ATTACHMENT D – Environment Protection Authority – Human Health Risk Assessment

This Attachment should be read in conjunction with the previous and subsequent attachments provided in this response.

Qualification in relation to feedstock

The EPA notes there is significant potential uncertainty around emissions that may result from the incineration of some waste types proposed to be used for the project. This is especially the case for those waste types that may not be routinely used at similar plant such as the Ferrybridge facility which is stated as of a comparable size and treating a like waste stream, or other European plant nominated in the RtS as reference facilities. The EPA and Arup Pty Ltd experts have reviewed the information provided within the RtS and elsewhere to assess the suitability of waste proposed to be used as fuel for the project, and the appropriateness of using the nominated reference facilities and their emissions profiles to assess potential impacts and risks associated with project emissions (see Attachments A and B).

Consequently, the EPA's review of the HHRA is based on the assumption that the design fuel proposed for the project is consistent with that used in the nominated reference facilities, and that the air quality modelling is accurate for quantitative health risk assessment purposes.

The EPA has reviewed the revised project human health risk assessment (HHRA) titled *Energy from Waste Facility, Human Health Risk Assessment, Honeycomb Drive, Eastern Creek* (AECOM, 28 September 2017).

Summary

The HHRA has been revised to address:

- changes to the proposal resulting from the implementation of Stage 1 of the project only. This reduces the processing capacity from the original proposal by a half to a maximum of 675,000 tonnes of residual waste fuel per annum; and
- the issues raised by the EPA, EnRiskS and others on the November 2016 HHRA[1] that was submitted as a part of the EIS placed on public exhibition in December 2016.

Prior to the November 2016 HHRA, the EPA reviewed the project HHRAs prepared by AECOM in November 2015[2], and Fichtner in March 2015[3].

The EPA notes the HHRA remains the same as that provided in the Revised Response to Submissions Report (Urbis, 29 September 2017), however the AQA has been updated to address issues identified in that report by the EPA and other experts. NSW EPA experts have reviewed the AQA and now consider the air quality modelling and the predicted emissions (on which the HHRA is based) to be accurate and reliable.

Issues previously identified with the HHRA have been determined to be adequately addressed or not likely to significantly influence the outcome of the assessment due to the incorporated

[1] Energy from Waste Facility, Human Health Risk Assessment, Honeycomb Drive, Eastern Creek (AECOM, 23 November 2016).
[2] Energy from Waste Facility, Human Health Risk Assessment, Honeycomb Drive, Eastern Creek (AECOM, 2 November 2015).
[3] The Next Generation NSW Pty Ltd, Energy from Waste Facility Eastern Creek, Human Health Risk Assessment (Fichtner, 20 March 2015).

conservative methodology which is designed to overestimate rather than underestimate project risks.

Details of the issues identified from the EPA's review of the HHRA are provided below.

1. <u>There remains some uncertainty associated with the assessment of facility impacts as it is unclear how accurate the assumptions and input data used in the assessment are.</u>

The HHRA and other relevant project documents have been amended to better support estimates or define assumptions used and associated with:

i. waste inputs, composition and processing (such as mixing/homogenisation);
ii. plant operation and performance – including to assess normal operations, periods of maintenance, start-up, shut-down and upset conditions; and
iii. emissions, particularly of air pollutants.

With respect to air emissions and their potential health impacts, the following factors are noted as especially significant sources of variability and uncertainty:

i. Fuel/waste composition;
ii. Plant design and operation;
iii. Flue gas treatment;
iv. Start-up and shut-down; and
v. Maintenance and upset conditions.

The EPA notes that the final plant design is not included in the RtS and consequently all information and aspects associated with environmental performance and outcomes (such as plant performance specifications) have not been defined or specified.

The EPA and Arup Pty Ltd have reviewed the information provided within the RtS and elsewhere to assess the accuracy of the air modelling, suitability of waste proposed to be used as fuel for the project, and the appropriateness of using the nominated reference facilities and their emissions profiles to assess potential impacts and risks associated with project emissions.

The EPA's review of the HHRA is based on the air modelling being accurate and reliable, and the waste proposed to be used as fuel being consistent with that used in the nominated reference facilities.

The EPA notes to address any remaining potential uncertainty, each element and aspect of the project must be designed, operated and maintained:

- in a manner consistent with that described and assessed in the RtS; and/or
- in accordance with current best practice, for the aspects that have not be finalised and/or are not described or defined in the RtS.

2. <u>Air pollutant emissions and assessed scenarios.</u>

The HHRA has been amended to considers five future operating scenarios (Section 4.2):

1. Normal/expected operating conditions – chronic health risk assessment. Considered to be the most representative of future operating conditions.
    a. Uses in-stack concentrations from representative facilities.

   b. All concentrations are based on stack testing data provided by Ramboll, except for certain metals.
   c. Certain metal concentrations are those presented in the UK Environment Agency (EA) guidance on assessing group 3 metals from incinerators (Version 4).
   d. Updated concentrations for hydrogen fluoride (HF), hydrogen sulphide (H_2S) and nitrogen oxides (NOx) were used.

2. POEO limit operating conditions – chronic health risk assessment. Considered to be of historical benefit only.
   a. Uses POEO Regulation 2010 emission standards for electricity generation.
   b. Metals were proportioned based on ratios determined by using the data provided in the UK EA Guidance.

3. Upset operating conditions – acute health risk assessment. Considered to be the most representative of potential upset operating conditions.
   a. Uses emission rates based on 10x Industrial Emissions Directive (IED; Directive 2010/75/EU) emission rates.
   b. Metals were proportioned based on ratios determined by using the data provided in the UK EA Guidance.
   c. NOx emissions were based on the likely post-combustion concentration using selective non-catalytic reduction (SNCR) emission controls.

4. Industrial Emissions Directive (IED) limits – chronic health risk assessment. Considered to be the most representative of the maximum operating conditions.
   a. Uses emission rates prescribed by the IED.
   b. Daily IED limits were adopted, however half hourly limits were used where no daily limit was available.
   c. Metals were proportioned based on ratios determined by using the data provided in the UK EA Guidance.

5. Diesel generators – acute health risk assessment. Considered to be the most representative of potential upset operating conditions in the case where the diesel generators are required to run.
   a. Assumes two emergency diesel generator emissions combined with stack emissions under normal operating conditions.
   b. Uses Cummins (2015) emission rates for NOx.
   c. Uses POEO emission limits for PM, CO and VOCs.
   d. SOx emissions were calculated in accordance with the relevant Australia fuel standard.
   e. Benzene within the exhaust was assumed to be ‘well below 1%’.

In the chronic health risk assessment (Scenarios 1, 2 and 4), the maximum annual average ground level concentration at each receptor (for residential, recreational and commercial) and grid maximum concentrations were adopted as typical exposure concentrations.

In the acute health risk assessment (Scenarios 3 and 5), the maximum 1-hour average ground level concentration at each receptor (residential, recreational and commercial) and grid maximum concentrations were adopted as typical exposure concentrations.

The EPA notes the chosen operating scenarios are generally appropriate for a conservative assessment of facility impacts, and that the HHRA has aimed to identify and apply realistic, relevant, and potential worst case emissions in the assessment.

The EPA notes the HHRA finds health risks to off-site residents and commercial workers from chronic exposure to air pollutants directly emitted from the facility, and associated with multiple exposure pathways, are low and acceptable for most complete pathways.

However, under the POEO limit operating conditions scenario, the acceptable hazard index of 1.0 was exceeded for offsite infants under the ingestion of breastmilk exposure scenario. The HHRA notes that the potential risk to an infant is considered unlikely due to the conservatism built into this scenario such as with respect to parameters associated with emission estimates and a mother and child's exposure. In addition, the HHRA notes that the WHO recommends breastfeeding in all but extreme circumstances as the advantages of breastfeeding far outweigh the potential risks from environmental pollutants.

In addition, health risks associated with acute exposure to emissions during upset conditions were also considered in the HHRA and found to be low and acceptable.

3. <u>The assessment of impacts on human health relies on the provision of accurate assumptions and data in other project investigations.</u>

The HHRA considers the following investigations with respect to potential risks to human health:

- Soil and Water Assessment;
- Ozone Impact Assessment;
- Air Quality and Greenhouse Gas Assessment;
- Noise Impact Assessment;
- Odour Assessment; and
- Preliminary Hazard Analysis and Fire Risk Assessment.

The HHRA found that outcomes from these assessments relevant to potential human health risks were such that further assessment of the respective impacts was not warranted – apart from impacts associated with ozone and air quality.

The EPA notes that these assessments provide critical information on which the assessment of health risks is based. In particular, the AQA and dispersion modelling output data is critical in the assessment of facility risks to human health. The HHRA refers to the project AQA for details of the proposed operation of the facility. These include, emission parameters, emission concentrations and details of modelling used to predict input values (including dust deposition) required for the quantitative assessment of health risks utilised in the HHRA.

As the AQA provides much of the input information into the HHRA, any inaccuracy in the AQA that affects air quality model outputs will also affect the HHRA input data, and thus may potentially adversely affect the outcomes of the HHRA.

In addition, the HHRA relies on numerous assumptions which must be achieved in practice for the outcomes of the HHRA to be applicable and accurate. Consequently, if the project is approved it must be required to be designed, built, operated and maintained strictly in accordance with the design parameters and assumptions applied in the project assessments.

The EPA notes that design information is not provided for all project aspects and in these cases current best practice must be implemented. This will ensure any emissions, potential environmental impacts and health risk that may be associated with the project are prevented or minimised to the maximum extent achievable.

Conclusion

With consideration to the matters discussed above, the EPA provides the following advice to DPE in relation to the proposal:

1. uncertainty exists around potential emissions associated with the waste proposed as fuel, especially waste streams that may not be used in the nominated reference facilities that are used to assess and demonstrate project air impacts and health risks are acceptable;

2. should the facility operate with the feedstock as per the nominated reference facility (Ferrybridge), project health risks are predicted to be low and acceptable in all cases except for the infant ingestion of breastmilk pathway where emissions are at the POEO limit, in which case likely unrealistic and conservative assumptions and scenarios have been applied; and

3. if the project is approved it must be designed and operated in a manner consistent with that described and assessed in the RtS, and according to current best practice where information on the design and operation of the plant and facility is not described in the RtS.