Our Reference: DOC17/178599

Mr Chris Ritchie
Director
Industrial Assessments
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

EMAIL & STANDARD POST

Dear Mr Ritchie

I refer to your letter dated 21 December 2016 to the Environment Protection Authority ("EPA") requesting comment on the amended Environmental Impact Statement ("amended EIS") submitted by Urbis Pty Ltd in relation to a proposed energy from waste facility at Eastern Creek (SSD 6236). The EPA has reviewed the amended EIS and supporting documents for the proposal.

The EPA still has significant concerns in relation to this proposal. The EPA is concerned that insufficient information has been provided to conduct a robust assessment of the potential impacts from the proposed facility. The EPA particularly has concerns in relation to potential air quality impacts; human health impacts; and alignment with the NSW EPA's Energy from Waste Policy.

Therefore, it is the EPA's position that it cannot support the proposal in its current form.

The EPA's comments in relation to the above concerns are attached to this letter. I have also included two independent reviews conducted by Arup Pty Ltd and Environmental Risk Sciences Pty Ltd, which provide expert advice in relation to the concept and technological design and the Human Health Risk Assessment respectively.

Please see detailed comments attached and if you have any questions in relation to this matter, please contact Ms Deanne Pitts on (02) 9995 5752.

Yours sincerely

STEVE BEAMAN 24-3-2017
Executive Director Waste and Resource Recovery
Environment Protection Authority

Enclosed:
Attachment A – Background
Attachment B – NSW EPA – Energy from Waste Policy
Attachment C – Arup Pty Ltd - Key Technical Issues
Attachment D – NSW EPA – Human Health Risk Assessment
Attachment E – Environmental Risk Sciences Pty Ltd - Review of Health Risk Related Matters
Attachment F – NSW EPA – Air Quality and Ozone Impact Statement
Attachment G – NSW EPA – Soil and Water Assessment

ATTACHMENT A

NSW Environment Protection Authority

Background

The Next Generation NSW Pty Ltd (TNG) has lodged a State Significant Development Application for the construction and operation of an Energy from Waste Facility at Lots 1, 2, 3 and 4, in DP 1145808 within the Eastern Creek Industrial Estate.

TNG is proposing to construct and operate an electricity generation plant within the Eastern Creek Industrial Estate powered from unsalvageable and uneconomic residue waste that would otherwise be landfilled. The proposed facility will have the capacity to process up to 1.35 million tonnes of residual waste fuel per year and generate up to 158 MW of electricity with a net thermal export to the grid of 140 MWe.

The development will be staged in two phases with each phase comprising two combustion grates and two 5 pass heat recovery boiler systems housed in one building with each boiler having its own independent flue gas treatment systems and connecting to one turbine enclosed in the adjacent turbine hall. Each boiler will also be connected to an air cooling system, one emissions stack and the other auxiliary elements connecting the process. Phase 2 will be built when it is demonstrated the required quantity of residual waste fuel is available to the facility.

The facility will operate 24 hours a day every day of the year apart from programmed offline periods for maintenance. The proposed facility aims to receive and process up to 1.3 million tonnes of residual waste per annum (C&I and C&D & other waste) for energy recovery using "moving grate" incineration technology.

Public Exhibition - 2015

On 22 May 2015, the EIS and associated assessments were placed on public exhibition by DPE. The EPA reviewed the relevant documents and provided its comments. The EPA advised that there was insufficient information provided to conduct a robust assessment of the potential impacts of the proposal and could not recommend approval of the proposal in its current form.

Public Exhibition – 2016-2017

In December 2016, Urbis provided DPE with an amended EIS, with the view of addressing the issues raised during public exhibition in 2015. On 9 December 2016, the amended EIS and associated documents were placed on public exhibition by DPE. The EPA conducted a review of the relevant environmental assessments provided.

Many of the issues previously raised by the EPA during the 2015 public exhibition of the proposal still remain and have not been satisfactorily addressed by the Proponent in the amended EIS. These issues are further detailed in Attachments B-G.

As raised previously by the EPA, in order to robustly assess potential impacts from the proposal, it is crucial to understand the waste feedstock proposed to be received at the facility, and understand how the proposed technology (HZI Moving Grate) will process that waste feedstock. It is the EPA's view that this has still not been addressed adequately. As also raised previously by the EPA, many of the assessments (air, ozone, human health, waste) by necessity, rely heavily on knowing the waste feedstock proposed to be accepted at the facility and how the technology will process it. Without a clear and robust understanding of the composition and source of the feedstock, it has been difficult to properly and robustly assess the potential impacts. This concern is reflected throughout the EPA's submission.

ATTACHMENT B

NSW Environment Protection Authority

NSW Energy from Waste Policy Statement

The NSW EPA has assessed the proposal against the *NSW Energy from Waste Policy Statement* (the Policy). In addition to this, the NSW EPA have engaged a technical expert, ARUP, to undertake a technical assessment of the proposal against the Policy, focusing on the technical and thermal efficiency criteria, the resource recovery criteria, as well as the requirement for a fully operational reference facility. Below is a summary of the EPA's comments, which should be considered in conjunction with ARUP's assessment.

Summary

There is not enough information presented in the proposal for the EPA to make an assessment regarding compliance with all criteria within the Policy. To make a revised assessment the NSW EPA would require the following information:

- **Waste Source Availability:** evidence that the facility will not monopolise the market for residual C&D waste, potentially restricting any future investment in other resource recovery or energy recovery opportunities in the Sydney metropolitan area.
- **Waste Source Composition**: further information regarding the characterisation of the waste streams, clarity around categories (combustibles, other combustibles, non-combustibles and other). More information regarding the characterisation of floc waste.
- **Resource Recovery Criteria:** evidence that the facility is receiving waste that is compliant with the Resource Recovery Criteria. This includes information about the processing facility, and percentages of the residual waste taken from these facilities for use at the proposed facility.
- **Reference Facility Requirement:** evidence that the technology can handle the waste stream and quantities proposed.
- **Technical and Thermal Efficiency:** The EPA will defer to comments provided by Arup Pty Ltd, the technical expert.

Waste Source Availability

Section *10.4.3.2 C&D and C&I Waste NSW* presents information on the proposed waste streams for the facility. The NSW EPA does not consider the estimations in the National Waste Report 2013 to be an appropriate and accurate source of information to extrapolate available tonnages for a facility. There is also concern around the age of the data as it is six years old. The NSW EPA would argue that the industry, and associated recovery rates have improved significantly since then, and the 2011 data is not reflective of the current waste industry and data.

The proponent outlines that the facility will use approximately 50% C&D waste as a feedstock for the facility. If the total tonnage per annum proposed for the facility (with four lines) will be 1,105,000 tonnes per annum, it means 552,500 tonnes per annum of C&D waste is required.

According to the calculations in section 10.4.3.2, there are 1,112,150 tonnes of C&D waste available. If this facility utilised 552,500 tonnes, this is approximately 50% of the total available C&D waste in the Sydney metropolitan area.

The NSW EPA has concerns that the quantities of waste required for the facility will result in market monopolisation of available residuals for any current or future investment in resource recovery and processing facilities, compromising present and future resource recovery activities. The EPA is aware of some future investment opportunities that may reduce the estimated available inputs that have been proposed by the proponent for their facility.

The EPA does not believe there is enough evidence, or enough residual waste to sustain a facility of this scale, as well as allow for future investment opportunities for higher order resource recovery and energy recovery processes. The EPA would require an in-depth assessment from the proponent on this matter to ensure there is sufficient available waste for the facility.

Waste Source Composition

Appendix DD.3_Design Fuel Mix_Concept to Definition Reports, outlines the composition of the waste streams proposed to be used at the facility. *Table 2 Ramboll Updated Technical Design Information*, outlines the percentages of materials in each waste stream.

An accurate characterisation of the waste streams proposed for use as a feedstock for an energy from waste facility is essential in order to be able to accurately determine the potential air emissions that would be generated from their combustion, and moreover suitable best available control technologies and techniques that may need to be implemented to mitigate any risks.

The NSW EPA has concerns that the proposed design fuel mix contains multiple categories that do not provide clear information of the material composition. They include *other combustibles*, *combustibles*, *non-combustibles* and *other*. There is no explanation of what these categories include, and how they differ.

The category *other* comprises a total of 10.14% of the design fuel mix. *Other combustibles* comprises 10.16% of the design fuel mix. When combined, this results in a total of 20.30% of the proposed fuel composition has not been described in sufficient detail. A full scale operational facility (1,105,000 tonnes per annum), would equate to a total of 225,766.45 tonnes per annum that has not been categorised sufficiently.

In floc waste, the category *other combustibles* is 70.41%. This excludes *combustibles* and it is unclear what materials would be included in this category. This is of significant concern, as the EPA believes floc waste can be variable and potentially hazardous, dependent on the source and processing of the material. For the EPA to approve the use of this waste stream in an energy recovery facility, a clear understanding of the material composition, and strict controls would be required to ensure there is no risk to human health or the environment.

Another concern is the risks presented by treated timber which are prevalent in mixed waste streams including C&I and C&D. The design fuel mix suggests that 30.24% of the total feedstock is wood, which is made up of predominately CRW (C&I and C&D sourced from on-site processes), C&I and C&D waste. This amounts to approximately 334,152 tonnes per annum at full scale (1,105,000 tonnes per annum). There is a high probability that these materials will contain treated timber, including CCA treated timber.

It is noted that the proponent suggests that only a small amount of wood waste will be treated (6% C&I and 14.4% C&D), however, even small amounts can result in emissions to air, and at these quantities it could have a significant impact. *Appendix J Waste Management Assessment, Section 5* outlines the management of incoming waste. This includes visual sorting and removal checkpoints. Section 5.4.1 outlines how treated timber will be managed, which includes visual sorting, waste composition audits and analysis of the ash. Some treated timber cannot be identified by visual inspection, and analysis of the ash, although it would provide a more accurate assessment, is after the material has been processed.

Considering this information, there is still concern as the facility will only reach a temperature of 850°C. In Europe, timbers at risk of being treated with CCA and other chemicals are combusted at hazardous waste thermal treatment facilities operating at higher temperatures to ensure destruction of harmful compounds so that there are no harmful emissions.

Additionally, the ***Source of Waste Report*** provided by the proponent to the EPA states that the 68.25% of "non-contaminated" soils currently being landfilled at Genesis are suitable for energy recovery. Soils are unsuitable for energy recovery. It also states that landfillable materials that are currently being recycled will be used for energy recovery instead. This goes against the objectives of the energy from waste policy.

The EPA believes the waste streams and fuel mix has not been properly identified or categorised sufficiently, and are concerned about the potential risk those materials could pose, especially considering there is no reference facility to provide assurance of the capability of the plant with the proposed waste streams. The NSW EPA requires more information about waste categorisation to ensure there is no risk to human health and the environment.

Resource Recovery Criteria

Appendix J Waste Management Report (Ramboll), Section 8.6 Resource Recovery Criteria Table 11, includes information relating to the Resource Recovery Criteria set out in Table 1 of the Policy. This table outlines percentages of waste streams allowable at an energy recovery facility. This is to ensure that only residual wastes with no other reuse or recycling opportunities are used at an energy recovery facility.

In the report, the resource recovery percentages have been miscalculated, using the National Waste Report recycling percentages to support use of the waste streams proposed. State-wide resource recovery rates or data limited to the regulated area of NSW cannot be used to justify the resource recovery rates of any particular facility.

The Resource Recovery Criteria are to be applied to each individual facility processing mixed or source separated waste streams. Once the waste stream has been through a processing facility, a proportion of the residuals can be utilised as a fuel in an energy recovery facility, such as the proposed facility. This also applies for separated waste streams, or streams that come directly from the generation site. This proportion is the percentages outlined in Table 1.

The proponent has not supplied sufficient evidence to demonstrate compliance with the Resource Recovery Criteria under the Policy at this stage. The EPA would require further evidence to show how the proponent will meet the criteria.

Reference facility

Appendix DD.1 Reference Facilities, is an assessment undertaken by Ramboll to determine compliance with the requirement for a reference facility under the Policy.

The Policy states: *Energy recovery facilities must use technologies that are proven, well understood and capable of handling the expected variability and type of waste feedstock. This must be demonstrated through reference to fully operational plants using the same technologies and treating like waste streams in other similar jurisdictions.*

As noted in *Appendix DD.1*, it is stated that: *We acknowledge that it has not been possible to identify an EfW plant (neither with comparable nor with alternative technology) processing a documented input of 50% C&D waste. The same technology has been used in other jurisdictions, but not utilising like waste streams, and similar capacity.*

In the EPA's assessment, the proposal has not met the requirement to have a fully operational reference facility, and could therefore not prove that this technology can handle this waste stream at the capacity proposed. The EPA requires further information to ensure there will be no harm to human health or the environment.

Technical and thermal criteria

As outlined above, the NSW EPA engaged a technical expert, ARUP to undertake an assessment of the proposal against the NSW Energy from Waste Policy. This includes assessing the proposal against the technical, thermal efficiency, reference facility and resource recovery criteria. The NSW EPA will defer to the ARUP assessment for advice regarding the best available technology, technical and thermal efficiency criteria of the Policy.

Technical Note

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Project title	Eastern Creek Energy from Waste Facility	Job number 239880-03	
cc	Chris Ritchie, DoPE Sally Munk, DoPE Henry Moore, NSW EPA Deanne Pitts, NSW EPA	File reference	
Prepared by	Giles Prowse/Joyanne Manning Joyanne Manning	Date 16 March 2017	
Subject	EIS Review - Key Technical Queries		

The Next Generation NSW Pty Ltd ('the Proponent') submitted an amended Environmental Impact Statement (EIS) in November 2016 for their proposed Energy from Waste Facility at Eastern Creek ('the proposed facility').

Arup have undertaken a review of the amended EIS ('the EIS'). The purpose of this review is to assess the adequacy of the EIS in light of the three Arup reviews previously undertaken of the application documentation provided by the Proponent. The previous reviews

- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS – Merit Review, 3 August, 2015, Arup.
- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS – Response to Agency and Company Submission, Urbis, November 2015 and Additional Urbis Submission of 22 February - Arup review.
- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS - EIS Additional Information Gap Review, 14 June, 2016, Arup

The review of the amended EIS submitted in November 2016, has raised **ten essential key queries** which need to be addressed as a priority as they are fundamental to assessing how the proposed facility meets the requirements of the NSW Energy from Waste Policy Statement and the Terms of Reference of for the EIS[1].

The queries raised can be grouped under four main headings:

- The need to demonstrate the technology being used is proven, well understood and capable of handling the expected variability and type of waste feedstock

[1] Director-General's Environmental Assessment Requirements Application number SSD 6236

- Material availability throughout the life of the project in accordance with the EfW Policy criteria
- Material composition
- Proof of Performance

It should be noted that the key queries detailed here are not presented as an exhaustive list of queries raised during the review process, however these queries relate directly to the adequacy of the proposed facility and are presented as the most fundamental that need to be addressed by the Proponent.

Reference facilities

NSW Energy from Waste Policy statement policy requires proponents to demonstrate that the technology being used is proven, well understood and capable of handling the waste feedstock proposed stating:
'Energy recovery facilities must use technologies that are proven, well understood and capable of handling the expected variability and type of waste feedstock. This must be demonstrated through reference to fully operational plants using the same technologies and treating like waste streams in other similar jurisdictions'.
This is a key requirement of the EfW Policy and underscores the criteria philosophy of the Agency. Therefore, the inability to provide a clearly defined demonstration facility treating like waste streams in a similar jurisdiction means that the proponent needs to consider carefully the composition and characteristics of the waste streams it is proposing to accept and how they compare to the waste streams being accepted in comparable overseas facilities.

The EIS acknowledges that the design fuel mix comprises 28.69% C&D waste and 23.27% chute waste i.e. approx. 50% C&D waste in total (figure 24 of the EIS). The EIS references the Ramboll Memo dated 26 October 2016 (Appendix DD.1). The EIS acknowledges (Section 4.4.1) that there is no reference plant accepting approx. 50% C&D waste. The EIS then continues to make the argument that there is potential uncertainty to the composition of feedstock being received in European facilities due to material being pre-processed prior to acceptance at the EfW facility: The EIS states:
'European experience with EfW has been that pre-processed waste materials received from external sources has been sorted prior to arriving at the facility and information relating to its waste declaration/identification is "lost" and cannot be tracked back to its origin.'

This statement implies there is uncertainty relating to the type and source of waste treated at the reference facilities stated (that are all in Europe), and that therefore reference facilities could be treating less or more C&D waste than stated potentially casting doubt on the data presented.

However, referring to the United Kingdom as an example, classifying waste with a List of Waste code / European Waste Catalogue code is a legal requirement under Duty of Care (i.e. chain of custody), and each batch of a particular waste requires a description, LoW/EWC code as well as a quantity on the waste transfer note that accompanies its transfer. Businesses are required to keep waste transfer notes for two years. Therefore, an EfW facility receiving pre-processed waste directly from a UK waste processing facility will know the EWC code and description for each

delivery of waste / RDF it receives. There are LoW/EWC codes specifically for C&D waste (the '17s').
Arup acknowledge that waste that is processed through a RDF or recovery facility, may be reclassified under different LoW/EWC codes e.g. '19.12.XX' (waste / RDF from waste management facilities) and therefore at face value the information on the original source of the waste would appear to be 'lost'. However, the RDF or recovery facility will still be required to hold information on where waste was sourced from. Therefore by following the chain of the custody it is possible to obtain information relating to waste origin – furthermore this should provide a more robust evidence base against which to compare the proposed facility.

Regardless, Arup are in agreement that there is no known comparable facility treating approx.50% C&D waste. There is insufficient explanation on how the proposed facility will cope with processing this high percentage of C&D waste in the absence of a fully operational reference facility.

Query 1: There is insufficient evidence that the proposed technology can operate successfully given the proposed levels (approx. 50%) of C&D feedstock waste. If a representative facility cannot be established, the proponent needs to clearly define and articulate the differences the proposed feedstock will cause in both process and emissions and demonstrate that any difficulties can be mitigated to ensure successful operation of the proposed facility.

Of note - Section 4 of Appendix J states '*no two EfW plants would have "identical feedstock" as the feedstock always depends on the region and the waste fractions delivered to the plant'*. The EIS goes on to state that that the comparison with reference facilities in terms of operation of emission behaviour is largely consistent irrespective of location and feedstock. This statement could be considered to be misleading at the emission behaviour of EfW plants is primarily driven by the requirement to meet the IED emission limits.

Material Availability

Construction and Demolition (C&D) residual waste

A methodology is presented for how composition of C&D residual waste has been derived in Section 4.1 of Appendix J (waste management report). This methodology states that 'appropriate resource recovery' rates likely to be achieved for each waste stream via a C&D recovery facility or via source separation at C&D sites have been defined, but it fails to state what these rates are or how they have been included in the composition calculation. In addition, Section 4.1 references the Hyder C&D report, which does contain composition data on C&D waste (table 3-1). It is unclear how this composition has been 'recalculated' based on remaining residual material. There are also inconsistences in the data, for example, Table 7 in Appendix J shows 43.9% wood, whereas wood is not included in the Hyder C&D composition.

In addition, C&D waste composition has a high proportion of 'other' waste (20.75% from figure 24 in the EIS) which is not defined.

Query 2: A detailed, evidenced-based, fully transparent explanation of how C&D residual waste composition has been calculated, including the recovery rates used, should be provided.

An evidence based description on what 'other' waste comprises of is required.

Section 10.4.3.2 of the EIS and Appendix J, Section 7.2, states there is 1,112,150 tpa of C&D waste potentially available as a fuel source for EfW in the Sydney Metropolitan Area (SMA). This is based on the National Waste Report, 2013 (based on 2011 data) and the assumption that SMA is 65% of the NSW total population. It appears that these figures for C&D do not take into account waste materials that are not suitable for incineration (asbestos, hazardous waste etc.).

There is not a robust consideration of the potential feedstock in relation to the proposed facility size. It is not appropriate to suggest that all residual C&D waste is potential feedstock as this does not take into account the composition of the overall waste stream which includes potentially unsuitable material. There is no acknowledgement that certain fractions of the waste will not be suitable to be used as a feedstock.

Query 3: An evidence-based, transparent explanation on the actual available C&D waste tonnages suitable as feedstock that are available in the SMA area is required.

Commercial and Industrial (C&I) residual waste

Similarly, a methodology is presented for how composition of C&I residual waste (16.84% of total waste, or 93,041 tpa) has been derived in Section 4.2 of Appendix J but resource recovery rates are not stated.

In addition, C&I waste composition has a high proportion of 'other' waste (14.44% from figure 24 in the EIS) which is not defined.

Query 4: A detailed, evidenced-based, fully transparent explanation of how C&I residual waste composition has been calculated, including the recovery rates used, should be provided. An evidence-based description of what 'other' waste comprises of is required.

Section 10.4.3.2 of the EIS and Appendix J, Section 7.2, states there is 1,430,000 tpa of C&I waste potentially available as a fuel source for EfW in the SMA. This is based on the same assumptions used for C&D waste.

There is not a robust consideration of the potential feedstock in relation to the proposed facility size. It is not appropriate to suggest that all residual C&I waste is potential feedstock as this does not take into account the composition of the overall waste stream which includes potentially unsuitable material. There is no acknowledgement that certain fractions of the waste will not be suitable to be used as a feedstock.

Query 5: An evidence-based, transparent explanation on the actual available C&I waste tonnages suitable as feedstock that are available in the SMA area is required.

Waste growth

It was previously raised that the Proponent should consider if assuming a positive waste growth rate is reasonable. There is current evidence (including recent data received by Arup from the NSW EPA) that indicates waste generation of C&D and C&I waste may reducing year on year.

The evidence provided in Section 7.4 of Appendix J states that the waste generation growth rate (2006/07 to 2010) is 12% The EIS makes reference to this same statistic in Section 10.4.3.2 The EIS is silent on more recent waste generation statistics that suggests annual waste generation may be decreasing. There doesn't appear to be any acknowledgement that annual waste generation may be decreasing (although it is acknowledged that recycling rates are increasing). Best practice would be to demonstrate the available feedstock would be to provide a detailed waste forecast model for the planned operational period of the proposed facility.

Query 6: An evidence-based justification needs to be given why the Proponent is assuming a waste growth rate from data that is over seven years old. The implications of a waste reduction rate needs to be fully considered with regard to long term waste availability. This could be demonstrated through a waste forecast model, which would estimate predicted waste tonnages over the planned operational period of the proposed facility.

Material Composition

Chute Residual Waste (CRW)

No explanation is given for how the composition of CRW waste has been derived. It comprises 58.20% wood (Figure 24 in the EIS), no breakdown of the types of wood are provided in particular with regard to Treated Wood Waste (refer to Query 7).

Query 7: A detailed, evidence-based and fully transparent explanation of how CRW composition has been calculated, including the recovery rates used, is required.

A detailed compositional breakdown of wood waste is required.

Shredder floc waste

Appendix DD.6 to the EIS includes an estimation of shredder floc composition. This is based on the assumption that 75% of an End of Life Vehicle (ELV) by weight is recovered metal, which would appear reasonable. The remaining shredder floc is estimated to comprise plastics (10.5%), rubber (3.8%), metals (2.5%), textiles (2.9%), fines (3.8%), and fluids (1.6%). Fluids comprises of operational oils/fluids and water.

No detailed chemical analysis suite is provided for floc waste. 'Overall' levels of hydrocarbons are stated as 2.99%. PCB is quoted as 120mg/kg (0.012% by weight) and Bromine as 0.02g/100g (0.02% by weight). No analysis for heavy metals is presented.

Appendix CC to the EIS (project definition brief) presents a chemical analysis of European floc waste in table 3, and a compositional analysis of floc waste likely to be processed at the proposed facility. Chloride concentration is quoted as 0.6 % for the proposed facility compared to 1.8% for

Europe, and Bromine 0.01% for the proposed facility compared to 0.02% for Europe (by weight). Total PAH is stated at 20 mg/kg and total PCB at 14 mg/kg (dry basis).

Appendix CC also includes a composition in figure 3 of shredder floc based on 17 samples, although no specific source for location, date, source, and the types of vehicle the floc is generated from is provided. This composition is different to the estimated composition in Appendix DD.6. A different Net Calorific Value (NCV) is also presented to the NCV in the EIS (Figure 24). 11.6MJ/kg is stated in Appendix CC and 12.59 MJ/kg is stated in the EIS.

Section 4.4.2.1 of the EIS states that *'in general floc processing in Australia is comparable to that undertaken in Europe'*. The EIS also states that *(floc waste in Australia is typically) 'brought to landfill for disposal as limited further resource recovery is possible from this shredded material. The metal industry has successfully secured landfill levy exemptions to assist with the costs of disposing of this difficult waste stream'*.
Specific reference facilities processing floc waste through EfW facilities in Europe has not been provided. If floc waste is processed through EfW facilities in Europe, and as floc waste is landfilled in Australia the assertion that floc waste processing in Australia is comparable to that undertaken in Australia is unfounded.

Query 8: Robust, evidence-based data is required to give a definitive detailed floc waste composition for Australia to allow for a comprehensive comparison to European floc waste.

A detailed comparison of the process used in Australia and Europe to treat ELV is required including clear identification of any differences and the impact this may have on the generated floc.

Identification of EfW facilities in Europe processing floc waste is needed, including composition, quantity and percentage floc waste in the overall waste stream. Consideration of any special operational or handling procedures employed at facilities accepting floc waste should also be articulated.

Treated Wood Waste (TWW)

Wood can be treated with a number of compounds including PCB (Polychlroinated biphenyls), CCA (Copper Chromated Arsenate), paints, and fire retardants. Therefore TWW is a potential source of contaminants of concern for EfW plants. The NSW Energy from Waste Policy statement requires a temperature of 1,100 °C for two seconds if waste has a content of more than 1% of halogenated organic substances, expressed as chlorine.

In addition, The PAS 111:2012 Specification for the requirements and test methods for processing waste wood, Annex A (Grades of recycled wood) indicates TWW (Grade 4 waste) must be processed as hazardous waste. The specification states that waste wood containing CCA preservation treatments and creosote, which is typically fencing, transmission poles railway sleepers, "requires disposal in a process as a hazardous waste incinerator". CCA treated TWW must therefore be treated with the increase temperature of 1100 °C for two seconds. It is common practise in the UK and other EU Countries for CCA TWW to be handled as hazardous waste and treated in an a hazardous waste incinerator.

Appendix DD.5 to the EIS includes a calculation that concludes for a given size of wood treated with PCB (Polychlorinated biphenyl) containing varnish, the chlorine concentration would be less than 0.01% by weight. Therefore the EIS states that there is no need for an increased combustion temperature of 1,100 °C for two seconds from the processing of TWW.

However, the design fuel mix (figure 24 in the EIS) states 0.88% of the design fuel will be Cl. This could include dense plastic such as PVC (Polyvinyl Chloride), and could increase the potential for the formation of dioxins. 0.88% is close to 1% Cl limit in the policy, and any fluctuations in input waste fuel could result in higher concentrations despite proposed mixing of waste in the feed hopper. Section 2.3.1 of Appendix CC (project definition brief) cites that waste mixing will overcome this, however this is stated as being done during 'low delivery' inferring it may not be done all the time. A guarantee of continual thorough waste mixing as a minimum would be required.

Regarding timber treated with Copper Chrome Arsenic (CCA), there does not appear to be any specific assurances there will procedures and processes in place to specifically ensure removal of CCA treated materials. In addition the calculation in Appendix DD.5 only focuses on PCB containing varnish and CCA is not given consideration.

Section and 4.9.2 and 5.4.1 of Appendix J (waste management report) to the EIS states that all treated timber will be monitored from general screening, waste composition audits and analytical analysis of ash residue. It is questionable how effective these measures will be at preventing treated timber from being burned in the facility, as the general screening is not adequately detailed for those waste streams (C&D, C&I) not originating from the Genesis MPC, and waste composition audits and analytical analysis are retroactive measures.

Given that a clear argument has not been provided that can justify that all TWW will be removed from the incoming waste streams, provision of an increased combustion temperature of 1,100 °C for two seconds should further be considered and justification of the proponents preferred position based on scientific modelling or evidence to reference facilities is required. Scenario modelling of varying concentrations of TWW should be undertaken to demonstrate if TWW does enter the feedstock the threshold levels it will not have a significant negative impact in accordance with the EfW Policy.

Query 9: A definitive, evidence-based estimation of the percentage of different types of TWW in the waste feedstock is required.

Detailed acceptance procedures that will be employed at the facility to remove TWW from all waste sources that will be accepted are required.

If adequate removal of TWW cannot be guaranteed, provision of a combustion temperature of 1,100 °C for two seconds operation needs be re-considered.

Scenario modelling of varying concentrations of TWW should be undertaken to demonstrate if TWW does enter the feedstock the threshold levels it will not have a significant negative impact in accordance with the EfW Policy.

Proof of Performance

Appendix LL to the EIS details proof of performance tests and procedures. This includes a detailed methodology for performance guarantee testing etc. but it does not include training requirements of operational staff / competency and capabilities of operational staff. EfW on this scale is a new technology for Australia, and there needs to be assurance that staff will be trained by experienced operators in order to ensure successful operation after the commissioning period is over.

Query 10: Detailed procedures required on how the proposed facility will be run during commissioning and operational phases by operational staff, including training requirements and qualifications.

Conclusion

It is necessary for the Proponent to clearly address the queries raised, and provide evidence based responses. Without the ability to demonstrate the performance of the technology through reference plants treating a similar design fuel mix, assertions made by the proponent about the functionality and performance of their plant and process, cannot be validated. The Proponent needs to provide more detail on the composition of the proposed waste streams and specifically assess and articulate how these waste streams will be processed through the facility and how they will impact the performance of the facility.

The Proponent also needs to give further consideration to the availability of suitable material based on composition and compliance with the EfW Policy, in the Greater Sydney Area which could be utilised as fuel for the facility.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Giles Prowse/Joyanne Manning	Joyanne Manning	Joyanne Manning
Signature			

ATTACHMENT D

NSW Environment Protection Authority

Review of the Human Health Risk Assessment

The EPA has reviewed the Human Health Risk Assessment (HHRA) (AECOM, 23 November 2016) on public exhibition for the proposed Energy from Waste Facility (the facility) at Eastern Creek (the site).

The HHRA includes the assessment of additional appropriate scenarios to demonstrate representative and worst case facility emissions are not likely to result in potential adverse health impacts.

According to the HHRA, the health risks to off-site residents and commercial workers from chronic exposure to air pollutants directly emitted from the facility, and chronic exposure to multiple non-direct inhalation exposure pathways, are low and acceptable. Health risks associated with acute exposure to emissions during upset conditions were also considered in the HHRA and the HHRA found them to be low and acceptable.

The EPA advises that the HHRA generally follows the requirements outlined in Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards (enHealth, 2012) (the enHealth Guidelines) and other relevant guidance documents referred to in the HHRA.

However, the EPA has identified a number of issues with the assessment that require further clarification or justification to demonstrate the assessment is robust and that risks associated with facility are acceptable.

The EPA notes the HHRA and supporting assessments use a range of information, assumptions and data to derive estimates to qualitatively and quantitatively characterise and define critical facility operations, parameters and emissions. In general there are numerous assumptions and variables relating to the waste/fuel, plant and project operations and performance, and emissions. These have not been clearly identified, well characterised or comprehensively evaluated in the HHRA. This brings into question the thoroughness and veracity of the assessment.

The EPA advises that the Air Quality Impact Assessment, ozone and other assessments provide critical information and source data on which the assessment of health risks associated with the facility is based. Thus changes that are made to supporting assessments will require the HHRA to be reviewed and potentially amended to reflect and address the changes.

The Next Generation NSW Pty Ltd (the proponent) has submitted an amended EIS (Urbis, November 2016) in support of its proposal to construct and operate an Energy from Waste (EfW) electricity generation plant (the facility/project) at Honeycomb Drive, Eastern Creek (the site).

The EIS addresses submissions, and includes design and other changes made to the facility since the previous EIS for the project was put on Public Exhibition. The EIS includes a revised Human Health Risk Assessment (HHRA) for the project (AECOM, 23 November 2016).

ISSUES OF CONCERN

The EPA has reviewed the project human health risk assessment (HHRA) titled *Energy From Waste Facility, Human Health Risk Assessment, Honeycomb Drive, Eastern Creek* (AECOM, 23 November 2016). Details of the issues identified by the EPA are provided below.

1 The assessment of facility impacts may be unreliable as it is unclear how accurate the assumptions and input data used in the assessment are.

A large number of assumptions have been incorporated in the assessment of risk to human health from the facility and supporting EIS. Generally the main assumptions are associated with estimating or defining:

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;
iii. Flue gas treatment;
iv. Start-up and shut-down; and
v. Upset conditions.

The EPA notes that numerous assumptions and input data used in the assessment of the facility are not well supported or clearly identified (see below), which brings into question the veracity of the assessment outcomes, and does not allow a comprehensive review of the EIS and its outcomes.

Further details of the main assumptions identified by the EPA are provided in the following points.

The EPA requires the proponent to revise the HHRA to ensure all parameters, input values, and assumptions used are clearly identified, described, characterised, evaluated and quantified (where possible). The assessment must demonstrate and justify that the values used are robust and appropriate for their required purpose.

1.1 Fuel/waste composition and demonstrated ability of plant to treat accepted materials. Assumptions and variability in waste inputs, chemical composition and processing.

Parameters such as the type, form and chemical makeup of the fuel/waste, are important with respect to ensuring the correct plant design and requirements for operation. In addition the nature of the feed material determines the air pollutants generated during and following incineration, and the operational requirements for treatment and capture of air pollutants and monitoring.

The project Waste Management Assessment and Project Definition Brief provides some details of the proposed waste sources and their composition and notes the potential variability in chemical composition within the various waste types. These assessments aim to characterise the makeup and chemical composition of the fuel/waste, and demonstrate the fuel/waste will be consistent and within the range accepted at other similar facilities operating in Europe.

The EPA notes there is a large variability in the proposed fuels/wastes and therefore likely feed material contaminants and contaminant concentrations. To accommodate this large variability, the incineration and air pollution control system must be designed to treat this large range of feed materials. This will ensure that air emissions are effectively captured or destroyed at the facility. The EPA also notes this variability of contaminant concentrations, and the acceptable range for treatment, is not well characterised or clearly presented in the HHRA.

In addition, insufficient justification is provided to demonstrate that all the fuels/wastes proposed to be accepted at the facility can be effectively processed. For example, it is unclear if emissions generated by the fuels containing significant amounts of wood treated with arsenic, or floc and construction and demolition wastes likely to contain elevated levels of heavy metals, can be effectively controlled by the proposed facility.

The EPA notes that appropriate waste selection, mixing and homogenisation is required to ensure all waste used as feedstock will be acceptable for effective combustion and emission control. However it is unclear how this process will be effectively ensured.

The EPA requires the proponent to provide additional information to demonstrate variability and uncertainties in fuel/waste composition has been robustly assessed.

1.2 Plant design, operation and performance.

The EIS generally assesses facility impacts based on reliable, consistent and predictable operation and performance of the plant. In particular, facility air emissions are assessed, in part, using emissions data from reference facilities that are assumed to provide representative emissions data that can be applied to the proposed facility.

The HHRA uses modelled emissions data and thus also incorporates these assumptions in the assessment of risks to human health.

The EPA notes that ongoing proper and efficient operation of the facility will be required to ensure assumptions incorporated into the assessment of risks to human health remain valid. Consequently, critical parameters and potential variability and uncertainty associated with these parameters must be robustly identified, evaluated, and applied or maintained.

The EPA requires that the proponent provide additional information to demonstrate assumptions and variability regarding plant operation and performance are well characterised and have been taken account of in the assessment.

1.3 Flue gas treatment

Flue gas treatment is stated to have been designed to meet best available technology, and for emissions to meet the requirements of the European Union Industrial Emissions Directive (IED).

The EPA notes that the air pollution control system must be robust and versatile so that it can effectively capture or destroy the wide range of air pollutants and emission concentrations that are likely to be generated by the feed material.

It is unclear if the flue gas treatment system will be able to effectively control all significant air pollutants to the levels required to ensure compliance with project requirements. This is due to the potential variability and uncertainty, and presence of potentially problematic wastes (such as arsenic treated wood and floc waste potentially high in heavy metals and/or chlorine), in the waste feed material.

The EPA requires that the proponent demonstrate the flue gas treatment system will be capable of effectively controlling emissions generated by the range of potential feed materials that may be used at the facility.

1.4 Start-up/shut-down and upset conditions

Start-up and shut-down periods are associated with emissions variability. Start-up and shut-down periods are stated to be infrequent and are anticipated to occur only during the Facility's annual maintenance program. To ensure adequate combustion above 850 °C and effective flue gas treatment during start-up and shut-down periods, the project incorporates the combustion of support auxiliary fuel (low sulphur light fuel oil) and certain waste processing.

Monitoring data during upset conditions is not available from existing facilities and consequently worst case assumptions have been made based on plausible emissions during these periods (in consultation with the UK Environment Agency). In addition, the EIS commits the operation of the facility to be consistent with the European Union Industrial Emissions Directive (IED; Directive: 2010/75/EU) which requires upset conditions to occur for no more than 4 hours uninterrupted and cumulatively no longer than 60 hours per year.

The EPA notes the design and operation of the facility must be consistent with the assumptions and requirements presented in the EIS to ensure the assessment of facility impacts remain valid.

The EPA requires that the proponent revise the HHRA to clarify the assumptions regarding start-up/shut-down and upset conditions are robust and conservative with respect to the assessment of risk to human health from the facility.

2 Air pollutant emissions.

The assessment notes[1] that no two EfW plants have identical feedstock as this is region and locally specific. However the assessment states for plant with comparable feedstock and "identical" air pollution control processes the emission behaviour is largely consistent, irrespective of location and feedstock. This is due to each EfW plant having a destruction and removal process for each contaminant group (such as acid gases, organic substances, and heavy metals) and continuous process and emission monitoring to ensure proper and efficient operation of the plant. The assessment argues that because of this, "plants with comparable (not identical) feedstock are sound evidence for the suitability of the technology".

The HHRA includes additional justification and details of the selected contaminants of potential concern (CoPC) in correspondence from Ramboll in the 5 memorandums presented in Appendix I of the HHRA. However, the EPA notes there is significant variability and numerous uncertainties and unknowns associated with emissions from the facility (refer to issues below and under issue **1** above).

The EPA has identified a number of issues related to project air pollutant emissions which are summarised in the following points.

2.1 <u>It is unclear what emission concentrations were modelled and if they are representative, conservative and correct.</u>

The HHRA considers three future operating conditions (Section 4.2):

a. Normal operating condition: Considered to be the most representative of future operation, where the facility is operating at the prescribed Industrial Emissions Directive (IED; Directive 2010/75/EU) emission rates.
b. POEO limit operation conditions: Representative of theoretical worst case impacts unlikely to be realised, where the facility is operating at the POEO (Clean Air) Regulation 2010 emissions standards except for cadmium.
c. Upset operating conditions: Considered to be the most representative of potential upset conditions, where the facility is operating at the mass emission rates provided to Pacific Environment by Ramboll (the proponent's engineers).

The EPA notes the chosen operating scenarios are generally appropriate for the assessment of facility impacts, and that the HHRA has aimed to identify and apply realistic, relevant, and potential worst case emissions in the assessment. However despite the HHRA stating the normal operating conditions scenario uses the prescribed IED emission rates, the EPA notes the modelling of emissions of CoPC were based on the significantly lower 'real world' in-stack concentration data. This in-stack data is sourced from other facilities stated to have identical air pollution control systems to the project and using 'similar' feedstocks (Ramboll, 20 October 2016). The 'real world' stack concentration data was provided by the proponent's engineer Ramboll, and the outputs of the revised air modelling have formed the inputs to the current HHRA. Consequently, it appears the revised modelling has resulted in ground level concentrations and deposition estimates (and also risk estimates) that are much lower than those included in the previous HHRA that was put on public exhibition in 2015.

If approval is given for the development, the emission limits in the Facility's licence will reflect the values demonstrated in the project EIS to not result in any adverse impacts to the environment or human health. Consequently the emission concentrations used to assess Facility impacts should be

[1] Updated Technical Design Information – The Next Generation NSW Pty Ltd (Ramboll, November 2015).

based on the proposed emission limits, rather than 'real world' (averaged or otherwise) stack concentrations, which may potentially significantly constrain facility operation.

The EPA notes AQA Appendix G includes a table of all in-stack concentrations under normal and upset conditions used in the dispersion model for air pollutants assessed in the HHRA. However the in-stack concentrations provided for some air pollutants (such as HCl, HF, SO2, NO2, CO, Hg, Cd, and Tl) are not equivalent to the IED limits stated as applied in Scenario 1 to assess normal operating conditions (HHRA Section 4.2).

In addition, the HHRA (or AQA) does not include a table of in-stack concentrations used for HHRA Scenario 2 (POEO Limit operating conditions).

Based on the above issues it is difficult to verify if the in-stack values were correctly applied in the air dispersion model and therefore that derived exposure point concentrations in the HHRA are accurate.

The EPA requires that the proponent:

i. **clarify and justify the emission concentrations used for all pollutants for each scenario, and revise the HHRA to include an assessment of risk to human health that clearly demonstrates an acceptable risk where the Facility emissions are at the proposed maximum permissible concentrations; and**
ii. **clarify the reasons why estimated emissions generally appear to have been reduced in each subsequent assessment.**

2.2 Appropriate selection and characterisation of emissions should be robustly demonstrated.

Emissions generated from the facility will be dependent on a range of factors as discussed in issue **1** above. Due to the variability of waste materials and their composition, a wide range of potential contaminants/contaminant classes and concentration ranges requires detailed consideration and assessment. Generally only limited and disjointed information is provided on the uncertainties and variability of contaminants/contaminant concentrations, and implications on potential facility emissions.

The EPA requires that the proponent revise the HHRA, to provide further comprehensive and cohesive discussion on the implications of uncertainties and variability associated with compound emissions.

2.3 The data on organic pollutant emissions is dated from the 1990's and may not be applicable to facility emissions

Ramboll (Memo 2, 19 October 2016) outlines the strategy used to demonstrate the CoPC chosen are robust for consideration and assessment of facility impacts. Ramboll notes there is little literature on the main organic components associated with total organic emissions from waste incineration plant, with most information published from the mid 1990's.

The EPA advises the HHRA generally tries to implement a conservative approach to assess possible organic compounds emitted. However, the likely speciation profile of emitted organic pollutants and their concentration at the facility is not known and likely to be highly variable and dependent on many factors including facility design, operation and wastes received.

The EPA requires that the proponent revise the HHRA to provide further discussion on the implications of uncertainties associated with organic compound emissions.

2.4 The evaluation of bromine emissions control refers mainly to a plant with an emissions control system that is of limited relevance to the facility.

Ramboll (Memo 5, 14 October 2016) evaluates the potential effect of waste with elevated bromine content such as waste containing brominated flame retardants and in particular floc waste. Ramboll notes that incineration will decompose brominated compounds to mainly hydrogen bromide and small amounts of other brominated organics such as dioxins partially or fully substituted by bromine. The memo also states there are few studies regarding incineration of waste containing brominated flame retardants at modern facilities.

Ramboll refers to a study of three incineration plant in Norway. Emissions of brominated flame retardants were detected at 14-22 ng/Nm^3 at the Klemetsrud plant in Oslo with no additional dioxin formation. However elevated carbon monoxide levels were observed in the stack gases demonstrated sub-standard plant performance. In addition the Klemetsrud plant includes a wet scrubber in addition to a fabric filter. The wet scrubber appears to reduce brominated flame retardant emissions by a significant amount (up to 150 times). The EPA notes that due to the different air pollution control system at the Klemetsrud plant, its relevance to the emission performance of the EfW project is limited.

Ramboll also refers to the Energos Plant at Ranheim which, due to its small size (10,000 tpa), is also likely to be of limited relevance with respect to project emissions.

The EPA notes that facility emission controls will likely be most effective if bromine containing wastes are well mixed with other wastes, and if the bromine content in the feed material is maintained at consistent and low levels. However it is unclear how this will be ensured.

The EPA advises the comparison of the facility emissions with those from the Klemetsrud plant is unreliable due to the different air pollution control systems at each site.

2.5 Clarification may be required regarding nitrogen dioxide (NOx) emissions during upset conditions.

Ramboll (Memo, 29 January 2015) states no monitoring data is available from existing facilities during upset conditions. In the absence of monitoring data, plausible worst-case assumptions are used based on consultation with UK Environment Agency. The memo states 'It would be worth consulting with HZI to ensure that they agree with the predicted NOx emissions under upset conditions". The EPA notes it is unclear if HZI (the plant manufacturer) agrees with the predicted NOx emissions.

The EPA requires that the proponent clarify the assumed NOx emissions under upset conditions have been confirmed by HZI.

3 It is unclear if the HHRA provides an accurate assessment of potential project health risks.

The EPA has identified a number of issues that require clarification in order to demonstrate the HHRA provides a robust and accurate assessment of project variability and uncertainties, and potential health risks. The issues identified are summarised as follows.

3.1 It is unclear if the predicted ground level air pollutant concentrations are accurate.

The HHRA 'conservatively' assumes the EFW facility will operate for 8,000 hours per year (allowing 760 hours for maintenance annually). In addition, the AQA (AQA Section 2.1), Ozone Impact Assessment (OIA, Section 2.2) and Odour Assessment (OA, Section 2) state that over a year, "it is assumed the facility would be operational for 8,000 hours as an annual average". Consequently the EPA notes it appears the AQA, OIA and OA have modelled annual emissions based on the plant operating 91% of the year (or 333 days per year).

Based on this assumption, the EPA notes that if the plant operates for longer than 8,000 hours per year the modelled annual average GLC predictions will no longer be applicable. In addition dispersion model predictions may underestimate GLCs where facility emissions are not assessed over a full year of meteorological data. Consequently it is unclear why the assessment did not conservatively assume a scenario of 8,760 hours operation per year.

The EPA requires that the proponent:

- **clarify how facility emission were modelled and advise if the modelled annual average ground level concentration predictions are based on the worst case with respect to the duration of facility operation over a year; and**
- **revise the HHRA and EIS to clarify the facility will not run for more than 8,000 hours per year or as otherwise required.**

3.2 The assessment of potential chronic health effects using Scenario 2 does not include all the relevant pollutants

The EPA notes that only four CoPC were considered under Scenario 2, the scenario which is meant to be representative of worst case impacts with the facility operating at the POEO (Clean Air) Regulation 2010 emission limits (except for cadmium). Consequently the calculated risk for this scenario is likely to be incorrect and underestimated.

The EPA requires that the proponent revise the HHRA to reassess Scenario 2 including all relevant CoPC.

3.3 The potential for fugitive and odorous emissions from the tipping hall have not been considered during upset or maintenance periods.

The HHRA notes that fugitive emissions from the tipping hall have not been included in the project air dispersion model as:

- the hall will be maintained under negative pressure; and
- the application of good dust management practices are considered to result in minimal potential for fugitive dust emissions.

The EPA notes that during upset conditions or maintenance periods, when incineration is not taking place, the tipping hall will not be maintained under negative pressure. Emissions from the tipping hall have not been modelled in the AQA or OA during these periods, despite the increased potential for fugitive and odorous emissions from the hall.

The EPA requires that the proponent further consider the potential for fugitive emissions and odour from the tipping hall during periods when incineration is not taking place.

3.4 The stack parameters provided in the HHRA are incorrect.

The EPA notes the stack parameters used for dispersion modelling in Table 7 (Section 3.4) incorrectly list the parameters used for the original AQA, not the revised current AQA (see AQA Table 7-8) and those advised by Ramboll (Memo no. 1, dated 13/09/2015).

The EPA note the summary of model (99.9th percentile) predictions reported in Section 3.4 of the HHRA correctly reflect those in the AQA (Section 9.1), which presumably were derived using the most up to date emission parameters. Consequently the EPA assumes the modelling that was undertaken uses the (correct) current emission parameters, however it is not clear this is the case.

The EPA requires that the proponent:

- **amended the HHRA the include the correct data in Table 7; and**
- **clarify the modelling undertaken uses the current and correct emission parameters.**

3.5 The meteorological data used in the dispersion model is not clearly demonstrated as representative of the long term meteorology.

Meteorological conditions used in the air quality model were data obtained in 2013 from St Mary's OEH meteorological station. This data were determined to be representative of long term meteorology at the site by an evaluation of 5 years of meteorological data between 2009 and 2013 from the Horsley Park Bureau of Meteorology automatic weather station (Section 2.10).

The AQA states that using the St Marys dataset resulted in ground level concentrations up to 64% higher than if the Horsley Park dataset was used which demonstrates the meteorology at each site differs to some extent. Despite this, the EPA notes that an evaluation to demonstrate that data from Horsley Park monitoring station is valid to determine the representativeness of St Mary's 2013 data is not presented in the AQA or HHRA.

The EPA requires that the proponent:

- **clarify why OEH St Marys 2010 to 2012 data was not used in the evaluation of the chosen 2013 data; and**
- **provide additional information to verify the 2013 St Marys meteorological data is representative of long term meteorology at that site and therefore suitable to use in the air dispersion model for the project.**

3.6 The HHRA does not include the dispersion modelling data used to justify the water supply at Prospect Reservoir will not be impacted.

Significant features near the facility considered in the HHRA are Minchinbury Reservoir and Prospect Reservoir (Section 2.0).

Minchinbury Reservoir is located over 1 km to the east of the proposed site and consists of 2 large tanks and pumping units. Due to the distance to the Reservoir and the fact that the tanks are covered, emissions from the site are unlikely to impact the stored water.

Prospect Reservoir, which is a lake with an area of 5.2km^2 and a catchment of 10km^2, located approximately 4.5 km ESE of the site and which is still used as a drinking water supply for Sydney, is also considered. The HHRA states Prospect Reservoir is unlikely to be impacted by the facility due to its distance from the facility, and the dispersion modelling outcomes. The HHRA refers to the Air Dispersion Modelling section regarding this issue. However the EPA notes that the Air Dispersion Modelling section of the HHRA does not further discuss or provide the dispersion modelling outcomes. These are needed to justify any impact at the water supply from deposition of air pollutants with Prospect Reservoir and catchment will not be significant

The EPA notes that significant deposition of air pollutants emitted from the proposal is unlikely to occur at a distance of 4.5 km of the site, however to demonstrate this, quantitative information should be provided.

The EPA requires that the proponent revise the HHRA to include quantitative data from the air dispersion modelling to demonstrate deposition of air pollutants within the catchment of Prospect Reservoir will not be significant enough to warrant further consideration.

3.7 The screening criteria lack evaluation.

The EPA notes the Tier 1 screening criteria for the chronic effects health assessment were generally selected based on a hierarchy of ambient air criteria listed in the HHRA and stated to be that in enHealth 2012 (Section 4.10.1).

A similar hierarchical approach was applied to the acute exposure screening approach (Section 4.13.1). However the criteria selection process does not include any evaluation of the criteria provided in the chosen hierarchy. This is despite other sources potentially being based on more recent data (for example for lead) or being set using more contemporary risk assessment methodologies.

The EPA requires that the proponent revise the HHRA to demonstrate the screening criteria used have been appropriately evaluated and applied.

3.8 The background allocation for some CoPC have not been referenced.

The EPA notes the background allocation for seven CoPC are not referenced (Section 5.2.3).

The EPA requires that the proponent comment on or include a reference for the background allocation for all CoPC.

3.9 Clarification is required why air-to-leaf transfer was not considered as a means of accumulation of CoPC in edible plants.

With respect to accumulation of CoPC in edible plants, root uptake and deposition onto outer plant surfaces have been considered, however the HHRA does not discuss air-to-leaf transfer. Stevens (1991) noted this transfer process as potentially as, or more, important than root update as a source of plant contamination.

The EPA requires that the proponent revise the HHRA to clarify a why air-to-leaf transfer was not considered as a means of accumulation in edible plants.

3.10 The location of grid maximum concentrations is different for Scenarios 1 and 2, however it is unclear why this is the case.

The HHRA presents the locations where grid maximum concentrations were reported for the modelled scenarios (Section 4.3.3). The EPA notes these maximums occur at different locations for Scenarios 1 and 2, however it is unclear why this is the case as the model parameters only differ with respect to emission concentrations.

The EPA requires that the proponent clarify why the grid maximum locations differ for Scenarios 1 and 2.

3.11 The terminology used to describe ground level concentrations is unclear.

The HHRA considers the "1-hour maximum annual average" ground level concentrations (GLCs) at each receptor to be representative of the worst case exposure scenario value. The EPA notes that the HHRA clarifies the meaning of this ambiguous term in Section 4.3.2 as 'the maximum value of the 1-hour averages that were predicted over an entire year'. However elsewhere in the HHRA the term '1-hour maximum annual average' remains.

The EPA requires that the proponent revise the terminology used to describe the ground level concentrations used in the HHRA to ensure their meaning is clear.

4 The assessment of impacts on human health relies on the provision of accurate assumptions and data in other project investigations.

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 potentially the outcomes of the HHRA.

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Attention: Deanne Pitts/ Chris Ritchie/ Sally Munk

Re: Energy from Waste Facility, Eastern Creek, NSW – Review of Health Risk Related Matters Covered in the EIS

1 Introduction

Environmental Risk Sciences Pty Ltd (enRiskS) has been commissioned by NSW Planning and NSW EPA to review the Human Health Risk Assessment (HHRA) (provided as Appendix N of a revised EIS published in November 2016), for the proposed Energy from Waste Facility, Honeycomb Drive, Eastern Creek. The report was prepared by AECOM on behalf of The Next Generation NSW Pty Ltd.

A range of other documents forming part of the EIS and the Response to Submissions have also been provided to assist in the review:

- Appendix N, Human Health Risk Assessment (prepared by AECOM, dated 23/11/16)
- Appendix K, Air Quality Response (prepared by Pacific Environment Ltd, dated 31/10/16)
- Appendix M, Ozone Impact Assessment (prepared by Pacific Environment Ltd, dated 25/10/16)
- Amended EIS, Main Report by Urbis dated November 2016

Previous versions of this risk assessment and AQIA used for input were reviewed for adequacy and while on public exhibition at various times in 2014, 2015 and 2016.

These reviews highlighted a number of issues with each of the risk assessments:

- the earlier ones were not done in accordance with Australian guidance
- the more recent ones did not provide a detailed enough explanation for the chemicals chosen to be assessed and the way concentrations were assessed

Another revision to the HHRA was prepared for the amended EIS submitted in November 2016 which was placed on public exhibition between December 2016 and March 2017. This version of the HHRA has now been reviewed and comments are provided in this letter report.

2 Overview

The assessment of the potential for health risks from this facility is based on estimating what chemicals might be emitted from the facility and what concentrations of each chemical emitted might be present at ground level around the facility where people live and breathe.

Determining which chemicals might be present in the emissions depends on:

- Types of waste proposed to be used in the plant

- How the various types of waste are combined (proportions and thoroughness of mixing)
- Controls on conditions inside the kiln
- Efficiency of the pollution control equipment to remove particular chemicals

Once the chemicals that might be present in the emissions have been identified then the concentrations of them in air at ground level around the plant need to be estimated. The concentrations depend on:

- Types of waste proposed to be used in the plant
- How the various types of waste are combined (proportions and thoroughness of mixing)
- Controls on conditions inside the kiln
- Efficiency of the pollution control equipment to remove particular chemicals
- How the stack has been engineered
- Dispersion of the stack emissions around the facility which depends on the meteorology in the area and the topography surrounding the plant

Having sufficient information about each of these aspects means that estimates of the ground level concentrations can be made with appropriate confidence for decision making. However, if there are some aspects which are not known with confidence then that limits the confidence in the estimates of the concentrations and means the human health risk assessment may not be as robust as would be normally expected.

There are aspects of each of these lists that are known with some confidence. The engineering of the different types of equipment used in the plant can be understood (kiln, pollution control equipment, stack). Air dispersion modelling of emissions from a stack is well developed and can be robust if there is sufficient understanding of the meteorological conditions and background air quality in the area. Understanding of which chemicals can be removed from the air emissions and how efficiently they can be removed by different types of pollution control devices can be estimated.

The difficult areas for this facility that limit the confidence in estimates of ground level concentrations of particular chemicals are whether or not there can be sufficient understanding at this time of:

- types of waste that will be used by this facility
- proportions of each waste type that will be included in the mix
- how the mix will vary across days, weeks, months, years
- variation in the characteristics of each type of waste processed at another facility (e.g. AWT or flock waste or chute residual waste)
- variation in the characteristics of a waste type not subjected to much processing where the mix of materials in it can vary over time (e.g. commercial/industrial waste – proportion of paper vs plastics vs other materials will vary through time or construction/demolition waste – proportion of concrete, brick, plastics, metals etc will vary through time depending on what is being demolished)
- how each waste type behaves in the kiln (in particular the more unusual waste types proposed for use in this facility)
- whether the presence of one type of waste affects the reaction of another inside the kiln or the pollution control equipment

There are plants that are similarly engineered (kiln with pollution control equipment and stack) for which information is available about the concentrations of chemicals in emissions. When a fuel source for a combustion process like this is relatively consistent (e.g. coal, gas, one type of waste that is well controlled etc), the emissions are relatively consistent and a robust assessment can be undertaken. It is normal practice for an EIS to use information about similar facilities and their emissions as the basis for understanding a new facility.

However, the mix of wastes to be used as a fuel source for this facility is quite different than the facilities which are similarly engineered in Europe. Also, the use of a mix of wastes proposed for this facility introduces a large range of variability into the process. Both of these matters make assessments (AQIA and HHRAs) difficult to do with confidence.

Maintaining consistency in the feedstock is desirable for any such plant to keep it operating efficiently, however, it is very difficult to do in practice when variable waste types are mixed together in variable proportions. There are also a range of controls that can be applied to the feedstock to help increase consistency and some of these are proposed for this plant. However, the success of such controls depends on:

- waste type
- rigour of processes used by suppliers of each waste type
- whether such processes are maintained through time
- how much of each waste type is available on a particular day
- how well the wastes are mixed together.

Experience with other waste processing facilities (using a range of processes not just combustion) in New South Wales has shown that such controls may not work as well as expected.

Some facilities using waste as fuel, manage the issue of variability by using only one or a limited number of waste types, targeting waste types that are less variable or sourcing material from only one supplier who they work with to ensure consistency. They may also be able to rely on controls on the overall waste stream due to legislation controlling what can and can't be done with some types of waste materials that are more likely to cause problems (e.g. definition of hazardous materials in Europe which includes some types of treated timber or focus on ensuring maximum recycling in the construction/demolition waste stream).

The proposed facility will use a wide range of waste types from a wide range of sources and suppliers. This means it is going to be difficult to get consistency through time in feedstock and mean the controls proposed may not be sufficient. Limitations on the understanding of the makeup of the feedstock (and therefore the chemicals in it), its consistency through time and the proportions of each waste type going through the plant at any point in time make assessing potential health risks very difficult.

One way to deal with such uncertainty is if the assessment demonstrates a significant margin of safety between what an assessment estimates might happen at a facility, when considering the best information available about the nature of the feedstock, and the level of health risk which is considered acceptable when making such decisions. If there is a significant margin of safety it can be assumed that even if there is some variation in emissions through time as the nature of the waste varies, the risks should still be in the acceptable range.

Unfortunately, for this facility the assessment that has been undertaken does not provide a significant margin of safety. The estimated risks are within one order of magnitude of the acceptable risk and this is not considered to be significant.

Another way to deal with such uncertainty, if the margin of safety is not large, is to undertake various sensitivity assessments as part of the AQIA and HHRA. Such assessments undertake the same calculations as undertaken for the assumed emissions from the plant but assume what might happen if the uncommon waste types are included (i.e. use of car flock and the much greater proportion of construction and demolition waste) or if one or more of the process controls managing the feedstock fail (e.g. CCA treated timber not being removed from the waste. These sensitivity calculations can then indicate whether or not these changes in feedstock make much of a difference to the estimated risks. Such a sensitivity analysis has not been undertaken in this EIS.

Consequently, this HHRA/AQIA has not demonstrated with sufficient confidence that this facility will not pose a human health risk.

3 Modelled Scenarios

This assessment has modelled concentrations for three scenarios:

- Scenario 1 – use of measured stack concentrations from other similar facilities
- Scenario 2 – use of NSW EPA regulatory limits for stack concentrations
- Scenario 3 – upset conditions based on Scenario 1 (measured stack concentrations at other facilities)

It is normal to consider worst case input data first and assess potential risks and, if risks could be elevated, then more refined modelling using more site-specific input data is undertaken. Also, it is noted in the NSW Approved Methods for the Modelling and Assessment of Air Pollutants that:

"Emissions from the premises must be demonstrated to comply with the requirements of the Regulation before progressing through the other stages of the air quality impact assessment."

There are issues with the modelling assessment including:

- Scenario 2
  - Uses some of the NSW EPA regulatory limits but not all of them so the assessment has not demonstrated risks are acceptable at the regulatory limits as required by the Approved Methods Manual.
  - Even if the modelling had looked at all relevant chemicals listed in the regulations, the risk assessment should also have included all the other chemicals identified as likely to be present in these emissions given the review of emissions at other facilities.
  - The risk assessment for Scenario 2 only includes 4 chemicals from the regulations so the estimated risk quotients are not relevant/appropriate.

Table 1 compares the 1 hour maximum ground level concentrations for the full set of parameters listed in the AQIA for Scenario 1 and Scenario 2. The values listed for Scenario 2 are significantly larger than those for Scenario 1 and would result in estimates of risk much greater than currently assessed.

Table 1 Comparison – Normal Operations / POEO Emission Limits – 1 hour maximums (mg/m³)

Parameter	AQIA October 2016		Increase
	Normal Operations (Scenario 1)	POEO Emission Limits (Scenario 2)	
NOx	0.077	0.205	2.7x
SOx	0.011	--	
CO	0.009	0.05	5.5x
PM10	0.00002	0.003	150x
PM2.5	0.00002	0.003	150x
HCl	0.004	--	
HF	0.0003 (24hr)	--	
NH_3	0.0007	--	
H_2S	0.0012	0.0012	Same
VOCs (as benzene)	0.000006	--	
Cd	0.000004	0.00008	20x
Hg	0.000002	0.00007	35x
PCDD/Fs	$4x10^{-12}$	$4x10^{-11}$	10x
PAHs	0.000002	--	

The HHRA has assessed risks for Scenario 2 and has concluded they are acceptable. However, the assessment has only included cadmium, mercury, PCDD/Fs and VOCs as benzene. As discussed above, it is acknowledged that not all chemicals assessed for Scenario 1 are mentioned in the regulations and cannot be modelled based on regulatory limits, more than these 4 can be assessed. In particular, a 150 fold increase in the incremental increase in PM10 and PM2.5 is significant and has not been discussed at all in the HHRA.

- Scenario 1
  - Until Scenario 2 is completed in accordance with the NSW EPA guidance, Scenario 1 cannot be considered.
  - Based on measured concentrations at other facilities with similar engineering but it has been acknowledged that these facilities do not use the same mix of wastes as feedstock so it cannot be known that the measured concentrations are relevant for this facility.
  - This facility is much larger than the existing ones with measured emissions which may affect the concentrations in the emissions.
- Scenario 3
  - Makes some assumptions about how concentrations may change under upset conditions.
  - As noted previously, for most of the chemicals this just resulted in a ten-fold change in concentration.
  - A consistent ten-fold change does not make a lot of sense given that different types of failures can occur in the plant which will affect different groups of chemicals differently (e.g. baghouse failure compared to failure of SCNR etc)
  - Ground level concentrations for this scenario were only assessed against acute criteria, however, these short-term increases in concentration have the potential to increase the overall annual average concentration – a worst case assessment using the upset conditions estimates for the the assumed maximum time per year the plant could operate under upset conditions and the annual average for the rest of the year to calculate a weighted annual average for assessment as for Scenario 1 and 2.

4 Specific Comments – Chemicals of Potential Concern (COPCs)

The first step in assessing the potential human health risks is to determine which chemicals might be emitted from the plant.

The list of chemicals being assessed for this facility has been based on a memo from Ramboll Environ dated 13/9/2015. This memo is quite short and does not explain in sufficient detail how and why particular chemicals have been included, particularly the list of chemicals covered under volatile organic compounds (VOCs or TOC in the AQIA, Appendix K of EIS). There are a range of chemicals in the list of COPCs which are standard for any combustion process and included in regulations such as Industrial Emissions Directive from the EU and the NSW POEO Clean Air Regulation. These are appropriate for inclusion in this assessment including metals, NOx, SOx, CO, PCDD/Fs, PAHs, PM10, PM2.5, Ozone.

Modelling emissions from such facilities looks at all volatile organic compounds as a group but to assess the human health risks from this group requires the identification of the individual chemicals that might be present or the use of an assumption that the estimate of VOCs concentration comes from a single chemical that is considered a good surrogate for the whole group such as benzene. The memo from 2015 uses some information to identify such a list of chemicals and the proportion each will contribute to the total VOCs estimate. Unfortunately, the information used is not readily available and appears to be in German so it cannot be reviewed. This was noted previously.

Also, as noted in previous comments provided by enRiskS (enRiskS 2016), some of the chemicals listed are not well supported. For the list of chemicals included as VOCs, some of the chemicals listed are not actually volatile so they cannot be measured by the VOCs analysis. Also, some of the chemicals listed are not named correctly so it is difficult to be confident that the correct chemical is being assessed (the names used could refer to multiple individual chemicals). The memo also lists the proportions used to estimate the concentrations of each of the listed compounds based on the VOC concentration in the stack but without sufficient explanation and evidence.

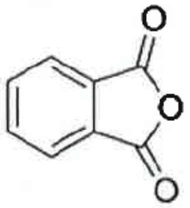
In this most recent amended EIS, no additional information has been included in the HHRA (Appendix N) to answer these queries. Within the text of Appendix K – the Air Quality Impact Assessment (AQIA) – there was also no additional discussion in relation to these queries. In fact, throughout the text of the AQIA, VOCs are assessed assuming they are all present as benzene which is an appropriate conservative approach. However, there has been some additional discussion of these issues in a number of additional memos from Ramboll Environ included in the appendices of AQIA (dated October 2016).

The matters raised previously included:

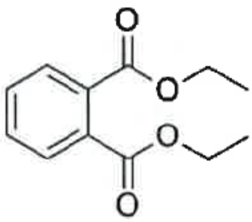
- Speciation of chromium
  - Insufficient information had been previously provided in support of the assumption made regarding how much chromium VI would be present in the emissions
  - Ramboll Environ COPC memo number 3 (19/10/16) provides some additional information using data from a range of plants in UK, France and Germany. Data on the proportion of chromium VI was only available for the ash/solid residues rather than the air emissions. The ash/solid residues at these plants were found to contain 0.1 to 0.6% chromium VI as a proportion of total chromium levels (i.e. 1-3 mg/kg in 500-1000 mg/kg). The memo states that the range in proportions is 0.1 to 0.3% (should have read 0.1-0.6%). The memo then proposes to use an average of 0.5% and a peak of 1% for the calculations.
  - This is based on guidance from the UK Environment Agency – Guidance to applicants on impact assessment for group 3 metals stack – Version 3 (published 2012) – and is appropriate for use in the assessment.
  - A new version of this guidance document from the UK EA (Version 4) was released in June 2016 but was not used in the Ramboll Environ memo. The new guidance indicates a similar proportion for chromium VI as the earlier guidance.
  - While this approach is reasonable and has been adopted by the UK EA, there are additional uncertainties in applying it to this facility given the different mix of wastes used and the potential for higher levels of metals in such wastes. Calculations for additional scenarios should have been undertaken as part of a sensitivity analysis to determine if the assumption about the proportion of chromium VI affected the risk estimates significantly.
- Names of individual chemicals
  - Previous reviews identified that a number of chemicals were named incorrectly so it was not possible to be sure about which chemicals they were and whether they were appropriate for inclusion in this assessment.
  - Table 16 of this revised HHRA includes relabelling of one of the incorrectly named chemicals – phthalates as phthalic anhydride. This renaming is only presented in this Table and Appendix G of the HHRA – the toxicological profiles. There is no discussion of why this chemical has been chosen from the group of chemicals that are known as phthalates. Also, this chemical is not actually a phthalate. Phthalates are formed by the reaction of phthalic anhydride (the listed chemical) with an alcohol to get a phthalate such as diethylphthalate.
  - The following figures show the difference for diethylphthalate. These chemicals are related but not the same.
  - Phthalates are used as plasticisers to make polymers softer and/or more flexible. They may be present in air emissions from such a facility from the breakdown/combustion of plastics. It is possible that phthalic anhydride is present in the air emissions as the first breakdown

product for phthalate plasticisers in air in the kiln from the combustion of plastics. The 2015 Ramboll Environ memo based the speciated list of volatile organic compounds on documents only available in German so it is not possible to determine which phthalate the original source document referred too.

- To address this lack of certainty about which chemicals may be present in the emissions, a sensitivity analysis should have been included in the HHRA looking at how much the risk estimates might change depending on which phthalates or related chemicals may actually be present in the air emissions.



Phthalic anhydride



Diethyl phthalate

- Range of chemicals assumed to makeup the volatile organic compounds measured
  - Previous reviews identified that there was insufficient evidence supporting the list of chemicals chosen for assessment for this facility to address VOCs.
  - Ramboll Environ COPC memo number 4 (20/10/16) provides some additional consideration of the individual chemicals that could comprise VOC emissions. This additional consideration was based on a journal article reviewing a facility in Canada .
  - The article lists the following chemicals as relevant for assessing risks for an energy from waste facility
    - Criteria pollutants – SOx, NOx, HCl, HF, PM10, PM2.5, NH_3
    - Chlorinated polycyclic aromatics – PCDD/Fs, PCBs
    - Metals – Sb, As, Ba, Be, B, Cd, Cr, Co, Pb, Hg, Ni, P, Ag, Se, Tl, Sn, V, Zn
    - Chlorinated monocyclic aromatics – 1,2-dichlorobenzene, 1,2,4,5-tetrachlorobenzene, 1,2,4-trichlorobenzene, pentachlorophenol, hexachlorobenzene, pentachlorobenzene, 2,3,4,6-tetrachlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol
    - PAHs
    - Volatile organic compounds – acetaldehyde, benzene, biphenyl, bromodichloromethane, bromomethane, dichlorodifluoromethane, formaldehyde, tetrachloroethene, toluene, trichloroethene, vinyl chloride, xylenes, bromoform, carbon tetrachloride, chloroform, dichloromethane, terphenyl, 1,1,1-trichloroethane, trichlorofluoromethane
  - This list was based on Canadian guidance for municipal incinerators, the national pollutant release inventory in Canada for waste incinerators and the results of stack testing for an existing facility. So, it is based on relevant sources of information.
  - The memo evaluates whether any of the volatile organic chemicals or the chlorinated monocyclic aromatics listed should be added to the evaluation of risks for this proposed facility. The memo concludes that none of the listed chemicals needed to be added to the evaluation for this facility because none contribute more than 1%.
  - However, the memo doesn't add any explanation as to why the chemicals listed in the original COPC memo, that were not evaluated for the Canadian facility, still need to be

evaluated for this facility nor is any additional evidence provided to support the proportions for each of the VOCs proposed in the original COPC memo which is what had been requested.

- Some of the chemicals listed in the journal article are also much more likely to be emitted from a combustion facility (e.g. formaldehyde, ethylbenzene) than some of those listed in the original COPC memo (e.g. hexadecanoic acid, tetradecanoic acid).
- So, there is still a lack of confidence in the list of individual chemicals proposed to make up the emissions of volatile organic compounds from this facility and the proportions they contribute.
- The new information supplied in the additional Ramboll Environ memos raises some additional queries in regard to the VOCs.
- Appendix G of the AQIA lists the values identified for the in-stack concentrations for each of the individual chemicals used in the modelling in this assessment for normal and upset conditions.
- The values listed are exactly the values listed in Appendix B of Ramboll Environ COPC memo number 2 dated 19/10/2016 even though that was based on a total VOCs concentration for the reference plant(s) of 1.2 mg/m^3.
- This plant is predicted to emit much lower amounts of VOCs – 0.015 mg/m^3 is listed in Table 7-4 of the AQIA.
- It was assumed that the values used in this modelling would have been scaled to the total VOCs for this specific plant (i.e. VOCs emissions are estimated to be 80 times lower than the reference facility). This would have reduced the in-stack concentrations that should have been modelled in this assessment. So, this assessment is conservative in regard to this matter.
- However, in addition to this matter, the information in this memo indicates that the listed chemicals only made up about 25% of the measured concentration for total VOCs (i.e. see table below – 0.3/1.2 mg/m^3). So, three quarters of the total VOCs likely to be present in the stack have not been identified and have not been included in the evaluation used in the HHRA.
- It is acknowledged that it is not possible to identify every single chemical that might be present but failing to identify chemicals that might contribute more than half of the measured VOCs emissions does mean there is uncertainty in both the mix of chemicals that might be present and the proportions each one contributes to the total VOCs. There is also no discussion about the unidentified 75% of VOCs measured in the stack of the reference facility.
- Also, some of the chemicals listed as present in the higher proportions are the chemicals that are less toxic and are, in fact, not volatile – the various acids for example – no further information has been supplied in this assessment to explain why these chemicals remain in the list at the proportions originally proposed. Using the information from the Canadian facility does tend to indicate that they may not be commonly found.

Consequently, there is limited confidence in the list of chemicals of potential concern being assessed in this HHRA and the most recent update does not allow any change to that conclusion. This issue relates to the list of chemicals being assessed as volatile organic compounds and the proportions of each present.

The rest of the list of chemicals being assessed is correct and appropriate.

5 Specific Comments – Estimates of Concentrations for Chemicals of Potential Concern

5.1 Introduction

Once the list of chemicals that might be present in the emissions has been determined, the concentration of each of them at ground level needs to be determined to allow risks to be assessed. In fact, this is the most critical input to the HHRA.

Calculating these estimates requires estimates of the concentration for each chemical in the stack, then uses the understanding of the height of the stack, the velocity of emissions from the stack and other stack parameters to estimate an emission rate for each chemical leaving the stack and then applies an understanding of the meteorological conditions, ground topography and the nature of buildings present in the vicinity of the stack via the air dispersion model to the emission rate to estimate how much of the chemical leaving the stack reaches the ground.

Air dispersion models are considered sufficiently robust for use in these types of assessments as long as they are used in accordance with relevant regulatory guidance (such as the relevant NSW Approved Methods Manual). There can be issues in obtaining sufficient information about the local meteorology which can limit confidence in the modelling. Also, if there is some flexibility in the engineering of the stack this can also lead to some issues in the modelling.

The main area of uncertainty in the modelling, however, for such a facility is the stack concentration/ emission rate for each chemical. As discussed above, if there are similarly engineered facilities with similar feedstocks that are operational then measured data from their stacks can be used for this part of the assessment.

In this case, while there are similarly engineered facilities, there are no facilities that use the same mix of wastes as feedstock. Despite this, the stack concentrations and emission rates used to estimate ground level concentrations were based on the measurements at these similarly engineered facilities.

For normal operation, the Ramboll Environ COPCs memo states that real data from 4 plants was used along with information available in the literature. The maximum measured value from these other plants and/or the literature was the value used in this assessment.

Using measured data from plants that do not use the same wastes as feedstocks provides no room for understanding the variability in the emissions from this proposed plant. Such variability is likely at this facility due to the larger volumes of waste being processed at this plant and the larger amount of construction and demolition waste proposed for the mix and the inclusion of car flock which are likely to contain higher amounts of metals and some other components.

Also, the ground level concentrations estimated across the various assessments for this facility have varied quite considerably. This has led to difficulty in accepting the conclusions of the AQIAs and HHRAs. The difference between some of the earlier assessments and the newer ones was a change from using 1 hour maximum values to annual averages for use in the HHRA. However, the HHRAs undertaken in 2015 and in 2016 both use annual average values but the ground level concentration used in these assessments differ by approximately ten-fold.

As can be seen in **Table 2**, there were no changes to the stack engineering parameters between the update to the modelling in October 2015 and the current AQIA prepared in October 2016. So, the changes in the estimated ground level concentrations are not due to any additional refinement or optimisation of the engineering of the stack.

Table 2 Parameters regarding engineering of the stack

Parameter	AQIA (Mar 2015)	AQIA Response (Oct 2015)	AQIA (Oct 2016)
Stack location (m, MGA, Zone 56)	298632.9 (E) 6257733.5 (N) 298574.6 (E) 6257741.3 (N)		
Base Elevation (m, AHD)	~65		
Stack Height (m)	100		
Stack Diameter (m)	2.5	2.2	2.2
Temperature (°C)	120		
Flue Gas Flow (Nm^3/s)	139.3	127.0	127.0
Gas Exit Flow Rate (Am^3/s)	175.8	165.2	165.2
Gas Exit Velocity (m/s)	35.8	21.7	21.7

As can be seen in **Table 3**, there was also no change between 2015 and 2016 in the stack concentrations used in the air dispersion modelling. The values listed in this table were taken from Appendix G in the AQIA from 2016 and Appendix C from the Air Quality Response from October 2015. So, the changes in the estimated ground level concentrations are not due to refinement of the stack concentrations.

Table 3 In-stack concentrations used in air dispersion modelling

Chemical	Normal Conditions (mg/m^3)		Upset Conditions (mg/m^3)	
	October 2015	October 2016	October 2015	October 2016
Acetone	0.018	0.018	0.18	0.18
Acetonitrile	0.014	0.014	0.14	0.14
Ag	0.00034	0.00034	0.026	0.026
As	0.004	0.004	0.04	0.04
Be	0.000007	0.000007	0.00053	0.00053
Benzene	0.015	0.015	0.15	0.15
Benzoic acid	0.1	0.1	1	1
Cd	0.009	0.009	0.09	0.09
Carbon Monoxide (CO)	23	23	230	230
Co	0.004	0.004	0.04	0.04
Cr	0.047	0.047	0.47	0.47
Cu	0.016	0.016	0.25	0.25
Dichloromethane	0.02	0.02	0.2	0.2
Ethyl benzoic acd	0.035	0.035	0.35	0.35
H2S	5	5	50	50
HCB	0.000008	0.000008	0.00008	0.00008
HCl	9	9	90	90
Heptane	0.005	0.005	0.05	0.05
Hexadecanoic acid	0.037	0.037	0.37	0.37
HF	4	4	40	40
Hg	0.004	0.004	0.013	0.013
Methyl hexane	0.006	0.006	0.06	0.06
Mn	0.037	0.037	0.46	0.46
Mo	0.000022	0.000022	0.0026	0.0026
NH_3	2	2	20	20
Ni	0.021	0.021	0.21	0.21
NO_x	188	188	1880	1880
PAHs	0.0005	0.0005	0.005	0.005
Pb	0.17	0.17	1.7	1.7
PCBs	0.00000002	0.00000002	0.0000002	0.0000002
PCDD/F	0.00000001	0.00000001	0.0000005	0.0000005
Phthalate	0.02	0.02	0.2	0.2
PM10	1	1	150	150

Chemical	Normal Conditions (mg/m³)		Upset Conditions (mg/m³)	
	October 2015	October 2016	October 2015	October 2016
PM2.5	1	1	150	150
Sb	0.015	0.015	0.15	0.15
Se	0.002	0.002	0.02	0.02
Sn	0.003	0.003	0.25	0.25
SO_2	27	27	270	270
TCE	0.005	0.005	0.05	0.05
Tetradecanoic acid	0.015	0.015	0.15	0.15
Tl	0.001	0.001	0.009	0.009
Toluene	0.03	0.03	0.3	0.3
Trichlorophenol	0.009	0.009	0.09	0.09
V	0.001	0.001	0.015	0.015
Xylenes	0.01	0.01	0.1	0.1
Zn	0.037	0.037	5.09	5.09

The only other input to the modelling calculations is the meteorological data. The reports indicate that the same/similar meteorological data was used for the various AQIAs. So, the changes in the estimated ground level concentrations are not due to changes to the understanding of climatic conditions.

Consequently, this review has not been able to determine why the ground level concentrations are ten times lower in the 2016 assessment. There is also no acknowledgement in the HHRA that there is a difference between this version and the previous one or why such a difference would have occurred.

Because it is not possible to know which version of ground level concentrations is correct without undertaking the entire modelling exercise again there is no way to know which estimate of risk is correct.

The estimated risks may be 0.1 or 1 or they could be even higher – there is no way to know.

Regardless of which estimate of the risk quotient is correct (0.1 or 1 or higher), given the uncertainties discussed above and below, this HHRA has NOT demonstrated that the facility is acceptable.

5.2 Comparison of Risk Estimates Between 2015 and 2016

Table 4 shows the grid maximum annual average ground level concentrations and the risk estimates for each of these chemicals at these concentrations for both the 2015 and 2016 values to further support this conclusion.

Table 4 Comparison of Calculated Risks between 2015 and 2016 HHRA

Chemical	Normal Conditions – Oct 2016		Normal Conditions – Oct 2015	
	Ground level concentration (µg/m³)	Risk Quotient	Ground level concentration (µg/m³)	Risk Quotient
Acetone	0.0004	0.00000001	0.004	0.0000001
Acetonitrile	0.0003	0.00005	0.003	0.000005
Antimony (Sb)	0.0003	0.00001	0.0003	0.0001
Arsenic (As)	0.00008	0.00008	0.0008	0.0008
Beryllium (Be)	0.0000001	0.000007	0.000001	0.00005
Benzene	0.0003	0.00001	0.003	0.0001
Benzoic acid	0.002	0.0000002	0.04	0.000003
Cadmium (Cd)	0.0002	0.045	0.002	0.4
Cobalt (Co)	0.00008	0.0008	0.0008	0.008
Chromium (Cr)	0.0009	0.009	0.009	0.099
Copper (Cu)	0.0003	0.000002	0.003	0.000006
Dichloromethane	0.0004	0.0000002	0.004	0.000001
Ethyl benzoic acd	0.0007	0.00000006	0.007	0.0000005

Chemical	Normal Conditions – Oct 2016		Normal Conditions – Oct 2015	
	Ground level concentration (µg/m³)	Risk Quotient	Ground level concentration (µg/m³)	Risk Quotient
Hexachlorobenzene (HCB)	0.0000002	0.000001	0.00002	0.00001
Heptane	0.0001	0.0000002	0.001	0.000001
Hexadecanoic acid	0.0007	0.00000008	0.008	0.000008
Lead (Pb)	0.003	0.007	0.07	0.14
Mercury (Hg)	0.00008	0.0004	0.0008	0.004
Methyl hexane	0.0001	0.0000002	0.001	0.000001
Manganese (Mn)	0.0007	0.006	0.008	0.05
Molybdenum (Mo)	0.0000004	0.00000004	0.000005	0.0000004
Nickel (Ni)	0.0004	0.03	0.004	0.2
PCBs	$3x10^{-10}$	$6x10^{-10}$	$3x10^{-9}$	$6x10^{-9}$
PCDD/F	$2x10^{-10}$	0.00006	$2x10^{-9}$	0.0006
Phthalate	0.0004	0.00002	0.004	0.0002
Selenium (Se)	0.00004	0.000005	0.0005	0.00002
Silver (Ag)	0.000007	0.0000004	0.000007	0.000004
Tin (Sn)	0.00007	0.0000001	0.0007	0.000001
Trichloroethene (TCE)	0.0001	0.00006	0.001	0.0005
Tetradecanoic acid	0.0003	0.0000003	0.003	0.000003
Thallium (Tl)	0.00002	0.007	0.0002	0.07
Toluene	0.0006	0.0000001	6.36	0.001
Trichlorophenol	0.0002	0.00002	0.002	0.0002
Vanadium (V)	0.00002	0.00002	0.0002	0.0002
Xylenes	0.0002	0.0000002	0.002	0.000002
Zinc (Zn)	0.0007	0.000004	0.008	0.000005
Total		**0.1**		**1.0**
Acceptable Risk		**≤1**		**≤1**

5.3 Other issues affecting the risk estimates

Some other issues, in relation to the concentrations at ground level for the chemicals of potential concern and the estimated risks shown above, include:

- HHRA refers to titanium whereas the AQIA refers to thallium. It appears there has been some confusion as to which metal has been modelled. Thallium is much more toxic than titanium so adding the risk quotient for thallium instead of titanium has increased the total risk quotient slightly.
- Only chromium III is listed in the table of risk estimates, however, the value used is for total chromium and the reference concentrations listed in Table 16 of the HHRA lists the same value for both chromium III and VI so the assessment has effectively considered all chromium being discharged from the facility is in the form chromium VI. This is conservative.
- Total VOCs modelling in the AQIA
    - Measured emission data for VOCs (total organic carbon) from the various plants listed in Appendix C of Ramboll Environ COPC memo number 2 dated 19/10/2016 ranges from 0.03 to 5 mg/m³. In Appendix B of this memo the VOC concentration listed for the plant from which the breakdown of individual chemicals is 1.2 mg/m³.
    - In Table 7-4 of the AQIA report the VOC concentration listed for in-stack for this facility that was used in modelling for normal operations is 0.015 mg/m³. This value is half the lowest value that was measured for any of the listed plants.
    - This extremely low value shows that the modelling has not used the maximum value measured at the reference facilities.

- It is not clear why this extremely low value was considered appropriate for this facility.
- If the higher concentrations listed in the memo are used the maximum 1 hour ground level concentration predicted from the modelling could be 0.0006 mg/m^3 for normal operations or 0.006 mg/m^3 for upset conditions.
- Both these maximum 1 hour values (normal and upset) are below the screening criteria for planning assessments for benzene of 0.029 mg/m^3 but they are much closer to this value leaving less room for the uncertainties that exist for this facility.

- Impact of assumed proportions for VOCs
  - Comparing the in-stack concentrations with the reference/acceptable concentrations identified in the HHRA allows the chemicals to be ranked as to their contribution to health impacts. As can be seen in the **Table 5**, some of the most toxic chemicals have some of the lowest in-stack concentrations. Small changes in those concentrations could change the risk profile.

Table 5 Assessment of proportions used for individual volatile organic compounds

Chemical	Listed In-Stack Concentration in Original COPC memo	Reference Concentration (adjusted for background) from HHRA	Comparison of In-Stack Concentration with Reference Concentration to Allow Ranking
Trichloroethene	0.005 mg/m^3	0.002 mg/m^3	2.5
Phthalates (as phthalic anhydride)	0.02 mg/m^3	0.02 mg/m^3	1
Trichlorophenol	0.009 mg/m^3	0.009 mg/m^3	1
Benzene	0.015 mg/m^3	0.024 mg/m^3	0.6
Acetonitrile	0.014 mg/m^3	0.054 mg/m^3	0.3
Hexadecanoic Acid	0.037 mg/m^3	0.9 mg/m^3	0.04
Tetradecanoic Acid	0.015 mg/m^3	0.9 mg/m^3	0.02
Xylenes	0.01 mg/m^3	0.87 mg/m^3	0.01
Methylhexane	0.006 mg/m^3	0.63 mg/m^3	0.009
Benzoic Acid	0.1 mg/m^3	12.6 mg/m^3	0.008
Heptane	0.005 mg/m^3	0.63 mg/m^3	0.008
Dichloromethane	0.02 mg/m^3	2.7 mg/m^3	0.007
Toluene	0.03 mg/m^3	5 mg/m^3	0.006
Ethyl Benzoic Acid	0.035 mg/m^3	12.6 mg/m^3	0.003
Acetone	0.018 mg/m^3	27.81 mg/m^3	0.0006
Total for Identified Chemicals	0.34 mg/m^3		
Measured Total VOCs for the facility from which this data was taken	1.2 mg/m^3		
Proportion identified	Approximately 30%		

  - The calculation spreadsheets for the HHRA list the risk quotients for each of the chemicals based on the annual average ground level concentration for the grid maximum. The risk quotients are listed in **Table 6.**

Table 6 Further consideration of estimated risks for VOCs

Chemical	Grid Maximum Annual Average	Risk Quotients
Trichloroethene	0.0001 µg/m^3	0.00006
Phthalates (as phthalic anhydride)	0.0004 µg/m^3	0.00002
Trichlorophenol	0.0002 µg/m^3	0.00002
Benzene	0.0003 µg/m^3	0.00001
Acetonitrile	0.0003 µg/m^3	0.000005

Chemical	Grid Maximum Annual Average	Risk Quotients
Hexadecanoic Acid	0.0007 µg/m³	0.0000008
Tetradecanoic Acid	0.0003 µg/m³	0.0000003
Xylenes	0.0002 µg/m³	0.0000002
Methylhexane	0.0001 µg/m³	0.0000002
Benzoic Acid	0.002 µg/m³	0.0000002
Heptane	0.0001 µg/m³	0.0000002
Dichloromethane	0.0004 µg/m³	0.0000002
Toluene	0.0006 µg/m³	0.0000001
Ethyl Benzoic Acid	0.0007 µg/m³	0.00000006
Acetone	0.0004 µg/m³	0.00000001

  - While these risk quotients are all low and concentrations would have to increase by a large amount to contribute significantly to the overall inhalation risk for this facility, there is still an issue with having confidence in the estimated ground level concentrations for this facility.
- In-stack concentrations for metals based on UK Environment Agency guidance
  - The UK EA have published guidance about levels of metals in emissions from waste incineration. Version 3 of this guidance was published in 2012 and Version 4 was published in 2016. The new version of the guidance lists higher emissions forsome metals.
  - **Table 7** compares the in-stack concentrations used in the assessment for this facility with the mean and maximum concentrations listed in both Versions of this guidance from the UK EA.

Table 7 Metal concentrations

Chemical	Normal Conditions (mg/m³)	UK Environment Agency Version 3 (mg/m³)		UK Environment Agency Version 4 (mg/m³)	
	October 2016	Mean	Maximum	Mean	Maximum
As	0.004	0.0007	0.003	0.001	0.025
Co	0.004	0.0004	0.004	0.0011	0.0056
Cr	0.047	0.011	0.052	0.008	0.092
Cu	0.016	0.0077	0.0163	0.0075	0.029
Mn	0.037	0.017	0.037	0.0168	0.06
Ni	0.021	0.022	0.1362	0.015	0.22
Pb	0.17	0.016	0.04	0.011	0.05
Sb	0.015	0.0033	0.0115	0.0014	0.0115
Sn	0.003	--	0.0024	--	--
V	0.001	0.0003	0.001	0.0004	0.006

  - This table shows that the source of metals concentrations used for this assessment is in line with the maximum value listed in the UK EA guidance from 2012 for arsenic, cobalt, chromium, copper, manganese, antimony, tin and vanadium.
  - However, this table shows that the source of metals concentrations used for this assessment provides lower in-stack concentrations than the maximum value listed in the UK EA guidance from 2012 for nickel and for the UK EA guidance from 2016 for arsenic, chromium, copper, manganese, nickel, antimony, tin and vanadium.
  - The in-stack concentration used in this assessment for lead is higher than that listed in the UK EA guidance.
  - Using lower values for the in-stack concentrations will result in lower estimates for ground level concentrations and lower estimated risks so without any justification for

using these lower values it is possible that the estimated risks in this assessment are too low.

- This is especially the case for nickel which is one of the main drivers of risk. The in-stack concentration for nickel in the 2016 UK EA guidance is ten times higher than the concentration used in this assessment. The estimated ground level concentrations for normal operations for nickel give a risk of 0.03 or 0.2 depending on which modelling outputs are correct. If an in-stack concentration ten times higher is used this would result in a risk estimate of 0.3 or 2 just from nickel alone.

6 Conclusions

The November 2016 version of the HHRA does not provide a robust assessment of risk for this proposed facility.

Some of the matters raised previously have been addressed in this revision – including assessment of grid maximums, addition of missing persistent/bioaccumulative chemicals to the multipathway assessment and correction of toxicity reference values.

However, a number of fundamental issues still remain including

- uncertainty in the makeup of the feedstock
  - affects the understanding of what chemicals and how much of them could be present in the emissions
  - lack of a similar facility with similar feedstock to use in more realistic modelling means it is not possible to improve the confidence in the "more realistic" estimates of in-stack concentrations
  - as a result, there is a larger than usual uncertainty in the AQIA and HHRA and the estimated risks are not sufficiently low to be robust given that level of uncertainty
- comparison of modelled ground level concentrations between 2015 and 2016
  - there is a lack of transparency about why the estimated ground level concentrations are ten-fold lower in 2016 compared to the values estimated in 2015 because none of the inputs to the modelling have changed
  - this means that while the total estimated risk in 2016 is 0.1 it could actually be 1.0 depending on which is the correct modelling output
  - if the total estimated risk is 1.0 then the facility cannot be demonstrated to be acceptable
- Regulatory limits
  - the assessment of scenario 2 is not sufficient to show that the facility poses an acceptable risk at the regulatory limits

7 Limitations

Environmental Risk Sciences has prepared this report for the use of NSW Planning and NSW EPA in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The methodology adopted and sources of information used are outlined in this letter report. Environmental Risk Sciences has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions.

This report was prepared in February/March 2017 and is based on the information provided and reviewed at that time. Environmental Risk Sciences disclaims responsibility for any changes that may have occurred after this time.

This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

If you require any additional information or if you wish to discuss any aspect of this letter, please do not hesitate to contact Therese on (02) 9614 0297 or 0487 622 551.

Yours sincerely,

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ATTACHMENT F

NSW Environment Protection Authority

Review of the Air Quality and Ozone Impact Assessment

Summary

The EPA has reviewed the amended EIS[1], AQIA[2] and ozone assessment[3] for the EfW Facility. Not all outstanding air quality issues identified in the review of the response to submissions have been satisfactorily resolved, as detailed below. Further, additional issues with the air quality impact assessment have been identified which are also detailed below.

The ozone assessment issues identified in the exhibition review have been satisfactorily resolved (as below). The revised assessment discusses emission offsets within the Sydney basin concluding that offsetting is impractical. The revised assessment proposes optimised selective non-catalytic reduction (SNCR) as a best practice approach to reduce NO_x emissions. Sound reasoning is provided that optimised SNCR meets the requirement for best available technology. The reduction in NO_x emissions from deployment of optimised SNCR results in maximum ozone increment less than the significant impact level (0.5 ppb).

There remains considerable uncertainty surrounding the ability of the proposed EfW facility to achieve best practice emissions control. There are uncertainties regarding the sufficiency of the mixing to maintain chlorine content to less than 1% at all times, prevalence of treated wood waste in the fuel and floc waste composition. Further, as there is no suitable reference facility in terms of throughput, technology and feedstock it remains unproven that the proposed EfW Facility will achieve best practice emissions control.

Resolution of the air quality issues detailed below will not address the uncertainty regarding the ability of the proposed EfW facility to achieve best practice emissions control. Addressing the issues raised below will confirm the acceptability of the air quality of the facility emitting at a particular level but it will not confirm whether or not the plant can achieve the assumed emissions level.

Background

The Next Generation NSW Pty Ltd (TNG) is proposing to construct and operate an Energy from Waste (EfW) Facility. The facility would have a technological capacity to thermally treat up to 1.35 million tonnes of waste per annum and generate up to 137.3 MW of electrical energy (MWe) for export to the National Grid. The proposed EfW facility would be located within the Eastern Creek Industrial Estate, which is located 18 kilometres west of Parramatta and 12 kilometres east of Penrith. It will operate 24 hours a day and 7 days a week.

The project site forms part of a larger area of land which comprises the Genesis Recycling and Landfill Facility at Honeycomb Drive, Eastern Creek (EPL 20121 and EPL 13426). The nearest residential areas to the project site are Minchinbury, approximately 1 kilometre from the northern boundary of the broader site and Erskine Park, approximately 1 kilometre west of the broader site. The eastern boundary of the broader site is occupied by the Hanson Asphalt Batching Plant and the Hanson yard ('the Hanson site'). The land adjoining the broader site boundaries is owned by: The Corporate Group Alexandria Landfill Pty Ltd; ThaQuarry Pty Ltd; Australand; Hanson; Jacfin; The Department of Planning and Environment; and Sargents. The above sites are identified for potential redevelopment for higher end industrial and employment uses over the next decade under the State Environmental Planning Policy (Western Sydney Employment Area).

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[1] Urbis (2016b) Amended Environmental Impact Statement, The Next Generation: Energy from Waste, Honeycomb Drive, Eastern Creek, November 2016

[2] PEL (2016a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment, The Next Generation, 31 October 2016

[3] PEL (2016b) Energy from Waste Facility – Ozone Impact Assessment, The Next Generation, 25 October 2016

The proposed EfW facility will source fuel from the adjoining Genesis Materials Processing Centre (MPC) and other authorised third parties. Energy will be recovered from the following residual waste fuel types: Genesis chute residual waste; commercial and industrial, construction and demolition, wood waste (treated wood), floc waste from car and metal shredding, paper pulp, glass recovery, green organics, AWT and MRF residual. Moving grate technology has been selected based on its capacity to handle a wide range of fuel types. The development will include four combustion lines and associated boilers (a four stream system), flue gas treatment systems, steam turbines and generator houses within a turbine hall and two auxillary diesel generators each with a capacity of 2.4MWe.

TNG propose to build the facility in two phases: streams 1 and 2 in Phase 1 and streams 3 and 4 in Phase 2 when the applicant can demonstrate the required quantity of residual waste fuel is available to the facility. Each phase will comprise of two combustion grates, two boiler systems housed in one building, and each boiler has its own independent flue gas treatment system and connects to one turbine and one emission stack.

The flue gas treatment system includes:

- Optimised selective non-catalytic reduction (SNCR) for reducing emissions of oxides of nitrogen;
- dry lime scrubbing for reducing emissions of acid gases, including hydrogen chloride (HCl) and sulfur dioxide (SO_2);
- activated carbon injection for reducing emissions of dioxins and mercury (Hg); and
- fabric filters for reducing emissions of particles and metals.

The cleaned exhaust gases will be released to atmosphere via two separate 100m twin flue standalone stacks.

The EPA undertook an adequacy review of the draft air quality[4] and ozone[5] impact assessment for the proposed EfW Facility. Issues with the assessments were identified and it was recommended the exhibited assessments include additional information to address the outstanding issues.

The exhibited air quality impact assessment (AQIA)[6] did not satisfactorily address all air quality issues identified in the adequacy review and additional issues were identified that need to be addressed (DOC15/289618). The exhibited ozone impact assessment[7] was generally conducted consistent with EPA's published *Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources*. Further detail was requested on possible approaches to reducing potential ozone impacts from the proposal.

The documents to respond to agency's comments on the exhibited Environmental Impact Statement (EIS), AQIA and ozone impact assessment[8, 9, 10] did not satisfactorily resolve all air quality issues identified in the exhibition review. Further, additional dispersion modelling was conducted as part of the response to submissions using revised stack exit parameters and lower emission concentrations. It was highlighted to the proponent that any emission limits for the project would be based on the revised modelling and the lower emission concentrations.

The ozone assessment issues identified in the exhibition review were not satisfactorily resolved in the response to submissions. This was due to the assessment of best practice to reduce NO_X emissions being based on incorrectly revised estimates of total NO_x emissions.

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[4] PEL (2014a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment The Next Generation, 8 September 2014

[5] PEL (2014b) Energy from Waste Facility – Ozone Impact Assessment The Next Generation, 20 June 2014

[6] PEL (2015a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment. The Next Generation, 26 March 2015

[7] PEL (2015b) Energy from Waste Facility – Ozone Assessment. The Next Generation, 14 April 2015

[8] Urbis (2015) Response to Agency and Company Submissions, November 2015

[9] PEL (2015d) RE: Response to Submissions: TNG Energy from Wast Facility, Eastern Creek, 27 October 2015

[10] Urbis (2016a) Response to Environmental Protection Agency (ARUP) Technology Assessment, 22 February 2016

ISSUES OF CONCERN

1. Insufficient information regarding the diesel generators

This issue has not been satisfactorily resolved.
The EIS and response to submissions reports were unclear regarding the proposed use of the diesel generators and the expected emissions performance. The EPA required the proponent to provide the following additional information regarding the emergency generators:

- Confirmation and further details regarding the proposed use of diesel generators and specifically whether or not they will be used to maintain the furnace temperature
- Concentration of air emissions from the diesel generators and their compliance with the relevant *Protection of the Environment Operations (Clean Air) Regulation 2010* (the Clean Air Regulation) emission standards
- Demonstration that benzene comprises 1% of the total VOC emissions from emergency diesel generators
- Revised air quality impact assessment which reflects worst case impacts from the proposed operation of the diesel generators.

Proposed Use of Diesel Generators
Urbis (2016b) and PEL (2016a) have clarified the proposed use of the two 2.4MWe emergency diesel generators as follows:

- One generator is for safe shutdown and the other is for black start
- Will not be used on a continuous basis and no more than 200 hours per year
- Emergencies such as a fire to ensure emergency lighting, fire-fighting pumps etc
- Scheduled and planned shutdowns

In events requiring a safe shutdown and black start the diesel generators will be operating for a minimum of 2 hours with a maximum of 6 hours for a black start if the plant shutdown is over a longer period.

The diesel generators will not be used to maintain furnace temperatures. The furnace design includes gas or diesel support burners. Gas is the preferred fuel and the proponent is in discussions with private gas supplier Jemena Gas Networks (Urbis, 2016b).

Compliance with the Clean Air Regulation
The emergency diesel generators must comply with all relevant Clean Air Regulation emission standards except NOx. Clause 57A of the Clean Air Regulation exempts emergency generators operating less than 200 hours per year from the NO_X emission standards in Schedule 4.

Previous information provided by the proponent has been contradictory regarding the expected performance of the emergency diesel generators. The performance specifications for the diesel generators are in Appendix H of PEL (2016b). The performance specifications show the generators will mostly comply with the relevant Clean Air Regulation emission standards. Particulate emissions at 712kW is calculated to be 57mg/Nm^3, which exceeds the Clean Air Regulation limit of 50mg/Nm^3. The particulate emissions at all other power levels comply with the Clean Air Regulation.

The EPA will require that any conditions of approval include post commissioning testing of the diesel generators to demonstrate compliance with the relevant Clean Air Regulation emission limits. Installation of post combustion controls should be required if the tests indicate a non-compliance with the Clean Air Regulation.

Benzene Content of VOC Emissions
In the diesel generator dispersion modelling the proponent has assumed that benzene comprises 1% of the total VOC emissions. The EPA has undertaken a review of NPI emission factors and confirmed

it is suitable to assume benzene emissions from large diesel generators are approximately 1 % of total VOC emissions.

Impact Assessment
Dispersion modelling was undertaken to assess the ground level concentrations during the operation of the two diesel generators during emergency conditions. The results were presented in PEL (2015d) and demonstrate compliance with the EPA's impact assessment criteria.

The operation of the two diesel generators in isolation with no other sources at the EfW plant is not the worst case scenario. For example, it does not represent the scenario of monthly testing of the generators which would be operating concurrently with the EfW facility. PEL (2016a) presents the results of a worst case scenario where two diesel generators are operating concurrently with the EfW facility. The predicted concentration at the most affected sensitive receptor due to the generators is added to the maximum predicted concentration at or beyond the site boundary (stacks). The results for CO, PM_{10} and PM2.5 are less than the EPA's assessment criteria. The benzene predicted concentrations also comply with the impact assessment criteria when the maximum concentration predicted at the boundary due to the generators is taken into consideration.

The compliance of the generators operating concurrently with the EfW facility with the NO_2 impact assessment criteria remains unclear. A total NO_2 concentration is not presented in Table 9-3 in PEL (2016a).

The EPA requires that the proponent is requested to provide total NO_2 concentration due to the generators and EfW facility operating concurrently.

2. No demonstration of suitability of secondary combustion chamber 850°C minimum operating temperature.

Uncertainty remains regarding the suitability of the secondary combustion chamber temperature.

The NSW Energy from Waste Policy Statement specifies a number of technical criteria for energy recovery facilities, including the minimum temperature and residence time of the gas resulting from the process:

'The gas resulting from the process should be raised after the last injection of combustion air, in a controlled and homogenous fashion and even under the most unfavourable conditions to a minimum temperature of 850°C for at least 2 seconds....If a waste has a content of more than 1% of halogenated organic substances, expressed as chlorine, the temperature should be raised to 1,100°C for at least 2 second after the last injection of air.'

The design of the proposed Energy from Waste Facility includes a secondary combustion chamber to optimise flow conditions and temperature profile, reduce CO concentration and improve burnout of the flue gas. In the secondary combustion chamber a minimum flue gas temperature of 850°C is proposed together with a residence time of 2 seconds.

During the adequacy review, the EPA requested the final EIS includes data to demonstrate that the chlorine content of the waste will be 1% at all times to confirm the suitability of the proposed secondary chamber flue gas temperature of 850°C.

Urbis (2015) and PEL (2015a) state the annual average chlorine content of the waste will be less than 1%. An annual average chlorine content is not sufficient and the proponent must commit to maintaining the chlorine content of the waste less than 1% at all times.

Another issue raised in Urbis (2015) is that a plant operating at 1100°C prevents efficient energy recovery. The EPA considers further more detailed explanation of the issues with the current technology that prevents efficient energy recovery at the higher temperatures needs to be provided

The EPA requested the proponent identify the expected chlorine content of the waste for the proposed EfW plant. This is the chlorine content that will be maintained at all times and not an annual average. Further, more detailed information must be provided regarding the issues with the current technology such that efficient energy recovery is prevented when operating at a temperature of 1100°C.

PEL (2015d) provided some information to address this outstanding issue. Reference was made to the different waste fractions in the feedstock being well known and the waste screening and sorting procedures. The memorandum on dioxin control (Appendix A.1) is also noted as is the flue gas treatment system which will ensure stack emissions will comply with in-stack emission limits.

Section 5.8 and Section 5.9 of Arup (2016) [11] raises related issues regarding treated wood waste and floc waste composition. These issues relate to the appropriate operating temperature of the facility and the chlorine content of the waste.

The amended EIS has provided some further information to address this issue. Urbis (2016b) states that chlorine content of the waste will be managed to be less than 1% at all times. This will be achieved by thorough mixing of the waste in the bunker by the crane driver who will pick it up and drop it in a different place of the storage area of the bunker. The EPA remains uncertain that this mixing is sufficient to maintain the chlorine content to less than 1% at all times. The issue of prevalence of treated wood waste in the fuel and floc waste composition also remain uncertain.

Therefore the ***suitability of the proposed secondary combustion chamber minimum flue gas temperature of 850°C remains uncertain.***

7. BAT for control of air emissions not demonstrated for proposed EfW plant

Uncertainty remains regarding performance of air pollution control equipment due to no reference facility.

Table 7-2 in PEL (2015a) provides an overview of Best Available Techniques (BAT) for EfW flue gas treatment and Table 7-3 provides the flue gas treatment at a selection of existing EfW facilities. This information is presented to demonstrate that existing technology can satisfy the emission limit requirements of the EU IED.

PEL (2015a) failed to consider the type of waste burnt at the existing facilities in Table 7-3. It is not highlighted whether or not these facilities are dedicated mixed municipal waste incineration facilities, hazardous waste incineration facilities or a combination. To demonstrate the proposed EfW facility will incorporate BAT for flue gas treatment, the proponent must make reference to an existing facility where the fuel mixture is identical to that for the proposed EfW facility.

The EPA recommended the proponent is requested to update Table 7-3 in PEL (2015a) to include the fuel type for the existing facilities and include additional existing facilities where the fuel mixture is identical to that for the proposed EfW facility. Should no facility exist where the fuel mixture is identical to that for the proposed EfW facility, the proponent must provide additional robust justification for the proposed plant design and technology.

PEL (2015d) provided an updated table which includes flue gas treatment and fuel type for the existing energy from waste facilities. The EPA notes Section 2.4.1 of Arup (2016)[11] raised similar issues regarding a suitable reference facility in terms of throughput, technology and feedstock.

The amended EIS and air quality impact assessment do not provide any further substantial information to address this issue. It is evident that there is no suitable reference facility in

[11] Arup (2016) NSW EPA The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS, EIS Additional Information Gap Review, 14 June 2016

terms of throughput, technology and feedstock. It therefore remains unproven that the proposed EfW Facility will achieve best practice emissions control.

8. Revised dispersion modelling

This issue remains to be fully addressed. Progress has been made to address this issue.

The flue gas flow rates and exit parameters have been revised during the detailed design process for the project. Revised exit parameters were provided within the technical memorandum included as Appendix A.3 in PEL (2015d). The most significant change is the decrease in stack exit velocity from 35.8m/s to 21.7m/s. A decrease in stack exit velocity will result in an increase in predicted ground level concentrations.

The proponent also revised the in-stack concentration estimates based on operational emissions data from similar plant in terms of waste received and emission control system. The revised in-stack concentration estimates are provided in Appendix C of PEL (2015d) and are significantly lower than the Group 6 emission standards in the Clean Air Regulation and the emission concentrations assumed in the exhibited air quality impact assessment. A reduction in assumed emission concentration will result in a decrease in predicted ground level concentrations.

Additional dispersion modelling was conducted to determine the potential impact of the revised exit parameters combined with revised in-stack concentration estimates on predicted ground level concentrations. The results show a substantial reduction in predicted ground level concentrations for all pollutants. For example, a 97% decrease in 24 hour average PM_{10} concentrations and a 74% decrease in cadmium ground level concentrations are predicted. Clearly, the substantial reduction in assumed emission concentrations far outweighs the potential increase in ground level concentrations that would be expected from a reduction in stack exit velocity.

The additional dispersion modelling incorporating the revised exit parameters combined with revised in-stack concentration estimates was presented in PEL (2015d) as the most up to date modelling for the project. Consequently, the proponent was advised that the EPA would use the revised in-stack concentration estimates in Appendix C of PEL (2015d) to recommend air emission limits for the project. Further, should the proponent seek emission limits different to those in Appendix C of PEL (2015d) then the dispersion modelling would need to be revised to reflect those emission limits in combination with the revised exit parameters.

PEL (2016b) includes the results of a regulatory scenario for the purposes of setting limits in the Environment Protection Licence. ***The EPA has identified issues with this scenario and all emission scenarios modelled to date which are detailed below.***

ADDITIONAL ISSUES OF CONCERN

1. Ambient impact assessment criteria are not included for all pollutants of concern

The EPA impact assessment criteria applicable for the assessment are summarised in Table 4.4 of PEL (2016a). All pollutants of concern for the project are not included in Table 4.4.

The EPA requires that the proponent update Table 4-4 to include <u>all</u> pollutants of concern for the proposed EfW facility.

2. Insufficient justification for the use of AERMOD

The AERMOD dispersion model was used to predict ambient concentrations of emitted pollutants from the proposed EfW Facility. PEL (2016a) does not adequately justify the choice of AERMOD for the assessment. Reference is made to validation exercises to confirm its satisfactory performance for both calm conditions and tall stack applications however the specific references are not provided. The use of AERMOD for other approved development applications is not sufficient justification for the use of

AERMOD for the proposed EfW facility. AERMOD, unlike other models such as CALPUFF, does not explicitly treat calm conditions. This is of concern due to the high percentage of calms (approximately 30%) in the meteorological data used in the air quality assessment.

The EPA requires that the proponent adequately justify the use of AERMOD to predict ambient concentrations of pollutants emitted from the proposed EfW facility. In particular, the superior performance of AERMOD for both calm conditions and tall stack applications must be discussed and reference made to other suitable models such as CALPUFF.

3. Emission rates not determined in accordance with the Approved Methods

Section 3.3 of the Approved Methods outlines the EPA's preferred methods for estimating the emission rate for each source: direct measurement and manufacturer's design specification. Emission factors are generally used when there is no other information available or when emissions can reasonably be demonstrated to be negligible.

PEL (2016a) presents a variety of emission scenarios, none of which are in accordance with the Approved Methods:

- **Emissions during normal operations:** estimated emission concentrations are based on stack testing data for existing reference facilities. Whilst the air pollution control equipment for the reference facilities is similar to that for the proposed EfW facility, there are substantial discrepancies in fuel type.

- **NSW Clean Air Regulation In stack Concentration Limits:** this scenario was presented to inform future Environment Protection Licensing of the EfW facility. It assumes in-stack concentrations at the Clean Air Regulation limits. The proposed EfW facility will clearly achieve emission concentrations less than the Clean Air Regulation limits. Ramboll (2016)[12] states that process guarantees will be set to ensure compliance with the (more stringent) Industrial Emission Directive (IED) emission limits as a minimum. The Clean Air Regulation scenario therefore does not represent the proposed operation of the EfW facility. It presents a 'pollute up to goal' scenario and is not reflective of the expected operation of the proposed EfW facility in a proper and efficient manner. The proponent is referred to Section 10.2 of the Approved Methods regarding the approach taken by the EPA to determine appropriate Environment Protection Licence emission limits.

- **Upset conditions:** expected emissions during plant upset. This does not represent the expected on-going performance of the plant.

The EPA considers PEL (2016a) does not include an emissions scenario which adequately represents the expected performance of the facility as required by the Approved Methods.

The EPA requires that the proponent present a revised assessment for the proposed EfW facility which includes an emissions scenario which adequately represents the expected performance of the facility. As there are no existing facilities using the same fuels as the proposed EfW facility, such an emissions scenario should be based on:

- ***Performance guarantee for the facility***
- ***Proposed fuel type.***

Further, emission rates and concentrations must be presented for all pollutants of concern for the proposed EfW facility and all Clean Air Regulation pollutants.

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[12] Ramboll (2016) *The Next Generation NSW Pty Ltd, Project Definition Brief*, October 2016

4. **Incremental and cumulative ground level concentrations not presented for all pollutants of concern**

PEL (2016a) presents predicted ground level concentrations for three scenarios: normal, upset and regulatory. All pollutants of concern for the project are not included in the tabulated results. As an example, the only type 1 and type 2 substances included for normal operations is cadmium and mercury. Chlorine, a Clean Air Regulation pollutant is also excluded from the results for normal operations. The regulatory scenario excludes the following Clean Air Regulation pollutants: hydrogen chloride, chlorine, hydrogen fluoride and all type 1 and type 2 substances except cadmium and mercury.

The EPA requires that the proponent present assessment results for all pollutants of concern for the project for all modelled scenarios.

5. **Control of vapour phase metals**

The fuel for the proposal has the potential to contain substantial amounts of metals. This is due to the use of floc waste as a fuel and the high likelihood of treated timber being used as fuel.

The proposed air pollution control equipment, namely the baghouse, should adequately control particulate phase metals. The efficiency of the proposed air pollution control equipment for vapour phase metals is unclear.

The EPA requires that the proponent discuss how vapour phase metals will be controlled and provide manufacturers performance guarantees to demonstrate the control efficiency for vapour phase metals.

6. **Assumption of 8000 hours**

PEL (2016a) states that the assessment assumes the plant operates for 8000 hours per annum. The EPA is unclear where this assumption has been applied in the assessment and how it affects the assessment results. The air quality impact assessment must assume the plant operates for 8760 hours per annum.

The EPA requires that the proponent clarify the assumption of 8000 operational hours per year and how this assumption has been used in the assessment.

ODOUR IMPACT ASSESSMENT

The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW defines a sensitive receptor as a location where people are likely to work or reside and should also consider the location of known or likely future sensitive receptors.

The project site is located within the Eastern Creek Precinct, in Central Western Sydney, 18 kilometres west of Parramatta and 12 kilometres east of Penrith. Land surrounding the site is owned by:

- The Corporate Group Alexandria Landfill Pty Ltd;
- ThaQuarry Pty Ltd;
- Australand;
- Hanson;
- Jacfin;
- The Department of Planning and Environment; and
- Sargents.

The above sites are identified for redevelopment for higher end industrial and employment uses over the next decade under the State Environmental Planning Policy (Western Sydney Employment Area). This land represents future sensitive receptors under the Approved Methods.
There are residential areas located to the north and west of the site and existing industrial facilities are located to the east and south of the site. According to the Approved Methods the residential and industrial areas surrounding the site are also defined as sensitive receptors.

The odour impact assessment only presents the 99th percentile odour concentrations at a subset of particularly sensitive receptors (schools, child care centres etc) located within the residential areas to the north and west of the site. The proponent has not assessed the odour impact of the project at all sensitive receptors as defined in the Approved Methods. The odour impact should additionally be assessed at the existing places of work to the east and south of the site and the likely future places of work due to the re-development of the land surrounding the site.

The EPA requires that the proponent revise the odour impact assessment to include an assessment of the odour impact of the project at all existing and likely future sensitive receptors as defined in the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW. This is to include locations where people reside and work.

OZONE IMPACT ASSESSMENT

Summary
The Next Generation NSW Pty Ltd (TNG) propose to establish an energy from waste (EfW) facility at Eastern Creek (the proposal).

The amended environmental impact statement finds:

- the revised proposal reduces ozone impacts below the significant impact level (SIL);
- optimised SNCR meets the criteria for best available technology to minimise NO_x emissions;
- NO_x offsetting is impractical in the Sydney basin.

The EPA finds that the amended ozone assessment meets the requirements set out in the EPA's *'Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources':*

- Level 1 screening of the revised proposal showed contribution to maximum ozone concentrations of less than the significant impact level (0.5 ppb).
- Adoption of optimised SNCR to reduce NO_x emissions meets the Procedure's requirement to consider best available technology (BAT).
- Offsetting NO_x emissions is impractical in the Sydney basin.

The EPA notes that detailed assessment of the initial proposal found ozone increments of up to 5.7 ppb whereas the amended ozone assessment determined an ozone increment of 0.47ppb. This is result of a revised proposal, namely, reduction in flue gas flow and a reduction in total NO_X emissions due to optimising the SNCR.

Documents

- *'Energy from waste facility – Ozone Impact Assessment'*, Pacific Environment Limited, 14 April 2015 (PEL, 2015b)
- *'Amended Environmental Impact Statement The Next Generation: Energy from Waste Honeycomb Drive, Eastern Creek'*, Urbis, November 2016 (Urbis, 2016b)
- *'Energy from waste facility – Ozone Impact Assessment The Next Generation'*, Pacific Environment Limited, 25 October 2016 (PEL, 2016b) Appendix M to Urbis (2016b)
- *'Energy from waste facility – Air Quality and Greenhouse Gas Impact Assessment The Next Generation'*, Pacific Environment Limited, 31 October 2016 (PEL, 2016) Appendix K to Urbis (2016b)
- *'BAT Evaluation'* Ramboll, 11 February 2016 (Ramboll, 2016b), Appendix KK to Urbis (2016b)

- *'Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources'*, Environ September 2011 available at http://www.epa.nsw.gov.au/air/appmethods.htm .
- *'Reference Document on the Best Available Techniques for Waste Incineration'* (BREF) European Union, August 2006.

Amended Environmental Impact Statement

An amended Environmental Impact Statement was submitted by TNG in November 2016 to support their development application (SSD 6236). This followed exhibition of the original proposal from May to July 2015, and includes a Response to Submissions addressing the issues raised in submissions on the original proposal. The proposal retains the development description, but has revised the Project Definition Brief and includes revised technical reports for air quality and greenhouse gases.

Ozone impacts – guidance, initial assessment, and issues raised

Guidance

The EPA has published a protocol for assessing potential regional ozone impacts, *'Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources'*, (Guidance) available at http://www.epa.nsw.gov.au/air/appmethods.htm . The EPA provided this guidance to TNG as Agency requirements.

The protocol defines a screening impact level (SIL) of 0.5 ppb. It further states that "incremental increase in excess of 1 ppb ozone has been selected as an unacceptable level within an ozone non-attainment area".

Based on the outcomes of a screening assessment, the protocol states for a non-attainment area:

- for impacts less than the SIL, no further assessment needed, but a best management practice determination should be undertaken considering reasonably available techniques;
- for impacts greater than the SIL but less than the unacceptable level (1 ppb) no further assessment is required, but a best management practice determination should be undertaken including a cost-benefit analysis of best available technology and/or consideration of emission offsets;
- for impacts greater than the unacceptable level, the EPA may require a refined assessment.

The Sydney airshed is a non-attainment area.

Initial assessment

Assessment of the initial proposal found:

- detailed chemical transport modelling of impacts from the proposal for a period containing days reporting elevated ozone concentrations found proposal emissions increased ozone concentration by more than the threshold for impact (1 ppb) for a number of grid cells
- maximum increments were as much as 5.7 ppb, but increments greater than 1 ppb were limited to ozone concentrations less than 80 ppb and generally between 50 ppb and 70 ppb
- simulated concentrations showed that no increment resulted in an additional exceedence of the ozone impact assessment criteria (1-hour 100 ppb; 4-hour 80 ppb).

EPA review of the initial assessment

The EPA reviewed the initially exhibited EIS and found that it was generally consistent with the guidance provided. Given that the assessment found ozone concentration increases greater than the unacceptable level (1 ppb), the EPA requested:

- discussion of potential offsets
- confirmation of best available technology.

The Amended Assessment

The amended assessment contains:

- a revised screening assessment based on reduced emissions arising from modification of the proposal
- discussion of best available technology (BAT)
- discussion of potential offsets for NO_x emissions.

Discussion of BAT is based on guidance provided by the European Union.

Revised Ozone Assessment

Following comment on the initial proposal, TNG modified their proposal. The changes relevant to potential ozone impacts are:

- reduction in flue gas flow from 139.3 Nm^3/s to 127 Nm^3/s
- reduction in total NO_x in the flue gas from 200 mg/m^3 to 120 mg/m^3 from optimising the selective non-catalytic reduction (SNCR).

This reduces NO_x load by 45%.

Using these revised emissions in the screening tool results in increments less than the SIL – 0.47 ppb for 1-hour ozone, and 0.41 ppb for 4-hour ozone.

Best Available Technology

Included in the amended assessment as Appendix KK (Ramboll 2016b) is a discussion of best available technology (BAT). The discussion refers to the European Union's *'Reference Document on the Best Available Techniques for Waste Incineration'* published in August 2006 (BREF). It claims:

- all requirements defined by BREF regarding design are fulfilled
- the expected emissions are within the required operational values of the BREF
- the facility exceeds the requirements of the BREF.

The pollutant of concern is (total) oxides of nitrogen (NO_x).

NO_x reduction – SCR versus SNCR

Reducing emissions of NO_x is achieved from both optimised combustion conditions to minimise formation, and from reduction of NO_x in the exhaust gas stream. There are two approaches to removing NO_x from the exhaust stream, selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR).

Ramboll (2016b) includes comments from the BREF regarding SCR and SNCR. These occur for items 15, 32, 35, and 40 of BREF.

Item 40 of the BREF is quoted as:

> "In general SCR is considered BAT where higher NO_X reduction efficiencies are required (i.e. raw flue-gas NO_X levels are high) and where low final flue-gas emission concentrations of NO_X are desired."

However, item 32 notes the increased energy requirements of SCR and in particular recommends that facility design minimise the additional energy demand for reheating flue gas. The proponent notes that choosing SNCR rather than SCR avoids the need for flue gas reheating.

The proponent argues in the Executive Summary of PEL (2016b) that as overall NO_x emissions meet the SIL, higher NO_x reduction efficiencies are not required and hence SNCR qualifies as BAT.

EPA's Comment

The EPA accepts the use of BREF to define BAT. The EPA notes that both SNCR and SCR reduce NO_x emissions, with SCR generally providing greater reductions in NO_x but requiring additional energy to operate. The EPA agrees that for the proposal as described, SNCR meets the requirements set out in the Guidance.

Potential NO_x Offsets

Section 11 of PEL (2016b) discusses potential NO_x offsets by referring to the EPA's 2008 emissions inventory for the Greater Metropolitan Region. They find that NO_x offsets are problematic because of the nature of emissions sources in the Sydney basin.

Within the defined Sydney region, the top eight anthropogenic sources of NO_x are transport related. These are a very large number of small sources and not readily amenable to NO_x offsets.
The next two largest source categories are gas-fired electrical generation, and petroleum and fuel production. It is expected that gas-fired electricity generation has already been optimised for NO_x emissions so cannot provide an offset. The two petroleum refineries comprising the other source have both closed and therefore also cannot provide offsets.

The proponent argues the nature of emission within the Sydney basin – very few large discrete emission sources – makes offsetting NO_x emissions impractical.

EPA's Comment

The EPA agrees that NO_x offsetting is not practical within the Sydney basin.

Assessment outcomes

Urbis (2016b) asserts that (section 13.6, p204):

> "In terms of ozone impacts, during normal operation of the plant, the emission levels are generally expected to be well within the limit value".

EPA's Comment

The EPA finds that assessment meets the requirements set out in the EPA's *'Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources'*.

- Level 1 screening of the revised proposal showed contribution to maximum ozone concentrations of less than the significant impact level (0.5 ppb).
- Adoption of optimised SNCR to reduce NO_x emissions meets the Procedure's requirement to consider best available technology (BAT).
- Offsetting NO_x emissions is impractical in the Sydney basin.

The EPA notes that detailed assessment of the initial proposal found ozone increments of up to 5.7 ppb whereas the amended ozone assessment determined an ozone increment of 0.47ppb. This is result of a revised proposal, namely, reduction in flue gas flow and a reduction in total NO_X emissions due to optimising the SNCR.

ATTACHMENT G

NSW Environment Protection Authority

Review of the Soil and Water Assessment

Documents Reviewed

- Response to Agency Comments on Soil and Water Report, The Next Generation, Energy from Waste Plant, Eastern Creek.
- Letter Response 26 October 2015, Edison Environmental & Engineering

Detailed Comments

A. Document: Environmental Impact Statement: The Next Generation NSW Energy from Waste Facility, Eastern Creek, April 2015.

1. In Table 5, page 55, it is stated under column "Control Measures" row "Soils and Water" that:

"If high salinity soils are encountered, these soils will be removed for covered storage and blended with less saline soils prior to re-use as backfill."

It should be ensured that during storage and/or during blending, saline runoffs are prevented from entering the local water course (Ropes Creek tributary) if high rainfall periods are encountered. It would be advised, that salinity (EC) levels in the Creek be measured when it is flowing, and any waters (such as runoffs or groundwater dewatering) with higher salinity be prevented from entering the creek. High salinity can be toxic to aquatic organisms and plants located onsite and/or downstream from the site of development, especially if discharges contain high bicarbonate together with other toxicants.

EPA's comment: Response satisfactory

2. On page 158, section 15.4.2 "Ground Water" it is stated that:

"It is expected that seepage water will be suitable for transfer to the construction-phase stormwater management systems. Poor quality groundwater may be encountered in some areas, such as elevated salinity associated with saline soils or highly alkaline water perhaps with elevated ammonia levels associated with the volcanic breccia present beneath the hill in the northern part of the site. On-site treatment, blending with stormwater or transfer off-site to a suitable, licensed disposal site may be necessary as a last resort."

The comments in point 2 above is also relevant to this statement as any high salinity and nutrient rich water should be prevented from entering the creek. Further details are also probably required as to the method that will be employed to decide what treatment any groundwater encountered would require.

EPA's comment: Response satisfactory

B. Document: Assessment of Soil and Water Impacts: Proposed Energy from Waste Facility, Eastern Creek, April 2015

3. Page 16, section 3.7.1. It is concluded from previous reports (ADI 1995 & ADI 1998) that groundwater at the site is not contaminated, although the writer questions the validity of the analytical results. It is also stated that: *"It is further noted that low-levels of both TPH*

and PAH can occur naturally in samples of bedrock in the Wianamatta Group rocks" although a reference to this statement is not provided. Recent site contamination investigations by ADE (2014) have not analysed the ground water to verify this conclusion.

It is advised that the ADI (1995 & 1998) reports or relevant extracts be provided for verifications along with a reference that substantiates the claim that natural TPH and PAH levels occur in the bedrock.

EPA's comment: Response satisfactory. However, the EIS still does not appear to have provided the requested reports, ADI 1995 and ADI 1998.

4. Page 25 mentions bio-retention basin, however this basin is now being used as a storage/treatment pond of runoff stormwater prior to discharge into a tributary of Ropes Creek.

Clarification is required of any water treatment that will be carried out prior to discharge. For example flocculation etc. If any treatment will be carried out, additional details of the chemicals used (eg. flocculant etc.) is required together with an explanation of dosing systems (automatic or manual) to avoid residual chemicals migrating into the creek.

EPA's comment: Satisfactory response. However, changes and clarifications are not provided in the document itself. It is recommended that clarification be added to the Assessment of Soil and Water Impacts document.

5. Page 26, section 5.2 refers Table 5.2 for monitoring details. Table 5.2 indicates relevant sampling locations 1 to 7, however the actual locations of these sampling points are not identified in a location plan.

Provide diagrammatic locations of the proposed sampling points.

EPA's comment: A diagrammatic location of the sampling points are not provided. Figure 3.6 shows only 3 surface water sampling points but no sampling points are stated to cross reference Table 5.1. Table 5.2 has been removed from the document. The response document provides a description of the sampling locations 1-7 from the IGGC (2015) report. This description should be included in the Assessment of Soil and Water Impacts document.

6. Page 26 refers to one of the Suite A analytes as "*total heavy metals*".

Clarification is required as to what this "analyte" actually represents. It appears that this refers to total concentrations of individual heavy metals, however, the individual heavy metals are not specified.

EPA's comment: The response has clarified the issue. However, it is recommended that relevant section of Assessment of Soil and Water Impacts document be amended to include the full list of heavy metal being tested. Therefore, Suite A contaminants should <u>specify</u> As, Cd, Cr, Cu, Hg, Ni, Pb and Zn. The term *total heavy metals* is ambiguous and should not be used. Replace it with either unfiltered heavy metals or total concentrations of heavy metals.

7. Page 27: Consider adding turbidity field measurement to suite B and suite C analytes.

EPA's comment: Response satisfactory

8. Additional information is required of the management options available if any of the Table 5.2 monitoring shows non-compliance.

EPA's comment: Response satisfactory

C. Document: Construction Environmental Management Plan: Energy from Waste Facility, Eastern Creek. Brookfield Multiplex Construction. Revision 3.

9. On page 25, second row of the table, it is stated that water carts/sprays may be used in dust control.

Consideration needs to be given to the source of water used in such spray dust control devices and any potential inhalation exposure pathway for onsite workers/visitors and any potential off-site receptors.

EPA's comment: Response satisfactory

10. Section 7.3, page 26, Table: Management Strategies. It is recommended that salinity (as electrical conductivity) be included in the list of water quality targets to be achieved prior to discharge into the creek. This is important as the groundwater is saline while the surface water creek may not be. The EC target can be established by undertaking background monitoring of EC in the creek and using ANZECC (2000) guidelines for establishing appropriate EC limit. Indicative limits for EC for different water systems are also provided in ANZECC (2000) guidelines.

EPA's comment: Response satisfactory

D. Document: Targeted Phase II Detailed Site Investigation, 6th August, 2014.

11. The detailed site investigation only investigated levels in the soils, sediments and surface waters. While the groundwater level is generally deep at the site, there are areas with perched groundwater. Generally, groundwater analysis is a good indicator of any site contamination (that can be missed by targeted soil sampling) and mobilisation of such contamination.

EPA's comment: An explanation is required to detail the reasons for not testing any groundwater and verifying the conclusions in the Assessment of Soil and Water Impacts Report, as per point 4 above.

12. Page 46, section 8.7.1 Heavy Metals. It is stated that:

"Four (4) surface water samples were analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc). All of the samples returned values below the adjusted threshold criteria for 'Extremely Hard' water."

Furthermore, it is noted on page 11 of the report that the creek was not flowing during investigations and *"the water depth was no greater than 0.2 m and dry in many sections."*

It should be noted that the above scenario would have also concentrated the salts and the presence of "extremely hard water" may not be reflective of normal flow conditions during times when the creek is actually flowing. Therefore, the hardness corrected guideline values derived may not be applicable when the creek is actually flowing. For any future assessments it is recommended that the hardness of creek water be re-tested to verify hardness. Also, the hardness correction of copper is not recommended as it has been clearly shown that hardness corrected values of copper is not protective of all aquatic species and this may be removed in the reviewed ANZECC guidelines. See paper:

Markich et al. (2005) Hardness corrections for copper are inappropriate for protecting sensitive freshwater biota. *Chemosphere* 60:1-8.

EPA comment: It is again highlighted that hardness correction of heavy metals is problematic as it does not protect all aquatic species. Hardness correction using extreme hardness is again problematic for the site as background hardness does not appear to be well established. It is recommended that hardness correction is not used for any of the heavy metals.

Our reference: DOC17/275495

Mr Chris Ritchie
Director
Industry Assessments
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

EMAIL & STANDARD POST

Dear Mr Ritchie

I refer to the amended Environmental Impact Statement ("amended EIS") submitted by Urbis Pty Ltd in relation to a proposed energy from waste facility at Eastern Creek (SSD 6236).

The EPA reviewed the amended EIS and provided extensive comments to the Department of Planning & Environment ("DPE") on 24 March 2017. Those comments mainly related to air quality impacts, human health impacts and alignment with the NSW EPA's Energy from Waste Policy.

The EPA has also undertaken a review of the Greenhouse Gas Assessment contained within the report titled "Air Quality and Greenhouse Gas Assessment" dated 31 October 2016 and prepared by Pacific Environment Limited ("GGA").

The EPA advises that, while the approach used in the GGA to assess greenhouse gas ("GHG") emissions is generally appropriate and based on the relevant guidelines, the GGA lacks information and justification on the input values and assumptions used. Consequently, the significance of GHG benefits from the facility are unclear.

The EPA's comments in relation to the GGA are enclosed as Attachment A.

If you have any questions in relation to this matter, please contact Deanne Pitts on (02) 9995 5752.

Yours sincerely

15 · 5 · 2017

STEVE BEAMAN
Executive Director Waste and Resource Recovery
Environment Protection Authority

Enclosed. Attachment A – NSW EPA – Greenhouse Gas Assessment

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ATTACHMENT A

NSW Environment Protection Authority

Review of the Greenhouse Gas Assessment

Summary
The EPA has reviewed the GGA (PEL, 31 October 2016) for the proposed Energy from Waste Facility (the facility) at Eastern Creek (the site). The GGA[1] consists of an updated assessment to that previously prepared by PEL in March 2015[2].

Greenhouse gas (GHG) estimations are critically dependant on the input values and assumption used. The EPA notes the GGA lacks justification to demonstrate this input information is robust in all cases.

Currently the GGA appears to significantly overestimate emissions from landfills which results in a doubling of net GHG emissions prevented compared to estimate of the previous GGA.

The EPA notes that for the GHG estimates to be realised in practice, the composition and, in particular, the carbon content of the waste streams and fuel mix as a whole, will need to be consistent or exceed those used in the calculations to estimate facility GHG emissions. For example, fuel mixtures that contain a lower carbon content to that used in the GGA will result in reduced calorific value of the feed material and consequently reduced energy output per tonne of waste feed material. This will in turn lessen the net benefits on GHG emissions resulting from the facility.

The EPA notes the issues identified in the GGA bring into question the significance of the facility's positive GHG impacts.

ISSUES OF CONCERN
The EPA has reviewed the project Greenhouse Gas Assessment (GGA) titled *Energy From Waste Facility - Air Quality and Greenhouse Gas Assessment, The Next Generation* (PEL, 31 October 2016). Details of the issues identified by the EPA are provided below.

1. **<u>GHG emission estimation methodologies and strategy.</u>**

The EPA notes the approach used to estimate GHG emissions due to Scope 1 and Scope 2 emissions is generally appropriate and is based on emission factors and equations provided in the NGER Technical Guidelines.

a. *<u>GHG emissions estimation from waste incineration (Scope 1 emissions).</u>*

The estimation of emissions directly generated from waste incineration at the facility uses Method 1 under Part 5.5 – Waste Incineration of the NGER Technical Guidelines.

The EPA notes, to incorporate and characterise the design fuel, every waste product was analysed and its chemical composition redefined based on a database of comparable products. The chemical analysis and calorific value data for each waste stream applied in the assessment is provided in the GGA Appendix D.1[3]. The EPA has not reviewed or verified the material source and composition data for the proposed design waste streams, presented as the revised design fuel mix[4].

The average waste carbon content (31.44%) and percent carbon that is of fossil origin (33.14%) were estimated from the chemical analysis of each waste stream from updated compositional data in Appendix D.1[5]. A default oxidation factor value (0.98) was used due to this value being unknown.

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[1] Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment – The Next Generation (PEL, 31 October 2016).
[2] Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment – The Next Generation (PEL, 26 March 2015).
[3] GGA Appendix D1: Ramboll Memo - Design Fuel Mix - 24 October 2016.
[4] GGA Appendix D1: Ramboll Memo - Design Fuel Mix - 24 October 2016. Updated Technical Design Information (UTDI, Nov 2015).
[5] GGA Appendix D1: Ramboll Memo - Design Fuel Mix - 24 October 2016.

ATTACHMENT A

The EPA notes the emissions estimation is critically dependant on the input values, information and assumptions used for each determination. For example, the current GGA reports GHG emissions from waste incineration (505,069 tpa CO_2-e) 20% lower than the previous GGA (629,784 tpa CO_2-e). The difference in GHG emissions results from a minor change only to the design waste stream/fuel mix: the inclusion of waste gyprock to the chute residual waste (CRW) and construction and demolition (C&D) waste streams. The EPA notes this clearly demonstrates how variations in waste streams (material sources and compositions) can result in fuel mixes different (to the design fuel mix), and consequently different GHG emission profiles. Consequently, the estimated value for GHG emissions based on the given design fuel mix may not be the most conservative value in practice.

The EPA notes a minor error in Table 10-1. Note 1 should refer to Appendix D, not Appendix G (as per the previous GGA).

The EPA advises:

i. **the assessment of emissions from waste incineration has been undertaken based on a theoretical design fuel composed of numerous different waste streams with different but specific carbon and chemical makeup; and**
ii. **the resulting emissions estimation may not be conservative if the fuel contains a lower carbon content and/or high content of fossil derived carbon than the assessed design fuel.**

b. *GHG emissions estimation from the facility substituting grid electricity.*

The estimation of emissions resulting from the substitution of grid electricity with facility generated electricity uses Method 1 under Chapter 7 of the NGER Technical Guidelines.

The EPA notes the emissions estimation is based on the facility design having a thermal input of 471.9 MW (117.98 MW for each combustion line) and an assumed net average annual electrical efficiency of 29.1%. The facility is designed to export 137.3 MWe to the main electricity grid. However, the GGA does not refer to detailed facility design information to justify the use of these parameters to estimate emissions substituted by energy/emissions generated from the facility.

The estimation also assumes the facility will operate for 8,000 hours per year, and uses a Scope 2 emission factor for grid electricity in NSW of 0.86 (kg CO_2-e/kWh). The EPA notes the latest NSW emission factor estimate from the most recent (August 2016) National Greenhouse Accounts Factors[6] is 0.84 (the same as at August 2015). Use of this reduced emission factor results in a lowering of the estimate GHG emissions replaced by the facility (by about 2.5%). In addition, it is anticipated that the emission factor will continue to decrease through introduction of less carbon intensive sources of energy.

The EPA advises:

i. **the estimation of grid emissions substituted by the facility is highly dependent on the input values and assumptions used;**
ii. **some of the facility design information used in the GGA is not referenced or justified; and**
iii. **use of the current Scope 2 emission factor for NSW results in a slightly lower value for CO_2-e diverted from the main electricity grid and therefore an estimated increase in net GHG emissions resulting from the facility. This emission factor is also expected to reduce over time which will reduce the benefit of facility substituting emissions.**

c. *GHG emissions estimation for emissions diverted from landfilling.*

The estimation of GHG emissions from decomposition of waste in landfill generally uses the methodology described under Part 5.2 of the NGER Technical Guidelines.

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[6] National Greenhouse Accounts Factors, Australian National Greenhouse Accounts (DEE, August 2016).

ATTACHMENT A

i. The GGA assumes combustion of landfill emissions would not occur.

The EPA notes the emissions estimation assumes there will be no emissions mitigation by the combustion of landfill generated methane (via flare or gas engine) as this does not currently occur at the Genesis landfill facility and 'would not form part of the future operations for the site'. The EPA notes that without the EfW facility it is likely some of the waste will be deposited at landfills other than the Genesis landfill facility that have methane treatment, as this technology is becoming more established for landfill GHG emissions mitigation. Such a scenario would significantly reduce the estimated GHG emissions diverted from landfilling, and thus the overall positive GHG impact from the operation of the facility.

The EPA advises the estimation of GHG emissions diverted from landfilling is likely to significantly overestimate these emissions by assuming no methane emissions generated by landfilled waste will be combusted.

The EPA requires the GGA incorporate an emissions estimation scenario that is more realistic with respect to landfill gas capture and treatment.

ii. The quantity of degradable organic carbon has significantly increased in the GGA.

The GGA assumes a quantity of degradable organic carbon (DOC) that is significantly (2 times) higher than the previous GGA. This results in a doubling of the estimation of methane emissions from landfilling the waste, from 1,230,199 tpa CO_2-e to 2,560,239 tpa CO_2-e.

The increased quantity of DOC in the waste results from a change in the applied value for DOC fraction from 0.2 (for 'garden and green') to 0.43 (for 'wood'). However, the GGA incorrectly states (Section 10.3.3, footnote *n*) a DOC fraction for 'garden and green' has been used which results in an underestimation of GHG emissions from landfilling.

The EPA notes it is unclear why the less conservative value for 'wood' has replaced the value for 'garden and green' in the current GGA. The emissions estimation is highly sensitive to this value and therefore it should be clearly justified as appropriate and conservative for use in the GGA.

The EPA advises the estimation of GHG emissions diverted from landfilling has effectively doubled by use of a less conservative value for the fraction of degradable organic carbon (DOC) in the waste.

The EPA requires the DOC fraction value used in the assessment is clearly justified as appropriate and conservative for use in the GGA.

2. <u>Estimated net GHG emissions.</u>

The estimated net GHG emissions resulting from the facility and the previous assessment are provided in the table below.

	<u>Current</u> GGA (tpa CO2-e)	**<u>Previous</u> GGA (tpa CO2-e)**
Emissions from waste incineration	505,069	629,784
Emissions alternative to grid	-944,624	-1,230,199
Emissions diverted from landfill	-2,560,239	-989,120
Net GHG emissions	-2,999,794	-1,589,536

The EPA notes the significant discrepancy in the estimated net GHG emissions arising from the significantly increased estimation of emissions diverted from landfill in the current GGA.

The EPA requires the GGA clearly justify changes to assumptions to demonstrate the GGA is robust and conservative with respect to the estimation of net GHG emissions resulting from the facility.

The EPA notes a minor error in GGA Table 10-4 for tpa CO_2-e alternative to grid: the value includes an erroneous extra digit.

Our reference: DOC15/294009

Mr David Mooney
A/Team Leader
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Mooney

Public Exhibition - Energy from Waste Proposal, Eastern Creek - SSD-6236

I refer to your email dated 25 May 2015 to the Environment Protection Authority (EPA) requesting comment on the Environmental Impact Statement ("EIS") submitted by Urbis Pty Ltd in relation to a proposed energy from waste facility at Eastern Creek (SSD-6236).

The EPA has reviewed the EIS and associated documents.

The EPA has significant concerns in relation to the following aspects of the proposal: human health risk assessment; ozone impact assessment; waste management report (including alignment with the EPA's Energy from Waste Policy); air quality and greenhouse gas assessment; and technological aspects.

A summary of the EPA's comments is provided in Attachment A, with detailed comments provided in Attachment B.

I have also included two independent reviews commissioned by the EPA to provide expert advice in relation to the Human Health Risk Assessment (EnRisks) and the technological assessment (Arup) of the proposal.

It is the EPA's recommendation that the Department of Planning & Environment reject the proposal in its current form.

Please see detailed comments attached and if you have any questions in relation to this matter, please contact Deanne Pitts on (02) 9995 5752.

Yours sincerely

4.8.2015

STEVE BEAMAN
Director Waste & Resource Recovery Branch
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ATTACHMENT A – SUMMARY COMMENTS

Background

An Environmental Impact Statement (**EIS**) has been prepared by Urbis Pty Ltd (**Urbis**) on behalf of The Next Generation NSW Pty Ltd in support of the State Significant Development Application for the construction and operation of the Energy from Waste Facility (proposed Facility) at Lots 1, 2, 3 and 4, in DP 1145808 (**the site**) within the Eastern Creek Industrial Estate.

The Next Generation NSW Pty Ltd (the Proponent) is proposing to construct and operate an electricity generation plant within the Eastern Creek Industrial Estate powered from unsalvageable and uneconomic residue waste that would otherwise be landfilled (the Project). The facility will have the capacity to process up to 1.35 million tonnes of residual waste fuel per year and generate up to 158 MW of electricity with a net thermal export to the grid of 140 MWe.

The development will be staged in two phases with each phase comprising two combustion grates and two 5 pass heat recovery boiler systems housed in one building with each boiler having its own independent flue gas treatment systems and connecting to one turbine enclosed in the adjacent turbine hall. Each boiler will also be connected to an air cooling system, one emissions stack and the other auxiliary elements connecting the process. Phase 2 will be built when it is demonstrated the required quantity of residual waste fuel is available to the facility.

The facility will operate 24 hours a day every day of the year apart from programmed offline periods for maintenance.

The proposed facility aims to receive and process up to 1.3 million tonnes of residual waste per annum (C&I and C&D & other waste) for energy recovery using "moving grate" incineration technology.

Prior to the EIS and associated assessments being publically exhibited the EPA completed a review of these documents and provided comments to the Department of Planning and Environment (DP&E).

On 22 May 2015, the EIS and associated assessments were placed on public exhibition by DP&E.

The EPA has reviewed these documents and provides its comments below. As well as general comments, there are specific comments in relation to air quality and greenhouse gas impact assessment; the ozone impact assessment; the human health risk assessment; and the waste management report. Many of these areas were identified previously prior to public exhibition of the EIS and still require attention by the Proponent.

Summary comments

A) General comments

- In general, the EIS and supporting documents still contain conflicting and inconsistent information, and lack of referencing, which makes it difficult to conduct a proper assessment. Further details are provided below, and in Attachment B. Separate assessments should be cross-referenced to ensure thorough assessments are completed, for example, although the Ozone Impact Assessment has predicted an impact, the effects of that impact on human health and human behaviour has not been mentioned at all in the Human Health Risk Assessment. Conflicting information about construction times, life of the operation, quantity of waste proposed to be received etc. makes it difficult to assess the proposal.

- In order to robustly assess potential impacts from the proposal, it is crucial to understand the waste feedstock proposed to be received at the facility, and understand how the proposed technology (HZI Moving Grate) will process that waste feedstock. During Adequacy Assessment, the EPA expressed concern that it was not fully known how the proposed technology would handle the proposed feedstock and the EPA requested some real data (preferably from an operating EfW with similar operations) to support many of the assumptions made in the EIS and associated assessments. It is the EPA's view that this has not been addressed adequately in the publicly exhibited EIS. Although a few facilities have been listed, they are not appropriate to use as real data for this assessment (and it has not been justified why they were listed in any case). Further detail on this point is provided in the Technological Assessment in Attachment B.

- In addition to the point made above, most of the assessments (air, ozone, human health, waste) by necessity, rely heavily on knowing the waste feedstock proposed to be accepted at the facility and how the technology will process it. By not having a clear picture and real data, it has been difficult to properly and robustly assess what the real impacts or potential impacts will be. This concern is reflected throughout the EPA's submission.

B) Human Health Risk Assessment

Note: The EPA conducted a review of the Human Health Risk Assessment and also contracted a specialist expert consultancy, EnRisks, to conduct an independent review. Results of both reviews were consistent and complimentary. For completeness, both reviews are provided in Attachment B & Attachment C respectively.

The Human Health Risk Assessment (HHRA) included in the EIS on public exhibition is a relatively generic assessment that contains limited site specific information and is very similar to the one submitted at the adequacy review stage. The HHRA concludes emissions from the proposed energy from waste facility will not result in any adverse health impacts.

However, the HHRA does not include sufficient information and clarification in order to comprehensively justify the appropriateness of the assessment methodology and the assessment findings, or to demonstrate the assessment of Project health risks has been performed according to the requirements of the enHealth Guidelines, *Environmental Health Risk Assessment – Guidelines for assessing human health risk from environmental hazards (2012).*

It is the EPA's view that the HHRA has not been completed adequately, with the required Australian guidance, and as such it is not possible to determine the proposed Facility's potential or actual impact on human health. Therefore, the EPA cannot support the proposal in its current form.

C) Air Quality Impact Assessment

The EPA has reviewed the Air Quality and Greenhouse Gas Assessment for the EfW Facility. It has generally been conducted in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW. However, not all issues identified in the adequacy review have been satisfactorily resolved, as detailed in Attachment B, especially in relation to information about the diesel generators; operating temperature for the secondary combustion chamber; no assessment of ammonia emissions; and general inconsistencies in the assessment. Also, additional issues have been identified, and those are detailed in Attachment B.

It is the EPA's view that the Air Quality and Greenhouse Gas Assessment has not addressed all the issues as required by the EPA and therefore, the EPA cannot support the proposal in its current form.

D) Ozone Impact Assessment

The EPA has reviewed the Ozone Impact Assessment for the proposed facility. It has been generally conducted in accordance with EPA's published '*Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources*'. However, there are potential impacts that may occur. Therefore, the EPA requires further detail on possible approaches to reducing potential ozone impacts from the proposal as set out in Attachment B.

Until the Proponent provides the further detail as required, the EPA cannot support the proposal in its current form.

E) Odour Impact Assessment

The EPA has review the Odour Assessment and it has generally been conducted in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.

The odour impact assessment predicts operation of the proposed EfW facility and the adjacent Genesis recycling and landfill facility will comply with an odour assessment criterion of 2 odour units (OU) at the nearest existing and future sensitive receptors.

F) Alignment with the EPA's Energy from Waste Policy

It is the EPA's view that the proposal as presented does not provide enough information in order to demonstrate compliance with the requirements of the NSW Energy from Waste Policy Statement 2014 (the Energy from Waste Policy), in relation to the technical, thermal and resource recovery criteria outlined in Part 4 of the Policy.

The Environmental Impact Statement's Waste Management Report and supporting appendices contain limited, conflicting and sometimes inconsistent information about the source, supply, composition, recovery and management of the proposed waste fuel feedstock for the TNG facility. Without sufficient information, the EPA cannot complete an assessment of the feedstock proposed by TNG to determine their compliance with the Resource Recovery Criteria in the Energy from Waste Policy.

It is the EPA's view that the information provided does not show that proof of performance trials will be undertaken to demonstrate compliance with air emissions standards, that genuine dialogue with community has and will continue to be undertaken or that there is any commitment to the good neighbour principle within the Energy from Waste Policy.

Based on the points raised above, the EPA cannot support the proposal in its current form.

G) Technological Assessment

Note: The EPA contracted an external consultancy, Arup Pty Limited, to conduct a review of the technological aspects of the proposal, with reference to international best practice for energy from waste facilities. Arup also conducted a review of the proposal against the EPA's Energy from Waste Policy.

Comment provided by Arup Pty Ltd:

"The overall EIS and supporting documentation appear to lack a 'source of truth' and there are a large number of inconsistencies between the Main EIS and the appendices which have been authored by different specialists and within the EIS itself. There are a number of inaccuracies and inconsistences

between the main EIS document, the Environ Waste Management Report and the Concept Design Report produced by Fichtner, which has resulted in uncertainty in the information being provided and the authors of this review being unsure on which report is the 'source of truth'. The Fichtner report is titled the Concept Design Report and could be expected to provide the basis of design for the EIS. However, the preferred technology provider Hitachi Zosen Inova (HZI) have provided reference data for the Environ Waste Management Report which at times is inconsistent with the Fichtner report. It would be reasonable to expect that a concept design would have been developed for the proposal that comprehensively and accurately defined the Facility and provided a consistent basis of design for the EIS.

The proposed technology provider is Hitachi Zosen Inova (HZI). Arup Pty Ltd recognise that HZI is a leading company in grate incineration technology, with reference facilities around the world treating MSW and C&I waste. However, the EIS and supporting documentation only outlines a possible concept for a facility and does not define the facility in sufficient detail to allow for a full adjudication to be made on whether the proposal is compliant with international best practice.

It is considered that insufficient data has been provided within the EIS and supporting documentation to a sufficient level of detail to allow a full technical assessment of the technology to be undertaken.

A full as possible assessment has been made of the Proposal against the requirements of the NSW EPA Energy from Waste Policy Statement based on the information provided in the EIS, Environ Waste Management Report and the Fichtner Concept Design Report. Possible suggested conditions for approval have been included where appropriate. Comments have also been made on the responses provided by the Proponent to the Terms of Reference Adequacy comments

Based on the merit assessment undertaken by Arup of the technical aspects of the EIS referring to the proposed technology and its compliance with the NSW Energy from Waste Policy Statement (2015), Arup would propose that the NSW EPA recommend that this application is not approved in its current form."

Based on the comments provided by Arup Pty Ltd, it is the EPA's view that the Proponent has not provided sufficient information about the technology proposed to be used and the feedstock in order to conduct a thorough assessment.

Therefore, the EPA cannot support the proposal in its current form.

H) Contaminated Sites Assessment

The EPA required the Proponent to assess the current levels of soil, water and groundwater contamination at the site to obtain a baseline and also to assess the potential for contamination from the Proposal. The EPA has identified some gaps that need to be addressed prior to construction activities commencing at the site. Additional detail is provided in Attachment B.

I) Water-related assessments

The EPA required the Proponent to provide details regarding the management of surface water and waste water at the proposed site and its potential impacts. The EPA reviewed the various assessments that discussed water management at the proposed facility and has provided comments in Attachment B.