

25th February 2022

Lesley Loane
Director
Land & Mineral Management

By Email

Our Ref: RMA/RC2331_1 – Wellingborough IBA Plant – H1 Technical Note

Dear Lesley,

RE: PROPOSED INCINERATOR BOTTOM ASH PROCESSING PLANT ON LAND TO THE NORTH OF DON WHITE ROAD, FINEDON INDUSTRIAL ESTATE, WELLINGBOROUGH, NN8 4FT – TECHNICAL NOTE TO SUPPORT THE H1 SURFACE WATER RISK ASSESSMENT MODELLING OF A DISCHARGE TO FOUL SEWER

Further to our instruction on behalf of Day Group to carry out H1 surface water risk assessment modelling for the above proposed discharge to foul sewer, we have set out in this technical note a description of the background to the proposed operation, a summary of the H1 assessment methodology, details of data sources and a summary of the results.

Project Background

The plant is proposed to accept incinerator bottom ash (IBA) into a processing building which is entirely under cover. The processed IBA (known as incinerator bottom ash aggregate [IBAA]) is then transferred to external areas for storage, prior to being taken off-site for use as an aggregate.

The externally stored IBAA is open to the elements and external areas of the site will be drained to foul sewer under the terms of a Trade Effluent Consent. A significant proportion of runoff is collected and re-used in the IBAA process. In order to obtain an Environmental Permit for the activity under the Environmental Permitting Regulations (2016), it is necessary to carry out a surface water risk assessment using the Environment Agency's (EA) H1 Database Tool.

Trade effluent discharges from the site would be routed to the Broadholme Sewage Treatment Works (STW) which is operated by Anglian Water and located to the east of Wellingborough. This STW discharges into the River Nene.

The principal objective of this study is to assess the implications of the proposed discharge on water quality in the River Nene after it is released from Broadholme STW.

H1 Assessment Methodology

The H1 surface water risk assessment has followed the following methodology:

1. Consultation has been undertaken with the project drainage engineers (BCAL Consulting) regarding the proposed foul drainage strategy and details of the proposed point of connection to public foul sewer, as well as maximum allowable discharge rates.

2. Key input parameters were derived for the proposed operation, including flow rates in the receiving water, effluent flow rates and release concentrations (as described in more detail in the following subsection).
3. Relevant information was entered into an H1 Surface Water Risk Assessment spreadsheet model to establish if the proposed discharge can be screened out by passing the key tests in the model. The model was designed to follow the assessment criteria set out in the EA's 'Surface water pollution risk for your environmental permit' guidance.¹

As the IBAA plant is not yet operational, relevant data for effluent flow rate and release concentrations have been taken from actual data from the Day Group IBAA plant at Royal Edward Dock in Avonmouth. The proposed plant at Wellingborough would be similar operationally to that at Avonmouth and it is therefore considered appropriate to use background data from the latter as a proxy site to inform the H1 assessment for Wellingborough.

Data Sources

The following data sources have been utilised in the H1 risk assessment:

1. There are no suitable gauging stations on the River Nene upstream of Broadholme STW, so Q95 flows for the receiving water have been obtained from the National River Flow Archive via the Flood Estimation Handbook (FEH) software for the gauging stations at Upton Total (32006), Harrowden (32004), Wootton Park (32031) and St Andrews Total (32007). These gauging stations represent a conservative estimate of the Q95 flow on the River Nene at Broadholme STW as they do not include all tributaries feeding into the River Nene upstream of the STW. The combined Q95 flow for the River Nene at Broadholme STW has been estimated as 0.729 m³/s (i.e. 729 l/s) which is broken down as follows:
 - a. Upton Total (32006) = 0.279 m³/s
 - b. Harrowden (32004) = 0.184 m³/s
 - c. Wootton Park (32031) = 0.042 m³/s
 - d. St Andrews Total (32007) = 0.224 m³/s
2. Conservative effluent flow rates have been taken as the maximum permissible discharge rate into foul sewer of 5 l/s with an average discharge rate of 4 l/s. As the vast majority of surface runoff would be captured and re-used in the IBAA process, it is considered that these assumed discharge rates are considerably greater than anticipated.
3. Release concentrations have been collated from actual concentration data from the Avonmouth plant for the following substances: chloride, fluoride, sulphate, arsenic, boron, cadmium, cobalt, chromium, copper, mercury, nickel, lead, vanadium and zinc. This list of substances was derived by reviewing the analytical data against the substances held within the H1 assessment database. Where concentrations were reported as below the limit of detection (LoD), the values were taken as being equal to the LoD in accordance with best practice (refer to Appendix A).
4. Sewage Treatment Factors were applied to each substance using the appropriate factors as reported on the gov.uk website.
5. The concentrations of copper, nickel and zinc were corrected from total metal concentrations to bioavailable metal concentrations using the EA's M-BAT tool so that they could be compared to the corresponding EQS (which are expressed as bioavailable concentrations). The concentrations of these metals used in the H1 model are therefore less than the total concentrations reported in Appendix A.

¹ [Surface water pollution risk assessment for your environmental permit - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit)

Summary of Results

The completed H1 assessment model is enclosed (refer to Appendix B) and this shows that arsenic and fluoride pass Test 1 due to their estimated release concentrations being less than 10% of the corresponding Environmental Quality Standard (EQS).

All remaining substances (with the exception of chloride) have been shown to pass Test 2. However, as chloride passes Test 3, it is concluded that the discharge (as modelled) does not pose a significant risk to the aquatic environment.

As none of the substances modelled fail Tests 3 or 4, detailed water quality modelling is not required in accordance with the EA's H1 guidance. All substances have been screened out of the H1 assessment as they do not pose a significant risk to the receiving water (the River Nene) after treatment at Broadholme STW.

I trust that we have interpreted your requirements correctly and look forward to hearing from you in due course.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Rob Murdock', with a long horizontal flourish extending to the right.

Dr Rob Murdock
Director

Encs: Appendix A – Proxy Effluent Data from Avonmouth IBAA Plant
Appendix B – H1 Assessment Tool (Completed)

***Appendix A:
Proxy Effluent Data from
Avonmouth IBAA Plant***

				Site	Royal Edward Dock - Avonmouth													
ACSE Sample Number					34885													
Sample ID					394435 - 18-91876													
Clients Sample Ref.					Water Sample; 27/03/2018													
Material Source					Yard And Finished Product Stockpile Area													
Location / Sample Depth (m)					Final Chamber of Wedge Pit													
Date Sampled					27/03/2018	10/04/2018	17/04/2018	24/04/2018	01/05/2018	08/05/2018	15/05/2018	22/05/2018	27/05/2018	05/06/2018	12/06/2018			
REPNAME	UNITS	DETRF	METHOD															
Chloride	mg/l	MT/ACSE/204	AR	mg/l	12.9000	9.9200	15.5000	575.0000	847.0000	947.0000	433.0000	1210.0000	1470.0000	3520.0000	2470.0000	1046.39	3520.00	
Fluoride	mg/l	MT/ACSE/204	AR	mg/l	0.1100	0.0600	0.1000	0.2900	0.4500	0.6400	0.2100	0.4500	0.5000	2.0200	1.0300	0.53	2.02	
Sulphate	mg/l	MT/ACSE/204	AR	mg/l	13.4000	4.4100	7.0100	45.1000	104.0000	127.0000	96.0000	105.0000	107.0000	181.0000	161.0000	86.45	181.00	
Arsenic	mg/l	MT/ACSE/205	AR	mg/l	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0120	0.0030	0.0038	0.0120	
Boron	mg/l	MT/ACSE/205	AR	mg/l	0.2000	0.2000	0.2000	0.2480	0.3330	0.2340	0.2000	0.2000	0.2000	0.2000	0.2090	0.22	0.33	
Cadmium	mg/l	MT/ACSE/205	AR	mg/l	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.30
Cobalt	mg/l	MT/ACSE/205	AR	mg/l	0.0010	0.0010	0.0010	0.0030	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0012	0.0030	
Chromium	mg/l	MT/ACSE/205	AR	mg/l	0.0030	0.0030	0.0040	0.0060	0.0190	0.0280	0.0070	0.0100	0.0210	0.0120	0.0140	0.0115	0.0280	
Copper	mg/l	MT/ACSE/205	AR	mg/l	0.0250	0.0190	0.0110	0.3210	0.5700	0.8560	0.2950	0.9520	1.1400	1.8700	1.6800	0.704	1.870	
Mercury	mg/l	MT/ACSE/202	AR	mg/l	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Nickel	mg/l	MT/ACSE/205	AR	mg/l	0.0008	0.0036	0.0003	0.0169	0.0227	0.0218	0.0117	0.0317	0.0360	0.0558	0.0459	0.022	0.056	
Lead	mg/l	MT/ACSE/205	AR	mg/l	0.0040	0.0040	0.0040	0.0110	0.0090	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0051	0.0110	
Vanadium	mg/l	MT/ACSE/205	AR	mg/l	0.0050	0.0060	0.0040	0.0060	0.0120	0.0170	0.0060	0.0080	0.0100	0.0090	0.0100	0.0085	0.0170	
Zinc	mg/l	MT/ACSE/205	AR	mg/l	0.4980	0.1390	0.1150	0.1250	0.0890	0.0030	0.1160	0.0360	0.0730	0.0270	0.0650	0.117	0.498	
pH (@ 20°C)	units	MT/ACSE/301	AR	units	5.7000	8.3000	8.2000	7.9000	7.7000	7.3000	8.1000	7.2000	6.5000	7.5000	7.2000	7.42	8.30	
Temperature	oC	IHP	AR	oC	19.0000	18.0000	19.0000	18.0000	19.0000	20.0000	19.0000	19.0000	19.0000	19.0000	19.0000	18.91	20.00	

Mean	Max	Mean	Max
mg/l	mg/l	ug/l	ug/l
1046.39	3520.00	1046393	3520000
0.53	2.02	533	2020
86.45	181.00	86447	181000
0.0038	0.0120	3.82	12.00
0.22	0.33	220	333
0.0003	0.0003	0.30	0.30
0.0012	0.0030	1.18	3.00
0.0115	0.0280	11.55	28.00
0.704	1.870	704	1870
0.0001	0.0001	0.10	0.10
0.022	0.056	22.47	55.80
0.0051	0.0110	5.09	11.00
0.0085	0.0170	8.45	17.00
0.117	0.498	117	498
7.42	8.30	7418	8300
18.91	20.00	18909	20000

CORRECTED TO BIOAVAILABLE METAL IN H1 USING MBAT TOOL

CORRECTED TO BIOAVAILABLE METAL IN H1 USING MBAT TOOL

CORRECTED TO BIOAVAILABLE METAL IN H1 USING MBAT TOOL

***Appendix B:
H1 Assessment Tool
(Completed)***

Site Location: Day Group IBA Plant, Wellingborough
Discharge NGR: SP 93991 68537 at WWTW
Receiving Water Body: River Nene Broadholme WWTW
Freshwater Q95 (m3/s): 0.729 GS 32006+32004+32031+32007
Discharge via Sewer: Yes
Mean Effluent Flow Rate (m3/s): 0.004 assumed mean flow of 80% of maximum permitted flow
Maximum Effluent Flow Rate (m3/s): 0.005 max permitted discharge rate to foul PS

Substances in Discharge	Limit of Det (ug/l)	Mean Conc (ug/l)	Max Conc (ug/l)	STRF	AA EC (ug/l)	MAC EC (ug/l)	AA EQS (ug/l)	MAC EQS (ug/l)	Upstream WQ (ug/l)	Test 1 Results AA EQS	Test 1 Results MAC EQS
Arsenic		3.82	12.00	89%	3.40	10.68	50.00	9999.00	5.00	Pass	
Chromium		11.55	28.00	16%	1.85	4.48	4.70	32.00	0.47	Fail	Fail
Cobalt		1.18	3.00	100%	1.18	3.00	3.00	100.00	0.30	Fail	Pass
Copper - bioavailable		11.64	31.10	21%	2.44	6.53	1.00	14.00	0.10	Fail	Fail
Lead		5.09	11.00	17%	0.87	1.87	1.20	9999.00	0.12	Fail	
Chloride		1046390.00	3520000.00	100%	1046390.00	3520000.00	250000.00	250000.00	25000.00	Fail	Fail
Mercury		0.10	0.10	67%	0.07	0.07	0.07	9999.00	0.01	Fail	
Nickel - bioavailable		2.25	5.72	76%	1.71	4.35	4.00	34.00	0.40	Fail	Fail
Sulphate		86447.00	181000.00	100%	86447.00	181000.00	400000.00	9999.00	40000.00	Fail	
Boron		220.00	333.00	100%	220.00	333.00	2000.00	9999.00	200.00	Fail	
Vanadium		8.45	17.00	100%	8.45	17.00	20.00	9999.00	2.00	Fail	
Zinc - bioavailable		19.43	82.69	33%	6.41	27.29	12.90	9999.00	1.29	Fail	
Fluoride		533.00	2020.00	50%	266.50	1010.00	5000.00	15000.00	500.00	Pass	Pass
Cadmium		0.30	0.30	37%	0.11	0.11	0.15	0.90	0.02	Fail	Fail

9999 if no MAC EQS

AA EC < 10% EQS

MAC EC < 10% EQS

Site Location: Day Group IBA Plant, Wellingborough
 Discharge NGR: SP 93991 68537

Receiving Water Body: River Nene
 Freshwater Q95 (m3/s): 0.729

Discharge via Sewer: Yes

Mean Effluent Flow Rate (m3/s): 0.004
 Maximum Effluent Flow Rate (m3/s): 0.005

Substances in Discharge	Limit of Det (ug/l)	Mean Conc (ug/l)	Max Conc (ug/l)	STRF	AA EC (ug/l)	MAC EC (ug/l)	AA EQS (ug/l)	MAC EQS (ug/l)	AA PC (ug/l)	MAC PC (ug/l)	Test 2 Results AA EQS	Test 2 Results MAC EQS
Arsenic	0.00	3.82	12.00	89%	3.40	10.68	50.00	9999.00	0.02	0.06	Pass	
Chromium	0.00	11.55	28.00	16%	1.85	4.48	4.70	32.00	0.01	0.02	Pass	Pass
Cobalt	0.00	1.18	3.00	100%	1.18	3.00	3.00	100.00	0.01	0.02	Pass	Pass
Copper - bioavailable	0.00	11.64	31.10	21%	2.44	6.53	1.00	14.00	0.01	0.04	Pass	Pass
Lead	0.00	5.09	11.00	17%	0.87	1.87	1.20	9999.00	0.00	0.01	Pass	
Chloride	0.00	1046390.00	3520000.00	100%	1046390.00	3520000.00	250000.00	250000.00	5710.18	19208.73	Pass	Fail
Mercury	0.00	0.10	0.10	67%	0.07	0.07	0.07	9999.00	0.00	0.00	Pass	
Nickel - bioavailable	0.00	2.25	5.72	76%	1.71	4.35	4.00	34.00	0.01	0.02	Pass	Pass
Sulphate	0.00	86447.00	181000.00	100%	86447.00	181000.00	400000.00	9999.00	471.74	987.72	Pass	
Boron	0.00	220.00	333.00	100%	220.00	333.00	2000.00	9999.00	1.20	1.82	Pass	
Vanadium	0.00	8.45	17.00	100%	8.45	17.00	20.00	9999.00	0.05	0.09	Pass	
Zinc - bioavailable	0.00	19.43	82.69	33%	6.41	27.29	12.90	9999.00	0.03	0.15	Pass	
Fluoride	0.00	533.00	2020.00	50%	266.50	1010.00	5000.00	15000.00	1.45	5.51	Pass	Pass
Cadmium	0.00	0.30	0.30	37%	0.11	0.11	0.15	0.90	0.00	0.00	Pass	Pass

AA PC < 4% AA EQS MAC PC < 4% MAC EQS

Site Location: Day Group IBA Plant, Wellingborough
 Discharge NGR: SP 93991 68537

Receiving Water Body: River Nene
 Freshwater Q95 (m3/s): 0.729

Discharge via Sewer: Yes

Mean Effluent Flow Rate (m3/s): 0.0040000
 Maximum Effluent Flow Rate (m3/s): 0.0050000

Substances in Discharge	Limit of Det (ug/l)	Mean Conc (ug/l)	Max Conc (ug/l)	STRF	AA EC (ug/l)	MAC EC (ug/l)	AA EQS (ug/l)	MAC EQS (ug/l)	BC (ug/l)	AA PEC (ug/l)	MAC PEC (ug/l)	Test 3 Results AA EQS	Test 3 Results MAC EQS
Arsenic	0.00	3.82	12.00	89%	3.40	10.68	50.00	9999.00	5.00	4.99	5.05	Pass	
Chromium	0.00	11.55	28.00	16%	1.85	4.48	4.70	32.00	0.47	0.48	0.50	Pass	Pass
Cobalt	0.00	1.18	3.00	100%	1.18	3.00	3.00	100.00	0.30	0.30	0.32	Pass	Pass
Copper - bioavailable	0.00	11.64	31.10	21%	2.44	6.53	1.00	14.00	0.10	0.11	0.14	Pass	Pass
Lead	0.00	5.09	11.00	17%	0.87	1.87	1.20	9999.00	0.12	0.12	0.13	Pass	
Chloride	0.00	1046390.00	3520000.00	100%	1046390.00	3520000.00	250000.00	250000.00	25000.00	30573.75	48874.49	Pass	Pass
Mercury	0.00	0.10	0.10	67%	0.07	0.07	0.07	9999.00	0.01	0.01	0.01	Pass	
Nickel - bioavailable	0.00	2.25	5.72	76%	1.71	4.35	4.00	34.00	0.40	0.41	0.43	Pass	Pass
Sulphate	0.00	86447.00	181000.00	100%	86447.00	181000.00	400000.00	9999.00	40000.00	40253.46	41016.37	Pass	
Boron	0.00	220.00	333.00	100%	220.00	333.00	2000.00	9999.00	200.00	200.11	201.18	Pass	
Vanadium	0.00	8.45	17.00	100%	8.45	17.00	20.00	9999.00	2.00	2.04	2.11	Pass	
Zinc - bioavailable	0.00	19.43	82.69	33%	6.41	27.29	12.90	9999.00	1.29	1.32	1.47	Pass	
Fluoride	0.00	533.00	2020.00	50%	266.50	1010.00	5000.00	15000.00	500.00	498.73	504.16	Pass	Pass
Cadmium	0.00	0.30	0.30	37%	0.11	0.11	0.15	0.90	0.02	0.02	0.02	Pass	Pass

BC-PEC <10% EQS BC-PEC <10% EQS

IF TEST 3 IS FAILED, DETAILED MODELLING IS REQUIRED

Site Location:	Day Group IBA Plant, Wellingborough
Discharge NGR:	SP 93991 68537
Receiving Water Body:	River Nene
Freshwater Q95 (m3/s):	0.729
Discharge via Sewer:	Yes
Mean Effluent Flow Rate (m3/s):	0.0040000
Maximum Effluent Flow Rate (m3/s):	0.0050000

Substances in Discharge	Limit of Det (ug/l)	Mean Conc (ug/l)	Max Conc (ug/l)	STRF	AA EC (ug/l)	MAC EC (ug/l)	AA EQS (ug/l)	MAC EQS (ug/l)	BC (ug/l)	AA PEC (ug/l)	MAC PEC (ug/l)	Test 4 Results AA EQS	Test 4 Results MAC EQS
Arsenic	0.00	3.82	12.00	89%	3.40	10.68	50.00	9999.00	5.00	4.99	5.05	Pass	
Chromium	0.00	11.55	28.00	16%	1.85	4.48	4.70	32.00	0.47	0.48	0.50	Pass	Pass
Cobalt	0.00	1.18	3.00	100%	1.18	3.00	3.00	100.00	0.30	0.30	0.32	Pass	Pass
Copper - bioavailable	0.00	11.64	31.10	21%	2.44	6.53	1.00	14.00	0.10	0.11	0.14	Pass	Pass
Lead	0.00	5.09	11.00	17%	0.87	1.87	1.20	9999.00	0.12	0.12	0.13	Pass	
Chloride	0.00	1046390.00	3520000.00	100%	1046390.00	3520000.00	250000.00	250000.00	25000.00	30573.75	48874.49	Pass	Pass
Mercury	0.00	0.10	0.10	67%	0.07	0.07	0.07	9999.00	0.01	0.01	0.01	Pass	
Nickel - bioavailable	0.00	2.25	5.72	76%	1.71	4.35	4.00	34.00	0.40	0.41	0.43	Pass	Pass
Sulphate	0.00	86447.00	181000.00	100%	86447.00	181000.00	400000.00	9999.00	40000.00	40253.46	41016.37	Pass	
Boron	0.00	220.00	333.00	100%	220.00	333.00	2000.00	9999.00	200.00	200.11	201.18	Pass	
Vanadium	0.00	8.45	17.00	100%	8.45	17.00	20.00	9999.00	2.00	2.04	2.11	Pass	
Zinc - bioavailable	0.00	19.43	82.69	33%	6.41	27.29	12.90	9999.00	1.29	1.32	1.47	Pass	
Fluoride	0.00	533.00	2020.00	50%	266.50	1010.00	5000.00	15000.00	500.00	498.73	504.16	Pass	Pass
Cadmium	0.00	0.30	0.30	37%	0.11	0.11	0.15	0.90	0.02	0.02	0.02	Pass	Pass

AA PEC > EQS

MAC PEC < EQS

IF TEST 4 IS FAILED, DETAILED MODELLING IS REQUIRED