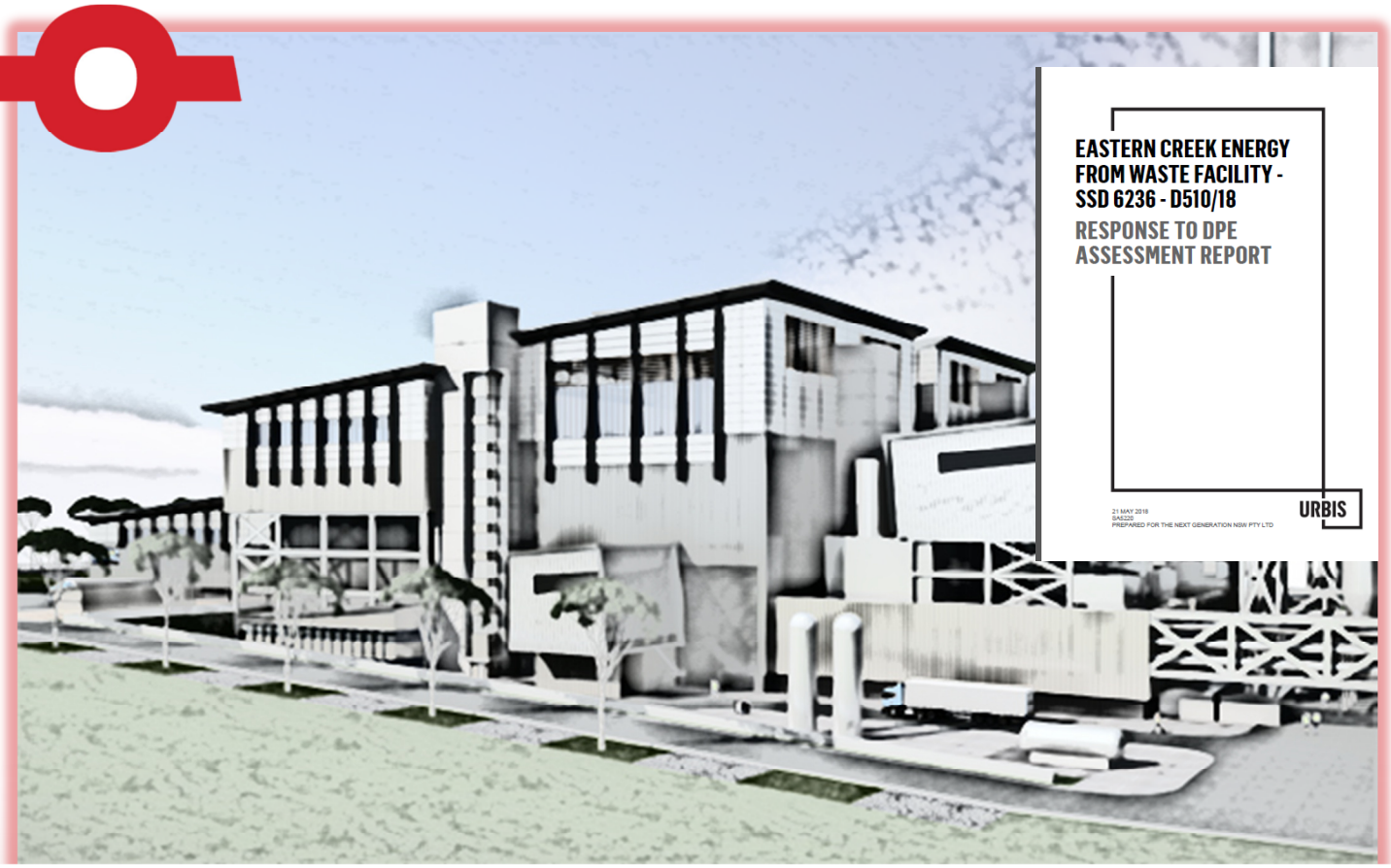
07/06/2018

RESPONSE TO URBIS SUBMISSION TO THE IPC - RISK ANALYSIS ISSUES



THE NEXT GENERATION

RESPONSE TO URBIS SUBMISSION TO THE IPC

IDENTIFICATION TABLE	
Client/Project owner	Jacfin
Project	NextGen Proposal - WtE Facility
Study	Response to URBIS Submission to the IPC
Type of document	FINAL Rev 1
Date	07/06/2018
File name	
Framework	
Reference number	LG20180606
Confidentiality	
Language	English
Number of pages	37

APPROVAL						
Version	**Name**		**Position**	**Date**	**Signature**	**Modifications**
Final Rev 0	Leonard Gawecki		Author	07/06/2018		
	Simon Meiers		Reviewer	07/06/2018		
	Howard Lister		Approved	07/06/2018		

Executive Summary

Background

Next Generation Pty Ltd (NextGen) proposes to establish a new waste to energy (WtE) facility (SSD6236) at Eastern Creek, in Sydney's western suburbs. Next Gen has engaged URBIS to prepare the "Response to the NSW DPE Assessment Report" in response to the Department of Planning and Environments' Assessment report.

NSW DP&E Assessment report

The Department of Planning and Environment (the Department) released its Assessment Report in April 2018 in respect of the proposed Next Generation Energy from Waste (EfW) Facility at Eastern Creek (the Report). The Report recommends that the proposed EfW facility not be approved.

SSL was previously engaged by Jacfin to review the original development application, the amended Environmental Impact Statement, the Response to Submissions Report and the Department's Assessment Report.

SSL understands that the NextGen proposal has now been referred to the Independent Planning Commission (IPC) for determination and that in addition to Jacfin's submission to the IPC, it is willing to accept supplementary comments from Jacfin in response to the Next Gen's Response to the Department's Assessment Report.

SSL now has been engaged to undertake a review of NextGen's Response and advise whether any statements are incorrect, or misconstrue or misrepresent the conclusions in the Department's Assessment Report.

SSL has only been provided with five working days, excluding the due date for comments by Jacfin, to provide comments in respect of this review.

Urbis Report

Urbis Pty Ltd, on behalf of NextGen, has prepared a response to the NSW DPE Assessment Report and submissions to the IPC.

Jacfin have engaged SYSTRA Scott Lister (SSL) to undertake a review of the Urbis Report, and advise whether there are any conclusions in the Urbis Report that SSL considers are

incorrect or which misconstrue or misrepresent the conclusions in the Departments Assessment Report.

Review Findings

The review of the Urbis report (dated 21 May 2018) by SSL finds that a number of key risk issues have been omitted, and as such need to be documented and presented to the IPC. These key risk issues are summarised as follows;

Hard Stand Areas

1. Insufficient information on the use of large hardstand areas has been provided by the proponent (NextGen) and URBIS in the latest report, such areas have been traditionally used to store and sort solid waste by other WtE facilities worldwide, and indeed in Australia.

2. Such large areas, and waste stores have a significant fire risk, and URBIS is silent on the long-term use of such hardstand areas.

Waste Fire Scenarios

3. In respect of large stockpiles of waste, there exists a significant fire risk, and an even greater health risk, as demonstrated by the recent waste fire incident at a recycling plant at Coolaroo on the outskirts of Melbourne.

4. Further, no modelling of solid waste fires and downwind effects has been undertaken by the proponent, nor Urbis, nor the NSW DPE – such fires have caused significant community concern and in some cases evacuation of nearby residents, as in the case of the Coolaroo fire incident that occurred in Melbourne in 2017, where over 115 residents were evacuated, and 5 people treated for smoke inhalation, and many people reported breathing difficulties). The fire burned for 3 days. See https://www.youtube.com/watch?v=94p6BfEgdzs – for video footage.

   In addition to waste fires from hardstand areas, there are also potential fires from the waste bunker, interim storage areas, and the trucks themselves. Again, no detailed fire risk analysis has been undertaken by the proponent, nor URBIS, nor or by the NSW DPE to address these important issues.

Preliminary Quantitative Risk results

5. The preliminary risk modelling demonstrates that the boundary risk levels exceed the NSW DPE individual risk criteria of 50 in a million per annum, which, is a basis for rejection of the NextGen proposal. Further the facility is deemed hazardous industry

as risk levels exceed the NSW DPE risk criteria for industrial land uses (Reference 1) of 50 in a million per year.

Land Use Zoning

6. The proposed use is inconsistent with the current Zoning IN1 – General Industrial which prohibits hazardous industries.

No Level 3 Quantitative Risk Assessment provided

7. The NSW DPE has not requested that NextGen prepare a level 3 – detailed Risk Assessment study of the waste facility, nor has URBIS provided any detailed fire risk assessment. Such a L3 QRA study should cover a detailed analysis of potential waste storage on large hardstand areas, dangerous goods stored, waste process upsets, potential waste fires and downwind effects etc. Indeed, both individual and societal risk results should be quantitatively assessed for the proposal. URBIS have also not responded in relation to boundary risk levels, nor have conducted any risk assessment to address this critical land use planning criteria.

These key risk issues are presented in detail in this submission report to the IPC.

Conclusions

SSL concurs with the Department's findings that the proposal should not be approved for the reasons annunciated in their Assessment Report (SSD 6236). This position remains the same, and URBIS has not provided in its report any further information that changes the conclusion that the development should not be approved.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

A development application has been made by The Next Generation Pty Ltd (NextGen) to establish a new waste to energy (WtE) facility at Eastern Creek, in Sydney's western suburbs. The application has been assessed by the NSW Department of Planning and Environment (NSW DPE) as State Significant Development.

Surrounding landowners, including Jacfin have raised their objection to the siting of the NextGen facility in western Sydney.

Systra Scott Lister (SSL) was previously engaged by Jacfin to review the original development application, the amended Environmental Impact Statement, the Response to Submissions Report and the Department's Assessment Report.

SSL understands that the proposal has now been referred to the IPC for determination and that in addition to Jacfin's submission to the IPC; it is willing to accept supplementary comments from Jacfin in response to the Next Gen's Response to the Department's Assessment Report.

SSL now has been engaged to undertake a review of the Next Gen's Response and advise whether any statements are incorrect, or misconstrue or misrepresent the conclusions in the Department's Assessment Report.

In that regard SSL addresses the URBIS Report (Dated 21 May 2018) and submits its review report for consideration by the IPC.

SSL would also like the IPC to note that SSL has only been provided with five working days, excluding the due date for comments by Jacfin, to provide comments in respect of this review.

2. DESIGN CHANGES TO HARD STAND AREAS

The URBIS Report does not address or provide sufficient information on risk from hard stand areas.

The amended development application submitted by The Next Generation Pty Ltd (NextGen) split the proposal into 2 stages and inferred that the Stage 1 proposal, which is the only stage for which consent is currently sought, was safer and processed less waste. However, this led to an increase in the hard stand areas of the site. This increase in area and the potential for storage of waste, and hence solid waste fires, has detrimental implications for fire and health risk.

2.1 Stage 1

In Stage 1, NextGen propose to reduce waste processing to 550,000 tpa of waste.

Stage 1 includes only 1 process train, comprising 1 x waste boiler, 1 x steam turbine and 1 x Air Cooled Condenser (ACC) as shown in Figure 1. This layout also shows the changes to the hard stand areas. (See also Appendix A for site layout details).

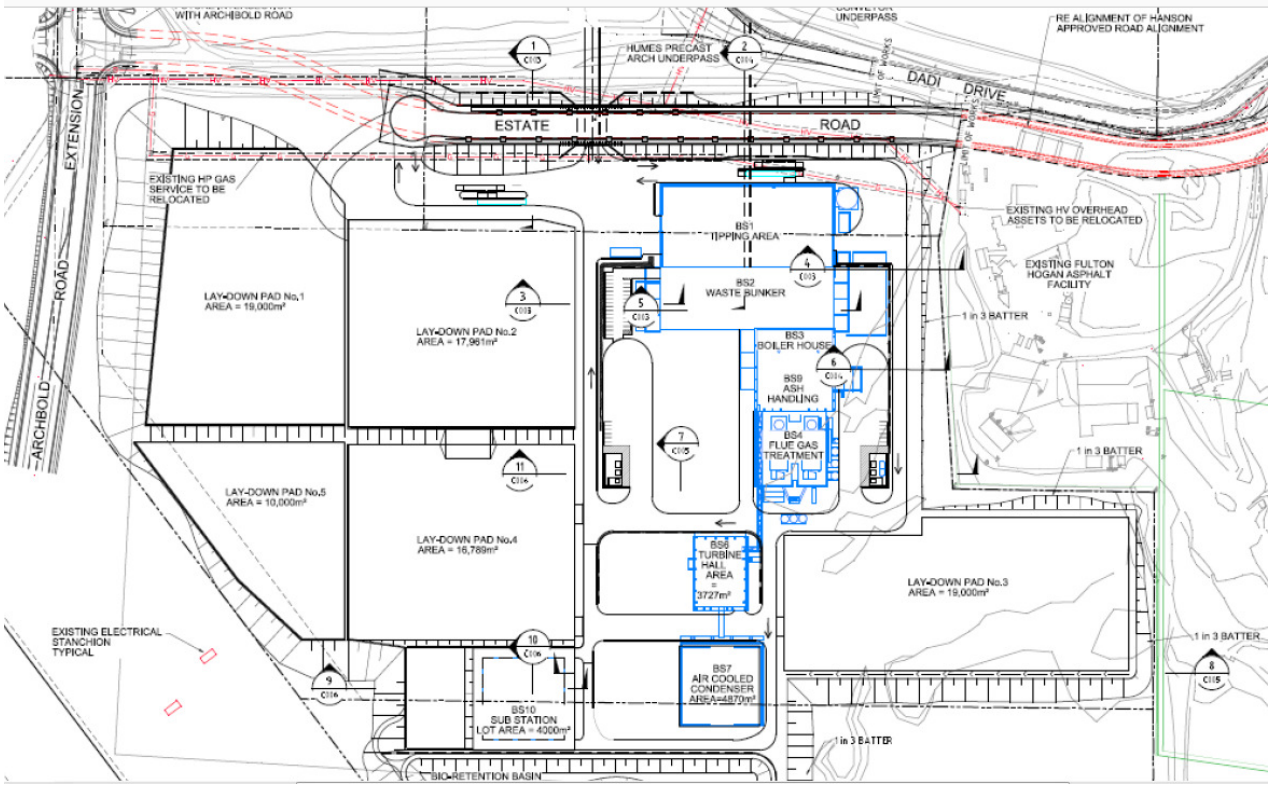


Figure 1 – Amended Layout – Stage 1

A second WtE process train will be added in Stage 2, subject to a separate development application. These changes are summarised in Table 1.

Plant Item	Original Proposal	Stage 1	Stage 2
WtE Process Train, includes 1 x Waste boiler, 1 x steam turbine, and 1 x Air-cooled condenser	2 WtE process Trains	1 WtE process train to process 552,000 tpa	1 WtE process train
# Laydown Areas	3	5	TBA
Laydown Area (m2)	77,514	82,750	TBA

Table 1 – Changes to Application.

A review of the report by URBIS has not identified any additional information on whether there will be changes to the chemicals used, or dangerous goods stored/processed on site. In that regard SSL has assumed that the chemicals stored or used on-site in processing waste remain unchanged. In that regard the original SSL PHA has provided the consequences and risk implications of these chemical and dangerous goods. Further, SSL submit that the risk findings and conclusions remain the same as the original SSL PHA, except that in some circumstances the risks have actually worsened as a result of the amended application. These instances are set out below.

Research conducted by SSL of existing waste recycling stations in Australia and the UK has shown that significantly large hard-stand areas are required for storage and sorting of waste at these centres. In this regard NextGen have altered the number and location of these hardstand areas in their final proposal, from 3 laydown areas (with an effective area of 77,514 m2) to 5 laydown areas, with an increase in area to 82,750 m2, and by increasing the number and size of these hardstand areas have increased the fire risk (should waste be stored and sorted on these hardstand areas in future). The fire heat flux from these hardstand areas is computed in Section 4 – Consequence Analysis of this risk review, and the risk implications in Section 7 – Risk Findings and Results and demonstrates that the NSW DPE risk criteria will be exceeded at the NextGen site boundary.

In this regard the URBIS Report does not quantitatively assess the fire risks from waste handling and storage on-site and is also silent on the boundary fire heat flux levels, and the boundary risk levels. These boundary risk levels are critical in any planning decision, and hence SSL submit that without a proper and thorough Level 3 Risk Analysis, that approval cannot be given, and that the IPC must reject the NextGen proposal on risk grounds also.

3. METHODOLOGY USED FOR RISK ASSESSMENT

3.1 Multi-Level Risk Assessment Approach

The NSW Department of Planning Multi Level Risk Assessment (Reference 1) approach was used for this revised risk review study by SSL. The approach considered the development in context of its location and its technical and safety management controls set out in the amended RtS and in the PHA prepared by RawRisk.

In the original PHA SSL found that a L3 QRA was required. This is also the case for the amended application.

In this regard the URBIS report has focused on health risk assessment and has not included any detailed risk assessment of the waste storages, dangerous goods, and waste handling activities, and hence is deficient in these aspects.

These incident scenarios are further discussed in the following section, Section 4 for the benefit of the IPC.

4. CONSEQUENCE ANALYSIS

4.1 Incidents Carried Forward for Consequence Analysis

The hazard analysis conducted in Section 3 of the original PHA by SSL (Ref 12) identified several hazards that have the potential to impact adjacent offsite areas. Those incidents carried forward for consequence analysis are:

- Diesel Bund Fire
- PAC silo explosion
- Waste fires in truck, waste bunker, and the 5 laydown areas shown in Appendix A.

A summary of each incident, including assessment results, was presented in the original PHA, and with the changes to design in the amended application, we now highlight the implications of these changes, and the failings of the URBIS report.

4.2 Solid waste fires for amended application

There are 2 aspects of the waste fires that need to be modelled to gauge the risk impacts to the surrounding land uses and populations as required by the NSW DPE, and these include:

1. The heat flux at the boundary, and

2. The effects of the combustion products dispersing downwind under “cold – fire conditions”, i.e. a smouldering fire, where combustion is incomplete and smoke combustion products will include NOx, SOx, HCl, COCL2 (phosgene) as well as CO, H20 and CO2.

Urbis has not considered or commented on the effects of toxic combustion products downwind, and indeed the toxicant effects present a potentially greater risk than heat flux and could have potential wide-ranging risk implications for populations located in the greater Sydney air-shed. The Sydney air-shed is defined by its boundaries: the higher ground to the north, the mountains to the west and south and the onshore winds at the coast. The air of Sydney’s air-shed may also be held within these boundaries under inversion layer conditions. The effect of this is to trap air pollution, which may recirculate for several days before it is dispersed.

The proponent has also not considered the hard stand areas in the original or amended applications.

It is noted that in the context of the operation of such waste handling and recycling plants worldwide it is reasonable to consider that these areas will be used for waste storage and sorting operations. Solid waste fires are postulated for each hardstand area now proposed by the proponent, as summarised in Table 2a for the amended design.

Using the average design fuel load of 12.3 MJ / kg for the waste solids and assuming a waste density of between 100 - 150 kg / m3 (taken as 100 kg / m3 for simplicity), and a stack height of 2m, this gives the equivalent mass of waste that may be combusted in a waste fire for each area, as shown in Table 2a. For modelling assumptions see Note 2.

Waste location #	Area (m2)	Volume (m3)	MT
Laydown Area 1	19000	38000	3800
Laydown Area 2	17961	35922	3600
Laydown Area 3	19000	38000	3800
Laydown Area 4	16789	33578	3358
Laydown Area 5	10000	20000	2000
Total	82750	165500	16558

Table 2a – Waste Storage – Hard Stand Areas under amended proposal

Notes to Table 2a:

Note 1: The current limit for waste storage at a waste recycling centre in NSW, according to the NSW EPA is 1000 MT or 1000m3, and would have the effect of reducing the site storage capacity from 15510 - 16558 MT to 1000 MT. However, this still represents a large stockpile of waste on site.

Note 2: As SAFETI does not model solid fires, a surrogate is used. In this case Vinyl Chloride. The burning characteristics of solid waste and Vinyl Chloride are provided in the Table 2b below;

Characteristic	Solid Waste	Vinyl Chloride
Heat of Combustion (Hc)	12.3 MJ/ kg	11.8 MJ /kg
Laminar Burn Rate m/s	0.1 – 0.5	0.52
Surface flux	30 - 50 kW/m2	170 kw /m2

Table 2b – Burning Characteristics

Whilst the Heat of Combustion are similar for both solid waste and vinyl chloride the radiant heat fluxes are markedly different, and to compensate we have dropped the radiant heat fraction from 0.4 for hydrocarbon fires to 0.25 for sooty or smouldering flames, and the surface flux from 170kw/m2 to 85 kW/m2 to align better with the heat flux and radiant heat fraction for large waste fires.

The average design fuel load of the waste stream is assumed to be 12.3 MJ / kg. (Source: Project definition Brief, Rambol, 2016, and as given in the EIS of November 2016, Table 4.4.4, and Figure 25 - Design fuel: Typical Profile)

All other data is sourced from NFPA – Fire Protection Handbook, or from the SAFETI Materials database.

The heat flux versus distance results for each hardstand area is presented in Table 3; distances are computed from the flame centre (centre of the hardstand area). Cases where hardstand areas adjoin are included as a combined area also. Hence, the worst case solid waste fire scenario could involve hardstand areas 1, 2, 4 and 5, as these areas share common boundaries.

Summary Input Data for heat flux at distance computations, using the inverse square method is provided in Appendix B. The solid waste fire flame flux (q1) is taken as 40kW/m2, to reflect an oxygen starved waste fire, and the average of 30 – 50 kW/m2 quoted in Ref 11.

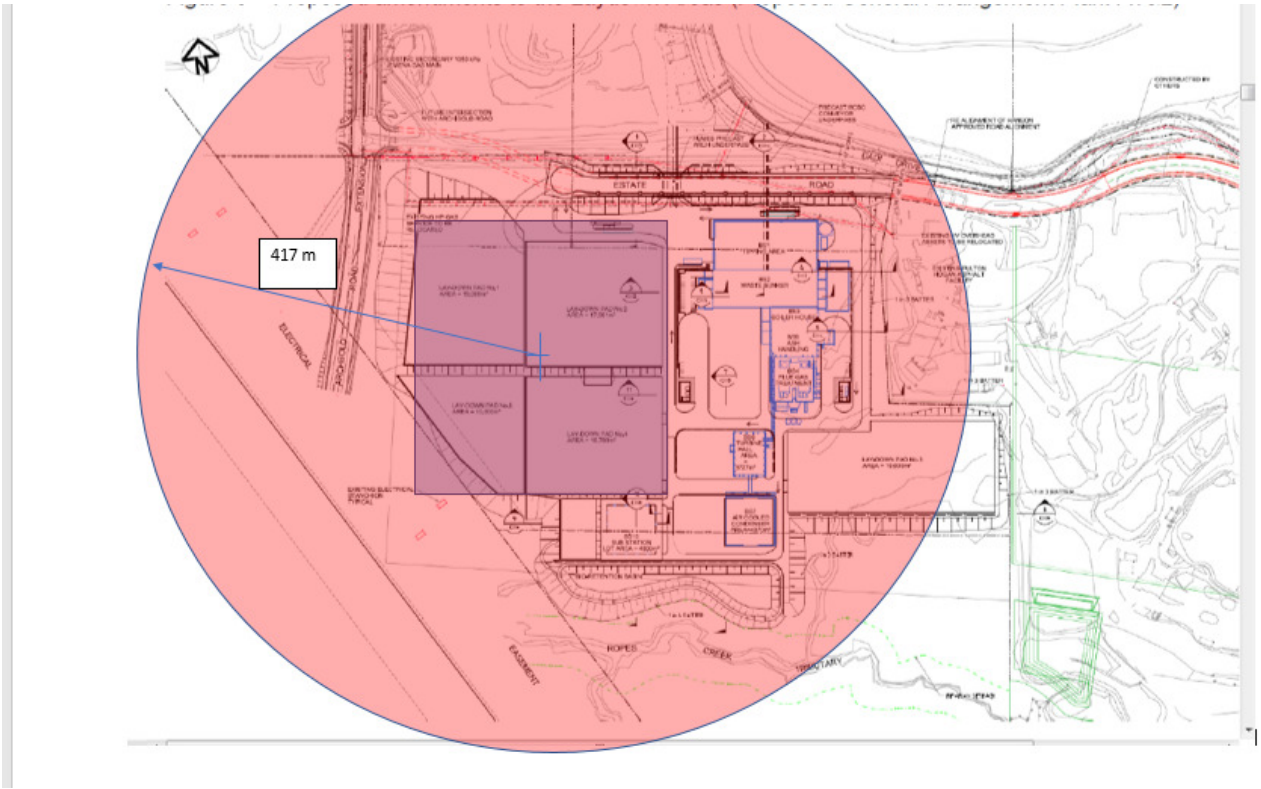
Waste location #	Area (m2)	Equ Dia (m)	Heat flux 35kw/m2	Heat flux 25kw/m2	Heat flux 12kw/m2	Heat flux 5kw/m2
Laydown Area 1	19000	156	83	100	139	228
Laydown Area 2	17961	151	81	96	135	220
Laydown Area 3	19000	156	83	100	139	228
Laydown Area 4	16789	146	78	93	130	214
Laydown Area 5	10000	113	61	72	101	165
Area 1+2+4+5	63750	285	153	181	255	417

Table 3 – Waste Storage – Hard Stand Areas

The heat flux contours for 5 kw/m2 are shown graphically in Figure 2.

As depicted in Table 3, the maximum distance to heat flux levels of 5kW/m2 is 417m, meaning that this heat flux level extends beyond the boundary of the site. This issue was not considered by URBIS in their response to the IPC, and hence the report is deficient and the proposal by NextGen should be rejected on the grounds of insufficient consideration of waste fires, and boundary risk levels.

Figure 2 –Distance to heat flux – 5 kW/m2



4.3 Downwind dispersion of toxic smoke

In addition to the heat flux impacts of a major solids fire, the downwind dispersion of toxic smoke may present a significant inhalation risk to surrounding populations.

Potential waste fires can emanate from the following;

1. B- Double Truck on fire
2. Waste bunker on fire
3. Fire in Waste storage stockpiled on hard stand areas.

In this respect a waste fire analysis and risk assessment needs to be conducted, covering the scenarios abovementioned. URBIS did not undertake this for any of the 3 fire sources listed above, and URBIS did not consider this deficiency in its response report.

The waste fire risk analysis report should clearly cover a detailed risk methodology, all assumptions and tabulate the release rate of all toxicants. Dispersion modelling should be conducted using validated software such as TNO Risk Curves, SAFETI or similar.

The results need to be expressed in individual risk, toxicant load, and societal risk plots and be analysed against the NSW DPE HIPAP 4 – Risk Criteria for Land Use Safety Planning (2011).

A detailed waste fire and risk report should have been prepared and submitted by URBIS for assessment. This was necessary to confirm that the level of risk is acceptable or unacceptable and has not been done.

As SSL has demonstrated there exists a significant fire risk, and an even greater health risk associated with the proposed facility.

We refer also to the recent Coolaroo Fire in Melbourne (Figure 3 and Reference 9) which demonstrates the risks of a large solid waste recycling fire scenario. The effects of which included;

- over 115 residents were evacuated,

- 5 people treated for smoke inhalation (and many people reported breathing difficulties).

The fire burned for 3 days.

More significantly no modelling of solid waste fires and downwind effects has been undertaken by the proponent or by URBIS in its response – such fires have caused significant community concern and in some cases evacuation of nearby residents (as in the case of the Coolaroo fire incident - Melbourne 2017).

Figure 3 – Coolaroo Waste recycling facility – Fire Incident May 2017

5. FREQUENCY ANALYSIS

5.1 Failure Rates for Equipment Failures

Generalised Probability/Frequency data is given in Table 4 – Generalised Frequency Data for the waste fire events. The data is generally expressed on a per annum basis. The reference sources for all data used in this study, is also given in the table.

Event	Item	Failure Frequency	Name /Reference #
Waste Stockpile fires (small)	Stockpile	1 / yr / site or stockpile Note 1.	Ref 4, 5.
Waste Stockpile fires (large)	Stockpile	0.04 / yr /site or stockpile	Ref 4, 5.

TABLE 4 - GENERALISED FREQUENCY DATA

The above failure rates for equipment items are provided to illustrate their reliability and facilitate the QRA. URBIS has not considered the probability of such solid waste fires in their assessment.

Notes to Table 4

Note 1. The number of waste recycling sites in the UK is estimated at 260 (HWRC sites) + private and other operators. For simplicity assume 300 sites (Ref 4). Based on 300 fire incidents in recycling centres per annum this gives frequency for small fires of 1 /annum per site. Of these fire services are called to attend larger fires approximately 1 / month or 12 times a year, giving a large fire incident rate per site of around 12/ 300 = 0.04. (Ref 5).

If we take the view that fire-fighting intervention is successful in 95 % of cases, then this leaves the failure frequency of an uncontrolled and large waste fire at around 0.04 x 0.05 = 0.002 or 2 x 10-3 per annum.

6. RISK ASSESSMENT CRITERIA

6.1 NSW Risk Criteria for Hazardous Industries

Urbis has not undertaken any risk assessment in its response, addressing;

- Individual risk, or
- Societal risk,

nor whether such risks, are acceptable when viewed against the NSW DPE risk criteria for land use safety.

Individual Risk

The following risk assessment criteria are used by the NSW DPE and planning authorities for the assessment of the safety of location of a proposed development of a potentially hazardous nature, or the land use planning in the vicinity of existing hazardous installations.

Land Use	NSW DPE Criteria (risk in a million per person per year)	Legend for Appendix C
Hospitals, school, and sensitive land uses	0.5	5E-7
Residential areas, including hotels and tourist resorts	1	1E-6
Commercial Developments, including retail centres and offices	5	5E-6
Sorting complexes and open space	10	1E-5
Industrial development	50	5E-5

Table 5 – Individual Risk Criteria

Where:

(a) Hospitals, schools, child-care facilities, and old age housing development should not be exposed to individual fatality risk levels in excess of half in one million per year (0.5 x 10-6 per year).

(b) Residential developments and places of continuous occupancy, such as hotels and tourist resorts, should not be exposed to individual fatality risk levels in excess of one in a million per year (1 x 10-6 per year).

(c) Commercial developments, including offices, retail centres, warehouses with showrooms, restaurants, and entertainment centres, should not be exposed to individual fatality risk levels in excess of five in a million per year (5 x 10-6 per year). And noting that commercial redevelopment of the sites adjacent to the site proposed for the WtE facility may infer that the risk boundary level be dropped to 5 from 50 in a million per person per year.

(d) Sporting complexes and active open space areas should not be exposed to individual fatality risk levels in excess of ten in a million per year (10 x 10-6 per year).

(e) Individual fatality risk levels for industrial sites at levels of 50 in a million per year (50 x 10-6 per year) should, as a target, be contained within the boundaries of the site where applicable.

Table 5 summarises the risk criteria for the various categories of land use.

6.2 Injury & Irritation Criteria

Relying entirely upon fatality risk criteria may not account for the following factors:

- Society is concerned about risk of injury as well as risk of death.
- Fatality risk levels may not entirely reflect variations in people's vulnerability to risk or irritation.

Some people may be affected at a lower level of hazard exposure than others. It is therefore appropriate that risk criteria also be set in terms of injury, i.e. in terms of levels of effects that may cause injury to people but will not necessarily cause fatality. The suggested injury risk criteria from HIPAP 10 of the NSW DPE are:

- Incident heat flux radiation at residential and sensitive use areas should not exceed 4.7 kW/m2 at a frequency of more than 50 chances in a million per year.
- Incident explosion overpressure at residential and sensitive use areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year.

- Toxic concentrations in residential and sensitive use areas should not exceed a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure at a maximum frequency of 10 in a million per year.

- Toxic concentrations in residential and sensitive use areas should not cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year.

The most relevant issue here is the toxic smoke that would emanate from a solid waste fire on the site. Such an event would result in toxic smoke drifting downwind for great distances (in some cases many kilometres) and impacting surrounding communities, including adjacent landowners, and indeed residential and sensitive land uses within the Sydney Airshed. At present the applicant, NextGen is silent on these aspects, and nor has URBIS provided any assessment of such events in their response.

6.3 Societal Risk

Developing criteria on tolerability of risks for hazards giving rise to societal concerns is difficult. Hazards giving rise to such concerns often involve a wide range of events with a range of possible outcomes. The summing or integration of such risks, or their mutual comparison, may call for the attribution of weighting factors for which, at present, no generally agreed values exist as, for example, the death of a child as opposed to an elderly person, dying from a dreaded cause, e.g., cancer, or the fear of affecting future generations in an irreversible way.

Nevertheless, the NSW DPE has provisionally adopted indicative criteria as shown in Figure 4 for addressing societal concerns arising when there is a risk of multiple fatalities occurring in one event. These were developed through the use of so-called FN-curves (obtained by plotting the frequency at which such events might kill N or more people, against N). The technique provides a useful means of comparing the impact profiles of man-made accidents with the equivalent profiles for natural disasters with which society has to live. The suggested criteria take into account the fact that society is particularly vulnerable to accidents, which though infrequent, have a potential to create multiple fatalities. The indicative societal risk criteria reflect these areas as three societal risk bands: negligible, As Low as Reasonably Practicable (ALARP) and intolerable.

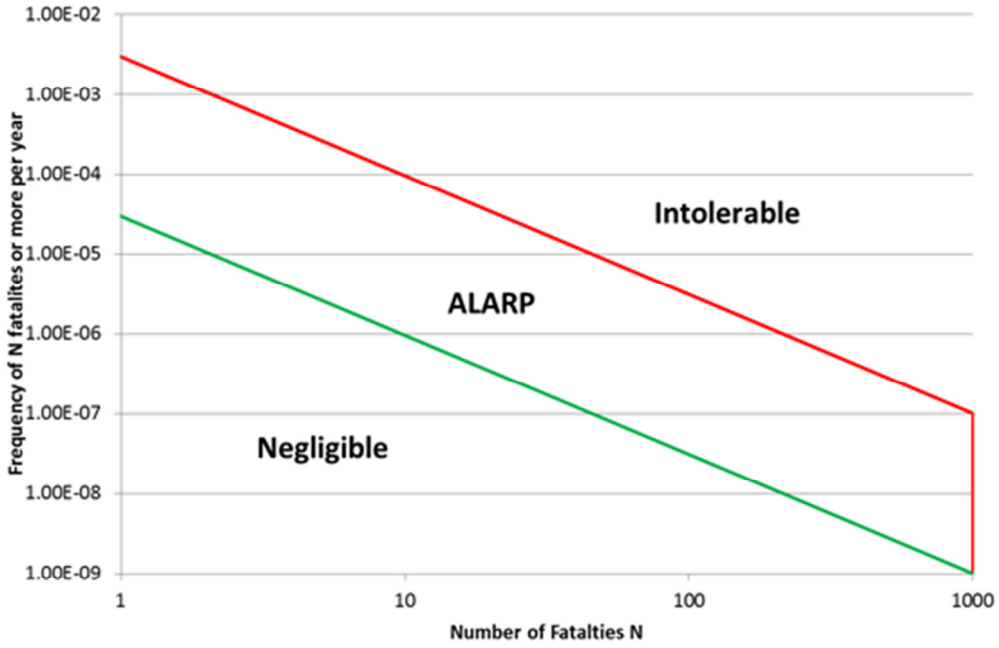


Figure 4 – Societal Risk Criteria

Below the negligible line, provided other individual criteria are met, societal risk is not considered significant. Above the intolerable level, an activity is considered unacceptable, even if individual risk criteria are met. Within the ALARP region, the emphasis is on reducing risks as far as possible towards the negligible line. Provided other quantitative and qualitative criteria of HIPAP 4 are met, the risks from the activity would be considered tolerable in the ALARP region. However, it is not possible to assess the WtE facility's compliance with the NSW DPE's societal risk criteria in the absence of an appropriate waste fire analysis and risk assessment.

Neither the applicant (NextGen), nor URBIS have demonstrated that the societal risks from waste fire events, such as truck fire, bunker fire or hardstand area fires pose acceptable societal risks to surrounding populations. Again, URBIS has also not provided its own quantitative assessment of such fire events or identified the lack of such assessment by the applicant as a deficiency in the application.

6.4 Relevant Criteria

In summary, this report and submission by SSL quantifies individual risk according to the NSW DPE risk criteria for the hardstand areas proposed by NextGen.

Injury and irritation criteria have also been considered, and for the reasons enunciated in Section 7 – Risk results, and Section 8 - Conclusions, require further investigation before the proposal can be properly assessed by the IPC.

7. QUANTITATIVE RISK ANALYSIS FINDINGS

SSL has completed a Level 3 Risk Analysis, and the individual risks have been cumulatively combined to demonstrate that the boundary risk levels exceed the relevant NSW DPE risk criteria of 50 in a million per person per year.

Individual Fatality Risk

The individual risk contour for the NextGen site is depicted in Appendix C. The boundary risks are driven by the high likelihood of a solids waste fire on the laydown areas, and resultant heat flux.

While the land is currently zoned IN1 Industrial, many of the adjoining sites have commercial activities, including offices and retail areas. As such it could be argued that the boundary risk levels adopted should be 5 in a million per annum (for commercial development), and not 50 in a million per year to reflect the changing land use demographics. This would result in even greater risk level exceedances than those described earlier.

These individual risk results do not include the dispersion effects of toxic combustion products that would emanate from such fires, and their short – term inhalation and injury effects on the surrounding industrial, commercial, and residential areas. As stated in the original PHA, this aspect requires further study and quantification.

Land Use	NSW DPE Criteria (risk in a million per person per year)	Findings / Comments
Industrial development	50	Risk levels exceeded at the boundary of the NextGen Site and Fulton Hogan sites.

Table 6 – Individual Fatality Risk Results

Injury Risk

NSW DPE Injury Criteria	Findings / Comments
Toxic concentrations in residential and sensitive use areas should not exceed a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure at a maximum frequency of 10 in a million per year.	Noting that the irritation or injury effects of waste fire and the dispersion of toxic combustion products may extend several kilometres, then this aspect must be considered to quantify the downwind exposure. This has not been assessed nor has a waste fire analysis and risk assessment study been undertaken.
Toxic concentrations in residential and sensitive use areas should not cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year.	

Table 7 – Injury Risk Results

Land Use Zoning

Based on the risk results computed by SSL the NextGen proposal can be considered potentially hazardous development.

As such, the proposed use in inconsistent with the current Zoning IN1 – General Industrial which prohibits hazardous industries.

The NSW DPE has not undertaken its own detailed risk assessment study, nor did it require a Level 3 risk assessment from the applicant. URBIS has not addressed the fact that this detailed risk assessment has been undertaken.

SSL would argue that the findings are also significant issues of concern, and also consider these issues to be critical to the rejection of the proposal.

Summary of SSL Risk Results and Findings

1. **Individual Fatality Risk -** Risks from the NextGen proposal exceed the NSW DPE criteria for industrial development of 50 in a million per annum, as shown in the Individual risk contour plot (Appendix D). As such, the proposal may be rejected on risk grounds alone. URBIS have not addressed this issue in their response report.

2. **Injury Risk – Toxicity -** The proposed development may not be capable of meeting the injury risk criteria for toxicity. The main reason for this is that the waste stockpiles are a feature of all waste recycling facilities, and to suggest that the large laydown areas shown in the NextGen site plan will not be used as such is illogical. Hence modelling of waste stockpile fires is required for completeness, and again the response by URBIS is silent on these matters.

Potential fire sources to be modelled include waste trucks, the waste bunker, and the hard stand areas. This aspect has not been covered in any of the applicants' assessments, and for that reason the URBIS Report is deficient, as it remains silent on these deficiencies.

The two main consequence effects that are required to be modelled for all such waste stockpile fires, include the following;

1. The heat radiation effects at distance, and
2. The downwind dispersion of toxic combustion products and their effects on the downwind populations in term of injury risk criteria.

8. SSL RESPONSE TO RISK COMMENTS RAISED BY URBIS

SSL provides a response to remarks made by URBIS in the context of acute risk issues;

These issues are presented and responded to in this section;

URBIS report, Section 2.1 (Page 6)

> The proposal represents the most efficient use of an available resource with no increase in the risk of harm to human health or the environment.

Response:

SSL has demonstrated that the NextGen proposal exceeds the NSW DPE criteria for individual risk at the boundary (see Appendix D of this report) and that the potential for waste to be stored in these hard stand areas represent a significant fire and health risk – so the phrase "no increase in risk of harm to human health or the environment "is unsubstantiated by the proponent and URBIS – in the context of individual and societal risk.

URBIS, and the proponent, is silent on potential solid waste fires, fires from waste storage and handling, waste truck fires, fires within the waste bunker area and potentially from hard stand areas. To date, the proponent and URBIS have provided no information on the assessment of effects of such fires, or the control measures to contain such fires should they occur.

9. CONCLUSIONS AND RECOMMENDATIONS

Jacfin has engaged Systra Scott Lister to undertake a review of the URBIS response report (dated 21 May, 2018) and advise whether there are any conclusions that SSL considers to be incorrect or misconstrues or misrepresents the conclusions in the DPE Assessment Report. This review by SSL addresses these inaccuracies or shortcomings and submits its findings for consideration by the IPC.

The risk review also summarises the Quantitative Risk Assessment findings computed by SSL. SSL have utilised advanced QRA computer models available to SYSTRA Scott Lister, namely SAFETI V7.2.1, to determine boundary risk levels.

SSL also finds that preliminary risk modelling indicates that the boundary risk levels exceed the NSW DPE individual risk criteria of 50 in a million per annum. This in itself is a basis for rejection of the proposal but was not considered by URBIS in its response report.

Summary Findings

The findings from this review are tabulated below.

#	Issue or deficiency not covered by URBIS	SSL Finding / Action required
1	Given the location, nature of proposal, and risks a Level 3 – Quantitative Risk Analysis is justified and has not been undertaken. Further, there are numerous risk issues that are still to be addressed, for e.g. the downwind dispersion of toxic combustion products from waste storage fires and their effects	Level 3 QRA justified, and no details provided by the proponent or by URBIS
2	Modelling of consequences has not been done using validated computer risk software (e.g., SAFETI or TNO Effects) nor has RawRisk undertaken a full quantification of risk events.	Risk quantification of all events required.

3	The activity is defined as a potentially offensive industry. If the necessary pollution licences or permits cannot be obtained the activity may be offensive industry, and therefore is a prohibited use in the current zoning (Zone INI). Further, URBIS has not considered whether the necessary licences can be obtained.	NextGen Stage 1 proposal (current application) appears to be an offensive industry. Urbis Report deficient on this issue.
4	SSLs Level 3 QRA finds that the boundary risk levels are above the NSW DPE risk criteria for Industrial Land of 50 in a million per year, and by definition the WtE facility is to be considered hazardous. Further, hazardous industrial development is prohibited in or on land zoned IN1. URBIS have not undertaken a L3 risk analysis.	The revised Level 3 QRA finds that the boundary risk levels are above the NSW DPE risk criteria for Industrial Land of 50 in a million per year, and by definition the proposed WtE facility (Stage 1) is to be considered hazardous. Further, hazardous industrial development is prohibited in or on land zoned IN1. Urbis Report deficient on this issue.
5	URBIS has not undertaken a sensitivity analysis for the largest consequence scenarios – such as the PAC silo dust explosion.	Urbis Report deficient on this issue.
6	URBIS has not undertaken a HAZOP or rigorous HAZID for the WtE facility – this may generate further hazardous issues, or risks, that need to be considered.	Urbis Report deficient on this issue.
7	Escalation issues are not considered in by URBIS. Escalation refers to an incident causing a cascade of incidents. A good example of this is dust explosions leading to further dust explosions, and/or fire. Often the primary dust explosion is small but leads to a second much larger and fiercer explosion.	Urbis Report deficient on this issue.

8	The issue of a major fire in the waste bunker is covered, but not in the lay down areas which I am instructed to assume may be used for waste storage. The risk of a major fire is significant, as we saw in recent waste fires at Chullora in Sydney (22 Feb 2017), Albury in NSW (11 March 2017), and in Bristol, UK (11 July 2017) and most recently in Coolaroo, Victoria which burned for more than 2 days (Reference 9) and required downwind lock-down by residents around the Melbourne CBD area. This aspect requires further consideration, and quantification.	Site hardstand areas present a significant waste stockpile fire risk. The proponent nor URBIS has not assessed the impacts of such fires.
9	Site hardstand areas total 82,000 m2.	Site hardstand areas present a significant waste stockpile fire risk. The proponent nor URBIS has not assessed the impacts of such fires.

Summary of Issues not covered by URBIS in their response to the NSW DPE Assessment Report that need to be considered by the IPC, include;

Hard Stand Areas

1. Insufficient information on the future use of large hardstand areas has been provided by the proponent (NextGen) or provided in URBISs' report, such areas have been traditionally used to store and sort solid waste by other WtE facilities worldwide, and indeed in Australia.

2. Such large areas, and waste stores have a significant fire and health risk, and the applicant is silent on the long-term use of such hardstand areas.

Waste Fire Scenarios

3. In respect of large stockpiles of waste, there exists a significant fire risk, and an even greater health risk, as demonstrated by the recent waste fire incident at a recycling plant at Coolaroo on the outskirts of Melbourne.

4. Further, no modelling of solid waste fires and downwind effects has been undertaken by the proponent, nor URBIS, nor the NSW DPE – such fires have caused significant community concern and in some cases evacuation of nearby residents (as in the case of the Coolaroo fire incident in Melbourne in 2017, where over 115 residents were evacuated, and 5 people treated for smoke inhalation, and many people reported breathing difficulties). The fire burned for 3 days. See https://www.youtube.com/watch?v=94p6BfEqdzs – for video footage.

   In addition to waste fires from hardstand areas, there exists the potential for fires from the waste bunker, interim storage areas, and the trucks themselves. Again, no detailed fire risk analysis has been undertaken by the proponent, URBIS or by the NSW DPE to address these important issues, and the NSW DPE has not acknowledged the deficiency in the proponents' application in its assessment report. I stress again that the IPC cannot approve this facility without the results of a detailed fire risk assessment study.

Preliminary Quantitative Risk results

5. The preliminary risk modelling demonstrates that the boundary risk levels exceed the NSW DPE individual risk criteria of 50 in a million per annum, which, is a basis for rejection of the NextGen proposal. Further the facility is deemed hazardous industry as risk levels exceed the NSW DPE risk criteria for industrial development.

Land Use Zoning

6. The proposed use is inconsistent with the current Zoning IN1 – General Industrial which prohibits hazardous industries.

No Level 3 Quantitative Risk Assessment provided

7. URBIS has not prepared a level 3 – detailed Risk Assessment study of the waste facility. Such a L3 QRA study should cover a detailed analysis of potential waste storage on large hardstand areas, dangerous goods stored, waste process upsets, potential waste fires and downwind effects etc. Indeed, both individual and societal risk results should be quantitatively assessed for the proposal.

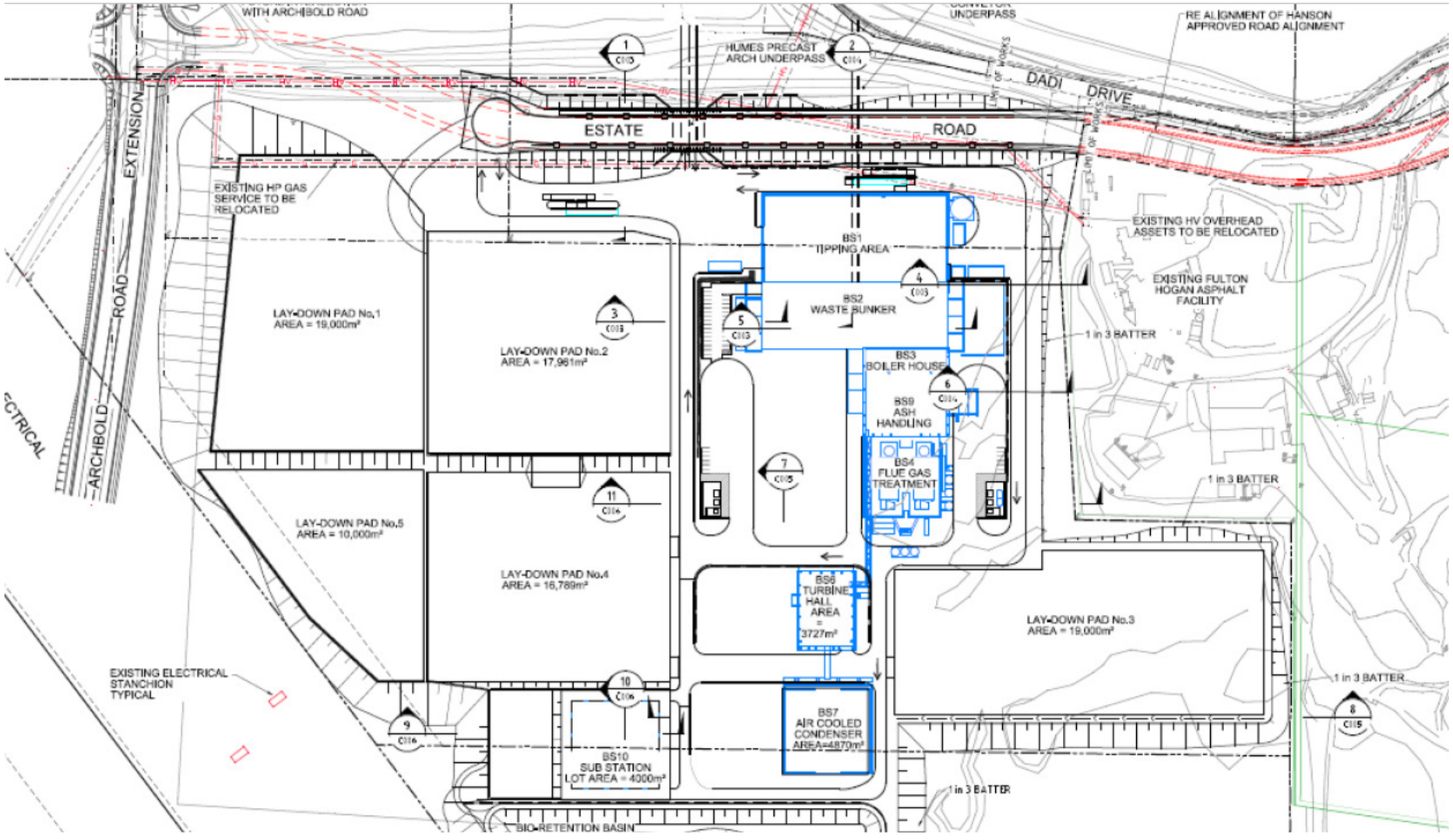
SSL concurs with the NSW DPE findings that the proposal should not be approved for the reasons outlined in the NSW DPE report and the additional reasons identified in this report, and submit these findings for the consideration of the IPC.

Again the URBIS report is silent on these important risk issues and their implications, which should have been addressed by the applicant. On that basis, the application for development should not be approved.

10. REFERENCES

1. URBIS Pty Ltd – Eastern Creek Energy from Waste facility – SSD 6263 – D510/18. Response to DPE Assessment Report. URBIS report # SA5220, dated 21 May 2018
2. Hazardous Industry Planning Advisory Papers Nos 1 through 10 – Guidelines for Hazard Analysis, Department of Planning, NSW.
3. State Environmental Planning Policy No.33 – Hazardous and Offensive Development Application Guidelines (2011), "Applying SEPP 33", Department of Planning NSW.
4. Multi-Level Risk Assessment, Department of Infrastructure, Planning and Natural Resources – May 2011.
5. National Household Waste Recycling Centres (UK) Annual report, 2017
6. The Guardian UK – article of 6th July , 2017 - refer link - https://www.theguardian.com/sustainable-business/2017/jul/06/troubling-fire-record-uk-recycling-plants
7. Frequency of Dust Explosion in Grain Storage, Vol63, No 13 TECNICAMOLITORIA10064 PINEROLO, ITALY.
8. ADG 7, Australian Dangerous Goods Code
9. Preliminary Hazard Analysis & Fire Risk Assessment "Report, The Next Generation, Honeycomb Drive, Eastern Creek. RawRisk Engineering Pty Ltd, dated 20 March 2017.
10. Coolaroo Waste Station Fire - YouTube video of the fire can be found at https://www.youtube.com/watch?v=LQL2f4XBA5A&t=318s , and details of the incident at http://www.heraldsun.com.au/news/victoria/factory-fire-at-skm-recycling-plant-in-coolaroo/news-story/9426d70b0a2ea9defc232ded4d3c4452
11. Methods for the calculation of Physical Effects Due to releases of hazardous materials (liquids and gases), TNO, the Netherlands, PGS-2, 1997
12. NFPA – Fire Protection Handbook.
13. Risk Review Report, "The Next Generation WtE facility", Systra Scott Lister, report Number LG20170803. - - Final Rev 1, dated 3rd August 2017
14. AARLEG- AARLEG -38847862 v1 WtE Facility – Submission

APPENDIX A –SITE LAYOUT PLAN – SHOWING 1 PROCESS TRAINS



APPENDIX B – HEAT FLUX COMPUTATIONS – SHOWING WORST CASE SCENARIO

POOL FIRE CALCULATIONS

Program Functions

1. For a given set of heat fluxes received, calculates the distance from the flame centre to the receiver.
2. Calculates the heat flux received at a given distance from the flame.

Calculation Methods

1. Inverse Square and API methods
   - They can be used to calculate the direct distance from the flame centre to the receiver r2 (m)
   - They do not allow for atentuation effects
2. View Factor ICI method
   - This can be used to calculate the horizontal distance from the flame centre to receiver R (m)
   - Includes correlations for effect of atentuation** (in the form of transmissivity T) of the base of the pool and the receiver
   - If R < 30m, then atentuation is negligible & T = 1 (This gives a conservative estimate of the heat radiated)
   - If 30m <= R <= 200m, then the Lihou & Maund correlation (depends only on R) is used
   - If R > 200m, go to inputs of % relative humidity & the ambient temperature to account for the effect of water vapour

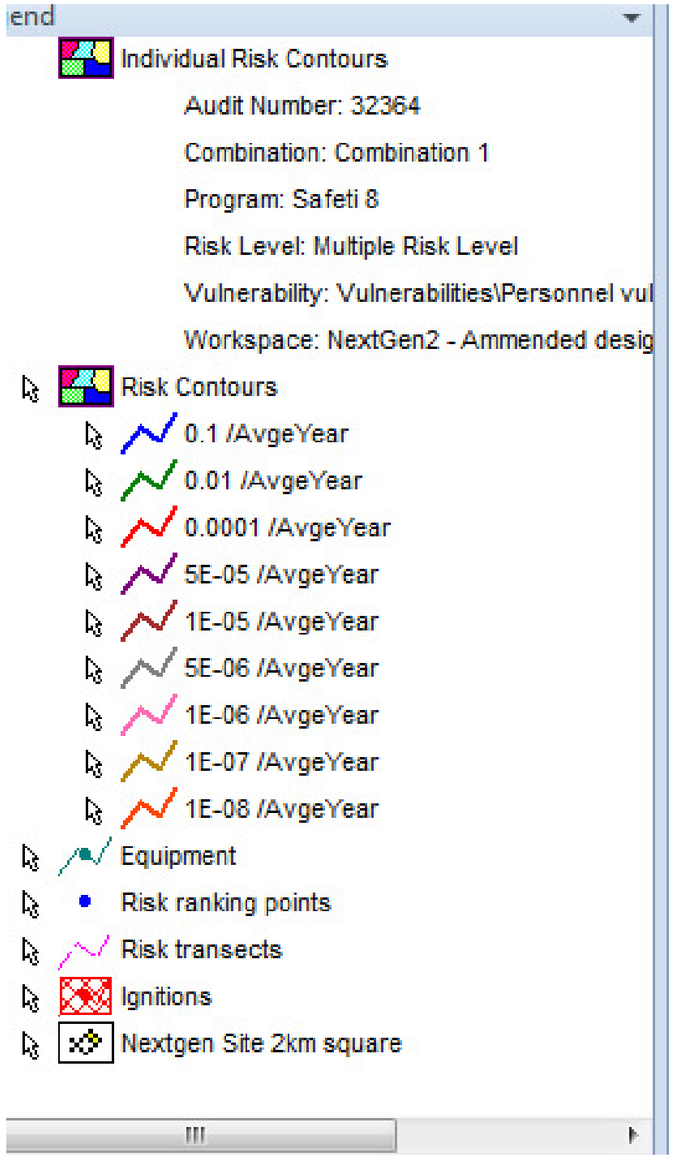
**NOTE: If attentuation is significant, the distance R can be recalculated in the spreadsheet by replacing the initial values of T (cells I42-I45) by those of T(cells G42-G45)

Assumption	Bund Area	Equivalent D	
Flame height = 2 times the pool diameter	63750	284.97	
Calculations			
Calculation of the surface flux q1 from the pool fire (kW/m^2)			
Pool diameter (D)	285	m	
Burning rate of fuel (r)	80	mm/min	
Fuel density (p)	100	kg/m^3	
Proportion of heat radiated to surrounds (n)	0.2		
Heat of combustion of fuel (Hc)	12.3	MJ/kg	
Heat radiated per unit area of flame (q1)	**41**	**kW/m^2**	
Calculation of water vapour partial pressure Pw			
% relative humidity	75		
Ambient temperature	25	deg C	
Water vapour partial pressure Pw	**2361.72**		

DISTANCE FROM THE FLAME TO HEAT FLUX q2 AT THE RECEIVER

Flux q2 (kW/m^2)	Direct distance to q2		Horizontal distance to q2		Initial T values	View Factor f	R/x1	Slope a	Y-intercept b	Mean Dist
	API	Inverse Square	ICI View Factor	Calculated Attenuation						
40	204.03	144.27	103.69	0.93	1	0.9756	0.7277	-1.2297	-0.1805	150.66
35	218.12	154.23	115.59	0.92	1	0.8537	0.8111	-1.2297	-0.1805	162.65
30	235.59	166.59	131.02	0.91	1	0.7317	0.9195	-1.2297	-0.1805	177.74
25	258.08	182.49	151.96	0.90	1	0.6098	1.0664	-1.2297	-0.1805	197.51
20	288.54	204.03	182.20	0.88	1	0.4878	1.2786	-1.2297	-0.1805	224.92
12.6	363.53	257.05	265.29	0.61	1	0.3073	1.8617	-1.2297	-0.1805	295.29
4.7	595.21	420.88	586.55	0.57	1	0.1146	4.1161	-1.6005	0.0428	534.21
2	912.45	645.20	999.33	0.54	1	0.0488	7.0128	-2.117	0.479	852.32

APPENDIX C – INDIVIDUAL RISK CONTOUR PLOT



APPENDIX D – INDIVIDUAL RISK CONTOUR PLOT – 50 X 10-6 PA