INDORAMA VENTURES

WELLMAN INTERNATIONAL LTD.

Wellman International Limited

Licence No. P0236-02

Annual Environmental Report

March 2018

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Facility Information Summary

Licence register number: P0236-02

Name & location: Wellman International Ltd., Mullagh, Kells, Co. Meath.

NACE code: 1310

Class of activity: 8.4 Manufacture of synthetic fibres

Significant changes/environmental performance during reporting period:

- 65% flake was used in the raw material mix. This is the equivalent of recycling 2.5 billion post-consumer bottles. This results in a saving of 239,000T of CO_2 equivalent from processing recycled material V's the use of virgin chip.
- Less than 4% of waste transferred off-site was disposed.
- Rehabilitation works on foul drainage network complete (as required by 2016 survey)
- There were no EPA reportable incident
- No complaints were received
- All air emissions monitoring results were compliant
- All water monitoring results were compliant
- Noise levels were compliant.
- Internal auditor training was completed
- Root cause analysis training completed
- Energy efficient compressor was installed
- Successful transition audit to ISO14001:2015

1.0 Introduction

This Annual Environmental Report of Wellman International Limited (WIL) covers the period January 2017 to December 2017.

For over 40 years WIL has been a recognised leader in Europe of the innovative use of recycled materials. WIL began operations in 1973 to convert post-industrial waste polymer materials into first grade fibre products. Polyester fibres made from these raw materials are sold across Europe to customers who in turn make a wide variety of finished goods such as car parts, soft filled household and bed products, furniture and personal hygiene items.

Bottle flake, sourced from household collection systems is a main source of raw material for Wellman International Limited, with over to 5 million post-consumer PET bottles being recycled at the plant daily.

Wellman International Limited is situated close to the village of Mullagh, Co. Cavan, fifty miles from Dublin. In addition to the four-storey production plant, the 27-acre site contains storage silos, warehouses, workshops, an ESB substation, a wastewater treatment plant and firewater retention ponds. The total covered area is 33,500m^2. The company employs almost 270 people.

1.1 Products

Polyester staple fibre products manufactured by Wellman International Limited (WIL) are sold worldwide under trade names that include Fillwell®, Fillwell® Hygiene, Fillwell® Softflex, Wellene®, Cirrus®, Sensifil™, Fillwell® Wellbond, Dreamfil™, Wellman HealthGuard, Celliant , Wellon, Wellcare Protect, Wellcare AM and Wellman Profile. WIL fibres are widely used in non-woven and filling applications including home furnishings, car interiors, carpets, hygiene products, geotextiles and technical textiles. The end uses to which these products are put are shown in the following table.

In line with changing market demands, business objectives and WIL's commitment to be Europe's leading producer of polyester staple fibre the company have developed and now produce a range of fibres which offer the high performance characteristics required for the demanding hygiene market sector. These speciality fibre products are manufactured to exacting standards of quality and performance and are independently tested and approved for hygiene applications. The manufacture of fibres for this market is a key element of WIL's future business strategy helping to ensure company's continued position as a leading European supplier of polyester stable fibre.

Product			**Product**		
Fillwell®	Regular Polyester fibre	1	Cirrus®	Moisture Management Polyester	8
Fillwell® Plus	Resilient Polyester fibre	2	Fillwell® Wellcare	Anti Dust/Microbial Polyester Fibre	9
Fillwell® h	Hollow Polyester fibre	3	Fillwell® Hygiene	Hygiene Polyester Fibre	10
Fillwell® hs	Hollow Siliconised Polyester	4	Fillwell® Wellbond	Bi-component Polyester fibre	11
Fillwell® huf	Hollow Soft Hand Polyester	5	Wellene	Spun dried Black & White Polyester	12
Fillwell® softflex	Hollow Spiral Polyester Filling	6	Wellman HealthGuard	Anti Dust/Microbial Polyester Fibre	13
Dreamfil™	Lightweight Polyester	7	Sensifil™	Allergy and sensitive friendly	14

Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**Description**
Abrasive Products	*											*			• Domestic and industrial cleaning and scouring pads
Apparel products	*		*	*				*			*	*		*	• Skiwear • Non-woven interlinings • Pile fabrics
Bedding products	*	*	*	*	*	*	*	*	*	*	*		*	*	• Quilts • Sleeping Bags • Pillows • Mattresses • Waterbeds
Construction Products	*	*							*		*	*	*		• Geotextiles • Insulations • Concrete/Asphalt • Flame Retardant • Roofing felts
Filtration products	*								*		*		*	*	• Heavy industrial filters • Air conditioning filters • Liquid filters • Domestic appliances
Floor covering products											*	*			• Spun Yarn • Carpet Backing • Needlepunch
Automotive Products	*								*		*	*	*		• Bootliners • Footwells
															• Headliners
															• Filters
															• Carpet
Hygiene Products										*					• Distribution layers in diapers • Femcare Products

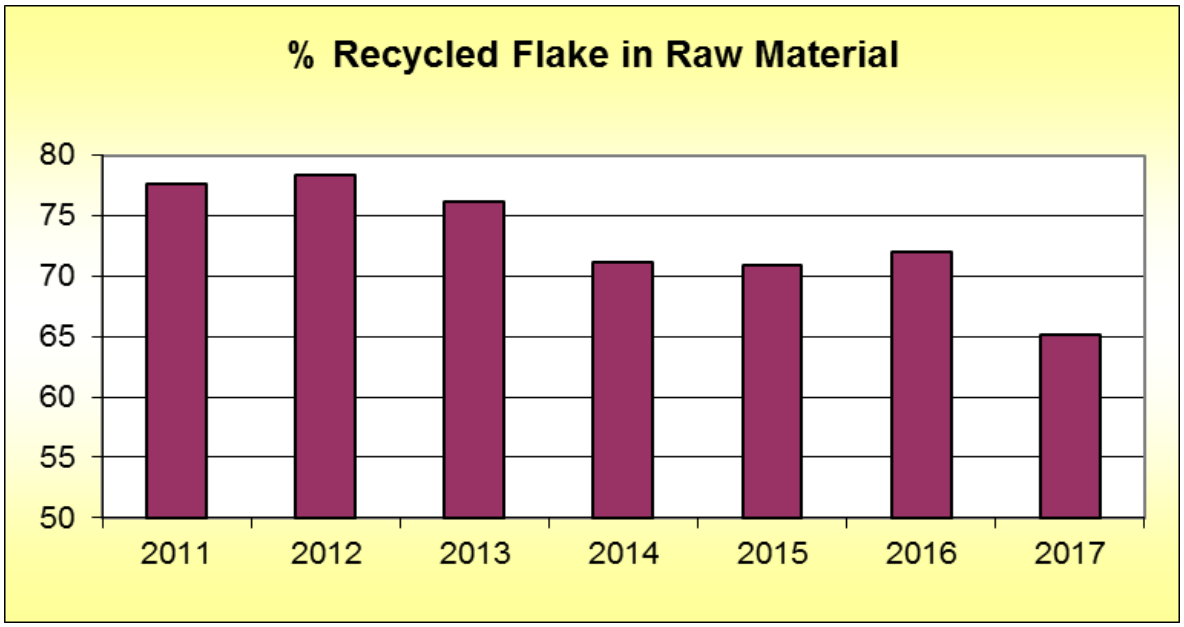
1.2 Raw Material

Raw materials are sourced world-wide. Raw materials can be broken down into the following categories:

- PET post consumer bottles, which are sorted, washed and granulated (rPET flake) prior to delivery to site.
- Fibre from other major polyester fibre production plants.
- Out-of specification polymer granules from polymer production plants.
- By-products from the major producers of film and packaging materials.
- Virgin chip

WIL itself uses over 6 million post-consumer bottles daily that would otherwise have to be sent to landfill or incinerated. 65% of our raw material mix in 2017 came from post-consumer bottle flake. Over 300,000 tonnes of harmful air emissions are saved annually by the recycling of post-consumer bottles alone. The percentage of recycled bottle flake used in the raw material is shown in Figure 1.

Figure 1: Percentage recycled bottle flake in raw-material mix

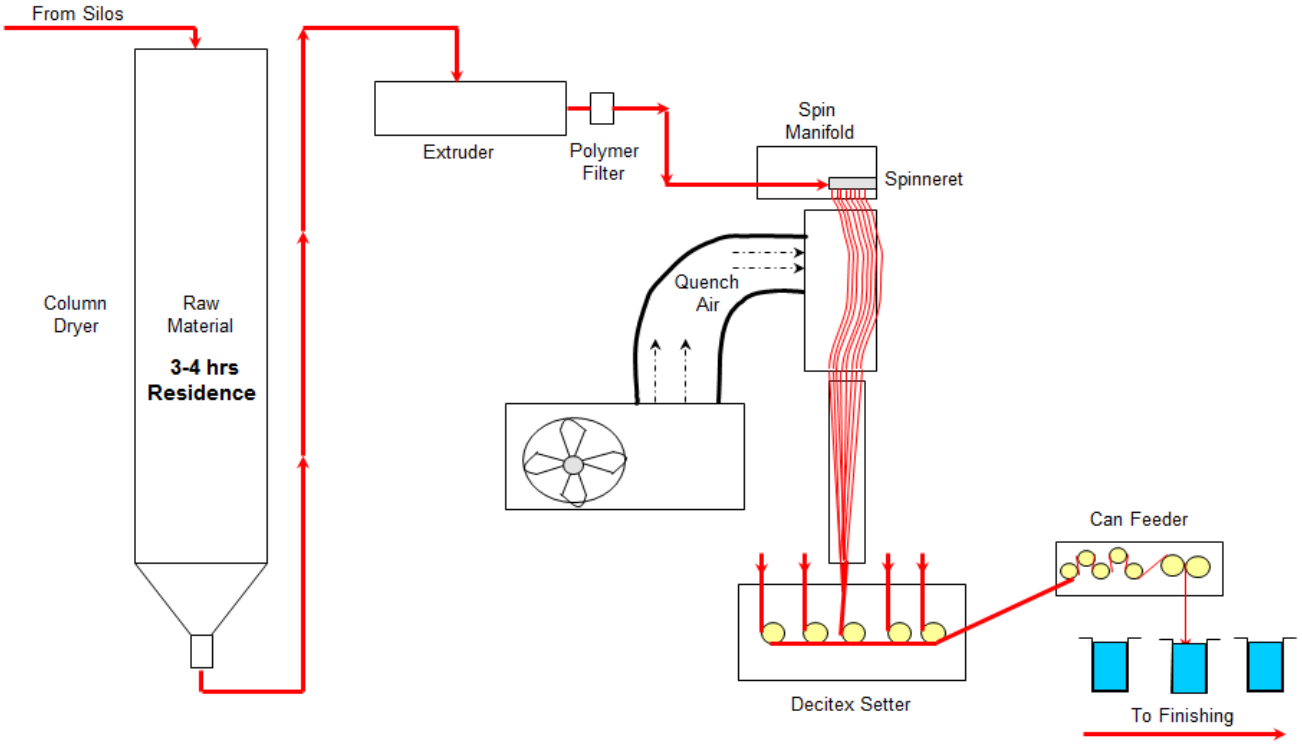


1.3 Production Process

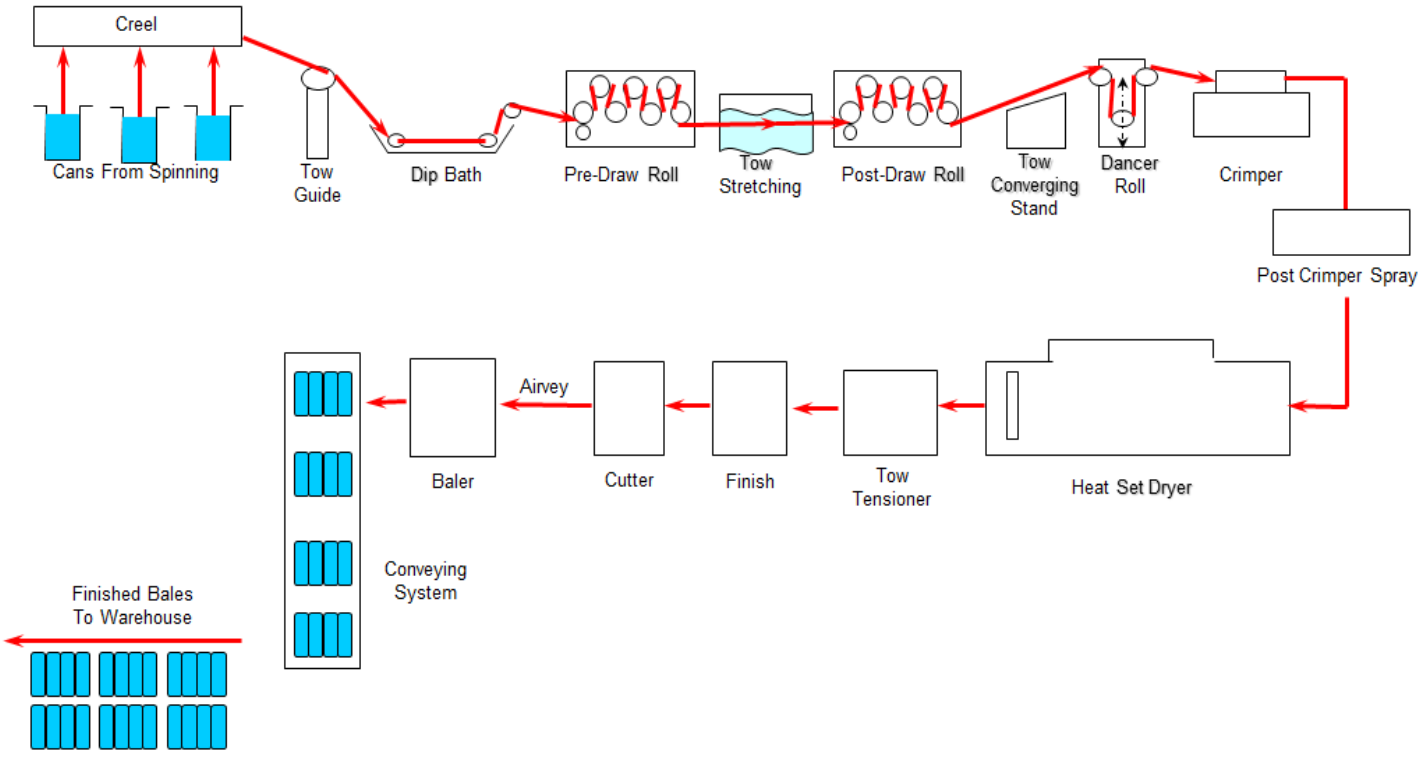
The process of making staple fibre is shown schematically overleaf and can be summarised as follows:

- Raw material is tested, sorted, prepared and dried for delivery to the extruder.
- The clean, dried raw material is melted and filtered in the extruder and molten polymer is delivered at pressure to spin packs.
- The spin pack creates thousands of individual strands of polymer fibre which are cooled using air.
- The material is collected in cans as a tow band.
- The tow bands are heated and stretched to give it strength.
- The strands are crimped to give bulk and set to maintain the crimp.
- They are then coated with a lubricant to enable further processing by the customers.
- Finally the strands are cut to the required length, baled and wrapped for delivery to the customer.

Fibre process stage 1



Fibre process stage 2



1.4 Environmental Issues

As an organisation involved in the recycling of plastic material there is a strong awareness of environmental issues. Since WIL was established, the company has demonstrated their commitment to sound management practice and a sustainable business model. This is demonstrated through good business and environmental standards and practice. This commitment has been shown through registration to the following standards and achievement of awards:

1990 Registered to ISO 9002
1997 Registered to ISO 14001/IS 3.10
1998 Obtained Integrated Pollution Control Licence. (Classification of Activity: 8.4 - The Manufacture of Synthetic Fibres.)
2001 Registered to ISO 9001:2000
2004 Registered to OHSAS 18001
2005 Registered to ISO 14001 2004
2007 Registered to OHSAS 18001:2007
2007 Short-listed in the Sustainable Energy Awards for a project entered into the 'Energy Efficiency in Large Industries' category
2007 Commendation in IBEC Environmental Awards
2008 Obtained technical amendment to existing licence which brings it up to IPPC standard
2009 Re-accredited to ISO 14001:2004
2012 Sustainable exporter of the year
2013 IPPC P0236-02 issued
2014 Licence confirmed as IPC licence
2014 Re-certified to ISO 14001:2004 by NSAI & IQNet
2017 Indorama Ventures Plc listed on Dow Jones Sustainability Index
2017 Certified to ISO14001:2015

1.5 Environmental Policy

A copy of the integrated health and safety, environmental and product quality policy is attached as **Appendix I**.

2.0 Emissions to atmosphere

2.1 Boiler Emissions

Process steam requirements are supplied by a main boiler, which operates on natural gas. This boiler has a capacity of 8000 kg/hr and operates at 250 psi. Backup is provided by a standby boiler, which is also run on natural gas. This boiler has a capacity of 7000 kg/hr and operates at 250 psi.

Boiler emissions are monitored at emission point reference number A1-2 as per Schedule 1 (iii) of the licence. Outlined in Table 1 below are the results for boiler emissions for the last seven years.

Table 1 Combustion equipment emissions at A1-2

Year	CO, mg/m^3	NO_x, mg/m^3
2011	8.11	18.2
2012	5	62
2013	1	88
2014	<1	75.3
2015	12.1	74.6
2016	<1.7	79.2
2017	<1.7	88.5

Space heating is provided by three domestic type burners, which heat the canteen and the training centre. These are not considered to present any significant environmental impact and as such no routine monitoring is carried out.

2.2 Process Air Emissions

2.2.1 Description

There are ten licensed process air emission points currently being monitored. A brief description of each is presented below.

Monomer Exhausts (A2-2, A2-3, A2-5, A2-6, A2-8, A2-12)

The monomer exhausts are fume extract systems, which also assist in the quenching of fibre on exit from the spinneret. On quenching of molten fibre, volatile organic compounds may be released. These emission points are monitored biannually for TA Luft Organics Class I, II and III compounds.

Rosin Dryers (A2-27)

The rosin dryers are used to dry raw materials prior to extrusion. Since the raw materials used are recycled, volatile organic compounds in addition to moisture may be released during drying. Air from the dryers is treated using a water spray scrubber prior to discharge through a single emission point (ref: A2-27). This emission point is monitored biannually for TA Luft Organics Class I, II and III compounds.

Unit 3 Dryer (A2-10, A2-11)

The unit 3 dryer is also used to dry raw material prior to extrusion. As with the rosin dryers, volatile organic compounds in addition to moisture may be given off. Biannual monitoring is conducted for TA Luft Organics Class I, II, and III compounds.

Hypox (A2-28)

The hypox system is used for cleaning purposes and removes contaminants and residual polymer from the metal components used in the fibre spinning process. It is monitored biannually for TA Luft Organics Class I, II and III compounds.

2.2.2 Results

The following graphs present a summary of air emission monitoring results from the last seven years (Fig. 2, 3 & 4).

Monitoring is conducted bi-annually and the mass emission rate in Kg/annum is determined from the measured concentration (mg m^{-3}) and flow rate. The emission rate depicted below is an average value of each set of results.

All monitoring results, including concentration limits, mass flows and volumetric flows for 2016 were within licensable parameters (Refer to Tables 2, 3, 4, 5 & 6). Emissions are variable due to raw material blend at time of monitoring.

Figure 2: TA Luft Organics Class 1

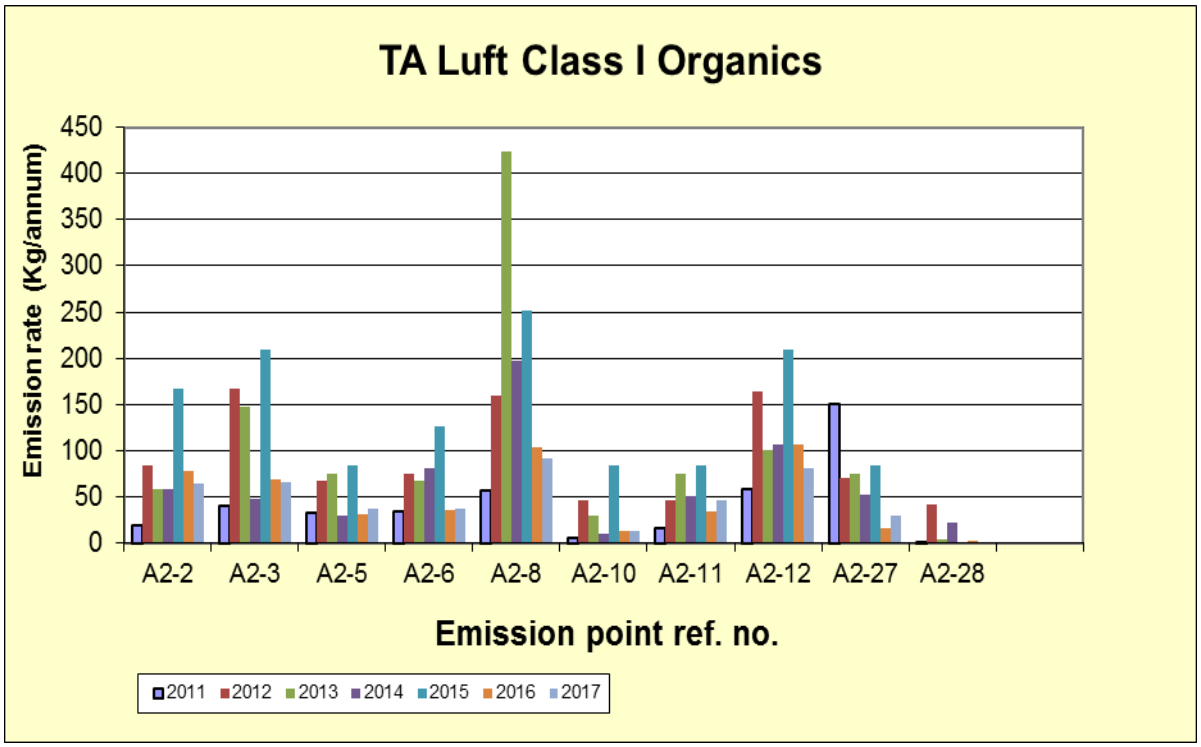


Figure 3: TA Luft Organics Class II

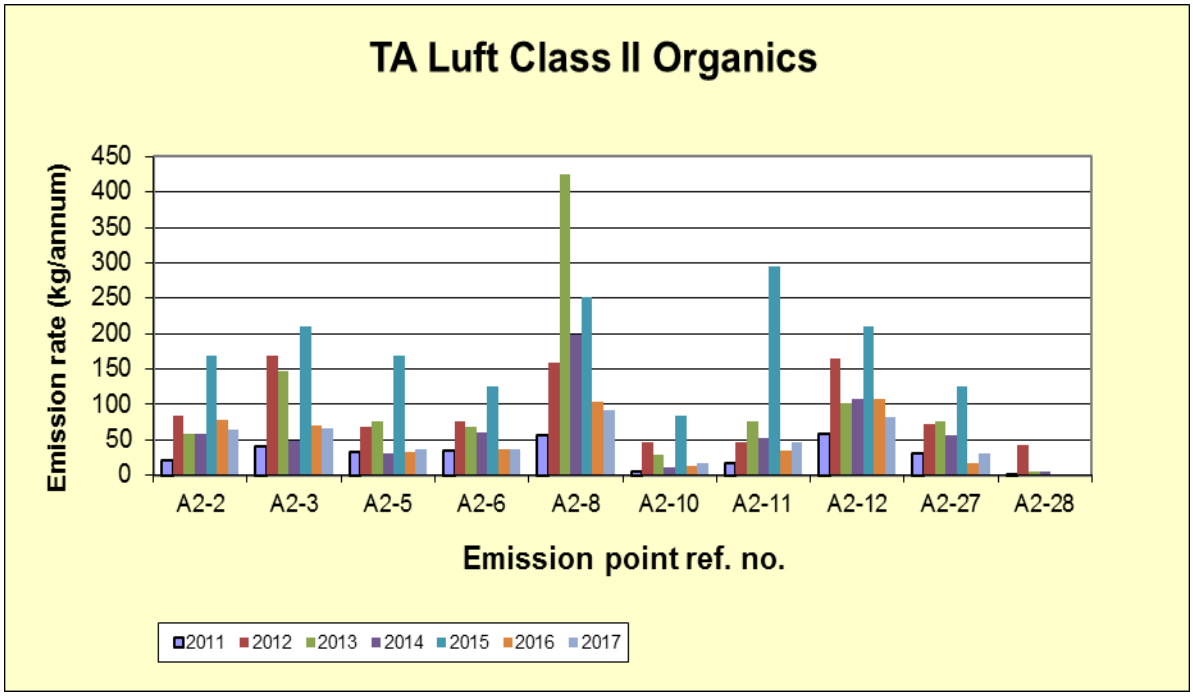
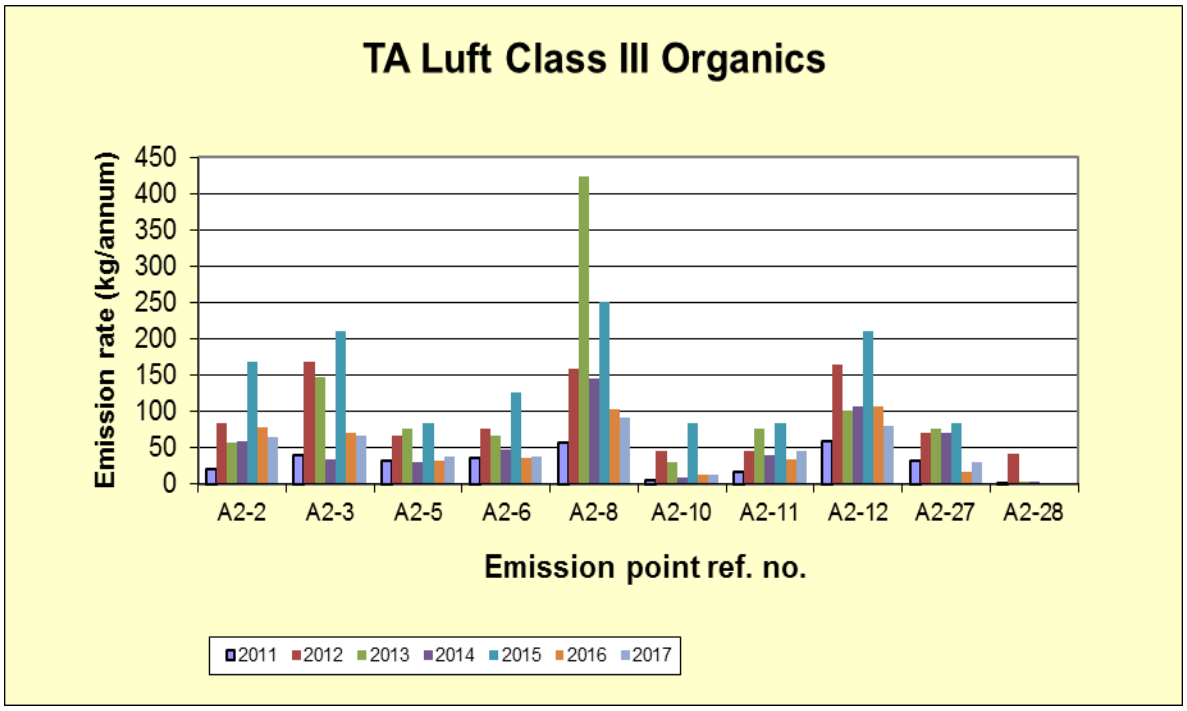


Figure 4: TA Luft Organics Class III



2.2.3 Non-compliances

There were no non-compliances with the licence in terms of air emissions during 2017.

Table 2 Concentration results for bi-annual air emissions monitoring 1

	IPPC Limits	Concentration (mg/m^3)									
	ELV mg/m^3	A2-2	A2-3	A2-5	A2-6	A2-8	A2-10	A2-11	A2-12	A2-27	A2-28
TA Luft Organics Class I	20	<0.75	<0.73	<0.69	<0.75	<0.75	<0.69	<0.75	<0.74	<0.73	<0.74
TA Luft Organics Class II	100	<0.75	<0.73	<0.69	<0.75	<0.75	1.03	<0.75	<0.74	<0.73	<0.74
TA Luft Organics Class III	150	<0.75	<0.73	<0.69	<0.75	<0.75	<0.69	<0.75	<0.74	<0.73	<0.74

* The concentration ELV doesn't apply as the mass flow is lower than the ELV mass flow.

Table 3 Concentration results for bi-annual air emissions monitoring 2

	IPPC Limits	Concentration (mg/m^3)									
	ELV mg/m^3	A2-2	A2-3	A2-5	A2-6	A2-8	A2-10	A2-11	A2-12	A2-27	A2-28
TA Luft Organics Class I	20	<0.81	<0.81	<0.81	<0.8	<0.8	<0.81	<0.8	<0.94	<0.8	3.76
TA Luft Organics Class II	100	<0.81	<0.81	<0.81	<0.8	<0.8	<0.81	<0.8	<0.94	<0.8	<0.84
TA Luft Organics Class III	150	<0.81	<0.81	<0.81	<0.8	<0.8	<0.81	<0.8	<0.94	<0.8	<0.84

Table 4 Mass flow emission results for bi-annual air emissions monitoring 1

	Mass flow threshold kg/h	Flow (kg/h)									
		A2-2	A2-3	A2-5	A2-6	A2-8	A2-10	A2-11	A2-12	A2-27	A2-28
TA Luft Organics Class I	0.1	<0.007	<0.0079	<0.0043	<0.0047	<0.0114	<0.0017	<0.0062	<0.0087	<0.004	<0.00002
TA Luft Organics Class II	2.0	<0.007	<0.0079	<0.0043	<0.0047	<0.0114	0.0025	<0.0062	<0.0087	<0.004	<0.00002
TA Luft Organics Class III	3.0	<0.007	<0.0079	<0.0043	<0.0047	<0.0114	<0.0017	<0.0062	<0.0087	<0.004	<0.00002

Table 5 Mass emission results for bi-annual air emissions monitoring 2

	Mass flow threshold kg/h	Flow (kg/h)									
		A2-2	A2-3	A2-5	A2-6	A2-8	A2-10	A2-11	A2-12	A2-27	A2-28
TA Luft Organics Class I	0.1	<0.0084	<0.008	<0.0047	<0.0044	<0.0107	<0.0015	<0.0049	<0.0108	<0.0034	0.00011
TA Luft Organics Class II	2.0	<0.0084	<0.008	<0.0047	<0.0044	<0.0107	<0.0015	<0.0049	<0.0108	<0.0034	<0.00002
TA Luft Organics Class III	3.0	<0.0084	<0.008	<0.0047	<0.0044	<0.0107	<0.0015	<0.0049	<0.0108	<0.0034	<0.00002

Table 6 Volumetric flow for air emissions monitoring

Monitoring location	IPPC limit	Bi-annual monitoring 1 Flowrate (m^3/h)	Bi-annual monitoring 2 Flowrate (m^3/h)
A2-2	17000m^3/h	9308	10284
A2-3	17000m^3/h	10851	9802
A2-5	17000m^3/h	6303	5816
A2-6	17000m^3/h	6327	5436
A2-8	23150m^3/h	15169	13225
A2-12	23150m^3/h	11684	11457
A2-27	10000m^3/h	5359	4363

3.0 Emissions to water

3.1 Wastewater discharges

Wastewater is discharged from the site at monitoring point SW1. COD, BOD, Suspended solids (suspended solids) and FOGs were analysed on a weekly basis and Total Ammonia and Ortho-P were monitored monthly. All results were within the requirements of the licence. The emission limit values together with the range of results for 2017 are outlined in Table 7. This final effluent is then mixed with non-contact cooling and storm water and returned to the River Borora.

Table 7 2017 Results at SW1

Parameter	ELV (mg/L)	Maximum results achieved in 2017
COD (mg/L)	None	804
BOD (mg/L)	40	38
SS (mg/L)	50	38
FOG (mg/L)	25	3.57
Total ammonia (mg/L)	10	1.9
Ortho-P (mg/L)	2	0.6

Figures 5, 6, 7, 8 & 9 provide a comparison of BOD, SS, FOG, Ortho-P and ammonia results over the last 7 years.

Figure 5: BOD at SW1

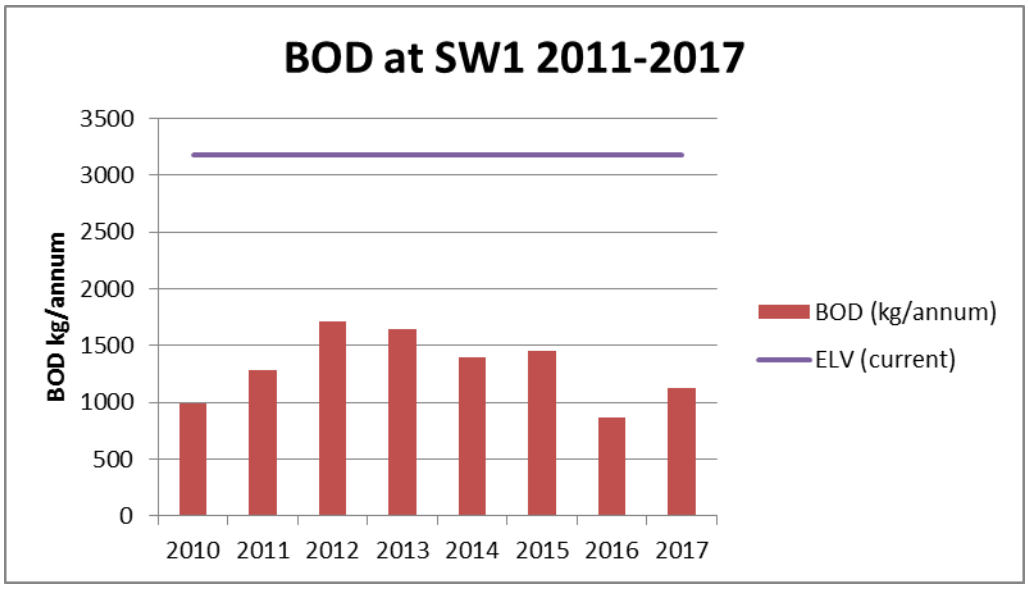


Figure 6: SS at SW1

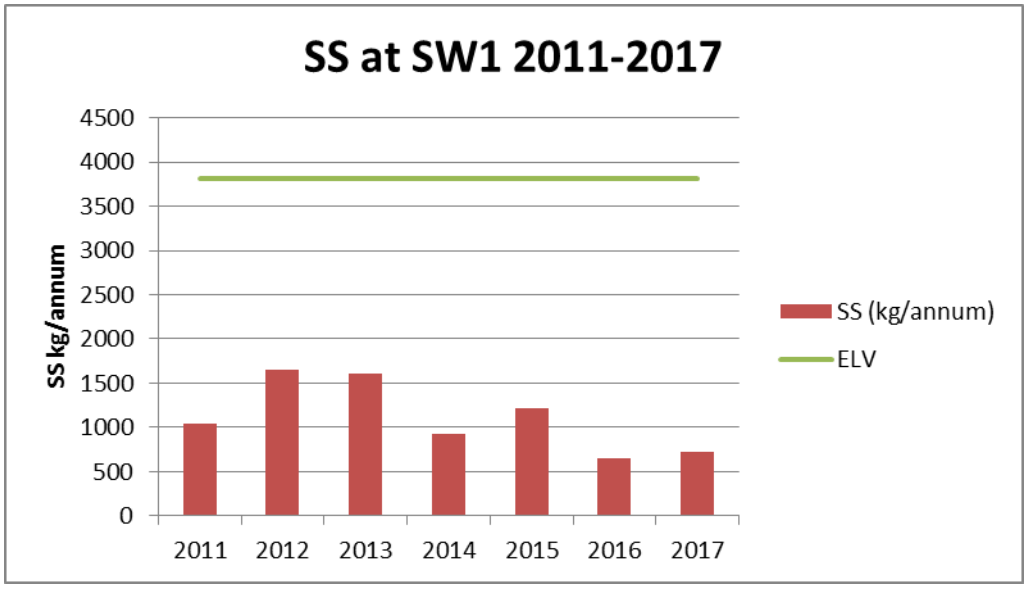


Figure 7: FOGs at SW1

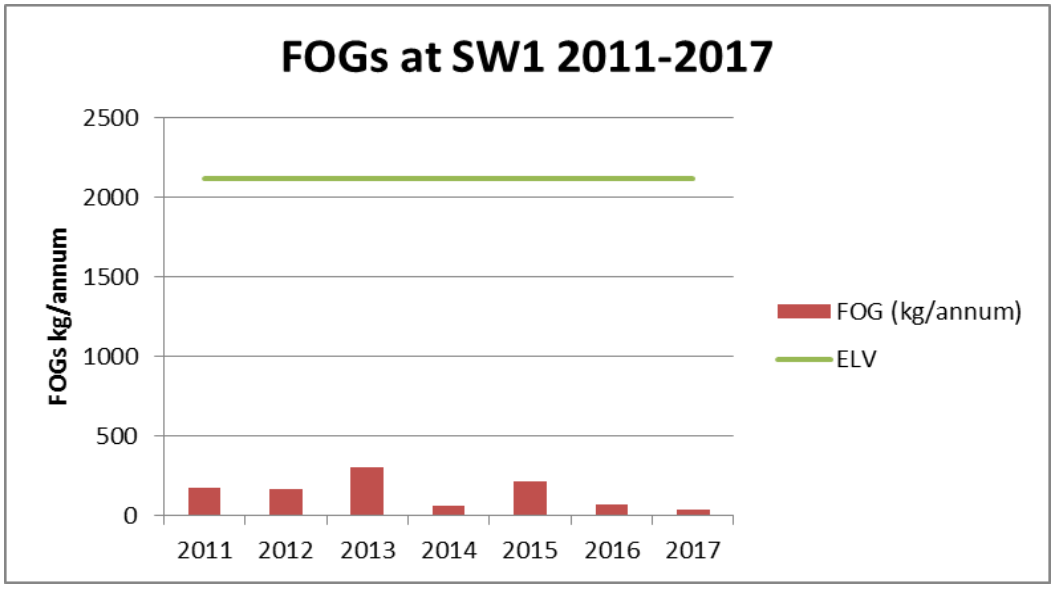


Figure 8: Ortho-P at SW1

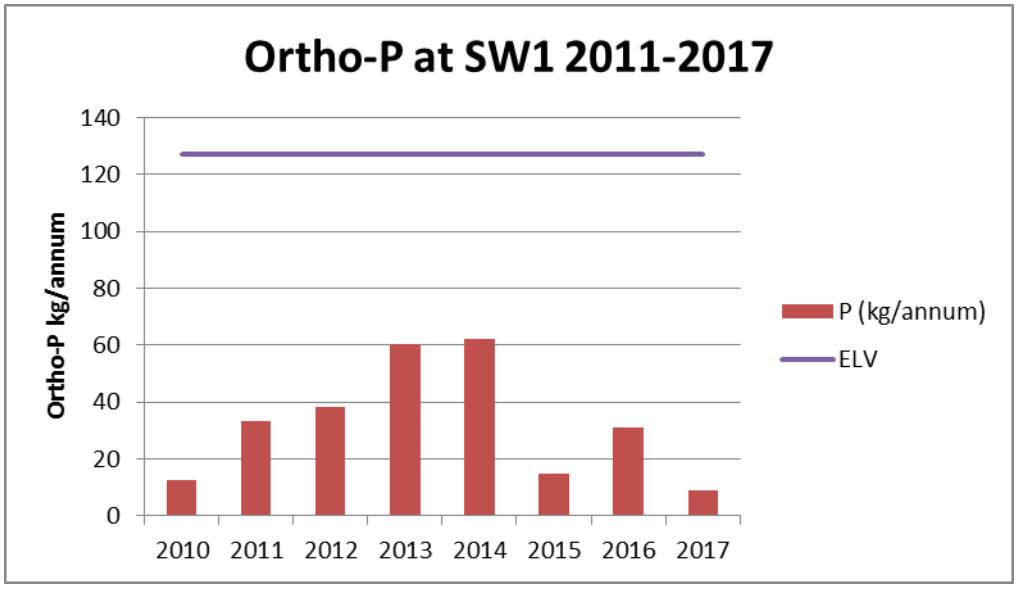
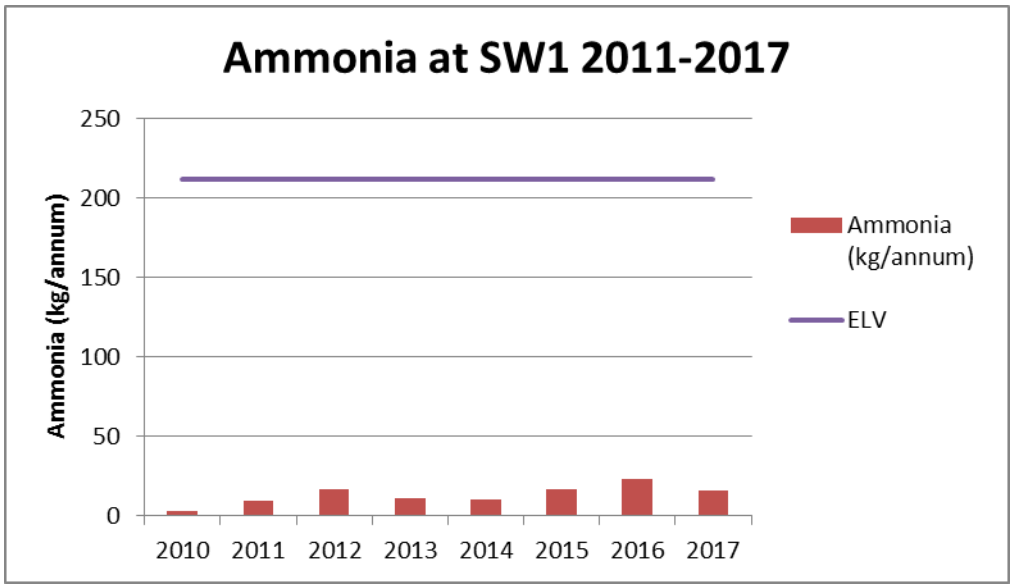


Figure 9: Ammonia at SW1



3.2 Priority substances

A heavy metal scan is carried out on wastewater discharges at SW1 on an annual basis as outlined in Schedule C.2.2 of the licence. The results of this monitoring are outlined below. Samples of waste water discharge from SW1 were taken in November 2017; JHG Analytical Services Ltd completed the required analysis.

Table 8 Heavy metals content at SW1

Parameter	2011	2012	2013	2014	2015	2016	2017
Aluminium, ppb	16	517	5	<50	36	2	855
Antimony, ppb	111	7	350	195	132	295	<0.5
Arsenic, ppb	<2	7	<2	<2	<2	<2	<0.1
Barium, ppb	258	26	152	167	65	168	<2
Beryllium, ppb	<2	<2	<2	<1	<2	<2	<0.6
Cadmium, ppb	<2	<2	<2	<0.5	<2	<2	108
Chromium, ppb	2	3	<2	<3	3	<2	200
Cobalt, ppb	9	<2	4	2.44	2	<2	<2
Copper, ppb	413	27	<2	<4	216	<2	25
Iron, ppb	<2	2.2 (ppm)	0.15 (ppm)	0.05 (ppm)	0.3 (ppm)	<0.1 (ppm)	0.148 (ppm)
Lead, ppb	6	6	<2	<0.5	6	<2	168
Manganese, ppb	62	465	30	12	12	12	226
Mercury, ppb	<1	<1	<1	<0.02	Not measured	<1	<0.5
Molybdenum, ppb							<1
Nickel, ppb	10	6	4	5	7	<2	<5
Phthalates, ppb							<2
Selenium, ppb	<2	4	<2	<1	<2	<2	<2
Silver, ppb	<2	<2	<2	<2	<2	<2	<0.1
Tin, ppb	<2	<2	<2	<3	<2	<2	<2
Zinc, ppb	474	28	38	60.7	114	35	955

3.3 Acute Toxicity

Acute toxicity testing was carried out on a sample of the final effluent in September 1999, March 2003, January 2006, September 2009, September 2012, November 2013 and June 2016.

These reports are summarised in Table 9 below.

Table 9 Acute toxicity testing at SW1

Sample Desc	Test Required	Test Species	1999 No. Toxic Units	2003 No. Toxic Units	2006 No. Toxic Units	2009 No. Toxic Units	2012 No. Toxic Units	2013 No. Toxic Units	2016 No. Toxic Units	Comments
Effluent	48h EC_{50} to *Daphnia magna*	*Daphnia magna*	<1 @ 100% vol/vol	<1 @ 100% vol/vol	<1 @ 100% vol/vol	<1 @ 100% vol/vol	1.9 @ 51.7% vol/vol	<1 @ 100% vol/vol	2.07 @ LC50 48.3% (48 hour test)	2016 sample classified as non-toxic
Effluent	15 min EC_{50} to *Vibrio fischeri (30min EC_{50} in 2012)*	*Vibrio fischeri*	<2.2 @ 45%vol/ vol	<2.2 45%vol/ vol	<2.2 @ 45%vol/ vol	<2.2 @ 45%vol/ vol	<2.2 @ 45%vol/ vol	<1 @ 100% vol/vol (toxicity, no light inhibition test conducted)	1.5 @LC50 of 65.5% (5 min test) 1.8 at LC50 of 55.5% (15 min test)	2016 sample classified as non-toxic

This monitoring will be repeated in 2019.

Monitoring Point Reference No. SW1

3.4 Macroinvertebrate bioassessment

A macroinvertebrate bioassessment of the River Borora, upstream and downstream of the WIL wastewater discharge point was conducted in September 2016.

A Sample was taken at one location upstream of the discharge point (S1). S1 is located 50m upstream of the Wellman discharge point. Five samples were taken down stream from the discharge point (S2, S5, S6, S3 & S4) at points immediately downstream, 60m downstream, 250m downstream and 2 samples taken at 2 1km downstream respectively. Results are outlined in Table 10.

The dissolved oxygen results range from 9.7 – 10.8 mg/L which indicates sufficient dissolved oxygen present to sustain life within the river. The temperature of the river was 12.3-13.1^{0}C.

Overall water quality has improved from the previous assessment done in 2013. Water quality varied from unpolluted in close proximity to the discharge point to moderately polluted 50m upstream and 1km downstream. It was previously thought that background pollution may be attributable to agricultural practices in neighbouring lands. Wellman discharge does not appear to be affecting the quality of the water.

Table 10 River Borora Water quality ratings (based on macroinvertebrate bioassessment)

Sample point	*Location*	*Q-rating*	*Interpretation*
S1	50m upstream	2-3	Moderately polluted
S2	Immediately downstream	3-4	Slightly polluted
S5	60m downstream	4	Unpolluted
S6	250m downstream	4	Unpolluted
S3	1km downstream	3	Moderately polluted
S4	1 km downstream	3	Moderately polluted

This study is scheduled to be repeated in 2019.

4.0 Waste

Waste removed from the site during 2017 is outlined in **Appendix II** (EPA AER Returns Worksheet).

4.1 Waste management indices

Gross WaMI

= [Waste Produced (t) / Raw Material Usage (t)] x 100

Nett of Process WaMI

$$= \frac{[\text{Waste Produced (t)} - \text{Amount Recovered on Site (t)}]}{\text{Raw Material (t)}} \times 100$$

Nett of Site WaMI

$$= \frac{[\text{Waste Produced (t)} - \text{Amount Recovered on Site (t)} - \text{Amount Recovered off Site (t)}]}{\text{Raw Material Usage (t)}} \times 100$$

Raw Material (Nett):	87602 tonnes
Waste Produced on Site:	5936 tonnes
Amount Recovered On-Site:	4232 tonnes
Amount Recovered Off-Site:	1646 tonnes

Table 11 Waste management indices

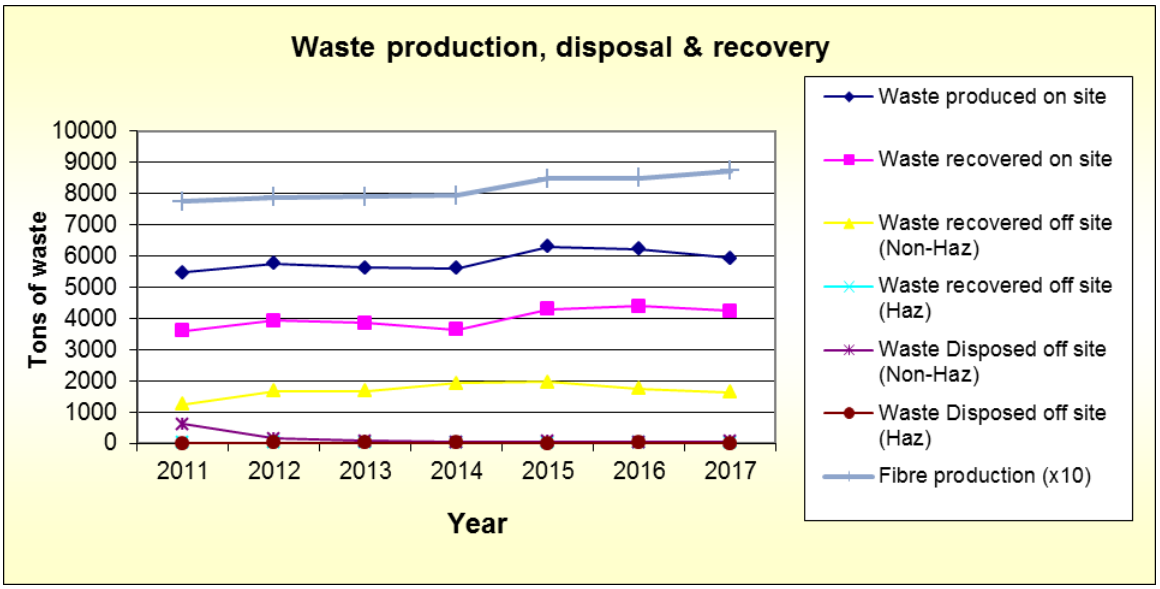
	2011	2012	2013	2014	2015	2016	2017
Gross WaMI	6.99	7.2	7.05	6.99	7.3	7.28	6.77
Nett of Process WaMI	2.4	2.3	2.21	2.45	2.34	2.14	1.95
Nett of Site WaMI	0.8	0.2	0.1	0.04	0.051	0.07	0.07

Waste generation has been relatively consistent over the last number of years. A very small volume of waste, in terms of raw material input, is being sent off-site for treatment. Considerable efforts have been made to reduce the volume of waste produced and to recycle any waste that is produced.

The volume of waste produced on annual basis is directly related to fibre production. On average 65-70% of the total waste produced on-site is recycled through the

manufacturing process. The volume of waste generated, recycled and disposed of from 2011 to 2017 is depicted in Figure 10.

Figure 9: Waste produced, recovered and disposed



In 2017, approximately 58T Tonnes of waste was disposed to landfill. This represents just over 3% of the total waste sent off-site.

4.2 Sludge analysis

As per Schedule C4 of the IPPC licence the sludge from the wastewater treatment process is analysed for organic content, heavy metals and water content each year. The wastewater treatment plant is de-sludged from the biotower and the aeration tank/settlement tank at alternate times. The sludge from each system is dried using a de-watering press, loaded into a skip and removed off-site for composting. The results are outlined in Table 12 below:

Table 12 Sludge analysis 2017

Parameter	**Biotower de-watered sludge (mg/kg)**	**Aeration tank de-watered sludge (mg/kg)**
Heavy metals		
Antimony	0.224	0.4
Arsenic	3.285	5
Aluminium	1.985	3.445
Barium	<0.002	<0.002
Beryllium		<0.0006
Boron	<0.002	<0.002
Cadmium	0.46	0.665
Chromium	5	5.25
Cobalt	0.15	0.168
Copper	0.615	0.725
Iron	0.55	0.7
Lead	1.135	1.556
Manganese	2.178	3.225
Molybdenum	0.268	0.33
Nickel	2.88	3.36
Selenium	1.06	1.785
Silver	<0.0001	<0.0001
Tin	<0.002	<0.002
Zinc	21.5	27.57
Mercury	0.016	0.033
Organic content	15125	21700
Moisture	12.65%	64.8%
Phthalates content	4	7.35
Titanium dioxide	0.065	0.09

5.0 Resource consumption

5.1 Water consumption

Process water is supplied primarily from the nearby river Borora. A totaliser on the pumps records the volume of water consumed.

The volume of river water consumed over the last seven years is summarised below (Table 13).

Table 13 River water consumption 2011-2017

Year	m^3/year	m^3/tonne
2011	76719	0.99
2012	68073	0.86
2013	63385	N/A
2014	62167	N/A
2015	60485	N/A
2016	70605	N/A
2017	74668	N/A

Water is also supplied to the site from two wells. In total 86240 m^3 water was consumed, this is equivalent to 0.98 m^3/tonne fibre produced.
In 2017 the average daily abstraction rate (per production day) was 215 m^3 from the river and 33 m^3 from the wells.

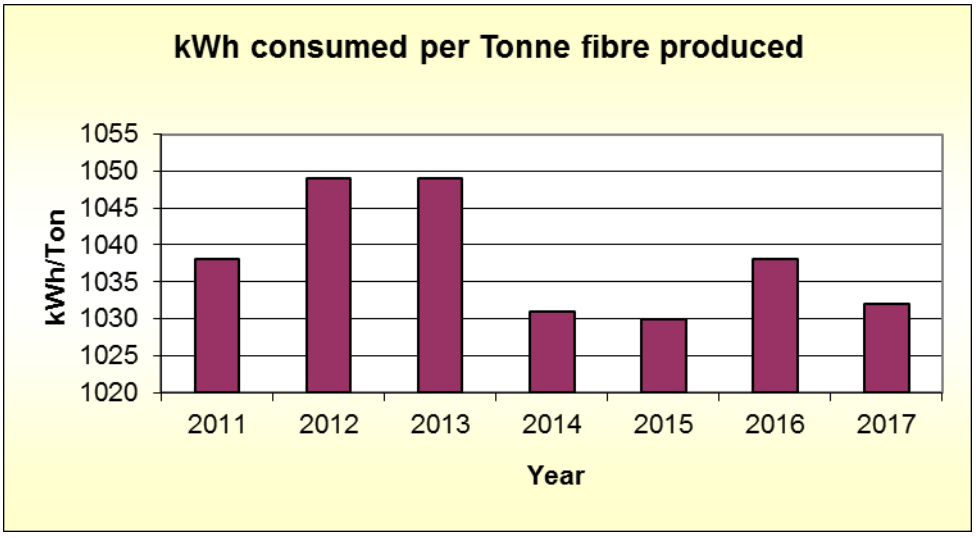
5.2 Energy and Fuel consumption

5.2.1 Energy

Three sources of energy are used at WIL; Natural Gas, LPG and Electricity. Almost half of the energy used is from electricity and slightly more than half is natural gas. LPG forms a very small portion of total energy consumed. The total amount of energy consumed in the last seven years has varied between a maximum usage of 1096 kWh per tonne fibre produced in 2010 and a minimum of 1030 kWh per tonne fibre produced in 2015. 2015 has been the best achievement to-date in terms of energy consumption per tonne fibre produced. There was 1032kWh of energy consumed in 2017 per tonne of fibre produced.

Considerable resources have been put into reducing energy consumption. Information relating to improvements made in energy consumption can be reviewed in additional detail in **Appendix III**, Project 5.3.

Figure 11 Energy consumed per Tonne fibre produced



6.0 Environmental incidents and complaints summary

6.1 Incidents

There were no reportable incidents in 2017.

6.2 Complaints

No complaints were received during the period January 2017 to December 2017.

7.0 Environmental management programme & schedule of environmental targets

In order to manage the effect our business has on the environment, Wellman International Limited has an Environmental Management System (EMS) accredited to ISO 14001:2015. As required by ISO 14001:2015 the following core objectives have been set. (Changes to the description of the core objectives from 2017 objectives have been made to ensure compliance to ISO14001:2015, which WIL became accredited to in Q4 2017.

1.0 To up-grade the wastewater treatment plant to ensure wastewater quality does not impact on the quality of the River Borora by ensuring continued compliance to IPPC and other legal requirements and (ii) by developing the plant in line with proposed production expansions and changes.

2.0 To identify and implement noise control projects to ensure continued compliance with IPPC and to ensure that activities on site do not impact neighbours or other stakeholders.

3.0 To develop a culture of sustainable 'thinking' throughout WIL by increasing environmental awareness and responsibility.

4.0 To identify and implement resource reduction projects, including energy and water to ensure sustainability of the business.

5.0 To identify and implement necessary programs to ensure the protection of groundwater and soil.

6.0 To identify and implement necessary programs to reduce waste generation and to ensure that wastes arising are handled and treated in a sustainable manner.

7.0 To ensure all relevant compliance obligations relating to the environment are identified and actioned.

8.0 To continuously improve the structure and performance of the ISO 14001 management system.

Under these core objectives a number of 5-year projects have been implemented and each year a set of targets are established under each project. Targets are set based on Aspects & Impacts, Audit findings, Legal requirements, Near-Misses & Observations, PESTLE analysis. Details of the 5-year projects and the annual targets for 2018 are provided in Table 14. **Appendix III** provides a detailed report of the progress made on each EMP project in 2017.

Table 14 EMP Projects & Schedule of Annual Targets

Core objective reference	Core Objective Description	Project timeframe	2018 targets
1.0	To up-grade the wastewater treatment plant to ensure wastewater quality does not impact on the quality of the River Borora by ensuring continued compliance to IPPC and other legal requirements and (ii) by developing the plant in line with proposed production expansions and changes.	Jan. 17- Dec. 22	• Install screen (primary treatment) in WWTP. • Complete a 6-S project in the WWTP laboratory. • Remove monotank. • Develop procedure to outline criteria for disposing of chemicals and other liquid waste to WWTP.
2.0	To identify and implement noise control projects to ensure continued compliance with IPPC and to ensure that activities on site do not impact neighbours or other stakeholders.	Jan. 17- Dec. 22	• Raise awareness about environmental noise Replace/lag raw material conveying pipework in Silo farm
3.0	To develop a culture of sustainable 'thinking' throughout WIL by increasing environmental awareness and responsibility.	Jan. 17- Dec. 22	• Provide ISO Auditor Training to the requirements of the revised 2015 standards for all outstanding internal auditors • Development of Environmental related visual aids to underpin environmental aspects • Complete 3rd Phase of Root Cause Analysis Training • Develop new Chemical Approval Infrastructure with Procurement (& other stakeholders) so as to prevent any chemicals entering the site without approval • Develop & Deliver Quality & Environmental awareness Training for Employees
4.0	To identify and implement resource reduction projects, including energy and water to ensure sustainability of the business.	Jan. 17- Dec. 22	• Review quality of final effluent and identify suitable on-site uses • Install LED lighting in creel area

5.0	To identify and implement necessary programs to ensure the protection of groundwater and soil.	Jan. 17- Dec. 22	• Complete bund register and integrity testing (including guidelines & procedure) • Repairs to Firewater Retention Ponds • Clean surface water drains and put maintenance procedure in place • Repair floor in AFM • Complete priority substances risk assessment
6.0	To identify and implement necessary programs to reduce waste generation and to ensure that wastes arising are handled and treated in a sustainable manner.	Jan. 17- Dec. 22	• Review sustainable/alternative outlets for IBC • Review sustainable/alternative outlets for clunker • Put recycling bins on production floor to capture paper/cardboard tickets • Roll out use of can puncturing unit (for aerosols) to other areas of the plant
7.0	To ensure all relevant compliance obligations relating to the environment are identified and actioned.	Jan. 17- Dec. 22	• Finalise ELRA & DMP and put financial provisions in place
8.0	To continuously improve the structure and performance of the ISO 14001 management system.	Jan. 17- Dec. 22	• Introduce "Pre-Qualification" System for HSE Related Suppliers • Develop a Structure for the Control, Recall & Replacement of Controlled Documents placed on display throughout the site, including locations for each

8.0 Pollution Release and Transfer Register

Outlined below is a list of releases to air and water from our facility which have been reported in compliance with SI123 of 2007.

Air

- Carbon di-oxide (CO_2)
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Sulphur dioxide (SO_2)
- Particulate matter (PM_{10})

TA Luft Class I, II & III were monitored at the licensed emission points.

Water

- Arsenic & compounds
- Chromium & compounds
- Copper & compounds
- Lead & compounds
- Nickel & compounds
- Zinc & compounds
- Cadmium & compounds

Details of the emissions are recorded in the EPA AER Returns Worksheet **(Appendix II)**

9.0 Noise Monitoring

Noise monitoring was conducted in the second half of 2017 in accordance with the EPA Guidance note NG4. Daytime and night-time noise levels are within the licence criteria at all nearest sensitive location

The results of the survey are included in the Effects Register and noise reduction projects are devised accordingly. Progress with noise reduction projects is addressed through the annual Objectives & Targets programme.

Table 15 summarises the results of the Annual Noise Survey Report from the Wellman International Ltd (WIL) site, conducted in 2017. The full report is available on-site.

Table 15 Noise monitoring summary

Date of monitoring	Time period	Noise location	NSL	LA_{10}	LA_{90}	LA_{max}	LA_{eq}	LA_{RT}	Tonal or impulsive noise	If tonal/impulsive was 5dB penalty applied	Comments
25/09/17	15:03-15:18	N2	✓	48	42	57	46	46	No	N/A	Silo farm noise, product conveying through pipework, intermittent blowers, dogs barking in the distance, local voices, construction activity at local properties, etc.
25/09/17	15:20-15:35	N2	✓	48	43	57	46	46	No	N/A	
25/09/17	15:36-15:51	N2	✓	48	41	60	46	46	No	N/A	
19/09/18	02:24-02:39	N2	✓	46	44	49	45				Product impacts, blowers turning on & off, dogs barking in the distance.
19/09/18	02:40-02:55	N2	✓	46	44	51	45				
25/09/17	16:55-17:10	N4	X	55	52	60	54	54	No	N/A	Fans on Spinning roof, product impacts through pipework, diverter valves opening & closing
25/09/17	17:11-17:26	N4	X	56	53	58	55	55	No	N/A	
25/09/17	17:27-17:42	N4	X	56	54	59	55	55	No	N/A	
19/09/18	23:42-23:57	N4	X	56	55	58	56				Fans on Spinning roof, product impacts through pipework, diverter valves opening & closing
19/09/18	23:58-00:13	N4	X	56	55	60	56				
25/09/17	08:25-08:40	N5	X	68	59	70	64	34	No	N/A	Fans on Spinning & Finishing roofs, product impacts through pipework. Dogs barking in the distance.
25/09/17	08:41-08:56	N5	X	66	58	72	63	63	No	N/A	
25/09/17	08:57-09:12	N5	X	67	59	71	65	65	No	N/A	
19/09/18	00:18-00:33	N5	X	55	53	66	55				Fans on Spinning & Finishing roofs, product impacts through pipework. Dogs barking in the distance.
19/09/18	00:34-00:49	N5	X	63	54	68	58				
25/09/17	10:20-10:35	N7	X	52	47	56	49	49	No	N/A	Fans on Spinning roof, bulk material filling to silos, blower noise & product impacts. Agricultural activity.
25/09/17	10:37-10:52	N7	X	53	49	60	52	52	No	N/A	
25/09/17	10:53-11:08	N7	X	56	48	72	53	53	No	N/A	
19/09/18	04:34-04:49	N7	X	42	40	50	41				Fans on Spinning roof, blower noise & product impacts.
19/09/18	04:50-05:05	N7	X	43	41	50	42				
25/09/17	11:22-11:37	N8	X	52	50	63	51	51	No	N/A	Forktruck activity in the yard, fan and product impacts through pipework.
25/09/17	11:38-11:53	N8	X	53	51	61	78	52	No	N/A	
25/09/17	11:54-12:09	N8	X	53	51	60	52	52	No	N/A	
19/09/18	05:15-05:30	N8	X	52	50	56	51				Fan & product impacts through pipework.
19/09/18	05:31-05:46	N8	X	52	50	58	51				

Date of monitoring	Time period	Noise location	NSL	LA_{eq}	LA_{90}	LA_{10}	LA_{max}	LA_{RT}	Tonal or impulsive noise	If tonal/impulsive was 5dB penalty applied	Comments
25/09/17	09:22-09:37	N10	X	53	49	64	51	51	No	N/A	Blowers turning on & off, product impacts through pipework & dogs barking in the distance.
25/09/17	09:38-09:53	N10	X	57	51	64	55	55	No	N/A	
25/09/17	09:55-10:10	N10	X	56	51	71	55	55	No	N/A	
19/09/18	00:57-01:12	N10	X	54	48	57	52				Blowers turning on & off, product impacts through pipework, dogs barking in the distance.
19/09/18	01:13-01:28	N10	X	54	41	62	50				
25/09/17	12:21-12:36	N13	X	53	50	57	52	52	No	N/A	Fans on Spinning roof, product impacts through pipework.
25/09/17	12:37-12:52	N13	X	52	50	57	51	51	No	N/A	
25/09/17	12:53-13:07	N13	X	53	51	58	52	52	No	N/A	
19/09/18	23:02-23:17	N13	X	57	56	59	56				Fans on Spinning roof, product impacts through pipework.
19/09/18	23:18-23:33	N13	X	58	56	61	57				
19/09/18	03:48-04:03	N13(a)	✓	48	45	51	46				This is a supplementary measurement, conducted at the nearest noise sensitive location to monitoring point N13. This measurement was conducted to ensure license compliance based on night-time noise levels measured at monitoring point N13.
19/09/18	04:04-04:19	N13(a)	✓	49	46	50	48				
25/09/17	14:02-14:17	N14	✓	54	51	62	53	53	No	N/A	Blowers turning on & off, product impacts through pipework, dogs barking in the distance. Construction activity.
25/09/17	14:19-14:34	N14	✓	53	51	57	52	52	No	N/A	
25/09/17	14:35-14:50	N14	✓	49	45	60	48	48	No	N/A	
19/09/18	01:48-02:03	N14	✓	47	47	48	47				Blowers turning on & off, product impacts through pipework, dogs barking in the distance.
19/09/18	02:04-02:19	N14	✓	48	46	51	47				
25/09/17	15:58-16:13	N15	✓	44	40	51	43	43	No	N/A	Fan noise and faint product impacts through pipework, local farmyard activity.
25/09/17	16:14-16:29	N15	✓	46	40	52	44	44	No	N/A	
25/09/17	16:30-16:45	N15	✓	47	41	53	44	44	No	N/A	
19/09/18	03:12-03:27	N15	✓	44	40	46	42				Fan noise and faint product impacts through pipework.
19/09/18	03:28-03:43	N15	✓	45	43	48	44				

All noise results were within licensable limits.

10.0 Groundwater monitoring summary

Ground water monitoring is scheduled to be carried out bi-annually, as outlined in Schedule C.6 of the licence. The results for the monitoring completed in 2017 are summarised below.

Table 16 Groundwater Monitoring Results

Parameter		GW1 (cooling water)		GW2 (drinking water)		*Drinking water std (µg/l)
		May-17	Nov-17	May-17	Nov-17	
pH		7.0	7.1	7.1	7.0	6.5-9.5
COD (mg/l)		5	5	7	5	
Conductivity mS/cm@20°C		610	610	630	610	2500
Nitrate (mg/l asN)		9.55	7.5	7.5	10	50
Total Nitrogen (mg/l)		-	-	-	-	
Chloride (mg/l)		13.6	24.5	11.5	22.5	250
DRO (µg/l)		<0.2	<0.2	<0.2	<0.2	
Speciated TPH (µg/l)		<0.5	<0.5	<0.5	<0.5	
Trace Organics (mg/l)	Methanol	<0.003	<0.003	<0.003	<0.003	-
	Acetonitrile	<0.003	<0.003	<0.003	<0.003	-
	Ethanol	<0.003	<0.003	<0.003	<0.003	-
	Acetone	<0.003	<0.003	<0.003	<0.003	-
	IPA	<0.003	<0.003	<0.003	<0.003	-
	USEPA 524.2 (µg/L)	<0.003	<0.003	<0.003	<0.003	-
Heavy Metals (µg/l)	Aluminium	2	<2	4	6	200
	Boron	<5	<5	<5	<5	1000
	Iron	65	280	118	105	200
	Manganese	30	56	25	40	50
	Copper	<2	<2	<2	<2	2000
	Zinc	<2	<2	<2	<2	-
	Barium	<2	<2	<2	<2	-
	Arsenic	<0.5	<0.5	<0.5	<0.5	10
	Cadmium	<2	<2	<2	<2	5
	Chromium	<2	<2	<2	<2	50
	Mercury	<0.5	<0.5	<0.5	<0.5	1
	Nickel	<5	<5	<5	<5	20
	Lead	<2	<2	<2	<2	25
	Antimony	<0.2	<0.2	<0.2	<0.2	5
	Selenium	<5	<5	<5	<5	10
	Cobalt	<2	<2	<2	<2	-
	Phthalates	<2	<2	<2	<2	-
	Beryllium	<0.1	<0.1	<0.1	<0.1	-
	Tin	<2	<2	<2	<2	-

The reference numbers for the two groundwater wells on site are GW1 and GW2. GW1 is located at the Southwest boundary of the site and is used for cooling water purposes and GW2 is located at the northeast boundary of the site and is used for drinking water purposes. There is a third well on-site GW3, which is located adjacent to GW2, and is used as a back-up for GW2. The use of GW2 & GW3 is interchangeable.

Analysis results for GW2 were in compliance with the limits specified in the European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I. No. 278 of 2007) which is used for drinking water purposes.

A hydrogeological assessment, taking into account EPA Guidance in relation to demonstrating compliance with the Environmental Objectives Groundwater Regulations (SI 9 of 2010), was conducted by Dr. Robert Meehan and the report submitted to the EPA. The assessment was approved by the Agency in April 2015. Quarterly groundwater monitoring was recommended as part of the report and this is currently underway. A summary report was submitted to the Agency following each round of monitoring. The complete suite of analysis concluded the following:

The conceptual model for the site demonstrates that during spells of dry weather the aquifer goes dry-ish and where pollutants are present they are detected. The levels of PAHs and TPHs found in the wells in December concur strongly with the outline conceptual model for the site. Following periods of wet weather such as December 2015 and January and February 2016, the pollutants are diluted and following dry weather conditions pollutants are more evident. It is therefore recommended that sampling be completed on an annual basis, to assess the long-term trend in decreasing pollutants in boreholes across the site.

Analysis was conducted by Complete Laboratory Solutions in May 2017. All certificates of analysis are available for inspection.

11.0 Surface water monitoring summary

Surface water discharges are monitored at M/235/S as outlined in Schedule C.2.3 of the licence. The results are presented in Fig. 12 below.

The results for M/000/S, the combined discharge to the river are monitored as outlined in Schedule C.2.2 of the licence. See Fig. 13

Figure 12 Monitoring at M/235/S 2011-2017

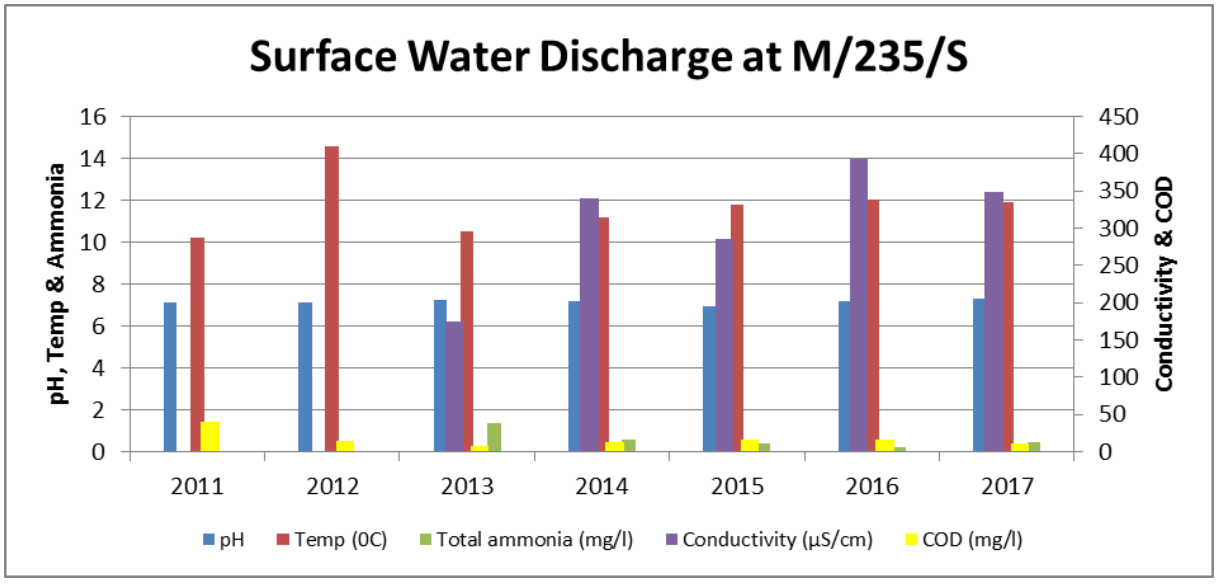
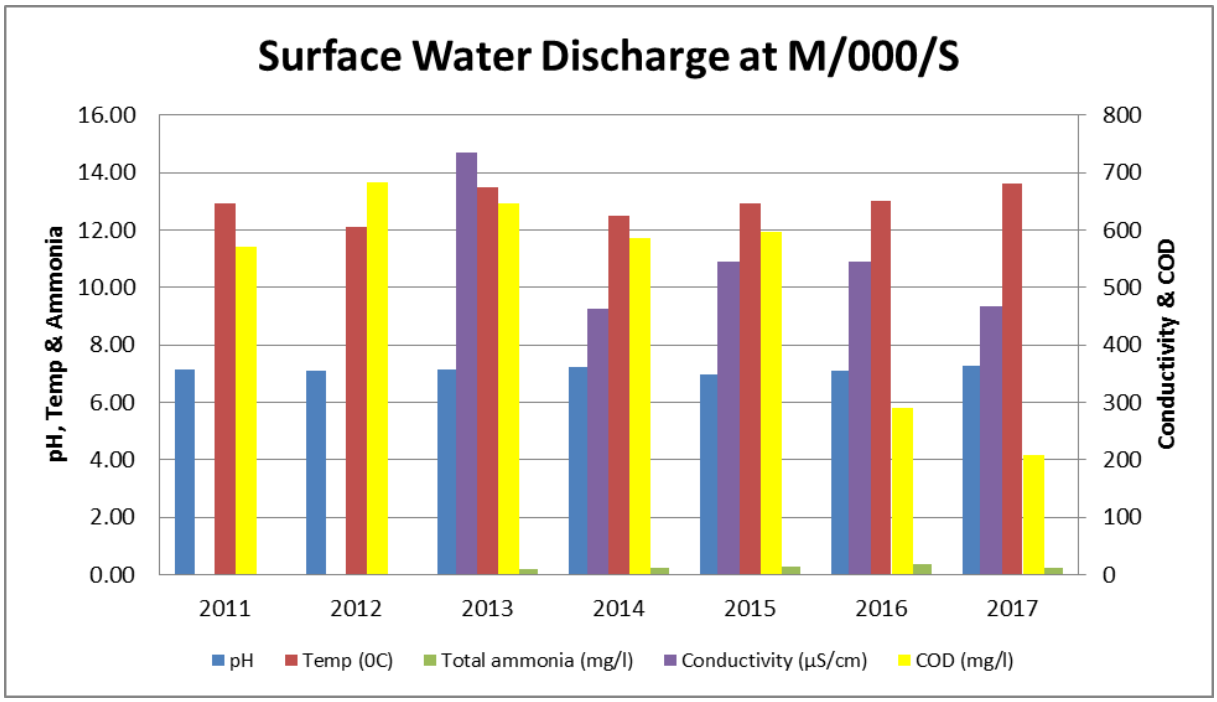


Figure 13 Monitoring at M/000/S



There were no non-compliances in relation to surface water monitoring during 2016.

12.0 Bund integrity testing

The bunds were integrity tested by TGP, Consulting Civil & Structural Engineers in 2015. The report is available for inspection on-site. A number of minor repairs were recommended on the report and are currently being closed out.
A program of testing of mobile bunds was completed in 2015. The summary report is provided in Appendix V. Three bunds failed the integrity test and these were subsequently decommissioned.

Integrity testing is required again in 2018.

13.0 Inspection of underground effluent & foul sewer pipes

A CCTV survey of the underground effluent & foul sewer pipes was conducted by JC Enviro Drain Services during 2016. All foul drains are currently in good condition and require no further rehabilitation works.

The next survey of the foul system is scheduled for 2019.

14.0 Decommissioning Management Plan

The Decommissioning Management Plan was accepted by the Agency in July 2015, subject to an annual review. It was reviewed in May 2016 and the Executive Summary is provided below.

.

Executive Summary

Project Instructions

Rowan Engineering Consultants were contracted to review the Decommissioning Management Plan on behalf of Wellman International Limited.

Closure Report Summary

Name & Address	Wellman International Limited Mullagh, Kells, Co. Meath
IPC Licence	P0236-02
Prepared by	Eimear Reilly BA (Mod) Hons Env. Sci. IEMA Rowan Engineering Consultants
Licence Activity	Class 8.4.0 *"The manufacture of synthetic fibres"*
Risk Category	RBME last – B3
Scope & methodology	Closure Plan in line with Agency's '*Guidance on Assessing and Costing Environmental Liabilities*', 2014.
Closure costs	€429,963 (including contingency of 20%)
Financial provision mechanism	Under review
Review period	Annually (in accordance with Condition 10.2.2)

15.0 Environmental Liabilities Risk Assessment

An Environmental Liabilities Risk Assessment was prepared by Rowan Engineering Consultants Ltd. in 2013. The ELRA was rejected by the Agency. It has been up-dated and further information submitted. The revised edition was accepted by the Agency. The ELRA will be reviewed in 2017.

Based on 'worst case scenario' assessment the maximum liability that may be incurred has been calculated at €412,324.

A total of 29 potential risks were identified. There is one medium level risk, relating to the management of firewater. All remaining risks are low level and indicate a need for continuing awareness and monitoring on a regular basis.

Statement of Measures

WIL have been in operation for the last 40 years. During this time environmental risk management has been a core value and it is reflected in the level of reasonably low level of risk identified in the risk assessment. The proposed/continued mitigation measures are outlined below.

Risk	Risk score	Mitigation measure
Loss of integrity of fuel bunds	3	Continue bund certification
Loss of integrity of diesel bund at river pump house	4	Continue daily inspection & weekly maintenance checks of bunds.
Loss of integrity of foul underground pipelines	2	Carry out CCTV survey of underground pipelines.
WWTP tanks or sumps overflowing	4	Continue weekly alarm checks
Uncontrolled & prolonged release of the final discharge outside the ELVs	6	Review & up-date existing WWTP manual
Release of significant noise emissions beyond the boundary of the site.	2	Continue annual noise monitoring
Release of uncontrolled gaseous emissions following malfunction of equipment.	2	Scrubber checked regularly as part of sites preventative maintenance
Extreme cold temperatures (potential impact on WWTP)	3	Review WWTP procedures & controls in place for cold weather.
Major site fire	8	Review emergency response procedures in relation to firewater management.
Potential unknown historical legacy issues	4	Groundwater monitoring

Based on the risk assessment environmental liabilities have been costed at €412,324 which is 'worst case scenario' with a 10% contingency.

Appendix I

Wellman International Limited
Health, Safety, Environmental & Quality (HSEQ) Policy

Wellman International Limited is Europe's leading producer of multiple polymer and fibre types into the Hygiene & Healthcare, Technical Fibres, Automotive and Home & Apparel industries. Our goal is to deliver products and services that meet or exceed our customer's expectations and enhance customer satisfaction.

It is our policy

- To provide products and services that meet or exceed the expectations of our customers
- To have a Leadership Team that provides direction, commitment and shared responsibility for establishing, implementing, integrating and maintaining the HSEQ Systems
- Through direction and support ensure each employee will have a clear understanding of the importance of their HSEQ responsibilities and how these relate to the success of the organisation
- To prevent injury or ill health to employees, contractors and visitors
- To manufacture our products in a sustainable and environmentally sound manner
- To work in partnership with our employees and other interested parties to ensure the highest standards of product quality, health & safety and environmental performance are achieved
- To fulfil all compliance obligations including all applicable national and international legislation and other applicable requirements related to HSEQ matters

We are committed to

- The provision of quality products and exceptional customer service
- Maintaining a safe working environment
- The prevention of pollution
- The efficient use of resources
- The minimisation of waste

We will routinely identify the key HSEQ risks and opportunities relevant to our business and address these through the development of objectives aimed at delivering continuous improvement in HSEQ performance.

We will comply with the standards of independently verified management systems including ISO 9001, ISO 14001 and OHSAS 18001 as well as other requirements where relevant.

We will reuse waste wherever practicable, promoting the use of recycled materials to reduce our environmental impact.

We will provide appropriate communication and adequate resources to ensure that all employees and other interested parties have the competency and awareness to actively promote the delivery of;

- product quality
- health & safety
- environmental performance

We will ensure that our HSEQ Systems are monitored, measured, analysed and evaluated regularly and we shall devote sufficient resources to ensure that this policy is implemented throughout the company.

Donal Breen
CEO

Date: 26.09.17 **FN169** **Rev: 05**

Appendix II

Environmental Protection Agency

| PRTR# : P0236 | Facility Name : Wellman International Limited | Filename : P0236_2017.xls | Return Year : 2017 |

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2017

1. FACILITY IDENTIFICATION

Parent Company Name	Wellman International Limited
Facility Name	Wellman International Limited
PRTR Identification Number	P0236
Licence Number	P0236-02

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Mullagh
Address 2	Kells
Address 3	
Address 4	
	Meath
Country	Ireland
Coordinates of Location	-6.92903 53.8121
River Basin District	IEEA
NACE Code	1310
Main Economic Activity	Preparation and spinning of textile fibres
AER Returns Contact Name	
AER Returns Contact Email Address	
AER Returns Contact Position	
AER Returns Contact Telephone Number	
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	87200.0
Production Volume Units	T
Number of Installations	1
Number of Operating Hours in Year	8316
Number of Employees	268
User Feedback/Comments	Air emission reults are based on bi-annual sampling events with the total emission extrapolated from the results. Level of variable is normal at the low levels achieved. Likewise variances in water emissions (heavy metals) is based on a single grab sample and total emissions are expolated based on total flow. As it is a final effluent sample the degree of variability can be notable.
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	Yes

This question is only applicable if you are an IPPC or Quarry site

4.1 RELEASES TO AIR Link to previous years emissions data

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
		Method Used						
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
		Method Used			A1-2			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
03	Carbon dioxide (CO2)	C	ESTIMATE	Standard emission rate from the combustion of gas	3856063.0	8289044.0	0.0	4432981.0
02	Carbon monoxide (CO)	C	ESTIMATE	Standard emission rate from the combustion of gas	1340.0	2881.0	0.0	1541.0
08	Nitrogen oxides (NOx/NO2)	C	ESTIMATE	Standard emission rate from the combustion of gas	3083.0	6627.0	0.0	3544.0
11	Sulphur oxides (SOx/SO2)	C	ESTIMATE	Standard emission rate from the combustion of gas	34.0	73.0	0.0	39.0
88	Particulate matter (PM10)	C	ESTIMATE	Standard emission rate from the combustion of gas	235.0	505.0	0.0	270.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs												
POLLUTANT		METHOD													QUANTITY		
		Method Used			A2-2	A2-3	A2-5	A2-6	A2-8	A2-10	A2-11	A2-12	A2-27				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	Emission Point 6	Emission Point 7	Emission Point 8	Emission Point 9	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
230	TA Luft organic substances class 1	M	ALT	EN13649:2014	64.03	66.11	37.42	37.84	91.89	13.31	46.15	81.08	30.77	468.8	0.0	0.0
231	TA Luft organic substances class 2	M	ALT	EN13649:2014	64.03	66.11	37.42	37.25	91.89	18.83	46.15	81.08	30.77	471.33	0.0	0.0
229	TA Luft inorganic dust particles class 3	M	ALT	EN13649:2014	64.03	66.11	37.42	37.25	91.89	13.31	46.15	81.08	30.77	468.01	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(otal) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Wellman International Limited

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS Link to previous years emissions data | PRTR# : P0236 | Facility Name : Wellman International Limited | Filename : P0236_2017.xls | Return Year : 2017 | 29/03/2018 09:38

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this only concerns Releases from your facility

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs				
POLLUTANT							QUANTITY		
			Method Used		SW1				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
17	Arsenic and compounds (as As)	M	OTH	APHA Ref.3500-As.C	0.005	0.0	0.005	0.0	0.0
18	Cadmium and compounds (as Cd)	M	OTH	APHA Ref.3500-Cd.C	5.76	0.0	5.76	0.0	0.0
19	Chromium and compounds (as Cr)	M	OTH	APHA Ref.3500-Cr.C	10.67	0.0	10.67	0.0	0.0
20	Copper and compounds (as Cu)	M	OTH	APHA Ref.3500-Cu.C	1.33	0.0	1.33	0.0	0.0
22	Nickel and compounds (as Ni)	M	OTH	APHA Ref.3500-Ni.C	0.3	0.0	0.3	0.0	0.0
23	Lead and compounds (as Pb)	M	OTH	APHA Ref.3500-Pb.C	8.96	0.0	8.96	0.0	0.0
24	Zinc and compounds (as Zn)	M	OTH	APHA Ref.3500-Zn.C	50.95	0.0	50.95	0.0	0.0
					0.0	0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used		SW1			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
303	BOD	M	OTH	Standard method based on Standard Methods for the Examination of Water & Wastewater	1130.0	1130.0	0.0	0.0
306	COD	M	OTH	Standard method based on Standard Methods for the Examination of Water & Wastewater	19203.0	19203.0	0.0	0.0
240	Suspended Solids	M	OTH	Standard method based on Standard Methods for the Examination of Water & Wastewater	728.0	728.0	0.0	0.0
314	Fats, Oils and Greases	M	OTH	Standard method based on Standard Methods for the Examination of Water & Wastewater	40.5	40.5	0.0	0.0
367	Ortho-phosphate (as P)	M	OTH	In-house accredited test	8.8	8.8	0.0	0.0
238	Ammonia (as N)	M	OTH	Standard method based on Standard Methods for the Examination of Water & Wastewater	16.3	16.3	0.0	0.0
355	Aluminium	M	OTH	APHA Ref. 3500-Al.C	45.6	45.6	0.0	0.0
205	Antimony (as Sb)	M	OTH	APHA Ref. 3500-Sb.C	0.03	0.03	0.0	0.0
373	Barium	M	OTH	APHA Ref. 3500-Ba.C	0.11	0.11	0.0	0.0
356	Cobalt	M	OTH	APHA Ref. 3500-Co.C	0.11	0.11	0.0	0.0
357	Iron	M	OTH	APHA Ref. 3500-Fe.C	7.9	7.9	0.0	0.0
321	Manganese (as Mn)	M	OTH	APHA Ref. 3500-Mn.C	12.06	12.06	0.0	0.0
368	Molybdenum	M	OTH	APHA Ref. 3500-Mo.C	0.05	0.05	0.0	0.0
370	Selenium	M	OTH	APHA Ref. 3500-Se.C	0.11	0.11	0.0	0.0
354	Silver	M	OTH	APHA Ref. 3500-Ag.C	0.005	0.005	0.0	0.0
358	Tin	M	OTH	APHA Ref. 3500-Sn.C	0.11	0.11	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTES | PRTR#: P0036 | Facility Name: Wellman International Limited | Filename: P0036_2017.xls | Return Year: 2017 |

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	M/C/E	Method Used	Location of Treatment	Haz Waste: Name and Licence/Permit No of Next Destination Facility / Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste: Address of Next Destination Facility / Non Haz Waste: Address of Recover/Disposer	Name and Licence / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
Within the Country	04 02 20	No	135.7	sludges from on-site effluent treatment other than those mentioned in 04 02 19	R3	M	Weighed	Offsite in Ireland	Kilmainham Compost,W0195-02	Ballynalurgan,Kilmainhamwood,Meath,,Ireland		
Within the Country	04 02 22	No	396.14	wastes from processed textile fibres	R1	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02	Carranstown,Duleek,Meath,,Ireland		
To Other Countries	04 02 22	No	359.21	wastes from processed textile fibres	R3	M	Weighed	Abroad	Vanden Recycling,[illegible]	30 Victoria Street,Belfast BT1 3GG,,Ireland		
To Other Countries	04 02 22	No	114.78	wastes from processed textile fibres	R3	M	Weighed	Abroad	Resource & Fuels Ireland Ltd,[illegible]	Exchange House,White Friars,Chester,CH1 1DP,United Kingdom		
To Other Countries	04 02 22	No	30.3	wastes from processed textile fibres	R3	M	Weighed	Abroad	Choice Waste Management,[illegible]	Denmark House Block Close,Kiln Farm, Milton Keynes,Buckinghamshire,MK 11 3DP,United Kingdom		
To Other Countries	04 02 22	No	44.83	wastes from processed textile fibres	R3	M	Weighed	Abroad	WTS J,[illegible]	[illegible] 2940,Tabor,,,Czech Republic		
Within the Country	04 02 22	No	4202.2	wastes from processed textile fibres	R3	M	Weighed	Onsite of generation	Wellman International Ltd,P0036-03	Mullagh,Kells,Co. Meath,,Ireland		
Within the Country	08 03 18	No	0.13	waste printing toner other than those mentioned in 08 03 17	R4	M	Weighed	Offsite in Ireland	WEEE Recycle/KMK,W0113-04	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland		
To Other Countries	11 01 13	Yes	0.48	degreasing wastes containing dangerous substances	R2	M	Weighed	Abroad	Safety Kleen Ltd,W0088-01	Unit 5,Airton Rd,Tallaght,Dublin 24,Ireland	Tradebe,[illegible],Weeland Rd,Knottingly,West Yorkshire,WF11 8DZ,United Kingdom	Weeland Rd,Knottingly,West Yorkshire,WF11 8DZ,United Kingdom
Within the Country	13 02 08	Yes	2.16	other engine, gear and lubricating oils	R9	M	Weighed	Offsite in Ireland	ENVA Ireland Ltd,W0184-01	Clonminam Ind Est,Portlaoise,Co. Laois,,Ireland	ENVA Ireland Ltd,W0184-01,Clonminam Ind Est,Portlaoise,Co. Laois,,Ireland	Clonminam Ind Est,Portlaoise,Co. Laois,,Ireland
To Other Countries	15 01 01	No	13.26	paper and cardboard packaging	R12	M	Weighed	Abroad	MLM Limited,[illegible]	Towers Business Park,Wilmslow Rd,Manchester,M20 2DX,United Kingdom		
Within the Country	15 01 02	No	29.82	plastic packaging	R3	M	Weighed	Offsite in Ireland	Leinster Environmentals,WPP LH 11-0002-01	Clermont Business Park,Haggardstown,Dundalk,Louth,Ireland		
Within the Country	15 01 03	No	303.28	wooden packaging	R3	M	Weighed	Offsite in Ireland	Connoy Recycling ,WPP WH 2008-0003-01	[illegible],Mullingar,Co. Westmeath,Ireland		
Within the Country	15 01 05	No	19.08	composite packaging	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,W0192-03	Block 402 Grants Drive,Greenogue Business Park,Rathcoole,Co. Dublin,Ireland		
Within the Country	16 06 01	Yes	0.83	lead batteries	R4	M	Weighed	Offsite in Ireland	WEEE Recycle/KMK,W0113-03	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland	WEEE Recycling/KMK,W0113-03,Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland
Within the Country	16 06 05	No	0.45	other batteries and accumulators	R4	M	Weighed	Offsite in Ireland	WEEE Recycle/KMK,W0113-03	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland		
To Other Countries	17 06 05	Yes	0.8	construction materials containing asbestos (18)	D1	M	Weighed	Abroad	Rilta Environmental Ltd,W0192-03	Block 402 Grants Drive,Greenogue Business Park,Rathcoole,Co. Dublin,Ireland	Grossenaspe Entsorgungsgesellschaft,[illegible],Strecker 39,27A,24622,Grossenaspe,,Germany	Strecker 39,27A,24622,Grossenaspe,,Germany
Within the Country	17 09 04	No	11.24	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	R13	M	Weighed	Offsite in Ireland	AES,W0131-02	Proudstown Rd,Navan,Co. Meath,,Ireland		
Within the Country	19 08 09	No	3.3	grease and oil mixture from oil/water separation containing only edible oil and fats	R3	M	Weighed	Offsite in Ireland	College Proteins,	College Road,Nobber,Co. Meath,,Ireland		
Within the Country	20 01 21	Yes	0.313	fluorescent tubes and other mercury-containing waste	R4	M	Weighed	Offsite in Ireland	Irish Lamp Recycling Company,WPP KE-14-0073-01	Woodstock Industrial Estate,Athy,Co. Kildare,,Ireland	Irish Lamp Recycling Company,WPP KE-08-0048-01,Woodstock Industrial Estate,Athy,Co. Kildare,,Ireland	Woodstock Industrial Estate,Athy,Co. Kildare,,Ireland
To Other Countries	20 01 25	No	0.69	edible oil and fat	R9	C	Volume Calculation	Abroad	Fyffe (Tyrone),LN 1183	[illegible] Rd Ind Est,[illegible],Co. Tyrone,[illegible],United Kingdom		
Within the Country	20 01 40	No	38.74	metals	R13	M	Weighed	Offsite in Ireland	Wilton Waste,CN-02-0005-01	[illegible],,Co. Cavan,Ireland		
Within the Country	20 03 01	No	57.46	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Drehid Landfill,W0201-03	,,Carbury,Co. Kildare,Ireland		
Within the Country	20 03 01	No	391.50	mixed municipal waste	R1	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02	Carranstown,Duleek,Meath,,Ireland		
Within the Country	20 03 99	No	3.23	municipal wastes not otherwise specified	R12	M	Weighed	Offsite in Ireland	AES (Tullamore),W0104-01	Cappincur,,Tullamore,Co. Offaly,Ireland		
To Other Countries	15 01 02	No	14.76	plastic packaging	R3	M	Weighed	Abroad	Irish Packaging Recycling Ltd,W0-263-01	Ballymount Road,Walkinstown,Dublin 12,,Ireland		
Within the Country	20 03 99	No	2.88	municipal wastes not otherwise specified	R12	M	Weighed	Offsite in Ireland	Great White Destruction,WPP[illegible]-02	Trim,,Co. Meath,,Ireland		
Within the Country	13 05 08	Yes	1.92	mixtures of wastes from grit chambers and oil/water separators	R9	M	Weighed	Offsite in Ireland	ENVA Ireland Ltd,W0184-01	Clonminam Ind Est,Portlaoise,Co. Laois,,Ireland		
Within the Country	04 02 99	No	0.80	wastes not otherwise specified	D15	M	Weighed	Offsite in Ireland	SRCL,W0055-02	400 Beech Road,Western Industrial Estate,Dublin 12,,Ireland		
Within the Country	04 02 20	No	10.0	sludges from on-site effluent treatment other than those mentioned in 04 02 19	R3	M	Weighed	Offsite in Ireland	McBreen Environmental,	[illegible],Cootehill Road,Cavan,,Ireland		
Within the Country	04 02 20	No	9.0	sludges from on-site effluent treatment other than those mentioned in 04 02 19	R3	M	Weighed	Offsite in Ireland	McBreen Environmental,	[illegible],Cootehill Road,Cavan,,Ireland		
Within the Country	16 02 13	Yes	0.1	discarded equipment containing hazardous components (15) other than those mentioned in 16 02 09 to 16 02 12	R4	M	Weighed	Offsite in Ireland	WEEE Recycle/KMK,W0113-03	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland		
Within the Country	16 02 14	No	0.4	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	R4	M	Weighed	Offsite in Ireland	WEEE Recycle/KMK,W0113-03	Cappincur Ind Est,Daingean Rd,Tullamore,Co. Offaly,Ireland		

* Select a row by double-clicking the Description of Waste then click the delete button

Appendix III

Project 1.4 Up-Grade & Refurbishment Projects in the Effluent Treatment Plant

The project was initiated in 2014 and is of 5-years duration. It will be managed as follows:

1. In quarter 1 of each year decide on projects for up-coming year. Projects will be based on audit findings, results at SW1, new legislation, development of new technologies.
2. Implement projects, these may be addressed within 1 year or over 5 years depending on reason for project, size & cost of project etc.
3. Assess the project. Infrastructural projects will be either complete or incomplete. New equipment will be assessed in terms of benefits achieved.
4. At the end of the 5 year project, a summary report will be prepared, detailing changes implemented and the effect of those changes.

Overall objective

Improve final effluent quality (suspended solids & COD) by 5% from 2013 levels.

	COD (mg/L) Daily average	COD (ave. kg/day)	SS (mg/L) Daily average	SS (ave. kg/day)
2013 levels at SW1	1003	124	36	4.4
Expected levels in 2018	952	118	34	4.2

Develop awareness within the site of the impact of production projects & programs on the WWTP.

Develop method to manage the plant in the event of changes to influent i.e. forward planning.

Targets set for 2014

- Install screen at balance tank
- Assess condition of biotower (external engineer)
- Investigate options to replace/renovate the biotower.

Progress made in 2014

- Screen not installed – carry over to 2016

- Biotower has been assessed by Thomas Garland & Partners from a structural point of view. It is recommended that the biotower be replaced.
- The cladding of the biotower has been replaced in some areas. This will help to maintain the biotower on a short-term basis (approximately 2 years), however options to replace it are yet to be considered.

Targets set for 2015

- Install screen at balance tank.
- Investigate options to renovate/replace biotower.
- Develop procedure to plan & manage changes to the plant.

Progress made in 2015

- Reviewed the Capital Expenditure Financial Request form for the screen prior to re-submitting. As part of the review it was recommended that a DAF system would be a better option than the screen and that the introduction of the DAF may bring about benefits that would remove the requirement for the biotower. Two quotations were received. It was decided to trial a pilot-scale DAF to ensure that it is the correct option for the WIL system. This will be carried over to 2016.
- During 2015 a consultant reviewed the overall management and efficiency of the wastewater treatment plant. The main recommendations from their report related to installation of screen/DAF and further testing and/or pilot studies to get a better understanding of how the plant is working.
- During 2015 a system to separate high strength waste finish from low strength waste finish was introduced. Both waste streams are then fed to the WWTP in a controlled manner with a maximum loading of 400kg COD per day. Although controlling the finish disposal is manual it is a very effective system and final effluent quality improved since the system of control was introduced. Information in relation to the volume of finish being disposed of is circulated to Production & Technical Personnel on a daily basis to increase awareness in relation to the effect of waste finish on the plant. This has led to tighter controls in these departments also.
- Overall knowledge & awareness of wastewater treatment plant has improved significantly.
- A preliminary review of the use of electrolysis to treat waste finish &/or to polish final effluent was completed. A demonstration was provided by Geomembrane Testing Services. A laboratory test was conducted on WIL wastewater streams and the

preliminary results were positive. This will be examined further in terms practicality and feasibility.

Targets set for 2016

- Replace centre well in settlement tank (the old well is corroded and is leading to blockages within the system.
- Trial a DAF system. Determine if it meets expectations in terms of treatment, if introduced can the biotower be decommissioned, is it financially feasible?
- Complete 6σ green-belt project on reducing the volume of highly concentrated waste finish being generated within the factory.
- Determine the practicality & feasibility of pursuing pilot-scale investigation into the use of electrolysis to treat wastewater streams generated on-site.

Progress made in 2016

- The centre well was replaced and this has successfully resulted in a reduction in blockages.
- It was not possible to source to pilot scale DAF to complete this project. Without completing a pilot scale study it is not possible to determine the suitability of a DAF system and this project cannot be progressed at this time.
- The 6-sigma project was successfully completed. The volume of high with the load of highly concentrated waste finish being disposed to the wastewater treatment plant being reduced by 30%.
- The success of the six-sigma project has removed the need to investigate electrolysis at this time.
- In 2016 the average COD concentration in the final effluent was 459mg/L and the average suspended solids concentration was 13mg/L.

Targets set for 2017

- Establish a WWTP team with responsibility for establishing ownership structure, future planning, impact assessments of trials/production plans and setting objectives and targets.
- Six-sigma project on the reduction of finish use in Spinning.
- Review options to replace belt press.

Progress made in 2017

- A multi-disciplinary team has been established

- The six-sigma project resulted in savings of almost 9000Kg of Finish in the Spinning Department resulting in a reduction in the volume of finish from this department being sent to the WWTP for disposal.
- The option to replace the belt press was reconsidered and postponed due to higher priority works being required in the WWTP.

Overall results from Project

Objective: Improve final effluent quality (suspended solids & COD) by 5% from 2013 levels.

	COD (mg/L) Daily average	COD (ave. kg/day)	SS (mg/L) Daily average	SS (ave. kg/day)
2013 levels at SW1	1003	124	36	4.4
2017 levels at SW1	341	53	13.2	2.0
Expected levels in 2018	952	118	34	4.2

This project is now closed and will be replaced with Objective 1 as outlined in Section 7.0 of this AER.

Project No. 2.3: Reduce noise levels from the plant

2.3.1 Relationship to Objectives and Targets

In-line with the company's objective to reduce noise emissions from the site.

2.3.2 Reason for undertaking project

To ensure that noise levels throughout the site are continuously assessed and that modifications are made, where practicable, to reduce noise emissions. Although the noise levels continue to be within the licensable limit, the noise levels at NSL14 at night-time are close to the limit and it is a main objective of the company to decrease this value where possible.

2.3.3 Target

Ensure that the night-time limits as specified in the IPPC licence are always met particularly at N14.

2.3.4 Project summary

Project 2.3	2015	**2016**				**2017**				**2018**				**2019**				**2020**			
Quarter		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																					
Phase 2																					
Phase 3																					
Phase 4																					

Phase 1:

Set specific annual targets for reducing environmental noise.

This will be reviewed annually in the final quarter.

Phase 2:

Carry out appropriate projects as identified during phase 1.

Phase 3:

Measure noise reductions achieved during each project.

Phase 4:

Assess noise reductions achieved as a result of the implementation of all annual targets. Particular attention should be paid to noise reductions achieved at NSLs.

2.3.5 Project implementation

Phase 1: Set specific annual targets for reducing environmental noise

2015 (Potential noise reduction projects identified during Q4, 2015 to be implemented in 2016).

2016 targets

- Prepare summary report on Project 2.2 (compare noise results since 2010, list any correlation with projects completed, include changes to operating conditions that may counteract achievements Investigate operation of QFT on baler condenser fans (due to tonal noise detected at N8)
- Lag pipework at Silo's 19 & 20.
- Review options to replace tannoy system.

Progress made in 2016

- Noise levels at the NSLs had not changed for the duration of the project. The internal Environmental Impact Assessment that is conducted for major projects ensures that controls are put in place to ensure there is No negative impact on noise levels.
- Lagging of pipework at Silo's 19 & 20 has not been completed.
- The tannoy system has not been replaced.

2017 targets

- Lag pipework at Silo's 19 & 20.
- Review options to replace tannoy system.
- Investigate operation of QFT on baler condenser fans.
- Deliver training/communication program on current noise levels on site, likely impact of changes to operations and importance of following internal Environmental Impact Assessment for all projects.

Progress made in 2017

- As a result of reviewing the area at Silos 19 & 20 it was concluded that the benefits of lagging the pipework in this area would be marginal therefore this project was closed.
- There was no progress made on this target.
- During the 2017 management review a presentation on current noise levels and the impact of future projects on noise levels was given. This was received by top management of the organisation.

2.3.6 Designation of responsibility

The Managing Director has overall responsibility for this project. The technical department are responsible for implementing the project.

This project is now closed and will be replaced with Objective 2 as outlined in Section 7.0 of this AER.

Project No. 3.0 Develop a culture of environmental sustainability within the organisation

3.0.1 Relationship to Objectives and Targets

In line with corporate policy on sustainability and environmental responsibility.

3.0.2 Reason for undertaking project

The project is being undertaken to increase awareness throughout the organisation of business, corporate and social responsibilities. It will allow WIL to manage environmental performance with greater understanding of impact of raw material use and product life cycle analysis. It is also a key corporate requirement in relation to sustainability and adoption of ISO 14001:2015

3.0.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

3.0.4 Project overview

Project 2.3	2015	**2016**				**2017**				**2018**				**2019**				**2020**			
Quarter		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																					
Phase 2																					
Phase 3																					
Phase 4																					

Phase 1 **Dec 2015, 2016, 2017, 2018, 2019**

Set specific targets for improved waste management practices each year.

Phase 2 **Mar 2016, 2017, 2018, 2019, 2020**

Review all options for meeting targets and evaluate feasibility.

Phase 3 **Dec 2016, 2017, 2018, 2019, 2020**

Complete approved projects.

Phase 4 **Dec 2016, 2017, 2018, 2019, 2020**

Evaluate projects.

3.0.5 Project implementation

Phase 1

Dec 2015 (Projects identified in December 2015 for implementation during 2016)

- Set-up 5-year project on sustainability
- Complete vendor evaluation of WIL suppliers

Dec 2016 (Projects identified in December 2016 for implementation during 2017)

- Establish a team with responsibility for managing sustainability planning within the organisation.
- Review corporate sustainability requirements, collate relevant data.

Phase 2

2016

- 5-Year project on sustainability has been set up
- Phase 1 of the vendor evaluation process has been completed - self-assessment forms have been circulated to key vendors.

2017 targets

- Establish a team with responsibility for managing sustainability planning within the organisation.
- Review corporate sustainability requirements and collate relevant data.

Progress made in 2017

- A team was established to review corporate sustainability requirements. Submission of reports to IVL was coordinated through the group. The team will meet as required.
- All relevant sustainability data required is available and files maintained by WIL.

This project is now closed and will be replaced with Objectives 3 & 7 as outlined in Section 7.0 of this AER.

Project No. 4.1 Waste Management Projects (Waste minimisation, use of renewable resources, sustainable disposal/recovery methods for handling waste etc.)

4.1.1 Relationship to Objectives and Targets

In line with the objective to minimise waste generation & to recycle waste materials whenever possible.

4.1.2 Reason for undertaking project

Review of waste management practices is an on-going process at WIL and setting objectives & targets provides a focus for ensuring that all progressive waste management practices are considered and implemented in a timely manner. Also waste generation is rated as a significant impact in the Effects Register.

4.1.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

4.1.4 Project overview

Project 4.0	2016	2017				2018				2019				2020				2021			
Quarter	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																					
Phase 2																					
Phase 3																					
Phase 4																					

Phase 1 **Dec 2016, 2017, 2018, 2019, 2020**

Set specific targets for improved waste management practices each year.

Phase 2 **Mar 2017, 2018, 2019, 2020, 2021**

Review all options for meeting targets and evaluate feasibility.

Phase 3 **Dec 2017, 2018, 2019, 2020, 2021**

Complete approved projects.

Phase 4 **Dec 2017, 2018, 2019, 2020, 2021**

Evaluate projects.

4.1.5 Project implementation

Phase 1

Dec 2016 (Projects identified in December 2016 for implementation during 2017)

- Complete an audit of 2 waste contractors
- Implement procedure to remove aerosol from silicone spray cans and render them non-hazardous
- Install hot water at IBC wash area to ensure thorough cleaning of IBCs.

Progress made in 2017

- Vanden Recycling was audited, as they operate as a broker/dealer only it was only possible to complete a desktop audit. No other audit was completed in 2017.
- A unit to remove aerosol content from aerosol cans has been installed in the Spinning Department
- There is hot water available to ensure thorough cleaning of totes.

4.1.6 Designation of responsibility

The HS & E manager is responsible for the implementation of this project.

This project is now closed and will be replaced with Objective 6 as outlined in Section 7.0 of this AER.

Project No 5.3. Optimisation of energy & water usage

5.3.1 Relationship to Objectives and Targets

In line with the objective to optimise energy efficiency & resource usage.

5.3.2 Reason for undertaking project

Water is one of the main natural resources used on-site. There has been a recent shift to using well water in conjunction with river water. A water audit has the potential to identify new projects from which savings can be attained.

5.3.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

2013 targets

- Complete water audit/balance for the site
- Identify new projects for improved energy efficiency

Progress made in 2013

- Water usage is being monitored on a monthly basis. There is a meter on in-coming water from the river. There is also a meter measuring the portion of river water going into the factory. Water usage by the boiler can also be monitored. When there is sufficient data water consumption will be reviewed to determine if there are any suitable water saving projects.
- An independent energy audit was completed by DEVKI Energy Consultants in December 2013.

2014 targets

- Record water consumption on a monthly basis.
- Review energy audit and identify suitable energy saving projects.

Progress made in 2014

- Water consumption was recorded throughout the year. The production processes are similar to previous years, however, the total volume of water used decreased from 76693m^3 in 2013 to 73606m^3 in 2015. This is equivalent to using 0.97m^3/Ton fibre V's 0.93m^3/Ton fibre respectively.
- Energy saving motors and pumps were sourced for the existing cooling towers. The energy savings will be evaluated during 2016.
- Water and energy usage is considered during the planning phase of all new projects. Where possible closed-loop systems for water supply are used for example recycled water is used in the container washer, the vacuum system on Unit 1 is a closed loop system.

2015 targets

- Review Energy Efficiency Regulations and conduct energy audit if required.
- Review options to re-size cooling tower pumps to suit their application

Progress made in 2015

- An energy audit was completed by Independent Energy Consultants in 2015. The report will be reviewed in 2016.
- The Autefa cooling tower pump has been re-sized to suit the application. Savings made from this project have to be calculated.

2016 targets

- Establish an energy team with responsibility for reviewing 2016 Energy Audit and developing, implementing & reviewing an effective and realistic energy plan.
- Up-grade the Cylon energy monitoring system.
- Review options to replace existing lights with LED lighting.

Progress made in 2016

- The energy audit report was reviewed and a plan for resources and projects is being compiled. The team will be established in 2017.
- Quotations for up-grading the Cylon energy monitoring system has been received, work will be completed in 2017.

- An option to out-source LED lights to a contractor was investigated but not deemed feasible. Priority areas will be completed internally in 2017.

2017 targets

- Establish an energy team with responsibility for reviewing 2016 Energy Audit and developing, implementing & reviewing an effective and realistic energy plan.
- Up-grade the Cylon energy monitoring system.
- Replace existing lights on A, B & C line cutters with LED lighting.
- Six sigma project to reduce gas consumption on the final dryers.

Progress made in 2017

- An energy management team was set up in Q4 of 2017.
- Phase 1 of the up-grade of the Cylon energy monitoring system was completed.
- LED lighting was installed on the A, B & Cline cutters resulting in savings of approximately 55c per light per XXX.
- The six-sigma project was successfully completed. Although no savings could be achieved within the scope of the project a number of recommendations were made.

This project is now closed and will be replaced with Objective 4 as outlined in Section 7.0 of this AER.

Project No 6.3. Groundwater protection

6.3.1 Relationship to Objectives and Targets

In line with the objective to minimise the potential risk to groundwater from activities on site.

6.3.2 Reason for undertaking project

Following from Project 6.2 further works have been identified to ensure groundwater protection.

6.3.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

6.3.4 Project overview

Project 6.3	2015				2016				2017				2018				2019			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																				
Phase 2																				
Phase 3																				

Phase 1 **Jan 2015, 2016, 2017, 2018, 2019**

Set specific targets for the coming year. The targets should be based on recommendations from internal audits, external audits, general reviews etc.

Phase 2 **Q2 & Q3 2015, 2016, 2017, 2018, 2019**

Complete targets as set out during Phase 1

Phase 3 **Dec 2015, 2016, 2017, 2018, 2019**

Evaluate projects

6.3.5 Project implementation

2015 targets

- Phase II of manhole repairs (front lawn & finishing).
- Investigate options to clean up bandsaw area.
- Review condition of FWRP & penstock valves. Carry out necessary repairs
- Investigate & reduce risk associated with historical oil spill.

Progress made in 2015

- Phase II of manhole repairs was completed. The manholes were integrity tested & certified following the repairs
- Options to clean-up bandsaw area were discussed. This project will be carried over to 2016.
- Three rounds of monitoring of existing boreholes in the vicinity of the historical oil spill were completed in 2015. Results are indicating that natural attenuation is occurring and that there is little risk of contaminants migrating off-site. Further investigations will be completed in 2016.
- Assessment and refurbishment of FWRPs will be carried over to 2016.
- Mobile bunds were integrity tested and certified.

2016 targets

- Complete investigation into historic oil spill.
- Complete CCTV survey of foul drainage network.
- Investigate options to clean up bandsaw area.
- Review condition of FWRP & penstock valves. Carry out necessary repairs.
- Complete bund register and issue Guidelines for the Use of Bunds.

Progress made in 2016

- A CCTV survey of the foul drainage network was completed in 2017. The drains and manholes are in good condition, with some minor repairs required.
- No progress was made on cleaning the bandsaw area. This will be completed in 2017.
- The investigation into the historic oil spill involved hydrogeological testing of boreholes in the vicinity of the spill on a quarterly basis over a one year period. It was concluded that the conceptual model for the site holds true The conceptual model demonstrates that during spells of dry weather the aquifer

goes dry-ish and where pollutants are present they are detected and following periods of wet weather the pollutants are diluted It has been recommended that sampling be completed on an annual basis, to assess the long-term trend in decreasing pollutants in boreholes across the site.

- Bund register has been completed and guidelines issued.

2017 targets

- Scope and complete repair works as outlined in 2016 CCTV survey
- Investigate options to clean up bandsaw area.
- Up-grade floor in Automatic Finish Mixing Area
- Complete 'priority substances' risk assessment and review procedures accordingly.
- Review options to provide weather protection for out-door chemstore units.

Progress made in 2017

- All repairs as required by the 2016 CCTV survey have been completed.
- A number of quotations were received for up-grade works to the AFM and the best option is currently being reviewed. This will be carried over to 2018.
- An internal risk assessment was completed however the EPA requested that a more detailed study be carried out. This risk assessment is almost complete.
- A covered bund has been delivered to site. If this meets our needs additional covered bunds will be sourced.

Project evaluation

Overall the risk posed by WIL to groundwater is low. The foul drainage system is in good condition and is surveyed every three years, there is a program in place for assessing bunds, chemicals are stored in dedicated storage areas, there is a well-trained Emergency Response Team on-site to deal with accidental spills and there are spill-kits located at key locations on-site. The projects/initiatives in 2016 enhance existing management systems and further reduce risk to groundwater.

This project is now closed and will be replaced with Objective 5 as outlined in Section 7.0 of this AER.

Project No 8.2 Alternative Energy Sources

8.2.1 Relationship to Objectives and Targets

In line with the objective to reduce factory dependence on commercial electricity.

8.2.2 Reason for undertaking project

Project 8.1 was initiated in 2010 however no alternative energy sources have been introduced due to changes in marketplace, new information and new technologies. Reducing factory dependence on commercial electricity is still an objective for the company.

At Wellman International Ltd. over 500kWh of commercial electricity is consumed per tonne of fibre produced. This equates to an annual usage of almost 40 x 10^6 kWh with a significant cost to the business.

A combined heat & power system (CHP) appears to be an attractive option as there is a significant requirement for steam and heat at the plant.

Due to the location of the factory the use of wind-energy as an alternative energy supply should be considered.

8.2.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

The overall aim of the project is to reduce the dependence on commercial electricity by 30% (starting from a baseline of 40 x 10^6 kWh per annum).

8.2.4 Project overview

Project 8.1	2015				2016				2017				2018				2019			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																				
Phase 2																				
Phase 3																				
Phase 4																				

Phase 1 **Jan 2015, 2016, 2017, 2018, 2019**

Set specific targets for the coming year. The targets should be based on recommendations from feasibility studies, legislation & initiatives on alternative energy supply etc.

Phase 2 **Dec 2015, 2016, 2017, 2018, 2019**

Conduct feasibility studies on alternative energy supplies

Prepare planned scope of works for feasible projects

Phase 3 **Dec 2017, 2018, 2019**

Install alternative energy supplies

Phase 4 **Dec 2015, 2016, 2017, 2018, 2019**

Evaluate projects

8.2.5 Project implementation

2015 targets

- Complete planning & licensing requirement for the implementation of CHP

Progress made in 2015

- The project is exempt from planning permission and a Section V notification has been issued, confirming this. A licence alteration request form was submitted to the EPA and a licence review was recommended.
- A quotation for the licence review has been received, however the feasibility of the project was queried again and no further actions have been taken.

2016 targets

- Review CHP project again.
- Complete licence review if project is deemed feasible.

Progress made in 2016

This project is on-hold.

8.1.6 Designation of responsibility

The Plant Engineer is responsible for the implementation of this project.

This project is now closed and will be replaced with Objective 4 as outlined in Section 7.0 of this AER.

Project No 9.1. Environmental Communications

9.1.1 Relationship to Objectives and Targets

Objectives & targets set to ensure effective communication of policies & procedures, including ensuring adequate training.

9.1.2 Reason for undertaking project

The project is being undertaken to increase environmental awareness throughout the organisation (including legal and corporate requirements). It will allow WIL to optimise environmental performance with the overall objective being to ensure that all Wellman Employees, contractors, visitors and interested parties have access to relevant environmental information, that they are aware of their duties & responsibilities in line with Wellman (& Indorama) policies and procedures. . It is also a key requirement in relation to sustainability and adoption of ISO 14001:2015.

9.1.3 Target

Specific targets will be set each year and will be managed through the objectives & targets programme

9.1.4 Project overview

Project 9.0	2016				2017				2018				2019				2020			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase 1																				
Phase 2																				
Phase 3																				

Phase 1 **Jan 2016, 2017, 2018, 2019, 2020**

Set specific targets for the coming year. The targets should be based on recommendations from internal audits, external audits, general reviews etc.

9.1.4 Project overview

Phase 1

2016 targets

- Set up 5-Year Communications Project
- Complete internal auditor training for ISO auditors
- Prepare high level environmental training plans for specific roles within the organisation.

2017 targets

- Complete additional internal auditor training
- Complete high level training plan – include relevant environmental training requirements
- Review option to integrate emergency response clauses of ISO 14001 and 18001 management systems and related documents.
- Complete a review and gap analysis on the requirements of the new ISO14001:2015, which will replace the existing standard in 2018.
- Establish a team to scope and define the context of the organisation and needs and expectations of stakeholders in preparation for future ISO 14001:2015 registration.
- Investigate the feasibility of providing root cause analysis training for managers and supervisors.
- Review environmental procedures as per 2017 review program.

9.1.5 Project implementation

Progress with 2016 targets

- 5-Year Communication Project has been set up.
- Auditor training for ISO auditing was completed.
- High level training template has been completed, the environmental training requirements may now be filled in.

Progress with 2017 targets

- Internal auditor training was completed for 15 people.
- A high level training plan for all site procedures has been completed and released.
- The ISO manual has been completely integrated including emergency response procedures.
- Gap analysis for ISO14001:2015 was completed and the company were successfully accredited to the new standard.

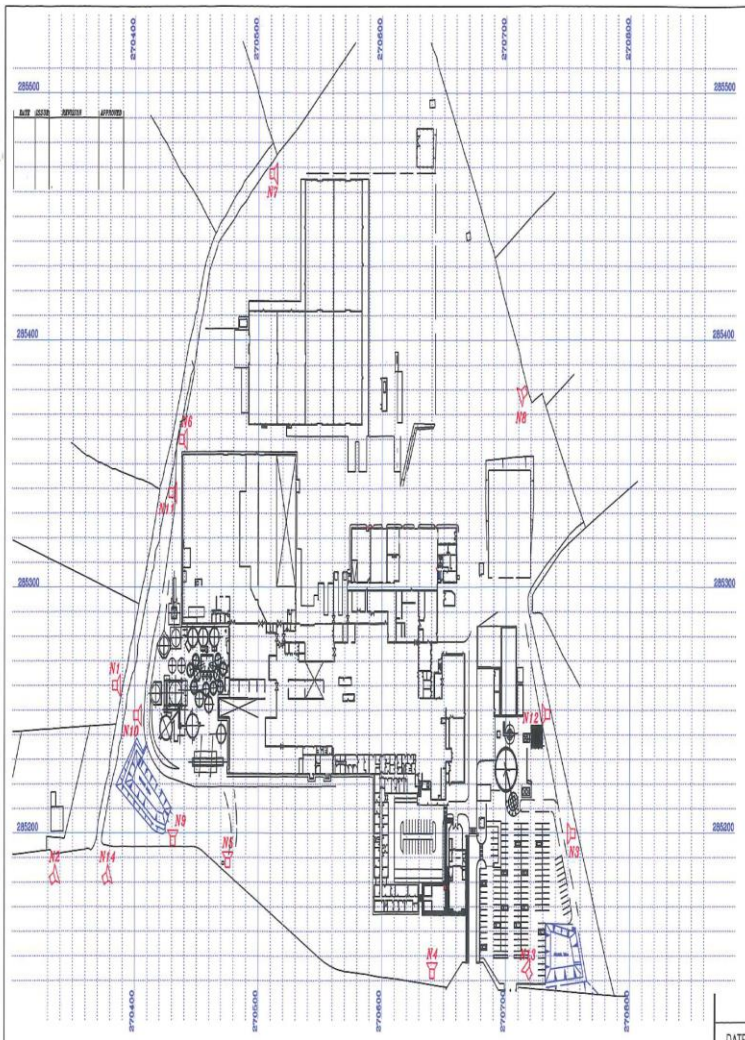
- Stakeholder analysis and a SWOT PESTLE of Internal & External issues have been completed. These will be reviewed annually as required by ISO 14001:2015.
- Root cause analysis training was completed for 30 people.

9.1.6 Designation of responsibility

The HS & E manager is responsible for the implementation of this project.

This project is now closed and will be replaced with Objectives 3 & 8 as outlined in Section 7.0 of this AER.

Appendix IV



DATE	DRAWN	CHECKED	APPROVED	AMENDMENT	ZONE

NOTES

INDORAMA VENTURES

WELLMAN INTERNATIONAL LTD.

TITLE:

NOISE MONITORING POINTS

MATERIAL:	
SCALE:	SCALE:- 1=750
DESIGN:	
DRAWN:	DATE
CHECKED	DATE
APPROVED	DATE

DRAWING NUMBER	*EM 3 Rev 1*

Appendix V

Register of mobile bunds

BUND MATRIX								
Client:		**Wellman International Limited**			**Date:**		**23rd September 2015**	
Bund Ref No.		**Bund Type**	**Construction Material**	**Bund Dimensions**			**Bund Retention Volume (m^3)**	**Result of Hydrostatic Test**
Existing	**New**			**L (cm)**	**W (cm)**	**H (cm)**		
	B 02	Portable	Plastic	122	61	14	0.1	Pass
	B 03	Portable	Plastic	25	15	20	0.0075	Pass
	B 05	Portable	Steel	250	140	20	0.70	Pass
	B 09	Portable	Steel	125	80	25	0.25	Pass
	B 11	Portable	Plastic	110	110	30	0.33	**Fail**
	B 12	Portable	Steel	200	150	45	1.35	Pass
	B 13	Portable	Steel	250	140	50	1.95	**Fail**
	B 14	Portable	Steel	250	140	50	1.75	Pass
	B 15	Portable	Steel	235	75	25	0.44	Pass
	B 17	Portable	Steel	250	140	50	1.75	Pass
	B 18	Portable	Steel	250	110	20	0.55	Pass
	B 19	Portable	Steel	250	140	50	1.75	Pass
	B 20	Portable	Steel	250	140	50	1.75	Pass
	B 21	Portable	Steel	250	140	50	1.75	Pass
	B 22	Portable	Steel	250	140	50	1.75	Pass
	B 28	Portable	Steel	240	160	75	2.88	Pass
	B 29	Portable	Steel	205	130	60	1.60	Pass
	B 30	Portable	Steel	200	140	20	0.56	Pass
	B 31	Fixed	Steel	240	92	86	1.90	**Fail**
	B 33	Portable	Steel	250	140	50	1.75	Pass
	B 37	Portable	Steel	133	125	20	0.33	Pass
CS 38		Portable	Steel	250	140	20	0.55	Pass
CS 44		Portable	Steel	150	80	25	0.55	Pass