ENVIROCO MANAGEMENT
ENVIRONMENTAL CONSULTANTS
LoCall 1890 522 000

Mr Brian Meaney
Inspector
Environmental Protection Agency (EPA)
PO Box 3000
Johnstown Castle Estate
Co Wexford

31st August 2012

RE: KMK Metals Recycling Ltd. (KMK)
Waste licence ref: W0113-04

Unsolicited additional information regarding; 1) Stack emissions monitoring and emission limit values, 2) Noise & Dust monitoring and 3) Waste water treatment system up-grade works to supplement waste licence review application ref: W0113-04.

Dear Mr Meaney,

Further to the present waste licence review application as being determined by your office ref; W0113-04, KMK wishes to include the following information as important amendments to the application.

(1) Stack emissions point; emission limit value & monitoring details.

In relation to dusts/particulates generated inside the D-WEEE plant (building), these are exhausted to a duct/ventilation system, followed by the dust collection system (bag house type) for treatment with final discharge via emissions stack to atmosphere.

To date there have been three stack emissions monitoring events conducted by; Odour Monitoring Ireland Ltd, on 2nd December 2011 and by Glenside Environmental

Services on 24th May and 20th July 2012. All monitoring reports are contained in Appendix 1 attached to this submission.

The WEEE processing plant was in use during monitoring, and the samples were taken as discharged from the emission stack after treatment.

The actual measured emissions for each monitoring event are summarised and tabulated below in tables 1, 2 and 3.

In summary the actual measured total particulate matter during the first monitoring event was 1.68 (mg/Nm^3), was 1.82 (mg/Nm^3) for the second monitoring event and was 0.21 (mg/Nm^3) for the third monitoring event. All monitoring occurred during typical working conditions at KMK.

Table 1: Summary of Air Emissions stack monitoring event on 2nd December 2011.

Emission points identity	Parameter	Periodic monitoring result	Expanded uncertainty (%)
Dust filtration plant – exhaust stack	Volume flow (Nm^3/hr dry gas)	29,197	-
	Cadmium and Thallium (mg / Nm^3 dry gas)	<0.00052	<1.0
	Mercury (mg / Nm^3 dry gas)	<0.000015	<1.0
	Lead (mg / Nm^3 dry gas)	0.00512	<1.0
	Chromium (mg / Nm^3 dry gas)	0.0392	<1.0
	Total particulate matter (mg/Nm^3 dry gas)	1.68	<2.0

Table 2: Summary of Air Emissions stack monitoring event on 24th May 2012.

Emission points identity	Parameter	Periodic monitoring result	Expanded uncertainty (%)
Dust filtration plant – exhaust stack	Volume flow (Nm^3/hr dry gas)	16,362	-
	Cadmium and Thallium (mg / Nm^3 dry gas)	<0.0018	n/a
	Mercury (mg / Nm^3 dry gas)	<0.0008	n/a
	Lead (mg / Nm^3 dry gas)	0.0059	n/a
	Chromium (mg / Nm^3 dry gas)	0.0048	n/a
	Total particulate matter (mg/Nm^3 dry gas)	1.82	0.06

Table 3: Summary of Air Emissions stack monitoring event on 20th July 2012.

Emission points identity	Parameter	Periodic monitoring result	uncertainty (mg / Nm^3)
Dust filtration plant – exhaust stack	Moist flow rate at STP (Nm^3/hr)	19,682.58	-
	Cadmium and Thallium (mg / Nm^3 dry gas)	0.0518	N/A
	Mercury (mg / Nm^3 dry gas)	0.0094	N/A
	Lead (mg / Nm^3 dry gas)	0.0392	N/A
	Chromium (mg / Nm^3 dry gas)	0.2902	
	Total particulate matter (mg/Nm^3 dry gas)	0.21	0.01

KMK has reviewed the present licence limit of 12.5mg/m^3 for this emission point ref: A2-8 as per the technical amendment recently granted on 25th June 2012 and wishes to amend the waste licence application with the following proposed Schedule B and C replacement tables;

Schedule B

Parameter	Emission Limit Value
Total particulates	20 mg/m^3

Schedule C.1.2

Parameter	Monitoring frequency	Analysis Method/Technique
Total particulates Metals species (Al, As, Cd, Cr, Cu, FE, Hg, Ni, Pb and Zn)	Annually	Standard sampling and laboratory analysis methods

As a justification to this proposal, please note the air emissions stack assessments were conducted over three separate monitoring events, approximately 6 months and 2 months apart. Given the start-up and commissioning phase of the WEEE separation process at all times of monitoring, KMK contests that a maximum limit of 20mg/Nm^3 for total particulates be strongly considered as the new license limit.

This limit will accommodate any additional treated dust emissions that may arise during periods of prolonged and/or repeat WEEE separations within the building.

It is proposed to conduct annual stack air emissions monitoring (i.e. total particulates and metals constituents) for future operations at the site in combination with a continuous particulates monitoring probe installed on the emissions stack. This probe device, effectively operates as a bag breach detector whereby any potential breach or problem on the filter bag possibly resulting in abnormal emissions from the stack will be automatically detected by the probe and resulting in an audible warning alerting management and operatives to the situation. This probe was sourced and fitted directly to the stack by the providers of the WEEE treatment equipment and will provide a real time detection should any abnormal emissions occur on the stack. Hence there will be no incidents of significant or abnormal continual emissions from the stack as KMK will be aware of these events should they occur immediately and therefore will rectify any plant defect or issue as a matter of urgency.

Finally, for comparison purposes, the following information is brought to the attention of the Agency;

- *Draft BAT Guidance Note on Best Available Techniques for Ferrous Metal Foundaries. Draft September 2011.* This BAT on table 6.1 states an emission level for dust of 5-20mg/Nm^3.
- *Draft BAT Guidance Note on Best Available Techniques for the Initial Melting and Production of Iron & Steel Sector, December 2009.* Table 6.1

itemises various emission levels for emissions to air, such as Total Particulates 5-10mg/Nm^3, lead 0.5-2mg/Nm^3 , chromium 0.05mg/Nm^3 etc.

- *BAT Guidance Note on Best Available Techniques for Non-Ferrous Metals and Galvanising.* Table 6.1 itemises various emission levels for emissions to air, such as Total Particulates 10mg/Nm^3, lead 0.5-2mg/Nm^3 , chromium 0.05mg/Nm^3 etc.
- *Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Waste Transfer and Materials Recovery.* There are no actual air emission levels referred to in this document with the exception of fugitive dusts.
- A previous waste licence No: W0233-01 for a company called Techrec Ltd, Dublin had 2 emission points whereby the **total particulates** levels were **50mg/m^3**, they also had the limits; chromium 1mg/m^3 and nickel 5mg/m^3. This company operated as a WEEE processing waste management plant, which is very similar to KMK present operations and activity.

Hence, the proposed maximum limit of 20mg/Nm^3 for total particulates with annual monitoring is considered appropriate and reasonable for the site operations given the plant and equipment installed on-site, continuous monitoring system and scale of activities.

Additional new air emissions point

In order to prepare for possible future operations at the site, KMK wishes to have an option available to install an air emission point at a location on E building. This emissions point will service a WEEE processing operation inside E building whereby the extracted air will be treated by a bag filter unit and the treated air will be discharged to atmosphere. The significance of emission will be lower than emission point A2-8. The exact nature and details of emission are not available at present but will be confirmed to the Agency at a later date on receipt of the waste licence and may be conditional within the same licence.

2) Ambient Noise & Dust monitoring – locations

In relation to compliance noise monitoring on-site, I refer to the attached letter sent to the enforcement section of the Agency on the 17th July and the corresponding acceptance letter from the Agency dated 7th August on same (Appendix 2). Therefore KMK formally requests the new noise monitoring locations of the waste licence review to reflect this information.

In relation to ambient dust monitoring at the site, it is now also proposed to modify the monitoring locations to reflect the overall new site design. Therefore it is now proposed to monitor ambient dust at 4 locations on-site reflecting the four site boundaries in all directions north, south, west and east.

3) Waste water treatment system up-grade works proposal

KMK has appraised their existing waste water treatment system (WWTS) and explored various options in order to improve the facilities on-site and at the same time comply with present guidelines on waste water treatment.

Therefore, a full proposal was prepared in July 2012 and was submitted to the Environment & Water Services section of Offaly County Council for their consideration prior to inclusion with a Planning Application proposed over the next couple of weeks. This full proposal titled 'Drain Impact and Assimilative Report based on a Proposed Waste Water Treatment System (WWTS)' is attached as Appendix 3 and was deemed appropriate and to the satisfaction of the environment section. The up-grade works to the WWTS will involve the following key improvements;

- The existing Biocycle treatment tank will be modified for use as a primary holding chamber for domestic effluent storage and settlement.

- A new tank will be installed to be used as a buffering and reaction tank called a Sequencing Batch Reactor (SBR) including dosing for ortho-phosphate and total nitrogen removal. This secondary treatment process is designed to reduce BOD, COD, solids, phosphates and ammonia over an 8, 10 or 12 hour batch cycle and thus prepare the effluent for sand filter treatment.

- The sand filter is a biological treatment process designed to further reduce the parameter loadings and ensure the final discharged effluent is acceptable for surface water assimilation in the land drain. There will be a sampling chamber located immediately downstream of the sand filter. The impact from the proposed discharge at point F (on-site WWTS source) will be acceptable to the land drain on the basis of the parametric values given for the output of the sand filter (5/1/1) for BOD/phosphates/ammonia respectively, the low volumes to be discharged from the system and the relative quality of the land drain up-stream of the proposed discharge point to effectively assimilate the loadings from KMK.

The report in Appendix 3 also concludes the following remarks regarding the impact to the land drain and indirectly the Tullamore River;

- All domestic and associated effluent from the proposed up-graded WWTS is effectively treated by a primary, secondary and final biological process prior to entry to the land drain.
- There will be a sampling chamber installed on the final outfall from the sand filter unit for sampling of treated effluent quality prior to linking with the roof water discharge pipe from D-Hanger building. This sampling point will provide monitoring of the discharge prior to dilution with rainwater during wet weather. The true dilution effect of the effluent discharge can be determined by sampling of the discharge pipe at the land drain during wet weather for comparison purposes.
- There are no chemicals or other substances entering the WWTS and therefore precluded from entering the land drain.
- The receiving land drain flows through a myriad of other land drains prior to entry to the Tullamore River. This network of land drains will assist greatly in assimilation of the organic and other parameters prior to entry to the river.

The proposed increase of waste acceptance tonnage and future operations at the KMK site will not affect the population usage of the WWTS and will not impact on its treatment capability.

As part of future developments, should foul sewer infrastructure be made available by Offaly County Council for occupiers of Cappincur Industrial Estate, KMK will assess their waste water system needs with the possibility to apply for connection to the foul sewer network and thereby ceasing their discharge to land drain.

A revised A3 size map ref: Map F.1.1b Environmental Monitoring Locations is also attached for inclusion with the review application submission.

If you have any questions, please do not hesitate to contact me.

Yours Sincerely,

Niall Nally

Niall Nally
Senior Environmental Consultant
Cc Kurt M Kyck, KMK Metals Ltd, Cappincur Industrial Estate, Tullamore, Co Offaly.

Appendix 1

Stack Emissions Monitoring reports

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

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www.odourireland.com

AIR EMISSION TESTING OF STACK EMISSIONS FROM KMK METALS RECYCLING LTD, CAPPINCUR INDUSTRIAL ESTATE, DAINGEAN RD, TULLAMORE, CO. OFFALY.

PREFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF ENVIROCS MANAGEMENT LTD.

PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Mr. Niall Nally
LICENCE NUMBER:	WO113-03
LICENCE HOLDER:	KMK Metals Recycling Ltd
FACILITY NAME:	KMK Metals Recycling Ltd
DATE OF MONITORING VISIT:	02nd December 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean Rd, Tullamore, Co. Offaly
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	13th Jan 2012 (ver.1) & 04th Feb 2012 (ver.2)
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	201245(2)
REVIEWERS:	Mr. Niall Nally

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Document Amendment Record

Client: KMK Metals Recycling Ltd.

Title: Air emission testing of stack emissions from KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean rd, Tullamore, Co. Offaly.

Project Number: 201245(2)			**Document reference:** Air emission testing of stack emissions from KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean rd, Tullamore, Co. Offaly		
201245(1)	Document for review	B.A.S.	JWC	B.A.S	13/01/2012
201245(2)	Minor Amendments	B.A.S.	JWC	B.A.S	04/02/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

Signing sheet

Brian Sheridan Ph.D Eng

For and on behalf of Odour Monitoring Ireland

Executive summary

Odour Monitoring Ireland was commissioned by KMK Metals Recycling Ltd to perform an air emission test of their dust filtration system on the 02nd December 2011.

Monitoring was performed for Airflow rate, Total particulates, Moisture content and speciated metals (Particulate bound and gaseous based Metals). Particular reference was given to standard methodologies including EN13284-1, EN14385, EN13211 and EN14790.

A summary of the results are presented below.

Emission points identity	Parameter	Monitoring period and date	Periodic monitoring result	Expanded uncertainty (%)	Emission limit value	Status
Dust filtration plant – Exhaust stack	Volume flow (Nm^3/hr dry gas)	02nd Dec 2011 – 11.50AM to 12.10 PM	29,197	–	–	–
	Cd and Tl (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00052	<1.0	–	–
	Mercury (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.000015	<1.0	–	–
	Lead (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.00512	<1.0		
	Chromium (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.0392	<1.0		
	Remaining metals (mg/Nm^3, dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00182	<1.0	–	–
	Total particulate matter (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	1.68	<2.0	–	–

1. Introduction

Odour Monitoring Ireland was requested by KMK Metals Recycling Ltd to perform air emission testing of their dust filtration emission points in accordance with standard European methods. The parameters listed in *Table 1.1* were monitored using the appropriate instrumentation as illustrated in *Table 1.1*.

Table 1.1. Monitored parameters and techniques for dust filtration emission point in KMK Metals Recycling Ltd.

Sample location	Parameter	AG2 Compliant	SOP	Analytical method
Exhaust dust filtration plant	Volumetric Flow Rate and temperature	Yes	2000	Pilot tube method and temperature probe-EN13284-1:2002
Exhaust dust filtration plant	Speciated Metals	Yes	2027	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN14385
Exhaust dust filtration plant	Mercury	Yes	2028	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN13211
Exhaust dust filtration plant	Water vapour	Yes	2017	Impingement – Gravimetric weight gain - EN14790:2005
Exhaust dust filtration plant	Total Particulates	Yes	2002	TCR Tecora automatic Total particulate sampling train and associated probes-EN13284-1:2002

This report presents details of this monitoring programme. This environmental monitoring was carried out by Dr. Brian Sheridan and Dr. John Casey, Odour Monitoring Ireland on the 02nd December 2011. Methodology, Results, Discussion, Conclusions and calculations are presented herein.

1.1 Plant details

The following surface plant details were noted during the study.

Company:	KMK Metals Recycling Ltd
Site:	KMK Metals Recycling Ltd
Stack:	Exhaust dust filtration plant
Sampling date:	02nd December 2011
Time sampling started:	11.50 AM
Time sampling ended:	15.30 PM
Licence Number:	WO113-03
Fuel type:	N/A
Plume appearance:	Not visible
Process:	Dust filtration from WEEE recycling / separation

1.2 Special Monitoring Requirements

There were no special monitoring requirements for this campaign.

1.3 Summary of methods

The summaries of methods are contained in *Table 1.1*.

Substance	Standard Method	Limit of Detection	Calculation Spreadsheet
Metals	EN 14385	<0.005 mg/m^3	6018
Mercury	EN 13211	<0.001 mg/m^3	6020
Flow Rates	EN 13284-1	0.80 m/s	6011

2. Monitoring Results

This section describes the results obtained through the study period.

2.1 Volumetric flow rate, temperature and stack static pressure

Sampling for airflow rate was performed in accordance with EN13284-1:2002. *Table 2.1* summarises the flow measurements from the stack and includes the stack velocity, expressed in metres per second (m s^{-1}) and volumetric airflow rates expressed in m^3 hr^{-1} at both actual and standard reference conditions of 273.15 K, 101.3 kPa (i.e. normalised temperature and pressure) on a dry gas basis.

Table 2.1. Volumetric airflow rate results for exhaust emission point from dust filter located in KMK Metals Recycling Ltd.

Stack Reference	Results Dust plant exhaust emission point
Stack diameter (m)	0.80
Average temperature (K)	286
Average airflow rate (m/s)	17.68
Area (m^2)	0.50272
Atmospheric pressure (kPa)	99.55
Average static pressure (kPa)	0.021
Standard barometric pressure (kPa)	101.30
Actual volumetric airflow rate (Am^3/hr)	31,997
Normalised volumetric airflow (Nm^3/hr)[1]	30,038
Moisture content (%)	2.80
Oxygen %	20.90
Normalised volumetric airflow rate dry (Nm^3/hr)	**29,197**
Limit value	--
Maximum pressure recorded (Pa)	255
Minimum pressure recorded (Pa)	218
Ratio b/n max and min pressure	1.169
Angle of swirl (deg) (must be less than <15)	2
Did measurement location comply with standard.	No (one port, doubled up on sampling across one plane)
Leak check pass on pitot	Yes
Dynamic pressure	>5Pa

Notes: [1] denotes normalised to 273.15 Kelvin and 101.3 kPa, with no correction for moisture content.

2.2 Results for Total particulates and metals species concentration

Flue gas analysis was performed on the exhaust emission points located on the dust filtration equipment. Total particulates and metals sampling and analysis was performed using a TCR Automatic Iso stack plus sampling train with heated probe and impinger train. The results of the testing are presented in *Table 2.2*.

Stack based concentrations have been presented at standard reference conditions of 273.15 K and 101.3 kPa, dry gas.

For Total particulates and metals sampling monitoring, the average DI% for monitoring of:

Emission point dust filtration plant was -0.21%,

This value were inside the lower and upper limit value of –ive 5% to +ive 15% in order to comply with reference standard EN13284-1:2002.

Sampling for Total particulates and Metals was performed on one sample plane. Sample points were doubled up on this single plane.

Table 2.2. Stack concentrations and emission value results from emission point dust filtration plant.

Emission Point Reference: Dust filtration plant										
Substance to be Monitored	**Emission Limit Value (see Table 7 TALuft) (kg/hr)**	**Periodic Monitoring Result (mg/Nm³, dry gas)**	**Units Reference Conditions 273 K, 101.3 kPa, dry gas**	**Uncertainty Of Measurement +/-**	**Stack Flow Rate (Nm³/hr dry gas)**	**Limit (Nm³/hr dry gas)**	**Date of Sampling**	**Sampling Start/End Times**	**Method Reference**	**Operating Status**
Particulate matter		**1.68**	mg/Nm³	<2%	29,197	-	02/12/11	11.50AM to 15.30PM	EN13284-1	---
Cadmium	0.0025	<0.00026	mg/Nm³	<1%						
Thallium	0.0025	<0.00026	mg/Nm³	<1%						
Total	--	--	mg/Nm³							
Mercury	0.0025	<0.000015	mg/Nm³	<1%					EN 13211 EN 14385	
Antimony	--	<0.00026	mg/Nm³	<1%						
Arsenic	0.0025	<0.00026	mg/Nm³	<1%						
Lead	0.025	**0.00512**	mg/Nm³	<1%						
Chromium	--	**0.0392**	mg/Nm³	<1%						
Cobalt	--	<0.00026	mg/Nm³	<1%						
Copper	--	<0.00026	mg/Nm³	<1%						
Manganese	--	<0.00026	mg/Nm³	<1%						
Nickel	0.025	<0.00026	mg/Nm³	<1%						
Vanadium	--	<0.00026	mg/Nm³	<1%						
Total	--	--	mg/Nm³	<1%						

Additional Information
Metals were tested by ICP-MS - Analysis was carried out in accredited laboratories.
The pre and post leak check were within the requirements of BS EN 13284-1 (Start – 100cc/min: End – 110 cc/min at 62 KPa).
Isokinetic conditions were -0.21% for the test
Number of ports = 1
Straight length before sample point = <5 –not in compliance
Straight length after sample point = >2 – in compliance
Sample blank = < 0.80% which is <10% ELV – Compliant
Pitot leak check = OK

Angle of Flow with regard to duct axis: <15 degrees
Differential pressure at pitot tube: >5Pa
Ratio of maximum to minimum velocity: <3:1
There was no negative flow in the stack
Moisture content of the gas: 2.80%
The temperature of stack gas was: 13 degrees C
Values in bold are the only detectable metals/dust in the air stream.

4. *Appendix I* - Sampling and analysis details

A.4.1 Location of Sampling
KMK Metals Recycling Ltd.

A.4.2 Date & Time of Sampling
02nd December 2011

A.4.3 Personnel Present During Sampling
Dr. John Casey, and Dr. Brian Sheridan Odour Monitoring Ireland, Trim, Co. Meath. MCERT Level 1 MM06743 and MM0674.

A.4.4 Instrumentation
S type pitot (OMI08) and PT100 thermocouple (OMI02);
Testo 400 handheld (OMI11) and appropriate probes.
Automatic ISOSTACK Plus TCR Tecora particulates sampling train (OMI 13).
Impinger train (OMI 14) and heated probe (OMI 09).

A.4.5 Standards
EN13284-1:2002
MID 13284-1, MCERTS Documentation, www.s-t-a.org.
EN14385
EN14790:2005
EN13211

6. *Appendix II* - Quality assurance checklist

Velocity measurements:

Were water droplets present?	No
Direction of gas flow within ± 15^0 of stack axis	Yes
Absence of swirling flow	Yes
Dynamic pressure > 5 Pa at all sampling points	Yes
Ratio of the highest to lowest dynamic pressure < 9:1.	Yes

Sampling:

Sampling plane was correctly positioned	Yes
Area of sampling apparatus was < 10% of stack area	Yes
Sampling was from centres of equal areas	Yes
Sampling at each point not less than 3 minutes	Yes
Nozzle was facing directly upstream to within ±10^0	Yes
Leak check performed before and after each run and passed	Yes

Sampling handling:

Minimum weight of sample collected > 0.30% of filter weights	Yes
Samples achieved stable weight	Yes
Particulate samples sent for analysis	Yes

QA procedure:

Isokinetic data sheet completed and signed off	Yes
Report saved electronically to server	Yes
Raw data and hard copy of report filed together	Yes

GLENSIDE
ENVIRONMENTAL SERVICES
Environmental and Engineering Consultants

DOCUMENT AUTHORISATION	
Glenside Report Reference	012-050
Client:	KMK Metals
EPA IPPC Licence REF:	W0113-03
Site Address:	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly
Document Title:	Stack Emissions Monitoring Report
Date of Survey:	24th May 2012
Document prepared by:	Glenside Environmental, Unit 7, Westpoint Buildings, Ballincollig, Cork

Preparation and technical review (including design review for design work) carried out by: Patrick O' Brien MCERTS Level II. Sampling carried out by Patrick Power & Ewa Piatek

Position/Discipline	Name	Signed	Date
Risk Assessor	Patrick Power		14/06/2012

Issue for Review to Client: Mr. Niall Nally, Enviroco on 15th June 2012.

This document has been produced and checked in accordance with the requirements of the Glenside Environmental Quality Management System and is duly authorised for issue.

Position/Discipline	Name	Signed	Date
Quality Manager	Patrick O' Brien	P. O' Brien	14/06/2012

Report Summary:

Job Quotation No:	**n/a**
Operator Licence No:	**W0113-03**
Operator Name:	**KMK Metals Recycling Ltd.**
Installation:	**Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly**
Contact Name:	**Mr. Niall Nally**
Monitoring dates	**24/05/2012**
Phone No:	**087/1221422**
Monitoring Organisation:	**Glenside Environmental Unit 7, Westpoint Buildings Link Road Ballincollig Cork**
Phone No:	**(021) 4810016**
Email:	**info@glenenv.ie**
Report Date:	**15/06/2012**
Report written by:	**Ewa Piatek**
MCERTS reg No:	**MM07 799**
Competency:	**Level 1**
Function:	**Technician**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	
Report approved by:	**Patrick O'Brien**
MCERTS reg No:	**MM08 992**
Competency:	**Level 2**
Function:	**Team Leader**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	

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1. Introduction

Glenside Environmental was commissioned by KMK Metals Recycling Ltd to perform air emission monitoring at the facility in Cappincur Industrial Estate, Dalngean Road, Tullamore, Co. Offaly. The monitoring was carried out as required by company representative Mr. Niall Nally from Enviroco Environmental Consultants. This report presents details of this monitoring programme.

2. Objectives

2.1. Substances to be monitored at each emission point

Sample Locations	Parameter
Dust Filtration Plant – Exhaust Stack	Particulates Run 1
	Particulates Run 2
	Particulates Run 3
	Metals (Total of Cd+Tl)
	Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)
	Mercury

2.2. Special Requirements

There were no special requirements for this monitoring campaign.

3. Monitoring Results

Tables 3.1 presents the results of the air emission monitoring sampling program carried out at the emission stacks listed below.

3.1. Monitoring Results at Dust Filtration Plant Exhaust Stack

Substances	Emission Limit Value	LOD	Results mg/Nm^3	Uncertainty %	Start –End
Particulates Run 1	n/a	0.17	0.98	0.03	10:06-10:36
Particulates Run 2	n/a	0.31	1.82	0.06	10:55-11:25
Particulates Run 3	n/a	0.32	0.41	0.01	11:34-12:04
Particulates	n/a	0.32	0.75	0.02	09:35-09:41
Metals (Total of Cd+Tl)	n/a	0.0018	<0.0018	n/a	12:23-12:53
Chromium	n/a	0.0030	0.0048	n/a	12:23-12:53
Lead	n/a	0.0009	0.0059	n/a	12:23-12:53
Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)	n/a	0.0175	0.0277	n/a	12:23-12:53
Mercury	n/a	0.0008	<0.0008	n/a	13:09-13-39

3.2. Reference Conditions

Emission Point	Reference Temperature	Reference Pressure	Reference Moisture	Reference Oxygen
Dust Filtration Plant – Exhaust Stack	273 K	101.3 kPa	No correction	No correction

3.3. Methods and Accreditation Status

Emission Point	Substances	Method	SOP Number	Accreditation Status	Analysis Laboratories	Accreditation Status
Dust Filtration Plant – Exhaust Stack	Particulates	BS EN 13284-2002	GEN3-001	n/a	SAL Laboratories Manchester	UKAS
Dust Filtration Plant – Exhaust Stack	Metals	BS EN 14385:2004	GEN3-014	n/a	SAL Laboratories Manchester	UKAS

4. Operating Information

Process Status Load /Feedstock	Process Details	Fuel /Feedstock	Abatement System	Status of Abatement System
Normal Operation	Continuous	1/3 of Load	Dust Filter	In Operation
Normal Operation	Continuous	Full Load	Dust Filter	In Operation

5. Monitoring Deviation

Requirements	Comments
Substances were monitored as per monitoring objectives	Yes
Substances were monitored in accordance with the monitoring stated in AG2 (Air Emissions Monitoring Guidance Note#2)	Yes
All monitoring substances were carried out as per Standard/Methods requirements.	Yes

Sampling Location Summary

Requirements	Comments
Stack Shape	Circular
Dimensions	0.8
Recommended 5 hydraulic diameters straight length before sampling plane	Yes
Recommended 2 hydraulic diameters straight length after sampling plane	No
Sufficient ports number Small stacks – 1 port <1.5m – 2 ports >1.5m – 4 ports	1 port
Appropriate port size	Yes
Suitable working platform	Yes
Safe and clean working environment	Yes

6. Annex 1

6.1. Personnel

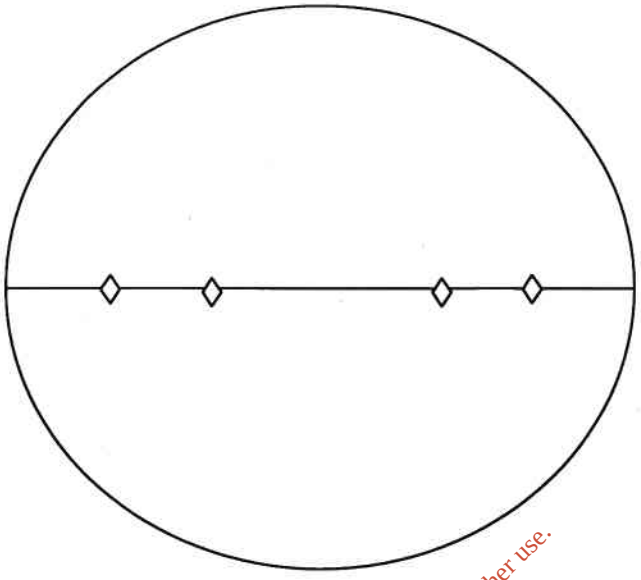
Scientist/Technician Name	Position	Qualification	Technical Endorsements	MCERTS Number
Ewa Piatek	Technician	Level 1	TE1, TE2, TE3, TE4	MM07 799
Patrick Power	Technician	Trainee	-	MM12 1183

6.2. Equipment used

Equipment
TCR Tecora
Probe
Impinger Set

7. Annex 2

7.1. Diagrams of the stack indicating Probe Positions



7.2. Sampling measurements

Determinant	Result	Units
Number of Ports Sampled	2	-
Number of Points Sampled	16	-
Average Velocity v'a	9.04	m/s
Average Pressure	100.3	kPa
Average Temperature	25.73	°C
Stack Diameter	0.8	m
Actual Moist Flow Rate	16362.02	m^3/Hr
Moist Flow Rate at STP	14805.33	m^3/Hr
Dry Flow Rate at STP	14760.91	m^3/Hr
T Reference	273	Deg K
P Reference	101.3	kPa
Isokinetic condition	Run 1 -1.73 Run 2 1.44 Run 3 2.11 Metals -1.59 Mercury -1.01	%
Oxygen	n/a	%
Water vapour	0.3	%

8. Annex 3

8.1. Results and uncertainty calculations, certificates of analysis

Scientific Analysis Laboratories Ltd
Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2404

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Report Number: 280936-1

Date of Report: 08-Jun-2012

Customer: Glenside Environmental
Unit 7
Westpoint Buildings
Ballincollig.
CO. CORK, VAT REG 9683448N

Customer Contact: Mr Patrick Power

Customer Job Reference: KMK METALS
Customer Purchase Order: 012-050 KMK
Date Job Received at SAL: 29-May-2012
Date Analysis Started: 30-May-2012
Date Analysis Completed: 08-Jun-2012

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

UKAS TESTING
1549

Report checked and authorised by :
Jennifer Wraith
Customer Services Manager

Issued by :
Jennifer Wraith
Customer Services Manager

SAL Reference: 280936
Customer Reference: KMK METALS

Probe Wash (27.5%HNO3) Analysed as Probe Wash (27.5%HNO3)

BS EN 14385 Metals Suite

					SAL Reference	280936 013	280936 014
					Customer Sample Reference	050-13	050-14
					Test Sample	AR	AR
Determinand	Method	LOD	Units	Symbol			
Antimony	ICPMS (HF BS EN 14385)	1	µg	U		<1	<1
Arsenic	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5
Beryllium	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5
Cadmium	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5
Chromium	ICPMS (HF BS EN 14385)	2	µg	U		<2	<2
Cobalt	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5
Copper	ICPMS (HF BS EN 14385)	0.5	µg	U		(13) <0.5	(13) <0.5
Lead	ICPMS (HF BS EN 14385)	0.5	µg	U		(13) <0.5	(13) 0.6
Manganese	ICPMS (HF BS EN 14385)	2	µg	U		<2	<2
Nickel	ICPMS (HF BS EN 14385)	2	µg	U		<2	<2
Thallium	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5
Vanadium	ICPMS (HF BS EN 14385)	0.5	µg	U		<0.5	<0.5

SAL Reference: 280936
Customer Reference: KMK METALS

Impinger (5%HNO3/5%H2O2) Analysed as Impinger (3.3%HNO3/1.5%H2O2)

BS EN 14385 Metals Suite

					SAL Reference	280936 009	280936 010	280936 011	280936 012
					Customer Sample Reference	050-09	050-10	050-11	050-12
					Test Sample	AR	AR	AR	AR
Determinand	Method	LOD	Units	Symbol					
Antimony	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Arsenic	ICPMS (BS EN 14385)	0.2	µg/l	U		<0.2	<0.2	<0.2	<0.2
Beryllium	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Cadmium	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Chromium	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	0.8	0.8	<0.5
Cobalt	ICPMS (BS EN 14385)	0.2	µg/l	U		<0.2	<0.2	1.2	<0.2
Copper	ICPMS (BS EN 14385)	1	µg/l	U		<1	<1	3	<1
Lead	ICPMS (BS EN 14385)	0.3	µg/l	U		3.0	4.1	9.2	<0.3
Manganese	ICPMS (BS EN 14385)	2	µg/l	U		3	<2	3	<2
Nickel	ICPMS (BS EN 14385)	2	µg/l	U		<2	3	<2	<2
Thallium	ICPMS (BS EN 14385)	0.3	µg/l	U		<0.3	<0.3	<0.3	<0.3
Vanadium	ICPMS (BS EN 14385)	0.3	µg/l	U		<0.3	<0.3	<0.3	<0.3
Volume	ICPMS (BS EN 14385)	1	ml	U		-	-	-	-

SAL Reference: 280936
Customer Reference: KMK METALS

Filter Analysed as Filter

BS EN 14385 Metals Suite

					SAL Reference	280936 015	280936 016
					Customer Sample Reference	050-15	050-16
					Test Sample	AR	AR
Determinand	Method	LOD	Units	Symbol			
Antimony	ICPMS (HF BS EN 14385)	0.05	µg	U		<0.05	<0.05
Arsenic	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) <0.05	(13) <0.05
Beryllium	ICPMS (HF BS EN 14385)	0.05	µg	U		<0.05	<0.05
Cadmium	ICPMS (HF BS EN 14385)	0.05	µg	U		<0.05	<0.05
Chromium	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) 1.3	(13) 0.40
Cobalt	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) 0.06	(13) <0.05
Copper	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) 0.17	(13) <0.05
Lead	ICPMS (HF BS EN 14385)	0.05	µg	U		2.0	0.22
Manganese	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) 0.81	(13) 0.10
Nickel	ICPMS (HF BS EN 14385)	0.05	µg	U		(13) 1.1	(13) 0.49
Thallium	ICPMS (HF BS EN 14385)	0.05	µg	U		<0.05	<0.05
Vanadium	ICPMS (HF BS EN 14385)	0.05	µg	U		<0.05	<0.05

SAL Reference: 280936
Customer Reference: KMK METALS

Probe Wash (27.5%HNO3) — Analysed as Probe Wash (27.5%HNO3)
Miscellaneous

					SAL Reference	280936 020
					Customer Sample Reference	050-20
					Test Sample	AR
Determinand	Method	LOD	Units	Symbol		
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U	(13)	<0.01

SAL Reference: 280936
Customer Reference: KMK METALS

Impinger (2%KMnO4/10%H2SO4) — Analysed as Impinger (2%KMnO4/10%H2SO4)
Miscellaneous

					SAL Reference	280936 017	280936 018	280936 019
					Customer Sample Reference	050-17	050-18	050-19
					Test Sample	AR	AR	AR
Determinand	Method	LOD	Units	Symbol				
Mercury	CVAFS (BS EN 13211)	5	µg/l	U		<5	<5	<5

SAL Reference: 280936
Customer Reference: KMK METALS

Filter — Analysed as Filter
Miscellaneous

					SAL Reference	280936 021
					Customer Sample Reference	050-21
					Test Sample	AR
Determinand	Method	LOD	Units	Symbol		
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U	(13)	<0.01

SAL Reference: 280936
Customer Reference: KMK METALS

Wash(DI) — Analysed as Wash(DI)
Miscellaneous

					SAL Reference	280936 005	280936 006	280936 007	280936 008
					Customer Sample Reference	050-05	050-06	050-07	050-08
					Test Sample	AR	AR	AR	AR
Determinand	Method	LOD	Units	Symbol					
Particulates (Total)	Grav	0.1	mg	U		0.5	0.8	<0.1	0.3

SAL Reference: 280936
Customer Reference: KMK METALS

Filter GFA 47mm — Analysed as Filter GFA 47mm
Miscellaneous

					SAL Reference	280936 001	280936 002	280936 003	280936 004
					Customer Sample Reference	050-01	050-02	050-03	050-04
					Test Sample	AR	AR	AR	AR
Determinand	Method	LOD	Units	Symbol					
Particulates (Total)	Grav (5 Dec)	0.05	mg	U		0.37	0.09	0.09	<0.05

Index to symbols used in 280936-1

Value	Description
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited

Company Name:	KMK Metals	Technicians:	
Site Name:	KMK Metals	MCERTS No:	
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1,
Date:	24/05/2012	Doc No	

Stack Information:
Circular Stack

Stak Diameter:	0.8	m
Average Flow:	9.042	m/s
Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%

Reeference Conditions:

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Mass Emissions Calculations:

Volumetric Flow Rate	4.55	m3/s
Volumetric Flow Rate	16362.02	m3/hr
Volumertic Flow Rate corrected to STP	14805.33	m3/hr
Volumertic Flow Rate corrected to STP and O2 ref	14805.33	m3/hr
Volumertic Flow Rate corrected to STP	14760.91	m3/hr

	Run 1	Run 2	Run 3	Run 4	Run 5	Average:
Flow	12.14	6.51	6.19	10.19	10.18	9.042
Temp.	22.33	24.78	25.96	27.78	27.78	25.726
Pressure	100.3	100.3	100.3	100.3	100.3	100.3

Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 1
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.37	280936001
Run Nozzle Wash:	0.5	280036006
	0.15	
Blank	0.35	
Run	0.87	

Air Volume corrected to STP:	0.89122	m3
Moisture:	0	%
Air Volume corrected to Moisture:	0.89122	m3

Stack Conditions

Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33	m3/hr

Reference Conditions

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.17	0.17	0.00	n/a
Blank	0.39	0.39	0.01	0.01
Run	0.98	0.98	0.01	0.03

Note: Blank result should be < 10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0 % by volume
Measured concentration	1.0	mg.m-3 (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.89122	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.87	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff		u (in units of fs)		
	ρm	0.009		0.009		
	Hm	0.009		0.009	$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$	
	Tm	0.003		0.006		
	ufs			0.014		1.56
Corrected volume	V	0.80	uV	0.013 m3	$V = V_m f_s$	1.57
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff		u		
	O2,m	0.05		0.005	$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$	
Factor for O2 Correction	ufc	1.00		0.005		0.48

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard cond	V	0.80	m3	1.21	0.02 mg.m-3	#DIV/0!	%
Mass	m	0.87	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.98	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.02 mg.m-3		

Expanded uncertainty as percentage of measured value	3.28	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.03	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.4	mg.m-3	(at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.89122	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff		u (in units of fs)		
	ρm	0.009		0.009		
	Hm	0.009		0.009		
	Tm	0.003		0.006		
	ufs			0.014		
Corrected volume	V	0.80	uV	0.013	m3	1.57
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff		u		
	O2,m	0.05		0.005		
Factor for O2 Correction	ufc	1.00		0.005		0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V_s = V_m f_s \qquad 1.56$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard conc	V	0.80	m3	0.49	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.39	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.28	% measured of value
Expanded uncertainty in units of measurement	0.01	mg.m-3
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV

expressed with a level of confidence of 95%
(Using a coverage factor k=2)

Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 2
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.09	280936002
Run Nozzle Wash:	0.8	280036007
	0.15	
Blank	0.35	
Run	0.89	

Air Volume corrected to STP:	0.48901	m3
Moisture:	0	%
Air Volume corrected to Moisture:	0.48901	m3

Stack Conditions

Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33	m3/hr

Reference Conditions

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.31	0.31	0.00	n/a
Blank	0.72	0.72	0.01	0.02
Run	1.82	1.82	0.03	0.06

Note: Blank result should be < 10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0 % by volume
Measured concentration	1.8	mg.m-3 (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertainty	Uncertainty	Requirement of std
Sampled Volume	Vm	0.48901	uVm	0.001	m3	0.20		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.89	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%
Intermediate calculations								
Factor for std conds	fs	0.90						
uncertainty components	symbol	sensitivity coeff		u (in units of fs)				
	ρm	0.009		0.009				
	Hm	0.009		0.009				
	Tm	0.003		0.006				
	ufs			0.014				1.56
Corrected volume	V	0.44	uV	0.007	m3			1.58
Factor for O2 correction	fc	1.00						
uncertainty components	symbol	sensitivity coeff		u				
	O2,m	0.05		0.005				
Factor for O2 Correction	ufc	1.00		0.005				0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard con	V	0.44	m3	4.13	0.03 mg.m-3	#DIV/0! %
Mass	m	0.89	mg	2.04	0.00 mg.m-3	#DIV/0! %
Factor for O2 Correction	fc	1.00		1.82	0.01 mg.m-3	#DIV/0! %
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0! %
Uncollected mass	UCM	0.00	mg	2.04	0.00 mg.m-3	#DIV/0! %
Combined measurement uncertainty					0.03 mg.m-3	

Expanded uncertainty as percentage of measured value	3.30	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.06	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.7	mg.m-3	(at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertainty	Uncertainty	Requirement of std
Sampled Volume	Vm	0.48901	uVm	0.001	m3	0.20		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations							
Factor for std conds	fs	0.90					
uncertainty components	symbol	sensitivity coeff		u (in units of fs)			
	ρm	0.009		0.009			
	Hm	0.009		0.009			
	Tm	0.003		0.006			
	ufs			0.014			
Corrected volume	V	0.44	uV	0.007	m3		1.58
Factor for O2 correction	fc	1.00					
uncertainty components	symbol	sensitivity coeff		u			
	O2,m	0.05		0.005			
Factor for O2 Correction	ufc	1.00		0.005			0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s \quad 1.56$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.44	m3	1.62	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.72	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.30	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 3
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.09	280936002
Run Nozzle Wash:	0.1	280036007
	0.15	
Blank	0.35	
Run	0.19	

Air Volume corrected to STP:	0.46601 m3
Moisture:	0 %
Air Volume corrected to Moisture:	0.46601 m3

Stack Conditions

Average Temperature:	298.726 K
Average Pressure:	100.3 kPa
Average Moisture:	0.3 %
Average Oxygen:	0 %
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33 m3/hr

Reference Conditions

Reference Temperature:	273.15 K
Reference Pressure:	101.325 kPa
Reference Oxygen:	0 %
Reference Moisture:	0 %

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.32	0.32	0.00	n/a
Blank	0.75	0.75	0.01	0.02
Run	0.41	0.41	0.01	0.01

Note: Blank result should be <10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0 % by volume
Measured concentration	0.4	mg.m-3 (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.46601	uVm	0.001	m3	0.21		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.19	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff		u (in units of fs)		
	ρm	0.009		0.009		
	Hm	0.009		0.009		
	Tm	0.003		0.006		
	ufs			0.014		1.56
Corrected volume	V	0.42	uV	0.007	m3	1.58
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff		u		
	O2,m	0.05		0.005		
Factor for O2 Correction	ufc	1.00		0.005		0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard con	V	0.42	m3	0.97	0.01 mg.m-3	#DIV/0! %
Mass	m	0.19	mg	2.15	0.00 mg.m-3	#DIV/0! %
Factor for O2 Correction	fc	1.00		0.41	0.00 mg.m-3	#DIV/0! %
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0! %
Uncollected mass	UCM	0.00	mg	2.15	0.00 mg.m-3	#DIV/0! %
Combined measurement uncertainty					0.01 mg.m-3	

Expanded uncertainty as percentage of measured value	3.31	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.01	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	%ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.8	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.46601	uVm	0.001	m3	0.21		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations							
Factor for std conds	fs	0.90					
uncertainty components	symbol	sensitivity coeff	u (in units of fs)				
	ρm	0.009	0.009			$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$	
	Hm	0.009	0.009				
	Tm	0.003	0.006				
	ufs		0.014			$V = V_m f_s$	1.56
Corrected volume	V	0.42	uV	0.007	m3		1.58
Factor for O2 correction	fc	1.00				$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$	
uncertainty components	symbol	sensitivity coeff	u				
	O2,m	0.05	0.005				
Factor for O2 Correction	ufc	1.00	0.005				0.48

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.42	m3	1.79	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.75	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.31	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

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Cork
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Stack Emissions Monitoring Report

for

KMK Metals Recycling Ltd.

Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly

EPA Waste Licence REF: W0113-03

Report No: 012-050-02 Rev.1

Monitoring Date: 20th July 2012

Report Summary:	
Job Quotation No:	**QGE12-003**
Operator Licence No:	**W0113-03**
Operator Name:	**KMK Metals Recycling Ltd.**
Installation:	**Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly**
Contact Name:	**Mr. Niall Nally**
Phone No:	**n/a**
Monitoring dates:	**20/07/2012**
Monitoring Organisation:	**Glenside Environmental Unit 7, Westpoint Buildings, Link Road Ballincollig**
Phone No:	**(021) 4810016**
Email:	**info@glenenv.ie**
Report Date:	**31/08/2012**
Report written by:	**Ewa Piatek**
MCERTS reg No:	**MM07 799**
Competency:	**Level 1**
Function:	**Technician**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	Ewa Piatek
Report approved by:	**Patrick O'Brien**
MCERTS reg No:	**MM08 992**
Competency:	**Level 2**
Function:	**Team Leader**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	

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1. Introduction

Glenside Environmental was commissioned by KMK Metals Recycling Ltd to perform air emission monitoring at the facility in Cappincur Industrial Estate, Dalngean Road, Tullamore, Co. Offaly. The monitoring was carried out as specified in Technical Amendment A of the Waste Licence W0113-03 for the facility. Condition C.1.2 specifies monitoring of particulates and metals for 3 months following the date of the Technical Ammendment and quarterly thereafter. This report presents details of this monitoring programme.

2. Objectives

2.1. Substances to be monitored at each emission point

Sample Locations	Parameter
A2-8	Particulates
	Metals (Total of Cd+Tl)
	Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)
	Chromium
	Lead
	Mercury
	Aluminium
	Arsenic
	Cadmium
	Copper
	Iron
	Nickel

2.2. Special Requirements

There were no special requirements for this monitoring campaign.

3. Materials and Methods

This section provides brief details of the methodologies employed to perform the air emission monitoring.

3.1. Particulates

A sample stream of gas is extracted from the main gas stream at representative sampling points for 30 minutes, with an isokinetically controlled flow rate and measured volume. The dust entrained in the gas sample is separated by a pre-weighed filter, which is then dried and reweighed. Deposits upstream of the filter in the sampling equipment are also recovered and weighed. The increase of mass of the filter and the deposited mass upstream of the filter are attributed to dust collected from the sampled gas, which allows the dust concentration to be calculated.

3.2. Metals

A known volume of flue gas is extracted representatively from a duct or a chimney during a certain period of time at a controlled flow rate following EN13284-1:2004 (Particulates Standard). The dust in the sampled gas volume is collected on a filter. Thereafter, the gas stream is passed through a series of absorbers containing absorption solutions and the filter passing fractions of the specific elements are collected within these solutions.

3.3. Volumetric Flow Rate

The volumetric airflow rate was determined from stack velocity measurements calculated in accordance with BS EN 13284. Airflow rate and temperature profiles were performed at pre-calculated intervals across the stack in order to determine the average velocity profile across the stack diameters. Results are presented in table 4.3.

4. Monitoring Results

Tables 4.1 present the results of the air emission monitoring sampling program carried out at the emission stacks listed below.

4.1. Monitoring Results

Results reported are corrected to reference conditions as per IPPC Licence requirements.

Emission Point	Substances	ELV mg/Nm^3	CEMS Results	LOD mg/Nm^3	Results mg/Nm^3	Results kg/hr	Uncertainty mg/m^3	Date of Monitoring	Start –End Time of Monitoring
A2-8	Particulates	12.5	n/a	0.16	0.21	0.004	0.01	20/07/2012	09:27-10:08
A2-8	Metals (Total of Cd+Tl)	n/a	n/a	0.0016	0.0518	0.0010	n/a	20/07/2012	10:16-10:57
A2-8	Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)	n/a	n/a	0.0152	0.9140	0.0180	n/a	20/07/2012	10:16-10:57
A2-8	Chromium	n/a	n/a	0.0026	0.2902	0.0057	n/a	20/07/2012	10:16-10:57
A2-8	Lead	n/a	n/a	0.0008	0.0392	0.0008	n/a	20/07/2012	10:16-10:57
A2-8	Mercury	n/a	n/a	0.0006	0.0094	0.0002	n/a	20/07/2012	10:59-11:32
A2-8	Aluminium	n/a	n/a	0.0021	0.0124	0.0002	n/a	20/07/2012	10:16-10:57
A2-8	Arsenic	n/a	n/a	0.0007	0.0210	0.0004	n/a	20/07/2012	10:16-10:57
A2-8	Cadmium	n/a	n/a	0.0008	0.0233	0.0004	n/a	20/07/2012	10:16-10:57
A2-8	Copper	n/a	n/a	0.0010	0.0165	0.0003	n/a	20/07/2012	10:16-10:57
A2-8	Iron	n/a	n/a	0.0027	0.0279	0.0005	n/a	20/07/2012	10:16-10:57
A2-8	Nickel	n/a	n/a	0.0032	0.1469	0.0029	n/a	20/07/2012	10:16-10:57

Emission Point	Substances	ELV mg/Nm^3	CEMS Results	LOD mg/Nm^3	Results mg/Nm^3	Results kg/hr	Uncertainty mg/m^3	Date of Monitoring	Start –End Time of Monitoring
Blank	Particulates	n/a	n/a	0.16	<0.16	n/a	0.01	20/07/2012	09:15-09:20
Blank	Metals (Total of Cd+Tl)	n/a	n/a	0.0016	<0.0016	n/a	n/a	20/07/2012	11:44-11:49
Blank	Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)	n/a	n/a	0.0152	<0.0152	n/a	n/a	20/07/2012	11:44-11:49
Blank	Chromium	n/a	n/a	0.0026	0.0029	n/a	n/a	20/07/2012	11:44-11:49
Blank	Lead	n/a	n/a	0.0008	0.0010	n/a	n/a	20/07/2012	11:44-11:49
Blank	Mercury	n/a	n/a	0.0006	<0.0006	n/a	n/a	20/07/2012	11:50-11:55
Blank	Aluminium	n/a	n/a	0.0021	0.0238	n/a	n/a	20/07/2012	11:44-11:49
Blank	Arsenic	n/a	n/a	0.0007	<0.0007	n/a	n/a	20/07/2012	11:44-11:49
Blank	Cadmium	n/a	n/a	0.0008	<0.0008	n/a	n/a	20/07/2012	11:44-11:49
Blank	Copper	n/a	n/a	0.0010	<0.0008	n/a	n/a	20/07/2012	11:44-11:49
Blank	Iron	n/a	n/a	0.0027	0.0995	n/a	n/a	20/07/2012	11:44-11:49
Blank	Nickel	n/a	n/a	0.0032	0.0032	n/a	n/a	20/07/2012	11:44-11:49

4.2. Reference Conditions

Emission Point	Reference Temperature	Reference Pressure	Reference Moisture	Reference Oxygen
A2-8	273 K	101.3 kPa	No correction	No correction

4.3. Volumetric Flow Rate

Emission Point	Actual Moist Flow Rate	Moist Flow Rate at STP	Dry Flow Rate at STP	Emission Limit Value	Units
A2-8	21419.13	19682.58	n/a	40 000	m^3/Hr

4.4. Methods and Accreditation Status

Emission Point	Substances	Method	SOP Number	Accreditation Status	Analysis Laboratories	Accreditation Status
A2-8	Flow, Temperature and Pressure	BS EN 13284-2002	GEN3-001	n/a	n/a	n/a
A2-8	Particulates	BS EN 13284-2002	GEN3-001	n/a	SAL Laboratories Manchester	UKAS
A2-8	Metals	BS EN 14385:2004	GEN3-014	n/a	SAL Laboratories Manchester	n/a

5. Operating Information

Emission Point	Process Status Load /Feedstock	Process Details	Fuel /Feedstock	Abatement System	Status of Abatement System
A2-8	Normal Operation	Full Load	n/a	Filter	In Operation

6. Monitoring Deviation

Requirements	Comments
Substances were monitored as per monitoring objectives	Yes
Substances were monitored in accordance with the monitoring stated in AG2 (Air Emissions Monitoring Guidance Note#2)	Yes
All monitoring substances were carried out as per Standard/Methods requirements.	Yes

Sampling Location Summary

Requirements	Comments
Stack Shape	Circular
Dimensions	0.8
Recommended 5 hydraulic diameters straight length before sampling plane	Yes
Recommended 2 hydraulic diameters straight length after sampling plane	No
Sufficient ports number Small stacks – 1 port <1.5m – 2 ports >1.5m – 4 ports	1 port
Appropriate port size	Yes
Suitable working platform	Yes
Safe and clean working environment	Yes

7. Annex 1

7.1. Personnel

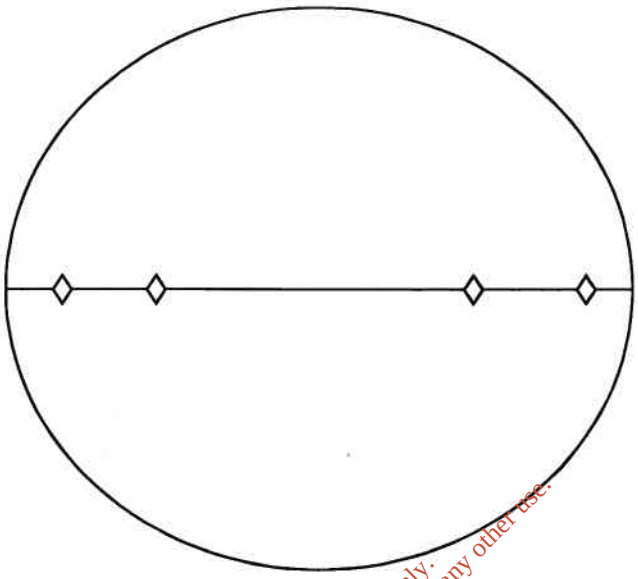
Scientist/Technician Name	Position	Qualification	Technical Endorsements	MCERTS Number
Ewa Piatek	Technician	Level 1	TE1, TE2, TE3, TE4	MM07 799
Patrick Power	Technician	Trainee	-	MM12 1183

7.2. Equipment used

Equipment	GEN Equipment No
TCR	EQ050
Impinger System	EQ051
Probe	EQ052
Pitot tube	EQ053
Nozzles	EQ054
Filters	Laboratory supplied

8. Annex 2

8.1. Diagrams of the stack



8.2. Sampling measurements

Determinant	Result	Units
Number of Ports Sampled	1	-
Number of Points Sampled	4	-
Average Velocity v'a	11.84	m/s
Average Pressure	100.3	kPa
Average Temperature	21.15	°C
Stack Diameter	0.8	m
T Reference	273	Deg K
P Reference	101.3	kPa
Isokinetic condition	Particulates -3.05 Metals -0.84 Mercury -1.90	%
Oxygen	n/a	%
Water vapour	n/a	%

9. Annex 3

9.1. Results and uncertainty calculations, certificates of analysis

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2404

Report Number: 289009-2

Date of Report: 29-Aug-2012

Customer: Glenside Environmental
Unit 7
Westpoint Buildings
Ballincollig.
CO. CORK, VAT REG 9683448N

Customer Contact: Mr Patrick Power

Customer Job Reference: KMK Metals
Customer Purchase Order: 012-050-02 KMK
Date Job Received at SAL: 26-Jul-2012
Date Analysis Started: 31-Jul-2012
Date Analysis Completed: 29-Aug-2012

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

UKAS TESTING
1549

Report checked and authorised by :
Mary Drury
Project Manager

Issued by :
Mary Drury
Project Manager

Signature Not Verified
Digitally signed by Mary Drury
Date: 2012.08.29 15:28:54 BST
Reason: Issue
Location: SAL

SAL Reference: 289009
Customer Reference: KMK Metals

Filter GFA 47mm Analysed as Filter GFA 47mm
Miscellaneous

					SAL Reference	289009 001	289009 002
					Customer Sample Reference	050-02-01 RUN 1 FILTER RUN	050-02-02 FILTER BLANK
					Test Sample	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Particulates (Total)	Grav (5 Dec)	0.05	mg	U		0.10	<0.05

SAL Reference: 289009
Customer Reference: KMK Metals

Wash(DI) Analysed as Wash(DI)
Miscellaneous

					SAL Reference	289009 003	289009 004
					Customer Sample Reference	050-02-03 RUN 1 NOZZLE WASH	050-02-04 NOZZLE WASH BLANK
					Test Sample	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Particulates (Total)	Grav	0.1	mg	U		<0.1	<0.1

SAL Reference: 289009
Customer Reference: KMK Metals

Impinger (5%HNO3/5%H2O2) Analysed as Impinger (3.3%HNO3/1.5%H2O2)
BS EN 14385 Metals Suite

					SAL Reference	289009 005	289009 006	289009 007	289009 008
					Customer Sample Reference	050-02-05 RUN 2 METALS IMPINGER 1	050-02-06 RUN 2 METALS IMPINGER 2	050-02-07 RUN 2 METALS IMPINGER 3	050-02-08 METALS IMPINGER BLANK
					Test Sample	AR	AR	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Antimony	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Arsenic	ICPMS (BS EN 14385)	0.2	µg/l	U		<0.2	<0.2	0.2	<0.2
Beryllium	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Cadmium	ICPMS (BS EN 14385)	0.5	µg/l	U		<0.5	<0.5	<0.5	<0.5
Chromium	ICPMS (BS EN 14385)	0.5	µg/l	U		0.6	0.9	1.7	<0.5
Cobalt	ICPMS (BS EN 14385)	0.2	µg/l	U		<0.2	0.2	0.7	<0.2
Copper	ICPMS (BS EN 14385)	1	µg/l	U		4	1	17	<1
Lead	ICPMS (BS EN 14385)	0.3	µg/l	U		5.3	8.1	16	<0.3
Manganese	ICPMS (BS EN 14385)	2	µg/l	U		9	13	7	<2
Nickel	ICPMS (BS EN 14385)	2	µg/l	U		<2	<2	3	<2
Thallium	ICPMS (BS EN 14385)	0.3	µg/l	U		<0.3	<0.3	<0.3	<0.3
Vanadium	ICPMS (BS EN 14385)	0.3	µg/l	U		<0.3	<0.3	<0.3	<0.3
Volume	ICPMS (BS EN 14385)	1	ml	U		92	100	100	99

SAL Reference: 289009
Customer Reference: KMK Metals

Impinger (5%HNO3/5%H2O2) Analysed as Impinger (3.3%HNO3/1.5%H2O2)
Suite F

					SAL Reference	289009 005	289009 006	289009 007	289009 008
					Customer Sample Reference	050-02-05 RUN 2 METALS IMPINGER 1	050-02-06 RUN 2 METALS IMPINGER 2	050-02-07 RUN 2 METALS IMPINGER 3	050-02-08 METALS IMPINGER BLANK
					Test Sample	AR	AR	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Aluminium	ICPMS (BS EN 14385)	1	µg/l	N		<1	<1	<1	<1
Iron	ICPMS (BS EN 14385)	1	µg/l	N		<1	<1	<1	<1

SAL Reference: 289009
Customer Reference: KMK Metals

Probe Wash (27.5%HNO3) Analysed as Probe Wash (27.5%HNO3)

BS EN 14385 Metals Suite

				SAL Reference	289009 009	289009 010
				Customer Sample Reference	050-02-09 METALS PROBE WASH	050-02-10 METALS PROBE WASH BLANK
				Test Sample	AR	AR
				Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Antimony	ICPMS (HF BS EN 14385)	1	µg	U	<1	<1
Arsenic	ICPMS (HF BS EN 14385)	0.5	µg	U	(13) <0.5	(13) <0.5
Beryllium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Cadmium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Chromium	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Cobalt	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Copper	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Lead	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Manganese	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Nickel	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Thallium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Vanadium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5

SAL Reference: 289009
Customer Reference: KMK Metals

Probe Wash (27.5%HNO3) Analysed as Probe Wash (27.5%HNO3)

Suite C

				SAL Reference	289009 009	289009 010
				Customer Sample Reference	050-02-09 METALS PROBE WASH	050-02-10 METALS PROBE WASH BLANK
				Test Sample	AR	AR
				Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Aluminium	ICPMS (HF BS EN 14385)	1	µg	N	7	13
Iron	ICPMS (HF BS EN 14385)	1	µg	N	(13) <1	(13) 92

SAL Reference: 289009
Customer Reference: KMK Metals

Filter Analysed as Filter

BS EN 14385 Metals Suite

				SAL Reference	289009 011	289009 012
				Customer Sample Reference	050-02-11 METALS FILTER	050-02-12 METALS FILTER BLANK
				Test Sample	AR	AR
				Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Antimony	ICPMS (HF BS EN 14385)	0.5	µg	U	21	<0.5
Arsenic	ICPMS (HF BS EN 14385)	0.5	µg	U	(13) 17	(13) <0.5
Beryllium	ICPMS (HF BS EN 14385)	0.5	µg	U	4.2	<0.5
Cadmium	ICPMS (HF BS EN 14385)	0.5	µg	U	18	<0.5
Chromium	ICPMS (HF BS EN 14385)	1	µg	U	240	<1
Cobalt	ICPMS (HF BS EN 14385)	0.5	µg	U	6.4	<0.5
Copper	ICPMS (HF BS EN 14385)	0.5	µg	U	11	<0.5
Lead	ICPMS (HF BS EN 14385)	0.5	µg	U	29	<0.5
Manganese	ICPMS (HF BS EN 14385)	0.5	µg	U	260	<0.5
Nickel	ICPMS (HF BS EN 14385)	1	µg	U	120	<1
Thallium	ICPMS (HF BS EN 14385)	0.5	µg	U	24	<0.5
Vanadium	ICPMS (HF BS EN 14385)	0.5	µg	U	35	<0.5

SAL Reference: 289009
Customer Reference: KMK Metals

Filter — Analysed as Filter
Filter suite 6

					SAL Reference	289009 011	289009 012
					Customer Sample Reference	050-02-11 METALS FILTER	050-02-12 METALS FILTER BLANK
					Test Sample	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012
Determinand	Method	LOD	Units	Symbol			
Aluminium	ICPMS (HF BS EN 14385)	0.5	µg	N		(13) 3.1	(13) 5.6
Iron	ICPMS (HF BS EN 14385)	1	µg	N		(13) 22	(13) <1

SAL Reference: 289009
Customer Reference: KMK Metals

Impinger (2%KMnO4/10%H2SO4) — Analysed as Impinger (2%KMnO4/10%H2SO4)
Miscellaneous

					SAL Reference	289009 013	289009 014	289009 015
					Customer Sample Reference	050-02-13 RUN 3 MERCURY IMPINGER 1	050-02-14 RUN 3 MERCURY IMPINGER 2	050-02-15 RUN 3 MERCURY IMPINGER BLANK
					Test Sample	AR	AR	AR
					Date Sampled	20-JUL-2012	20-JUL-2012	20-JUL-2012
Determinand	Method	LOD	Units	Symbol				
Mercury	CVAFS (BS EN 13211)	5	µg/l	U		86	<5	<5
Volume	CVAFS (BS EN 13211)	1	ml	U		100	100	90

SAL Reference: 289009
Customer Reference: KMK Metals

Probe Wash (27.5%HNO3) — Analysed as Probe Wash (27.5%HNO3)
Miscellaneous

					SAL Reference	289009 016
					Customer Sample Reference	050-02-16 MERCURY PROBE WASH
					Test Sample	AR
					Date Sampled	20-JUL-2012
Determinand	Method	LOD	Units	Symbol		
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U		(13) <0.01

SAL Reference: 289009
Customer Reference: KMK Metals

Filter — Analysed as Filter
Miscellaneous

					SAL Reference	289009 017
					Customer Sample Reference	050-02-17 RUN 3 FILTER MERCURY
					Test Sample	AR
					Date Sampled	20-JUL-2012
Determinand	Method	LOD	Units	Symbol		
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U		(13) 0.02

Index to symbols used in 289009-2

Value	Description
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

GLENSIDE
ENVIRONMENTAL SERVICES
Environmental and Engineering Consultants

Company Name:	KMK	Technicians:	EP/PP
Site Name:	KMK	MCERTS No:	MM07 799
Stack ID:	A2-6	TE's:	TE1, TE2, TE3, TE4
Date:	20/07/2012	Doc No	

Stack Information:
Circular Stack

Stak Diameter:	0.8	m
Average Flow:	11.84	m/s
Average Temperature:	294.15	K
Average Pressure:	100.3	kPa
Average Moisture:		%
Average Oxygen:	0	%

Reeference Conditions:

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Mass Emissions Calculations:

Volumetric Flow Rate	5.95	m3/s
Volumetric Flow Rate	21419.13	m3/hr
Volumertic Flow Rate corrected to STP	19682.58	m3/hr
Volumertic Flow Rate corrected to STP and O2 ref	19682.58	m3/hr
Volumertic Flow Rate corrected to STP	19682.58	m3/hr

	Run 1 Part	Run 2 Metals	Run 3 Mercury	Average:
Flow	12.96	11.23	11.32	11.84
Temp.	19.99	21.38	22.09	21.15
Pressure	100.3	100.3	100.3	100.3

GLENSIDE
ENVIRONMENTAL SERVICES
Environmental and Engineering Consultants

Company Name:	KMK	Technicians:	EP/PP
Site Name:	KMK	MCERTS No:	MM07 799
Stack ID:	A2-8	TE's:	TE1, TE2, TE3, TE4
Date:	20/07/2012		

Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	289009 002
Blank Nozzle Wash:	0.1	289009 003
Run Filter:	0.1	289009 001
Run Nozzle Wash:	0.1	289009 004
	0.15	
Blank	0.15	
Run	0.2	

Air Volume corrected to STP:	0.94625	m3
Moisture:	0	%
Air Volume corrected to Moisture:	0.94625	m3

Stack Conditions

Average Temperature:	294.1533333	K
Average Pressure:	100.3	kPa
Average Moisture:	0	%
Average Oxygen:	0	%
Volumertic Flow Rate corrected to STP O2 ref and Moisture	19682.58	m3/hr

Reference Conditions

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.16	0.16	0.003	n/a
Blank	0.16	0.16	0.003	0.01
Run	0.21	0.21	0.004	0.01

Note: Blank result should be < 10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: 1 % of ELV
If the blank result is higher than requirements of ELV result should be rejected

Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	12.5	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.2	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaini	Uncertaini	Requirement of std
Sampled Volume	Vm	0.94625	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	294.1533333	uTm	2	k	0.68		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0	uHm	1	% by volume	1.00		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.2	um	0.00	mg	0.00	0.00	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations							
Factor for std conds	fs	0.92					
uncertainty components	symbol	sensitivity coeff	u (in units of fs)				
	ρm	0.009	0.009		$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$		
	Hm	0.009	0.009				
	Tm	0.003	0.006				
	ufs		0.014			1.57	
Corrected volume	V	0.87	uV	0.014	m3	$V = V_m f_s$	1.57
Factor for O2 correction	fc	1.00					
uncertainty components	symbol	sensitivity coeff	u				
	O2,m	0.05	0.005		$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$		
Factor for O2 Correction	ufc	1.00	0.005			0.48	

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard con	V	0.87	m3	0.24	0.00 mg.m-3	0.03 %
Mass	m	0.20	mg	1.06	0.00 mg.m-3	0.00 %
Factor for O2 Correction	fc	1.00		0.21	0.00 mg.m-3	0.01 %
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	0.00 %
Uncollected mass	UCM	0.00	mg	1.06	0.00 mg.m-3	0.00 %
Combined measurement uncertainty					0.00 mg.m-3	

Expanded uncertainty as percentage of measured value	3.28	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.01	mg.m-3	
Expanded uncertainty as percentage of limit value	0.1	% ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	1.25	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.2	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertainty	Uncertainty	Requirement of std
Sampled Volume	Vm	0.94625	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	294.1533333	uTm	2	k	0.68		<=1%
Sampled gas Pressure	pm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0	uHm	1	% by volume	1.00		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.15	um	0.00	mg	0.00	0.00	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations							
Factor for std conds	fs	0.92					
uncertainty components	symbol	sensitivity coeff		u (in units of fs)			
	pm	0.009		0.009		$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$	
	Hm	0.009		0.009			
	Tm	0.003		0.006			
	ufs			0.014		$V = V_m f_s$	1.57
Corrected volume	V	0.87	uV	0.014	m3		1.57
Factor for O2 correction	fc	1.00				$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$	
uncertainty components	symbol	sensitivity coeff		u			
	O2,m	0.05		0.005			
Factor for O2 Correction	ufc	1.00		0.005			0.48

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard con	V	0.87	m3	0.18	0.00 mg.m-3	0.20 %
Mass	m	0.15	mg	1.06	0.00 mg.m-3	0.00 %
Factor for O2 Correction	fc	1.00		0.16	0.00 mg.m-3	0.06 %
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	0.00 %
Uncollected mass	UCM	0.00	mg	1.06	0.00 mg.m-3	0.00 %
Combined measurement uncertainty					0.00 mg.m-3	

Expanded uncertainty as percentage of measured value	3.28	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.01	mg.m-3	
Expanded uncertainty as percentage of limit value	0.4	% ELV	

Company Name:	KMK	Technicians:	EP/PP		
Site Name:	KMK	MCERTS No:	MM07 799		
Stack ID:	A2-8	TE's:	TE1, TE2, TE3, TE4		
Date:	20/07/2012				

Run

Lab Results	LOD Filter µg	LOD Probe W µg	LOD Impingers µg/l	Filter µg	Rince µg/l	Impinger 1 µg/l	Impinger 2 µg/l	Impinger 3 µg/l	Impinger 5 µg/l	Impinger 6 µg/l
Aluminium	0.5	1	1	3.1	7	1	1	1	n/a	n/a
Antimony	0.05	1	0.5	21	1	0.5	0.5	0.5	n/a	n/a
Arsenic	0.05	0.5	0.2	17	0.5	0.2	0.2	0.2	n/a	n/a
Barium									n/a	n/a
Beryllium	0.05	0.5	0.5	4.2	0.5	0.5	0.5	0.5	n/a	n/a
Boron									n/a	n/a
Cadmium	0.05	0.5	0.5	18	0.5	0.6	0.5	0.5	n/a	n/a
Chromium	0.05	2	0.5	240	2	0.5	0.9	1.7	n/a	n/a
Cobalt	0.05	0.5	0.2	6.4	0.5	4.0	0.2	0.7	n/a	n/a
Copper	0.05	0.5	1	11	0.5	5.3	1.0	17.0	n/a	n/a
Iron	1	1	1	22	1	1.0	1.0	1.0	n/a	n/a
Lead	0.05	0.5	0.3	29	0.5	9.0	8.1	16.0	n/a	n/a
Manganese	0.05	2	2	260	2	3.0	13.0	7.0	n/a	n/a
Nickel	0.05	2	2	120	2	2.0	2.0	3.0	n/a	n/a
Selenium									n/a	n/a
Silver									n/a	n/a
Thallium	0.05	0.5	0.3	24	0.5	0.3	0.3	0.3	n/a	n/a
Tin									n/a	n/a
Vanadium	0.05	0.5	0.3	35	0.5	0.3	0.3	0.3	n/a	n/a
Zinc									n/a	n/a
Mercury	0.01	0.01	5	0.02	0.01				86	5

Blank

Lab Results	Filter µg	Rince µg/l	Impinger 1 µg/l	Impinger 2 µg/l	Impinger 3 µg/l	Impinger 5 µg/l	Impinger 6 µg/l
Aluminium	6.8	13	1			n/a	n/a
Antimony	0.05	1	0.5			n/a	n/a
Arsenic	0.05	0.5	0.2			n/a	n/a
Barium						n/a	n/a
Beryllium	0.05	0.5	0.5			n/a	n/a
Boron						n/a	n/a
Cadmium	0.05	0.5	0.5			n/a	n/a
Chromium	0.4	2	0.5			n/a	n/a
Cobalt	0.05	0.5	0.2			n/a	n/a
Copper	0.05	0.5	1.0			n/a	n/a
Iron	1	52	1.0			n/a	n/a
Lead	0.22	0.6	0.3			n/a	n/a
Manganese	0.1	2	2.0			n/a	n/a
Nickel	0.49	2	2.0			n/a	n/a
Selenium						n/a	n/a
Silver						n/a	n/a
Thallium	0.05	0.5	0.3			n/a	n/a
Tin						n/a	n/a
Vanadium	0.05	0.50	0.3			n/a	n/a
Zinc						n/a	n/a
Mercury	0.01	0.01					5

	Run					Blank				
Solutions Volume	**Impinger 1**	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 1**	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**
ml	92	100	100	100	100	99			90	

	Metals	Mercury
Air Volume corrected to STP:	0.83508 m3	0.82947 m3
Air Volume corrected to STP and Moisture:	0.83508 m3	

Average Temperature:	294.15	K
Average Pressure:	100.3	kPa
Average Moisture:	0	%
Average Oxygen:	0	%
Volumetric Flow Rate corrected to STP O2 ref and Moisture	19682.58	m3/hr

Reference Conditions:

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

If one of the metal elements in the last impinger is more than 10% of the total combined metals (i.e. the filter, probe rinse and impingers) collected then the result shall be rejected, unless the total result is less than 30% of the ELV.

Results :	**mg in sampling train LOD**	**mg in sampling train Run**	**mg in sampling train Blank**	**mg/m3 at STP/Dry LOD**	**mg/m3 at STP/Dry Run**	**mg/m3 at STP/Dry Blank**	**Corrected to reference oxygen LOD**	**Corrected to reference oxygen Run**	**Corrected to reference oxygen Blank**	**kg/hr LOD**	**kg/hr Run**	**kg/hr Blank**
Aluminium	0.0018	0.0104	0.0199	0.0021	0.0124	0.0238	0.0021	0.0124	0.0238	0.0000	0.0002	0.0005
Antimony	0.0012	0.0221	0.0011	0.0014	0.0265	0.0013	0.0014	0.0265	0.0013	0.0000	0.0005	0.0000
Arsenic	0.0006	0.0176	0.0006	0.0007	0.0210	0.0007	0.0007	0.0210	0.0007	0.0000	0.0004	0.0000
Barium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Beryllium	0.0007	0.0048	0.0006	0.0008	0.0058	0.0007	0.0008	0.0058	0.0007	0.0000	0.0001	0.0000
Boron	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cadmium	0.0007	0.0187	0.0006	0.0008	0.0223	0.0007	0.0008	0.0223	0.0007	0.0000	0.0004	0.0000
Chromium	0.0022	0.2423	0.0024	0.0026	0.2902	0.0029	0.0026	0.2902	0.0029	0.0001	0.0057	0.0001
Cobalt	0.0006	0.0074	0.0006	0.0007	0.0088	0.0007	0.0007	0.0088	0.0007	0.0000	0.0002	0.0000
Copper	0.0008	0.0138	0.0006	0.0010	0.0165	0.0008	0.0010	0.0165	0.0008	0.0000	0.0003	0.0000
Iron	0.0023	0.0233	0.0031	0.0027	0.0279	0.0995	0.0027	0.0279	0.0995	0.0001	0.0005	0.0020
Lead	0.0006	0.0327	0.0006	0.0008	0.0392	0.0010	0.0008	0.0392	0.0010	0.0000	0.0008	0.0000
Manganese	0.0026	0.2643	0.0023	0.0032	0.3165	0.0026	0.0032	0.3165	0.0026	0.0001	0.0062	0.0001
Nickel	0.0026	0.1227	0.0027	0.0032	0.1469	0.0032	0.0032	0.1469	0.0032	0.0001	0.0029	0.0001
Selenium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Silver	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Thallium	0.0006	0.0246	0.0006	0.0008	0.0294	0.0007	0.0008	0.0294	0.0007	0.0000	0.0006	0.0000
Tin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vanadium	0.0006	0.0356	0.0006	0.0008	0.0426	0.0007	0.0008	0.0426	0.0007	0.0000	0.0008	0.0000
Zinc	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mercury	0.0005	0.0078	0.0005	0.0006	0.0094	0.0006	0.0006	0.0094	0.0001	0.0000	0.0002	0.0000
Total of Metals	0.0181	0.8402	0.1165	0.0217	1.0081	0.1395	0.0217	1.0081	0.1395	0.0004	0.0196	0.0027
Total of Cd and Tl	0.0013	0.0432	0.0012	0.0016	0.0518	0.0014	0.0016	0.0518	0.0014	0.0000	0.0010	0.0000
Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be	0.0127	0.7633	0.0124	0.0152	0.9140	0.0148	0.0152	0.9140	0.0148	0.0003	0.0180	0.0003

Efficiency Check

Efficiency	**Efficiency Requirement a %**	**ELV**	**Result as percentage of ELV**
0.96	10		#DIV/0!
0.23	10		#DIV/0!
0.11	10		#DIV/0!
#DIV/0!	10		#DIV/0!
1.03	10		#DIV/0!
#DIV/0!	10		#DIV/0!
0.27	10		#DIV/0!
0.07	10		#DIV/0!
0.95	10		#DIV/0!
12.33	10		#DIV/0!
0.43	10		#DIV/0!
4.89	10		#DIV/0!
0.26	10		#DIV/0!
0.24	10		#DIV/0!
#DIV/0!	10		#DIV/0!
#DIV/0!	10		#DIV/0!
0.12	10		#DIV/0!
#DIV/0!	10		#DIV/0!
0.08	10		#DIV/0!
#DIV/0!	10		#DIV/0!
5476.45	10		#DIV/0!

For example ELVs for metals may be:
- Cd and Tl combined – 0.05 mg/m3
- Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V combined – 0.5 mg/m3
- mercury – 0.05 mg/m3

For Cd and Tl combined it would not be necessary to comply with the less than 10% in the last impinger criteria, provided the overall combined Cd and Tl result for the sample train was below 0.015 mg/m3.
For combined metals (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V) it would not be necessary for each individual element to comply with the less than 10% in the last impinger criteria, provided that the overall combined result for the sample train was below 0.15 mg/m3.
For mercury it would not be necessary to comply with the less than 10% in the last impinger criteria, provided the overall mercury result for the sample train was below 0.015 mg/m3.

Appendix 2

Noise submission July and response August 2012

Office of
Environmental
Enforcement

Regional Inspectorate, Seville Lodge
Callan Road, Kilkenny, Ireland

Cigireacht Réigiúnach, Lóiste Sevilla,
Bóthar Challainn, Cill Chainnigh, Eire

T: +353 56 779 6700
F: +353 56 779 6798
E: info@epa.ie
W: www.epa.ie

LoCall: 1890 33 55 99

Mr Kurt M Kyck,
Managing Director,
KMK Metals Recycling Limited,
Cappincur Industrial Estate ,
Daingean Road,
Tullamore,
Co. Offaly.

7th August 2012

Our Ref: W0113-03/ap07db

Dear Mr Kyck,

I refer to the correspondence from Mr Kenneth Goodwin, Enviroco Management Environmental Consultants, on behalf of KMK Metals Recycling Ltd., dated 17th July 2012, received by the EPA on 20th July 2012, requesting Agency agreement for the noise monitoring proposal for 2012 at the licensed facility (Waste Licence Reg. No.W0113-03).

I am to inform you that the proposal submitted is to the satisfaction of the Agency. The Licensee should conduct the noise monitoring programme for 2012 as outlined in the aforementioned correspondence.

The Licensee is advised that noise monitoring should be carried out and reported in accordance with EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) 2012, which can be downloaded at the following web address:

http://www.epa.ie/downloads/advice/noise/

Please quote the above reference in future correspondence in relation to this matter.

Yours sincerely,

Dermot Burke, Inpsector,
Environmental Enforcement (Kilkenny),
Office of Environmental Enforcement.

W0113-03\ap07db

ENVIROCO MANAGEMENT
ENVIRONMENTAL CONSULTANTS
LoCall 1890 522 000

Mr Dermot Burke
Inspector
Environmental Protection Agency (EPA)
PO Box 3000
Johnstown Castle Estate
Co Wexford

17th July 2012

KMK Metals Recycling Ltd (KMK) (Reg No. W0113-03) Acoustic Monitoring 2012

Dear Mr Burke,

My client, KMK Metals Recycling Ltd (KMK Metals) have under condition 6.11.1 and Schedule B.4 and C.5 a responsibility to monitor and report boundary noise measurements on an annual basis. Schedule C.5 indicates the location of the said measurements, to comply with Map I.6.1 of the application submitted.

Due to the maturing of the KMK Metals site, I would like to propose, for the monitoring event to occur in September 2012, the following monitoring positions. This alteration to the existing Schedule C.5 will enable measurements to better reflect the existing site and to enable a report that is representative of the local environment.

If agreed this alteration will supersede the locations identified in Schedule C.5 for the 2012 noise monitoring event, as required under conditions 2.11.1 and Schedule B.4. All measurements will now be amended to reflect the most recent guidance notes by the EPA on noise monitoring of Scheduled Activities (NG4) released in April of this year. Table 1 below gives the amended monitoring locations for 2012 with the corresponding monitoring times as per NG4 document:

BOW HOUSE O'MOORE STREET TULLAMORE CO. OFFALY
T: 057 935 2200 o F: 057 935 2342 o email: info@enviroco.ie o www.enviroco.ie
Registered in Ireland, Number 297801 • Directors: A. Fahey. D. Fahey

Table 1: Proposed Monitoring Durations as per NG4, at the KMK Facility in 2012.

Station	Day				Night			
	1	2	3	Total	1	2	3	Total
NE1	30 min	30 min	30 min	1hr 30	15 min	15 min	N/A	30 min
NE2	30 min	30 min	30 min	1hr 30	15 min	15 min	N/A	30 min
NE3	30 min	30 min	30 min	1hr 30	15 min	15 min	N/A	30 min
NE4	30 min	30 min	30 min	1hr 30	15 min	15 min	N/A	30 min
Total	**6 hours**				**2hours**			

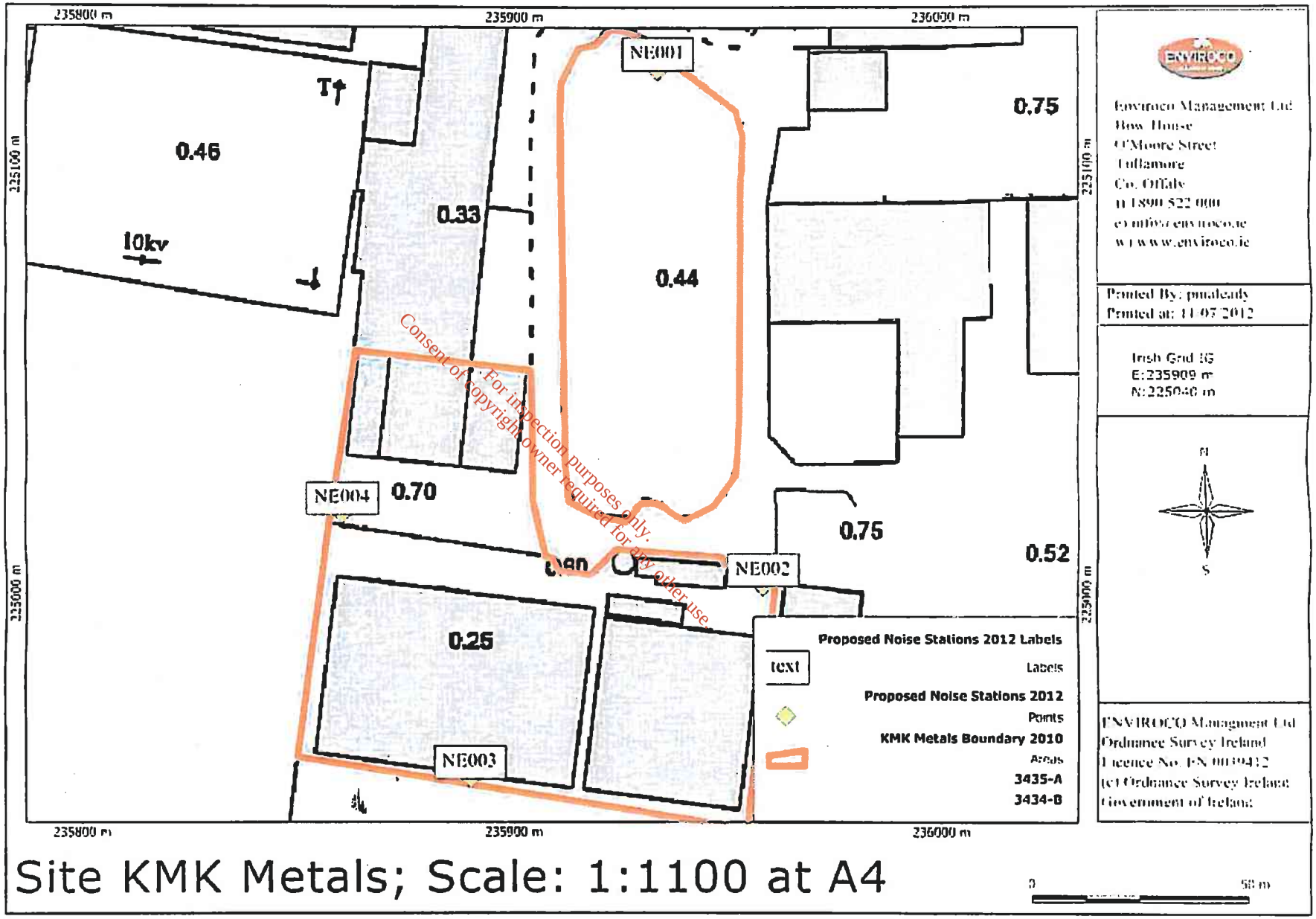
Attached map 'Site KMK Metals; Scale: 1:1100 at A4' shows the proposed noise monitoring stations for the event scheduled for September. These stations will enable a solid understanding of the existing noise arising from site activities at the boundaries of the KMK facility. The repeated measurements, as shown in table 1 will result in over 8 hours of monitoring data recorded for the site, significantly more than recommended under the NG4 document for day-time monitoring events.

The night-time monitoring is done for a repetition of each station twice as per the NG4 guidance. KMK only opens its doors after 6am and is shut down by 10pm. As such it is not possible to gain access to the monitoring stations for more than a 2 hour period of the EPA defined 'night-time' period (between 6am and 8am). The above procedure will result in a recording of the full extent of KMKs 'night-time' operations on the specific date, it is therefore perceived as more than adequate for reporting purposes.

If you have any questions on this, please do not hesitate to contact me on 057 93 52200.

Yours Sincerely

Kenneth Goodwin, AMIOA, AIEMA
Environmental Consultant
Cc Charlotte Walker, KMK Metals Ltd, Cappincur industrial estate, Tullamore.



Site KMK Metals; Scale: 1:1100 at A4

Appendix 3

Drain Impact & Assimilative Report based on a Proposed Waste Water Treatment System (WWTS)

DRAIN IMPACT & ASSIMILATIVE REPORT BASED ON A PROPOSED WASTE WATER TREATMENT SYSTEM (WWTS)

FOR

KMK METALS RECYCLING LTD.

AT

CAPPINCUR INDUSTRIAL ESTATE,

TULLAMORE, CO OFFALY

20th July 2012

Report prepared by;

ENVIROCO Management Ltd.
Bow House,
O'Moore Street
Tullamore
Tel : (057 93) 52200
Fax : (057 93) 52342
Website : www.enviroco.ie

KMK proposes to submit a planning application and EIS to Offaly County Council for their facility at Cappincur Industrial Estate, Tullamore, Co Offaly.

As part of this application and to address condition 4 of a previous grant of planning permission ref: 10/101 with states: *'The proposed new soil polishing filter shall be installed in accordance with the recommendations of the 2009 EPA Code of Practice 'Wastewater Treatment and Disposal Systems Serving Single Houses (P.E ,10)'. Setback distances shall be adhered to as far as reasonably practicable'* KMK has now appraised the situation fully. The three options available can be summarised as follows;

1) Purchase additional land space adjoining the existing percolation area, remove the existing percolation area and install a new area subject to the *2009 EPA Code of Practice.* This option was not viable to KMK due to land unavailability from the land owner and prohibitive costs.
2) Connect to the proposed foul sewer network once it is installed by Offaly County Council. This option was discounted due to a delay for several years for the foul sewer line to become available to users of Cappincur Industrial Estate.
3) The option to contain the domestic effluent in a holding tank for off-site removal to the County Council Wastewater Treatment plant was considered. However, this practise was discounted as unsustainable due to prohibitive costs and time incurred for liquid transport and associated treatment fees by the Council Plant over a number of years.
4) A final option was to upgrade the existing WWTS on-site taking into consideration best available technologies as alternatives to the standard percolation methods. After approaching two providers of WWTS, a full appraisal of the system proposed by Molly Precast was strongly considered as an appropriate method of treatment of effluent and associated wastes. This is considered the best option and is discussed further below.

The full details of the proposed WWTS are included in **Appendix 1** and will involve the following key improvements;

- The existing tank will be modified for use as a primary holding chamber for domestic effluent storage and settlement.
- A new tank will be installed to be used as a buffering and reaction tank called a Sequencing Batch Reactor (SBR) including dosing for ortho-phosphate and total nitrogen removal. This secondary treatment process designed to reduce BOD, COD, solids and ammonia over an 8 hour batch cycle and prepare the effluent for sand filter treatment.
- The sand filter is a biological treatment process designed to further reduce the parameter loadings and ensure the final discharged effluent is acceptable for surface water.

This report is an investigation of the assimilative capacity of the receiving water (land drains) based on field work flow measurements and water quality of the same drain as determined from grab samples taken; up-stream and down stream of the proposed KMK discharge point associated with a newly proposed Waste Water Treatment System (WWTS).

The proposal also includes a full assessment of the new WWTS to be provided by Molloy Precast, Tullamore and its associated treated effluent discharge quality and volumes. It is proposed to discharge treated effluent from the up-graded WWTS to the land drain.

The land drain flow rate was measured on 20th June 2012 at three transects across the drain and are tabulated below:

Table 1.0 – Flow rate field work June 2012

Transect	Average Cross Sectional Area (m^2)	Average Velocity (m/s)	Average Flow (m^3/s)
A	0.19	0.013	**0.0025**
B	0.14	0.019	**0.0027**
C	0.16	0.018	**0.0028**
Average			**0.0026**

This assessment is to judge what the likely potential loading will be on the local land drain and the capacity for this drain to assimilate the chemical and biological components of the discharge. The following equation is utilised to calculate the current loading of the land drain from existing influents to the water body.

Existing loadings (kg) = flow x conc. of each parameter measured (mg/l) / 1000
The proposed treated effluent discharge point flow as determined from water metering installed at the KMK site is: 1,790litres/day or 0.000021m^3/s.

To calculate the existing chemical/biological parameter loadings the following equation is used:
Existing loadings (kg) = flow x conc. of each parameter measured (mg/l) / 1000

Water quality analysis was carried out on water samples taken at;

- Upstream of the proposed discharge point
- Down stream of the proposed discharge point

Please see map (Fig 1) attached for reference to sample locations and general drainage network of area.

Cappincur Drainage

Fig 1 Showing sampling locations for KMK Metals site at Cappincur and the general drainage network to the Tullamore River.

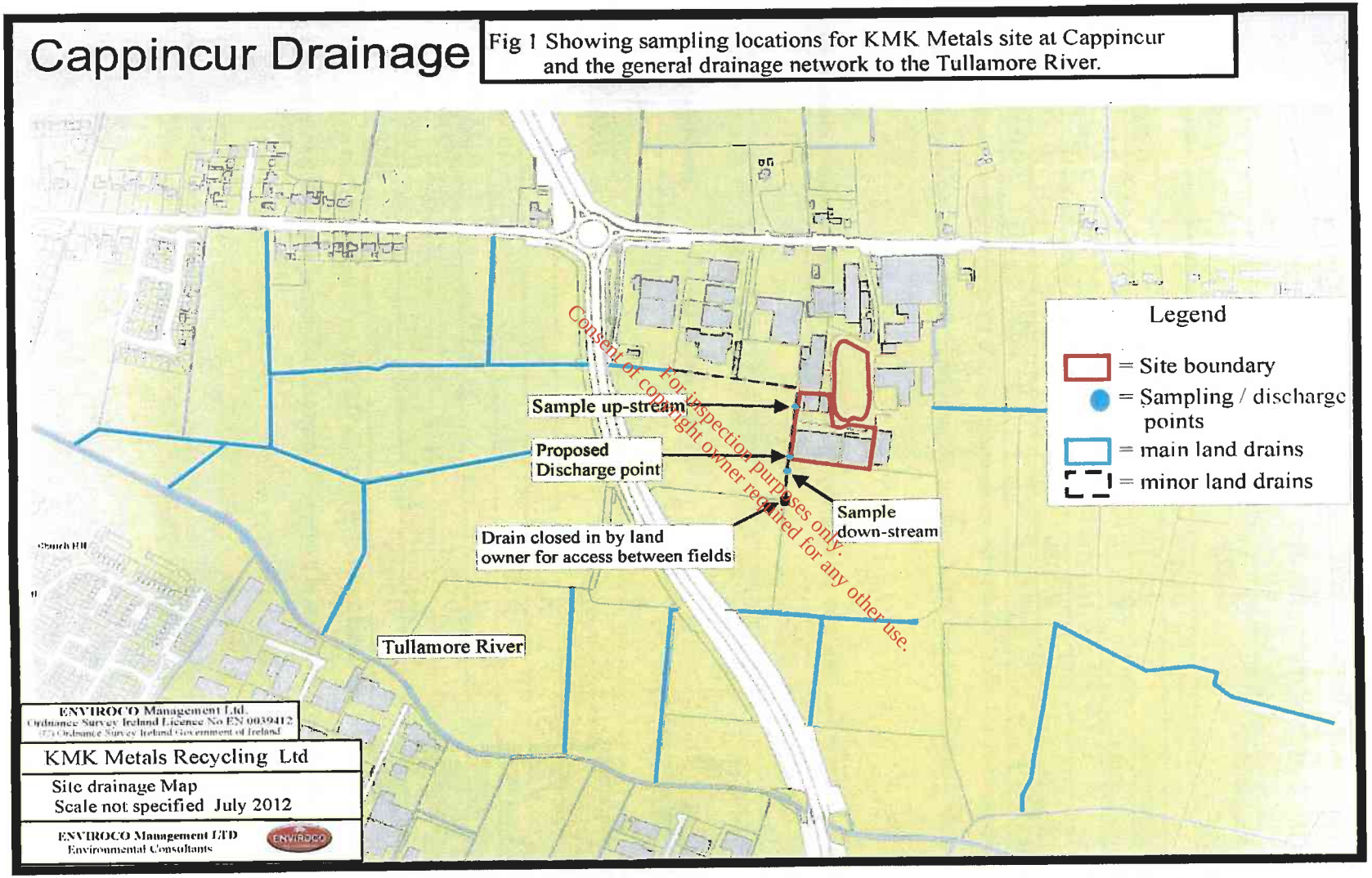


Table 1.1 shows the baseline parameter loadings for the land drain- Upstream (US) of the proposed discharge outlets (E Drain)

Parameter	River Flow (m^3/s)	US Concentration measured (mg/l)	Estimated loadings* (kg)
Total Suspended Solids	0.0026	70	0.00018
pH	0.0026	6.95	-
Total Ammonia	0.0026	0.28	0.0000007
Orthophosphate	0.0026	0.13	0.0000003
BOD	0.0026	14	0.000036
COD	0.0026	48	0.000125
Nitrate (NO3)	0.0026	1.33	0.0000034

*Figures based the calculated flow rate of the drain: 0.0026 m^3/s and using water quality analysis data taken upstream of the proposed discharge point. See **Appendix 2** for analysis results

Table 1.2 shows the baseline parameter loadings for the land drain- Downstream (DS) of the proposed discharge outlets (E Drain)

Parameter	River Flow (m^3/s)	DS Concentration measured (mg/l)	Estimated loadings* (kg)
Total Suspended Solids	0.0026	100	0.00026
pH	0.0026	6.98	-
Total Ammonia	0.0026	0.16	0.0000004
Orthophosphate	0.0026	0.14	0.0000003
BOD	0.0026	11	0.0000286
COD	0.0026	49	0.0001274
Nitrate (NO3)	0.0026	0.25	0.00000065

*Figures based the calculated flow rate of the drain: 0.0026 m^3/s and using water quality analysis data taken downstream of the proposed discharge point. See **Appendix 2** for analysis results

Table 1.3 shows the variation between upstream and downstream, including discharge values.

Parameter	Units	US	DS	US-DS
Total Suspended Solids	mg/l	70	100	**+30.0**
pH	pH units	6.95	6.98	**+0.03**
Total Ammonia	mg/l	0.28	0.16	**-0.12**
Orthophosphate	mg/l	0.13	0.14	**+0.01**
BOD	mg/l	14	11	**-3.0**
COD	mg/l	48	49	**+1.0**
Nitrate (NO3)	mg/l	1.33	0.25	**-1.08**

Positive results indicate an increase in the sample parameter from up-stream to downstream
Negative results indicate a decrease in the sample parameter from the up-stream to the downstream

The estimated parameter loadings from the upgraded wastewater treatment plant including after sand filtration is shown in table 1.4.

Table 1.4 – Potential loading impacts to the land drain

Parameter	Units	Proposed maximum parameters as discharged after sand filter (mg/l)[note1]	Dry Weather Flow Rate[note2] m^3/s	Loading Kg
pH	Units	7	0.00002	-
BOD	mg/l	5	0.00002	0.00000014
COD	mg/l	35	0.00002	0.0000007
Total solids	mg/l	4	0.00002	0.00000008
Phosphorous	mg/l	1	0.00002	0.00000002
Ammonia	mg/l	1	0.00002	0.00000002
Nitrates	mg/l	8	0.00002	0.00000016

Note1 = values taken from table on page 4 of Molloy Precast report in Appendix 2

Note2 = it should be noted that the final discharge to land drain will also include rainwater run-off from the building roof and rainwater soakage from the open area of the sand filter (during wet weather only). This rainwater will increase the volume of discharge but will also dilute the overall discharged loading. Average rainfall contribution is therefore estimated as:

1.2m (annual rainfall) x [95m^2 (sand filter area) + 1,016m^2 (D-Hanger building area)] /365 = 3.65m^3/day

It is therefore necessary to show the comparison between the existing loadings on the land drain and the proposed loadings from the upgraded WWTS discharge point from KMK (represented in Table 1.5 below).

Table 1.5 – Potential loading impacts to the land drain

Parameter	Existing loadings (kg) downstream of discharge point	Proposed Loading from final discharge kg*	% increase in drain loading from discharge point
pH (units)	-	-	-
BOD (mg/l)	0.0000286	0.00000014	0.49
COD (mg/l)	0.0001274	0.0000007	0.55
Total solids (mg/l)	0.00026	0.00000008	0.31
Phosphorous (mg/l)	0.0000003	0.00000002	6.6
Ammonia (mg/l)	0.0000004	0.00000002	5
Nitrates (mg/l)	0.00000065	0.00000016	24.6

* Figures based on 1,790 l/day being discharged from KMK WWTS process to the land drain over a typical day (10 hour working period) and using proposed effluent quality analysis data taken from Molloy Precast (the proposed WWTS provider). The proposed flow from KMK is $0.000021 m^3/s$. See Appendix 2 for laboratory analysis results.

Similarly, when we take a 'Mass Balance' approach, the following is used:

This formula is used to calculate the concentration of a parameter in the receiving water i.e. land drain downstream of the discharge. This downstream concentration may then be compared directly with the water quality standard (EQS) to determine whether the discharge will cause an exceedance of the EQS value.

Mass balance Equation:

$$T = \frac{FC + fc}{F + f}$$

where:

- F is the river flow upstream of the discharge (usually 95%ile flow m^3/sec);
- C is the concentration of pollutant in the river upstream of the discharge (mean concentration in mg/l);
- f is the flow of the discharge (m^3/sec);
- c is the maximum concentration of pollutant in the discharge (mg/l);
- T is the concentration of pollutant downstream of the discharge.

Suspended solids is thus investigated and quantified in terms of its potential increase down stream as follows:

Suspended solids:

$$T = \frac{0.182 + 0.00008}{0.0026 + 0.00002}$$

= 69.5

Ammonia is thus investigated and quantified in terms of its potential increase down stream as follows:

Ammonia :

$$T = \frac{0.00073 + 0.00002}{0.0026 + 0.00002}$$

= 0.286

Discussion:

From the above results in tables 1.1, 1.2, 1.3, 1.4 and 1.5 and from the Mass Balance Equation calculations, we can see that there is a negligible reduction in the water quality of the land drain downstream of the proposed discharge point from KMK Metal's WWTS.

For example: the expected ammonia increase will only be 5% of the existing levels on the drain, the phosphorous levels will be increased by 6% and nitrates by 24%.
It is also important to consider that the receiving land drain flows through agricultural and industrial land prior to entering the Tullamore River. The entry point to the river is estimated at various points depending on land drain water levels.
Further reasons for the projected low impact to the Tullamore river from KMK are as follows;

- The discharge from the WWTS will be controlled and treated. The following treatment of discharge is carried out;
  - All domestic and associated effluent from the proposed up-graded WWTS is effectively treated by a primary, secondary and final biological process prior to entry to the land drain. This treatment process is described on page 2 previously and technical details are fully represented in the Molly Precast Environmental Solutions document in Appendix 1.
  - There will be a sampling chamber installed on the final outfall from the sand filter unit for sampling of treated effluent quality prior to linking with the roof water discharge pipe from D-Hanger building. This sampling point will provide monitoring of the discharge prior to dilution with rainwater during wet weather. The true dilution effect of the effluent discharge can be determined by sampling of the discharge pipe at the land drain during wet weather for comparison purposes.
  - There are no chemicals or other substances entering the WWTS and therefore precluded from entering the land drain.

- The receiving land drain flows through a myriad of other land drains prior to entry to the Tullamore River (refer to Fig 1 previously). This network of land drains will assist greatly in assimilation of the organic and other parameters prior to entry to the river. For example, vegetation growing in the land drains can utilise nutrients in water such as nitrogen and phosphorous. In addition, dilution effects of rainfall can also reduce the concentration of contaminants.

APPENDIX 1

MOLLOY PRECAST Environmental Solutions
Proposed Waste Water Treatment Plant improvements

MOLLOY PRECAST
Environmental Solutions

Colerain, Clara Road, Tullamore, Co. Offaly.
Tel: 05793 26000 Fax: 05793 26060
Email: info@molloyprecast.com Web: www.molloyprecast.com

KMK Metals, Cappincar, Tullamore, Co. Offaly

Proposed Waste Water Treatment plant improvements

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Proposed treatment system 3
Proposed secondary treatment system components 3
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Tertiary Treatment Recommendations.....6-7
Service period Recommendations.....7
Service Contract sample 8-9

Atached drawings:
Site plan
Proposed system
Proposed sand filter

Attached by others: Final Site Layout Drawings

C.O. Niall Nally, Enviroco Management Services
Bow House, O'Moore Street, Tullamore, Co. Offaly
Phone: 087 1221422
Email: nnally@enviroco.ie

Date: 17-07-2012

MOLLOY
Precast Products Ltd.
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Tullamore, Co. Offaly
T: 057-93-26000
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E: info@molloyprecast.com
W:www.molloyprecast.com

Date: 17th July 2012

Re: Site Specific information for WWT system and sand filter for KMK Metals, Cappincar, Tullamore

Site relevant parameters:

The site at KMK metals is small and very restricted, only a limited portion of land will be available for percolation. It is proposed to install Primary, Secondary and Tertiary treatment unit discharging to surface water.

The design criteria will be:

1. To achieve the level of treatment that is suitable for surface water discharge.
2. To have a system that is as automatic and as simple as possible to run.
3. To have a system that will have reasonable ongoing running costs.
4. To have a system that will require low external maintenance costs.
5. Regular in-house monitoring should be quick and simple.

Estimated daily flow into the existing wastewater treatment plant is 1790 litres.

Calculated PE (Hydraulic Load@ 150l/person): 12 PE
Calculated Organic Load: 1.44kg Equiv. 24PE

On review of effluent quality results from Oldcastle (lab ref 217988), and with comparison of COD tests carried out in house, they seem to be somewhat accurate. The effluent from the existing system is very strong and further treatment will be required for dosing onto a sand filter.

Some items of concern include:

- High phosphorus content, this will require ferric chloride dosing, the combination of a secondary treatment unit and sand filter will not bring phosphorus levels down to desirable levels.

- Limited Carbon, we feel that the levels of Carbon in this system are not high enough to deal with the nutrient levels. For proper removal carbon dosing will be required.

Proposed treatment system

Aswaflow A1 10 - 20PE using *WISSMANN ELEKTRONIK GMBH* patented *SBR* ***Clear Rex*** ® technology, certified tested to EN 12566-3, MFPA 4-50PE Cert No.B31.12.081.01.

The primary, buffer and treatment tanks are installed underground and will not give rise to any noise nuisance or any unpleasant odours once the system is correctly vented and maintained.

Proposed secondary treatment system components

The proposed *Aswaflow Wastewater Treatment System* is a SBR (Sequencing Batch Reactor) mechanical aeration system designed to cater for 10 to 20PE *(population equivalent)*.
The system will be programmed to specifically suit the calculated loads..

The following set-up will be applied:

- Installation of a 7000 litre tank divided into two equal compartments after the existing biocycle unit. The existing tank will operate as a basic primary tank for solid settlement. The first chamber of the new tank will act as a buffer, capable of buffering a day's influent. The second chamber will act as the reaction chamber.
- Installation of a SBR unit operating on a 12 hour cycle modified to include both ferric chloride and carbon dosing .
- Installation of a 2500 litre pump station to feed the previously designed sand filter. (Pumps sized specifically for the designed pipework layout)
- After commissioning, a check and testing is carried out at three months or by agreement.
- A local care taker will be trained and instructed in the operation and checks of the system, for efficient operation.
- Electrical requirements are: an independently 16A 220v supply.
- Kiosk with control panel installed with **audible and visual alarms**.
- **Yearly electrical power consumption will be < 1500 kWh for this site.**
- All tanks are installed under ground with low noise operation.
- No unacceptable odors will be present when the correct ventilation is installed.
- Recommended servicing periods, four times per year.
- Recommended minimum de-sludging frequency is once per year, or as the service engineer directs.
- During light load periods the system will revert to economy mode and holiday mode to reduce energy consumption to the minimum.

Tests and approvals of the SBR system

- *National Technical Approval, Germany* **Z-55.3-165 4-50PE** Approval was based on independent testing done by the University Weimar, MFPA Weimar. Threshold tested values to **DIN En 12566-3. Cert number MFPA 4-50PE** cert No.B31.12.081.01.

BOD_5: 11mg/l
COD: 62mg/l
Settable solids: 28 mg/l
NH_4-N: 5 mg/l
P : <1.8 mg/l *(with Ferric Chloride dosing)*

A correctly constructed polishing filter or sand or soil can be expected to achieve final effluent results as follows. (See Tertiary treatment below)

Characteristics In mg/l	Prior to Treatment	Treated (SBR) 8 hour cycle	After Polishing Filter (or sand)
Ph	7.5	7 – 7.5	7
$B.O.D_5$	<300	< 11	< 5
C.O.D.	>400	< 62	< 35
Total Solids	>200	< 28	< 4
Phosphorous	<10	<2 (with chemical dosing)	<1
Ammonia (NH_4-N)	>60	< 5	<1
Nitrates NO_3-N		<10	<8
Nitrites NO_2-N		<1	<1

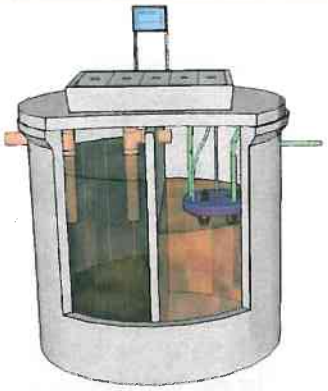
EPA manual *Waste Water Treatment – Single houses – Small Communities. The achievement of these results is not guaranteed as the treatment achieved will depend on the soil and site conditions and good system operational and maintenance practice.*

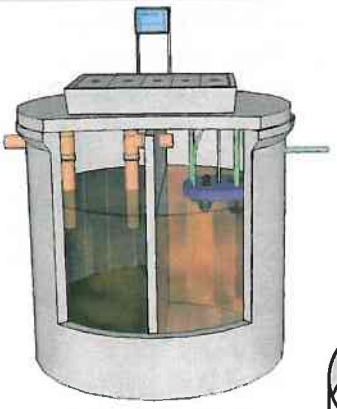
How does a Sequential Batch Reactor system work

AswaFlow uses Sequence Batch Reactor technology to treat wastewater to the minimum standards set out by the EPA. An SBR system treats wastewater in a cycle of three phases namely **FILL**, **REACT**, **SETTLE** and **DISCHARGE**. The AswaFlow system repeats this cycle three times each day. The sewage treatment system is separated into three tanks, namely: Primary, Buffer and Treatment. Raw sewage enters the Primary Tank where it is stored; this in turn overflows into the Buffer Tank, where it is intermittently pumped into the Treatment Tank. The Primary Tank allows solids to settle under quiescent conditions. The purpose of the Buffer Tank is to collect and store wastewater while the Treatment tank is in a cycle. The Treatment tank treats the wastewater prior to discharge into the percolation system. The illustrations below are for a two chamber domestic system, however, the process is identical to the operation of the Buffer Tank and Treatment Tank of the commercial system.

Fill

Sewage is transferred from the first chamber into the second chamber via a siphon pipe primed by the sludge pump. An equal amount of wastewater is transferred every time. If the required amount is not available within the first chamber the next phase (React) will not commence until the quantity of wastewater is available.



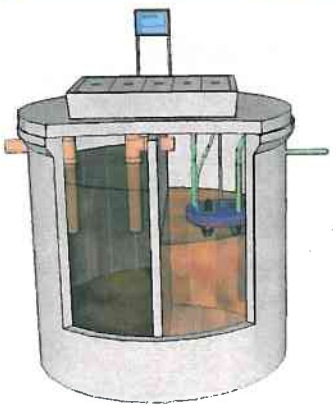


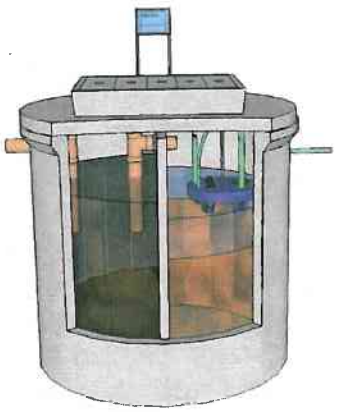
React

The AswaFlow system uses bacteria already in the chamber to degrade the impurities within sewage. This is achieved by agitating the contents of the tank to mix the sewage with the existing contents of the chamber together. Oxygen is added using an aerator to allow the bacteria to thrive and efficiently remove the sewage's impurities. To prevent excessive amounts of sludge building up in the second chamber a small portion of sludge is intermittently pumped back to the first chamber using the sludge pump.

Settle

The React Phase finishes after a set period of time, all equipment is then switched off allowing the sludge and bacteria within the tank to settle out. This produces a clarified volume of water on the top of the chamber.





Discharge

This phase removes the clarified volume of water. The clarified effluent is pumped to the percolation system using the clear water pump. The volume of water discharged is equal to the volume added in the fill phase and is controled by a float switch.

Site Specific Adjustments of SBR

The Aswaflow system is unique in that the cycle can be successfully adjusted to run a 6 hour, an 8 hour, a 12 hour or a 24 hour cycle. The system proposed for this development can buffer 100% of the days calculated output of waste water at the beginning of a cycle.

MOLLOY PRECAST LTD. fully guarantees the *Aswaflow Wastewater Treatment System* as suitable for the development in question. The system must be installed according to the manufacturer's specific instructions and commissioned by trained personnel. To ensure the efficient treatment and disposal of the domestic wastewater, we recommend the following:

- **NO RAINWATER, SURFACE WATER** etc., should be discharged to the treatment system.
- Only domestic wastewater, which includes all effluent from the kitchen, toilets, bathroom, showers, appliances, should be discharged to the treatment system.

- **N.B. Urinals and any other automatically flushing apparatus should be economy type and only operate during the occupied time. (A water meter should be fitted to the main supply for regular checking to determine there is no unnecessary waste.)**

Type of Tertiary Treatment - Intermittent Sand Filter

Intermittent sand filters use unsaturated aerobic conditions to effectively treat wastewater. Sand filters consist of a number of beds of graded sand 700-900mm deep in total underlain by a 200mm thick gravel layer to prevent outwash or piping of the sand as per fig.8.5 p31 of EPA CoP 2009. Sand filters can have good phosphorus removal attributes however this is entirely dependent on the sands mineralogy and phosphorus removal is finite. The sand filter should be constructed in the following way as per section 8, EPA CoP, 2009.

- The sand filter for this project should be **95 m^2** in size.
- The recommended dosing rate is 40 lit per m^2 per day.
- This filter is best finished on top with gravel for better Oxygen uptake, monitoring and maintenance. (A minimum of soil cover for, grass growth, can be used effectively.)
- Wastewater should be distributed evenly throughout the sand filter using a pressured pipe network.
- The sand filter should be vented appropriately
- The sand filter should be sealed on the sides to prevent side flows.
- Construct the Sand Filter as per the attached drawing.

- **Discharge is collected and diverted away from site.**
- **Place the 4" perforated ventilation pipes in place with the non perforated vertical vent shafts supported as required as per the supplied construction drawings.**
- Place the side sealing impermeable membrane in place.
- Since the side sealing impermeable membrane must extend to the full height of the sand filter fold the excess back over the clay while the bottom layers of the sand filter are being assembled with the vent pipes also being positioned at this time.
- Continue building the clay bank to enclose the sand filter in stages insuring that the sealing side sealing membrane is kept in place.
- Place the sand filter media in layers, exactly as shown in the drawing, the fine filter sand must be correctly graded and **certified for the Cu D_{60}/D_{10} <4** requirement as per EPA recommendations. (To insure that the Sand Filter reaches its design life of >25 years the Cu should be <2)
- Place the pressurized distribution pipes in place as per the drawing with holes pointing downwards and pipes sloped away from the manifold at a gradient of about 1:200
- Cover the distribution pipes with a little more stone and a membrane to prevent weed growth.
- The pipe system should drain down after dosing to insure **frost protection.**
- A degree of skill and experience is required to construct a Sand Filter successfully. The attached generic drawing should be studied for guidance only, consult Molloy Precast for specific details.
- Ensure that the contractor is familiar with Sand Filter construction and has a level of skill and experience required to construct the filter correctly.

Servicing

Servicing is carried out by Molloy Precast Products Ltd. trained personnel.
It is recommended that this system is serviced four times a year and monitored by a caretaker weekly.

Please contact me should you require any additional information.

Yours sincerely,

Shane Fox

Shane Fox B.Eng MIEI

Civil Engineer
Molloy Precast Products Ltd

MOLLOY
Precast Products Ltd.
Coleraine, Clara Road
Tullamore, Co. Offaly
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F: 057-93-26060
E: info@molloyprecast.com
W:www.molloyprecast.com

Site ID:tba.

Maintenance Contract Agreement:
Aswaflow Wastewater Treatment System For 10-20 PE

For: **Management**

At: **KMK Metals, Cappincur, Tullamore, Co. Offaly**

Contact phone numbers: Tel:..... Fax: .....

MOLLOY PRECAST LTD. undertakes to service the system as follows:

- Visual inspection and servicing off all components of the Aswaflow system and a complete check of the Pumping Station pumps and the Sand Filter condition.
- Efficiency testing of the system on the following core parameters:
  - Sludge level in the primary settlement tank (to determine de-sludging frequency)
  - Sequential batch reactor(SBR) sludge volume check (Settled Sludge Volume – SSV_{30})
  - System test run through the control panel and check alarm log
  - Adjustment of system settings on the control panel where necessary
  - Issue a maintenance report of tests when completed

Service charge: €350 inc. VAT payable in advance, for each service call.

Payable in advance. Renewable yearly. Call out charges are at our standard rates plus parts and mileage. Equipment under warranty is dependent on Molloy Precast Ltd. servicing the system as advised. As a minimum the system should be serviced annually. (This service contract applies only to the treatment system and does not extent to the pipe work outside of the tank area. Toilet and pipe blockages or percolation areas are not covered.)

First Service Call due after : TBA
Second Service call due after : ... .
Third Service call due after : ... .

Optional Laboratory testing of effluent on request.
It is advisable to avoid excessive use of detergents and household cleaning agents and to use the phosphate free alternative products.
Disclaimer: Molloy Precast Ltd. cannot take responsibility for the effluent quality as the treatment achieved will depend on household input, good system operation and maintenance. Molloy Precast Ltd cannot take responsibility for equipment damage owing to flooding/unfavourable site conditions.

Signed: ---------- **Signed:** ----------
(for - MOLLOY PRECAST LTD. Ltd.) *(for Customer/Client)*

Position: Civil Engineer
Date: 17th July 2012 **Date:** ----------

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W:www.molloyprecast.com

(Prices Valid 2011 – VAT @ 13.5% - See terms & conditions)

Maintenance Contract Terms & Conditions

- **Molloy Precast Products Ltd.** trained service personnel will conduct the servicing of the designated Sewage Treatment System in a safe and efficient manner in accordance with Molloy Precast Products Ltd. Safety Statement.
- The site Occupier / Owner will insure that the site is accessible and safe.
- This contract does not bind Molloy Precast Products Ltd. to effluent quality, however every effort will be made to advise the occupier and to make any adjustments to the plant that will ensure the best possible effluent quality.

1. The occupier should insure that all manholes pertaining to the sewage treatment system are accessible.
2. Access to the control panel is also required. (If access to the control panel is not available at the time of a service call, the service will proceed without that component of the service.)
3. Access to a water tap is needed to clean components during servicing.
4. It is advisable that children and pets are not present in the vicinity of the sewage treatment tanks during servicing. (Open manholes present a significant risk of injury or drowning in the deep tanks.)

- The Service visit includes the items and visits that are paid for and indicated on the maintenance contract only.
- Replacement, broken or unserviceable parts will be charged for at cost.
- Breakdowns, alarms, etc. requiring **call out**, are subject to the charges below.
- Note: This maintenance contract only covers the treatment system. It does not extend to any fowl sewer pipe work or blockages or house fittings external to the treatment system. It does not cover any problems relating to percolation or soak-aways.
- A call out request, that occurs close to a due service call date, may be combined with the service by mutual agreement.

Failure to have the system serviced, on an annual basis, will invalidate any current warranty after the first 12 months of operation.

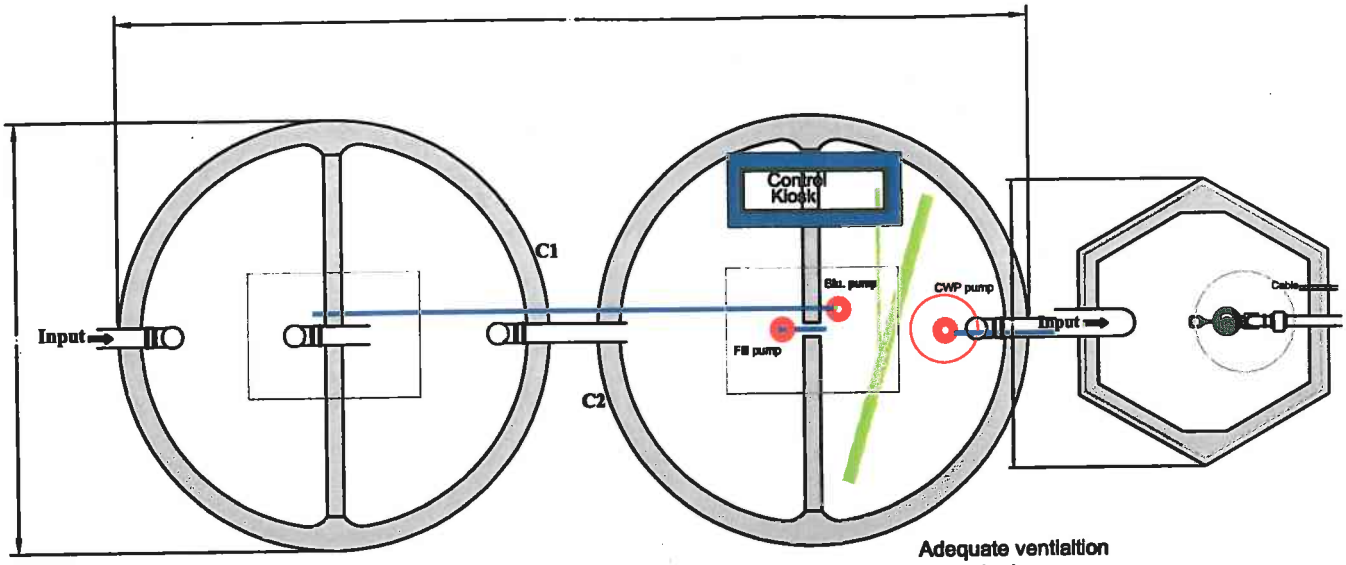
Call out costs are: €100 per visit plus mileage @ €1.20 per mile from Tullamore and €40 per hour for every hour after the first hour, all plus VAT at 13.5%.

Access and mutually acceptable times must be arranged beforehand. No access at the time of an arranged call will incur the full callout charge.

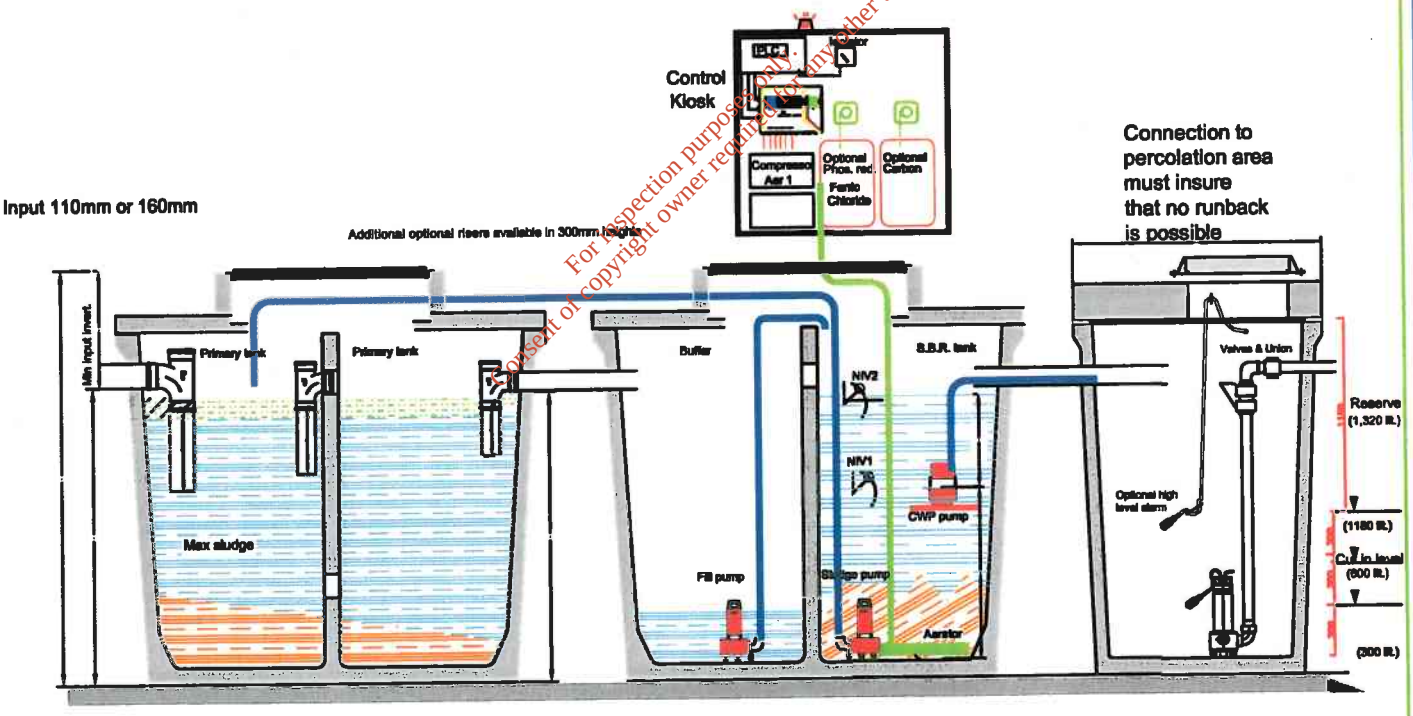
Please mark the services required on the signed document and return to Molloy Precast with payment & VAT for the required services. The counter-signed document will be returned with a receipt.

(Prices Valid 2011– VAT @ 13.5%)

4-20 PE Wastewater Treatment System - 2S+ Tanks (14,000 L) with 2500 litre pump station



Adequate ventilation is required.



Primary & Sludge **Buffer** **SBR Reactor** **Pump Station**

A good firm, rock free, level base is required.
Where ground is unsuitable, a C30 concrete base may be required.

Clara Road, Tullamore, Co. Offaly, Ireland
Tel: 057 9326000 info@molloyprecast.com
Fax: 057 9326060 www.molloyprecast.com

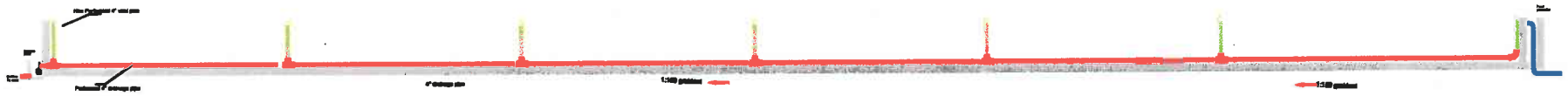
Note: Observe all safety regulations in regard to excavation and lifting requirements. Never leave opening uncovered or unattended at any time.
Note: Specify any specific requirements prior to ordering. All civil works by customer.
Note: Do not scale from this drawing. Only for illustration purposes.

Tank Type: 2S+H+	**Title:** Aswaflow Treatment System - 2S+
Tank Size: 5440mm x 2570mm (Overall)	**Population Equivilant:** 4-20 PE
Height: 2480mm (Each)	**Date:** June 2012
Volume: 14000 litres (7000 litres Each)	**Drg. No.:** WWT-2S+H+-20PE-00
Weight: 7100 kg (Each)	**Drawn By:** SF
(Tank Dim: ± 20mm. **Weight:** ± 30Kg.)	

Suggested layout and design for a tank enclosed 95m sq. open top Intermittent tertiary treatment sand filter.

EPA CoP 2009 part 6.2 page 29 - 10.1.2 page 44 - Table 10.2 page 45 - EPA CoP Clarifications 2/2012

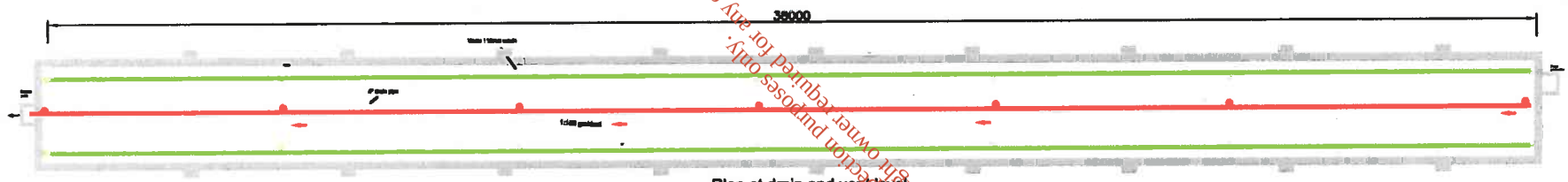
KMK Metals Tullamore



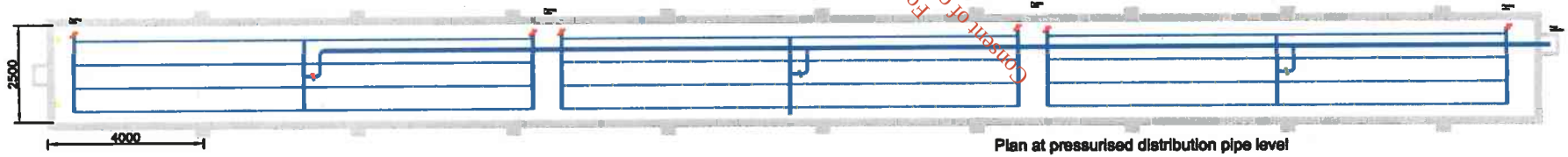
Section through drain pipe

Section through ventilation pipes

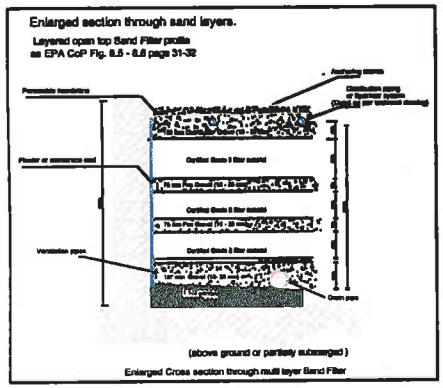
Suggested layering and volumes for this design.



Plan at drain and vent level



Plan at pressurised distribution pipe level



Enlarged Cross section through multi layer Sand Filter

Section through tank

Section through tank at pillars

Section at sample point

Section at rising main frost protection area

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Tullamore, Co.Offaly.
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E-mail: info@molloyprecast.com
Web: www.molloyprecast.com

Local Authority and EPA 2009 CoP Table 6.1 p54 details should be complied with at planning and installation stage.

Minimum separation distances in metres

	Water Course	Well	Lake	Boundary	Road	House
Tanks:	10	10	60	3	4	7
Percolation:	10	30	60	3	4	10

Hydraulic design criteria for three zone single supply.

As per EPA CoP clarifications 02 2012
As per US EPA/625/R-00/8 manual - Chapter 4.07

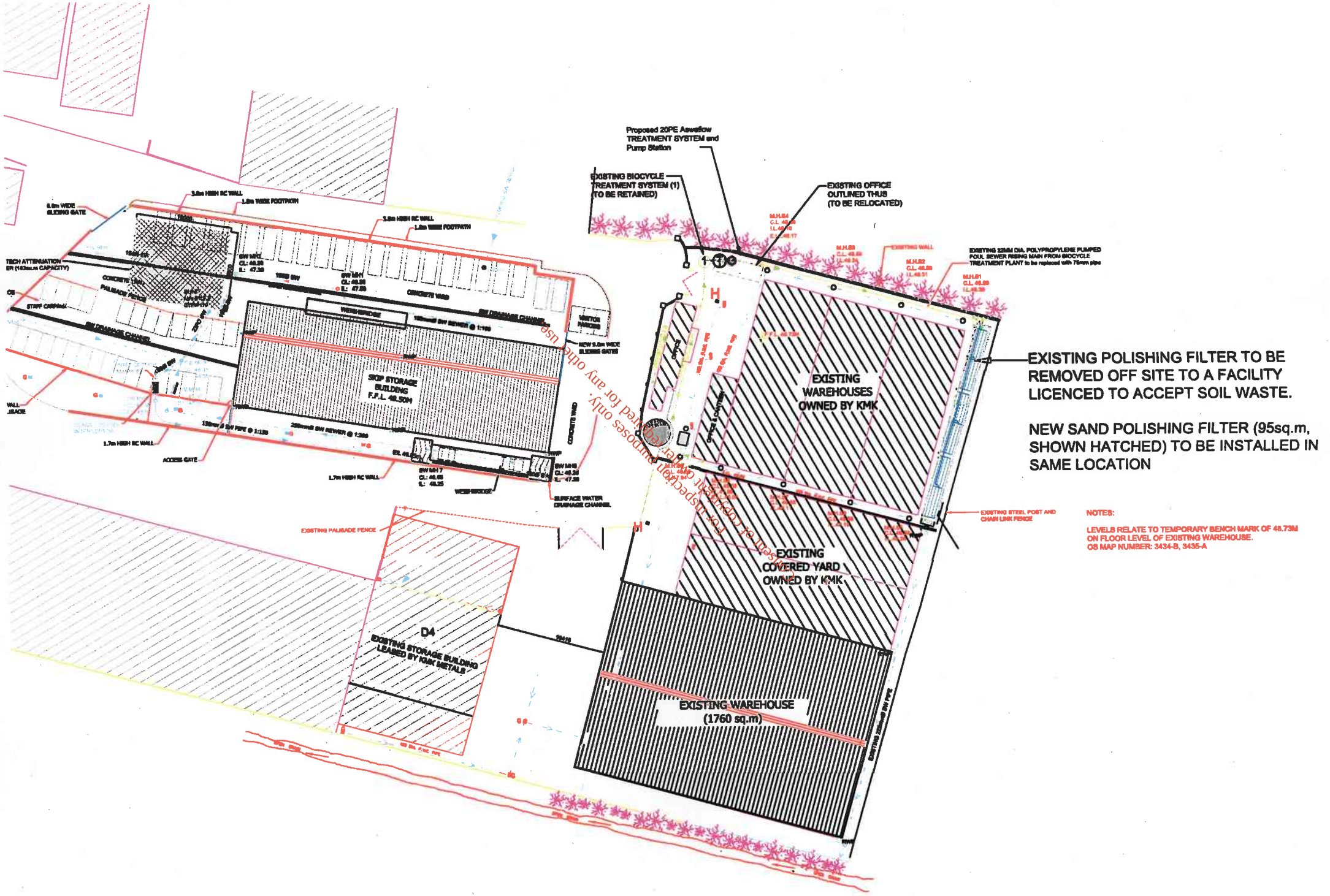
Rising main Supply pipe min 75mm
Manifold distribution pipe 50mm
All laterals 32mm

340 of 5mm holes spaced .8m x .8m x .4m
System drain down for frost protection
Contact Molloy's for details.

Minimum supply pump size :.... litr @ 7m head. Contact Molloy's for details.
60m 75mmØ rising main flow friction at 420 ltrs = 4.34m
30m 75mmØ rising main flow friction at 420 ltrs = 1.63m
Liquid velocity in 75mm rising main 1.85 m/s
Liquid velocity in 50mmØ manifold 1.29 m/s
Liquid velocity at the beginning of each 32mm lateral pipe .4 m/s
Design head for each hole 300mm

Cross sections of sand filter

View of sand filter



APPENDIX 2

LABORATORY ANALYSIS DATA

TEST REPORT

Analysing
Testing
Consulting
Calibrating

BHP
New Road
Thomondgate
Limerick
Ireland
Tel +353 61 455399
Fax + 353 61 455447
E Mail bhpcem2@bhp.ie

Client: Enviroco Management Ltd
Bow House
O'Moore St
Tullamore
Co.Offaly

FTAO: Kenneth Goodwin

BHP Ref. No.: 104541
Order No:
Date Received: 21/06/12
Date Completed: 04/07/12
Test Specification: Nil
Item : See below

Date Sampled: 20/06/12

TEST	Client Reference	Units	Results	Method
Total Suspended Solids	LD US	mg/l	70	APHA - 2540 -D
pH		-	6.95	APHA - 4500 - H^+ - B
Total Ammonium (as N)		mg/l	0.28	APHA-4500-NH_3-D
OrthoPhosphate (as PO_4)		mg/l	0.13	APHA - 4500 - P-E
BOD		mg/l	14	APHA - 5210 - B
COD		mg/l	48	APHA - 5220 - D
Nitrate (as NO3)		mg/l	1.33	APHA - 4110 - B
Total Suspended Solids	LD DS	mg/l	100	APHA - 2540 -D
pH		-	6.98	APHA - 4500 - H^+ - B
Total Ammonium (as N)		mg/l	0.16	APHA-4500-NH_3-D
OrthoPhosphate (as PO_4)		mg/l	0.14	APHA - 4500 - P-E
BOD		mg/l	11	APHA - 5210 - B
COD		mg/l	49	APHA - 5220 - D
Nitrate (as NO3)		mg/l	0.25	APHA - 4110 - B

Additional Information: All methods are from Standard Methods for the Examination of Water and Wastewater 20th Edition.

Authorised by:

Pat O' Sullivan
Chemical and Environmental Monitoring Laboratory
Environmental Site Manager

Date of Issue: 04th July 2012

Map F.1.1b Environmental Monitoring Locations at the KMK Metals Recycling Ltd Facility