Technical Note

Project:	SWIP, Stopgate Lane, Simonswood		
Subject:	Review of AQA & HHRA Addendum – Final		
Author:	Atkins		
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Rev 2.0	Final	SJH	CW	VS	PM	28/09/22

1. Introduction

A planning application has been submitted by Culzean W2E Ltd (the Applicant) to Lancashire County Council (LCC) as Waste Planning Authority, for the development of a medical waste incineration plant at Tower House, Stopgate Lane, Simonswood Industrial Park, Simonswood, (planning application reference LCC/2022/0003).

Atkins was commissioned by LCC as the waste planning authority, to review the Applicant's Environmental Statement (ES) that was submitted with the planning application in December 2021. Atkins' review considered whether the air quality assessment and associated human health risk assessment were robust and carried out in accordance with relevant guidance and legislation, using suitable methods and applying appropriate criteria for evaluation. A review was also provided of relevant statutory consultee comments. Recommendations were made for additional work to address any identified shortcomings or clarifications, and thus verify the validity of the conclusions.

The Applicant has subsequently issued an Addendum to the Planning Statement and ES (Version 1.3, 8 July 2022) and this further review by Atkins considers the following relevant sections of the updated assessment:

- Chapter 4 – Response to Consultation Comments
- Appendix V – Updated Emissions Modelling Assessment (Version 1.5, 8 July 2022)
- Appendix VI – Updated Human Health Risk Assessment (Version 1.3, 8 July 2022);

As the Applicant has issued an Addendum which describes the changes made but without a specific response to each of the points raised in Atkins initial review, reasonable endeavours have been made to identify if the changes address each of the comments raised and how, or where the comments are not addressed, whether this is a material concern.

This report presents and summarises the findings of Atkins' review. The air quality specialist leading the review has over 20 years' experience in air quality assessment, is a full member of the Institution of Environmental Sciences (IES) and Institute of Air Quality Management (IAQM) and is a Chartered Scientist and Chartered Environmentalist.

2. Changes to proposals

The proposals are for a high temperature treatment facility for management of medical wastes. This will include acceptance of up to 3,650 tonnes/annum of hazardous wastes for treatment, which will form the majority of wastes accepted, in addition to smaller quantities of non-hazardous waste with wastes predominantly arising from medical sites. The waste will be treated (thermally destroyed) in a pyrolysis unit, which will process, on average, 400 kg of waste per hour and be operational 24/7.

As the plant will have a capacity less than or equal to 10 tonnes per day for hazardous waste, it is classified as a "small waste incineration plant" and will require an Environmental Permit (EP) to operate under Schedule 13 of the Environmental Permitting (England and Wales) Regulations 2016. The permit, which will include limits on pollutant emissions to air set out in the EU Industrial Emissions Directive (IED) (2010/75/EU), will be issued by West Lancashire Borough Council (WLBC), the local authority area within which the facility is sited.

The proposed abatement of air emissions is comprised of:

- Removal of solids/dust with a trace heated cyclone prior to the oxidiser;
- Selective Non-Catalytic Reduction (SNCR) for nitrogen oxides (NOx) control;
- Ceramic filtration for particulate matter removal;
- Sodium bicarbonate to treat acid gases (SO_2, HCl, HF);
- Powdered Activated Carbon (PAC) to control volatile heavy metals and dioxins and furans

Following the above treatment steps, emissions will be discharged to atmosphere via a 26 m high stack (12 m higher than the previously proposed 14 m stack). The emissions modelling assessment has been updated by the Applicant to reflect this design change.

The assessment of best available techniques (BAT) for the proposed facility will be undertaken by the regulator as part of the permit application process and it is not discussed as part of this review.

3. Review of information

Atkins' review of the updated dispersion modelling assessment (DMA) and human health risk assessment (HHRA), supporting documentation and consultee responses provided by the Applicant is summarised below. Note that only those items where action was proposed are presented; ES Chapter 10 has not been reissued and the initial five items in Atkins first review are not included below as they were not of material impact.

Item	Original Reference	New reference	Atkins comment	Action proposed by Atkins	Action taken by Applicant
Emissions modelling assessment					
6	Appendix VI 3.1	Appendix V 3.1	The Applicant has focused only on the local authority within which the facility is situated (WLBC), and therefore has not identified the closest AQMA to the site, Liverpool City AQMA located 3.7 km south-west of the site. The Liverpool City AQMA is unlikely to be affected but a comment ruling out any potential impacts, for which the IAQM has set more stringent traffic change criteria, is missing.	Applicant to check all nearby authorities and confirm whether other AQMAs could be affected.	No comment made regarding other authorities' AQMAs but Atkins' judgement based on results at closest receptors is that this is of no material impact. **CLOSED**
7	Appendix VI 3.2.1	Appendix V 3.2.1	The closest AURN monitoring site is correctly identified to be St Helens Linkway which is 10 km to the south east of the proposed site. St Helens Linkway AURN data is excluded on the basis of being located in an urban traffic location, which is appropriate. It would however be useful to identify the closest representative (background or suburban) AURN monitoring site. WLBC monitoring data and that undertaken by adjacent authorities has not been considered. WLBC data is excluded on the basis of being located within the WLBC AQMA, which is appropriate. However, there are potentially other relevant sites in neighbouring authorities that would represent receptors in the study area.	AURN sites and adjoining local authority reports should be reviewed to identify if more suitable background monitoring data are available to verify the suitability of the DEFRA mapped background data used in the assessment.	Data for additional continuous monitoring sites is now included. **CLOSED**

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8	Appendix VI 3.3	Appendix V 3.3	DEFRA 2020 mapped data were used in the assessment rather than measured data for NO_2, PM_{10} and $PM_{2.5}$. DEFRA 2001 mapped values (with appropriate adjustment to 2020) were used rather than measured for CO and SO_2.	See item 7	Applicant has updated DEFRA mapping to 2022 data and used measured urban background concentrations where available. **CLOSED**
24	Appendix VI 3.2.3 Table 3.1	Appendix V 3.2.3 Table 3.9	The closest DEFRA Heavy Metals monitoring site is correctly identified as Runcorn Weston Point (note: distance from the proposed site stated incorrectly as 20km rather than 50km). This monitoring site closed in March 2019, however the data presented in Table 3.1 is considered appropriate for use in the assessment. Table 3.1 appears to be incorrectly labelled as the maximum calculated annual mean metal concentrations across **urban industrial monitoring locations** between 2015 and 2019 whereas the data is stated in the text as for the Runcorn site only. Data presented in Table 3.1 also appears to contain inconsistencies for example: for arsenic the maximum should be 0.733 ng/m^3 (2019) rather than 0.708 ng/m^3 (2016); for cadmium the maximum should be 0.118 ng/m^3 (2016) rather than 0.128 ng/m^3 , and for chromium the maximum should be 1.70 ng/m^3 (2018) rather than 1.729 ng/m^3. The methodology for estimating Cr(VI) from chromium is stated to be as per the reference cited (Metals and Metalloids, Expert Panel on Air Quality Standards, 2009) and is in line with the EA document *"Releases from municipal waste incinerators - Guidance to applicants on impact assessment for group 3 metals stack emissions from incinerators"* (https://www.gov.uk/government/publications/waste-incinerators-guidance-on-impact-assessment-for-group-3-metals-stack). However, the background Cr(VI) concentration of 0.785 ng/m^3 presented in Table 3.1 appears to be not 20% but rather 45% of the maximum annual mean chromium concentration of 1.729 ng/m^3. Data provided for the background Cr(VI)	Data provided in Table 3.1 appears to be inconsistent with published data. Data should be checked and corrected as appropriate. Also, see item 84	It is confirmed the Runcorn site is 20 km away. Table 3.9 correctly titled. Noted that the years are now given as 2014 to 2018 which was the source of some discrepancies. Cadmium discrepancy remains but not material. Chromium discrepancy remains but not material as the value used is over twice the measured value and PC is not a material contribution to this. **CLOSED**

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			concentration in Table 3.5 and as used in the assessment is however correct (0.35 ng/m^3). See Item 84 under consultee responses below for further discussion and suggested actions.		
25	Appendix VI 3.2.4 Table 3.2	Appendix V 3.2.4 Table 3.10	The closest DEFRA non-automatic hydrocarbon monitoring site is correctly identified as Liverpool Speke. Data presented in the Table 3.2 appears to contain slight inconsistencies with published data, however the maximum annual mean data used in the assessment (for 2017, as provided in Table 3.5) is correct and therefore the assessment results are unaffected.	N/A	Assessment uses an appropriate value of 0.79 µg/m^3 (2017 annual mean) **CLOSED**
26	Appendix VI 3.2.5 Table 3.3	Appendix V 3.2.5 Table 3.11	The closest Toxic Organic Micropollutants (TOMPs) monitoring site is correctly identified as Manchester Law Courts. Data for all six TOMPs sites across the UK is presented in Table 3.3 (incorrectly titled as data for the Manchester Law Courts site only). An average of all annual mean concentrations across all six sites between 2012 and 2016 (latest 5 years of available data) has been used to represent the background dioxin and furan concentration at the proposed site. Data presented in the Table 3.3 appears to contain slight inconsistencies with published data. The range in the annual mean data presented in Table 3.3 implies the use of an average across all sites is not conservative. However this is unlikely to materially impact the results as the assessment of dioxin is focused on ingestion not inhalation.	Applicant to justify the suitability of background data used.	Applicant explains that as there is an industrial process within 1km the maximum in five years (33 fg/m^3) is used in a conservative approach (the average is 6.5 fg/m^3). Not a material concern as not used in risk assessment. **CLOSED**
27	Appendix VI 3.2.6	Appendix V 3.2.6 Table 3.12	The closest acid gas and aerosol monitoring station is identified as Plas Y Brenin which is 82km to the south west of the proposed site. Ladybower is located closer, 76km south east of the proposed site. Both sites stopped monitoring HCL in 2016. Data for the sites has not been provided. The background HCL and HF data used in the assessment has been taken from the EPAQS report, *Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health Against Acute Irritancy Effects, Expert Panel on Air Quality Standards, 2005*. For HCl, this has been taken as the maximum annual mean concentration across 12 monitoring locations in 2002. More recent data are available and have not	Applicant to justify suitability of the background data used and consider using more recent HCl monitoring data from the UK Acid Gases and Aerosols Monitoring	Applicant has presented more recent data for HCl and uses the maximum across all UK sites in the updated assessment. **CLOSED**

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			been used. For example, the maximum concentration measured in the UK 2011 to 2015 was 0.71 µg/m^3. For HF, there are very limited data available. The annual mean has been taken from the maximum monthly concentrations measured in the vicinity of three industrial plants. Therefore the background used in the assessment is deemed to be highly conservative. See Item 84 under consultee responses below for further discussion and suggested actions.	Network where available. Also, see item 84.	
28	Appendix VI Table 3.5	Appendix V Table 3.14	Table 3.5 presents the specific background data used in the assessment. EA guidance *"Air Emissions Risk Assessment for your Environmental Permit"* states that for short term averaging periods (hourly, daily, 8-hourly, 15-minute) the background concentrations should be assumed to be twice the long term concentration (annual mean). The Applicant has applied this rule to the 1-hour mean background data only, while backgrounds for averaging periods of 24 hour mean, 8 hour mean and 15 min mean have been calculated by applying conversion factors, which in our view are only to be applied to the modelled pollutant concentration. Table 3.5 does not provide a background concentration for daily benzene, for comparison with the latest air quality criterion in EA guidance.	Applicant to amend Table 3.5 and update results accordingly.	Applicant has not changed the approach and states this has been accepted by the regulator for other applications. We cannot comment on this but the guidance clearly intends the factors to be applied to modelled process concentrations (PC) "*if you've calculated a **PC** on an hourly basis, you must multiply it by...*" Later in the guidance it refers to backgrounds in the context of calculating total concentrations (PEC) as distinct from PCs. Table 3.14 still presents a 1h mean value for benzene. The assessment later uses this for the 24h assessment (Table

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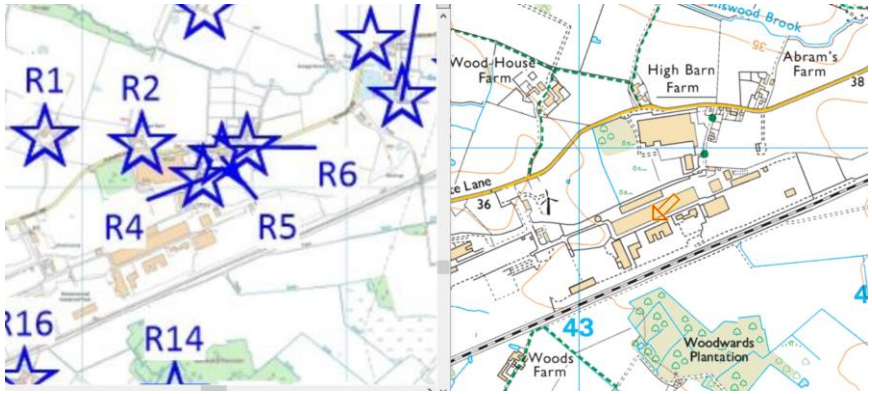
					6.9). The PCs for this and other pollutants are less than 10% of the EAL so consideration of background is not required. Therefore whilst we disagree with the method, it is not material in terms of the conclusions. **CLOSED**
29	Appendix VI 3.5.1	Appendix V 3.5.1	The precise location of the listed receptors in the receptor figure (see Appendix II to the emissions assessment) is unclear, but by cross comparison to OS mapping (see inset) it appears a suitable selection of existing receptors, including those closest to the source, has been included in the study. There is, however, no mention of future developments that could introduce new sensitive receptors. No short term receptors have been specifically selected for assessment, such as footpaths or amenity space, however, the maximum short term ground level concentrations suggest this is not an issue. 	Applicant to confirm local plans have been reviewed to identify locations of future sensitive development	Not addressed by the Applicant. LCC may wish to check that new development is not proposed to be in a more affected area than the maximum results at nearest existing receptors (R4) but this is not considered likely to be an issue. **CLOSED**

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30	Appendix VI 4.1.1	Appendix V 4.1.1	The use of the AERMOD dispersion modelling software is appropriate and common industry practice. The ES states that modelling was undertaken using the 2019 executable v19191. The latest AERMOD executable is v21112 which was released 22/4/2021. A reason is not provided for not using the most up to date version but it is considered unlikely that minor recent upgrades would materially impact the results.	N/A	The Applicant has now used AERMOD v21112. **CLOSED**
31	Appendix VI Table 4.1	Chapter 4, 14.13.4 Appendix V Table 4.1	Atkins' calculation of normalised flow is slightly higher at 1.46 Nm^3/s but likely due to rounded values used as presented in the table. A lower flow rate will give lower mass emissions and thus lower modelled ground level concentrations. The moisture content of 4% appears low for medical waste with biological material content; a value of 10% would instead give a normalised flow rate closer to that presented in the table.	Applicant to clarify flow rate calculation and moisture content	The Applicant has clarified the use of a lower moisture value which was provided by the technology provider. Their calculation of flow rate is unchanged but Table 4.1 now provides a value for oxygen of 14% in dry and 13.5% in wet gas; the former correctly gives a flow of 1.36 Nm^3/h. **CLOSED**
33	Appendix VI 4.2.2.3 – 4.2.2.5	Appendix V 4.2.2.3 – 4.2.2.6	The use of data for Municipal [solid] Waste Incinerators (MSW) and Waste Wood Incinerators is only accepted if it can be shown that the data are representative. Given the fact that medical waste to be incinerated at the proposed site, is likely to have a different elemental composition to MSW/wood, supporting evidence should be provided. See Item 84 under consultee responses below for further discussion and suggested actions.	See item 84	The Applicant states that MSW and waste wood incinerators encompass a much larger range of wastes than is proposed and suggest this is conservative. Applicant states this approach has been used for other clinical waste sites, but this does not address the

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					question of the specific composition of the material being handled i.e. a bigger range of waste types is not of relevance. Applicant's emissions monitoring data should be requested once the facility is operating to demonstrate this is a sound assumption **REFER TO PERMITTING**
34	Appendix VI 4.2.2.7	Appendix V 4.2.2.8	The benzene short-term EAL was updated in EA guidance in September 2021 to a 24 hour mean of 30 µg/m^3.	Applicant to update reference in 4.2.2.7	Applicant has updated the reference. **CLOSED**
35	Appendix VI 4.2.3	Chapter 4, para 4.13.2 Appendix V 4.2.3	Structure B is a relatively large building to the north of the proposed facility (see Table 4.4 of Appendix VII which states 12m high). The proposed stack height of 14 m does not therefore meet standard practice of 3 m clearance above nearby structures. Aerial photography also shows another structure north of Structure B which appears not to have been modelled. If lower than Structure B it would not be the dominant structure and results should not be affected. The results of a stack height calculation or sensitivity analysis are not provided, to demonstrate that 14 m is an appropriate height for the stack discharges. The results for annual mean dioxin concentrations (Table 4.1, Appendix VII) show the field wide maximum concentrations are 25 times higher than at the closest receptor (R4). This suggests poor dispersion possibly as a result of building downwash due to Structure B. See also Item 43 (assessment of percentiles not maxima is not appropriate for a stack height study).	Applicant to clarify how 14 m stack was derived and the buildings included in that calculation; or present a stack height study to support their choice.	Applicant has undertaken a sensitivity study using maximum modelled NOx concentrations. An increased stack height at 26 m above ground is now proposed. It states this so that "*the most significant impacts from building downwash are overcome*". It is for the Applicant and Regulator to agree whether this meets the definition of best

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					available techniques (BAT) and that will include consideration of whether costs are proportionate to the risk. Atkins' request was to see supporting evidence for the proposed stack height, which has been satisfied. In terms of an improvement in dispersion, this is evident from the results for dioxins in Table 4.1 of Appendix VI which now show a much lower ratio of 6 to 8 between the max PC and R4. **CLOSED**
37	Appendix VI Table 4.5	Appendix V Table 4.5	It is not possible to check from the information presented what land use categories were assigned to arrive at the stated values.	Applicant to clarify land use	Clarification is not provided but it is now understood the Applicant has used AERSURFACE which generates land use based directly on mapping and not by manually defining a specific land use. **CLOSED**
41	Appendix VI 4.3	Appendix V 4.3	Other significant processes with point source emissions within 1km of the proposed site were searched by the Applicant. This search radius may not be	Statement as to whether there are	Applicant does not appear to have

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			sufficient should a large combustion plant to be proposed, as the plume may travel further to cause a cumulative impact at the proposed site. It is unclear if such a possibility has been ruled out.	any proposed large combustion plants likely to impact the proposed site to be added.	considered other large combustion plant within a search area beyond 1km. Emissions from large facilities with taller stacks may have an impact beyond this distance. The regulator may require further consideration as part of the permit application. **REFER TO PERMITTING**
42	Appendix VI 4.4 & 4.5	Appendix V 4.4 & 4.5 & 6.2	The Applicant refers to the screening criteria in EA guidance that are intended for users of the screening methodology to determine firstly if detailed modelling is required. In this case, as detailed modelling has been undertaken, the key determining factor is whether the total predicted environmental concentration (PEC) exceeds relevant ambient air criteria. Nevertheless it is common practice to consider long term process contributions (PCs) equal to <1% of the relevant criterion, and short term PCs of <10% of the relevant criterion, as “not significant”.	The criteria in 4.4.3 should not have been used in the assessment of results in section 5.1.	Applicant has updated the report text accordingly **CLOSED**
43	Appendix VI 5.1	Chapter 4, 4.13.5 Appendix V 6.1	The Applicant mentions that the maximum modelled concentrations from five years’ modelling have been used in the assessment. However, the assessment of short term impacts e.g. for NO_2, PM_{10} and SO_2, presents the modelled percentile equivalent to the objective. This excludes the top 18/35 etc. results and masks the highest results, which are particularly important when determining whether a stack height is sufficiently high to exclude downwash effects.	Applicant to provide maximum modelled short term concentrations for all relevant pollutants in table format. Applicant to present stack height study using maxima (see item 35).	The Applicant justifies using modelled percentiles because this has been accepted by the EA on other applications. Atkins would clarify that objectives do not “allow” a number of exceedences by an individual operator but are for local authorities to use in local air quality

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					management duties. LCC should be aware that this means the results presented for modelled hourly NO_2 will exclude the top 18 results, however, given the concentrations presented, this is unlikely to affect conclusions drawn. Regarding downwash effects, the Applicant has presented a stack height sensitivity study which is reported to use maximum PCs. Atkins have applied a standard ratio (0.35) to estimate maximum NO_2 which indicates that at 100 µg/m^3 this would not exceed the AQS. **REFER TO PERMITTING**
44	Appendix VI 5.2.1	Appendix V 6.2.1	Annual mean NO_2 results indicate that the PC is less than 1% of the AQS objective at the majority of receptors. Where it is above 1% (R1, R2 and R4-R6), the PEC is well below (<30%) of the objective at all receptors. Hourly mean 99.8th percentile NO_2 results indicate that the PC is less than the short term 10% criterion at all receptors. However this table does not present the *maximum* hourly concentration and this may mask some high results at the maximum point of impact (where the PC as the 99.8th percentile equates to 53% of the criterion).	Applicant to provide maximum annual mean and maximum hourly mean contour plots for NO_2.	Applicant has provided contour plots for total concentrations, not for the PCs. As a result the effectiveness of stack dispersion is not clear. Plots of PCs for the key pollutant NO_2 are

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			Contour plots are stated to be in Appendix IV to the emissions assessment (Appendix VI), but have not been identified; they should be found after the windroses in Appendix III.		preferred for clarity but not essential in light of the concentrations evident in the tables. **REFER TO PERMITTING**
45	Appendix VI 5.2.2	Chapter 4, 4.13.5 Appendix V 6.2.2	Both the short and long term PM_{10} and $PM_{2.5}$ results show the PC to be less than the EA screening criteria at all receptors and the maximum point of impact. Again the Applicant has presented a 90.4th percentile rather than the maximum daily mean and the PC at maximum point of impact is a large proportion of the criterion. The assessment would also be impacted by the correction of the background concentration used for daily mean PM_{10}. See item 28.	Applicant to provide maximum daily PM_{10} concentrations and check impact of a corrected background concentration (using EA approach)	The Applicant has continued to use modelled percentiles with justification being that this has been accepted by the EA on other applications. As per item 43, LCC should be aware that this means the results presented for modelled daily PM_{10} will exclude the top 35 results, however given the concentrations presented, this is unlikely to affect conclusions drawn. **REFER TO PERMITTING**
47	Appendix VI 5.2.4 Table 5.9	Appendix V 6.2.4 Table 6.9	Table 5.9 is incorrectly titled as hourly mean rather than daily mean. Twice the annual mean background has been correctly applied to calculate the PEC. Both the annual and daily mean benzene results demonstrate the PC to be less than 1% and 10% of assessment criteria at all receptors. The maximum point of impact daily PEC equates to 30% of the criterion. It is therefore agreed that	Table 5.9 heading to be amended if a revised report is issued	Table 6.9 has been updated. [Earlier in Table 4.6 an hourly mean benzene is presented, but this does

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			further consideration of the PEC is therefore not required, and the impact can be considered to be insignificant.		not have a material impact on results]. **CLOSED**
48	Appendix VI 5.2.5	Appendix V 6.2.5	Tabulated results for maximum hourly carbon monoxide concentrations are not provided.	Applicant to include a table for modelled carbon monoxide results	Not provided but this is not a material impact as the PC for hourly CO is typically a small fraction of the EAL. **CLOSED**
50	Appendix VI 5.2.7	Appendix V 6.2.7	The short term HF results demonstrate the PC to be less than 10% of the assessment criterion at all receptors and the maximum point of impact. It is therefore agreed that further consideration of the PEC is therefore not required, and the impact can be considered to be insignificant. The assessment would therefore not be materially affected by the correction of the background concentration used for monthly HF. See item 28	Background data used for monthly mean PEC calculation should be amended.	No change to approach made but no material impact on findings. **CLOSED**
52	Appendix VI 5.2.9	Appendix V 6.2.9	Both the short and long term results for all group 3 metals with the exception of Cr (VI) demonstrate the PEC to be less than the EAL at all receptors and the maximum point of impact. It is therefore agreed that the impact can be considered to be insignificant. For commentary on Cr(VI) results refer to item 84.	See item 84 of the consultee response review.	No change required as no material impact on findings. **CLOSED**
54	Appendix VI 5.3.1	Appendix V 6.3.1	The results for relevant pollutants and averaging periods demonstrate the PC to be less than the EA assessment criteria for local nature sites at all receptors. EA guidance does not require the PEC to be calculated for local nature sites. It is therefore agreed that further consideration is therefore not required. For commentary on HF results refer to item 84 of the consultee response review.	See item 84 of the consultee response review.	No change required as there no material impact on findings. **CLOSED**
56	Appendix VI 5.4	Appendix V 6.4	Annual mean NO_2 results table is missing a title. Results indicate that the PC and PEC are below relevant EA screening criteria. It is therefore agreed that further consideration is therefore not required, and the potential for in-combination impacts is not considered to be significant.	Update title if a revised report is issued.	Table 6.1 now labelled as annual mean. **CLOSED**

Human health risk assessment

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57	Appendix VII 1.1-1.3	Appendix VI 1.3	The reference to H1 methodology is out of date – the Applicant should refer to the online source Air emissions risk assessment for your environmental permit - GOV.UK (www.gov.uk) (as correctly referenced in footnote 5 to paragraph 10.2.2.1 of the ES AQ chapter).	Confirm latest guidance has been applied	Reference to H1 remains but assume a typographical error as the correct guidance is referenced earlier on. **CLOSED**
58	Appendix VII 1.3	Chapter 4, 4.13.7-8 Appendix VI 1.3	The Applicant has considered dioxins/furans only, not PCBs or heavy metals. The EALs for metals in the above referenced guidance are considered by the EA to be sufficiently protective of human exposure via routes other than inhalation so it is common now not to see metals included in the HHRA. Conversely, there are no ambient air quality standards for dioxins/furans and these pollutants can accumulate in the environment with 90% of exposure through the diet (see also para 2.2.1), hence the requirement for the HHRA. Regarding dioxin-like PCBs, it is unclear if these were excluded because there are no PCB sources in the incoming medical waste stream or if it is an omission from the assessment.	Provide supporting evidence for exclusion of PCBs	Applicant has now included PCBs in the assessment and has taken a suitable approach to the selection of an emission rate and compounds assessed. **CLOSED**
60	Appendix VII Table 2.3	Chapter 4 4.13.6 Appendix VI 2.1.3-2.1.4	The Applicant has applied a dioxin profile for municipal waste incineration plant in absence of site specific information. It does not appear to align with the profiles found in other Waste to Energy applications. No supporting information has been provided as to why or to what extent the applied municipal waste emissions profile (taken from data for US incinerators in 2000) is deemed representative of the proposed hazardous medical waste incinerator emissions in 2022, other than it being described as a “large dataset”. A medical waste incinerator may well be expected to have a different profile.	Applicant to provide evidence of applicability to emissions from medical waste, or adjust modelled emission profile accordingly.	The Applicant refers to other facilities which have used dioxin profiles from MWI plants in HHRAs for clinical waste incineration plants and which have been permitted. The Applicant states the technology provider does not expect clinical waste to contain more than 1% halogenated organic compounds (including chlorine) and the dioxin emission profile from the plant is

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					expected to be comparable to that of MWI. Testing of medically derived wastes has shown chlorine content to be negligible. This explanation is accepted and it is noted a stringent emission standard will apply to total dioxin emissions. **CLOSED**
61	Appendix VII Table 2.1	Chapter 4, 4.13.6 Appendix VI Table 2.1	The TEQ factors appear generally reasonable but with some discrepancies against other MSW applications published online, which have been based on the international toxic equivalence factors as given in the IED (2010/75/EU) Annex VI Part 2. Instead the factors appear to have been taken from the US EPA recommendations in https://rais.ornl.gov/documents/dioxin_tef.pdf.	Provide comment on likely impact on results or amend assessment. Consider sensitivity test assuming all 2,3,7,8-TCDD in light of uncertainty.	A sensitivity test has not been undertaken but further justification is provided with regard to dioxin emissions profiles. This explanation is accepted and it is also noted that a stringent emission standard will apply to total dioxin emissions. **CLOSED**
62	Appendix VII 2.1.2	Appendix VI 2.1.2	An emission concentration of 0.1 ng/Nm^3 i-TEQ is used in the modelling, based on the IED emission limit value for dioxins/furans. The EU BREF for waste incineration (Waste Incineration | Eippcb (europa.eu)) suggests a value of 0.04 ng/Nm^3 or combined 0.06 ng/Nm^3 for dioxins and dioxin-like PCBs can be achieved by new plant. The EU BREF Section 3.2.2.4 presents data on periodically monitored PCDD/F emissions concentrations including a figure of 0.02 ng i-TEQ/Nm^3 for two small (2 tph) clinical waste incinerators in the UK	Provide clarification or supporting information	No further justification but not a material concern as the use of 0.1 ng/Nm^3 is conservative. **CLOSED**

Item	Original Reference	New reference	Atkins comment	Action proposed by Atkins	Action taken by Applicant
			(Knostrop, Leeds; twin-line stepped hearth design; flue gas cleaning with bag filter, dry scrubber mixing unit, dry sorbent injection). Therefore the value used in the assessment may be considered conservative.		
63	Appendix VII 2.3.2	Appendix VI 2.4.2	A Tolerable Weekly Intake (TWI) for dioxins, furans and dioxin like PCBs of 2 picograms (pg) I-TEQ/kg body weight (bw), equivalent to approximately 0.29 pg I-TEQ/kg bw/day, has been adopted by the Applicant for this assessment. However, the UK Committee on Toxicity (COT, March 2021) draft interim position paper[1] suggests that the European Food Safety Authority (EFSA) proposal for a TWI of 2 pg/kg bw/day is not supported and that a tolerable daily intake (TDI) of 2 pg/kg bw per day is deemed protective for effects on the developing male foetus. Therefore we consider the WHO and UK COT recommended value is a TDI of 2 pg I-TEQ/kg bw/day. The implication is that by using the TWI, the Applicant has compared results to a much more stringent criterion than is typically applied for other waste plant in UK planning and permitting applications.	Applicant to explain why this limit was adopted or amend assessment to use TDI.	The Applicant now uses 2 pg/i-TEQ/kg as TDI rather than TWI previously. The intake as a percentage of the TDI is much lower at the point of maximum impact at 5% compared to 25% previously, for an adult farmer, despite the increase in deposition (see item 80). **CLOSED**
68	Appendix VII 3.3.2.1-2	Appendix VI 3.3.2	All dioxins have been modelled as particle phase / bound and selection of Method 2 is appropriate as is a mean particle diameter of 0.1 microns. However, the most volatile e.g. 2,3,7,8-TCDD/F could be modelled in the gaseous phase. (Ref. US EPA HHRAP companion database in Appendix A of HHRAP). It is unclear if dioxins were modelled as particle phase or particle bound and what impact this choice would have on the results.	Applicant to clarify approach and comment on likely effect of this on results	Applicant has now modelled 2,3,7,8-TCDD/F and PCBs in the vapour phase **CLOSED**
70	Appendix VII 3.6.1.1	Appendix VI 3.6.1.1	The time period for average annual rainfall is not stated, e.g. if it is for a recent year or a 30 year historical average. The flood assessment uses a higher figure of 873 mm and rainfall in future years may be higher as a result of climate change. Liverpool John Lennon Airport data was used for wind data, and it is unclear if the values differ substantially between this site and Crosby.	Applicant to clarify potential impact of underestimating rainfall	Not addressed but not a material concern **CLOSED**

[1] (https://cot.food.gov.uk/sites/default/files/2021-03/Dioxin%20interim%20position%20statement_0.pdf

Item	Original Reference	New reference	Atkins comment	Action proposed by Atkins	Action taken by Applicant
74	Appendix VII 3.6.5.1	Appendix VI 3.6.5.1	Wind speed is taken from Liverpool John Lennon Airport data which is appropriate given the use of data for the modelling, although inconsistent with source of rainfall data from Crosby.	Applicant to comment on choice	Not addressed but not a material concern **CLOSED**
78			The IRAP/HHRAP default value of 70 kg for an adult and 15 kg for a child were applied, whereas in the UK a value of 20 kg is typically applied for a child. This is inconsistent with the approach taken for inhalation where a UK value was selected for a child, presumably because the choice of a lower body weight is conservative.	Applicant to comment on rationale for selection	Not addressed but not a material concern **CLOSED**
79	Appendix VII 4.1.1 Table 4.1	Appendix VI 4.1.1 Table 4.1	There is a substantial difference (x 25 or more) between the maximum point of exposure and receptor R4 which suggests dispersion may not have been optimised through stack height. See comments under 3.4 above.	Applicant to clarify how stack height was determined	Applicant proposes an increased stack height of 26 m based on a stack height sensitivity study. This reduces the unitised concentration from 59 to 11 µg/m^3 per g/s which is a notable improvement. The maximum unitised concentration at R4 is reduced from 2.5 to 1.8 µg/m^3 per g/s. **CLOSED**
80	Appendix VII Table 4.2	Appendix VI Table 4.2-4.3	Unitised deposition rates provide lower values than may typically be expected. i.e. for a concentration of 50 µg/m^3 we would expect a deposition rate in g/m^2/year of the same order of magnitude or 2 to 3 times higher for a deposition velocity of 0.01 m/s (suitable for fine particles). It is the case that the AERMOD calculation of wet deposition tends to give negligible results, whereas ADMS can give much higher deposition rates.	Applicant to review and confirm relationship between concentration and dry/wet deposition is as expected	Applicant has updated the assessment of wet deposition and results are now several orders of magnitude higher. However, due to the improved stack dispersion as a result of the revision to stack

Item	Original Reference	New reference	Atkins comment	Action proposed by Atkins	Action taken by Applicant
					height, and the use of TDI rather than TWI, there is not considered to be any material impact on the conclusions. **CLOSED**

Atkins' review of the changes where relevant to the consultee responses is summarised below.

Item	Reference	Topic	Atkins comment	Action proposed by Atkins	Action taken by Applicant
Consultee responses					
84	Knowsley Council (KBC) (Environmental Health & Consumer Protection)	Air emissions	KBC raise concerns regarding the results for HF and Cr(VI). For HF, their concern is that the PEC exceeds the EAL at ecological receptors, and for Cr(VI) that the PEC exceeds the EAL for human health. There is a lack of available background data for HF in recent years. The EAPQs study refers to a concentration rate of 0.5 to 3 µg/m^3, the upper range relating to sites in proximity to coal fired power stations, aluminium production, brick and coke production, none of which apply to the Application site. Therefore the use of a background of 2.35 µg/m^3 is deemed to be highly conservative. The HF EAL of concern is for a weekly average and is not a statutory air quality standard or objective. The EA approach to assessment against non-statutory critical levels is to ensure that the PC does not exceed 100% of the EAL which is considered to demonstrate BAT. This is the case, as stated in paragraph 5.3.1.1. Indeed, the maximum PC is less than 10% of the EAL and just 1.7% of the selected background concentration. It is deemed to be not significant. The National Atmospheric Emissions inventory shows the HF emissions have declined over the last 50 years (Pollutant information - NAEI, UK (beis.gov.uk)) The assessment of Cr(VI) follows EA guidance for the assessment of Group 3 metals which uses data for MSW and waste wood co-incinerators to allocate the percentage of each metal to the total Group 3 metal emission rate (Table 4.2 of ES Appendix VI). There is no supporting discussion as to how this distribution may also be considered representative for a medical waste facility. Table 3.1 of Appendix VI provides maximum annual mean metal concentrations. For Chromium the value of 1.7 ng/m^3 appears low compared to the UK mean in the NPL heavy metals monitoring network report (2016) but in line with the median. The comment in para 3.2.3.2 regarding 20% being assumed to be Cr(VI) does align with the EA screening approach for Cr(VI) but the value presented of 0.785 ng/m^3 is not	Applicant to provide evidence that the EA metals fraction for MSW is suitable. Alternatively, LCC to consider a post-commissioning emissions test requirement. Applicant to demonstrate that use of older monitoring data is conservative.	Discrepancies remain regarding chromium background but PCs are low so not of material concern. **CLOSED** The Applicant states in Chapter 4 para 4.2.2.3 that as MSW and waste wood incinerators encompass a larger range of wastes than is proposed, the approach is conservative. The Applicant notes that a similar approach has been accepted by the regulator for other sites. It is noted that the query raised was the specific nature (chemical composition) of the materials being handled. The Applicant will need to ensure adherence to emissions limit values and prove compliance through monitoring as a permit requirement. The data should be made publicly

Item	Reference	Topic	Atkins comment	Action proposed by Atkins	Action taken by Applicant
			consistent with this. Table 3.5 of Appendix VI however provides the correct Cr(VI) value of 0.35 ng/m^3 and it is this value that has been used in the assessment. For Cr(VI) the modelled PC is less than 0.2% of the EAL at the most affected receptor (R4). Therefore, whether or not the background site used is representative of local conditions or a conservative value, assuming the metal distribution is appropriate the contribution from the proposed facility can be regarded as not significant without the need to consider total concentrations. The suggestion for real time monitoring of ambient levels of HF and Cr(VI) is not considered to be proportionate to the risk presented by the emissions for either compound. KBC have queried the use of data for the years 2013 to 2017. The Environment Agency permitting guidance does not specify that meteorological data must be the most recent years, the key point is that the data cover a five year period to capture a range of dispersion conditions. With regard to background data, most pollutants exhibit a downward trend over time so monitoring results from an older period would typically be conservative. The NPL monitoring network report 2016 show generally downward trends for heavy metals in recent years. Heavy Metals Annual Report 2015 (defra.gov.uk)		available and this can be used once the facility is operating to demonstrate this is a sound assumption. **REFER TO PERMITTING**

4. Conclusion

The Applicant's original assessment of stack emissions submitted with the Planning Statement and ES (December 2021) was generally found to have been conducted in line with appropriate guidance, using reasonable assumptions to give confidence in the conclusions drawn. The results were compared to relevant health criteria and the results of dispersion modelling indicated that the facility stack contributions and resultant environmental concentrations of all pollutants considered are not significant. This is largely because of the relatively small size of the proposed facility.

Atkins has reviewed the Applicant's Addendum to the Planning Statement and ES (Version 1.3, 8 July 2022), plus supporting documentation (Appendices V and VI). The review has focused on the points raised regarding human health impacts of stack emissions where actions were recommended. Most areas that were identified for clarification, including the calculation of stack parameters, the choice of and calculation of background concentrations, and the calculation of deposition have been adequately addressed.

The results of a stack height sensitivity study have now been presented and an increase in stack height is proposed from 14 m to 26 m; the Applicant states this overcomes significant effects of building downwash and this is evident from the graph which shows a reduction in modelled maximum hourly concentrations.

The HHRA has been updated to use the TDI, rather than the TWI, which - combined with the increase in stack height to reduce ground level concentrations - means that the modelled increase in deposition rate does not affect the conclusions with regard to dioxins and furans, which was that effects are not significant.

There are a few points which we suggest can be addressed at permitting stage: numbers 33, 41, 43, 44, 45 and 84, but which do not present a material concern for planning in terms of local air quality.

There is a question still over the suitability of data from older municipal waste/waste wood incinerators to determine emission rates and profiles to represent emissions from medical waste incineration [points 33 and 84]; this is justified by the Applicant as an approach commonly accepted by the regulator in the absence of other data. We feel there are no grounds to challenge this further and that the assumption can be supported with emissions monitoring data, once available. The clarification regarding the chlorine content of the waste is noted.

The Applicant has clarified the assessment does not use the maximum modelled short term concentrations for relevant pollutants such as nitrogen dioxide and instead uses percentiles to reflect the air quality objectives [points 43 to 45]. This appears to be a common approach taken by some applicants and has been accepted by the regulator but means that the maximum concentrations in the local area have not been evaluated. Given the small percentage contributions that the percentile results make to the air quality standards of concern, we feel there are no reasonable grounds to challenge this further.

The Applicant has maintained a one kilometre search radius for potential cumulative impacts [point 41]. If LCC are aware of other large point sources that are proposed in the planning system these may require consideration by the Applicant. This further check may be requested at the permitting stage by the regulator, and LCC can comment further at that time.

We note that in the ES the Applicant does not refer to monitoring of emissions and facility performance once operational but this would be expected for the permit conditions as a requirement of the IED. LCC can review (as a statutory consultee at permit determination stage) the proposals for in-stack emissions monitoring which will provide evidence to support the use of assumptions at the assessment stage. The permit application should also describe other pragmatic measures such as how to ensure odours and dust are kept under control, and how abatement equipment such as filters and scrubbers would be maintained so as to avoid cases of malfunctioning which could cause ELVs to be exceeded. This again would be a matter for the permitting authority to determine as appropriate, as an Environmental Management System is a requirement of the permit.

In conclusion, the material which has been submitted by the Applicant regarding emissions to air and associated risks to health has been reviewed and the methodologies had been compared to what is normally required by the regulator of such permitted facilities. These assessments have been conducted to a reasonable standard which is proportionate to the risk and cover the key issues using appropriate methods or - in the case of the few areas identified above - would be unlikely to make a material difference to the conclusions drawn.