

Tegral Building Products Ltd.

Annual Environmental Report (AER) 2017

In Relation To

Waste Disposal Facility

At

Ballylinan, Co. Laois

Waste Management License Reference 0046-01

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1. Introduction

1.1. Licensee

Tegral Building Products Ltd.
Athy,
Co. Kildare.

1.2. Register Number

W046-01

1.3. Reporting Period

1st January to 31st December 2017

1.4. Location

Ballylinan,
Co.Laois.

1.5. Environmental Policy

For the Environment Policy Statement refer to Appendix 1.

1.6. Summary of Compliance (1st January to 31st December 2017)

The landfill site at Ballylinan was not used for disposal of waste in 2017. Implementation of the agreed closure plan was completed in September 2007.

No non-compliance was notified by the Agency, in the period.

2. Site Description

2.1. Location

The landfill disposal site is located in the Ballylinan Townland approximately 1 km East of the village of Ballylinan, Co. Laois. The National Grid Reference for the site is:

2656 E, 1884 N.

The site comprises an area of 1.489 hectares of which approximately 0.755 hectares is a disused limestone quarry and the remaining 0.734 hectares is grass borders and site access road. The site has been in use since 1990, initially under Permit from Laois County Council and is licensed by the E.P.A. since 18th May 1999. The site was used exclusively for the disposal of wastes arising from the manufacture of fibre-cement products at the Athy factory.

3. Site Management Personnel

3.1. Board of Directors

The Board of Directors bears ultimate statutory responsibility for the actions of the company. Consequently, the ultimate authority within the company rests with the Board.

3.2. Works Manager

The Works Manager is **Mr. Stephen Gormalley** and his duties regarding Ballylinan Landfill Site include the following:

- Ensuring compliance with all relevant environmental legislative requirements;
- Ensuring that at all times competent staff and appropriate resources are available to meet the requirements of the Waste Management License.

3.3. Facility Manager

The Facility Manager is **Dr. Paul Loughman** who is responsible for the following;

- Ensuring compliance with all relevant environmental legislative requirements;

3.4. Deputy Facility Manager

The Deputy Facility Manager, when the site was active was **Mr. Paul Molloy** who is employed by Tegral as Relief Day Shift & Warehouse Manager.

3.5. Other Personnel

No other personnel were involved on the site in 2017.

4. Waste Acceptance and Handling

4.1. Waste Types

No wastes were deposited on the site in 2017.

4.2. Quantities

No waste was deposited on the site in 2017.

4.3. Deposition of Waste

No waste was deposited on the site in 2017.

4.3.1. Further Procedural Guidelines

Now not relevant

5. Landfill Monitoring

5.1 Groundwater Monitoring

In accordance with the requirements of the Waste Management License (W046-01) groundwater in the vicinity of the site is sampled four times per year at nine locations. Five of these locations are from monitoring wells installed in and around the landfill site and designated MW01-MW05. One sampling location, designated MW06 is a public hand pump located North of the site (although no samples could be obtained at this location), MW08 is located South East of the site. Samples were also taken at two additional wells not referenced in the waste management licence. These are MW09 located up gradient of the facility and MW10 located down gradient. These wells were installed following a hydro geological assessment of the site undertaken in December 2004.

Three additional wells were installed off site in April 2016 at the request of the EPA.

Two of the wells (MW-11 and MW-12) are to the north of and downgradient of the landfill, and one well (MW-9A) is to the south and upgradient of the landfill.

O'Callaghan Moran & Associates (OCM) were contracted to do the sampling and analysis as required in the license. The following reports, produced by OCM were submitted to the Agency during the year.

1 st Quarter 2017	Report Submitted
2 nd Quarter 2017	Report Submitted
3 rd Quarter 2017	Report Submitted
4 th Quarter 2017	Report Submitted

5.2. Air Monitoring

No wastes were deposited on the site in 2017. Air monitoring was carried out on 22/12/2017.

5.3. Climatological Data

Data for rainfall and wind speed and direction is, as agreed with the Agency, obtained from Met Eireann. This data was obtained for the Oak Park station in Carlow. The daily figures for rainfall, mean wind speed are included in Appendix 2 and are summarized below.

Monthly Precipitation Data Oak Park

Month	Total Precipitation mm	Number of Days with No Precipitation	Daily Max. Precipitation mm
Jan	36.3	11	10.1
Feb	57.8	2	10.6
March	66.6	9	12.1
April	15.8	19	5.5
May	81.8	17	21.1
June	91	9	17.7
July	52.7	11	12.7
August	62.3	6	24
September	91.3	7	17.1
October	62.9	7	22
November	54.1	8	19.7
December	84.2	10	28.2
Annual Total	756.8	116	---

Monthly Mean Wind Speeds – Knots *

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Carlow	6.9	9.2	8.3	6.4	6.36	7.56	6.68	6.85	7.7	8.77	6.65	7.77

Annual Mean Oakpark = 7.43

* Source Met Eireann, Oakpark, Carlow

6. Emission Impacts

6.1. Groundwater

6.1.1. Discharges to Groundwater

There are no direct discharges to groundwater from the facility. Indirect discharges are calculated based on the net precipitation over the area of the site enclosed by the quarry rock face, which is 0.755 hectares. The measured total precipitation at the Met Eireann Station in Oakpark during 2017 was 756.8 mm.

The potential evaporation for Oak Park Carlow from the 2017 (Met Eireann) data was 519 mm. This gives a net precipitation of 237.8 mm.

This yields a volume of 1795m³ of which a maximum of 5% would have penetrated the cap and percolated through the waste. The maximum indirect discharge to groundwater is therefore estimated to be 89.77m³.

6.1.2. Groundwater Quality

All of the groundwater monitoring data is presented on the following tables. There are no standards prescribed in the waste management license for groundwater quality. It is important to note that there are no private wells in the immediate vicinity of the landfill site. The local residents are serviced by a public water supply scheme.

The groundwater monitoring programme, which has been ongoing since 1999 has identified the consistent presence of elevated levels of ammonia, chloride, phenols, BTEX, pH and potassium in a number of the monitoring wells.

In general, however, the 2017 monitoring results are consistent with those of previous years. The presence of faecal organisms in some of the wells is a clear indication of an external source of contamination.

Ballynua Landfill Site
Groundwater Monitoring Results 2017

N 188424	E 265543	Monitoring Well No. MW-01		West of Centre		
Parameter		Units	Monitoring Dates			
			Q1	Q2	Q3	Q4
Barium		µg/l	<3	5	<3	<3
Calcium		mg/l	5.6	8.8	4.1	7.2
Total Iron		µg/l	29	35	66	39
Manganese		µg/l	<2	8	<2	2
Potassium		mg/l	116.9	86.7	114.5	134.6
Sodium		mg/l	53.4	37.6	51.4	49.9
Sulphate		mg/l	11.9	18	0.8	14.7
Chloride		mg/l	26.1	23.8	28.8	22.1
Nitrate		mg/l (NO ₃)	<0.2	1.2	<0.2	<0.2
Nitrite		mg/l (NO ₂)	<0.02	<0.02	<0.02	<0.02
Total Oxidised Nitrogen		mg/l (N)	<0.2	0.3	<0.2	<0.2
Ammoniacal Nitrogen		mg/l (N)	12.85	8.21	13.53	13.57
Electrical Conductivity		µS/cm	674	457	590	605
pH		pH units	9.93	9.09	9.99	9.29
Total Organic Carbon		mg/l	<2	14	54	41
2-Chlorophenol		µg/l	<0.5	<0.5	<0.5	<0.5
2-Methylphenol		µg/l	<0.5	<0.5	0.6	<0.5
2-Nitrophenol		µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol		µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol		µg/l	5	4.4	10.9	13.4
2,4,5-Trichlorophenol		µg/l	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol		µg/l	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol		µg/l	<0.5	<0.5	<0.5	<0.5
4-Methylphenol		µg/l	7.3	<0.5	21.6	35.1
4-Nitrophenol		µg/l	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol		µg/l	<0.5	<0.5	<0.5	<0.5
Phenol		µg/l	33.4	43.2	86.6	94.1
Total Speciated Phenols		µg/l	46	48	120	143
Boron		µg/l				21
Cadmium		µg/l				<0.5
Total Chromium		µg/l				<1.5
Copper		µg/l				<7
Lead		µg/l				<5
Magnesium		mg/l				0.6
Mercury		µg/l				<1
Zinc		µg/l				<3
Total Cyanide		mg/l				<0.01
Total Phosphorus		mg/l				0.112
Fluoride		mg/l				0.4
Total Alkalinity		mg/l				266
Total Solids		mg/l				437
Benzene		µg/l				<0.5
Toluene		µg/l				53
Ethylbenzene		µg/l				21
Total Xylenes		µg/l				50
Total Coliforms		cfu/100ml				0
E.Coli		cfu/100ml				0
Pesticides		µg/l				N.D

ND – Non-detect

Ballynau Landfill Site
Groundwater Monitoring Results 2017

N 188464 E 265602		Monitoring Well No. MW-02		North of Centre	
Parameter	Units	Monitoring Dates			
		Q1	Q2	Q3	Q4
Barium	µg/l	32	33	45	45
Calcium	mg/l	131.6	76.2	166.1	127.3
Total Iron	µg/l	<20	<20	<20	<20
Manganese	µg/l	154	235	4	8
Potassium	mg/l	16.9	63	7.6	24.3
Sodium	mg/l	8.8	19.7	7.4	10
Sulphate	mg/l	18.8	143.1	11.9	18.3
Chloride	mg/l	22.5	24.9	12.2	12.5
Nitrate	mg/l (NO ₃)	14.3	0.4	8.3	14.5
Nitrite	mg/l (NO ₂)	0.93	0.23	0.02	0.62
Total Oxidised Nitrogen	mg/l (N)	3.5	<0.2	1.9	3.5
Ammoniacal Nitrogen	mg/l (N)	1.55	6.39	0.32	0.8
Electrical Conductivity	µS/cm	828	607	794	722
pH	pH units	7.52	7.57	7.31	7.31
Total Organic Carbon	mg/l	7	6	7	4
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5
Total Speciated Phenols	µg/l	<6	<6	<6	<6
Boron	µg/l				33
Cadmium	µg/l				<0.5
Total Chromium	µg/l				1.6
Copper	µg/l				<7
Lead	µg/l				<5
Magnesium	mg/l				6.2
Mercury	µg/l				<1
Zinc	µg/l				21
Total Cyanide	mg/l				<0.01
Total Phosphorus	mg/l				0.098
Fluoride	mg/l				<0.3
Total Alkalinity	mg/l				362
Total Solids	mg/l				557
Benzene	µg/l				<0.5
Toluene	µg/l				<5
Ethylbenzene	µg/l				<1
Total Xylenes	µg/l				<2
Total Coliforms	cfu/100ml				0
<u>E.Coli</u>	cfu/100ml				0
Pesticides	µg/l				ND

ND – Non-detect

Ballynynan Landfill Site
Groundwater Monitoring Results 2017

N 188411	E 265684	Monitoring Well No. MW-03		East of Centre	
Parameter	Units	Monitoring Dates			
		Q1	Q2	Q3	Q4
Barium	µg/l	23	40	56	31
Calcium	mg/l	110.2	119.8	116.9	125.8
Total Iron	µg/l	<20	<20	<20	<20
Manganese	µg/l	46	14	790	<2
Potassium	mg/l	10.8	24.6	36.2	13.9
Sodium	mg/l	7.7	11.6	14.8	8.8
Sulphate	mg/l	18	41.5	51.6	21.2
Chloride	mg/l	10.4	15	18.4	15.9
Nitrate	mg/l (NO ₃)	9	6.6	2.6	12.7
Nitrite	mg/l (NO ₂)	0.03	<0.02	0.12	<0.02
Total Oxidised Nitrogen	mg/l (N)	2	1.5	0.6	2.9
Ammoniacal Nitrogen	mg/l (N)	0.45	0.57	1.93	0.12
Electrical Conductivity	µS/cm	662	607	844	659
pH	pH units	7.6	7.5	7.08	7.27
Total Organic Carbon	mg/l	<2	<2	4	<2
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5
Total Speciated Phenols	µg/l	<6	<6	<6	<6
Boron	µg/l				25
Cadmium	µg/l				<0.5
Total Chromium	µg/l				<1.5
Copper	µg/l				<7
Lead	µg/l				<5
Magnesium	mg/l				3.6
Mercury	µg/l				<1
Zinc	µg/l				178
Total Cyanide	mg/l				<0.01
Total Phosphorus	mg/l				0.823
Fluoride	mg/l				<0.3
Total Alkalinity	mg/l				396
Total Solids	mg/l				1,454
Benzene	µg/l				<0.5
Toluene	µg/l				<5
Ethylbenzene	µg/l				<1
Total Xylenes	µg/l				<2
Total Coliforms	cfu/100ml				0
<u>E.Coli</u>	cfu/100ml				0
Pesticides	µg/l				N.D

ND – Non-detect

**Ballynua Landfill Site
Groundwater Monitoring Results 2017**

N 188362	E 265618	Monitoring Well No. MW-04		South of Centre		
Parameter		Units	Monitoring Dates			
			Q1	Q2	Q3	Q4
Barium	ug/l	50	49	56	55	
Boron	µg/l				18	
Cadmium	µg/l				<0.5	
Calcium	mg/l				119.4	
Total Chromium	µg/l				<1.5	
Copper	µg/l				<7	
Total Iron	ug/l	<20	<20	<20	<20	
Lead	µg/l				<5	
Magnesium	mg/l				4.5	
Manganese	ug/l	534	264	572	85	
Mercury	µg/l				<1	
Potassium	mg/l	20	18.2	18.1	18.3	
Sodium	mg/l	28.8	23.7	23	25.7	
Zinc	µg/l				46	
Total Cyanide	mg/l				<0.01	
Total Phosphorus	mg/l				0.299	
Sulphate	mg/l	5.8	6.2	3.5	8.6	
Chloride	mg/l	19.5	18	20.4	18.2	
Fluoride	mg/l				<0.3	
Nitrate as NO ₃	mg/l	0.4	2.2	0.3	4.3	
Nitrite as NO ₂	mg/l	0.05	2.66	2.21	1.62	
Total Alkalinity	mg/l	1.6	7.2	1.1	17.8	
Total Solids	mg/l	0.05	1.82	0.03	0.89	
Total Oxidised Nitrogen	mg/l (N)				316	
Ammoniacal Nitrogen	mg/l (N)				680	
Electrical Conductivity	uS/cm	690	587	610	600	
pH	pH units	7.41	7.42	7.37	7.24	
Total Organic Carbon	mg/l	32	<2	8	<2	
Benzene	µg/l				<0.5	
Toluene	µg/l				<5	
Ethylbenzene	µg/l				<1	
Total Xylenes	µg/l				<2	
Total Coliforms	cfu/100ml				5	
<u>E.Coli</u>	cfu/100ml				5	
Pesticides	µg/l				N.D	
2-Chlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2-Nitrophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	
4-Methylphenol	ug/l	<0.5	<0.5	<0.5	<0.5	
4-Nitrophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	ug/l	<0.5	<0.5	<0.5	<0.5	
Phenol	ug/l	<0.5	<0.5	<0.5	<0.5	
Total Speciated Phenols	ug/l	<6	<6	<6	<6	

ND – Non-detect

Ballynynan Landfill Site
Groundwater Monitoring Results 2017

N 188465	E 265657	Monitoring Well No. MW-05		North East of Centre	
Parameter	Units	Monitoring Dates			
		Q1	Q2	Q3	Q4
Barium	µg/l	185	242	251	198
Calcium	mg/l	134	137.8	144.4	133
Total Iron	µg/l	<20	<20	<20	<20
Manganese	µg/l	<2	341	34	<2
Potassium	mg/l	20.7	25.9	27.5	21.8
Sodium	mg/l	9.8	13.1	13.5	10.8
Sulphate	mg/l	31.7	36.9	38.5	17.6
Chloride	mg/l	37.4	31	29.7	23.4
Nitrate	mg/l (NO ₃)	34	11.4	0.6	9.2
Nitrite	mg/l (NO ₂)	<0.02	0.14	0.04	0.1
Total Oxidised Nitrogen	mg/l (N)	7.7	2.6	<0.2	2.1
Ammoniacal Nitrogen	mg/l (N)	0.03	0.89	0.18	0.38
Electrical Conductivity	µS/cm	878	710	817	740
Nitrate	mg/l (NO ₃)	7.41	7.2	7.19	7.15
Total Organic Carbon	mg/l	2	<2	<2	2
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5
Total Speciated Phenols	µg/l	<6	<6	<6	<6
Boron	µg/l				37
Cadmium	µg/l				<0.5
Total Chromium	µg/l				<1.5
Copper	µg/l				<7
Lead	µg/l				<5
Magnesium	mg/l				7
Mercury	µg/l				<1
Zinc	µg/l				21
Total Cyanide	mg/l				<0.01
Total Phosphorus	mg/l				0.184
Fluoride	mg/l				<0.3
Total Alkalinity	mg/l				344
Total Solids	mg/l				565
Benzene	µg/l				<0.5
Toluene	µg/l				<5
Ethylbenzene	µg/l				<1
Total Xylenes	µg/l				<2
Total Coliforms	cfu/100ml				0
E.Coli	cfu/100ml				0
Pesticides	µg/l				ND

ND – Non-detect

**Ballynna Landfill Site
Groundwater Monitoring Results 2017**

N 188359	E 265781	Monitoring Well No. MW-08	Murphy's Well East South East of Centre			
			Monitoring Dates			
Parameter	Units	Q1	Q2	Q3	Q4	
Barium	µg/l	22	23	22	26	
Calcium	mg/l	112.2	114	110.9	114.6	
Total Iron	µg/l	<20	<20	<20	<20	
Manganese	µg/l	<2	<2	<2	<2	
Potassium	mg/l	1.7	1.4	1.4	1.8	
Sodium	mg/l	7.9	7.5	8	7.9	
Sulphate	mg/l	13	12.1	12.1	12.8	
Chloride	mg/l	17.4	16.5	16.7	18.1	
Nitrate	mg/l (NO ₃)	18.4	19.8	9.9	18.7	
Nitrite	mg/l (NO ₂)	<0.02	<0.02	<0.02	<0.02	
Total Oxidised Nitrogen	mg/l (N)	4.2	4.5	2.2	4.2	
Ammoniacal Nitrogen	mg/l (N)	<0.03	<0.03	0.03	<0.03	
Electrical Conductivity	µS/cm	676	556	591	599	
pH	pH units	7.75	7.7	7.6	7.62	
Total Organic Carbon	mg/l	<2	<2	<2	<2	
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Total Speciated Phenols	µg/l	<6	<6	<6	<6	
Boron	µg/l				22	
Cadmium	µg/l				<0.5	
Total Chromium	µg/l				<1.5	
Copper	µg/l				<7	
Lead	µg/l				<5	
Magnesium	mg/l				9.6	
Mercury	µg/l				<1	
Zinc	µg/l				<3	
Total Cyanide	mg/l				<0.01	
Total Phosphorus	mg/l				0.025	
Fluoride	mg/l				<0.3	
Total Alkalinity	mg/l				276	
Total Solids	mg/l				355	
Benzene	µg/l				<0.5	
Toluene	µg/l				<5	
Ethylbenzene	µg/l				<1	
Total Xylenes	µg/l				<2	
Total Coliforms	cfu/100ml				0	
<u>E.Coli</u>	cfu/100ml				0	
Pesticides	µg/l				N.D	

ND – Non-detect

Ballylnan Landfill Site
Groundwater Monitoring Results 2017

Parameter	Units	Monitoring Well No. MW-09A				South of Centre			
		Monitoring Dates							
		Q1	Q2	Q3	Q4				
Barium	µg/l	100	Dry	Dry	110				
Calcium	mg/l	129.2	Dry	Dry	136.3				
Total Iron	µg/l	<20	Dry	Dry	<20				
Manganese	µg/l	6	Dry	Dry	9				
Potassium	mg/l	2.5	Dry	Dry	2.2				
Sodium	mg/l	11.6	Dry	Dry	8.5				
Sulphate	mg/l	31	Dry	Dry	17.6				
Chloride	mg/l	18	Dry	Dry	13.5				
Nitrate	mg/l (NO ₃)	6.7	Dry	Dry	5				
Nitrite	mg/l (NO ₂)	<0.02	Dry	Dry	0.16				
Total Oxidised Nitrogen	mg/l (N)	1.5	Dry	Dry	1.2				
Ammoniacal Nitrogen	mg/l (N)	0.05	Dry	Dry	1.09				
Electrical Conductivity	µS/cm	848	Dry	Dry	736				
pH	pH units	7.44	Dry	Dry	7.16				
Total Organic Carbon	mg/l	2	Dry	Dry	<2				
2-Chlorophenol	µg/l	<0.5	Dry	Dry	<0.5				
2-Methylphenol	µg/l	<0.5	Dry	Dry	<0.5				
2-Nitrophenol	µg/l	<0.5	Dry	Dry	<0.5				
2,4-Dichlorophenol	µg/l	<0.5	Dry	Dry	<0.5				
2,4-Dimethylphenol	µg/l	<0.5	Dry	Dry	<0.5				
2,4,5-Trichlorophenol	µg/l	<0.5	Dry	Dry	<0.5				
2,4,6-Trichlorophenol	µg/l	<0.5	Dry	Dry	<0.5				
4-Chloro-3-methylphenol	µg/l	<0.5	Dry	Dry	<0.5				
4-Methylphenol	µg/l	<0.5	Dry	Dry	<0.5				
4-Nitrophenol	µg/l	<0.5	Dry	Dry	<0.5				
Pentachlorophenol	µg/l	<0.5	Dry	Dry	<0.5				
Phenol	µg/l	<0.5	Dry	Dry	<0.5				
Total Speciated Phenols	µg/l	<6	Dry	Dry	<6				
Boron	µg/l				63				
Cadmium	µg/l				<0.5				
Total Chromium	µg/l				<1.5				
Copper	µg/l				<7				
Lead	µg/l				<5				
Magnesium	mg/l				17.8				
Mercury	µg/l				<1				
Zinc	µg/l				503				
Total Cyanide	mg/l				<0.01				
Total Phosphorus	mg/l				1.388				
Fluoride	mg/l				<0.3				
Total Alkalinity	mg/l				1204				
Total Solids	mg/l				4,855				
Benzene	µg/l				<0.5				
Toluene	µg/l				<5				
Ethylbenzene	µg/l				<1				
Total Xylenes	µg/l				<2				
Total Coliforms	cfu/100ml				0				
E. Coli	cfu/100ml				0				
Pesticides	µg/l				N.D				

ND – Non-detect

Ballynynan Landfill Site
Groundwater Monitoring Results 2017

Monitoring Well No. MW-09		South of Centre	
Parameter	Units	Monitoring Dates	
		Q1	Q4
Barium	µg/l	<3	5
Calcium	mg/l	0.9	3.6
Total Iron	µg/l	<20	24
Manganese	µg/l	<2	<2
Potassium	mg/l	236.6	221.1
Sodium	mg/l	83.5	65.3
Sulphate	mg/l	16.5	24
Chloride	mg/l	30.7	36.9
Nitrate	mg/l (NO ₃)	<0.2	<0.2
Nitrite	mg/l (NO ₂)	0.19	<0.02
Total Oxidised Nitrogen	mg/l (N)	<0.2	<0.2
Ammoniacal Nitrogen	mg/l (N)	17.67	8.18
Electrical Conductivity	µS/cm	1283	922
pH	pH units	10.6	9.46
Total Organic Carbon	mg/l	<2	18
2-Chlorophenol	µg/l	<0.5	<0.5
2-Methylphenol	µg/l	<0.5	<0.5
2-Nitrophenol	µg/l	<0.5	<0.5
2,4-Dichlorophenol	µg/l	<0.5	<0.5
2,4-Dimethylphenol	µg/l	15.8	8.6
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5
4-Methylphenol	µg/l	12.2	14.3
4-Nitrophenol	µg/l	<0.5	<0.5
Pentachlorophenol	µg/l	<0.5	<0.5
Phenol	µg/l	27.6	62.5
Total Speciated Phenols	µg/l	56	85
Boron	µg/l		33
Cadmium	µg/l		<0.5
Total Chromium	µg/l		<1.5
Copper	µg/l		<7
Lead	µg/l		<5
Magnesium	mg/l		2.5
Mercury	µg/l		<1
Zinc	µg/l		<3
Total Cyanide	mg/l		<0.01
Total Phosphorus	mg/l		0.064
Fluoride	mg/l		<0.3
Total Alkalinity	mg/l		370
Total Solids	mg/l		621
Benzene	µg/l		3.1
Toluene	µg/l		76
Ethylbenzene	µg/l		25
Total Xylenes	µg/l		63
Total Coliforms	cfu/100ml		0
<u>E.Coli</u>	cfu/100ml		0
Pesticides	µg/l		N.D

ND – Non-detect

Groundwater Monitoring Results 2017

Parameter	Units	Monitoring Dates			
		Q1	Q2	Q3	Q4
		Monitoring Well No. MW-10		North East of Centre	
Barium	µg/l	22	24	24	23
Calcium	mg/l	122.2	127	123.8	120.9
Total Iron	µg/l	<20	<20	<20	<20
Manganese	µg/l	<2	<2	<2	<2
Potassium	mg/l	2.5	2.3	2.4	2.4
Sodium	mg/l	9.4	9.3	9.7	9.1
Sulphate	mg/l	17.6	18.3	20	15.9
Chloride	mg/l	20.7	20.2	22.1	18.1
Nitrate	mg/l (NO ₃)	20.9	22.1	7.4	7.5
Nitrite	mg/l (NO ₂)	<0.02	<0.02	<0.02	<0.02
Total Oxidised Nitrogen	mg/l (N)	4.7	5	1.7	1.7
Ammoniacal Nitrogen	mg/l (N)	<0.03	0.03	0.03	<0.03
Electrical Conductivity	µS/cm	731	613	668	814
pH	pH units	7.51	7.45	7.4	7.08
Total Organic Carbon	mg/l	<2	<2	<2	<2
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5
Total Speciated Phenols	µg/l	<6	<6	<6	<6
Boron	µg/l				45
Cadmium	µg/l				<0.5
Total Chromium	µg/l				1.5
Copper	µg/l				<7
Lead	µg/l				<5
Magnesium	mg/l				8.4
Mercury	µg/l				<1
Zinc	µg/l				<3
Total Cyanide	mg/l				<0.01
Total Phosphorus	mg/l				0.043
Fluoride	mg/l				<0.3
Total Alkalinity	mg/l				278
Total Solids	mg/l				384
Benzene	µg/l				<0.5
Toluene	µg/l				<5
Ethylbenzene	µg/l				<1
Total Xylenes	µg/l				<2
Total Coliforms	cfu/100ml				7
<u>E.Coli</u>	cfu/100ml				7
Pesticides	µg/l				N.D

ND – Non-detect

Ballylunan Landfill Site
Groundwater Monitoring Results 2017

Parameter	Monitoring Well No. MW-11		North East of Centre			
	Units	Monitoring Dates				
		Q1	Q2	Q3	Q4	
Barium	µg/l	192	204	165	129	
Calcium	mg/l	139.6	136.7	153.2	140.6	
Total Iron	µg/l	<20	<20	<20	<20	
Manganese	µg/l	<2	<2	<2	<2	
Potassium	mg/l	26.9	27	19.7	12.4	
Sodium	mg/l	23.1	21.9	15.3	10.6	
Sulphate	mg/l	35.2	30.1	20	18.3	
Chloride	mg/l	59.4	57.6	36.7	26.8	
Nitrate	mg/l (NO ₃)	41.9	31.7	29.5	6.6	
Nitrite	mg/l (NO ₂)	<0.02	<0.02	<0.02	<0.02	
Total Oxidised Nitrogen	mg/l (N)	9.5	7.1	6.7	1.5	
Ammoniacal Nitrogen	mg/l (N)	0.06	0.32	0.04	<0.03	
Electrical Conductivity	µS/cm	943	948	906	822	
pH	pH units	7.44	7.08	7.06	7.09	
Total Organic Carbon	mg/l	<2	<2	5	<2	
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Total Speciated Phenols	µg/l	<6	<6	<6	<6	
Boron	µg/l				38	
Cadmium	µg/l				<0.5	
Total Chromium	µg/l				<1.5	
Copper	µg/l				<7	
Lead	µg/l				<5	
Magnesium	mg/l				9.6	
Mercury	µg/l				<1	
Zinc	µg/l				52	
Total Cyanide	mg/l				<0.01	
Total Phosphorus	mg/l				0.111	
Fluoride	mg/l				<0.3	
Total Alkalinity	mg/l				338	
Total Solids	mg/l				581	
Benzene	µg/l				<0.5	
Toluene	µg/l				<5	
Ethylbenzene	µg/l				<1	
Total Xylenes	µg/l				<2	
Total Coliforms	cfu/100ml				8	
<u>E.Coli</u>	cfu/100ml				8	
Pesticides	µg/l				N.D	

ND – Non-detect

Ballynua Landfill Site
Groundwater Monitoring Results 2017

Parameter	Units	Monitoring Well No. MW-12				North North East of Centre
		Monitoring Dates				
		Q1	Q2	Q3	Q4	
Barium	µg/l	16	23	25	23	
Calcium	mg/l	110	117.9	116.5	124	
Total Iron	µg/l	<20	<20	<20	<20	
Manganese	µg/l	<2	<2	<2	<2	
Potassium	mg/l	1	1.1	1.4	1.2	
Sodium	mg/l	6.2	5.5	5.8	4.9	
Sulphate	mg/l	6.5	8.7	7.2	4.2	
Chloride	mg/l	11.1	13.5	4.2	5.6	
Nitrate	mg/l (NO ₃)	4.7	6.9	4	1.4	
Nitrite	mg/l (NO ₂)	<0.02	<0.02	<0.02	<0.02	
Total Oxidised Nitrogen	mg/l (N)	1.1	1.5	0.9	0.3	
Ammoniacal Nitrogen	mg/l (N)	<0.03	<0.03	0.09	<0.03	
Electrical Conductivity	µS/cm	621	566	537	619	
pH	pH units	7.55	7.4	7.53	7.09	
Total Organic Carbon	mg/l	<2	<2	<2	<2	
2-Chlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Methylphenol	µg/l	<0.5	<0.5	<0.5	<0.5	
4-Nitrophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Phenol	µg/l	<0.5	<0.5	<0.5	<0.5	
Total Speciated Phenols	µg/l	<6	<6	<6	<6	
Boron	µg/l				29	
Cadmium	µg/l				<0.5	
Total Chromium	µg/l				<1.5	
Copper	µg/l				<7	
Lead	µg/l				<5	
Magnesium	mg/l				5.4	
Mercury	µg/l				<1	
Zinc	µg/l				4	
Total Cyanide	mg/l				<0.01	
Total Phosphorus	mg/l				0.03	
Fluoride	mg/l				<0.3	
Total Alkalinity	mg/l				290	
Total Solids	mg/l				327	
Benzene	µg/l				<0.5	
Toluene	µg/l				<5	
Ethylbenzene	µg/l				<1	
Total Xylenes	µg/l				<2	
Total Coliforms	cfu/100ml				0	
E.Coli	cfu/100ml				0	
Pesticides	µg/l				N.D	

ND – Non-detect

6.2. Air Quality

6.2.1. Fibres in Air

One fibre in air monitoring sample was taken in 2017. All results were <0.01f/ml and comply with the required standard.

6.2.2. Dust Deposition

Dust deposition monitoring has ceased as agreed with the agency.

7. Site Design / Development

7.1. Security

Security is ensured by the provision of fencing with secure and lockable gates. The access road to the site is private; therefore the landfill is not adjoining a public road.

There are two gates between the public road and the landfill site. The external gate is used for access to the site inner gate, along the private access road, which is also used by the farmer from whom the land is leased to access his other property. The internal gate is used exclusively for site entry, and is open to allow free movement of sheep who graze the property as agreed with the agency.

7.2. Site Inspections

No waste was deposited on the site in 2017 and there was no need for the routine inspections undertaken during the operational phase of the site. The site was inspected by O'Callaghan Moran Consultants to ensure there were no indications of settlement, surface ponding, leachate outbreaks, etc.

7.3. Site Roads

When the site was active the private site access road was inspected on a regular basis. The site owner also uses this as a means of access to a portion of his land.

7.4. Electricity Supply

The electrical supply to the site was disconnected by the ESB in 2008 as there is now no need to maintain such a supply.

7.5. Other Infrastructure

There is no other infrastructure on the site.

7.6. Restoration

The implementation of the restoration plan agreed with the Agency was completed in September 2007.

7.7. Site Development Works

There were no such works.

7.8. Topographical Survey

The finished site levels are shown on the drawings with the Construction Validation reported prepared by O'Callaghan Moran / Capita Simmons.

7.8.1. Area Covered by Waste

0.755 hectares has been covered with waste.

8. Objective and Targets

8.1.

The objective set for 2017 was to continue to implement the monitoring and other relevant requirements of the licence.

This was achieved.

8.2. Objectives for 2018

The objective for 2018 is to continue to implement the monitoring and other relevant requirements of the licence.

9. Resources and Energy Consumption

9.1. Cover Material

Disposal activities at the site ceased in May 2005. No cover material was used in 2017.

9.2. Diesel Fuel

Not relevant as site not in use for disposal of waste in 2017.

9.3. Electricity

Not relevant as site not in use for disposal of waste in 2017.

10. Non-Compliance with License Conditions

No non-compliances with the Waste Management License were notified during the year.

11. Complaints

No complaints were received during 2017.

12. Incidents

There were no incidents during the year.

13. Financial Provisions

In accordance with the requirements of Condition 11.2 of the license Tegral contracted Bord na Mona to undertake an environmental liabilities and risk assessment of the activity. Their report was submitted to the Agency in February 2000. According to their findings the worst-case scenario would be a targeted groundwater clean-up programme. Tegral Building Products Limited have made a provision of 127,000 Euro in the accounts to cover such an eventuality. On the basis of the monitoring results generated during 2017 and the risk assessment undertaken by O'Callaghan Moran & Associates, it is considered that this provision is adequate.

APPENDIX 1

ENVIRONMENTAL

POLICY

Tegral Buildings Products Annual Environmental Report 2017

Environmental Policy Statement

Tegral Building Products Limited is committed to complying with all relevant current licensing regulations with regard to operations carried out at its manufacturing plant in Athy, County Kildare and associated activities at its licensed landfill site at Ballylinan, County Laois.

In order to re-enforce this policy, Tegral is committed to the continued implementation of an Environmental Management System in compliance with the ISO 14001 International Standard. Certification to this standard was achieved in December 2001 and upgraded in 2005 to ISO14001:2004

The company undertakes to provide the necessary resources, including manpower and related training to achieve and demonstrate sound environmental performance and foster environmental protection by controlling the impact of its operational activities on the environment at large.

All employees shall be made aware of the commitment necessary to support environmental protection in the performance of their duties.

PATRICK KELLY
Managing Director

PAUL LOUGHMAN
Quality & Environment Manager

APPENDIX 2

MET EIREANN

DATA

Date	Rainfall(mm)	Mean Wind Speed(knots)
01/01/2017	1.4	9.6
02/01/2017	0.1	4.9
03/01/2017	0	4.4
04/01/2017	0.1	3.8
05/01/2017	0	5.8
06/01/2017	2.9	8
07/01/2017	0.8	2
08/01/2017	0.1	5.3
09/01/2017	3.5	10.3
10/01/2017	0.1	10.2
11/01/2017	0.1	11.5
12/01/2017	4.5	9.3
13/01/2017	0.1	10.4
14/01/2017	0	8.3
15/01/2017	0.1	7.9
16/01/2017	0.1	3.3
17/01/2017	0.6	3.3
18/01/2017	0.1	3.3
19/01/2017	0	4.2
20/01/2017	0	4.1
21/01/2017	0	1.7
22/01/2017	0	1.7
23/01/2017	0	6.9
24/01/2017	0	11.9
25/01/2017	0	16.3
26/01/2017	0	14.2
27/01/2017	1	7.7
28/01/2017	1.2	5.6
29/01/2017	5.3	3.8
30/01/2017	4.1	9.6
31/01/2017	10.1	4.5
01/02/2017	2.2	11.1
02/02/2017	10.6	17.3
03/02/2017	0.1	6.3
04/02/2017	1.2	6.2
05/02/2017	0.1	4.4
06/02/2017	8.2	9.5
07/02/2017	0.1	5.0
08/02/2017	0.1	4.5
09/02/2017	0	9.6
10/02/2017	0	4.6
11/02/2017	5	8.9
12/02/2017	1.8	9.0
13/02/2017	0.6	9.7

14/02/2017	1.1	8.0
15/02/2017	0.4	9.3
16/02/2017	0.1	7.5
17/02/2017	0.2	9.3
18/02/2017	0.7	8.0
19/02/2017	0.1	7.4
20/02/2017	1.4	10.5
21/02/2017	4.3	10.3
22/02/2017	5.6	8.1
23/02/2017	3.3	19.0
24/02/2017	1.4	8.2
25/02/2017	5.5	11.4
26/02/2017	2.5	14.0
27/02/2017	0.8	7.1
28/02/2017	0.4	13.7
01/03/2017	6.9	8.2
02/03/2017	4.1	10.4
03/03/2017	12.1	6.4
04/03/2017	2.7	2.2
05/03/2017	3.8	9.1
06/03/2017	1.9	6.2
07/03/2017	1.8	7.8
08/03/2017	0	7.4
09/03/2017	0	5.9
10/03/2017	0.1	10.3
11/03/2017	1.8	4.9
12/03/2017	2.6	8
13/03/2017	0	6.8
14/03/2017	0	8.5
15/03/2017	0	6.7
16/03/2017	0.1	9.5
17/03/2017	1.6	12.8
18/03/2017	0.4	14.3
19/03/2017	0.3	11.9
20/03/2017	2.3	12.2
21/03/2017	2.2	8.6
22/03/2017	11.7	10.2
23/03/2017	0.2	9.9
24/03/2017	0	4.6
25/03/2017	0	3.7
26/03/2017	0	4.4
27/03/2017	0	4.3
28/03/2017	1.2	8.2
29/03/2017	1.3	10.6
30/03/2017	3.8	11.6
31/03/2017	3.7	10.9
01/04/2017	0.6	6.3
02/04/2017	0	6.9
03/04/2017	1.7	11.9
04/04/2017	0.1	7.3

05/04/2017	0	4.7
06/04/2017	0	3.2
07/04/2017	0	4.2
08/04/2017	0	6.5
09/04/2017	0	6.3
10/04/2017	0	6.3
11/04/2017	0	7.6
12/04/2017	0.2	8.9
13/04/2017	0	5.7
14/04/2017	2.4	7.9
15/04/2017	0	7.6
16/04/2017	0.9	8.7
17/04/2017	0	5.2
18/04/2017	0	2.6
19/04/2017	2.7	3
20/04/2017	0	3.2
21/04/2017	0	3.8
22/04/2017	0	3.8
23/04/2017	0	3.7
24/04/2017	0.4	8.1
25/04/2017	0.3	9.1
26/04/2017	0	5.8
27/04/2017	0	6
28/04/2017	0	5.3
29/04/2017	1	11.5
30/04/2017	5.5	9.7
01/05/2017	0	5.5
02/05/2017	0	3.5
03/05/2017	0	6.7
04/05/2017	0	7.8
05/05/2015	0	9.1
06/05/2017	0	5.9
07/05/2017	0	4
08/05/2017	0	4.5
09/05/2017	0	3.3
10/05/2017	0	3.1
11/05/2017	0.1	3
12/05/2017	18.5	3.6
13/05/2017	9	10.2
14/05/2017	1.2	11
15/05/2017	10.4	14.6
16/05/2017	0	11.2
17/05/2017	3.1	5.4
18/05/2017	5.9	5.4
19/05/2017	3.8	3.9
20/05/2017	0.7	6.4
21/05/2017	1.9	11.4
22/05/2017	0	8.3
23/05/2017	0	4.9
24/05/2017	0	4.2

25/05/2017	0	7.2
26/05/2017	0	6.9
27/05/2017	21.1	6.4
28/05/2017	1.5	3.6
29/05/2017	3.2	2.7
30/05/2017	1.4	5.1
31/05/2017	0	8.4
01/06/2017	7.5	8.5
02/06/2017	0	4.9
03/06/2017	0.6	7
04/06/2017	9.1	7
05/06/2017	14.3	7.2
06/06/2017	1.4	6.2
07/06/2017	5.1	7.7
08/06/2017	18.7	7.7
09/06/2017	5.6	7.7
10/06/2017	6.1	13.8
11/06/2017	2.3	13.1
12/06/2017	0.2	9.7
13/06/2017	0.2	7.8
14/06/2017	0.4	9.6
15/06/2017	0.2	10.3
16/06/2017	0	6.2
17/06/2017	0	5.3
18/06/2017	0	3.4
19/06/2017	0	3.2
20/06/2017	0	4.4
21/06/2017	0.2	6.5
22/06/2017	0	7.2
23/06/2017	0	8.8
24/06/2017	0	8.1
25/06/2017	0.5	6.7
26/06/2017	7.9	4.9
27/06/2017	6.8	8
28/06/2017	3.6	5.6
29/06/2017	0.2	9.3
30/06/2017	0.1	10.9
01/07/2017	0	6.3
02/07/2017	0.2	6.4
03/07/2017	5.6	4.7
04/07/2017	0.1	7
05/07/2017	0	3.5
06/07/2017	0.5	2.9
07/07/2017	0.3	5.8
08/07/2017	0	5.1
09/07/2017	0.1	5.4
10/07/2017	1.2	4.3
11/07/2017	0.8	4.1
12/07/2017	0.1	5.1
13/07/2017	0	7

14/07/2017	0	7.2
15/07/2017	0	9.9
16/07/2017	0.6	5.4
17/07/2017	0	3.2
18/07/2017	0	5.6
19/07/2017	12.7	5.7
20/07/2017	6.8	6.9
21/07/2017	11.3	10.3
22/07/2017	0.5	4.1
23/07/2017	0.1	5.1
24/07/2017	0	5.6
25/07/2017	1.8	12.1
26/07/2017	5.2	11.7
27/07/2017	1.4	9.4
28/07/2017	0	9.3
29/07/2017	0	9
30/07/2017	0.8	8.9
31/07/2017	2.6	9.8
01/08/2017	0.2	6.8
02/08/2017	1.7	10.3
03/08/2017	0.2	10.2
04/08/2017	0.3	5.3
05/08/2017	0.7	5.8
06/08/2017	4.4	6.1
07/08/2017	0.3	5.9
08/08/2017	1.1	4.8
09/08/2017	0	7
10/08/2017	0	4.7
11/08/2017	1.2	9.7
12/08/2017	0.2	7.3
13/08/2017	5.1	5.6
14/08/2017	24	7.5
15/08/2017	0	6.4
16/08/2017	1.4	10.4
17/08/2017	1.3	8.7
18/08/2017	5.3	10.5
19/08/2017	0.6	9.9
20/08/2017	8.1	4.7
21/08/2017	5	6.6
22/08/2017	0.3	7.7
23/08/2017	0.1	5.9
24/08/2017	0	6.8
25/08/2017	0.1	6.6
26/08/2017	0	3.3
27/08/2017	0.2	7.6
28/08/2017	0.3	7.1
29/08/2017	0.1	5
30/08/2017	0	4.7
31/08/2017	0.1	3.5
01/09/2017	0	3.5

02/09/2017	5.3	8.9
03/09/2017	11.8	4.6
04/09/2017	4.8	5.7
05/09/2017	7.9	7.4
06/09/2017	0	7.8
07/09/2017	0.4	8.1
08/09/2017	3	8.1
09/09/2017	3.3	9.5
10/09/2017	2.4	13.2
11/09/2017	1.7	13.1
12/09/2017	6.4	9.5
13/09/2017	0.7	8
14/09/2017	0.6	8.7
15/09/2017	0	8
16/09/2017	3.1	6.6
17/09/2017	0.1	4.5
18/09/2017	0	2.9
19/09/2017	0	6.5
20/09/2017	10.1	8.6
21/09/2017	2.3	5.9
22/09/2017	3.9	8.4
23/09/2017	3	12.6
24/09/2017	0.2	3.3
25/09/2017	0.1	3.7
26/09/2017	0	8
27/09/2017	17.1	8.4
28/09/2017	2.9	9.9
29/09/2017	0.2	9
30/09/2017	0	4.3
01/10/2017	1.6	10.8
02/10/2017	0.5	10.9
03/10/2017	0	8
04/10/2017	1.3	11.5
05/10/2017	1.3	7.8
06/10/2017	0.2	6.6
07/10/2017	0.1	7.6
08/10/2017	0	2.3
09/10/2017	0.3	5.6
10/10/2017	1.1	8.9
11/10/2017	3.4	11.3
12/10/2017	0	10.2
13/10/2017	0.6	11.2
14/10/2017	0.1	12
15/10/2017	0.7	8
16/10/2017	3.4	20.5
17/10/2017	0	8.5
18/10/2017	0.3	5.2
19/10/2017	22	11.2
20/10/2017	8.6	11.2
21/10/2017	6.8	19.9

22/10/2017	0.5	10
23/10/2017	0.1	7.9
24/10/2017	9.1	7.7
25/10/2017	0	6.8
26/10/2017	0.4	2.7
27/10/2017	0.3	2.3
28/10/2017	0	7.5
29/10/2017	0.1	6.5
30/10/2017	0	4.8
31/10/2017	0.1	6.5
01/11/2017	0.1	3.5
02/11/2017	0	2.4
03/11/2017	0.1	4
04/11/2017	1.1	8.8
05/11/2017	0.5	7.4
06/11/2017	1.8	10.7
07/11/2017	2.9	6.8
08/11/2017	1.8	5.3
09/11/2017	1	7.6
10/11/2017	6.7	8.6
11/11/2017	5	5.7
12/11/2017	0.2	7.7
13/11/2017	3.1	4.9
14/11/2017	0.2	4.8
15/11/2017	0	4.1
16/11/2017	0.8	6
17/11/2017	0	4.1
18/11/2017	3.1	2.9
19/11/2017	0.6	4.8
20/11/2017	0.7	7.8
21/11/2017	0.9	7.7
22/11/2017	19.7	8.4
23/11/2017	0.2	9.9
24/11/2017	0	4.9
25/11/2017	0	8.7
26/11/2017	2.7	8.6
27/11/2017	0.9	11.4
28/11/2017	0	8.5
29/11/2017	0	6.7
30/11/2017	0	6.9
01/12/2017	0	4.5
02/12/2017	0.4	5.1
03/12/2017	0	5.3
04/12/2017	0	3.8
05/12/2017	0	5.6
06/12/2017	1.3	14.8
07/12/2017	3.4	12.2
08/12/2017	0.6	9.8
09/12/2017	0.4	3.2
10/12/2017	28.2	6.1

11/12/2017	0	5.4
12/12/2017	1.9	5.7
13/12/2017	6.6	12.7
14/12/2017	2.3	11.7
15/12/2017	0.1	9.6
16/12/2017	0	5.9
17/12/2017	0.7	6.7
18/12/2017	0	4
19/12/2017	0.2	5.9
20/12/2017	2.6	4.3
21/12/2017	3.2	5.9
22/12/2017	0.2	4.2
23/12/2017	0	6.9
24/12/2017	0.2	11.9
25/12/2017	12.5	7.9
26/12/2017	0.1	7.3
27/12/2017	0	8.4
28/12/2017	0	3.7
29/12/2017	13.9	12.1
30/12/2017	3.3	13.9
31/12/2017	2.1	13.1