**ATTACHMENT B – Environment Protection Authority – Air Quality and Ozone Impact Assessment**

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

**Feedstock**

The proposed Eastern Creek EfW Facility does not comply with all the reference facility requirements of the NSW Energy from Waste Policy Statement (the EfW Policy). This is due to the absence of a fully operational plant in a similar jurisdiction using the same technology and treating like waste streams. Ferrybridge (UK) is presented as the most comparable reference facility to the proposed EfW Facility. Whilst Ferrybridge is in a similar jurisdiction and use the same technology, the waste types proposed at Eastern Creek are not of similar sources to the Ferrybridge design fuel mix. Some uncertainty therefore remains regarding the actual performance of the proposed EfW Facility and the ability to achieve best practice emissions control. Ferrybridge would be a comparable reference facility for the proposed EfW Facility if the waste stream was restricted to 100% solid recovered fuel (SRF) of a similar source and composition to Ferrybridge.

**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 675,500 tonnes of waste per annum and generate up to 68.65 MW of electrical energy (MWe) for export to the National Grid. The optimum fuel throughput is 552,500 tonnes per annum when the fuel waste, on an annualised basis, has a net calorific value (NCV) of 12.3 MJ/kg.

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).

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 two combustion lines and associated boilers (a two 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. 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 a 100m twin flue standalone stack.

The original proposal for the facility was a two-stage development: streams 1 and 2 in stage 1 and streams 3 and 4 in stage 2. The facility would have a capacity to thermally treat up to 1.35 million tonnes of waste per annum and generate up to 137.3 MWe. Each stage would comprise of two combustion grates, two boiler systems housed in one building, and each boiler would have its own independent flue gas treatment system and connect to one turbine and one emission stack. Construction of the second stage was contingent upon the availability of suitable fuel and the satisfactory performance and compliance of stage 1.

The EPA has reviewed the submitted documents on numerous occasions. A timeline of the advice provided is below.

Original two stage proposal

- 2014: adequacy review of the draft air quality[1] and ozone[2] 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 (DOC14/245515-01).
- 2015: exhibited air quality impact assessment (AQIA)[3] 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[4] 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 reduce potential ozone impacts from the proposal (DOC15/289618).
- 2016: response to submissions on the exhibited Environmental Impact Statement (EIS), AQIA and ozone impact assessment[5, 6, 7] (the response to submissions) 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

[1] PEL (2014a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment The Next Generation, 8 September 2014
[2] PEL (2014b) Energy from Waste Facility – Ozone Impact Assessment The Next Generation, 20 June 2014
[3] PEL (2015a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment. The Next Generation, 26 March 2015
[4] PEL (2015b) Energy from Waste Facility – Ozone Assessment. The Next Generation, 14 April 2015
[5] Urbis (2015) Response to Agency and Company Submissions, November 2015
[6] PEL (2015d) RE: Response to Submissions: TNG Energy from Wast Facility, Eastern Creek, 27 October 2015
[7] Urbis (2016a) Response to Environmental Protection Agency (ARUP) Technology Assessment, 22 February 2016

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.

- December 2016/March 2017: proponent formally amended the application and submitted an amended EIS[8]. The project was amended to align with the Ramboll Project Definition Brief (PDB), which superseded the technology report initially prepared by Fichtner. This amended EIS also provided a response to the outstanding air quality issues. The EPA reviewed the amended EIS, AQIA[9] and ozone assessment[10] for the EfW Facility. Not all outstanding air quality issues identified in the review of the response to submissions were satisfactorily resolved (DOC17/187723).

Revised proposal of Stage 1 only

- December 2017: response to submissions on the amended EIS[11] which confirms that the application seeks approval for only Stage 1 construction and operation of the facility with an engineering capacity of between 405,000 and 675,500 tonnes per annum. Optimum expected throughput is 552,500 tonnes per annum. The construction and operation of Stage 2 of the facility would be the subject of a separate and future development application.

## REVIEW OF RESPONSE TO SUBMISSIONS ON AMENDED EIS AGAINST OUTSTANDING ISSUES

### ENERGY FROM WASTE POLICY TECHNICAL CRITERIA

### 1. Suitability of secondary combustion chamber 850°C minimum operating temperature.

**This issue is adequately addressed.**

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 second. 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.

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

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

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

[11] Urbis (2017) Response to Submissions Report SSD6236: Energy from Waste, Eastern Creek, 29 September 2017, Final

Throughout the review of all submitted documents, the EPA has raised that there is uncertainty regarding the suitability of a secondary combustion chamber temperature of 850$^{o}$C. This was due to the lack of information provided regarding the chlorine content of the waste and if it will be less than 1% at all times.

The amended EIS provided some further information to address this issue. Urbis (2016b) states that the 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 amended EIS RTS provides some further information regarding the chemical composition of the waste and the chlorine content. The proponent presents chloride content data which ranges from 0.06% to 0.6% and it is argued that this is a sufficiently low level to ensure 1% chloride content will not be reached. Arup (2018) concludes that the demonstrated chemical analysis combined with the proposed waste mixing in the bunker mean that chloride levels will likely remain below 1%.

## 2. Emissions not demonstrated for proposed EfW plant based on all operational reference facility requirements

**This issue has not been adequately addressed but can be resolved in any conditions of approval.**

The NSW Energy from Waste Policy Statement requires energy recovery facilities to:

*'…use technologies that are proven, well understood and capable of handling the expected variability and type of feedstock. This must be demonstrated through reference to fully operational plants using the same technologies and treating like waste streams in similar jurisdictions.'*

Comments have been provided throughout the review of the submitted documents that the proponent has not demonstrated there is a suitable reference facility in terms of throughput, technology and feedstock. The proponent therefore could not demonstrate that the proposed EfW Facility will meet the IED emission limits and achieve best practice emissions control.

Further information has been provided in the amended EIS RTS. Ferrybridge (UK) is selected as the reference facility for the proposal. Arup (2018) compares the fuel mix proposed for Eastern Creek to the permitted and operational waste streams at Ferrybridge. Arup (2018) concludes that Ferrybridge represents similar technology in a like jurisdiction, however, the waste types proposed in the Eastern Creek design fuel mix are not wholly comparable to the waste types making up the design fuel mix for the Ferrybridge facility. Arup (2018) identifies that the waste streams currently accepted at Ferrybridge are refuse derived fuel (RDF) and other wastes derived from the mechanical treatment of wastes which are most likely to be from a municipal solid waste (MSW) and construction and industrial (C&I) source. It can then be concluded that a like waste stream would be 100% Solid Recovered Fuel (SRF) of a similar source and composition to Ferrybridge.

To comply with the reference facility requirements of the EfW Policy, the proposed Eastern Creek EfW Facility should treat 100% SRF of a similar source and composition to Ferrybridge.

## AIR QUALITY IMPACT ASSESSMENT

### 1. Diesel Generators

**This issue has generally been resolved but conditions of approval are required to confirm performance and acceptability of impacts.**

During the review of the EIS, RTS and amended EIS, the following issues were raised regarding the diesel generators:

- lack of clarity 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 the 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*

The amended EIS clarified the proposed use of the two 2.4MWe diesel generators. This has been reconfirmed in the amended EIS RTS and is 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 amended EIS stated that gas is the preferred fuel for the furnace support burners and that the proponent is in discussions with private gas supplier Jemena Gas Networks. According to the amended EIS RTS the preferred fuel for the furnace support burners is fuel oil. The Protection of the Environment Operations (Clean Air) Regulation 2010 contains limits on the sulfur content of liquid fuel used to operate any fuel burning equipment. In Sydney, a person must not operate any fuel burning equipment with liquid fuel having a sulfur content of more than 0.5 percent by weight. It is appropriate that best practice is applied to all aspects of the facility, not just the energy from waste technology. It is therefore recommended that the only liquid fuel used on site is automotive diesel and that this requirement is included in any conditions of approval.

#### *Compliance with the Clean Air Regulation*

Previous information provided by the proponent has been contradictory regarding the expected performance of the emergency diesel generators. The performance specifications in Appendix H of the amended EIS AQIA (PEL, 2016a) 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 updated AQIA (PEL, 2017) acknowledges that the performance specification shows the anticipated particulate emissions from the diesel generators do not comply with the Clean Air Regulation limit of 50mg/$Nm^3$. As the modelling for the diesel generators was conducted at the Clean Air Regulation limit of 50mg/$Nm^3$, PEL (2017) proposes a statement of commitment requiring the final selection of diesel generators to meet or exceed the Clean Air Regulation limits.

***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 undertook 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.

The updated AQIA (PEL, 2017) provides further information regarding the benzene content of VOC emissions from the diesel generators. It is stated that the owner's engineer has confirmed that benzene compositions within the emergency diesel generators exhaust is anticipated to be well below 1%. It is also suggested that this can be confirmed during the commissioning stack testing and if this is not the case, the generators can be retrofitted with catalysts to further reduce in-stack benzene concentrations.

***Impact Assessment***

Comments to date have focussed on obtaining an assessment of the worst case scenario for the diesel generators. That is, the concurrent operation of the two diesel generators with the EfW plant. This represents the scenario of monthly testing of the generators which would be operating concurrently with the EfW facility.

The amended EIS AQIA (PEL, 2016a) presented the results for two diesel generators operating concurrently with the EfW facility. The predicted concentration at the most affected sensitive receptor due to the generators was added to the maximum predicted concentration at or beyond the site boundary (stacks). The results for CO, $PM_{10}$ and PM2.5 were 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. Compliance with the $NO_2$ impact assessment criteria, however, remained unclear as PEL (2016a) did not include a total $NO_2$ concentration.

The updated AQIA (PEL, 2017) includes a revised assessment of the diesel generators operating concurrently with the EfW facility. Compliance is predicted for all pollutants. It is, however, noted that the engines that have been referenced to estimate emissions are *'representative of the likely technology to be adopted'*. It would therefore be appropriate that the performance of the generators and their impacts are re-visited prior to procurement of the preferred technology.

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

**This issue has not been adequately addressed but can be resolved in any conditions of approval.**

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

Table 4.4 in the updated AQIA (PEL, 2017) has been revised to include all pollutants of concern for the project, except chlorine and sulfuric acid mist.

Chlorine and sulfuric acid mist are pollutants of concern for the proposed EfW facility and should have been included in Table 4-4. Further, both pollutants are regulated under the Clean Air Regulation and impacts should have been modelled.

The EPA expects emissions of chlorine and sulfuric acid mist from the project will be significantly lower than the relevant Clean Air Regulation emission limits. This is a result of the proposed pollution control equipment (acid gas scrubber) and the need to minimise emissions of some pollutants (e.g. sulfuric acid mist) to maintain the integrity of the pollution control equipment.

With a view of recommending an emission limit, the EPA reviewed the dispersion modelling results in the updated AQIA to determine predicted impacts of chlorine and sulfuric acid when emitting at the Clean Air Regulation emission limits. The maximum chlorine and sulfuric acid ground level concentration at and beyond the boundary would comply with the relevant 99.9$^{th}$ percentile impact assessment criteria.

## 3. Insufficient justification for the use of AERMOD

***This issue is adequately addressed.***

The AERMOD dispersion model was used to predict ambient concentrations of emitted pollutants from the proposed EfW Facility. An adequate justification for the choice of AERMOD for the assessment was not provided in the amended EIS AQIA (PEL, 2016a). Reference was made to validation exercises to confirm its satisfactory performance for both calm conditions and tall stack applications however the specific references were not provided. 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 updated AQIA (PEL, 2017) provides an adequate justification for the use of AERMOD for the assessment. The justification includes reference to the validation exercises, including those that demonstrated AERMOD has a tendency to over-predict across the range of model validation databases.

To address the issue of treatment of calm conditions by AERMOD, all wind speeds below 0.5m/s were treated at being 0.5m/s. This removed any potential for underprediction of ground level concentrations due to a compromised calculation of convective mixing height when calm conditions are present in the surface meteorological file.

## 4. Emission rates not determined in accordance with the Approved Methods

**This issue is adequately addressed.**

The amended EIS AQIA (PEL, 2016a) presented a variety of emission scenarios, none of which were 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 and throughput.

- **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.

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

The updated AQIA (PEL, 2017a) includes an additional scenario, Regulatory (IED Limits[13]), to reflect the expected on-going performance of the plant. As the EfW facility will be designed to achieve the IED limits (Ramboll, 2017), the EPA considers the Regulatory (IED Limits) scenario to appropriately reflect the expected on-going performance of the plant. This is, however, dependent on the plant achieving the IED limits for the proposed fuel composition and throughput.

Some uncertainty remains regarding the plants ability to achieve the IED Limits for the proposed fuel composition and throughput - as previously discussed in the section on the EfW Policy reference facility requirements above.

It is noted in Ramboll (2017) that the proponent intends to design and operate the plant in accordance with section 46.6 of the IED directive:

> *" …the waste incineration plant…shall under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limit values are exceeded. The cumulative duration of operation in such conditions over 1 year shall not exceed 60 hours."*

The EPA has previously advised the proponent that the emission limits are 100$^{th}$ percentile and neither the NSW Regulations or the Energy from Waste Policy contain provisions regarding acceptable number of hours emission limits can be exceeded. Previous air quality impact assessments and the most recent assessment acknowledge this to be the case.

## 5. Some inappropriate emission rates are used in the Regulatory (IED Limits) Scenario

**This issue has not been adequately addressed but can be resolved in any conditions of approval.**

[12] Ramboll (2017) The Next Generation NSW Pty Ltd Project Definition Brief, September 2017
[13] Industrial Emissions Directive reference.

The IED in-stack concentration limits have been adopted for Scenario 4. This is appropriate as the facility is designed and will be operated to achieve the IED emission limits.

The IED contains half hourly average and lower daily average emission limits. The assessment has assumed the half hourly average emission limits for those metrics with an impact assessment criterion of 1 hour average or less. For those metrics with an assessment criterion of greater than 1 hour average, the lower daily average IED limit has been adopted.

The averaging period for the emission limits in an Environment Protection Licence are as specified in the Clean Air Regulation and are typically a 1 hour average (except dioxins and furans). The emission limits therefore permit the licensee to continuously emit at that 1 hour average limit every hour of the year. There are no lower daily average emission limits in an EPL. The licensee therefore needs to demonstrate there is adequate protection of human health impacts when emitting continuously at the higher 1 hour average limit every hour of the year.

**6. Incremental and cumulative ground level concentrations not presented for all pollutants of concern (chlorine and sulfuric acid)**

**This issue has not been adequately addressed but can be resolved in any conditions of approval.**

As outlined above, Table 4.4 in the updated AQIA (PEL, 2017) has been revised to include all pollutants of concern for the project, except chlorine and sulfuric acid.

**7. Control of vapour phase metals**

**This issue has not been adequately addressed but can be resolved in any conditions of approval.**

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 recommended the proponent discuss how vapour phase metals will be controlled and provide manufacturers performance guarantees to demonstrate the control efficiency for vapour phase metals. Vapour phase metals are of concern given the proposed use of floc waste as a feedstock material.

The updated Project Definition Brief[14] provides further information regarding the control of volatile metals. It is stated that only mercury will remain gaseous in the flue gas even at lower temperatures in the boiler area. The other metals with a low evaporation temperature (cadmium and arsenic) will partly condensate at lower temperatures in the boiler area. The baghouse filter will remove all heavy metals except mercury as they are predominantly present as particulates in the air pollution control system. Mercury and any other traces of volatile heavy metals are adsorbed on the activated carbon and are thereby effectively removed from the flue gas.

[14] Ramboll (2017) The Next Generation NSW Pty Ltd Project Definition Brief, September 2017

Manufacturers performance guarantees were not provided by the proponent to demonstrate the control efficiency of the air pollution control system for volatile and semi-volatile metals. Ideally, this information should have been provided by the proponent, as requested, to support the claims regarding the expected performance of the air pollution control system regarding volatile and semi-volatile metals.

The amended EIS RTS provides some information regarding the composition of the floc waste to demonstrate it is not hazardous. Arup (2018) identifies that Ferrybridge is not permitted to accept floc waste of a similar composition and nature to what is being sought by the proponent. It is also concluded that floc waste is not an eligible waste under the EfW Policy and does not meet the resource recovery criteria for energy recovery facilities. Arup (2018) recommends Floc waste is removed from the design fuel mix for the proposed Eastern Creek EfW facility.

The EPA considers the control of volatile and semi-volatile metals for the proposed EfW Facility remains uncertain. The exclusion of potentially variable and hazardous waste, such as floc, from the feedstock material and a mercury emission limit with emission testing for total (particulate and vapour phase) emissions would adequately manage this uncertainty.

## 8. Assumption of 8000 hours

***This issue has been adequately addressed.***

The amended EIS (PEL, 2016a) stated that the assessment assumes the plant operates for 8000 hours per annum. It was unclear where this assumption had been applied in the assessment and how it affected the assessment results. The air quality impact assessment must assume the plant operates for 8760 hours per annum.

The EPA requested clarification regarding the assumption of 8000 operational hours per year and how this assumption has been used in the assessment. The amended EIS RTS (PEL, 2017a) confirms that for dispersion modelling purposes it has been assumed that the plant is operational for the entire year (8760 hours).

## AQIA CONSISTENCY ISSUES

***Increase in stack diameter in updated AQIA is to model the two adjacent stack ducts as one source***

The updated AQIA (amended EIS RTS) assumed a stack diameter of 3.1 metres compared with a stack diameter of 2.2 metres in the amended EIS AQIA and exhibited AQIA RTS assessments. An exit velocity of 21.7 m/s was assumed in all three assessments. Different stack parameters were assumed in the exhibited AQIA assessment as it was conducted prior to the completion of the final detailed plant design.

Increasing the stack diameter (as done in the updated AQIA) whilst retaining the designed exit velocity was used to represent the two adjacent stack ducts as one source in the dispersion model.

It is possible then that all previous AQIA's (which assumed a stack diameter of 2.2 metres to represent the two adjacent ducts which each have a diameter of 2.2 metres) have therefore incorrectly represented the two adjacent stack ducts as one source in the model. As a

consequence, a more concentrated plume was modelled and therefore the amended EIS AQIA, exhibited AQIA RTS and exhibited AQIA may have overpredicted ground level concentrations.

The updated AQIA may also overpredict ground level concentrations. It appears the enhancement of plume buoyancy due to the merging of the plumes from the adjacent stack ducts has not been accounted for in the modelling. The plume rise assessment[15] determines there is enhanced plume rise due to the merging of the plumes and calculates a buoyancy enhancement factor of 1.3.

### *Model set-up has changed which probably supports updated AQIA results being less than half of the October (2016) results*

It is expected that the predicted ground level concentrations in the updated AQIA are approximately 50% of the predicted ground level concentrations in the amended EIS AQIA due to the halving of plant capacity. The updated AQIA results are, however, less than half of the amended EIS AQIA results. This could be attributed to the following changes to the model set-up:

- Overestimate of predicted ground level concentrations in October (2016) due to possible error (i.e assuming stack diameter of 2.2 metres instead of a larger stack diameter) in representing in the model the two adjacent stack ducts (separated by a few metres) as one stack source.
- Increase in the resolution of the terrain data from 90m to 30m
- Replacement of all calm conditions in meteorological data file with a wind speed of 0.5m/s to resolve issue of potential underprediction of ground level impacts from tall stacks during calm conditions
- Geometric mean diameter of 1um instead of overly conservative diameter of 10um which affects the deposition of particle phase pollutants (dioxins/furans, PAHs and all metals).

## CONCLUSIONS

### *Proponent confirms seeking approval for Stage 1 only*

The Next Generation has prepared a Response to Submissions Report on the Amended EIS (the Amended EIS RTS) [16] for the proposed EfW Facility at Eastern Creek. The Amended EIS RTS includes an updated air quality impact assessment[17] and ozone assessment[18].

The Amended EIS RTS confirms that the application seeks approval for only Stage 1 construction and operation of the facility. Stage 1 would have an engineering capacity of between 405,000 and 675,500 tonnes per annum. Optimum expected throughput is 552,500 tonnes per annum. The construction and operation of Stage 2 of the facility would be the subject of a separate and future development application.

[15] Ramboll (2017) *Plume Rise Assessment Energy from Waste Facility*, Ramboll Environ, September 2017
[16] Urbis (2017) Response to Submissions Report SSD6236: Energy from Waste, Eastern Creek, 29 September 2017, Final
[17] PEL (2017a) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment, The Next Generation, 20 November 2017
[18] PEL (2017c) Energy from Waste Facility – Ozone Impact Assessment, The Next Generation, 13 September 2017

***Most recent air quality impact assessment conducted generally in accordance with the Approved Methods***

The updated AQIA has generally been conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (Approved Methods). The majority of the outstanding air quality issues identified in the review of the amended EIS have been satisfactorily resolved, as detailed above. The remaining outstanding air quality issues can be adequately managed via conditions.

***All air quality impact assessment results are generally consistent***

The EPA has reviewed the results of all previous AQIA's. This has involved comparing assumed emission concentrations and predicted ground level concentrations in the four AQIA's. Despite the issues with the previous AQIA's, the changes in the predicted ground level concentrations are generally consistent with any changes in the model set-up or assumed emission concentrations.

***Updated AQIA includes five emission scenarios***

A total of five emission scenarios were included in the updated AQIA:

- Scenario 1 - expected operation: based on maximum emissions from existing overseas reference facilities
- Scenario 2 – Regulatory (POEO limits): Protection of the Environment Operations (Clean Air) Regulation 2010 (the Clean Air Regulation) Group 6 emission limits
- Scenario 3 – upset: emissions 10 fold increase above either EU Industrial Emissions Directive (IED) limit or expected scenario emission concentration
- Scenario 4 – Regulatory (IED Limits): European Union IED emission limits for waste incineration
- Scenario 5 - diesel generators: concurrent operation of energy from waste plant and back up diesel generators.

***Scenarios include very conservative emission estimates for metals***

Scenario 1 adopts the maximum measured emissions of metals from either of the following:

- Operational data from similar plant with similar pollution control technology or
- UK Environment Agency (EA) 2012 and 2016 data on metals emissions from waste incineration.

Scenario 1 has generally adopted the UK EA 2016 metals emissions data. It should be noted that the assumed nickel emission concentration in Scenario 1 of 0.22mg/Nm$^3$ is referred to by the UK EA as an outlier[19]. The second highest recorded nickel concentration is also referred to by the UK EA as an outlier. The third highest nickel concentration is 0.053mg/Nm$^3$, which is implied by the UK EA to be a reasonable worst case nickel emission concentration. It should be noted, however, that the reason for being an outlier is not provided.

Scenario 2 and Scenario 4 very conservatively assumes all Type 1 and Type 2 substances and metals individually comprise 100% of the Clean Air Regulation Group 6 limit or IED limit rather than in aggregate.

[19] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/532474/LIT_7349.pdf

### *AQIA generally predicts compliance with the EPA's impact assessment criterion*

The updated AQIA predicts compliance with the EPA's impact assessment criterion for all pollutants for Scenario 1 (expected) and Scenario 4 (IED Limits).

Compliance is predicted for all pollutants in Scenario 2 (Clean Air Regulation) except beryllium. It is noted that a beryllium emission concentration of 1mg/Nm$^3$ was assumed in Scenario 2 which is the Group 6 emission limit for all Type 1 and Type 2 substances in aggregate. In Scenario 1, where the maximum measured beryllium emission concentration was assumed, the predicted ground level concentration is 0.02% of the impact assessment criterion.

Cadmium is the only pollutant to exceed the EPA's impact assessment criterion in Scenario 3 (upset). Cadmium emissions in the upset scenario are approximately 10 times the IED limit.

The predicted ground level concentrations of most metals in Scenario 2 and Scenario 4 are a considerable proportion of the EPA's impact assessment criteria due to the very conservative assumption of metal emissions individually at the aggregate limit.

### *Scenario 4 (IED Limits) is the most appropriate emissions scenario to assess the EfW plant performance and air quality impacts*

The proposed EfW Facility is designed to achieve the best practice IED emission limits[20]. Scenario 4 is therefore the most appropriate scenario to assess the performance of the plant and the predicted air quality impacts.

### *Ability to achieve the best practice IED Limits (Scenario 4) remains uncertain*

The proposed Eastern Creek EfW Facility does not comply with all the reference facility requirements of the NSW Energy from Waste Policy Statement (the EfW Policy). This is due to the absence of a fully operational plant in a similar jurisdiction using the same technology and treating like waste streams. Ferrybridge (UK) is presented as the most comparable reference facility to the proposed EfW Facility. Whilst Ferrybridge is in a similar jurisdiction and use the same technology, the waste types proposed at Eastern Creek are not of similar sources to the Ferrybridge design fuel mix. [7]. Some uncertainty therefore remains regarding the actual performance of the proposed EfW Facility and the ability to achieve best practice emissions control.

### *Compliance with EfW Policy reference facility requirements could be achieved with project modifications*

The EPA and Planning jointly engaged Arup as independent experts to provide advice on the projects compliance with the EfW Policy. Arup (2018)[21] identifies that the waste streams currently accepted at Ferrybridge[22] are refuse derived fuel (RDF) and other wastes derived from the mechanical treatment of wastes which are most likely to be from a municipal solid waste (MSW) and construction and industrial (C&I) source. Ferrybridge would be a comparable reference facility for the proposed EfW Facility if the waste stream was restricted to 100% solid recovered fuel (SRF) of a similar source and composition to Ferrybridge.

### *Adverse air quality impacts are unlikely if project is modified to comply with the reference facility requirements of the EfW Policy*

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[20] Ramboll (2017) The Next Generation NSW Pty Ltd Project Definition Brief, September 2017

[21] Arup (2018) NSW Environment Protection Authority and NSW Department of Planning and Environment, *Eastern Creek The Next Generation Energy from Waste Facility, Response to submissions merit review,* 7 March 2018

[22] Based on waste returns for 2016

The proponent has provided stack monitoring data from Ferrybridge which demonstrates the facility can comply with the best practice IED emission limits. The updated AQIA demonstrates acceptable air quality impacts when achieving the best practice IED emission limits. Compliance with the EPA's impact assessment criterion is predicted for all pollutants for Scenario 4 (IED Limits), including metals which are very conservatively assumed to individually emit at the aggregate limit. It can therefore be concluded that a project, modified as recommended in Arup (2018) to comply with the EfW Policy, is unlikely to result in adverse air quality impacts.

***Proposed EfW Facility will not significantly increase ozone concentrations***

A Level 1 screening assessment[23] of the revised proposal showed contribution to maximum ozone concentrations of less than the significant impact level of 0.5ppb. This is due to a revised proposal seeking approval for stage 1 only and deployment of optimised SNCR to reduce $NO_X$ emissions to 120mg/$Nm^3$. Adoption of optimised SNCR to reduce NOx emissions meets the Procedure's[8] requirement to consider best available technology (BAT) for this proposal. The proponent concludes emission offsets within the Sydney Basin are impractical.

***Conditions of approval can address all outstanding air quality issues***

The resolution of the outstanding air quality issues via conditions will not compromise the air quality performance of the proposal. Should approval be granted for the proposed EfW Facility, it is recommended that conditions are included to manage air quality issues and address the outstanding air quality issues. These can be provided to DPE if required. It is recommended that the EPA review any draft conditions of project approval prior to the proposal being determined.

[23] In accordance with the requirements set out in the EPA's *'Tiered Procedure for Estimating Ground-Level Ozone Impacts from Stationary Sources'*