc.).

The layout of the existing facility, and of the proposed biowaste facility, is shown on O'Callaghan Moran (OCM) Drawing No 2.1 and Michael Punch and Partners Drawing 022-045-001, both reproduced in Appendix A. The drawings also shows the location and layout of waste storage areas, skip and vehicle parking areas, vehicle maintenance and refuelling areas, weighbridges and the overhead power lines in the vicinity of the site.

Figure 3 below shows an aerial view of the site from Google Earth.

Figure 3
Aerial View of Site (from Google Earth)



The waste licence allows acceptance of waste at the facility 24 hours per day, 7 days per week, following technical amendment issued by the Agency in 2006.

All commercial and industrial / construction and demolition wastes accepted at the facility are emptied at dedicated bays within the MRF building. Mixed wastes are emptied at separate bays to pre-segregated wastes. All waste intake is inspected for unsuitable material and if any is identified, it is transferred to a dedicated waste quarantine area. Following inspection, the initial sorting of the mixed waste streams involves removing larger and heavier items (such as timber and metal) using a mechanical grab and placing them in dedicated storage bays elsewhere within the MRF building. The remaining wastes are then segregated into different waste streams using automated processing equipment and some manual picking. The segregated wastes (paper, cardboard, plastic, metal cans, SRF, wood, timber and fines) are then stored separately pending transfer off-site to authorised recycling and recovery facilities. The residual waste is also stored separately pending transfer off-site to authorised disposal (landfill) facilities.

The waste tonnage accepted and consigned at the Millennium Park facility (broken down by European Waste Catalogue (EWC) Codes) reported in Annual Environmental Reports (AER) for the calendar years 2010 and 2011 are shown in Table 1-1 below.

**Table 1-1
Waste Movement at Millennium Park MRF in 2010 and 2011**

Commodity (EWC)	Description	Waste In 2011 (t)	Waste Out 2011 (t)	Waste In 2010 (t)	Waste Out 2010 (t)
07 05 13*	Potentially contaminated MSW				117
10 01 01	Bottom ash, slag and boiler dust	4		1	
10 03 05	LDF alumina	14		10	
13 02 08	Waste oil		3		
13 05 03	Interceptor sludge	9			
15 01 01	Segregated cardboard / paper packaging	258	276	769	659
15 01 02	Segregated plastic packaging	128	1	120	18
15 01 03	Segregated wood packaging	614	41	607	41
15 01 04	Segregated metal packaging (Al cans)	4			
15 01 06	Segregated mixed packaging	5,987	4,889	3,813	3,546
15 01 07	Segregated glass packaging	52		54	
16 01 03	Tyres	139	93	6	
16 05 04	Hazardous gas cylinders		3		
16 06 01	Hazardous lead acid batteries		1		
17 01 01	Concrete from C&D waste			7,000	
17 04 11	Cables from C&D waste (non-hazardous)			1	
17 05 04	Soil and stone from C&D waste	103	7,674	16	56
17 08 02	Gypsum based C&D waste-plasterboard	17			
17 09 04	Mixed C&D waste	5,284			
19 09 02	Sludge				2
19 09 05	Resin			6	
19 12 01	Paper / cardboard from mechanical treatment			25	
19 12 07	Wood (non-hazardous) from mechanical treatment		6,267	498	3,475
19 12 09	Minerals from mechanical treatment (inorganic fines, sand and stones)	8	16,715	3	18,999
19 12 10	RDF combustible		3,213		51
19 12 12	Mixed municipal waste		20,247	21,318	1,067
20 01 01	Paper / cardboard from municipal sources	9		22	5
20 01 02	Glass from municipal sources	8		8	
20 01 08	Commercial food waste	1,116	6,078	1,068	2,686
20 01 10 / 20 10 11	Textile waste from municipal sources	38			
20 01 35*	WEEE	1		0.5	
20 01 38	Wood waste from municipal sources	2,205	998	1,210	2,875
20 01 39	Plastic from municipal sources	3		4	

Commodity (EWC)	Description	Waste In 2011 (t)	Waste Out 2011 (t)	Waste In 2010 (t)	Waste Out 2010 (t)
20 01 40	Metals from municipal sources	466	2,508	291	2,207
20 01 99	Other wastes (grease trap / gas cylinders)	1			2
20 02 01	Biodegradable garden and park waste	7,032	41	4,809	2,424
20 03 01	Mixed residual waste (black bin)	18,163		4,723	
20 03 01	Mixed dry recyclables (green bin)	12,555			
20 03 03	Street cleaning residues	954	2,498		
20 03 07	Bulky waste	32,019	11,635	28,312	30,635
Total Received		87,191		74,694	
Total Consigned			83,181		68,869

1.5 Site Monitoring

The waste licence for the Millennium Park facility requires regular environmental monitoring of noise, dust, surface water and wastewater emissions (to sewer) at designated locations across the site (shown on OCM Drawing No. 2.1, reproduced in Appendix A). A review of the 2010 and 2011 monitoring data indicates that the site generally appears to be operating in compliance with emission limit values set in the waste licence.

1.5.1 Surface Water Monitoring

At the present time, only approximately 50% of the total site area has been paved or developed. There are currently two surface water monitoring locations (designated SW-1 and SW-2) located around the entrance to the facility, as shown on O'Callaghan Moran (OCM) Drawing No 2.1, reproduced in Appendix A.

Schedule D of the Waste Licence requires surface water monitoring to be undertaken at these locations at quarterly intervals. The results of quarterly monitoring undertaken in 2010 and 2011 are presented in Table 1-2 below. Quarterly data has not been provided for several quarterly periods, as there was no surface water flow off-site at the time sampling personnel visited the facility. With the exception of one notable exceedance at SW-2 in Q4 2011 (when a suspended solids concentrations of 488mg/l was recorded), tests results indicate that pre-set trigger levels for BOD, total suspended solids and mineral oils in surface water run-off were not exceeded.

Table 1-2
Surface Water Quality: SW-1 and SW-2 Monitoring Results

Parameter	Units	SW1		SW2			Trigger Level
		Q4 2010	Q4 2011	Q2 2010	Q4 2010	Q4 2011	
pH	pH units	7.63	8	8.14	8.07	8.31	N/A
Conductivity	mS/cm	0.334	0.436	0.177	0.364	0.569	N/A
Temperature	°C	13	11	12.2	13	10.8	N/A
BOD	mg/l	3	3	3	8	8	25
COD	mg/l	315	13	14	18	45	N/A
Ammoniacal Nitrogen	mg/l	1.64	2.13	0.15	5.49	1.85	N/A

Parameter	Units	SW1		SW2			Trigger Level
		Q4 2010	Q4 2011	Q2 2010	Q4 2010	Q4 2011	
Total Suspended Solids	mg/l	10	NDP	<10	15	488	35
Oil Fats and Greases	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	N/A
Mineral Oils	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	5

NDP – No detection possible

1.5.2 Wastewater Monitoring

Schedule D of the Waste licence requires wastewater emissions from the facility to be sampled and tested at two monthly (bi-monthly) intervals. Wastewater discharge from the facility primarily comprises wash down water from the waste intake and storage bays and vehicle washing. It is collected and discharged via a silt trap and petrol/oil interceptor to the public sewer network within Millennium Park. The location of the wastewater sampling point, designated SE-1, is shown on O'Callaghan Moran (OCM) Drawing No 2.1, reproduced in Appendix A.

The results of quarterly monitoring undertaken at SE-1 in 2010 and 2011 are presented in Tables 1-3 and 1-4 below. Tests results indicate that emission threshold limits set by the waste licence were not exceeded in either year.

**Table 1-3
Wastewater Emissions: SE-1 Monitoring Results (2010)**

Parameter	Units	Feb 2010	Apr 2010	Jun 2010	Aug 2010	Oct 2010	Dec 2010	Emission Limit
pH	pH units	7.63	7.84	8.44	7.42	8.08	Dry	6-10
Temperature	°C	13.5	8.7	13.4	15.1	14	Dry	42
BOD	mg/l	185	110	72	419	271	Dry	6,000
COD	mg/l	1010	460	21	2290	437	Dry	12,000
Ammoniacal Nitrogen	mg/l	1.46	1.42	1.87	34.97	77.76	Dry	100
Total Suspended Solids	mg/l	102	250	10	448	<10	Dry	2,500
Oil Fats and Greases	mg/l	<0.01	0.066	<0.01	<0.01	<0.01	Dry	100
Orthophosphate	mg/l	0.74	<0.06	0.42	11.28	9.02	Dry	100
Surfactants	mg/l	2.2	0.51	0.3	2.5	0.5	Dry	100
Sulphate	mg/l	257.4	147.9	93.46	85.1	41.58	Dry	1,000

**Table 1-4
Wastewater Emissions: SE-1 Monitoring Results (2011)**

Parameter	Units	Feb 2011	Apr 2011	Jun 2011	Aug 2011	Oct 2011	Dec 2011	Emission Limit
pH	pH units	7.26	8.12	7.72	7.72	8.12	8.32	6-10

Temperature	°C	12	13.1	13.3	13.2	14.8	10.2	42
BOD	mg/l	44	318	262	177	223	5	6,000
COD	mg/l	229	782	561	365	559	44	12,000
Ammoniacal Nitrogen	mg/l	2.47	2.52	41.42	4.55	10.97	1.89	100
Total Suspended Solids	mg/l	152	229	757	65	26	184	2,500
Oil Fats and Greases	mg/l	<1	0.23	<0.01	<0.01	2.78	<0.01	100
Orthophosphate	mg/l	<1	2.305	24.26	0.89	3.57	<0.06	100
Surfactants	mg/l	<0.21	2.3	0.4	0.9	0.6	<0.2	100
Sulphate	mg/l	104.5	201.3	13.0	95.0	97.9	217.4	1,000

1.5.3 Noise Monitoring

Schedule D of the Waste Licence requires noise monitoring to be undertaken at annual intervals at three discrete locations around the facility, designated N1, N2 and N3 (shown on OCM Drawing No. 2.1, reproduced in Appendix A). Noise was also recorded at the nearest noise sensitive location a residential property to the south of the site along Cappagh Road, designated NSL-1. A summary of recorded noise levels is presented in Table 1-5 below

**Table 1-5
Recorded Noise Levels at Facility 2010 and 2011**

Location	2010				2011			
	L _{Aeq,30min} dB	L _{A10,30min} dB	L _{A90,30min} dB	Specific Level dB	L _{Aeq,30min} dB	L _{AF10,30min} dB	L _{AF90,30min} dB	Specific Level dB
N1	52	55	46	46	55	57	49	55
N2	62	64	60	62	60	62	47	60
N3	73	72	68	73	70	72	69	70
NSL1	68	72	50	<50	70	75	48	<48

Specific Level – Sound pressure level considered to be contributed by waste facility

It is noted that the continuous equivalent A-weighted noise level (L_{Aeq}) recorded at the noise sensitive residence in both 2010 and 2011 was considerably in excess of the 55dBA limit set by the waste licence limit for the Millennium Road MRF. The elevated noise level at this residence is however principally attributable to the continuous flow of traffic along Cappagh Road and the AERs suggest that noise from the Greenstar site is barely (if at all) audible at this location.

It is noted that at the two noise monitoring locations closest to the MRF building (N2 and N3), both the recorded continuous equivalent and background noise levels are in excess of the emission limit of 55dBA set by the waste licence, but there are other noise sources in the vicinity of these monitoring points.

1.5.4 Dust Monitoring

Schedule D of the Waste Licence requires dust monitoring to be undertaken at the facility three times a year, with at least two of those monitoring periods being between May and September. Dust monitoring is undertaken using the Bergerhoff method at four discrete

locations, designated DS-01, DS-02, DS-03 and DS-04, shown on OCM Drawing No. 2.1, reproduced in Appendix A. The threshold limit for dust emissions set by the waste licence is 350mg/m²/day. A summary of recorded dust levels is presented in Table 1-6 below

**Table 1-6
Recorded Dust Levels at Facility 2010 and 2011**

Location	Units	2010			2011			Emission Limit
		Feb 10	July 10	Aug 10	May11	June 11	July 11	
DS-01	mg/m ² /day	38.8	80.4	35.4	55.7	37.3	43.7	350
DS-02	mg/m ² /day	29.7	247.4	47.7	67.5	146.4	27.1	350
DS-03	mg/m ² /day	449.3	194.6	281.9	259.4	246.3	77.4	350
DS-04	mg/m ² /day	38.2	49.4	108.8	107.7	225.6	47.2	350

The only recorded exceedance of the dust emission limit occurred in February 2010 at location DS-03 along the southern boundary which is shared with an adjoining pre-cast concrete production facility. Given the generally low level of dust emissions around the facility, it was considered that some activities at the adjoining site around that time may have contributed to the elevated dust level recorded in February 2010.

1.6 Bund Testing

The Licence for the facility requires that tank, drum, pipeline and bund testing to be carried out every three years. In addition to this, bunds are inspected weekly and maintained / emptied as required. The bunds were tested in May 2009 and the drains in January 2010 and were passed fit for purpose. In the third quarter of 2012 integrity test reports were submitted in relation to five permanent material storage bunds on the site.

1.7 Site Audits/Inspection

A review of recent compliance files for the site has been carried out to identify any instances of non-compliance noted in Agency site audit and inspection reports which may have had an adverse environmental impact on the site. This review identified that site audits had been carried out in on the facility in 2010 and 2011 and that a site inspection had been carried out in November of 2012.

In the case of the 2010 Audit, the inspector identified one non-compliance relating to the maintenance of waste records and made five observations relating to the overall operation of the site. Each issue was subsequently addressed by the facility operators to ensure compliance.

In 2011, the audit identified three non-compliances and eight observations. The non-compliances related to waste records kept at the facility, the storage of waste outdoors and the operation of the waste transfer building doors. Each non-compliance was subsequently addressed to ensure that operations do not result in any adverse environmental impacts.

Most recently, an Agency inspector conducted a site inspection of the facility in November of 2012 which resulted in the identification of two non-compliances and seven observations. All non-compliance (relating to waste storage on site and litter management) and observation items were promptly addressed by the facility operators.

1.8 Other Notable Issues

In April 2010, there was a small fire in hopper area of the facility's construction and industrial waste shredder. On this occasion the fire containment system proved efficient and no significant consequential damage arose. The only emissions were airborne smoke and an estimated fire water volume of 3,000 litres which was captured by the foul water system.

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2.0 INITIAL SCREENING AND OPERATIONAL RISK ASSESSMENT

2.1 Introduction

In order to determine the requirements for an Environmental Liability Risk Assessment (ELRA), a relatively simple risk assessment decision matrix is employed to classify the site into one of three risk categories. The specific requirements for an ELRA are dependent on the resultant risk classification.

The decision matrix used to determine the risk classification for the Millennium Park Materials Recovery Facility is that set out in Chapter 2 of EPA publication *Guidelines on Environmental Liability, Risk Assessment, Residuals Management Plans and Financial Provision*.¹ This decision matrix essentially looks at three key factors

- (i) **Complexity:** a factor which takes account of the extent and magnitude of potential hazards due to the operation of the waste facility. A complexity band is assigned to the waste facility on the basis of look-up table in Appendix B of the EPA guidance document. Complexity ratings range from G1 for the least complex site to G5 for the most complex.
- (ii) **Environmental Sensitivity:** a factor which takes account of the receiving environment in the immediate vicinity of the waste facility, with more sensitive locations given a higher score (due to proximity of aquifers, high quality surface water features or human receptors). Environmental sensitivity is assessed on a site specific basis using a matrix presented in Table 2.2 of the EPA guidance document.
- (iii) **Compliance Record:** a factor which takes account of the compliance history of the waste facility and whether activities carried on are in compliance with licence requirements and emission limits.

Each of the three factors assessed above is multiplied to give the total score for the waste facility and this is used to place it into an appropriate risk category (identified as Category 1 to Category 3), as outlined in Table 2-1 below.

**Table 2-1
Risk Category**

Risk Category	Total Score
Category 1	< 5
Category 2	5 – 23
Category 3	> 23

Having determined the facility category, it is then possible to establish specific requirements for the ELRA and associated financial provisions.

¹ Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision, EPA (OEE), 2006.

2.2 Complexity

The complexity band assigned to the Millennium Park MRF is obtained from the 'look-up table' in Appendix B of the EPA publication *Guidelines on Environmental Liability, Risk Assessment, Residuals Management Plans and Financial Provision*.

The operation of the Millennium Park site includes a number of waste recovery activities that are listed in the final section of EPA 'look-up table'². The existing MRF is capable of handling up to 220,000 tonnes of non-hazardous waste per annum. In addition, the as-yet un-built biowaste treatment facility is licensed to handle 50,000 tonnes of organic waste per annum. Given the scale of the facility, it is assigned a Band G5 rating.

A Band G5 activity is assigned a complexity factor of 5 by the EPA guidance document.

Complexity Factor = 5

2.3 Environmental Sensitivity

The environmental sensitivity of the MRF at Millennium Park is assessed using a matrix presented in Table 2.2 of the EPA guidance document. This matrix assigns an environmental attribute score to the facility under six separate headings

- (i) Human occupation
- (ii) Groundwater protection
- (iii) Sensitivity of receiving waters
- (iv) Air quality and topography
- (v) Protected ecological sites and species
- (vi) Sensitive agricultural receptors

Applying the criteria set out in Table 2.2 of the EPA guidance document, the environmental attribute scores for the Millennium Park facility for each of the six headings listed above are as shown underlined and bold in Table 2-2 below:

² see Page B11 of EPA Document

**Table 2-2
Environmental Sensitivity of the Millennium Park Site**

Environmental Attribute	Environmental Attribute Score
Human Occupation¹	
< 50m	5
50m - 250m	3
250m - 1000m	1
> 1km	0
Groundwater Protection^{2,3}	
Regionally Important Aquifer	2
Locally Important Aquifer (part of site)	1
Poor Aquifer	0
Vulnerability Rating - Extreme	3
Vulnerability Rating - High	2
Vulnerability Rating - Moderate	1
Vulnerability Rating - Low	0
Sensitivity of Receiving Waters⁴	
Class A	3
Class B	2
Class C	1
Class D	0
Designated Coastal & Estuarine Waters ⁵	2
Potentially Eutrophic Coastal & Estuarine Waters ⁶	1
Air Quality & Topography	
Complex terrain ⁷	2
Intermediate terrain ⁸	1
Simple terrain⁹	0
Protected Ecological Sites and Species¹⁰	
Within or directly bordering species protected site	2
< 1km to protected site	1
> 1km from protected site	0
Sensitive Agricultural Receptors¹¹	
Fruit, vegetable or dairy farming < 50m from the activity footprint	2
Fruit, vegetable or dairy farming 50m - 150m from the activity footprint	1
Fruit, vegetable or dairy farming > 150m from the activity footprint	0
Total Environmental Sensitivity Score for Millennium Park Site =	6

Notes *

1. Measured from activity/footprint to public or private occupied building
2. Groundwater Classifications according to DoELG, EPA, GSI Groundwater Protection Schemes (1999)
3. Aquifer Classification Score to be added to Groundwater Vulnerability Score
4. Site located within catchment of EPA Surface Water Classification (1996) or adjacent to transitional water body
5. Designated as Sensitive Areas UWWT Regulations (2001)
6. EPA (2002) Water Quality in Ireland 1998-2000
7. Generally elevated terrain such as a mountain or the side of a valley, where receptors are at elevations above the stack tip elevation, US EPA (2000) Meteorological Monitoring Guidance for Regulatory Modelling Applications
8. Intermediate terrain where the elevations of receptors lie between the stack tip elevation and the plume rise elevation, US EPA (2000) Meteorological Monitoring Guidance for Regulatory Modelling Applications
9. Relatively flat terrain, where receptor elevations are between stack base and the stack tip elevations, US EPA (2000) Meteorological Monitoring Guidance for Regulatory Modelling Applications
10. Distance from activity/footprint to protected areas designated as pNHA (Irish Wildlife Acts 1976, 2000), cSAC (Habitats Directive 1992) and/or SPA (Birds Directive 1979).
11. Distances derived from UK Department for Environment, Food and Rural Affairs (2003), Local Air Quality Management - Technical Guidance LAQM.TG(3)

* or more recent equivalent reference material

The nearest residential property to the site is located approximately 280 metres to the south of the facility / waste activities.

Geological mapping published by the Geological Survey of Ireland (GSI) indicates that the bedrock underlying the site is comprised of the calcareous shales and limestone conglomerates of the Tober Colleen Formation and the massive unbedded lime-mudstone of the Waulsortian Limestones. GSI mapping also indicates that a geological contact (fault) crosses the site. The Waulsortian Limestone underlying the southern section of the site is categorised as a locally important aquifer, moderately productive in local zones (LI).

GSI mapping also indicates an 'extreme' vulnerability rating for the aquifer beneath the site. The site is indicated by Teagasc / EPA soil mapping to be underlain by limestone till.

The site is located at the upstream end of the River Tolka catchment. Run-off in the vicinity of Millennium Park drains to the River Tolka via a local stream. The River Tolka is classified as being of moderate (or Class C) status upstream and downstream of its confluence with the local stream leading from Millennium Park.

The topography of the area surrounding the facility is quite flat and the terrain is considered to be simple. There are no protected ecological sites within 1 km of the site and no fruit, vegetable or dairy farming within 150 m of the active area of the site.

The accumulated Environmental Attribute Scores for the site is therefore 6. The EPA guidance determines that a score of less than 7 means that the site achieves an Environmental Sensitivity Classification of 1 (Low sensitivity).

Environmental Sensitivity Factor = 1

2.4 Compliance Record of the Facility

The available documentation indicates that in the recent years (the period 2010-2011), the MRF at Millennium Park had <5 non-compliances identified in annual EPA audits, much of these being of an operational or administrative nature. There have been some minor emission non-compliances in 2011, with elevated noise levels at locations N2 and N3 and more notably, elevated concentrations of suspended solids at location SW-2 in Q4-2011.

The EPA guidance document indicates that the compliance factor for a facility with minor emission non compliances (<5 non compliances over a 12 month period) are classified as Minor Non-compliant and have a compliance factor of 3.

Compliance Factor = 3

2.5 Risk Category

We multiply the scores for Complexity (5), Environmental Sensitivity (1) and Compliance Record (3) and reach a total score of **15**. This falls at the mid-range of Category 2 risk facilities in the EPA guidance Table 2.1, reproduced on Table 2-3 below:

**Table 2-3
Risk Category for Millennium Park Site**

Risk Category	Total Score
Category 1	< 5
Category 2	5 – 23
Category 3	> 23

Risk Category = Category 2

Figure 1.1 of the EPA guidance document indicates that facilities classified as Risk Category 2 require 'Generic Approaches' to address unknown liabilities.

However, Condition 11.2 of the waste licence for the MRF at Millennium Park requires that the 'licensee shall arrange for a comprehensive and fully costed *Environmental Liabilities Risk Assessment (ELRA)* of the facility to be carried out'. The licence further requires that the ELRA 'shall have particular regard to any accidents, emergencies, or other incidents, which might occur at the facility and their effect on the environment and shall include the cost of making adequate *Financial Provision*. The financial provision shall include the costs entered into or incurred in the carrying on of the activities to which this licence relates or will relate including the decommissioning and closure of the facility'.

The remainder of this report contains a site-specific ELRA for the Millennium Park facility, prepared in accordance with the EPA Guidance document. In addition, the report addresses the issue of restoration following closure of the facility.

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3.0 SITE SPECIFIC ELRA

3.1 Objectives and Scope

According to the EPA guidance document, the objectives of a site-specific ELRA are as follows:

- To identify and quantify environmental liabilities at the facility focusing on: unplanned, but possible and plausible events occurring during the operational phase.
- To calculate the value of financial provisions required to cover unknown liabilities
- To identify suitable financial instruments to cover each of the financial provisions; and
- To provide a mechanism to encourage continuous environmental improvement through the management of potential environmental risks.

The EPA advise that the ELRA should cover environmental risks leading to a potential or anticipated liability. Environmental risks will be deemed to cover all risks to: surface water, groundwater, atmosphere, land and human health.

The EPA guidance document on ELRA, Residuals Management Plans and Financial Provision (referenced above) includes an 'Example Site-Specific ELRA' in Appendix D. The example 'Project Risk Register' in Appendix D of the Guidance includes risks that are clearly Health and Safety risks, rather than environmental risks. For example, the register includes '20. Employee struck by large plant or reversing trucks' and '21. Drowning in lagoons, stormwater settling tanks, the White River or inspection chambers.'

In light of the Guidance, this ELRA includes H&S risks as well as environmental risks and these are all expected to be covered by standard insurance policies. The conclusions section then highlights the potential environmental liabilities, separate from the potential H&S liabilities.

3.2 Risk Classification and Identification

The EPA guidance recommends that risks are identified and classified following a 'Risk Management Workshop' involving the facility management, environmental manager and independent environmental consultant.

SLR Consulting visited the site on 7th January 2013 and met with the site manager and environmental manager to review the potential hazards, pathways and receptors that inform the ELRA. This involved a site walkover, a review of all relevant files and an interview with site management.

3.2.1 Identification of Processes / Hazards

The waste handling processes carried out at the site inevitably generate noise and dust.

The materials stored in the main shed on site may produce some leachate as waste placed in skips is often left open to the elements for a number of days and rainwater can come into contact with the waste.

There is also potential for discovery of liquid or potentially hazardous wastes, hidden within incoming loads of compliant waste.

Storage of hydrocarbons in tanks and drums on site is also identified as a potential hazard.

Each of these potential hazards is addressed individually below.

Noise

Noise monitoring results for the facility are discussed earlier in this report. High levels of noise have been recorded at the site and in the local area. Some of this noise is attributable to traffic movements on the Cappagh Road and some relates to other industrial premises in the area.

Noise from the plant and machinery operating on site is a potential hazard to employees working in the vicinity of this equipment and the risk of hearing damage is addressed in this report.

Dust

Dust monitoring results for the facility are discussed earlier in this report. The recorded levels are generally low compared to the Emission Limit Value of 350mg/m² set in the waste licence. One exceedance at the southern boundary has been attributed to activity at the adjacent pre-cast concrete plant.

Dust deposition can potentially pose a health risk to site workers and if high levels of dust are emitted from the site, dust could also pose a health risk to neighbours.

Odour

The waste types accepted at the site have some potential to generate odours. However, the AERs for 2008 to 2011 reported that there were only two complaints of odour received from a neighbour (Artisan Furniture) over that 4 year period, so odour is clearly not a significant concern at the facility and is not addressed further in this report.

Effluent

All wastes are processed in the main shed and are therefore protected from contact with rainfall, so trade effluent (leachate) is minimal and is generally absorbed into the solid wastes rather than collected and treated as effluent. Run-off from the inside of the shed is to foul sewer.

There is a truckwash and bin wash area located close to the eastern boundary of the site. This area also drains to the foul sewer via a silt trap and interceptor.

The paved site yard drains to the local authority storm water collection system at the site entrance via a hydrocarbon interceptor. The northern portion of the site is unpaved and some recovered stone has been placed on a portion of this area. The stone was recently cleaned up after an EPA observation regarding the quality of the fill. Contaminants appeared to consist primarily of plastic and wood, so groundwater contamination from this material is not suspected.

The yard areas are used for storage of baled and wrapped refuse derived fuel (RDF/SRF), baled recyclables, bin storage and truck parking. These materials have little potential to cause contamination of the yard run-off, but general traffic movements in and out of the waste processing building can impact on the cleanliness of the site yard areas.

Diesel and Waste Oil Storage

The Millenium Park site contains 3 (No.) x 2,500 litre self-bunded plastic tanks containing hydrocarbons. A marked (green) diesel tank and a waste oil tank are contained in a large bunded area (capacity 75m³) at the eastern boundary of the site as shown in Photo 1 below and a second diesel tank used for a back-up generator is located adjacent to the generator as shown on Photo 2 below.

Photo 2 – Green Diesel and Waste Oil Tanks



Photo 3 – Diesel Tank at Back-Up Generator



These tanks are potential sources of contamination that must be considered in this risk assessment. Minor spillages of hydrocarbon can usually be addressed by treatment with

absorbent material contained in spill-kits that are available on site. However, a major impact on one of these tanks from a vehicle such as a loading shovel could penetrate the tank and the bund, causing a spill that must be considered in the ELRA. The concrete bunds and crash barriers will be given full consideration in mitigation of this potential risk.

Chemical / Oil Product Storage

There is a requirement for storage of relatively small volumes of chemicals and oils on site, such as paints or white spirit for maintenance purposes, drums of hydraulic oils for maintenance of machinery, engine oils, anti-freeze and diesel additive (ad-blue) for vehicles, etc. These are stored in the maintenance shed on bunded pallets that are designed to contain these relatively small volumes (200 litre drums and smaller) of hazardous liquids (see Photo 4 below). Larger containers, such as 1,000 litre IBCs containing liquids, such as Ad-Blue diesel additive, are stored in the 75m³ outdoor bund, shown in Photo 2 above.

Minor spills of these materials can be contained locally and cleaned using spill-kits. Larger spills of several drums are possible and these could spill out of the shed into the surface water drainage system.

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Photo 4 – Drum Storage in Maintenance shed



Fire at the Facility

The facility contains combustible materials such as paper, cardboard, SRF and plastic, so there is a significant risk of fire at the facility. The greater the volume of combustible waste stored on site, the greater the risk of a large fire with associated damage to the business and the environment. The facility is licensed to accept 90,000 t/a of C&I wastes, which will contain much of the combustible material, although the site is currently operating well below the licensed capacity.

Photo 5 – Production of Solid Recovered Fuel (SRF) at the Facility



Source: Greenstar 2010

The environmental consequences of a fire at a waste transfer station can be manifested in a number of ways. Smoke from a fire can cause air pollution, run-off from fire-fighting water has the potential to contaminate the water environment and residual waste from the fire will require disposal or recovery.

Air emissions from accidental fires cannot be easily controlled and are generally accepted as an unfortunate consequence of such unwelcome events. Fires of this nature are usually short term events, where the external cost to the environment is not normally quantified or applied to the business in question.

Best practice waste transfer facilities are designed to contain fire-fighting water along with rainwater that may fall during the course of a fire. This issue is better addressed in this report under '*Contaminated Yard Run-Off*' rather than under the '*Fire at the Facility*' heading.

In a facility such as Millenium Park, a fire would be expected to change the nature of the waste materials. The volumes of recoverable and non-recoverable wastes would both be reduced. Potential revenues from plastic, paper and cardboard could be reduced, but disposal/recovery costs of SRF and residual wastes would also be expected to be lower. The alteration of the waste during the course of a fire is considered to be a 'business interruption' issue that will have a financial cost, rather than an issue that increases the risk of environmental pollution in the vicinity of the site.

3.2.2 Identification of Environmental Receptors

The processes and hazards described above have the potential to impact on environmental receptors such as those described below.

Employees or Other Site Users

Waste management facilities pose hazards to site operatives such as the risk of hearing injury from noise sources, respiratory issues associated with dust inhalation, exposure to hazardous chemicals or injuries from contact with vehicles, plant or machinery.

Occupied Houses

The nearest house to site is located c.280 metres to the south of the site. There are no other houses within 500 metres of the Greenstar facility.

Groundwater

The Geological Survey of Ireland (GSI) on-line database shows that the bedrock underlying the site is comprised of the calcareous shales and limestone conglomerates of the Tober Colleen Formation and the massive unbedded lime-mudstone of the Waulsortian Limestones. The GSI database also indicates that a geological contact (fault) crosses the site. The Waulsortian Limestone underlying the southern section of the site is categorised as a locally important aquifer, moderately productive in local zones (L).

The GSI database also shows an 'extreme' vulnerability rating for the site. The site is indicated by EPA / GSI soils mapping to be underlain by limestone till.

The GSI database also shows that the aquifer vulnerability rating for the site is low. The site is indicated by EPA / GSI soil mapping to be underlain by estuarine deposits.

Surface Water

The site is located at the upstream end of the River Tolka catchment. Run-off in the vicinity of Millennium Park drains to the River Tolka via a local stream. The River Tolka is classified as being of moderate (or Class C) status upstream and downstream of its confluence with the local stream leading from Millennium Park.

Ecological Designations

There are no protected ecological sites within 1 km of the site.

Amenity Areas

There are no known amenity areas in close proximity to the site.

Neighbouring Premises

The neighbouring premises are industrial in nature, so they are relatively insensitive to the activities at the Greenstar site. The AERs state that the site has only been subject to 2 complaints over the last 4 years.

3.3 Assessment of Risks

All potential environmental risks associated with the facility that have been identified by SLR are included in the Project Risk Register presented on Table 3-1 below.

**Table 3-1
Project Risk Register**

Risk Ref. No.	Potential Failure Mode/Risk
1	Excessive dust emissions from site processes
2	Excessive noise emissions from site processes
3	Contaminated yard run-off
4	Diesel tank leak or spillage
5	Other hazardous spill (paint, white spirits, hydraulic oil, engine oil, anti-freeze, etc.)
6	Employee or visitor struck by vehicles or plant
7	Employee contact with hazardous materials
8	Fire at the Facility

Table 3-2 below provides a classification of risks in terms of likely occurrence and estimated severity. The Financial Costs quoted below are consistent with the EPA Guidance manual.

**Table 3-2
Risk Classification Table**

Rating	Occurrence		Severity	
	Description	Probability (%) (in a 30 year period)	Description	Financial Cost
1	Very Low	0-5	Trivial	0 - €1,000
2	Low	5-10	Minor	€1,000 - €10,000
3	Medium	10-20	Moderate	€10,000 - €50,000
4	High	20-50	Major	€50,000 - €100,000
5	Very High	>50	Massive	>€100,000

The Risk Assessment Table provided in Table 3-3 below assigns a 'Risk Score' to the risks identified in the Project Risk Register based on the likely occurrence and severity of the event. The Risks are then ranked on that basis of the most serious to the least serious.

At this point of the report, mitigation measures such as personnel protection equipment (ppe), staff training, spill kits, bunding, etc, are not considered when assessing the risks. These are addressed in the next section of this report, where use of such mitigation reduces the likely occurrence or severity of the risks.

**Table 3-3
Risk Assessment Table for Unmitigated Risks**

Risk Ref. No.	Potential Failure Mode/Risk	Occurrence Rating	Severity Rating	Risk Score
1	Excessive dust emissions from site processes	2	3	6
2	Excessive noise emissions from site processes	2	3	6
3	Contaminated yard run-off	3	3	9
4	Diesel tank leak or spillage	2	3	6
5	Other hazardous spill (paint, white spirits, hydraulic oil, engine oil, ad-blue, etc.)	3	2	6
6	Employee or visitor struck by vehicles or plant	3	5	15
7	Employee contact with hazardous materials	2	2	4
8	Fire at the Facility	4	5	20

The rationale behind the risk scores assigned above is as follows:

1. Excessive dust emissions from site processes:

All C&D waste processing is carried out inside a purpose built building. Dust deposition levels recorded at the site boundaries appear to be compliant with the licence and have not attracted complaints from neighbours. The occurrence rating for dust is therefore considered to be 'low'.

High levels of dust can impact on the health of employees, visitors and neighbours, depending on individual sensitivities. We consider that the severity of such a potential impact is 'moderate'.

2. Excessive noise emissions from site processes:

The plant and equipment used in the main processing building and the site yard act as sources of noise at the site. Noise results reported in the recent AERs for the site suggest that noise levels are not excessive and are considered to be compliant with the waste licence. The occurrence rating, without consideration of mitigation measures, is therefore considered 'low'.

The severity of hearing impairment of site employees is considered to be 'moderate' as it could involve permanent damage.

3. Contaminated Yard Run-Off

Run-off from the yard areas has the potential to cause minor contamination of the local authority stormwater collection system and ultimately impact on local watercourses. The surface water monitoring results for the site are generally compliant with the licence, with elevated COD and suspended solids noted on occasion. The occurrence of such contaminated run-off, without mitigation, is therefore considered to be 'medium'.

The severity of contaminated run-off is considered 'moderate' as the types and volumes of waste stored at the site are unlikely to generate large volumes of harmful effluent with the potential to have a major impact on the water environment.

4. Diesel Tank Leak or Spillage

The diesel tanks at the site are all self-bunded and are all contained within concrete bunds with more than adequate capacity to contain the full volume of the tanks. The likely occurrence of a major rupture to any of the diesel tanks is considered 'low', as the tanks are well located and well protected from impact by a loading shovel or other site plant.

The severity of an uncontrolled diesel spill to the local authority stormwater system is considered 'moderate' as the diesel tanks are relatively small and we expect that such a spill could be cleaned up for €50,000 or less.

5. Other hazardous spill

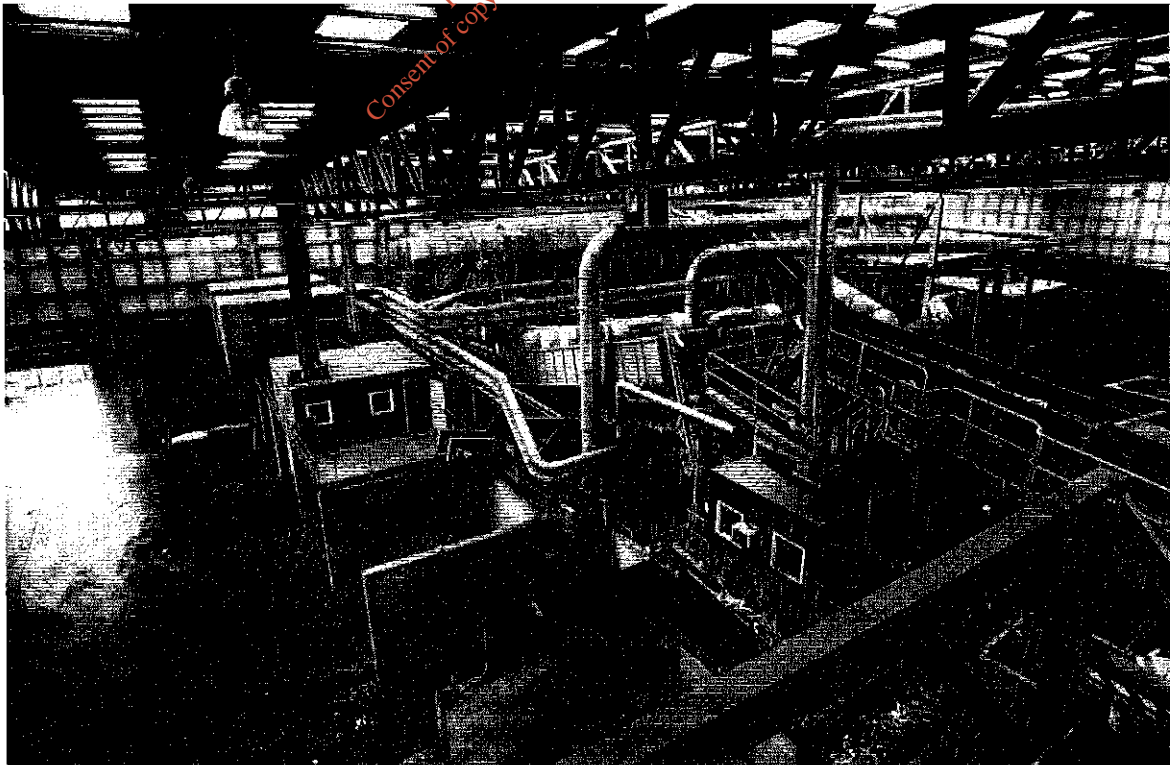
There are a number of substances used on site that have the potential to cause environmental pollution if spilled. These include hydraulic oils, engine oils, paint, white spirits, anti-freeze, etc. There is a 'medium' risk of spillage of a can or drum of any of these substances, which would be directed to the local authority stormwater collection system if not contained on site.

The severity of such an event is considered 'Minor' as some contamination could occur, but the volumes involved are likely to be modest.

6. Employee or Visitor Struck by Vehicles or Plant

There have been a number of incidents of this nature at waste transfer stations in Ireland in recent years. Reversing loading shovels are particularly hazardous and a busy yard can be dangerous for site employees. The site has a relatively high level of activity, but is highly automated with little reason for personnel to come close to vehicles or mobile plant. Without mitigation, the likely occurrence of an impact of this nature is considered 'medium'.

Photo 6 – Highly Automated Mechanical Treatment at Millenium Park Facility



Source: Greenstar 2010

The severity of an employee or visitor being struck by site plant or machinery, such as a front loading shovel, is considered to be **'massive'** as such impacts are often fatal.

7. Employee Contact with Hazardous Materials

The site is a non-hazardous facility, so hazardous materials are limited to some substances used for maintenance purposes or non-compliant wastes found within reportedly non-hazardous deliveries. The likely occurrence of employee contact with such hazardous materials is therefore considered **'low'**.

Unmitigated infrequent employee contact with small volumes of paints, solvents, oils, etc is likely to be restricted to skin irritation, so the severity of this risk is considered **'minor'**.

8. Fire at the Facility

There have been a number of major and minor fires at waste transfer stations in Ireland in recent years including a small fire at this facility (see Section 1.8 above), so the risk of the occurrence is considered **'high'**.

The severity of a fire could be **'massive'** if employees, visitors or third parties are killed or injured. The financial costs could run to millions of euro, even if injuries are not incurred, as expensive equipment and buildings can be destroyed. Business interruption caused by a major fire can also cause financial distress to a company.

3.4 Risk Matrix

The ranking of the unmitigated risks identified above can be visualised on a 'Risk Matrix' diagram, as presented on Table 3-4 below.

In line with the EPA Guidance, the risks have been colour coded in the matrix to provide a broad indication of the critical nature of each risk. The colour code is as follows:

- | | |
|--------------------------|---|
| Red – | These are considered to be high-level risks requiring priority attention. These risks have the potential to be catastrophic and as such should be addressed quickly. |
| Amber – | These are medium-level risks requiring action, but are not as critical as a red coded risk. |
| Green (light and dark) - | These are lowest-level risks and indicate a need for continuing awareness and monitoring on a regular basis. Whilst they are currently low or minor risks, some have the potential to increase to medium or even high-level risks and must therefore be regularly monitored and if cost effective mitigation can be carried out to reduce the risk even further this should be pursued. |

**Table 3-4
Risk Matrix of Unmitigated Risks**

30 year Probability %		Ranking of Unmitigated Risks				
Occurrence	>50%	Very High 5				
	20%-50%	High 4				
	10%-20%	Medium 3		5		6
	5%-10%	Low 2		7	1, 2, 4	
	<5%	Very Low 1				
	Impact	Trivial 1	Minor 2	Moderate 3	Major 4	Massive 5
	Estimated Cost	<€1k	€1-10k	€10-50k	€50-100k	>€100k
		Severity				

The Risk Matrix shows that Risk No. 8 (fire at the facility) requires priority attention as it has the potential for catastrophic outcomes. Risk No.6 (vehicle or plant impact) next requires attention in the form of mitigation. The other risks are lower priority, but all have been improved by mitigation as described in the next section of this report. Much of this mitigation is required by the waste licence and EPA enforcement action can be expected in the event of failure to implement many of these mitigation measures.

3.5 Identification and Assessment of Mitigation Measures

The risk levels identified above are mitigated in a number of ways as outlined below. We understand from discussions with Greenstar's Environmental and H&S Managers that all mitigation measures mentioned below are in place at the site.

1. Excessive dust emissions from site processes:

A roadsweeper is regularly employed to sweep the site yards and building floors.

Maintenance or other personnel working in the middle section of the waste processing building are obliged to wear dust masks.

2. Excessive noise emissions from site processes:

The site plant and machinery are maintained as per the site preventive maintenance programme.

Maintenance or other personnel working in the middle section of the waste processing building are obliged to wear ear protectors.

3. Contaminated Yard Run-Off

All wastes are delivered and processed within a waste processing building, designed to prevent run-off to ground or surface water drainage. SRF stored in the yard area is baled and wrapped with plastic film to mitigate against contaminated run-off. Baled recycled materials stored outdoors have little, if any, potential to contaminate surface water run-off.

Drainage from the truck and bin wash area is directed to the foul water system via a silt trap and hydrocarbon interceptor.

Photo 7 – Truck and Bin Wash Area



Note: We have been informed that Lub Oil Tank in Photo 7 was empty and is stored in bunded area when full.

The site yard is comprised of concrete slabs, thus protecting groundwater beneath the site.

Site yards are regularly swept with a roadsweeper.

Firewater Retention

In the event of a large fire at the facility, fire-fighting water is expected to drain firstly to the sewer and potentially overspill to the surface water drainage system. Automated shut-off valves linked to the fire alarm have been installed at the sewer and stormwater outfalls from the site and these will be automatically closed in the event of a fire. This will contain firewater within the site until it can be tested.

Given the types of materials handled at the site, discharge of firewater to the foul sewer is likely to be permitted after a fire, as was the case in the previous small fire at the facility. However, the operator has taken a precautionary approach whereby firewater is retained on site for testing prior to release. There is a possibility that a fire in the maintenance shed could cause the release of stored hydrocarbon products and containment would be the first important step in that event.

4. Diesel Tank Leak or Spillage

The two marked diesel tanks and the waste oil tank are all double skinned (self-bunded) and stored within concrete bunds.

The bunds are regularly tested for integrity.

Spill kits comprising containment booms and absorbent materials are stored on site and are easily accessible in the event of a diesel spill or leak from a tank or from plant or machinery operating on the site.

The shut-off valves on the surface water drainage system and the foul sewer can be activated in the event of a diesel spill at the site.

The concrete surfaces in the yard provide mitigation against the potential impact of a diesel spill on groundwater beneath the site.

Emergency Response Procedures and Plans are in place detailing the actions should a spillage event occur.

Emergency Response Training is carried out as part of Environmental Awareness Training for all staff.

A Site Inspection Checklist is in place and involves checking spill containment measures, content of spill kits, plant and equipment, hazardous materials storage, bunds, spill trays, surface water infrastructure, hydrocarbon interceptor, etc.

5. Other hazardous spill

The paint, hydraulic oils, engine oils, anti-freeze, etc. are stored on bunded pallets in an enclosed building, where the concrete floor and walls will contain the materials if spilled.

Spill kits are also available in this building for the purpose of containing minor hydrocarbon spills.

An Emergency Response Manual and Emergency Response Procedure are in place detailing the actions should a spillage event occur.

Emergency Response Training is carried out as part of Environmental Awareness Training for all members of staff. Material storage procedure is in place and integrated into Environmental Awareness Training. It outlines how waste and materials are stored to prevent material damage and environmental pollution

Material Safety Data Sheets are filed for all hazardous liquids contained on site.

A Site Inspection Checklist is in place and involves checking spill containment measures, content of spill kits, plant and equipment, hazardous materials storage, bunds, spill trays, surface water infrastructure, hydrocarbon interceptor, etc.

6. Employee or Visitor Struck by Vehicles or Plant

No employees or visitors are allowed in the site buildings or yard areas without wearing highly visible (hi-vis) jackets.

A very low speed limit is enforced on site.

Plant and machine operators are made aware of personnel in the vicinity of the plant or machinery that they operate. They are also be fully trained in the operation of the plant and/or machinery that they are responsible for operating.

All employees are adequately trained in Health and Safety and acquire H&S certificates, where relevant.

Mobile plant, such as front loading shovels, are fitted with reversing alarms that give a clearly audible signal that can be heard through ear protectors.

Adequate lighting is employed on-site during hours of darkness.

All visitors are accompanied by site staff whilst in the buildings or yard areas.

Designated walkways are provided for administration staff and visitors to the site. The designated walkways are known to plant and machine operatives and are avoided by them or where avoidance is not possible, the operatives approach these areas with an adequate degree of caution.

The site is accredited with OHSAS 18001 since March 2009. This well established Health and Safety system provides significant protection to the safety of site employees, as well as visitors to the site.

7. Employee Contact with Hazardous Materials

Employees that are at risk of coming into contact with hazardous materials on site are issued with PPE including gloves and where appropriate, safety glasses.

These employees are also adequately trained in handling hazardous materials.

Non-conforming wastes are quarantined and safely removed from site for appropriate treatment or disposal.

An Emergency Response Plan is in place with a section addressing 'Handling hazardous and chemical waste'.

8. Fire at the Facility

The site was accredited with OHSAS 18001 in March 2009. This well established Health and Safety system provides many procedures relating to fire prevention and fire-safety, including Emergency Response procedures and plans.

Employees are fully trained in fire-safety, including fire prevention, evacuation procedures, fire drills, etc. Visitors to the facility are inducted in fire safety procedures or are accompanied at all times by site personnel.

Plant and machinery are designed for fire safety, e.g. hot exhausts will not come into contact with combustible materials, such as dry recyclables. Risk assessments are carried out in advance of dangerous activities such as welding, angle grinding, etc at the facility.

Water hoses and fire extinguishers are available in site buildings and can be used for stopping minor fires before they get out of control. Fire hydrants are available locally and their positions known to key site personnel.

3.6 Risk Reduction

In light of the existing mitigation measure described above, the risks posed by the site activities are greatly reduced. This risk reduction is detailed on Table 3-5 below where the resulting mitigated risks are assessed and ranked.

It is important that the site operator maintains all the mitigation measures to achieve the full risk reduction outlined in Table 3-5. Failure to do so will result in a risk that falls between the unmitigated and the mitigated positions.

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**Table 3-5
Risk Reduction due to Existing Mitigation Measures**

RISK IDENTIFICATION			RISK ASSESSMENT						
No.	Risk	Impact	BEFORE CONTROL			Mitigation Measures	AFTER CONTROL		
			Occurrence	Severity	Risk Level		Occurrence	Severity	Risk Level
1	Excessive dust emissions from site processes	Potential impact on the health of employees, visitors and neighbours.	2	3	6	a) A roadsweeper is regularly employed to sweep the site yards and building floors. b) Maintenance or other personnel working in the middle section of the waste processing building are obliged to wear dust masks	1	3	3
2	Excessive noise emissions from site processes	Potential impact on the health of employees, visitors and neighbours.	2	3	6	a) Site plant and machinery are maintained as per site preventive maintenance programme. b) Maintenance or other personnel working in the middle section of the waste processing building are obliged to wear ear protectors.	1	3	3
3	Contaminated yard run-off	Potential contamination of local watercourse and/or groundwater.	3	3	9	a) Mitigation is provided in the form of the processing building which keeps rainwater from coming into contact with wastes. Any SRF stored in the yard area is baled and wrapped with plastic film. b) Drainage from the truck and bin wash area is directed to the foul water system via a silt trap and hydrocarbon interceptor. c) The site yard is comprised of concrete slabs, thus protecting groundwater beneath the site. d) Site yards are regularly swept with a roadsweeper. e) Automated shut-off valves linked to the fire alarm have been installed at the sewer and stormwater outfalls from the site and these will be automatically closed in the event of a fire to contain firewater.	2	3	6

RISK IDENTIFICATION			RISK ASSESSMENT						
No.	Risk	Impact	BEFORE CONTROL			Mitigation Measures	AFTER CONTROL		
			Occurrence	Severity	Risk Level		Occurrence	Severity	Risk Level
4	Diesel tank leak or spillage	Potential contamination of local watercourse and/or groundwater.	2	3	6	a) The two marked diesel tanks and the waste oil tank are all double skinned (self-bunded) and stored within concrete bunds. b) The bunds are regularly tested for integrity. c) Spill kits comprising containment booms and absorbent materials are strategically placed on site. d) Drainage from the yard passes through a large hydrocarbon interceptor that will contain hydrocarbon spills or leaks at the site. e) The shut-off valves on the surface water drainage system and the foul sewer can be activated in the event of a diesel spill at the site. f) The concrete surfaces in the yard provide mitigation against the potential impact of a diesel spill on groundwater beneath the site. g) Emergency Response Procedures and Plans are in place detailing actions should a spillage event occur. h) Emergency Response Training is carried out as part of Environmental Awareness Training for all staff. i) A Site Inspection Checklist is in place and involves checking spill containment measures, content of spill kits, plant and equipment, hazardous materials storage, bunds, spill trays, surface water infrastructure, hydrocarbon interceptor, etc.	2	3	6
5	Other hazardous spill (paint, white spirits, hydraulic oil, engine oil, anti-freeze, etc.)	Potential contamination of local watercourse and/or groundwater.	3	2	6	a) The paint, hydraulic oils, engine oils, anti-freeze, ad-blue, etc. are stored on bunded pallets in an enclosed building, where the concrete floor and walls will contain the materials if spilled. b) Spill kits are also available in this building for the purpose of containing minor hydrocarbon spills. c) Emergency Response Procedures and Plans are in place detailing the actions should a spillage event	1	2	2

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RISK IDENTIFICATION			RISK ASSESSMENT						
No.	Risk	Impact	BEFORE CONTROL			Mitigation Measures	AFTER CONTROL		
			Occurrence	Severity	Risk Level		Occurrence	Severity	Risk Level
						occur. d) Emergency Response Training is carried out as part of Environmental Awareness Training for all members of staff. Material storage procedure is in place and integrated into Environmental Awareness Training. It outlines how waste and materials are stored to prevent material damage and environmental pollution e) Material Safety Data Sheets are filed for all hazardous liquids contained on site. f) A Site Inspection Checklist is in place and involves checking spill containment measures, content of spill kits, plant and equipment, hazardous materials storage, bunds, spill trays, surface water infrastructure, hydrocarbon interceptor, etc.			
6	Employee or visitor struck by vehicles or plant	Potential injury or fatality to employee or visitor.	3	5	15	a) Compulsory use of hi-vis jackets. b) A very low speed limit is set and enforced on site. c) Plant and machine operators are made aware of other personnel on site and are fully trained. d) All employees are adequately trained in H&S. e) Mobile plant is fitted with clearly audible reversing alarms. f) Adequate lighting is employed during hours of darkness. g) All visitors are accompanied by site staff whilst in the buildings or yard areas. h) Designated walkways are provided for administration staff and visitors to the site. i) The site is accredited with OHSAS 18001 and this is well maintained and well managed.	2	5	

RISK IDENTIFICATION			RISK ASSESSMENT						
No.	Risk	Impact	BEFORE CONTROL			Mitigation Measures	AFTER CONTROL		
			Occurrence	Severity	Risk Level		Occurrence	Severity	Risk Level
7	Employee contact with hazardous materials	Potential impact on health of employee.	2	2	4	a) Employees that are at risk of coming into contact with hazardous materials are issued with appropriate PPE and are adequately trained in handling hazardous materials. b) Non-conforming wastes are quarantined and safely removed from site for appropriate treatment or disposal. c) An Emergency Response Plan is in place with a section addressing 'handling hazardous and chemical waste'.	1	2	2
8	Fire at the Facility	Potential injury or fatality to personnel and potential destruction of plant, machinery and buildings.	4	5		a) The site is accredited with OHSAS 18001. This well established Health and Safety system provides many procedures relating to fire prevention and fire-safety, including Emergency Response Procedures and Plans. b) Employees are fully trained in fire-safety, including fire prevention, evacuation procedures, fire drills, etc. c) Visitors to the facility are inducted in fire safety procedures if unaccompanied by site personnel. d) Plant and machinery is designed for fire safety. e) Risk assessments are carried out in advance of dangerous activities such as welding, angle grinding, etc at the facility. f) Water supply and other fire containment materials are available for stopping minor fires before they get out of control. g) Fire hoses and extinguishers are available in the site buildings. h) Fire hydrants are available locally and their positions known to key site personnel.	2	5	

The identified risks all fall within the green zone after mitigation. The two highest risks after mitigation are No.6 (vehicles or plant) and No. 8 (Fire). Both of these risks involve the protection of employees' and visitors' health and safety. The company's OHSAS 18001 accreditation plays an important role in minimising these risks.

3.7 Mitigated Risks

Table 3-6 below shows the Risk Matrix for the facility after full mitigation is considered.

**Table 3-6
Risk Matrix of Mitigated Risks**

30 year Probability %		Ranking of Mitigated Risks				
Occurrence	>50% Very High 5					
	20%-50% High 4					
	10%-20% Medium 3					
	5%-10% Low 2			3, 4		5, 6
	<5% Very Low 1		5, 7	1, 2		
Impact		Trivial 1	Minor 2	Moderate 3	Major 4	Massive 5
Estimated Cost		<€1k	€1-10k	€10-50k	€50-100k	>€100k
		Severity				

Each of the identified risk has a reduced likelihood of occurrence in the mitigated scenario. Compliance with the waste licence and good management of the ISO14001 and OHSAS 18001 systems should ensure that the identified risks stay within the Green Zone (Low Risk) in the Risk Matrix.

3.8 Risk Management Programme

The risks identified in the previous section must be managed to ensure that they remain in the Green Zone (low risk) category. The mitigation identified in this report requires ongoing inspection and management. New risks may emerge with new processes or new methods of working. Additional hazards can arise from the use of new materials for maintenance or fuelling at the site. Additional mitigation measures can become available or better

techniques developed. The staff structure can change and new responsibilities allocated to the site management team.

As mentioned earlier in this report, the site has been accredited with ISO 14001 and OHSAS 18001. Good management of these systems is the most appropriate way to ensure that all mitigation measures are consistently implemented at the site and in doing so, the risks identified above are expected to be well managed and well mitigated.

The ISO and OHSAS systems are dynamic in nature and require regular internal and external audits, ensuring that new risks and new mitigation measures are fully addressed at the site. New or revised procedures should be introduced to address any significant changes to the risks or the mitigation measures.

4.0 ASSESSMENT OF POTENTIAL LIABILITIES

4.1 Best Case Scenario

In the best case scenario, the mitigation measures will succeed in preventing any liability, so the cost to the operator will be zero.

4.2 Worst Case Scenario

In the worst case scenario, a fatality could occur on site, most likely due to impact with a vehicle or an item of mobile plant. This is expected to incur a cost of up to €1,000,000, depending on the estimated loss associated with the potential future earnings of the individual. With full mitigation in place, the likelihood of occurrence of such a tragic event is considered low (<10% in 30 year period).

The possibility that 2 people could be struck and killed by an item of mobile plant, such as a reversing front loading shovel cannot be ruled out. The likelihood of occurrence of this event is considered to be less than 1% in a 30 year period and would be expected to incur costs of up to €2 million. The operator must have sufficient insurance to cover this eventuality, as a minimum.

The risk of health problems for employees or visitors due to noise, dust or contact with hazardous materials should also be covered by public liability and employee liability insurances. The risk of occurrence of these problems is considered very low if the proposed mitigation measures are fully implemented.

Fire risk has been identified as a risk with potentially severe consequences. The risk of a serious fire is considered 'high' with no mitigation measures in place, but this is reduced to 'low' if all mitigation measures proposed in this report are implemented and maintained by the site operator. Fire should be covered by insurance of buildings and equipment at facilities such as the Millenium Park site and the insurance cover should be adequate to cover destruction of the premises and all equipment. Risk of injury or death to employees or the public during a fire event should be covered under the most relevant insurance policy held by the operator. We suggest that Employer's Liability and Public Liability insurance cover of €5m each should be adequate to cover this risk.

4.3 Most Likely Scenario

The most likely scenario is based on the median probability and severity for each risk after implementation of the Risk Management Programme as shown in Table 4-1 below. The costs used are consistent with the EPA guidance except in relation to the following:

- Risk No. 8 (Fire at the facility). Recent major fires at waste transfer stations have caused several million euro worth of damage. We therefore suggest that the €1m upper limit for Severity Class 5 may be too low to cover the cost of this event. We suggest that a range of €100k to €5m is more appropriate for this event.

**Table 4-1
Most Likely Scenario**

Risk Identification	Occurrence Rating	Probability	Severity Rating	Cost Range	Median Probability	Median Severity	Most Likely Scenario Cost
1 Excessive dust emissions from site processes	1	0-5%	3	€10,000 - 50,000	2.5%	€30,000	€750
2 Excessive noise emissions from site processes	1	0-5%	3	€10,000 - 50,000	2.5%	€30,000	€750
3 Contaminated yard run-off	2	5-10%	3	€10,000 - 50,000	7.5%	€30,000	€2,250
4 Diesel tank leak or spillage	2	5-10%	3	€10,000 - 50,000	7.5%	€30,000	€2,250
5 Other hazardous spill (paint, white spirits, hydraulic oil, engine oil, anti-freeze, etc.)	1	0-5%	2	€1,000 - €10,000	2.5%	€5,500	€138
6 Employee or visitor struck by vehicles or plant	2	5-10%	5	€100,000 - €1m	7.5%	€550,000	€41,250
7 Employee contact with hazardous materials	1	0-5%	2	€1,000 - €10,000	2.5%	€5,500	€138
8 Fire at the Facility	2	5-10%	5	€100,000 - €5m	7.5%	€2.55m	€191,250
						Total	€238,776

5.0 CONCLUSIONS

5.1 All Identified Liabilities

In consideration of the worst case scenario and the most likely scenario as discussed above, we recommend that the site operator should have the following insurances in place:

- Employers Liability – indemnified for at least €5 million.
- Public Liability – indemnified for at least €5 million.
- Buildings and contents insurance - indemnified for an amount consistent with the total cost of removal of fire-fighting water, replacing all buildings, plant, machinery, etc. and ideally covering business interruption caused by a fire at the facility.

In addition, the worst case scenario could incur environmental liabilities of up to €50,000, relating to contaminated surface water discharge at the site. (Items 3 or 4 – worst case view)

The 'Most Likely Scenario', as detailed in Table 4-1 above, incurs an estimated cost of €238,776, but this figure is not relevant, as most of the costs identified are covered by insurance policies. Items No.1, No.2, No.6, No.7 and No.8 on Table 4-1 above are primarily H&S and commercial issues and should be covered by Employee Liability, Public Liability, Buildings and Contents insurances.

Provision should be made by any future operator of the site to cover the other items (environmental liabilities) on Table 4-1 (No. 3, 4 & 5) and these would incur an estimated annual cost of €4,638 in the 'most likely' scenario.

In addition, in each scenario the future operator should provide for any 'excess' included in the insurance policies.

In summary, the 'worst case' and 'most likely case' scenarios can be covered as follows:

Worst Case:

- Employers Liability Insurance – indemnified for at least €5 million.
- Public Liability Insurance – indemnified for at least €5 million.
- Buildings and contents insurance - indemnified for an amount consistent with the total cost of removal of fire-fighting water, replacing all buildings, plant, machinery, etc. and ideally covering business interruption caused by a fire at the facility.
- Provide for 'excess' in relation to insurance cover.
- Provision for €50,000 potential environmental liabilities costs, possibly covered under Environmental Liability Insurance.

Most Likely Case:

- Employers Liability Insurance – indemnified for at least €2 million.
- Public Liability Insurance – indemnified for at least €2 million.
- Buildings and contents insurance - indemnified for an amount consistent with the total cost of removal of fire-fighting water, replacing all buildings, plant, machinery, etc. and ideally covering business interruption caused by a fire at the facility.

- Provide for 'excess' in relation to insurance cover.
- Annual allowance of €4,638 potential environmental liabilities costs.

5.2 Worst Case Environmental Liabilities

This section highlights the estimated costs of liabilities that are strictly environmental in nature. These costs are a subset of the costs identified in the previous section.

Our 'environmental' designation goes beyond the environmental liabilities that are subject to the EU Environmental Liabilities Directive³, as it includes air emissions and measures to prevent air pollution.

These issues are considered relevant to the waste licence for the facility and provision for these potential liabilities should be covered by the licensee to comply with the ELRA and financial provision conditions of the waste licence.

Table 5-1 below details SLR's estimates in this regard.

**Table 5-1
Worst Case Environmental Liabilities**

	Risk Identification	Potential Environmental Impact	Remediation Required	Estimated Worst Case Remediation Cost
1	Excessive dust emissions from site processes	Dust Deposition	Road sweeping	€3,000
3	Contaminated yard run-off	Contamination of surface water or groundwater	Soil, groundwater or stream clean-up	€50,000
4	Diesel tank leak or spillage	Contamination of surface water or groundwater	Soil, groundwater or stream clean-up	€50,000
5	Other hazardous spill	Contamination of surface water or groundwater	Soil, groundwater or stream clean-up	€10,000
8	Fire at the Facility	Air emissions and potential surface water contamination	Fire-fighting and fire-water management ⁴	€100,000
Total				€213,000

³ DIRECTIVE 2004/35/CE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

⁴ The cost of fire-fighting and fire-water management presented here is ball-park, based on the quantities and combustible nature of the wastes handled at the site (2011 data) and benchmarked against the equivalent costs at a recent fire in a large MRF in Ireland.

6.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and data supplied by Greenstar and has been accepted in good faith as being accurate and valid.

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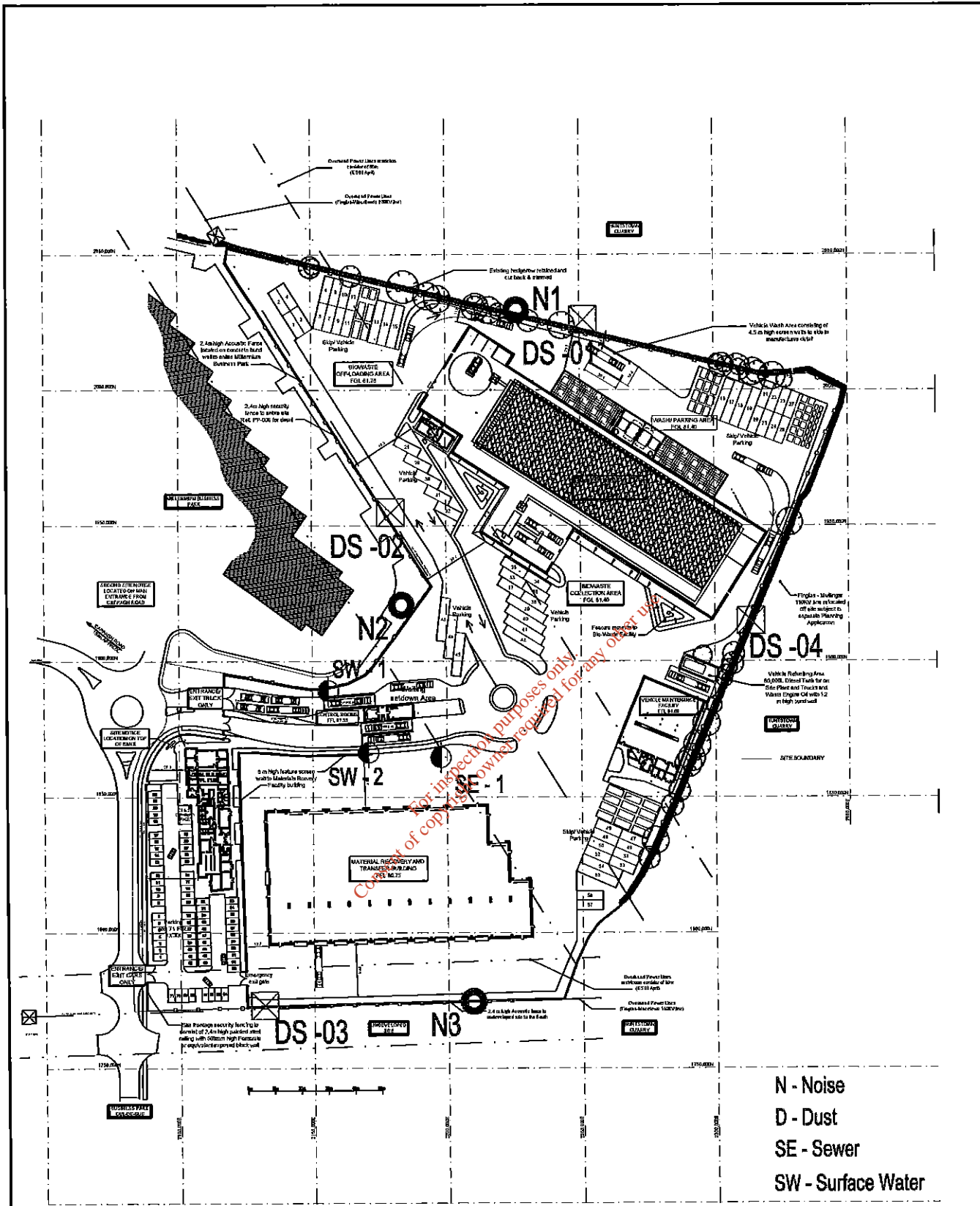
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**Appendix A -
Site Layout Drawings**

OCM Drawing No. 2.1

Michael Punch & Partners Drawing 022-045-001

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environmental management for business

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