

Ordinary Council Meeting

Notice of Meeting

4 July 2017

6.00pm

Council Chamber

Level 9

Council House

27 St Georges Terrace, Perth WA

6000



City of Perth

Agenda

ORDER OF BUSINESS AND INDEX

- 1 Prayer
- 2 Declaration of Opening
- 3 Apologies
- 4 Question Time for the Public

4.1 - Questions taken on Notice at the Council Meeting held 6 June 2017

The following questions were taken on notice at the meeting held **6 June 2017** and the response provided is outlined below:

Questions from Mr Neill Alexandre for The Council of Owners of Panorama Luxury Apartments, in relation to the (TRIM 115557/17).

Question 1:	Can the Council explain why the residents of Perth, and in particular those close to the Hyatt development, were not given the chance to address the Design Advisory Committee (DAC)?
Answer:	The purpose of the Design Advisory Committee is to provide independent technical advice and recommendations to the Council in respect to applications requesting Bonus Plot Ratio and design issues on other applications referred to it for consideration. The Design Advisory Committee does not make any decisions or determinations in respect of any development applications. These meetings are closed to the public and it is not included as part of the Design Advisory Committee Terms of Reference to consider objections and submissions by third parties. Applicants are afforded the opportunity to make a 10 minute presentation and answer questions, however they are not present during the Design Advisory Committee deliberation and formulating its advice.
Question 2:	Can the Council advise how the Design Advisory Committee can make an informed decision with only limited facts from the party proposing the development?
Answer:	For each application the Design Advisory Committee members receive copies of the plans and a report prepared by the City's Officers that sets out key information relevant to the Design Advisory Committee's terms of reference. In addition to any presentation given by the applicant, the City's Officers also provide an introduction to the proposal and raise issues for the Design

	Advisory Committee consideration. City Officers are also able to respond to any questions asked by the Design Advisory Committee throughout the meeting. This enables the Design Advisory Committee to come to an informed position and to then provide advice on each application. The Design Advisory Committee's does not make any decisions.
Question 3:	Can the Council advise why the Design Advisory Committee has included comments beyond their Terms of Reference, thus influencing the Council's report?
Answer:	In regard to the proposed additions and alterations to the Hyatt Hotel site, the Design Advisory Committee confined its advice to matters relating to the awarding of bonus plot ratio and the design of the additions and therefore, their advice is considered to be in accordance with the Design Advisory Committee's Terms of Reference.
Question 4:	Can the Council please advise why there has not been an independent report on: <ul style="list-style-type: none"> a. Traffic on Terrace Road? b. Pedestrian dangers posed by extra entrances and loading docks? c. Noise issues in a residential area? d. The vast non-conformance with the Terrace Road Design Policy? e. Reflection, heat, noise and light issues from the structure?
Answer:	It is the role of the City's Officers to provide specialist professional and objective assessments of these matters rather than seeking other independent reports. Regarding both a and b the City's traffic experts have provided comments and advice that has been incorporated into the Officers report to the Local Development Assessment Panel. Noise impacts have been addressed in the report and is the subject of conditions within the Officer's recommendation, noting that the development and the proposed uses are required to comply with the Noise Regulations. In regard to compliance with the Terrace Road Design Policy, the report to the Local Development Assessment Panel addresses non-compliance issues with this and all relevant policies and scheme provisions. In regard to reflection, heat and light issues, comments by the Design Advisory Committee and the City Architect have been taken into account and the BCA and Health provisions will be applied to any approval in the building permit process.
Question 5:	Can the Council please confirm that the Council's report to Local Development Assessment Panel will include an evidence based balanced evaluation of the interests of the developer compared with the interests of the neighbouring ratepayers with regards to the terms of the Terrace Road Design Policy?
Answer:	The purpose of the Local Development Assessment Panel report is to make a reasonable and objective planning assessment of the application. In preparing the report and when determining the application both the City's Officers and the Local Development Assessment Panel are required to have regard for the matters set out in clause 67 of the Deemed Provisions, including:- <ul style="list-style-type: none"> • the aims and provisions of the Scheme and the statement of intent set out in the relevant precinct plan; • the requirements of orderly and proper planning;

	<ul style="list-style-type: none"> • any local planning policy for the Scheme area; • the compatibility of the development with its setting including the relationship of the development to development on adjoining land and the likely effect of the height, bulk, scale, orientation and appearance of the development; • the adequacy of the proposed means of access to and egress from the site; and arrangements for the loading, unloading, manoeuvring and parking of vehicles; • the amount of traffic likely to be generated by the development, particularly in relation to the probable effect on traffic flow and safety; • any submissions received on the application; and • the comments or submissions received from any authority.
Question 6:	Can the Council advise how they intend to protect the value of the assets of the growing number of apartment owners in the CBD if the design policies intended to protect the quality of the apartments is going to be ignored?
Answer:	The consideration of any application aims to ensure an outcome which is consistent with the orderly and proper planning of the locality and the conservation of the amenities of the locality. Furthermore the Council's discretion to vary any development standard can only be enacted if the Council is satisfied that any approval would not have any undue adverse effect on the occupiers or users of the development; the property in, or inhabitants of, the locality; or the likely future development of the locality.

Questions from Mr Albert Thurgood, 15/110 Mounts Bay Road, West Perth WA 6000 (TRIM 117580/17).

Questions:	<p>In her written statement dated 9/05/17 the Lord Mayor mentions in essence that; despite other colleagues and Councillors having made breaches of the Local Government Act the focus remains solely on herself.</p> <ol style="list-style-type: none"> 1. Can she elaborate on who those other councillors are who have fallen short of the declaration requirements? 2. Or are they willing to own up to their inadvertent wrong doings?
Answer:	The Lord Mayor advised that comments would not be made on behalf of other Elected Members and that it is appropriate to await the necessary determinations related to this matter prior to making any further comment.

- 5 Members on Leave of Absence and Application for Leave of Absence
Deputy Lord Mayor Cr Limnios (leave of absence)
- 6 Confirmation of minutes – **Ordinary Council Meeting – 6 June 2017**
– **Special Council Meeting – 28 June 2017**
- 7 Announcements by the Lord Mayor
- 8 Disclosure of Members' interests
- 9 Questions by Members of which due notice has been given
- 10 Correspondence
- 11 Petitions

In accordance with Section 5.23(2) of the *Local Government Act 1995*, the meeting will be required to be closed to the public prior to discussion of the following:

Item No.	Item Title	Reason
Confidential Item 13.13 and Attachments 134E and F	Energy from Waste Tender Consideration	s5.23(2)(e)(ii)
Confidential Item 13.14 and Attachment 13.14B	Confidential Item - Appointment of Designated Senior Employee - Director Economic Development and Activation	s5.23(2)(b)
Confidential Item – 13.15 and Attachment 13.15B	Appointment of Designated Senior Employee - Director Planning and Development	s5.23(2)(b)
Confidential Item – 13.16 and Attachment 13.16A	Confirmation of Interim Key Performance Indicators for the Chief Executive Officer	s5.23(2)(b)

Reports

- 13.1 24 – 28 (Lots 19 and 20) Coolgardie Street, West Perth – Proposed demolition of existing two storey brick and iron commercial building
- 13.2 9 and 15 (Lots 5 and 6) The Esplanade, Perth – ‘In Principle’ Approval for a Proposed 19 and 54 Storey Mixed-Use Development at Elizabeth Quay
- 13.3 28 (Lot 743) St Georges Terrace and 501 (Lots 563 and 744) Hay Street, Perth – Amended Application for the Construction of a 13-Level Mixed-Use Building for the RSLWA Club and Offices, Commercial Offices and Dining Tenancies
- 13.4 621 (Lot 1) Wellington Street, Perth – Installation of a Wall Sign Displaying Third Party Advertising Content
- 13.5 Annual Arts Sponsorship – AWESOME International Arts Festival
- 13.6 Annual Arts Sponsorship – WAM Festival 2017
- 13.7 Payments from Municipal and Trust Funds – May 2017
- 13.8 Financial Statements and Financial Activity Statement for the Period Ended 31 May 2017
- 13.9 Nomination of Elected Member Representative and Deputy to the Mindarie Regional Council
- 13.10 Amended Council Policy 1.9 – Media Policy – Media Statements, Press Releases and Social Media

- 13.11 Third Party Travel Contribution – Speaking Invitation for 2017 Australia Day National Conference
- 13.12 Third Party Travel Contribution – Cr Green – Appointment as Independent Chair – KIC Australia Ltd
- 13.13 Energy from Waste Tender Consideration
- 13.14 Confidential Item - Appointment of Designated Senior Employee - Director Economic Development and Activation
- 13.15 Confidential Item - Appointment of Designated Senior Employee - Director Planning and Development
- 13.16 Confirmation of Interim Key Performance Indicators for the Chief Executive Officer
- 14** Motions of which Previous Notice has been given
- 15** Urgent Business
- 16** Closure



MARTIN MILEHAM
CHIEF EXECUTIVE OFFICER
29 June 2017

This meeting is open to members of the public



City of Perth

Council Chambers Seating Layout



Manager Governance
Mark Ridgwell



The Right Honourable
the Lord Mayor
Ms Lisa-M. Scaffidi



Chief
Executive Officer
Martin Mileham



Director Community and
Commercial Services
Rebecca Moore



Cr Judy McEvoy



Cr Janet Davidson
OAM JP



Personal Aide to
the Lord Mayor
Paul Anastas



Acting Director Planning
and Development
Erica Barrenger



Cr Reece Harley



Cr Jemma Green



Director Construction
and Maintenance
Paul Crosetta



Manager
Development Approvals
Margaret Smith



Cr Keith Yong



Cr Lily Chen



Director
Corporate Services
Robert Mianich



Acting Director Economic
Development and Activation
Annaliese Battista



Deputy Lord Mayor
Cr James Limnios



Cr Jim Adamos



Governance and
Electoral Officer
Siobhan Rippington

Public Gallery

INFORMATION FOR THE PUBLIC ATTENDING COUNCIL MEETINGS

Welcome to this evening's Council meeting. This information is provided on matters which may affect members of the public. If you have any queries on procedural matters please contact a member of the City's staff in attendance tonight.

Question Time for the Public

- An opportunity is available at Council meetings for members of the public to ask a question about any issue relating to the City. This time is available only for asking questions and not for making statements. Complex questions requiring research should be submitted as early as possible in order to allow the City sufficient time to prepare a response.
- The Presiding Person may nominate a Member or officer to answer the question and may also determine that any complex question requiring research be answered in writing. No debate or discussion is allowed to take place on any question or answer.
- To ask a question please write it on the white Question Sheet provided at the entrance to the Council Chamber and hand it to a staff member before the meeting begins. Alternatively questions can be forwarded to the City of Perth prior to 3.00pm on the day of the meeting, by:-
 - Letter: Addressed to GPO Box C120, Perth, 6839;
 - Email: governance@cityofperth.wa.gov.au.
- Question Sheets are also available on the City's web site: www.perth.wa.gov.au.

Disclaimer

Members of the public should note that in any discussion regarding any planning or other application that any statement or intimation of approval made by any Member or officer of the City during the course of any meeting is not intended to be and is not to be taken as notice of approval from the City. No action should be taken on any item discussed at a Council meeting prior to written advice on the resolution of the Council being received.

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EMERGENCY GUIDE

Council House, 27 St Georges Terrace, Perth



The City of Perth values the health and safety of its employees, tenants, contractors and visitors. The guide is designed for all occupants to be aware of the emergency procedures in place to help make an evacuation of the building safe and easy.

BUILDING ALARMS

Alert Alarm and Evacuation Alarm.

ALERT ALARM

beep beep beep

All Wardens to respond.

Other staff and visitors should remain where they are.



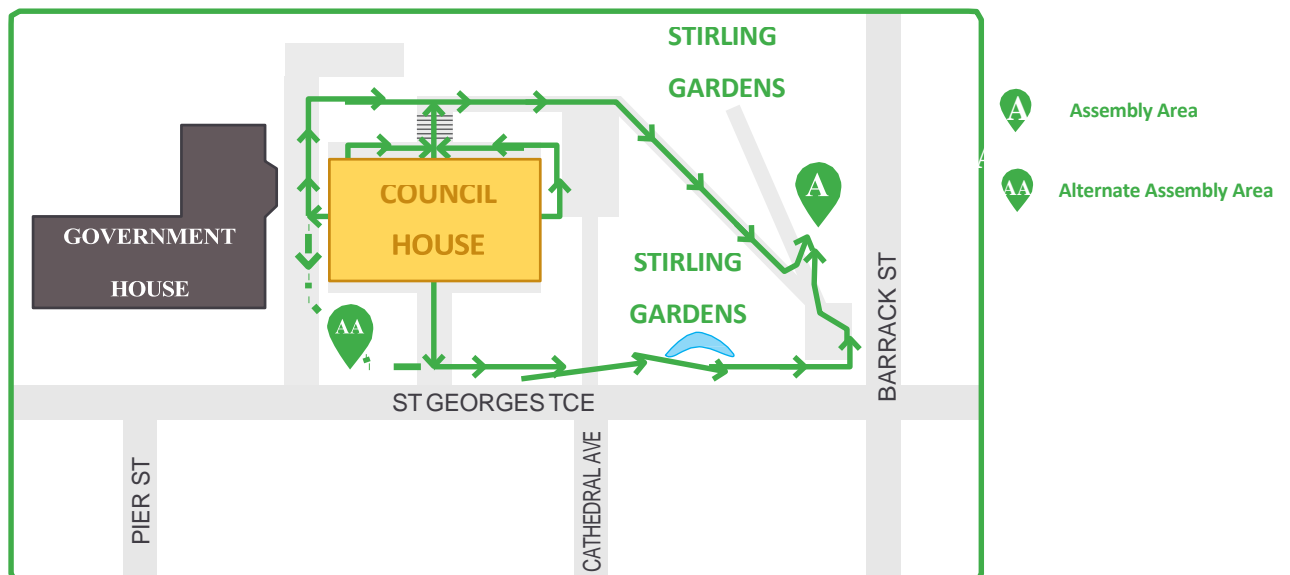
EVACUATION ALARM / PROCEDURES

whoop whoop whoop

On hearing the Evacuation Alarm or on being instructed to evacuate:

1. Move to the floor assembly area as directed by your Warden.
2. People with impaired mobility (those who cannot use the stairs unaided) should report to the Floor Warden who will arrange for their safe evacuation.
3. When instructed to evacuate leave by the emergency exits. **Do not use the lifts.**
4. Remain calm. Move quietly and calmly to the assembly area in **Stirling Gardens** as shown on the map below. Visitors must remain in the company of City of Perth staff members at all times.
5. After hours, evacuate by the nearest emergency exit. **Do not use the lifts.**

EVACUATION ASSEMBLY AREA



Report to the Planning Committee

Agenda	24 – 28 (Lots 19 and 20) Coolgardie Street, West Perth –
Item 13.1	Proposed demolition of existing two storey brick and iron commercial building

Recommendation:

That: in accordance with Clause 37 of the City Planning Scheme No. 2 and Clause 68 of the Planning and Development (Local Planning Schemes) Regulations 2015 (Deemed Provisions) the Council REFUSES the request for the demolition of the existing two storey brick and iron commercial building at 24 – 28 (Lots 19 and 20) Coolgardie Street, West Perth received on the 12 April 2017 for the following reasons:

- 1. the demolition of the existing commercial building will result in the site remaining vacant for an extended period of time, noting that Council has not granted development approval for the subsequent development of the site and that this would have a detrimental impact upon the environment, character, streetscape and amenity of the area having regard for Clause 67(n) of the Planning and Development (Local Planning Schemes) Regulations 2015 (Deemed Provisions);***
- 2. the demolition of the building will be contrary to the general objectives of City Planning Scheme No. 2 whereby the resulting vacant site will not enhance the physical environment of the area); and***
- 3. the demolition of the building will be contrary to the orderly and proper planning of the locality).***

The Committee recommendation to the Council for this report was resolved by the Planning Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	2017/5147
SUBURB/LOCATION:	24 – 28 (Lots 19 & 20) Coolgardie Street, West Perth
REPORTING UNIT:	Development Approvals
RESPONSIBLE DIRECTORATE:	Planning and Development
DATE:	13 June 2017
ATTACHMENT/S:	Attachment 13.1A – Location Map and Photos of existing building
3D MODEL PRESENTATION:	No

LANDOWNER: PFJ Investments (WA) Pty Ltd
APPLICANT: Burgess Design Group
ZONING: (MRS Zoning) Urban
(City Planning Scheme Precinct) West Perth (P10)
(City Planning Scheme Use Area) Commercial
APPROXIMATE COST: \$120,000

Legislation / Strategic Plan / Policy:

Legislation *Planning and Development Act 2005*
Planning and Development (Local Planning Schemes)
Regulations 2015
City Planning Scheme No. 2

Policy

Policy No and Name: 4.1 City Development Design Guidelines

Purpose and Background:

The 504m² site is located on the eastern side of Coolgardie Street in West Perth. The site is currently occupied by a two storey brick and iron building that is currently vacant and straddles both lots 19 and 20.

The City recommended approval to the WA Planning Commission on 22 March 2017 for the proposed amalgamation of eight lots, including lots 19 and 20 into the freehold subdivision of two separate lots of 1,843m² and 2,293m² respectively. The existing building will be incorporated into proposed lot 1 (1,843m²), with the remainder of the site to the rear of the building being occupied by an at grade car park.

Details:

Approval is sought to demolish the existing two storey warehouse to facilitate the sale of the newly created lot as vacant land. The applicant has stated that the existing building is a significant underutilisation of the development potential of the site permitted under the City Planning Scheme and is no longer reflective of the changing character of the area.

The applicant has advised that the site will be cleared and made good to the satisfaction of the City.

Compliance with Planning Scheme:

Development Requirements

In considering an application for or involving demolition, the Council is to have regard to the matters listed in clause 37(1) 'Determination of Application for Demolition' of City Planning Scheme No. 2 (CPS2) which states that:

"(1) In considering and application for or involving demolition, which is not exempt under clause 61 of the Deemed Provisions, the local government is to have regard to the matters listed in clause 67 of the Deemed Provisions and may refuse the application where the local government has not granted approval for the subsequent development of the relevant site."

Clause 67 of the Deemed Provisions 'Matters to be considered by local government' requires, among other things, that the aims and provisions of the Scheme, the requirements of orderly and proper planning and the amenity of the locality be taken into consideration when determining an application.

Comments:

The purpose of clause 37 'Determination of Applications for Demolition' of CPS2 is to avoid situations where buildings are demolished and sites are then left vacant for extended periods, detracting from streetscapes, and impacting on local amenity and city vitality. Generally the Council has refused to approve applications for demolition unless there is a degree of certainty in regard to the timely redevelopment of the site, or where the building may pose a danger on structural grounds.

Sufficient planning justification for the demolition has not been provided in support of the application. The applicant has advised that the demolition is being sought to facilitate the sale of the site as a vacant and unencumbered site and to allow for the future redevelopment of the site. The demolition of the existing building in the current economy is likely to result in the property remaining vacant for a significant length of time given there is no development approval for a replacement building in the foreseeable future.

The demolition of the warehouse building will result in a significant break in the continuity of the Coolgardie Street streetscape. Coolgardie Street is a relatively short street, being approximately 125 metres in length, with the demolition of the 28 metre wide warehouse building significantly impacting on the established streetscape and amenity of the area.

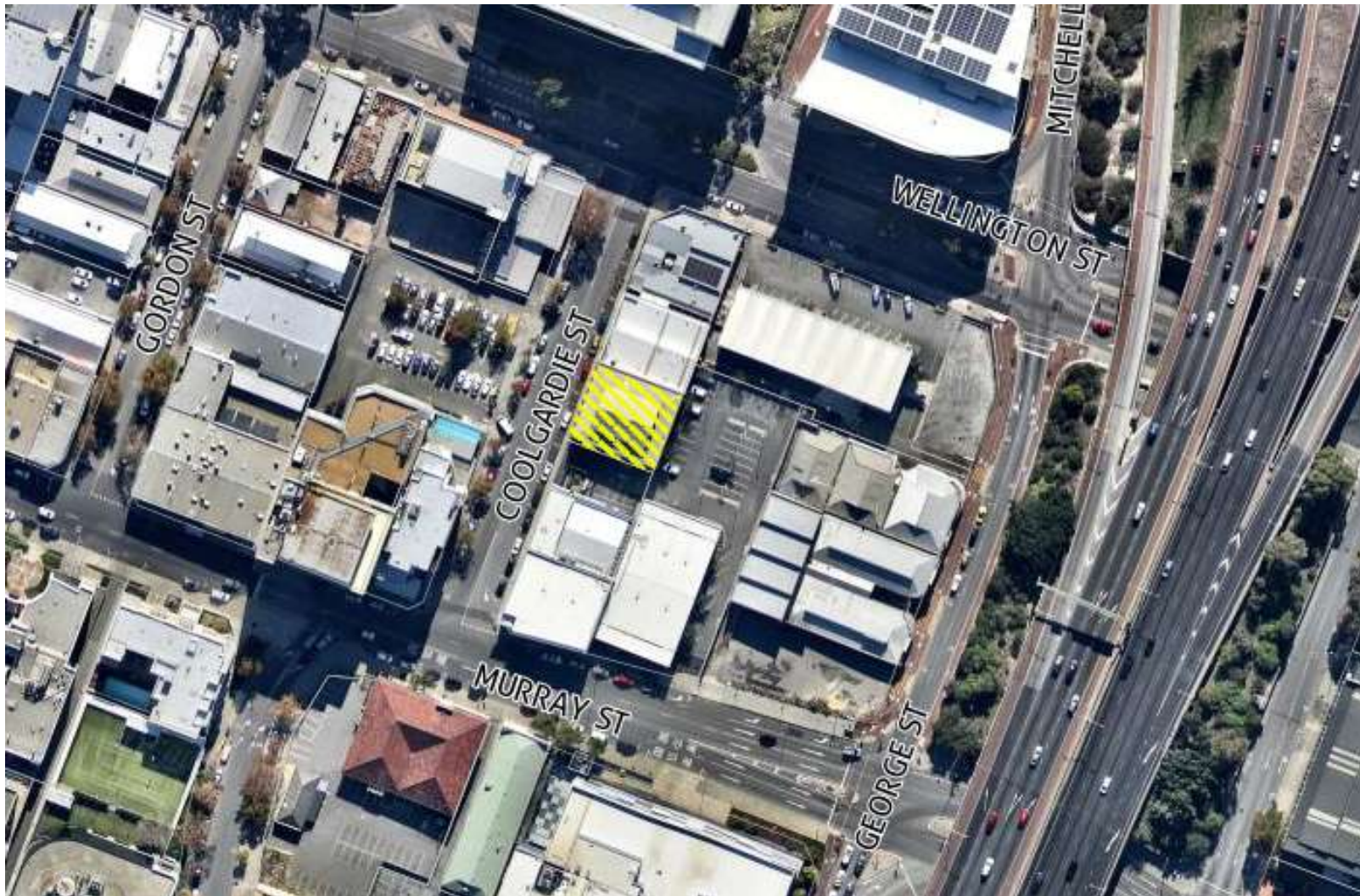
The City Development Design Guidelines requires that at grade car parks be screened from external views to improve amenity. The demolition of the building will result in the existing carpark to the rear of the building being made visible to the street. This is something that should strongly be discouraged and hence any demolition of the existing building should not be supported until such time a replacement development is approved for the site.

The existing warehouse building appears to be in good condition and is not considered to adversely impact on the existing streetscape whilst providing screening to the rear at grade carpark. Similar warehouse style buildings within close proximity to the site have been successfully retrofitted for other uses in recent years. While the condition of the interior of the building is unknown, it has been identified by the City's Officers that such a building could be attractive for use by Event Management companies looking for unique and exclusive venues to host events for their clients, use by Arts companies looking for spaces to exhibit or use as workshops, and so forth. It is therefore, recommended that the application for the demolition of the building without a replacement development not be supported.

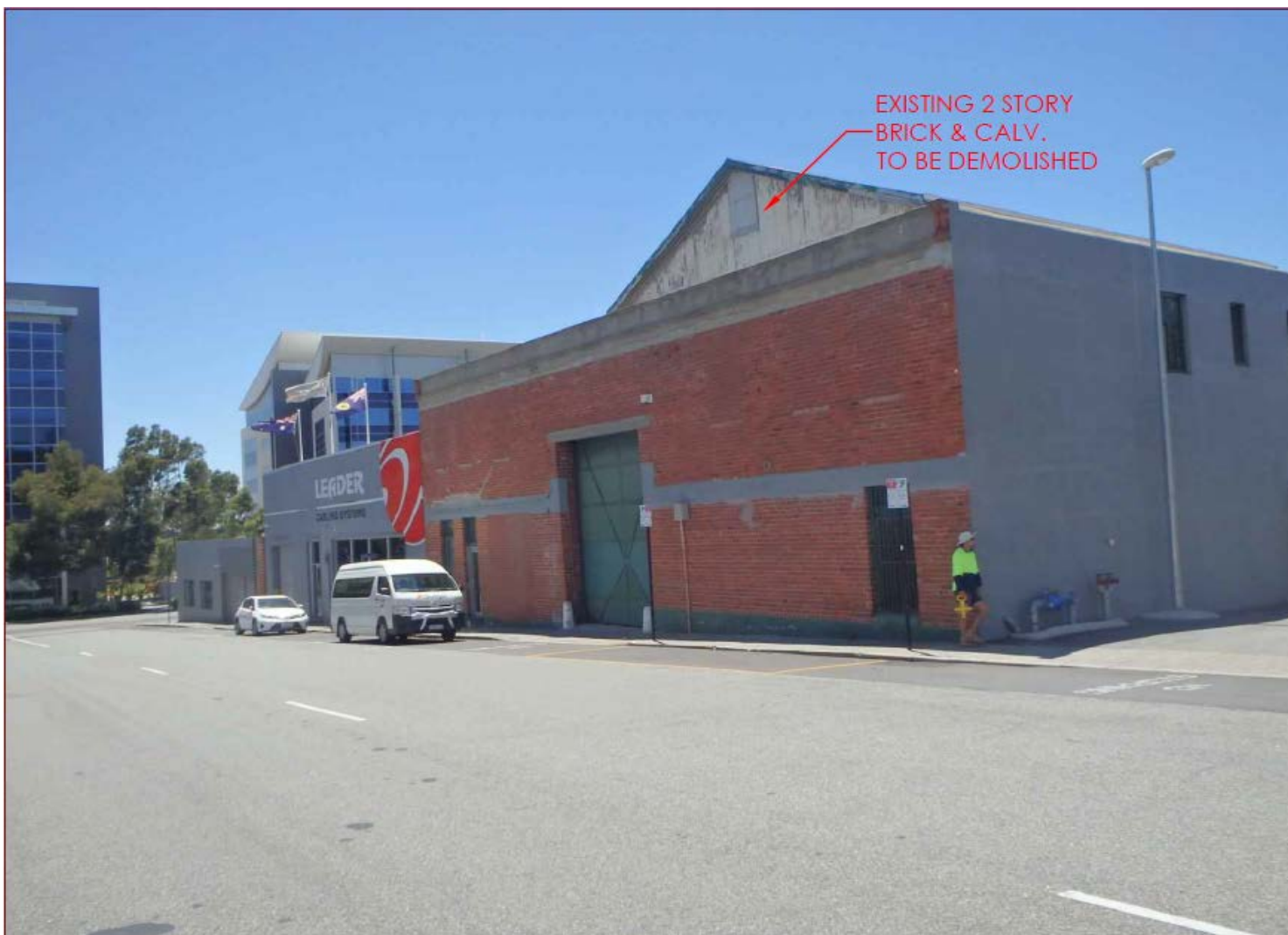
Conclusion

While it is understood that the owner wishes to sell the site without the encumbrance of an existing vacant building, the proposed demolition of the existing building without an approval for a replacement development will result in a large vacant site that is considered to be contrary to the orderly and proper planning of this locality as it will detract from the existing streetscape and remove the screening to the existing at-grade car park located at the rear of the building. In order to protect the amenity of the City, Council has generally discouraged or refused to approve applications for demolitions in the past unless it is likely

the site will be redeveloped in a timely manner. The justification for the demolition is considered insufficient to warrant the demolition and therefore it is recommended that the application be refused.



2017/5147 - 24 – 28 (LOTS 19 AND 20) COOLGARDIE STREET, WEST PERTH



2017/5147 - 24 – 28 (LOTS 19 AND 20) COOLGARDIE STREET, WEST PERTH



2017/5147 - 24 – 28 (LOTS 19 AND 20) COOLGARDIE STREET, WEST PERTH

Agenda Item 13.2 9 and 15 (Lots 5 and 6) The Esplanade, Perth – ‘In Principle’ Approval for a Proposed 19 and 54 Storey Mixed-Use Development at Elizabeth Quay

Recommendation (Advice to Metropolitan Redevelopment Authority):

That Council advises the Metropolitan Redevelopment Authority that it notes that the proposed 19 and 54 storey mixed-use development at 9 and 15 (Lots 5 and 6) The Esplanade, Perth, within the Elizabeth Quay Project Area proposes significant variations to the development standards under the Elizabeth Quay Design Guidelines with respect to the maximum building height and required podium and tower form, however Council is generally supportive of recommending ‘in principle’ approval for the 19 and 54 storey mixed-use development and provides the following comments:

- 1. The architect is commended on the high standard of design and architectural expression, noting the importance of the final materials and detailing to the external facades which will be crucial to the quality and success of the overall outcome for the development.*

- 2. The impact of the significant variations to the height and setback requirements of the buildings on Lots 5 and 6 including the lack of any podium element is generally offset by the design providing the following:*
 - 2.1 the 19 storey tower on Lot 6 is one storey less than the minimum height requirement;*
 - 2.2 the overall development is considered to demonstrate design excellence;*
 - 2.3 the development will provide a positive contribution to the city in terms of providing significant public open space between the towers and to the south adjacent to The Landing; and*
 - 2.4 the development will provide improved pedestrian connectivity/permeability between the towers on Lots 5 and 6 and vistas through the site, between Elizabeth Quay and The Esplanade;*

(Cont’d)

3. *Further investigation/modelling is required in terms of the final location of the towers, the design of the 'Plus' element and the design and location of the canopies/awnings at the ground floor level to increase access to sunlight on The Landing, noting the extent of non-compliance with the solar access requirements of the Elizabeth Quay Design Guidelines, and to ensure any existing and proposed vegetation is not adversely impacted in terms of the overshadowing, wind or radiated heat impacts of the development;*
4. *The design of the ground floor level lacks clarity and detailing in terms of the pedestrian environment/experience. Further details of the ground floor should be provided in order to ensure the 'tower to ground' response achieves adequate levels of ground floor activation, human scale and creates a comfortable pedestrian environment, particularly in terms of wind impact and solar access;*
5. *Vehicle access to the building should be modified to provide a single vehicle access point from either Duchess or Enchantress Way to a combined basement carpark, in compliance with the Elizabeth Quay Design Guidelines. The carpark for Lots 5 and 6 should be designed to service both buildings and allow for sufficient height clearance and space for large waste collection and delivery vehicles to enter and exit in forward gear, noting that no details of the basement level carpark have been provided at this preliminary stage;*
6. *The quantum and allocation of car parking within the development should be provided in accordance with the Elizabeth Quay Design Guidelines and Perth Parking Policy, noting the site's immediate proximity to various modes of public transport;*
7. *The design of the internal office space with generous lobbies and efficient floor plates is generally supported however further consideration should be given to the internal configuration of these large spaces;*
8. *The design of the hotel rooms and residential apartments is generally supported however further consideration should be given to providing natural light into the internal corridors; and*

(Cont'd)

9. ***Council supports the proposed mix of land uses, comprising of retail, office, hotel and residential land uses within the building on Lot 5 and retail and offices in the building Lot 6, noting that the land uses proposed as part of the 'in principle' approval are indicative only and will be subject to finding appropriate tenants/operators at a later stage. The final design of the building must ensure that measures are taken to ameliorate any potential conflict between land uses, with particular attention to adequate noise attenuation for all residential apartments and hotel rooms.***
10. ***The formal development application will be required to include:***
 - 10.1 ***A waste and servicing management plan;***
 - 10.2 ***An acoustic report demonstrating proposed measures to mitigate noise impacts within and external to the development;***
 - 10.3 ***A detailed transport impact assessment addressing all matters related to traffic management, vehicular and pedestrian access to and from the site;***
 - 10.4 ***A wind impact assessment that informs the final wind amelioration canopy design; and***
 - 10.5 ***Preliminary consideration of construction management that specifically addresses the constrained access to the sites and the risks associated with constructing basements in relation to dewatering the site and the management of associated environmental impacts;***
11. ***Noting that the development is proposed to be built in stages, any portion of the site that is left temporarily vacant must be appropriately landscaped and maintained by the owner(s) of the land and be made available to the public as a passive or active recreational and/or entertainment space consistent with the current use of Lots 5 and 6 and that any revisions to the later stage of the development must reflect the form, massing and architectural intent of the 'completed development'.***

The Committee recommendation to the Council for this report was resolved by the Planning Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	2017/5177
SUBURB/LOCATION:	9 and 15 (Lots 5 and 6) The Esplanade, Perth
REPORTING UNIT:	Development Approvals
RESPONSIBLE DIRECTORATE:	Planning and Development
DATE:	19 June 2017
ATTACHMENT/S:	Attachment 13.2A - Map and Perspectives
3D MODEL PRESENTATION:	A 3D Model for this application will be available at the Committee meeting
LANDOWNER:	Metropolitan Redevelopment Authority

APPLICANT: Brookfield Office Properties Australia
ZONING: (MRS Zone) Redevelopment Scheme/Act Area
(MRA Central Perth Redevelopment Scheme Precinct)
Elizabeth Quay – Inlet (P39)
APPROXIMATE COST: \$400 million

Legislation / Strategic Plan / Policy:

Legislation *Metropolitan Redevelopment Authority Act 2011*
Metropolitan Redevelopment Regulations 2011
Central Perth Redevelopment Scheme No. 2

Policy
Policy No and Name: Metropolitan Redevelopment Authority's Elizabeth Quay
Design Guidelines

Purpose and Background:

The Metropolitan Redevelopment Authority (MRA) has referred an application for the City to comment on an 'in principle' approval for the construction of a 19 and 54 storey mixed-use development at Lots 5 and 6 at the Elizabeth Quay site. The design by REX Architects is the winner of an international design competition held by Brookfield Property Partners, the preferred developers of the site.

Clause 5.32 of the MRA Central Perth Redevelopment Scheme allows an applicant to obtain 'in principle' development approval on a proposal prior to lodging a formal development application. An 'in principle' approval may deal with the following matters;

- The proposed built form of the proposal;
- The response to the site and streetscape context;
- The response to relevant environmental, transport, heritage and public realm considerations;
- Compliance with or proposed variations to Scheme, Design Guideline or Development Policy Provisions; and
- Any other important considerations or aspects of the development, as determined by the Authority, or as requested by the applicant.

Brookfield is seeking the MRA's 'in principle' approval specifically for the proposed built form and its response to the site context including the following:-

- Tower to ground form, without a podium element;
- The height and footprint of the proposed towers on Lot 5 and Lot 6;
- The setback variations at the ground and above podium level;
- The separation of buildings and consideration of view corridors;
- The impact on solar access to the The Landing;
- The architectural expression of the building, internal layout and orientation; and
- The provision of communal open space at the ground floor level.

Details:

The proposed development includes buildings on each of the lots that are integrated in terms of the architectural design and response to the site. More specifically the application proposes the following:

- A 54 storey mixed-use tower on Lot 5 with retail uses on the ground and first floor levels, eleven levels of office space above, a 'PLUS' element comprising of three levels of amenities including a restaurant, bar, ballroom, gymnasium and meeting rooms, 9 levels of hotel accommodation (23 rooms per level) and 27 levels of residential accommodation (9 apartments per level).
- A 19 storey mixed-use tower on Lot 6 incorporating retail uses on the ground and first floor levels and 17 levels of office space above.
- Communal spaces including an area of public space earmarked for alfresco dining along the northern boundary adjacent to The Esplanade, a 22.3 metre wide public space (main street) between the towers on Lots 5 and 6 and an event space to the south of the towers adjacent to The Landing.

Compliance with Planning Scheme & Design Guidelines:

The MRA is responsible for planning and development control within the Central Perth Redevelopment Area (CPRA). The Elizabeth Quay project area is subject to the provisions of the MRA's Central Perth Redevelopment Scheme No. 2 (CPRS2). The general land use intent of the CPRS is to create diverse mixed land use urban environments, including creating high quality spaces for people through an activated and interesting public realm.

The form and function of development within Elizabeth Quay is guided by the MRA's associated Elizabeth Quay Design Guidelines. The vision of the Elizabeth Quay Project is to transform the relationship between the city and the river and enhance the identity of central Perth. Elizabeth Quay will be a highly interactive civic space, accessible to the whole region and within walking distance of all major facilities within central Perth.

Land Use

The site is located with the MRA's Inlet Precinct (Precinct 39) of the Elizabeth Quay Project Area under CPRS2. The land uses in the Inlet Precinct will include a mix of permanent and transient residential, commercial, retail, dining and entertainment land uses. 'Commercial', 'Retail', 'Residential' and 'Dining and Entertainment' land uses are preferred uses within the Inlet Precinct, whilst 'Culture and Creative Industry' and 'Community' land uses are contemplated uses within the Precinct under CPRS2.

The application proposes a mixed-use development comprising of retail, office, hotel and residential land uses within the building on Lot 5 and retail and offices in the building Lot 6. This is consistent with the Elizabeth Quay Design Guidelines for Lots 5 and 6 which encourages active uses including shops, restaurants, café and small bars at the ground floor level; offices, shops, café, residential serviced apartments and hotel within the upper podium levels; and office, residential, serviced apartments and a hotel in the tower levels. It is noted that the land uses proposed as part of the 'in principle' approval are indicative only

and will be subject to finding appropriate tenants/operators at the development approval stage. The final design of the building must ensure that measures are taken to ameliorate any potential conflict between land uses.

Development Requirements

The MRA's Elizabeth Quay Design Guidelines recognises the potential for sites 5 and 6 to be amalgamated should a developer wish to propose an integrated development solution for the combined site.

Where sites 5 and 6 are to be amalgamated the future development on the combined sites will be designed to ensure that the towers do not negatively impact on the city skyline, view corridors or the public realm. The towers will be designed and proportioned in such a way as to minimise apparent size from surrounding view points and excessive overshadowing of the adjacent public realm.

Towers should not present a 'wall' of development to the north of the Inlet and the extent of area between Howard Street and Sherwood Court occupied by a single tower should be minimised through an appropriate design response.

The lower levels will be highly activated with a fine grain architectural response incorporating multiple openings at grade and opportunity for integrated pedestrian connections in the form of retail arcades.

The developments compliance with the MRA's building requirements for the amalgamated Lots 5 and 6 is summarised below:

Development Standard	Lots 5 & 6 Amalgamated	Proposed
Podium Height:	Minimum: 2 storeys up to 8 metres Maximum: 6 storeys up to 24 metres	No podium level proposed for the buildings on Lots 5 or 6
Tower Height:	Minimum: 20 storeys Maximum: 30 storeys	Lot 5 – 54 storeys Lot 6 – 19 storeys
Lot Setbacks:	Nil to lot boundary at ground level	Nil to eastern and western boundary 5 metres to northern boundary 14 metres to southern boundary
Setbacks Above Podium:	Minimum: 5 metres north and south Minimum: 10 metres east and west	5 metres to north and 14 metres to south Nil to 8.7 metres to eastern boundary and Nil to western boundary
Minimum Residential Dwellings, Hotel Rooms or Short Stay Serviced Apartments	Nil	243 residential apartments and 207 hotel rooms
Green Building Policy Classification	Minimum Tier 2	Not specified

Development Standard	Lots 5 & 6 Amalgamated	Proposed
Vehicle and Service Access	Single access point only from either Howard Street or Sherwood Court	Vehicle access shown from both Howard Street (Enchantress Way) and Sherwood Court (Duchess Way)
Solar Access	Maintain 80% minimum solar access to the Landing at 12pm on 1 September	28% solar access at 12pm 1 September to overall Landing and 46% to Lower Landing

Architectural Expression and Building Design

Elizabeth Quay represents the opportunity to create an iconic urban destination which will signify Perth in the 21st century and set the benchmark for future developments. Developers are to create architecture and public spaces that are exemplary in design quality at all levels of detail. Buildings within the Elizabeth Quay Project Area are to demonstrate exemplary design quality of an international standard, generating interesting, innovative and creative architectural expression whilst remaining respectful to the Perth context. Lots 5 and 6 are located on the central axis of the Elizabeth Quay waterfront and will form a highly prominent landmark site.

Brookfield Property Partner's main objective is to achieve a landmark, mixed-use development set within the new world class location of Elizabeth Quay. In order to achieve its objective Brookfield held a design competition and invited four internationally acclaimed architects to submit a design response. REX Architecture, the internationally acclaimed architecture and design firm based in New York City, and the winner of the design competition, was later appointed as the project architect to progress the design of Lots 5 and 6.

The architectural expression of the building is considered to demonstrate a high standard of design excellence and a world class development for the Elizabeth Quay waterfront. The proposed design with its simplicity of architectural form, an iconic cantilevered structural element ('PLUS') and the juxtaposition of the tower heights will create a landmark development for the site. It is noted that due to its simple massing, the design will need to rely heavily on the careful detailing of the external facades of the towers to achieve an elegant result.

With respect to the internal layout, the simple and efficient layout of the office levels is generally supported. Further consideration however should be given to the internal fit-out and layout of these large spaces. The design of the residential and hotel levels are also generally supported however natural daylight should be achieved into the internal corridors. The internal design of the ground floor plane is also lacking clarity and detail which will be vital at the development application stage in terms of ensuring an appropriate level of activation is achieved.

Built Form, Heights and Setbacks

The Elizabeth Quay Design Guidelines sets out the design intent of the general development form envisaged for the project area. Elizabeth Quay is to be organised around mid-rise podiums with tower elements above that are setback from the street. The podium tower design is to facilitate the breaking up of the visual presence of the towers and to provide

view lines between the buildings. The podiums present an opportunity for diversity of use with scale differentiation to the towers above, providing a sense of human scale to the streetscape and an appropriate built form response to the street context. Podiums also importantly assist in reducing the wind impact of towers at street level. All developments are to provide fine grain human scale at the podium and street level to ensure a quality street edge and reduce building bulk and massing.

The proposed development includes a substantial variation in terms of the maximum building height specified under the guidelines whereby a minimum of 20 storeys and maximum of 30 storeys is required with 54 storeys proposed for the tower on Lot 5 and 19 storeys for the proposed on Lot 6. It is also proposed that the tower on Lot 5 will have a three level projecting structural element at levels 15 to 17 (referred to as the 'PLUS'). It is considered that whilst the guidelines allow for flexibility, the recommended building heights and envelopes were formulated based on a rigorous analysis of the site context and overall vision for Elizabeth Quay and there is an inherent expectation that development will proceed generally in accordance with the prescribed requirements. Further, it is noted that the proposed height of the taller tower is in direct conflict with the City's Urban Design Framework that recognises that the city's built form has an influence over many aspects of the city's social and economic life. Built form controls, such as height, *"provide a higher degree of certainty for developers, regulators and the community on the city's capacity for growth, development potential, land values, access to views, overshadowing of public spaces, and access to light and sunshine. Control of the built form also enables the scale and proportion of streets and other public spaces to be set at levels that encourage an appropriate degree of intimacy or grandeur depending on the role of the space and the surrounding buildings"*.

The proposed design also seeks a significant departure from the design intent specified in the guidelines in terms of the podium and tower effect. Both towers on Lots 5 and 6 are designed without podiums.

With respect to setbacks the guidelines specify a nil setback to all lot boundaries for the podium, and a 5 metre setback to the north and south and a 10 metre setback to the east and west for the towers above. The proposed design through its tower to ground form is also seeking variations to the lot boundary setbacks. The towers propose setbacks of 5 metres to the northern boundary, 14 metres to the southern boundary and nil to the eastern and western boundaries.

Although the development does not achieve the tower and podium design intent of the guidelines, there are numerous benefits to the design approach. The setback between the towers of 22.3 metres will for example enable a significant public space to be created in the form of a main street or pedestrian mall, improving permeability and opening up vistas through the site. The setback of the towers to the south at 14 metres, together with The Landing and Geoffrey Bolton Avenue will also create a substantial event space.

With respect to the impact of the towers at street level, further details should be provided to demonstrate that human scale and a comfortable pedestrian environment can be achieved. This may include the incorporation of canopies and awnings at ground level to provide protection from the elements, particularly the impact of wind. The 'in principle' application has included a study into various designs for wind amelioration canopies that will need to be addressed as part of any formal development application for the sites. The MRA will also need to consider how public access to the areas of open space within the lot boundaries can be reserved for public purposes.

With respect to the impact of the development on solar access it is noted that only 28% solar access will be achieved to The Landing area at 12.00pm on 1 September which is well below the minimum 80% requirement for solar access specified under the guidelines. The proposed development with the lower tower of 19 metres on Lot 6 will however comply with the solar access requirements to The Island (100% minimum) and The Promenade (80% minimum). The applicant advises that solar access to the lower section of The Landing is 46% which is considered significant as this is the area in where people will sit and walk along the waters edge. The solar access percentage also improves before and past 12.00pm and by 1.00pm it is at approximately 40% and by 2.00pm 80%. Overall the development therefore will achieve an annual average of 75.8% solar access to The Landing and will provide a public space in the form of a main street or pedestrian mall between the towers which will improve the amount of solar access to the public realm during the day.

Some concerns are also raised regarding the impact of the overshadowing of the towers and proposed awning/canopy structures on any existing and new vegetation to the south as well any excessive heat load impacts of the towers to the north.

It is considered that the amount of solar access achieved at The Landing area at 12.00pm on 1 September could be improved in terms of the design and position of the towers and the 'PLUS' structural element. It is recommended that further investigation of the design of the 'PLUS' structural element, the canopies/awning and the design and setback of the towers should take place to improve the amount of sunlight access to The Landing area and to ensure there is no detrimental impact to the surrounding vegetation in terms of overshadowing or radiated heat impacts.

Traffic and Carparking

The 'in principle' proposal does not provide any details regarding the basement level carpark however it does indicate two crossovers from the internal roads Enchantress Way and Duchess Way. The Elizabeth Quay Design Guidelines specifies that the amalgamated site should include only a single access point from either of the internal roads. It is considered that the improved pedestrian outcome achieved by the design should not be discounted and lost by providing an additional crossover and associated vehicle impacts. The basement level carpark should be designed to service both buildings including and to allow sufficient height clearance so that large vehicles for waste collection and deliveries can enter the carpark and exit in forward gear.

It should also be recommended that the quantum of car parking should comply with the maximums prescribed by the Elizabeth Quay Design Guidelines and Perth Parking Policy, noting the proximity of the sites to various modes of public transport.

Technical Reports

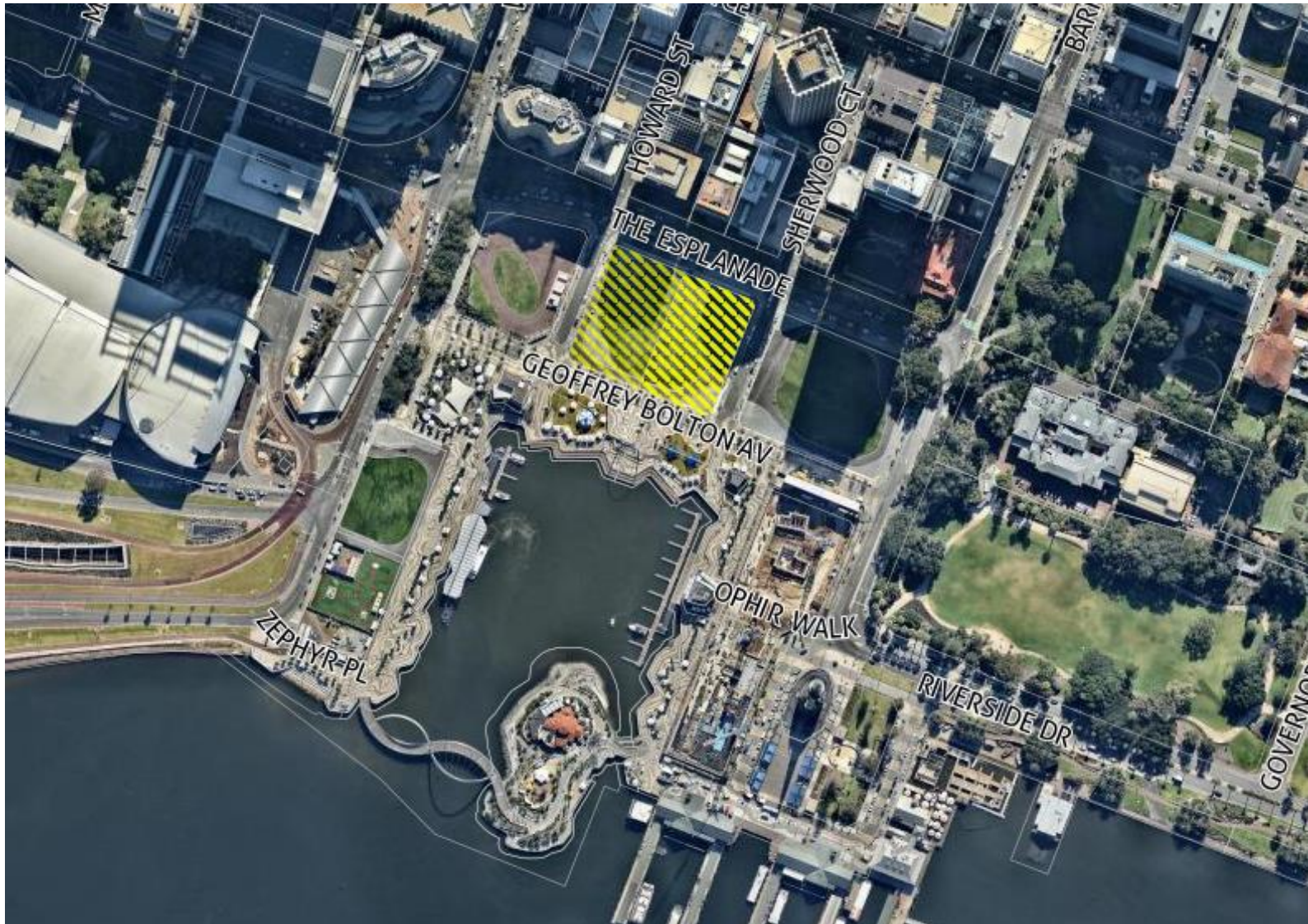
In recognition of the subject location, the scale of the development proposed and potentially constrained nature of the sites, it is recommended that early consideration be given by the applicant in relation to waste management and servicing, wind impacts, noise impacts and amelioration (noting potential conflict between the activation of Elizabeth Quay and residential uses) and future construction management with specific consideration for dewatering and associated environmental impacts.

Staging

The submitted plans indicate that the 54 storey 'Plus' tower will be constructed as the first stage of the development with the 19 storey tower being developed at a later stage. If this is to occur then it should be advised that the City's expectations would be that any portion of the site that is left temporarily vacant must be appropriately landscaped and maintained by the owner(s) of the land and be made available to the public as a passive or active recreational and/or entertainment space consistent with the current use of Lots 5 and 6. Given that the development is being assessed as a whole, any later stage of development should reflect the form, massing and architectural intent of the 'completed development', noting that changes in the market could result in the design and use of the building being revised.

Conclusion

The development of Lots 5 and 6 at Elizabeth Quay presents an opportunity to showcase world class buildings of an exemplary design quality at the central axis of the Perth waterfront. The proposed development includes significant variations to the MRA's Elizabeth Quay Design Guidelines and together with the 52 storey development proposed for Lots 2 and 3 at Elizabeth Quay, the height and form of the development within this precinct will also depart substantially from the City's own Urban Design Framework. However, it is considered that the design for Lots 5 and 6 has the potential to create a landmark development for the city. The development will also contribute to the precinct in terms of providing significant areas of public space between the towers and to the south adjacent to The Landing. Provided it can be demonstrated that tower form can still achieve a high quality urban environment and experience at the pedestrian level in terms of human scale and protection from the elements, and that solar access to The Landing area can be improved, it is considered that the Council should advise the MRA that the overall development, incorporating variations to the built form, height and setback requirements, is generally supported 'in principle'.



2017/5177 – 9 AND 15 (LOTS 5 AND 6) THE ESPLANADE, PERTH



2017/5177 – 9 AND 15 (LOTS 5 AND 6) THE ESPLANADE, PERTH



2017/5177 – 9 AND 15 (LOTS 5 AND 6) THE ESPLANADE, PERTH



2017/5177 – 9 AND 15 (LOTS 5 AND 6) THE ESPLANADE, PERTH



2017/5177 – 9 AND 15 (LOTS 5 AND 6) THE ESPLANADE, PERTH

Report to the Planning Committee

Agenda Item 13.3	28 (Lot 743) St Georges Terrace and 501 (Lots 563 and 744) Hay Street, Perth – Amended Application for the Construction of a 13-Level Mixed-Use Building for the RSLWA Club and Offices, Commercial Offices and Dining Tenancies
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Recommendation:

*That, in accordance with the provisions of the City Planning Scheme No. 2, the Planning and Development (Local Planning Schemes) Regulations 2015 – Deemed Provisions for Local Planning Schemes and Metropolitan Region Scheme, the Council **APPROVES BY AN ABSOLUTE MAJORITY**, an amended application for the construction of a 13-level mixed-use building for the RSLWA Club and Offices as well as commercial offices, dining and retail tenancies at 28 (Lot 743) St Georges Terrace and 501 (Lots 563 and 744) Hay Street, Perth subject to Conditions 1, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15 as detailed on the approval letter dated 20 February 2017 remaining.*

The Committee recommendation to the Council for this report was resolved by the Planning Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	2017/5157
SUBURB/LOCATION:	28 (Lot 743) St Georges Terrace and 501 (Lots 653 and 744) Hay Street
REPORTING UNIT:	Development Approvals
RESPONSIBLE DIRECTORATE:	Planning and Development
DATE:	21/06/2017
ATTACHMENT/S:	Attachment 13.3A – Map and Perspectives Attachment 13.3B – Council Approval Letter dated 20/02/2017
3D MODEL PRESENTATION:	A 3D Model for this application will be available at the Committee meeting
LANDOWNER:	State of WA – Department of Lands
APPLICANT:	MacCormac Architects
ZONING:	(MRS Zone) Central City Area (City Planning Scheme Precinct) Civic Precinct 7 (P7) (City Planning Scheme Use Area) City Centre
APPROXIMATE COST:	\$5.366 million

Legislation / Strategic Plan / Policy:

Legislation	<i>Planning and Development Act 2005</i> City Planning Scheme No. 2
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Policy

Policy No and Name:	4.1 – City Development Design Guidelines
	4.4 – Building Heights and Setbacks
	4.5 – Plot Ratio
	4.6 – Signs Policy
	5.1 – Parking Policy
	5.2 – Loading and Unloading
	5.3 – Bicycle Parking and End of Journey Facilities

Purpose and Background:

The subject site is located on the north-west corner of the St Georges Terrace and Irwin Street intersection. The existing site contains the Central Law Courts building and the existing ANZAC House building with a total site area of 4,061m². The site consists of Lots 563, 743 and 744 and the two buildings currently traverse the lot boundaries. The applicant advises that the site will be subdivided to reflect the boundaries of the new RSLWA building as well as creating separate lots and Certificates of Title for the RSLWA Club and the Central Law Courts building in due course. The applicant has confirmed that compliance with City Planning Scheme No. 2 (CPS2) development standards in terms of plot ratio and car parking will be achieved on the proposed new lots without the requirement for the creation of a special control area under CPS2.

At its meeting held on **14 February 2017**, Council approved an application for the demolition of the existing ANZAC House and Club Building and the construction of a 10-level mixed-use building for the RSLWA Club and offices, commercial offices and dining tenancies. During the Council's consideration of the proposal, some Elected Members commented that the applicant could consider additional height for the new RSLWA building, noting the underdevelopment of the site in terms of the maximum plot ratio and maximum building height, and the opportunity to take further advantage of the views across to the Government House gardens and to the Swan River. On this basis, the applicant has submitted an amended development application proposing an additional three levels to the building.

On **18 May 2017** the City issued a building permit for forward works at the site including alterations to the bin storage area, service area and egress route from the Central Law Courts Building. On **8 June 2017** the City issued a permit for the demolition of the existing ANZAC House building.

Details:

Approval is sought to amend the existing approval to construct a 13-level mixed-use building for the RSLWA Club and Offices.

The building has been designed to represent the RSLWA as an organisation as well as giving reference to the earlier Art Deco building of 1934 on the site. The building seeks to capitalise on the views across to the Government House gardens and to the Swan River by designing the building with large expanses of glass to the southern elevation and large balcony/deck areas to the commercial offices and members bar and restaurant from levels 7 to 9.

As noted above the main amendment to the current approval is to construct an additional 3 floor levels for use by the RSLWA Club and Offices. The other proposed modifications to the building are outlined below:

- minor reconfiguration of the toilet and end of journey change and shower facilities at the ground floor level;
- a proposed new RSLWA shop ('Retail-General') in the commercial tenancy (105m²) at the western end of the ground floor level;
- a small reduction in the size of the approved coffee shop ('Dining') at the ground floor level (96m²);
- minor changes to the design of the toilet and storage facilities and the addition of a small bar to the prefunction/function space at level 1;
- the reconfiguration and additions to the number of commercial office tenancies including five tenancies at levels 2 to 6 (73m², 2 x 77m², 91m² and 170m²) with the RSLWA occupying level 2 and organisations allied to the RSLWA at levels 3 to 6;
- a new members lounge bar (111m²), restaurant (83m²), kitchen (87m²) and meeting rooms (23m² and 38m²) at level 7; and
- three commercial tenancy office spaces at level 8 (102m², 85m² and 84m²) and level 9 (42m², 50m² and 57m²).

Compliance with Planning Scheme:

Land Use

The subject site is located in the City Centre Use Area of the Civic Precinct 7 under CPS2. The Civic Precinct will maintain its present functions as the focal point of the city's open space and parkland system, an area of heritage interest and the principal centre for civic and judicial activities.

The development includes a mixture of uses including function, administration and office space for the RSLWA Club ('Entertainment' and 'Offices') and commercial office space ('Offices') from levels 1 to 9 and a café/restaurant ('Dining') and RSLWA shop ('Retail-General') at the ground floor level. Both 'Entertainment' and 'Office' uses are preferred uses ('P') in the Civic Precinct. 'Dining' and 'Retail-General' are also preferred uses ('P') in the Civic Precinct however are contemplated ('C') uses where they front onto St Georges Terrace.

The revised application is not proposing to change the land uses which were previously approved at the site. The additional 'Retail-General' use at the ground floor level will allow for the sale of products of the RSLWA and for organisations allied with the RSLWA. It is considered that the additional retail use will provide for pedestrian interest and activity at the ground floor level.

Development Requirements

The amended application has been assessed against the City Planning Scheme requirements and the revised proposal's compliance with the City's development standards is summarised below:-

Development Standard	Proposed	Permitted / Required
Maximum Plot Ratio:	3.75: 1.0 (15,240m ² inclusive of the Central Law Courts Building)	5.0: 1.0 (20,305m ²)

"(3) The Council cannot grant planning approval for a non-complying application unless -

- (c) *the Council is satisfied by an absolute majority that:-*
 (i) *if approval were to be granted, the development would be consistent with:-*
 (A) *the orderly and proper planning of the locality;*

- (B) the conservation of the amenities of the locality; and*
- (C) the statement of intent set out in the relevant precinct plan; and*

(ii) the non-compliance would not have any undue adverse effect on:-

- (A) the occupiers or users of the development;*
- (B) the property in, or the inhabitants of, the locality; or*
- (C) the likely future development of the locality.”*

Comments:

Consultation

As the amended application is proposing further variations to the maximum street building height and setbacks along Irwin Street and St Georges Terrace, as specified under CPS2, the application was re-advertised for a period of 14 days expiring on 19 May 2017. No submissions were received during this period.

Design Advisory Committee

As the amended application is not proposing any significant departure from the original design and form of the building and is still within the maximum plot ratio permitted at the site, there was no requirement for the application to be reconsidered by the City's Design Advisory Committee. It is noted that the City's Design Advisory Committee previously supported the design in terms of its incorporation of symbolism and historical references and its recessive form.

Building Height and Setbacks

The building is located on a corner site where there are different provisions in terms of the street frontage height and setback requirements. The proposed additional three levels still results in a building height which is well below the maximum height requirement in this location (100 metres permitted, 50.45 metres proposed). Given the additional three levels the revised application proposes further variations to the street frontage height and setback requirements along Irwin Street and St Georges Terrace (where there was previously no variation). Along Irwin Street a varying street frontage height of 27 metres to 44.4 metres is proposed (14 metres maximum required) with encroachments into the five metre street setback from level 3 to 10. Along St Georges Terrace a street frontage height of 27 metres is proposed (21 metres maximum required) with encroachments into the five metre street setback at levels 5 to 7.

The proposed street building height and setbacks along St Georges Terrace and Irwin Street are, however, still considered to meet the principles of the City's Building Heights and Setback Policy 4.4 in terms of providing for pedestrian scale, being respectful to the heights of buildings along the street and maximising sunlight penetration into the street. The recessive form of the building and the additional street building height is also considered appropriate in terms of its prominent corner location and is consistent with the built form principles outlined in the City Development Design Guidelines 4.1. The proposed further variations to the street frontage height and setback requirements along St Georges Terrace and Irwin Street should therefore be supported.

With respect to the side and rear setbacks there are no variations sought in terms of the current boundaries, however as noted in the original report the RSLWA Club is to be

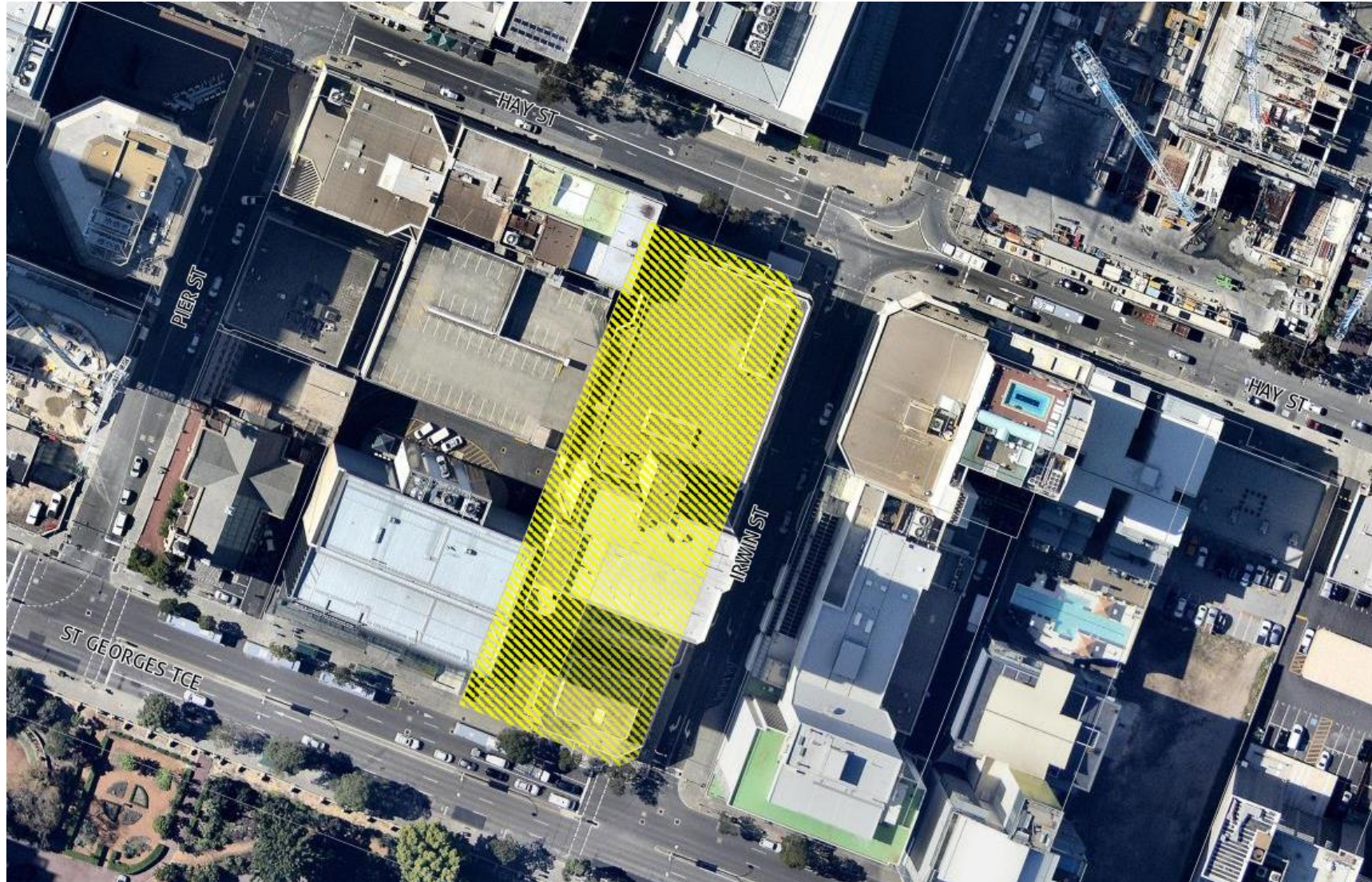
subdivided from the Central Law Courts site. This will result in a variation to the future northern (rear) boundary at the upper floor levels (3 metres required, 1 metres proposed). The additional height will therefore increase the amount of the upper floor level building which does not comply with the northern setback requirement. The applicant has however confirmed that the variation to the northern boundary is acceptable to the owners of the adjacent building, noting the setback will permit sufficient light to reach the existing narrow slit windows of the Central Law Courts building to the north. The proposed additional height of the new RSLWA club building will also be well under the maximum height limit in this location (100 metres permitted, 50.45 metres proposed) and therefore is considered to have an acceptable level of amenity impact on the adjacent Central Law Courts building, particularly given the constraints of the site and its inner city context. It is considered that the proposed further variation to the future northern lot boundary can therefore be supporting in accordance with the City's Building Heights and Setbacks Policy 4.4 and clause 36 of CPS2.

Conclusion

The revised application proposes an additional three floor levels to the approved new RSLWA Club and Offices building. This will allow for additional commercial tenancies and an RSLWA members lounge bar and restaurant to be accommodated within the building. The additional height will also enable the building to fully capitalise on views across to the Government House gardens and to the Swan River. The building is generally compliant with the CPS2 development standards in terms of the maximum plot ratio and overall building height. Aside from the additional height, there are no changes proposed to the external design and presentation of the building to the street, noting this design was previously commended by the City's Design Advisory Committee in terms of its historical references and recessive form.

The further variations sought in terms of the maximum street frontage height and setbacks along Irwin Street and St Georges Terrace and to the setback of the future northern boundary with the Central Law Courts Building are minor in nature and do not raise any undue adverse amenity impacts and can be supported in accordance with the City's Building Heights and Setbacks Policy and clause 36 of CPS2.

Based on the above it is recommended that the application for a 13-level mixed-use development for the RSLWA Club and offices, commercial offices and retail and dining tenancies should be approved subject to relevant conditions, taking into account a number of the planning conditions have already been addressed to the City's satisfaction at the forward works and demolition permit stages.



2017/5157 - 28 (LOT 743) ST GEORGES TERRACE AND 501 (LOTS 653 AND 744) HAY STREET, PERTH



2016/5473 - 28 (LOT 743) ST GEORGES TERRACE AND 501 (LOTS 653 AND 744) HAY STREET, PERTH



2016/5473 - 28 (LOT 743) ST GEORGES TERRACE AND 501 (LOTS 653 AND 744) HAY STREET, PERTH

Planning and Development Act 2005
City of Perth

Notice of determination on application for development approval

Application Ref No. **DA-2016/5473**
Location: **28 St Georges Terrace and 501 Hay Street, Perth**
Lots: **743, 563 and 744** Plan/Diagram: **150091 and 29924**
Vol. No: **LR3126** Folio No: **725 and 726**
Application date: **18 November 2016** Received on: **16 January 2017**

Description of proposed development: ***Demolition of the existing ANZAC House and Club Building and the construction of a 10-level mixed-use building for the RSLWA Club and Offices as well as commercial offices and dining tenancies***

The application for development approval is **GRANTED BY AN ABSOLUTE MAJORITY (By the Council at its meeting held on 14 February 2017)** in accordance with the provisions of City Planning Scheme No. 2, the Planning and Development (Local Planning Schemes) Regulations 2015 – Deemed Provisions for Local Planning Schemes and the Metropolitan Region Scheme:

Conditions:

- 1. the amalgamation and re-subdivision of the subject lots into two separate lots on two Certificates of Titles to accommodate the new RSLWA Club building and Central Law Courts building, in compliance with the City's maximum plot ratio and car parking requirements, as well as any required vehicle access and servicing easements prior to occupancy of the new RSLWA Club building;***
- 2. an interpretation strategy and archival record of the existing ANZAC House building being prepared in consultation with the State Heritage Office and being submitted for approval by the City prior to applying for a demolition permit;***
- 3. an archaeological management strategy being prepared by a suitably qualified historical archaeologist, to inform demolition and redevelopment works at the site, in consultation with the State Heritage Office and being submitted to the City for approval prior to applying for a demolition permit;***
- 4. final details of the design and a sample board of the high quality and durable materials, colours and finishes for the building, including the treatment to the vehicle entrance on Irwin Street,***

being submitted for approval by the City prior to applying for a building permit;

- 5. final details of the design and finishes to the western courtyard and display space, including security and surveillance measures to ensure the area is safe during and after operating hours, being submitted for approval by the City prior to its installation;***
- 6. any proposed external building plant, lift overruns, piping, ducting, water tanks, transformers, air condensers and fire booster cabinets shall be located so as to minimise any visual and noise impact on the adjacent developments and being screened from view of the street, including any such plant or services located within the vehicle entrance of the development, with details of the location and screening of such plant and services being submitted for approval by the City prior to applying for a building permit;***
- 7. a final Waste Management Plan, identifying a permanent storage and wash down facility for bins both recyclables and general waste and including a waste disposal/collection strategy demonstrating how these facilities will be serviced by the City or a private operator, being submitted for approval by the City prior to applying for a building permit;***
- 8. details of on-site stormwater disposal/management being to the City's specifications and being submitted for approval by the City prior to applying for a building permit;***
- 9. the proposed floor levels of the pedestrian and vehicle entrances into the building being designed to match the current levels of the adjacent footpaths, to the City's satisfaction, with details being submitted for approval by the City prior to applying for a building permit;***
- 10. thirteen car parking bays (including one universal access car parking bay) being provided on-site within the new RSLWA Club and Offices building, with all on-site parking being for the exclusive use of the tenants of the development and their customers/guests;***
- 11. in the event that the approved development has not been substantially commenced within six months of the demolition of the existing building on site, the site is to be landscaped and***

aesthetically screened at the owner's cost, with details being submitted for approval by the City prior to installation, in order to preserve the amenity of the area and to prevent dust and sand being blown from the site, with the site being maintained in a clean and tidy state to the City's satisfaction;

- 12. the works referred to in Condition 11, shall be secured by a bond/deed of agreement between the applicant and the City, to the value of the proposed works, with the cost of the deed to be borne by the applicant;***
- 13. any signage for the development being integrated into the design of the building and any signs which are not exempt from approval under the City's Signs Policy 4.6 requiring a separate application;***
- 14. the ground floor commercial tenancies being restricted to 'Dining' (café or restaurant), 'Office' or 'Retail (General)' uses with any other proposed uses not listed above or any external alterations to the tenancies requiring a separate application for approval;***
- 15. a construction management plan for the development being submitted to the City for approval prior to applying for a building permit, detailing how it is proposed to manage;***
 - 15.1 the delivery of materials and equipment to the site;***
 - 15.2 the storage of materials and equipment on the site;***
 - 15.3 the parking arrangements for the contractors and subcontractors;***
 - 15.4 any dewatering of the site;***
 - 15.5 any impacts on city infrastructure and street trees in the surrounding streets and footpaths; and***
 - 15.6 other matters likely to impact on the Central Law Courts and surrounding properties.***

Date of determination: **20 February 2017**

- Note 1: This is a planning determination and NOT a building permit. This approval cannot be acted on without obtaining any required building or health approval from the City.
- Note 2: If the development the subject of this approval is not substantially commenced within a period of 2 years, or another period specified in the approval after the date of determination, the approval will lapse and be of no further effect.

- Note 3: Where an approval has so lapsed, no development must be carried out without the further approval of the City having first been sought and obtained.
- Note 4: If an applicant or owner is aggrieved by this determination an application may be made in writing to the Council to revoke or amend this planning approval and there is a right of review by the State Administrative Tribunal in accordance with the Planning and Development Act 2005 Part 14. An application must be made within 28 days of the determination.

20 February 2017

MANAGER DEVELOPMENT APPROVALS

For and on behalf of the City of Perth





Enquiries to:
Contact:
Our Reference: DA-2016/5473

20 February 2017

MacCormac Architects
Suite 3/1329 Hay St
WEST PERTH WA 6005

Dear Sir/Madam

28 (LOT 743) ST GEORGES TERRACE AND 501 (LOTS 563 AND 744) HAY STREET, PERTH – DEMOLITION OF THE EXISTING ANZAC HOUSE AND CLUB BUILDING AND THE CONSTRUCTION OF A 10-LEVEL MIXED-USE BUILDING FOR THE RSLWA CLUB AND OFFICES AS WELL AS COMMERCIAL OFFICES AND DINING TENANCIES

Thank you for your application dated 18 November 2016 and for the plans received on 16 January 2017 for the demolition of the existing ANZAC House and Club Building and the construction of a 10-level mixed-use building for the RSLWA Club and Offices as well as commercial offices and dining tenancies.

This proposal was considered by the Council at its meeting held on 14 February 2017 where in accordance with the provisions of the City Planning Scheme No. 2, the Planning and Development (Local Planning Schemes) Regulations 2015 – Deemed Provisions for Local Planning Schemes and the Metropolitan Region Scheme it was resolved to grant conditional approval. The attached Approval to Commence Development outlines the conditions applied.

Please note that building works cannot proceed prior to the City issuing a building permit. You are advised that where a condition of approval is required to be satisfied "prior to applying for a building permit", it is the developer's responsibility to address these matters in a timely manner. To assist applicants in obtaining the City's clearance of all relevant planning conditions, together with addressing any preliminary building, health or engineering advice notes (as attached) the City offers a free 'Pre-Permit Clearance' service. To take advantage of this service, please complete the attached application form and submit it to the City with a written statement advising how each of the relevant conditions and advice notes have been satisfied, together with two sets of final architectural drawings for the development where appropriate. The City will issue written confirmation that the conditions and

plans have been cleared to the City's satisfaction, which can then be included in your application for a building permit as evidence of the necessary approvals being in place.

You are then required to submit an application for an Occupancy Permit (BA9) to the City. _____ is available on _____ to assist with any queries you may have in relation to these applications.

Preliminary building and health advice is also enclosed for your information and compliance.

_____ of the City's Development Approvals Unit is available on _____ to assist you with any further queries you may have relating to this matter.

Yours faithfully

MANAGER DEVELOPMENT APPROVALS

Encl. Planning determination
 Approved plans
 Preliminary advice

PRELIMINARY ADVICE

DA-2016/5473 'ANZAC CLUB', 28 St Georges Terrace, PERTH WA 6000,
'CENTRAL LAW COURTS', 501 Hay Street, PERTH WA 6000

BUILDING ADVICE

BPR Building permit required

A building permit is required to be submitted and approved prior to undertaking building work.

AN02 Disability Discrimination Act

The building owner/developer is hereby notified that in addition to the disabled access and facility requirements of the BCA, it is the responsibility of the building owner/developer to ensure the development complies with the Disability Discrimination Act 1992 and the Disability (Access to Premises - Buildings) Standards 2010. Further information may be obtained from the Disability Services Commission.

BG07 Occupancy Permit

The building or any part thereof, shall not be occupied until this Council has issued a Occupancy Permit to the owner.

HEALTH CONDITIONS

HMISC Health Miscellaneous
Legislation

The proposed development is satisfactory subject to compliance with the following Environmental Health and other legislation:

- Food Act 2008;
- Food Regulations 2009;
- Food Safety Standards 3.2.3 *Food Premises and Equipment*;
- **Health (Public Buildings) Regulations 1992**
- Occupational Health, Safety and Welfare Act/Regulations;
- Sewerage (Lighting, Ventilation & Construction) Regulations 1971;
- City of Perth Health, Health Local Law 2000;
- Metropolitan Water Supply, Sewerage and Drainage Board by-laws 1981;
- Environmental Protection (Noise) Regulations 1997;
- Liquor Licensing Act 1988.

Toilets

- Sanitary conveniences to be provided in accordance with the provisions of Table F2.3 of the Building Code of Australia.

Exhaust Canopy

- Cooking equipment with energy input over 8kW or 29 MJ/h to be provided with an exhaust canopy in accordance with AS 1668.2-2012.

Grease Trap

- A grease trap is to be provided in accordance with the Water Corporation Trade Waste Section.

Bin Area

The premises to be provided with access to a bin area with:

- A tap connected to a water supply;
- Smooth impervious walls minimum 1.5 metres in height;
- An access way minimum 1 metre wide fitted with a self-closing door;
- Smooth impervious floor minimum 75mm thick, graded and drained to a 100mm industrial grade floor waste.

Public Building

- As it is intended to use parts of this development as a Public Building as defined in Section 173 of the Health Act 1911 it will be necessary to make application for a Certificate of Approval Maximum Accommodation Notice before commencing use as a public building operation.
- Provide detailed plans and specifications of the public building to the Approval Environmental Health Officer of the Environment and Public Health Unit prior to construction or alternations.

Public Building Step Treads and Risers

Step treads and rises to public building areas shall have treads not less than 280mm wide and risers not exceeding 180mm in height.

Agenda **621 (Lot 1) Wellington Street, Perth – Installation of a Wall Sign**
Item 13.4 **Displaying Third Party Advertising Content**

Recommendation:

That, in accordance with the provisions of the City Planning Scheme No. 2, the Planning and Development (Local Planning Schemes) Regulations 2015 – Deemed Provisions for Local Planning Schemes and the Metropolitan Region Scheme, the Council REFUSES the application for the installation of a wall sign displaying third party advertising content at 621 (Lot 1) Wellington Street, Perth, as indicated on the Local Planning Scheme Form and Metropolitan Region Scheme Form One dated 14 March 2017 and the plans received on 19 April 2017 for the following reasons:

- 1. *The proposed sign does not comply with City Planning Scheme No. 2 Policy 4.6 – Signs given that:***
 - 1.1 *the sign is contrary to clause 6.6 c) i) as it is not located within or facing onto a public space where it is oriented for viewing within the space and not from adjacent streets;***
 - 1.2 *the sign is contrary to clauses 5.0 c), 6.6 c) i) b) and 7.12 b) as it is not designed as an integral element of building and is out of proportion with the building's eastern façade, detrimentally impacting on the character and appearance of the existing building and the streetscape;***
 - 1.3 *the third party advertising content is contrary to clause 5.0 h) as it will not enhance or make a positive contribution to the visual quality, amenity and vibrancy of the area;***
 - 1.4 *the sign is contrary to clause 6.6 c) iv) as the third party advertising content of the sign is not limited to products, brands and events within the local government boundaries; and***
 - 1.5 *noting 1.1, 1.2, 1.3 and 1.4 above, the sign is considered to be contrary to orderly and proper planning.***

The Committee recommendation to the Council for this report was resolved by the Planning Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE: 2017/5150
 SUBURB/LOCATION: 621 (Lot 1) Wellington Street, Perth
 REPORTING UNIT: Development Approvals
 RESPONSIBLE DIRECTORATE: Planning and Development
 DATE: 19 June 2017
 ATTACHMENT/S: Attachment 13.4A – Map and Perspective for 621 Wellington Street
 3D MODEL PRESENTATION: N/A

 LANDOWNER: Mode Modular Systems Pty Ltd (Mantra Hotels)
 APPLICANT: Adventure Outdoor Advertising Pty Ltd
 ZONING: (MRS Zone) Central City Area
 (City Planning Scheme Precinct) Citiplace Precinct 5 (P5)
 (City Planning Scheme Use Area) City Centre
 APPROXIMATE COST: \$10,000

Legislation / Strategic Plan / Policy:

Legislation Planning and Development Act 2005
 City Planning Scheme No. 2

Policy

Policy No and Name: 4.6 Signs Policy
 Precinct Plan 5 - Citiplace

Details:

The application proposes the installation of a wall sign at the upper floor levels of the eastern elevation of the Peppers Hotel development. The wall sign is proposed to display third party advertising content. The sign will measure approximately 7.4 metres in width by 15.5 metres in height and will project 0.8 metres beyond the existing wall into the adjacent property at 613-619 Wellington Street, Perth. The applicant has received consent from the adjacent property owner at 613-619 Wellington Street for the encroachment of the sign into their property.

In addition the applicant has provided the following details in relation to the content and quality of the sign:

- Advertisers will only use high quality graphics and vibrant artistic content that maintains or improves the visual amenity of the locality consistent with the applicant's GR8 Media Advertising Policy.
- No advertisement will contain corporate markings, logos or branding exceeding more than 10 per cent of the total billboard area.
- No individual advertisement will be displayed for a period exceeding six calendar months.
- New advertisements will be installed immediately after the removal of the previous advertisement.
- All advertising is to conform to the standards outlined in the applicant's GR8 Media Social Policy and in accordance with the Outdoor Media Association's Code of Ethics.

Compliance with Planning Scheme:

Development Requirements

The subject site is located in the City Centre Use Area of the Citiplace Precinct 5 (P5) under City Planning Scheme No. 2 (CPS2). The Citiplace Precinct will be enhanced as the retail focus of the State providing a range of retail and related services more extensive than elsewhere in the metropolitan region. The site is also located in the 'Retail Core Area' under the City's Signs Policy 4.6 whereby signs should contribute to a lively, colourful and stimulating pedestrian environment with the character of the signage reflecting the intended predominance of retail uses in the area.

The proposed sign is defined as a 'wall sign' with 'third party advertising content' under the City's Signs Policy 4.6 as outlined below:-

***"Wall Sign** means a sign that is fixed flat or parallel to, or painted upon, the surface of a wall of a building (including a glass wall or a decorative or screen material fixed flat or parallel to the wall), but not to a roof top plant room setback from the main elevation of the building or to an architectural feature at the top of the building. It includes cabinets fixed to walls to display an advertisement."*

***"Third Party Advertising Content** means sign content that advertises businesses, products, goods or services not located or available at the premises where the sign content is displayed."*

The applicant is seeking variations to the City's Signs Policy 4.6 which will be discussed in further detail under the comments section of this report. Variations to the Signs Policy can only be granted by an absolute majority decision of Council, in accordance with Clause 36 of the City Planning Scheme No. 2 and provided Council is satisfied that:

- "36(3)(c)(i) if approval were to be granted, the development would be consistent with:*
- (A) the orderly and proper planning of the locality;*
 - (B) the conservation of the amenities of the locality; and*
 - (C) the statement of intent set out in the relevant precinct plan; and*
- (ii) the non-compliance would not have any undue adverse effect on:*
- (A) the occupiers or users of the development;*
 - (B) the property in, or the inhabitants of, the locality; or*
 - (C) the likely future development of the locality.'*

Comments:

Location

Signage should be predominantly located at ground, first floor or the top of the building identifying principle tenants of the building. Signage at other locations on a building should be limited and may only be supported where the building has been designed to specifically accommodate signage at that location and where the purpose and viewing audience of the signage is clear and justified.

The City's Signs Policy 4.6 which was adopted by Council on 13 December 2016 provides specific guidance on where third party advertising content should be located within the city.

Under clause 5.0 h), third party advertising content should only be permitted in limited locations within the city where it can be demonstrated that it will enhance and not adversely affect the visual quality, amenity, vibrancy and safety within the city. In addition clause 6.6 c) i) a) limits third party advertising to signs which face or are located within a public space within the Entertainment Area, the Retail Core Area, the Town Centre Area or The Terraces Area where the sign is oriented for viewing from within the space and not from adjacent streets.

With respect to the location of wall signs, clause 6.6 c) i) b) of the City's Signs Policy restricts these signs to buildings within the Entertainment, Retail Core Area or Town Centre Area where the subject building has a valid development approval granted prior to June 2014 and the wall sign is proposed to be installed upon a large section of the blank wall that would be enhanced by its addition.

The proposed wall sign which will display third party advertising content will be located on the eastern elevation of the Peppers Hotel, where it is primarily oriented for viewing from Wellington Street. Whilst the wall sign will be located within the Retail Core Area and on a building granted development approval prior to June 2014, it is inconsistent with clause 6.6 c) i) a) which requires third party advertising signs to be oriented for viewing from within a public space and not from adjacent streets.

The applicant's reference to the City's Thoroughfares and Public Places Local Law in terms of the definition of a footpath as a public space is not relevant in terms of what is intended as a public space under the City's Sign's Policy. Whilst it is understood that the preference of advertising companies is to locate third party advertising in highly visible locations, primarily adjacent to main roads for viewing by passing motorists, the intent of the Policy is to provide a controlled approach and prevent it from becoming excessive or dominant in the City. For this reason third party advertising is limited to active public spaces designed for people to gather, where it will complement and enhance the nature and vibrancy of the space, including public plazas and pedestrian malls.

The applicant has also referred to the Metropolitan Redevelopment Authority's (MRA) Perth City Link Masterplan in justifying the Wellington Street footpath as a public space. Whilst it is acknowledged that the Masterplan seeks to encourage pedestrian activity along Wellington Street through alfresco dining and the provision of street furniture, the footpath is part of the road reserve and is not a public gathering space as envisaged by the Policy. There are many streets in the City that have alfresco dining and street furniture however it was never the intention of the Policy that third party advertising content be oriented towards these spaces. Signage in the streetscape should principally be for the purpose of numbering and naming buildings and businesses along the ground floor level. It is also noted that the southern side of Wellington Street (including the southern footpath) falls within the City's jurisdiction and not within the MRA Perth City Link Area.

Based on the above it is considered that the proposed wall sign which will display third party advertising content is contrary to clause 6 c) i) of the City's Signs Policy 4.6 as it is not located within or facing onto a public space where it is oriented for viewing within the space and not from adjacent streets and, therefore, the proposed location of the sign should not be supported

Sign Content and Vibrancy

Clause 6.6 c) iv) of the City's Signs Policy 4.6 further requires third party advertising content to be related to products, services or events available within the city boundaries. It should also be demonstrated that the third party advertising content will enhance and not adversely affect the visual quality, amenity, vibrancy and safety of the place in accordance with clause 5.0 h). The advertising strategy submitted with the application sets out the general advertising standards that will be applied however does not indicate the type of content that will be displayed or that it will be limited to products, services or events within the City. Whilst the sign is considered to have no detrimental impacts on road safety, the use of general third party advertising content in this location does not result in a positive contribution to the visual quality, amenity or vibrancy of the area.

Based on the above it is considered that the sign is contrary to clause 5.0 h) and 6.6 c) iv) of the Sign's Policy 4.6 as the third party advertising content of the sign is not proposed to be limited to products, brands and events within the local government boundaries and will not result in a positive contribution to the area in terms of visual quality, amenity or vibrancy.

Design and Scale

Clause 5.0 c) of the City's Signs Policy 4.6 requires that signs are compatible in scale and are integrated into the architectural design of the building, having regard to the form, materials, finishes, colours and fenestration of the building and the architectural features of a building should not be obscured. The scale of signs should be compatible with the form of buildings they are on. Furthermore appropriate dimensions are achieved by using structural lines or material panels as a guide. This ensures that the architectural character of the building remains dominant.

In addition clause 7.11 b) of the Signs Policy requires that wall signs located at the top of the building should have a maximum vertical dimension equal to one tenth of the building's height, but not more than the combined height of two typical floors of a building. Wall signs should also only be installed on large sections of blank walls which are enhanced by its addition in accordance with clause 6.6 c) i) b).

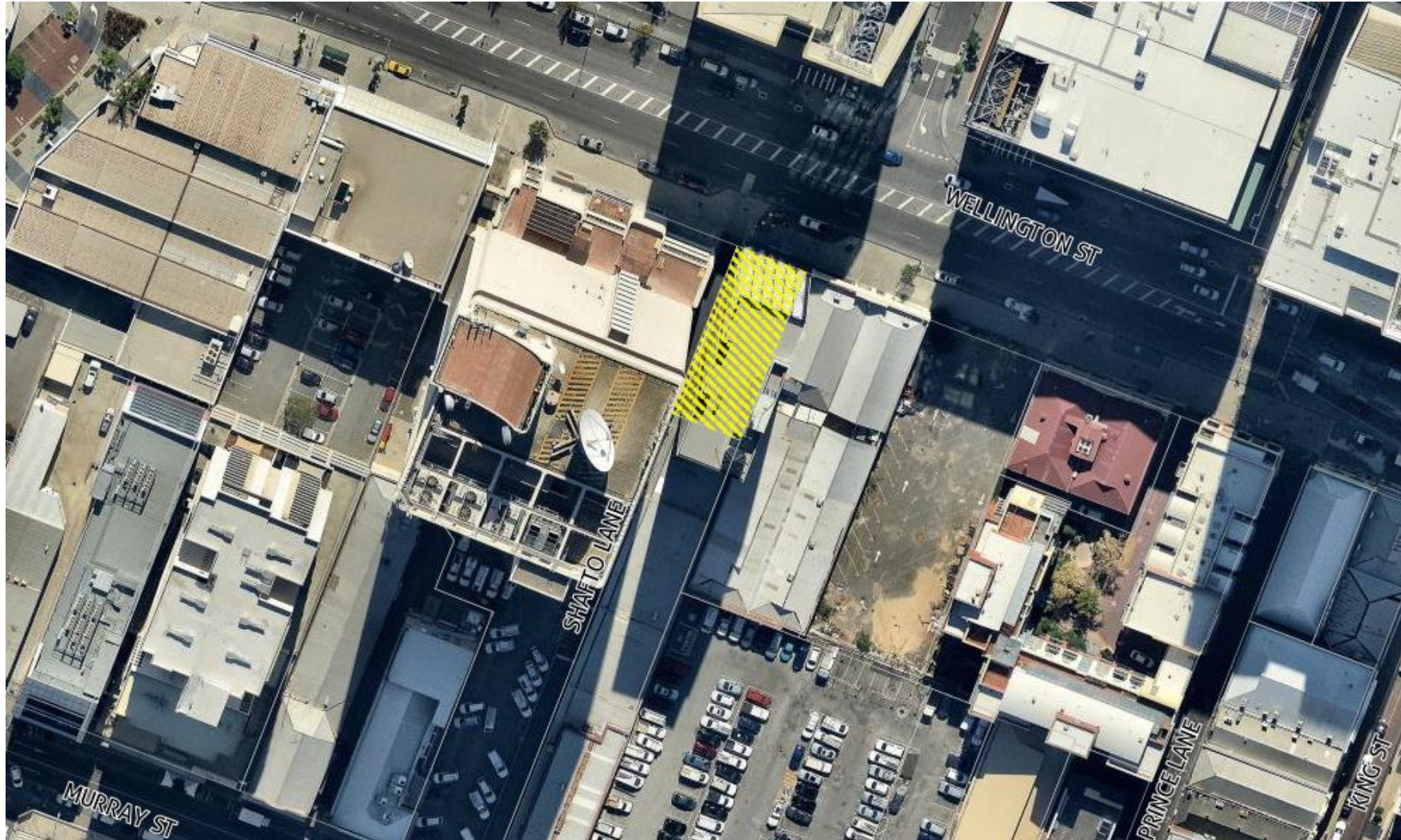
It is considered that the proposed wall sign has not been integrated into the design of the building and does not enhance the appearance eastern elevation wall. The position of the sign is not contained within the existing panels and does not make any reference to the pattern behind. This will result in a sign which appears as an ad hoc addition to the building. The height of the sign is also excessive in relation to the height of the overall building (29% of the height of the building), is greater than the maximum vertical dimension permitted under clause 7.11 b) and will therefore appear out of proportion with the building's eastern elevation.

Based on the above it is considered that the sign has not been designed as an integral element of the building, does not enhance the eastern elevation wall and will appear out of proportion with the scale of the existing building, detrimentally impacting on the external appearance of the building and streetscape and contrary to clauses 5.0 c), 6.6 c) i) b) and 7.11 b) of the City's Signs Policy 4.6.

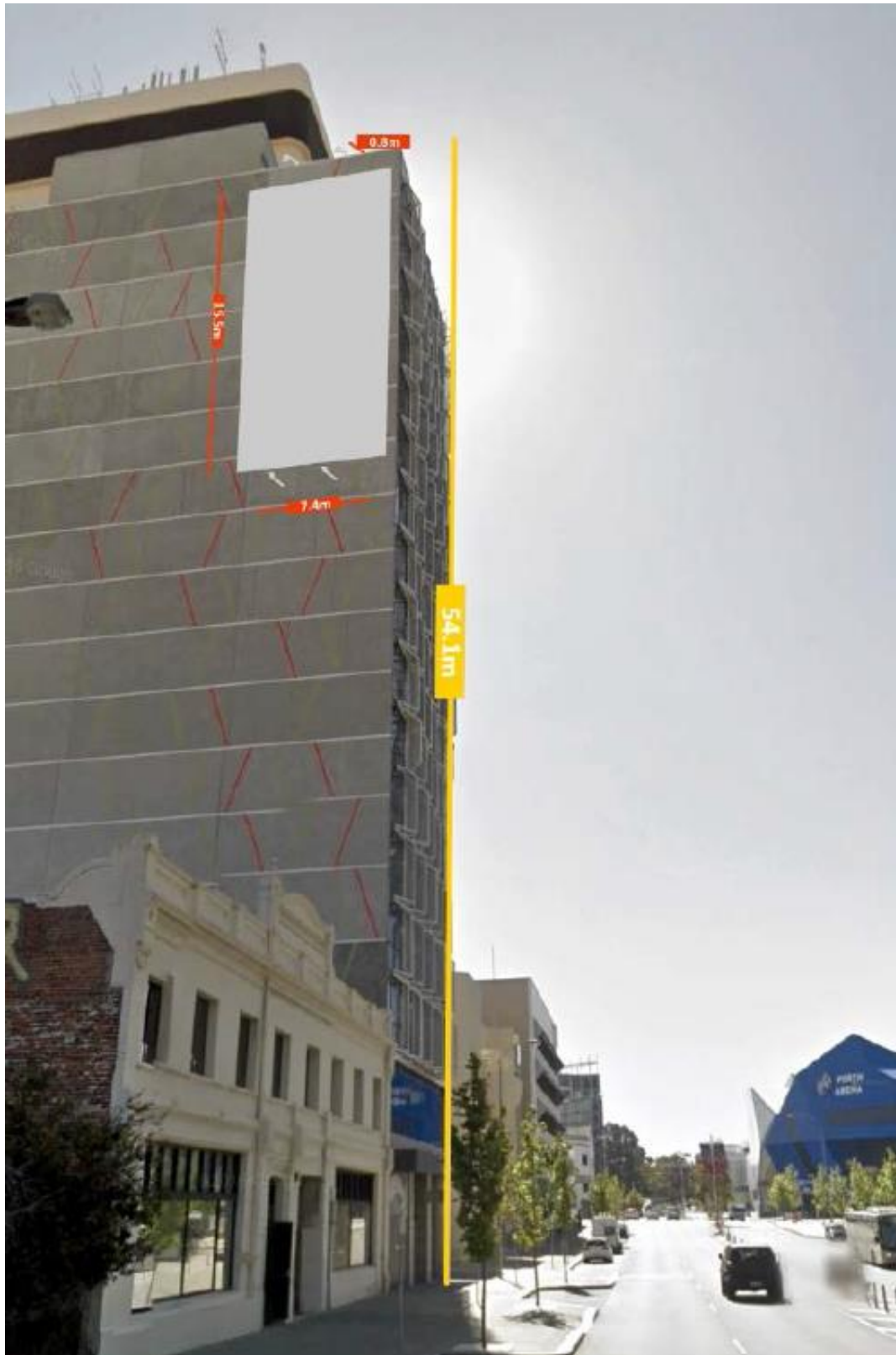
Conclusion

The new Peppers Hotel at 621 Wellington Street is a highly visible location that would enable third party advertisements to be viewed from major roads and from a considerable distance where it would have a large audience in terms of motorists and pedestrians. This however is not necessarily a good outcome for the visual appearance of the locality or the city generally. Third party advertising, if not carefully managed, can create visual noise and detract from the visual amenity of the city, from general way-finding and from the advertising of the local city businesses and their goods and services. There is a danger that it can become the dominant element of the urban environment, rather than the buildings, spaces and business making and forming the city's character.

For these reasons the City's Signs Policy 4.6 seeks to ensure that signage is well designed and positioned, innovative, responds to its setting and makes a positive contribution to the visual appeal of the public realm and the city as a whole. The proposed permanent display of a larger third party advertising wall sign on the eastern elevation of the Peppers Hotel at 621 Wellington Street is contrary to the intent and specific requirements of the City's Signs Policy and will have a negative impact on the streetscape and character of the area. Therefore, it is recommended that this application be refused.



2017/5150 - 621 (LOT 1) WELLINGTON STREET, PERTH



2017/5150 - 621 (LOT 1) WELLINGTON STREET, PERTH

Agenda Item 13.5 Annual Arts Sponsorship – AWESOME International Arts Festival

Recommendation:

That Council by ABSOLUTE MAJORITY decision and subject to the approval of the 2017/18 budget:

- 1. approves cash sponsorship of \$100,000 (excluding GST) to Awesome Arts Australia Ltd to support the 2017 AWESOME International Arts Festival from Saturday, 30 September to Friday, 13 October 2017;***
- 2. notes the provisional list of sponsorship benefits contained within the Detailed Officer Assessment in Attachment 13.5A;***
- 3. notes the provisional benefits offered in Attachment 13.5A and authorises the Chief Executive Officer (or an appointed delegate) to negotiate with the applicant the final list of sponsorship benefits according to the Council approved funding amount; and***
- 4. notes that a detailed acquittal report, including all supporting material, will be submitted to the City of Perth by 31 January 2018.***

The Committee recommendation to the Council for this report was resolved by the Marketing, Sponsorship and International Engagement Committee at its meeting held on 20 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1034140#04
REPORTING UNIT:	Business Support and Sponsorship
RESPONSIBLE DIRECTORATE:	Economic Development and Activation
DATE:	7 June 2017
ATTACHMENT/S:	Attachment 13.5A – Detailed Officer Assessment

Legislation / Strategic Plan / Policy:

Legislation	N/A
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Integrated Planning and Reporting Framework Implications	Strategic Community Plan Council Four Year Priorities: Perth as a Capital City Healthy and Active in Perth S5 Increased place activation and use of under-utilised space
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- S6 Maintain a strong profile and reputation for Perth as a city that is attractive for investment
- S15 Reflect and celebrate the diversity of Perth

Policy

Policy No and Name: 18.13 - Sponsorship

Purpose and Background:

The City of Perth received a request for a Triennial Arts Partnership of \$125,000 (excluding GST) for the 2017 AWESOME International Arts Festival for Bright Young Things (AWESOME Festival).

The application for funding did not achieve the threshold for support under Triennial Arts Partnership. Panel members however unanimously agreed on the value of the event to the City and the application has now been reassessed under Annual Arts Sponsorship criteria and is recommended for annual sponsorship of \$100,000.

Details:

2017 will mark the 21st year of the AWESOME Festival. City of Perth is the AWESOME Festival's foundation partner and was instrumental in bringing the event into Perth in 1996.

The AWESOME Festival is a multi-form arts Festival for children and young people, from infants to twelve years old. Perth's premier arts event for children and families, the Festival is presented annually in October over two weeks and attracts an estimated 173,000 people to the Perth Cultural Centre and other venues in the City of Perth.

The AWESOME Festival's diverse program includes theatre, dance, workshops, visual arts, literature, new media, film and interactive activities. The Festival presents an interactive curated program for children, their families and educators and supports learning, development and connection.

Financial Implications:

ACCOUNT NO:	93E190007901
BUDGET ITEM:	N/A
BUDGETED AMOUNT:	\$1,070,000
AMOUNT SPENT TO DATE:	\$360,000
PROPOSED COST:	\$100,000
BALANCE REMAINING:	\$710,000
ANNUAL MAINTENANCE:	N/A
ESTIMATED WHOLE OF LIFE COST:	N/A

All figures quoted in this report are exclusive of GST.

Assessment:

Outcome	Assessment Score (%)
Cultural Outcomes	77.5%
Economic Outcomes	71%
Community and Social Outcomes	84%
Environmental and Place Outcomes	50%
Civic Outcomes	62.5%
Organisational Competency	82.5
<u>TOTAL ASSESSMENT SCORE</u>	<u>75%</u>

Comments:

The panel recognised that AWESOME Festival is an important annual event on the City's events calendar. The panel noted the educational, cultural and artistic importance of the event to the target audience and their importance to the ongoing vitality of the City. The panel believes that AWESOME is a key event to attract the demographic of families and children into the city, to experience arts, science and technology.

The event is almost contained entirely within the Perth Cultural Centre and the panel would like to see the possibility for satellite events to be developed in future years which will enhance and activate other key city locations.

The panel note that there will be increased car parking benefits to City of Perth parking as many families will drive into the city, rather than use public transport, to attend the event.

The panel applauded AWESOME's intention to grow and expand into underutilised spaces, and the panel noted that this would assist AWESOME to secure triennial funding in the future.

ATTACHMENT 13.5A

Annual Arts Sponsorship – AWESOME International Arts Festival 2017

Project Title	The AWESOME International Arts Festival for Bright Young Things		
Project Start Date	30/09/2017		
Project End Date	13/10/2017		
Venues	Perth Cultural Centre State Theatre Centre of Western Australia State Library of Western Australia Art Gallery of Western Australia Perth Concert Hall University of Western Australia Theatres (The Octagon & Dolphin Theatres)		
Expected attendance numbers	173,000		
Projected overall attendance at free components	160,000	Projected overall attendance at ticketed component	13,000
Total Project Cost	\$1,336,000		
Total Amount Requested	\$125,000 (9% of the total project budget)		
REMPAN Impact (Direct)	\$16.815M	REMPAN Total	\$27.191M
Recommendation	Approval for Annual Arts Sponsorship		
Recommended amount	\$100,000	Assessment Score	63 out of 84 (75%)

Applicant Details*Information from the Australian Business Register*

ABN	57075789383
Entity Name	Awesome Arts Australia Ltd
Entity Type	Australian Public Company
ABN Status	Active
ATO Endorsed Charity Type	Charity
Goods & Services (GST)	Yes
Endorsed as DGR	Yes
DGR Item Number	Item 1
DGR Funds	N/A
Tax Concessions	FBT Rebate, GST Concession, Income Tax Exemption
Main Business Location Postcode	6003
Main Business Location State	WA
ACNC Registration	Registered

Program Summary

Awesome Arts Australia Ltd is a not-for-profit company established in 1996 to create a contemporary arts festival for young people. The company is based in Northbridge.

The AWESOME International Arts Festival for Bright Young Things (AWESOME Festival) is Perth's premier arts event for children, families and educators. Presented annually in October over two weeks, the Festival attracts an estimated 173,000 people to the Perth Cultural Centre and other venues in the city.

The event brings whole families together and supports learning, development and connection from infants through to Year 10 students.

City of Perth is the AWESOME Festival's foundation partner and has been a major sponsor of the event since 1996. The City was instrumental in bringing the event into Perth in 1996, where it continues to thrive with its diverse, multi-art form program of quality theatre, dance, visual arts, exhibitions, dance performances, films, creative workshops and free interactive activities.

Program Description

The 2017 Festival will be held from 30 September – 13 October 2017. The Festival will include both free and ticketed components.

The first ten days of the event are presented for general public audiences, while the final four days are for school excursions. During this time schools are invited to participate with specially-curated programs including shows and workshops. To maximise learning outcomes, AWESOME provides schools with curriculum-linked education resource kits, specifically designed for each year level.

Free Activities and Exhibitions

- AWESOME will present a diverse program of free interactive activities, events and exhibitions across various locations in the City of Perth. The free activities are advertised in the Festival program, with additional pop-up activities designed to surprise and delight audience members when they arrive at the event.
- Projected attendance of 160,000 attendees

Ticketed Shows, Workshops and Activity Zone

- AWESOME will present a variety of ticketed theatre shows, creative workshops, and an activity zone with a number of interactive elements.
- Most tickets are priced at \$15, with a small number of in-depth workshops, shows at UWA Theatres and the State Theatre Centre priced between \$20 and \$28. The Activity Zone will be a \$15 ticket, valid for the full 10 days to encourage repeat visitation.
- Projected attendance of 13,000 attendees

Triennial Funding Application

The City of Perth received a request for Triennial Arts Partnership of \$125,000 (excluding GST) for the AWESOME Festival. The application for funding did not achieve the threshold for support under Triennial Arts Partnership which was set at 70 out of 92 in the assessment matrix. Panel members however unanimously agreed on the value of the event to the City and the application has now been reassessed under Annual Arts Sponsorship criteria and is recommended for annual sponsorship of \$100,000.

Previous City of Perth Support (last 5 years)

The City of Perth has provided sponsorship for the AWESOME Festival for 18 years. Recent sponsorship is as follows:

Year	Amount
2012	\$100,000
2013	\$100,000
2014	\$100,000
2015	\$100,000
2016	\$100,000
TOTAL	\$500,000

Sponsorship Benefits

Organisers will provide the below benefits for the requested sponsorship.

1. Acknowledgement of City of Perth as a Major Partner and the City of Perth logo included on:
 - a. The AWESOME Festival Program (22,000 copies distributed across the metropolitan area);
 - b. The AWESOME Festival lift out in the West Australian (80,000 copies on Saturday 23 September 2017);
 - c. Event signage;
 - d. Two social media posts on AWESOME channels;
 - e. One inclusion in an EDM to AWESOME Festival database (5,700 subscribers); and
 - f. The Sponsor Page on the AWESOME website.

In addition the City of Perth will receive:

2. One full page colour advertisement in the AWESOME Festival Program;
3. Invitation to the Lord Mayor, or City representative, to open the AWESOME Festival at the VIP Festival launch event; and
4. Opportunity to display one pull up banner at an indoor venue during the two weeks of the AWESOME Festival.

Annual Arts Sponsorship Assessment Score Card

The application was assessed by a two person assessment panel and the scoring has been averaged for each outcome.

The following outcomes are based on the schema of measurable outcomes for cultural engagement, developed by the Cultural Development Network:
<http://www.culturaldevelopment.net.au>

CULTURAL OUTCOMES		SCORE
Is the arts activity of international calibre, with suitably experienced personnel?		3
Does the project contribute to building and sustaining a local arts economy?		3
Does the project provide professional development opportunities for local artists and/or cultural workers?		2.5
Does the project reflect new practices through engagement of new forms of technology and/or multidisciplinary art forms?		3
Does the project utilise innovative technologies to widen audience engagement?		4
Subtotal 15.5 out of 20 (77.5%)		
Comments <ul style="list-style-type: none"> • AWESOME aims to be internationally recognised as one of the world's Top 5 organisations dedicated to the interface between the arts and children; • Organisers believe that the AWESOME Festival program now has a reputation that brings national and international programmers and curators to Perth; • Organisers aim to increase the standard of what is on offer for Perth families and engage professional artists who must be of international standing; and • The event showcases some of Perth's leading professional artists alongside their international counterparts and in 2016 the AWESOME Festival engaged 25 locally based artists. 		
ECONOMIC OUTCOMES		
Does the project attract a broad audience and stimulate the local economy?		3
Does the project contribute to a unique cultural tourism offering for local, national and international audiences?		2.5
Does the project demonstrate intrinsic economic impact and have ongoing social and cultural influence?		3
Subtotal 8.5 out of 12 (71%)		
Comments <ul style="list-style-type: none"> • Economic modelling on the projected attendance with the City's economic modelling tool REMPLAN indicates a total estimated direct economic impact of \$16,815,000 to the local City of Perth economy; • In 2016 the event drew an estimated 160,000 people into Perth and remains on a steady growth trajectory with 42% of survey respondents indicating that this was their first visit. The value and diversity of the program offering is further validated by the fact that 51% of the 2016 audience attended for multiple days; and • Organisers estimate an attendance of 173,000 for the 2017 event. 		

COMMUNITY AND SOCIAL OUTCOMES	
What is the level of anticipated community benefits for the project?	4
Does the project increase access to and opportunities to participate in cultural life?	4
Does the project drive social engagement and participation of the broader community?	2.5
Does the project challenge established understanding through exploration and exchanging ideas?	3
Subtotal 13.5 out of 16 (84%)	
Comments <ul style="list-style-type: none"> • A primary objective for the 2017 Festival is focusing on growing the audience across all segments but most particularly the early childhood market including expanded opportunities for Creative Play (structured and unstructured) and increased number of performances available for children under five years of age; • The program is specifically designed to be equally as enjoyable for adults and aims to foster exploration, conversation and growth, providing Western Australian families and educators with opportunities to connect with each other and their community. Organisers believe this approach builds capacity, provides more opportunities for meaningful engagement and communication within families and with the broader community. It also contributes to learning and development in children; • Organisers believe the event provides an opportunity for families to participate in the arts and cultural activities together, moving beyond the idea that parents drop the children off for passive experiences, but actively participate with the children as collaborators in the activities on offer; • Programming encourages creative play, exploration and promotes positive wellbeing through participative experiences in a social environment; • Organisers have received global recognition for their Autism Spectrum Disorder (ASD) Guide. This unique guide enables hundreds of children with ASD to participate in cultural life via the AWESOME Festival, often for the first time; and • For two years, AWESOME has partnered with the Department of Culture and Arts to deliver a subsidised ticketing program for low-income families. 	
ENVIRONMENTAL AND PLACE OUTCOMES	
Does the project activate public spaces with dynamic cultural programming?	2.5
Does the project activate underutilised locations or locations prioritised for activation by the City in interesting and engaging ways?	1.5
Subtotal 4 out of 8 (50%)	
Comments <ul style="list-style-type: none"> • The full Festival takes place within City of Perth boundaries; • Organisers aim to inspire and delight AWESOME's audience and enliven public space, • The early childhood program makes the AWESOME Festival highly accessible for entire families with children of varying ages and encourages participation and engagement with public spaces from a very young age. 	

CIVIC OUTCOMES	
Does the project increase visibility and understanding of the City's cultural heritage and its precincts through immersive projects and interventions?	2
Does the project deliver innovative arts activity that represents Perth's unique cultural identity?	3
Subtotal 5 out of 8 (62.5%)	
Comments <ul style="list-style-type: none"> Organisers aim to contribute to the social capital of the city by offering unique, quality experiences that are affordable and accessible and bring families and students together to learn, participate and to be immersed in cultural experiences; and In 2016 AWESOME conducted a Culture Counts survey which indicated that 99% of survey respondents said that the AWESOME Festival was an important addition to Western Australia's cultural scene. 	
ORGANISATIONAL COMPETENCY	
Overall quality of the application for accuracy, content, detail, attachments and response to the questions	3
Are the project plan and budget realistic and value for money?	3.5
Does the applicant have a demonstrated capacity to undertake all aspects of the project including evaluating and documenting the results?	4
Does the applicant have evidence of partnerships with other government agencies, businesses or community organisations?	3
Is the project concept and planning well developed and articulated?	3
Subtotal 16.5 out of 20 (82.5%)	
Comments <ul style="list-style-type: none"> Awesome Arts Australia has successfully managed this event for 19 years and has consistently met all City requirements; The amount recommended (\$100,000) for the City of Perth to support the Festival represents 7% of the total program cost; The event has a range of both government and corporate funding sources including Principal Partner BHP, Lotterywest, the State Government through the Department of Culture and the Arts and Wesfarmers Arts. Culture Counts will be engaged again in 2017 to accurately measure the outcomes of the 2017 Festival. 	
TOTAL ASSESSMENT SCORE 63 out of 84 (75%)	

Agenda**Annual Arts Sponsorship – WAM Festival 2017****Item 13.6**

Recommendation:

That Council by ABSOLUTE MAJORITY decision and subject to the approval of the 2017/18 budget:

- 1. approves cash sponsorship of \$40,000 (excluding GST) to the West Australian Music Industry Association Incorporated to support the WAM Festival 2017 from Wednesday, 1 November to Sunday, 5 November 2017.***
- 2. notes the provisional list of sponsorship benefits contained within the Detailed Officer Assessment in Attachment 13.6A;***
- 3. authorises the Chief Executive Officer (or an appointed delegate) to negotiate with the applicant the final list of sponsorship benefits according to the Council approved funding amount; and***
- 4. notes that a detailed acquittal report, including all supporting material, will be submitted to the City of Perth by 28 February 2018.***

The Committee recommendation to the Council for this report was resolved by the Marketing, Sponsorship and International Engagement Committee at its meeting held on 20 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1034140#04
REPORTING UNIT:	Business Support and Sponsorship
RESPONSIBLE DIRECTORATE:	Economic Development and Activation
DATE:	7 June 2017
ATTACHMENT/S:	Attachment 13.6A – Detailed Officer Assessment

Legislation / Strategic Plan / Policy:

Legislation	N/A
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Integrated Reporting Implications	Planning and Framework	Strategic Community Plan
		Council Four Year Priorities: Perth as a Capital City
		Healthy and Active in Perth, Perth at Night
		S5 Increased place activation and use of under-utilised space
		S6 Maintain a strong profile and reputation for Perth

as a city that is attractive for investment

S13 Development of a healthy night time economy

S15 Reflect and celebrate the diversity of Perth

Policy

Policy No and Name: 18.13 - Sponsorship

Purpose and Background:

The City of Perth received a request for Triennial Arts Sponsorship of \$110,000 (excluding GST) from the West Australian Music Industry Association (WAM) for the 2017 WAM Festival.

The application for funding did not achieve the threshold for support under Triennial Arts Sponsorship. Panel members however unanimously agreed on the value of the event to the City and the application has now been reassessed under Annual Arts Sponsorship criteria.

The revised request under Annual Arts Sponsorship is for \$50,000. The application is recommended for annual sponsorship of \$40,000.

Details:

Celebrating its 23rd year in 2017, the WAM Festival (WAMFest) is an annual showcase and celebration of original Western Australian contemporary music. WAMFest is a celebratory event for the whole community, as well as a market and audience development opportunity for WA artists.

The 2017 WAMFest will be held from Wednesday, 1 November to Sunday, 5 November 2017 and will include a number of free and ticketed events.

WAMFest incorporates a variety of elements which are staged in Perth city and the greater metropolitan area. Activities staged within the city will include the WAM Festival Opening Parties, WAM Festival launch performance, WA Music Conference, Friday Showcases and Saturday Spectacular.

Financial Implications:

ACCOUNT NO:	93E190007901
BUDGET ITEM:	Donations and Sponsorships
BUDGETED AMOUNT:	\$1,070,000
AMOUNT SPENT TO DATE:	\$360,000
PROPOSED COST:	\$40,000
BALANCE REMAINING:	\$710,000
ANNUAL MAINTENANCE:	N/A
ESTIMATED WHOLE OF LIFE COST:	N/A

All figures quoted in this report are exclusive of GST.

Assessment

Outcome	Assessment Score (%)
Cultural Outcomes	62.5%
Economic Outcomes	75%
Community and Social Outcomes	84%
Environmental and Place Outcomes	94%
Civic Outcomes	56%
Organisational Competency	78%
<u>TOTAL ASSESSMENT SCORE</u>	<u>74%</u>

Comments:

The panel noted WAM's efforts to engage with key City of Perth staff over the previous six months on a range of topics to further the relationship between the two parties and align the direction of WAM and the City for events held or proposed to be held within the Perth LGA.

It is evident that WAM is eager to activate public and underutilised spaces which should be applauded as it demonstrates a strong link to the City's strategic community plan.

The panel noted that WAM Festival is an important event that sustains the local contemporary music scene and offers significant professional development and promotional opportunities for artists and ensures the ongoing viability of the industry.

The Saturday Spectacular is likely to provide some benefit to local businesses, bringing attendees into the city.

The City is supportive of WAM in their efforts to progress to a "WA Music Week" and officers should remain engaged to ensure planned festival growth can be considered in financial year 2018/19 for additional support.

ATTACHMENT 13.6A

Annual Arts Sponsorship – WAM Festival 2017

Project Title	WAM Festival 2017		
Project Start Date	01/11/2017		
Project End Date	05/11/2017		
Venues	Forrest Place (subject to availability) or Murray St Mall State Theatre Centre Various City and Northbridge licensed venues Car park on Roe St, or the old Busport site Perth Cultural Centre amphitheatre Wesley Church.		
Expected attendance numbers	41,536		
Ticket Pricing - Standard	\$10.00		
Projected overall attendance at free components	39,596	Projected attendance at ticketed component	1,940
Total Project Cost	\$295,775		
Total Amount Requested	\$50,000 (17% of the total project budget)		
REMPPLAN Impact (Direct)	\$4.056M	REMPPLAN Total	\$6.560M
Recommendation	Approval for Annual Arts Sponsorship		
Recommended amount	\$40,000	Assessment Score	62.5 out of 84 (74%)

Applicant Details*Information from the Australian Business Register*

ABN	19395503276
Entity Name	The West Australian Music Industry Association Incorporated
Entity Type	Other Incorporated Entity
ABN Status	Active
ATO Endorsed Charity Type	N/A
Goods & Services (GST)	Yes
Endorsed as DGR	Yes
DGR Item Number	N/A
DGR Funds	WA MUSIC FUND Item 1
Tax Concessions	No tax concessions
Main Business Location Postcode	6003
Main Business Location State	WA
ACNC Registration	N/A

Program Summary

Western Australia has a long and well-established reputation for contemporary music, with acts such as Tame Impala, Empire of the Sun, Eskimo Joe, Jebediah, Pendulum and San Cisco making an impact both nationally and overseas.

The West Australian Music Industry Association (WAM)'s stated mission is to champion West Australian music. WAM aims to strengthen and advance contemporary West Australian music by developing, celebrating and connecting the musicians, industry professionals and general public on a local, national and international and international platform.

Celebrating its 23rd year in 2017, the WAM Festival (WAMFest) is an annual showcase of original Western Australian contemporary music. WAMFest is a celebratory event for the whole community, as well as a market and audience development opportunity for WA artists.

Program Description

The 2017 WAMFest will be held from 1 November to 5 November 2017 and will include a number of free and ticketed events.

WAMFest incorporates a variety of elements which are staged in the city and the greater metropolitan area. Activities staged within the city will include:

WAM Festival Opening Parties – Wednesday, 1 November 2017

The WAM Festival will officially open with four opening events in city venues (The Bird, Amplifier, The Ellington and Laneway Lounge), featuring a range of performances from Perth artists. The events will be free-to-the-public to maximise engagement and celebrate the start of WAMFest. Organisers anticipate 650 attendees.

WAM Festival launch performance – Thursday, 2 November 2017

WAMFest proposes launching the WAMFest in 2017 to the general public on Thursday 2nd November, by putting known Perth bands onto the public stage in Forrest Place (subject to availability) or Murray Street Mall, and have artists perform short sets.

The performances will be scheduled through the day around the peak foot traffic periods, attracting crowds as they head into city for shopping and office workers as they break for lunch, as well as drawing audiences into the space. Organisers anticipate 9,000 attendees at this component.

WA Music Conference – Friday, 3 November – Saturday, 4 November 2017

The WA Music Conference is positioned as an important initiative for everyone working in or creating in the music space in Western Australia. Held at the State Theatre Centre of

Western Australia over two days, WA Music Conference features sessions with a range of speakers across all disciplines, from around the world.

The Conference offers a dynamic environment for audiences to engage in panel sessions, one-on-one meetings, radio pitching opportunities and networking sessions. Conference pass holders also receive free entry to all WAMFest activities. Organisers project attendance of 200 attendees, with tickets prices of \$185.00 (Adult) and \$140.00 (Concession).

Friday Showcases – Friday, 3 November 2017

Friday Showcases is a series of gigs, curated in partnership with Perth bookers, labels and programmers, held in music venues in the city and across the metropolitan area.

In 2016, these showcases were very well patronised, attracting audiences in excess of 3,000 attendees across 12 venues. The events are ticketed with an average price of \$10.00.

Saturday Spectacular - Saturday, 4 November 2017

Saturday Spectacular is a day of free music in Perth and Northbridge. The Spectacular will include: the Block Party, a licensed festival style pop-up venue located either in the Wilson car park on Roe St, or the old Busport site between Roe and Wellington Streets (TBC); an all ages stage in the Perth Cultural Centre amphitheatre; an assortment of genre-focused local showcases inside licensed venues in the both the Northbridge and Perth city area; and programming inside the Wesley Church.

The Saturday Spectacular program will offer a diverse range of performances to suit all ages and all tastes, and the stage in the Perth Cultural Centre will present an opportunity for parents and young children to have access to local music in a familiar and safe atmosphere.

Some gigs will commence at midday and most programming will finish at midnight. Venues with late licenses will finish at 2.00am. Organisers anticipate an attendance of 15,800 at this component of the Festival.

Triennial Funding Application

The City of Perth received a request for Triennial Arts Sponsorship of \$110,000 from the West Australian Music Industry Association (WAM) for the 2017 WAMFest.

The application for funding did not achieve the threshold for support under Triennial Arts Sponsorship. Panel members however unanimously agreed on the value of the event to the City and the application has now been reassessed under Annual Arts Sponsorship criteria.

The revised request under Annual Arts Sponsorship is for \$50,000. The application is recommended for annual sponsorship of \$40,000.

Previous City of Perth Support (last 5 years)

Year	Amount
2012	\$76,258
2013	\$50,000
2014	\$37,000
2015	\$40,000
2016	\$40,000
TOTAL	\$243,258

Sponsorship Benefits

Organisers will provide the following benefits for the requested sponsorship:-

1. Logo recognition on all program promotional material;
2. Logo recognition on event website;
3. Logo recognition on event related media releases;
4. Sponsor profile on event website;
5. Full page advertisement in the WAM Festival digital event program;
6. Logo recognition and designation included in the printed event program;
7. Two feature posts on WAM's social media channels about the City's involvement in the WAM Festival (content provided by the City in conjunction with WAM's marketing and communications officer);
8. Minimum of 20 social media posts that include acknowledgement of the City of Perth through the use of your designated hashtags;
9. Leaderboard/gif banner ad (artwork to be supplied by CoP) in rotation on the WAM website and in WAMplifier eNews for a one year period;
10. MREC ad (artwork to be supplied by CoP) promoted on WAM website for a one year period;
11. Opportunity to display City of Perth signage at the funded events;
12. Opportunity for the Lord Mayor, Deputy Lord Mayor, Elected Members or key staff (CEO) to participate, speak or present at the event launch (details TBC);
13. Opportunity for the Lord Mayor or delegated representative to present the Golden WAMi award at the WA Music Awards;
14. City of Perth will be the exclusive provider of waste management services for the program/event (except for events entirely on private property);

Annual Arts Sponsorship Assessment Score Card

The application was assessed by a two person assessment panel and the scoring has been averaged for each outcome.

The following outcomes are based on the schema of measurable outcomes for cultural engagement, developed by the Cultural Development Network:
<http://www.culturaldevelopment.net.au>

CULTURAL OUTCOMES	
Is the Arts activity of international calibre, with suitably experienced personnel?	2.5
Does the project contribute to building and sustaining a local arts economy?	3.5
Does the project provide professional development opportunities for local artists and/or cultural workers?	3.5
Does the project reflect new practices through engagement of new forms of technology and/or multidisciplinary art forms?	1
Does the project utilise innovative technologies to widen audience engagement?	2
Subtotal 12.5 out of 20 (62.5%)	
Comments <ul style="list-style-type: none"> Organisers believe that the WA Music Conference is an important focal point of WAM's annual development program for WA artists; The Festival offers not only audience development, recognition and skills development opportunities for local artists, but is also the industry's foremost opportunity to engage with the broader community. 	
ECONOMIC OUTCOMES	
Does the project attract a broad audience and stimulate the local economy?	4
Does the project contribute to a unique cultural tourism offering for local, national and international audiences?	2
Does the project demonstrate intrinsic economic impact and have ongoing social and cultural influence?	3
Subtotal 9 out of 12 (75%)	
Comments <ul style="list-style-type: none"> WAM utilises the Culture Counts impact assessment tool to measure the impact of the event. The 2016 report revealed indicated that the 2016 WAM Festival delivers a \$2.4 million total economic impact and \$1.5 million gross attendee expenditure; A recent WAM research project, in conjunction with Edith Cowan University, reported that the live music industry contributes more than \$1billion to the WA economy annually; and WAM's growth strategy for the WAMFest is to take in the aggregated WAMCon and WA Music Awards and create a singular event: WA Music Week. Organisers anticipate they will be in a position to introduce WA Music Week in 2019. 	

COMMUNITY AND SOCIAL OUTCOMES	
What is the level of anticipated community benefits for the project?	4
Does the project increase access to and opportunities to participate in cultural life?	3.5
Does the project drive social engagement and participation of the broader community?	3
Does the project challenge established understanding through exploration and exchanging ideas?	3
Subtotal 13.5 out of 16 (84%)	
Comments <ul style="list-style-type: none"> Each year, the WAM Festival attracts approximately 40,000 attendees to see hundreds of artists performing in an accessible and engaging format; Culture Counts research conducted by organisers shows that 65% of attendees would have otherwise stayed home had they not come into the city for WAMFest. The multifaceted musical program, at traditional music venues as well as accessible all ages locations, allows an opportunity for all people to engage and participate in cultural life through music. The Saturday Spectacular is an important focus of the Festival, and is presented to the WA community completely free of charge, offering many and varied music performances across the city at both traditional music venues as well as festival-style outdoor events. 	
ENVIRONMENTAL AND PLACE OUTCOMES	
Does the project activate public spaces with dynamic cultural programming?	4
Does the project activate underutilised locations or locations prioritised for activation by the City in interesting and engaging ways?	3.5
Subtotal 7.5 out of 8 (94%)	
Comments <ul style="list-style-type: none"> WAMFest activates public spaces with dynamic cultural programming by using spaces not necessarily known for music (such as the proposed carpark venue), to deliver a further dimension to the performance program, and engage the interest of the public; In the 2016 Culture Counts impact, respondents indicated that 85% agreed they “enjoyed the vibrancy and activity in the city”; 85% of attendees said that “attending the WAM Festival made them feel part of a community”; and 80% said that the Festival “has a connection to the place we live”. 	
CIVIC OUTCOMES	
Does the project increase visibility and understanding of the City’s cultural heritage and its precincts through immersive projects and interventions?	2
Does the project deliver innovative arts activity that represents Perth's unique cultural identity?	2.5
Subtotal 4.5 of 8 (56%)	
Comments <ul style="list-style-type: none"> Showcasing WA music to visiting industry representatives at WAMFest, WAM plays an active role in advocacy and policy development on issues facing the sector, and above all, provides the opportunity for the community to see, listen to and engage with local original music. 	

ORGANISATIONAL COMPETENCY	
Overall quality of the application for accuracy, content, detail, attachments and response to the questions	3.5
Are the project plan and budget realistic and value for money?	2.5
Does the applicant have a demonstrated capacity to undertake all aspects of the project including evaluating and documenting the results?	4
Does the applicant have evidence of partnerships with other government agencies, businesses or community organisations?	2.5
Is the project concept and planning well developed and articulated?	3
Subtotal 15.5 out of 20 (78%)	
Comments <ul style="list-style-type: none"> • The City has a long history of support of event and WAM has consistently met all City requirements; • The amount recommended (\$40,000) for the City of Perth to support the Festival represents 13% of the total program cost; • The event has a range of both government and corporate funding sources including Healthway, Lotterywest and the Australian Council for the Arts; and • Culture Counts will be engaged again in 2017 to accurately measure the outcomes of the 2017 Festival. 	
TOTAL ASSESSMENT SCORE 62.5 out of 84 (74%)	

Agenda**Payments from Municipal and Trust Funds – May 2017****Item 13.7**

Recommendation:

That in accordance with Regulation 13(1) of the Local Government (Financial Management) Regulations 1996, the list of payments made under delegated authority for the month ended 31 May 2017, be received and recorded in the Minutes of the Council, the summary of which is as follows:

FUND	PAID
Municipal Fund	\$ 14,689,471.61
Trust Fund	\$ 34,958.51
TOTAL:	<u>\$ 14,724,430.12</u>

The Committee recommendation to the Council for this report was resolved by the Finance and Administration Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1033586-65
REPORTING UNIT:	Finance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	7 June 2017
ATTACHMENT/S:	A detailed list of payments made under delegated authority for the month ended 31 May 2017 can be accessed by Elected Members via the Elected Members Portal. Members of the public can access the list of payments on request

Legislation / Strategic Plan / Policy:

Legislation	Regulation 13(1) of the <i>Local Government (Financial Management) Regulations 1996</i>
Integrated Planning and Reporting Framework Implications	Strategic Community Plan Council Four Year Priorities: Community Outcome Capable and Responsive Organisation A capable, flexible and sustainable organisation with a strong and effective governance system to provide leadership as a capital city and deliver efficient and effective community centred services.

Comments:

Payments for the month of May 2017 included the following significant items:

- \$357,176.49 to Data 3 for payments of \$332,294.09 for the Microsoft exchange, Microsoft server licensing and application licensing and \$24,882.40 for various invoices relating to hardware and software items;
- \$347,606.38 to Deloitte Consulting Pty Ltd in relation to the Organisational Capability and Compliance Audit;
- \$334,693.78 to Rosmech Sales and Service Pty Ltd for the supply and delivery of a new street sweeper and for other minor parts and repairs; and
- There were three payroll payments made in the month of May.

Agenda **Financial Statements and Financial Activity Statement for the** **Item 13.8** **Period Ended 31 May 2017**

Recommendation:

That Council approves the Financial Statements and the Financial Activity Statement for the period ended 31 May 2017, as detailed in Attachment 13.8A of this Report.

The Committee recommendation to the Council for this report was resolved by the Finance and Administration Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1033508
REPORTING UNIT:	Finance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	16 June 2017
ATTACHMENT/S:	Attachment 13.8A – Financial Statements and Financial Activity Statement for the period ended 31 May 2017

Legislation / Strategic Plan / Policy:

Legislation	Section 6.4(1) and (2) of the <i>Local Government Act 1995</i> Regulation 34(1) of the <i>Local Government (Financial Management) Regulations 1996</i>
Integrated Planning and Reporting Framework Implications	Strategic Community Plan Council Four Year Priorities: Community Outcome Capable and Responsive Organisation A capable, flexible and sustainable organisation with a strong and effective governance system to provide leadership as a capital city and deliver efficient and effective community centred services.

Financial Implications:

There are no direct financial implications arising from this report.

Details:

The Financial Activity Statement is presented together with a commentary on variances from the revised budget.

Comments:

The Financial Activity Statement commentary compares the actual results for the eleven months to 31 May 2017 with the original budget approved by Council on **28 June 2016** and budget adjustments adopted by Council on **30 August 2016** and **1 November 2016** and the budget review adopted by Council on **14 March 2017**.

**FINANCIAL ACTIVITY STATEMENT FOR THE ELEVEN MONTHS TO
31 MAY 2017**

REPORT OF VARIANCES TO BUDGET

This report compares the actual performance for the eleven months to 31 May 2017 to the adopted 2016/17 Budget and budget adjustments adopted by Council on 30 August 2016, 1 November 2016 and the budget review 2016/17 adopted by Council on 14 March 2017.

Operating Revenue

- Parking revenue year to date was \$66.6 million, which was \$629,000 above the revised budget. The variance mainly consisted of \$294,000 for Open Air Car Parks, \$368,000 for Kerbside Parking and \$68,000 for Undercover Car Parks.
- The variances for Open Air Car Parks were primarily for above the revised budget revenue for the following carparks: \$97,000 Point Fraser; \$80,000 Terrace Road, \$75,000 Queens Gardens and \$66,000 for the Fire Station. Undercover Car Parks performing better than the revised budget on a year to date basis were: His Majesty's \$122,000, Elder Street \$92,000, Roe Street \$64,000 and State Library \$62,000.
- Fines and Costs were higher than the revised budget by \$65,000 mainly due to parking fines.
- Investment Income and Interest were \$285,000 or 6.1% above the revised budget, mainly due to the strong performance of the Colonial Share Index Balanced Fund.
- Rentals and Hire Charges were 2.1% or \$(75,000) below the revised budget.
- Recurrent Grants were above the revised budget by 1.9% or \$34,000.
- Other income was \$490,000 above the revised budget at the end of May. This was mainly due to a distribution of the share of advertising revenue from bus shelters of \$327,000. Additionally building license fees were above the revised budget by \$169,000 partly offset by lower than the revised budget in Planning/Development fees of \$(93,000).

Operating Expenditure

- Employee costs ended the month \$620,000 or 0.9% below the revised budget. This is expected to be a timing variance only.
- Materials and Contracts were \$4,589,000 below the revised budget. The main areas of underspend to date were: Property Maintenance \$1.1 million (mainly for Council House \$302,000, Pedestrian Walkways \$120,000 and Library \$86,000), Infrastructure Maintenance \$778,000 (mainly for River Wall \$204,000 and footpaths \$195,000), Consultancy \$581,000 and Other

**FINANCIAL ACTIVITY STATEMENT FOR THE ELEVEN MONTHS TO
31 MAY 2017**

REPORT OF VARIANCES TO BUDGET

Professional Fees \$744,000. Various smaller variances were spread throughout the City's accounts.

- Utilities were lower than the revised budget by \$270,000 due to lower than budgeted consumption.
- Loss on disposal of assets was \$(928,000) above the revised budget. The majority of this variance is expected to be a timing variance.

Investing Activities

- Capital Grants were \$193,000 above the revised budget. During May \$350,000 was received from the Metropolitan Redevelopment Authority in respect of the Esplanade Intersections project.
- Capital expenditure was \$8.6 million below the revised budget. At the end of May capital spent was \$22.6 million, being 44% of the revised budget. The program of project works has progressed slower than anticipated resulting in this significant variance. The actual capital expenditure does not however reflect committed expenditure on projects which have commenced.
- Projects identified to be carried forward into the 2017/18 budget totals \$8,375,000; thus the forecast capital spend on year end is expected to be \$43,466,000. It is therefore likely the carry forward amount will increase significantly by financial year end.
- Capital expenditure for the month of May totalled \$3.7 million which included the following:
 - Forrest Place -Pedestrian Walkways (ISPT) \$2.2 million
 - CCTV Network Replacements \$224,000
 - CIT Precinct Plan - Museum Street \$153,000

Financing Activities

- Transfers to Reserves were \$6.1 million below the revised budget. Utilisation of reserve funds was lower than expected, this being a timing variance.
- Transfers from Reserves were below budget by \$(5.1 million). This is mainly due to slower than anticipated progress on capital expenditure.

**FINANCIAL ACTIVITY STATEMENT FOR THE ELEVEN MONTHS TO
31 MAY 2017**

REPORT OF VARIANCES TO BUDGET

Amounts sourced from Rates

- Rates revenue raised was \$208,000 or 0.4% above the revised budget, primarily due to \$478,000 of interim rates raised during January to May partly offset with a rates refund of \$301,000 processed in May.

FINANCIAL ACTIVITY STATEMENT - for the period ended 31 May 2017

	Revised Budget 2016/17 \$	Budget YTD 31-May-17 \$	Actual YTD 31-May-17 \$	Variance YTD 31-May-17 \$
Proceeds from Operating Activities				
Operating Revenue				
<i>Nature of Income</i>				
Parking Fees	71,712,089	65,961,084	66,590,312	629,229
Fines and Costs	8,801,152	8,080,058	8,144,925	64,866
Investment Income and Interest	4,918,455	4,644,512	4,929,875	285,363
Community Service Fees	1,456,742	1,340,087	1,295,511	(44,577)
Rubbish Collection	8,302,124	8,301,508	8,294,250	(7,259)
Rentals and Hire Charges	5,179,527	4,759,032	4,683,889	(75,144)
Recurrent Grants	1,779,681	1,763,594	1,797,556	33,962
Contributions, Donations and Reimbursements	470,294	430,452	441,204	10,752
Other Income	4,504,578	4,237,484	4,727,705	490,220
Distribution from TPRC	1,000,000	0	0	0
	108,124,642	99,517,813	100,905,225	1,387,412
Less: Operating Expenditure				
<i>Nature of Expenditure</i>				
Employee Costs	77,744,705	70,079,625	69,459,900	619,725
Materials and Contracts	50,014,941	44,134,491	39,545,282	4,589,209
Utilities	3,332,014	2,992,755	2,723,075	269,681
Insurance Expenditure	1,199,316	1,087,439	1,032,227	55,212
Depreciation and Amortisation	33,049,701	30,326,964	30,551,539	(224,575)
Interest Expenses	1,724,106	1,604,950	1,641,616	(36,667)
Expense Provisions	939,820	860,350	860,106	244
Loss on Disposal of Assets	932,495	1,416,675	2,344,232	(927,557)
Other Expenditure	24,624,320	22,669,625	22,255,076	414,549
	193,561,420	175,172,874	170,413,053	4,759,822
Add back Depreciation	(33,049,701)	(30,326,964)	(30,551,539)	224,575
(Loss) / Profit on Disposals	(932,495)	(1,416,675)	(2,344,232)	927,557
	159,579,224	143,429,235	137,517,281	5,911,953
Net Surplus/(Deficit) from Operations	(51,454,581)	(43,911,422)	(36,612,056)	7,299,366
Investing Activities				
Capital Grants	2,096,862	1,716,862	1,910,181	193,319
Capital Expenditure	(51,840,629)	(31,194,450)	(22,618,056)	8,576,394
Proceeds from Disposal of Assets/Investments	1,437,449	1,201,156	1,065,510	(135,646)
	(48,306,318)	(28,276,433)	(19,642,365)	8,634,068
Financing Activities				
Repayment of Borrowings	(6,111,896)	(6,111,894)	(6,111,894)	0
Transfers to Reserves	(27,949,200)	(9,057,617)	(2,968,841)	6,088,776
Transfer from Reserves	27,516,966	24,973,056	19,866,458	(5,106,598)
	(6,544,131)	9,803,545	10,785,723	982,178
Add: Opening Funds	21,140,731	21,140,731	21,140,731	0
Net Surplus/(Deficit) before Rates	(85,164,300)	(41,243,578)	(24,327,967)	16,915,611
Amount Sourced from Rates	87,941,859	87,951,858	88,159,844	207,986
Closing Funds	2,777,559	46,708,280	63,831,877	17,123,596
Net Cash on Hand				
Cash On Hand	5,879,024	7,579,836	10,000,473	2,420,637
Money Market Investments	110,065,722	125,479,377	126,435,882	956,505
Funds on Hand	115,944,746	133,059,213	136,436,355	3,377,142
Analysis of Funds on Hand				
Reserves	86,217,852	65,163,153	68,646,783	3,483,630
Provisions	12,379,102	12,623,095	10,552,709	(2,070,386)
General Funds	17,347,791	55,543,477	57,507,375	1,963,898
Funds on Hand	115,944,746	133,059,213	136,436,355	3,377,142

CITY OF PERTH

CURRENT POSITION AS AT THE END OF THE PERIOD 31 MAY 2017

	Revised Budget 2016/17 \$	Budget YTD 31-May-17 \$	Actual YTD 31-May-17 \$	YTD Variance \$
Current Assets				
Cash and Cash Equivalents	5,879,024	7,579,836	10,000,473	2,420,637
Deposits and Prepayments	310,521	1,551,454	2,987,686	1,436,232
Money Market Investments - Municipal Funds	23,847,869	60,316,224	57,789,099	(2,527,125)
Money Market Investments - Restricted Funds	86,217,852	65,163,153	68,646,783	3,483,630
Trade and Other Receivables	3,313,909	6,964,854	9,623,608	2,658,754
Inventories	972,511	1,207,364	898,403	(308,961)
Total Current Assets	120,541,686	142,782,885	149,946,052	7,163,167
Current Liabilities				
Trade and Other Payables	30,430,230	30,952,535	17,402,315	(13,550,220)
Employee Entitlements	12,379,102	12,393,667	10,552,709	(1,840,958)
Provisions	383,868	229,428	335,589	106,161
Borrowings	7,083,366	7,083,366	7,083,366	0
Total Current Liabilities	50,276,567	50,658,996	35,373,979	(15,285,017)
Working Capital Position Brought Forward	70,265,120	92,123,889	114,572,073	22,448,184
Deduct Restricted Cash Holdings	(86,217,852)	(65,163,153)	(68,646,783)	(3,483,630)
Deduct Restricted Cash - Non-current leave	11,376,413	12,393,667	10,552,709	(1,840,958)
Deduct Restricted Capital Grants	270,512	270,512	270,512	0
Add Current Borrowings	7,083,366	7,083,366	7,083,366	0
Current Funds Position Brought Forward	2,777,558	46,708,280	63,831,877	17,123,596

EXPLANATORY NOTES – FINANCIAL ACTIVITY STATEMENT

BACKGROUND

- Regulation 34 of the Local Government (Financial Management) Regulations 1996 was amended effective from 1 July 2005.
- The amendment prescribes a monthly Financial Activity Statement (FAS) reporting the sources and application of funds, as set out in the Rate Setting Statement which is included in the Annual Budget.

PURPOSE

- The FAS reports the actual financial performance of the City in relation to its adopted budget, which has been structured on financial viability and sustainability principles.
- The FAS is intended to act as a guide to Council of the impact of financial activities and the reasons for major variances to the annual budget estimates.

PRESENTATION

- Regulation 34 prescribes the minimum detail to be included in the FAS. These are listed below.
 - Annual Budget estimates, and approved revisions to these, are to be included for comparison purposes.
 - Actual amounts of income and expenditure to the end of the month of the FAS.
 - Material variances between the comparable amounts and commentary on reasons for these.
 - The net current assets at the end of the month to which the FAS relates.
- An explanation of the composition of the net current assets at the end of the month to which the FAS relates; less committed and restricted assets.
- Councils are given the option of adopting a format which is considered most appropriate to their needs. These options are listed below.
 - According to nature and type classification,
 - by program, or
 - by business unit.
- It is recommended that while the information presented by cost objects (programs and activities) or by cost centres (business units) are useful for expense allocation and cost centre accountability purposes, they are less informative and difficult to comprehend in matters of disclosure and less effective in cost management and control.
- The FAS has therefore been presented in the format using nature and type classification as the most meaningful disclosure to the Council and public.

FORMAT

- The FAS is formatted to align with the Rate Setting Statement.
- The first part deals with operating income and expenditure, excluding rate revenue.
- The next classification is the amount spent on capital expenditure and debt repayments.
- The classification 'Financing Activities' provides a statement of sources of funds other than from operating or rates revenue, which are usually associated with capital expenditure.
- Attached to the FAS is a statement of 'Net Current Assets' for the budget and actual expenditure to the end of the month to which the FAS relates.
- Opening and closing funds represent the balance of 'Net Current Assets', not including any funds which are committed or restricted.
- "Committed assets" means revenue unspent but set aside under the annual budget for a specific purpose.
- "Restricted assets" means those assets the uses of which are restricted, wholly or partially, by regulations or other externally imposed requirements", e.g. reserves set aside for specific purposes.
- To avoid duplication in calculating 'Closing Funds on hand', certain balances, such as provisions and borrowings, are also deducted.
- The total Closing Funds on hand are to be taken into account when calculating the amount to be raised by rates each year.
- The classification "Net Cash on Hand" represents the balances of funds held in cash or invested and the analysis into those funds reserved, carried forward or remaining unspent at the end of the month to which the FAS relates.



CITY of PERTH

CITY of PERTH

Financial Report

For the 11 months ended 31 May 2017

**CITY OF PERTH
MUNICIPAL**

Statement of Comprehensive Income for the 11 months ended 31 May 2017

(By Program)

	<i>Note</i>	Budget 2016/2017	Revised Budget YTD	Actual YTD 31/05/2017	YTD Variance	
OPERATING REVENUE		\$	\$	\$	\$	%
General Purpose Funding Rates		86,075,041	88,965,235	89,192,328	227,093	0.3%
General Purpose Funding Other		5,038,022	5,107,359	5,354,831	247,472	4.8%
Law, Order, Public Safety		23,178	35,496	94,184	58,688	165.3%
Health		780,345	869,181	997,348	128,167	14.7%
Education and Welfare		2,105,728	1,776,133	1,734,169	(41,964)	-2.4%
Housing		781,872	773,351	718,588	(54,763)	-7.1%
Community Amenities		10,789,799	10,782,694	10,946,752	164,058	1.5%
Recreation and Culture		1,732,910	1,485,993	1,559,476	73,483	4.9%
Transport		90,120,021	76,257,236	76,931,994	674,758	0.9%
Economic Services		831,710	778,051	944,610	166,559	21.4%
Other Property and Services		803,852	638,942	590,792	(48,150)	-7.5%
Total Operating Income		199,082,478	187,469,671	189,065,072	1,595,401	0.9%
OPERATING EXPENDITURE						
Governance		10,394,320	10,194,490	9,355,756	838,734	8.2%
General Purpose Funding		6,128,645	2,825,878	2,807,020	18,858	0.7%
Law, Order, Public Safety		3,758,622	4,323,502	4,329,151	(5,649)	-0.1%
Health		4,603,806	2,930,262	2,787,627	142,635	4.9%
Education and Welfare		3,688,491	3,427,480	3,331,561	95,919	2.8%
Housing		554,156	529,280	502,962	26,318	5.0%
Community Amenities		30,384,835	27,251,014	25,304,479	1,946,535	7.1%
Recreation and Culture		35,350,738	31,589,405	30,386,536	1,202,869	3.8%
Transport		85,682,324	73,579,945	71,298,905	2,281,040	3.1%
Economic Services		10,316,035	11,187,787	10,766,955	420,832	3.8%
Other Property and Services		5,020,459	5,917,156	7,197,867	(1,280,711)	-21.6%
Total Operating Expenditure		195,882,431	173,756,198	168,068,819	5,687,379	3.3%
NET FROM OPERATIONS		3,200,047	13,713,473	20,996,253	7,282,780	53.1%
GRANTS/CONTRIBUTIONS						
For the Development of Assets						
- General Purpose Funding		-	96,780	96,780	-	0.0%
- Law ,Order,Public Safety		240,150	40,000	40,000	-	0.0%
- Recreation and Culture		2,693,400	270,581	510,581	-	0.0%
- Transport		2,834,765	1,309,501	1,262,820	(46,681)	-3.6%
Total Grants/Contributions		5,768,315	1,716,862	1,910,181	193,319	11.3%
DISPOSAL/WRITE OFF OF ASSETS						
Gain/(Loss) on Disposal of Assets	2	(1,437,448)	(1,416,675)	(2,344,233)	(927,558)	65.5%
Change in net assets resulting from operations before significant items		7,530,914	14,013,659	20,562,201	6,548,542	46.7%
SIGNIFICANT ITEMS						
Distribution from TPRC		1,000,000	-	-	-	0.0%
Change in net assets resulting from operations after significant items		8,530,914	14,013,659	20,562,201	6,548,542	46.7%

**CITY OF PERTH
MUNICIPAL**

Statement of Comprehensive Income for the 11 months ended 31 May 2017

(By Nature)

	<i>Note</i>	Budget 2016/2017	Revised Budget YTD	Actual YTD 31/05/2017	YTD Variance	
OPERATING REVENUE		\$	\$	\$	\$	%
Rates		85,143,608	87,951,859	88,159,844	207,985	0.2%
Grants and Contributions for Non Capital Purposes		1,514,031	1,763,594	1,797,556	33,962	1.9%
Donations and Reimbursements		585,576	430,452	441,204	10,752	2.5%
Fees and Charges		105,213,130	91,344,078	92,077,779	733,701	0.8%
Interest and Investment Income		4,672,819	4,644,512	4,929,875	285,363	6.1%
Other Revenue		1,953,314	1,335,177	1,658,814	323,637	24.2%
Total Revenue from Operating Activities		199,082,478	187,469,671	189,065,072	1,595,401	0.9%
OPERATING EXPENDITURE						
Employee Costs		77,205,335	70,079,625	69,459,900	619,725	0.9%
Materials and Contracts		53,092,963	44,134,491	39,545,282	4,589,209	10.4%
Utilities		3,596,588	2,992,755	2,723,075	269,680	9.0%
Depreciation and Amortisation		33,144,020	30,326,964	30,551,537	(224,573)	-0.7%
Interest		1,562,208	1,604,950	1,641,616	(36,666)	-2.3%
Insurance		1,197,885	1,087,439	1,032,227	55,212	5.1%
Expenses Provision		998,010	860,350	860,106	244	0.0%
Other Expenses from Ordinary Activities		25,085,422	22,669,625	22,255,076	414,549	1.8%
Total Expenses from Ordinary Activities		195,882,431	173,756,198	168,068,819	5,687,379	3.3%
Change in Net Assets from Ordinary Activities before Capital Amounts		3,200,047	13,713,473	20,996,253	7,282,780	53.1%
GRANTS/CONTRIBUTIONS						
Grants and Contributions- Capital		5,768,315	1,716,862	1,910,181	193,319	11.3%
NET OPERATING SURPLUS		8,968,362	15,430,335	22,906,434	7,476,099	48.5%
DISPOSAL/WRITE OFF OF ASSETS	2	(1,437,448)	(1,416,675)	(2,344,233)	(927,558)	65.5%
SIGNIFICANT ITEMS						
Distribution from TPRC		1,000,000	-	-	-	0.0%
<i>Change in net assets resulting from operations after capital amounts and significant items</i>		8,530,914	14,013,659	20,562,201	6,548,542	46.7%

**CITY OF PERTH
MUNICIPAL**

Statement of Financial Position as at 31 May 2017

	Note	31/05/2017	30/06/2016
CURRENT ASSETS		\$	\$
Cash and Cash Equivalents	11	10,000,473	10,063,697
Deposits/Prepayments	4	2,987,686	1,246,983
Investments	3, 11	126,435,882	100,249,402
Trade and Other Receivables	5	8,948,303	10,022,460
Rates Receivable	1	675,305	190,815
Inventories		898,403	1,016,223
TOTAL CURRENT ASSETS		149,946,052	122,789,580
NON CURRENT ASSETS			
Investments	3	6,949,950	7,162,072
Trade and Other Receivables	5	50,690	32,434
Property, Plant and Equipment	8	684,427,912	694,573,987
Infrastructure	8	475,962,217	485,179,495
Capital Work in Progress	8	40,234,803	32,151,366
TOTAL NON CURRENT ASSETS		1,207,625,572	1,219,099,354
TOTAL ASSETS		1,357,571,624	1,341,888,934
CURRENT LIABILITIES			
Trade and Other Payables	6	17,402,315	15,973,970
Employee Benefits	7	10,552,709	11,051,588
Provisions	7	335,589	390,015
Loan Liability	9	7,083,366	6,772,073
TOTAL CURRENT LIABILITIES		35,373,979	34,187,646
NON CURRENT LIABILITIES			
Employee Benefits	7	1,762,097	1,762,097
Provisions	7	4,616,822	4,259,487
Loan Liability	9	23,131,742	29,554,929
TOTAL NON CURRENT LIABILITIES		29,510,661	35,576,513
TOTAL LIABILITIES		64,884,640	69,764,159
NET ASSETS		<u>\$1,292,686,984</u>	<u>\$1,272,124,775</u>
EQUITY			
Accumulated Surplus		661,299,446	623,860,830
Asset Revaluation Reserve	10	560,056,898	560,035,698
Reserves	10	71,330,640	88,228,247
TOTAL EQUITY		<u>\$1,292,686,984</u>	<u>\$1,272,124,775</u>

<p style="text-align: center;">CITY OF PERTH MUNICIPAL <i>Statement of Changes in Equity for the 11 months ended 31 May 2017</i></p>				
	Accumulated Surplus	Asset Revaluation Reserve	Cash Backed Reserves	Total Equity
	\$	\$	\$	\$
Balance at 1 July 2015	612,108,629	560,795,095	87,574,492	1,260,478,216
Change in net assets resulting from operations	11,646,560	-	-	11,646,560
Transfer to Cash Backed Reserves	(24,631,265)	-	24,631,265	-
Transfers to Asset Revaluation Reserve	(3,047,888)	3,047,888	-	-
Transfers from Asset Revaluation Reserve	3,807,285	(3,807,285)	-	-
Transfer from Cash Backed Reserves	23,977,510	-	(23,977,510)	-
Balance at 30 June 2016	\$623,860,830	\$560,035,698	\$88,228,247	\$1,272,124,775
	\$	\$	\$	\$
Balance at 1 July 2016	623,860,830	560,035,698	88,228,247	1,272,124,775
Change in net assets resulting from operations	20,562,201	-	-	20,562,200
Transfer to Cash Backed Reserves	(2,968,842)	-	2,968,842	-
Transfers to Asset Revaluation Reserve	(76,383)	76,383	-	-
Transfers from Asset Revaluation Reserve	55,183	(55,183)	-	-
Transfer from Cash Backed Reserves	19,866,458	-	(19,866,458)	-
Balance at the end of the reporting period	\$661,299,446	\$560,056,898	\$71,330,631	\$1,292,686,975

**CITY OF PERTH
MUNICIPAL**

Statement of Cash Flows for the 11 months ended 31 May 2017

	Note	Budget 2016/2017	YTD Actual 31/05/2017	YTD Variation	
		\$	\$	\$	%
Cash Flows from Operating Activities					
Receipts					
Rates		85,150,558	87,643,905	2,493,347	2.9%
Fees and Charges		110,473,787	93,294,856	(17,178,931)	-15.6%
Interest		4,672,819	4,721,761	48,942	1.0%
Other		2,000,854	1,970,798	(30,056)	-1.5%
		202,298,018	187,631,320	(14,666,698)	-7.3%
Payments					
Employee Costs		(76,246,522)	(70,573,516)	5,673,006	7.4%
Materials and Contracts		(45,634,268)	(39,742,662)	5,891,606	12.9%
Interest		(1,546,536)	(1,556,016)	(9,480)	-0.6%
Other		(31,117,629)	(26,001,919)	5,115,710	16.4%
		(154,544,955)	(137,874,113)	16,670,842	10.8%
Net Cash Flows from Operating Activities	12	47,753,063	49,757,207	2,004,144	-4.2%
Cash Flows from Investing Activities					
Receipts					
Distribution from TPRC		1,000,000	-	(1,000,000)	-100.0%
Proceeds from Disposal of Assets		1,280,000	853,388	(426,612)	-33.3%
Proceeds from Disposal of Investments(Non Current)		-	212,122	212,122	0.0%
Payments					
Purchase Land and Buildings		(14,005,532)	(545,040)	13,460,492	-96.1%
Purchase Infrastructure Assets		(29,412,097)	(731,349)	28,680,748	-97.5%
Purchase Plant and Mobile Equipment		(17,160,028)	(2,819,620)	14,340,408	83.6%
Purchase Office Furniture and Equipment		(2,153,478)	(268,296)	1,885,182	-87.5%
Work in Progress		-	(18,060,227)	(18,060,227)	0.0%
		(62,731,135)	(22,424,532)	40,306,603	64.3%
Net Cash Flows from Investing Activities		(60,451,135)	(21,359,022)	39,092,113	64.7%
Cash Flows from Financing Activities					
Repayment of Borrowings		(6,111,896)	(6,111,894)	2	0.0%
		(6,111,896)	(6,111,894)	2	0.0%
Cash Flows from Government and Other Parties					
Receipts from Appropriations/Grants					
Recurrent		4,414,618	1,926,776	(2,487,842)	-56.4%
Capital		5,768,315	1,910,181	(3,858,134)	-66.9%
		10,182,933	3,836,957	(6,345,976)	-62.3%
Net Increase (Decrease) in Cash Held		(8,627,035)	26,123,248	34,750,283	-402.8%
Cash at 1 July 2016		117,479,382	110,313,099	(7,166,283)	-6.1%
Cash at 31 May 2017	11	108,852,347	136,436,355	27,584,008	25.3%

MUNICIPAL

Notes to the Balance Sheet for the 11 months ended 31 May 2017

1 Rates Receivable

	Actual YTD 31/05/2017	2015/16 YTD 31/05/2016
	\$	\$
Outstanding Amount at 30 June 2016	190,816	64,096
Rates Levied for the Year	88,172,216	83,238,540
Late Payment Penalties	154,925	109,543
Ex Gratia Rates	17,741	17,464
Rates Administration Fee	337,725	295,252
Rates Instalment Interest	367,715	341,842
Back Rates	(30,113)	(69,855)
Bins Levy	82,530	33,737
	89,293,555	84,030,619
Amount Received during the Period	88,618,250	83,861,200
Outstanding Amount at 31 May 2017	\$675,305	\$169,419

2 Gain/(Loss) on Disposal/Write off of Assets

	Annual Budget	Actual YTD 31/05/2017
Land and Buildings	\$	\$
Proceeds on Disposal	-	-
Less: Carrying amount of assets sold/written off	-	76,288
(Loss) on Disposal/Write Off	-	(76,288)
Infrastructure		
Proceeds on Disposal	-	-
Less: Carrying amount of assets written off	1,640,250	2,303,035
(Loss) on Write Off	(1,640,250)	(2,303,035)
Plant and Mobile Equipment		
Proceeds on Disposal	1,280,000	853,388
Less: Carrying amount of assets sold/written off	1,077,198	815,682
Profit on Disposal/Write Off	202,802	37,706
Furniture and Equipment		
Proceeds on Disposal	-	-
Less: Carrying amount of assets sold /written off	-	2,616
Profit/(Loss) on Disposal/Write Off	-	(2,616)
Gain/(Loss) on Disposal/Write off of Assets	(\$1,437,448)	(\$2,344,233)

3 Investments

Current	31/05/2017	30/06/2016
Short Term Cash Investments *	\$	\$
Call Funds	6,226,085	12,111,382
Bank/Term Deposits	115,500,000	84,000,000
Managed Funds	4,709,797	4,138,020
Total Current Investments	\$126,435,882	\$100,249,402

* Short Term Cash Investments as stated in Note 11.

Non Current Investments	31/05/2017	30/06/2016
	\$	\$
Mortgage Backed Securities (MBS)	2,683,848	2,743,759
	2,683,848	2,743,759
Equity in Local Government House	10,000	10,000
Equity in Mindarie Regional Council	432,094	420,412
Equity in Tamala Park Regional Council	3,824,008	3,987,901
	\$6,949,950	\$7,162,072

MUNICIPAL**Notes to the Balance Sheet for the 11 months ended 31 May 2017****4 Deposits/Prepayments**

	31/05/2017	30/06/2016
	\$	\$
Prepaid Insurance	205,470	-
Prepaid Parking Bay Licence Fees	1,447,517	-
Other	1,334,699	1,246,983
	\$2,987,686	\$1,246,983

5 Trade And Other Receivables

	31/05/2017	30/06/2016
Current	\$	\$
Emergency Services Levy (ESL)	115,949	36,912
Accrued Interest and Investment Income	744,783	536,669
Accrued Income	849,791	1,445,677
Modified Penalties/Fines and Costs	8,041,275	7,468,902
Debtors - General		
Australian Taxation Office - GST Refundable	149,029	177,492
Works and Services	17,861	35,731
Other Debtors	2,531,782	3,744,857
	12,450,470	13,446,240
Less: Provision for Doubtful Debts	(3,502,167)	(3,423,780)
	\$8,948,303	\$10,022,460
Non Current		
Pensioners' Rates Deferred	50,690	32,434
	\$50,690	\$32,434

6 Trade And Other Payables

	31/05/2017	30/06/2016
Current	\$	\$
Trade Creditors	9,493,686	10,591,073
Emergency Services Levy	160,341	-
Interest Payable on Loans	285,448	199,848
Accrued Expenses - Operating	3,202,607	2,293,106
Accrued Expenses - Capital	566,777	10,837
Advances Received for Recoverable Works	90,184	40,635
Income Received / Raised in Advance	756,842	1,008,030
Other Creditors	2,846,430	1,830,441
	\$17,402,315	\$15,973,970

MUNICIPAL**Notes to the Balance Sheet for the 11 months ended 31 May 2017****7 Employee Benefits**

	31/05/2017	30/06/2016
Current	\$	\$
Leave Entitlements		
Annual Leave	4,220,658	4,454,492
Self Funded Leave	147,350	238,785
Long Service Leave	6,064,500	6,222,059
Recognition of Employees- Presentations	120,201	136,252
	\$10,552,709	\$11,051,588
Non Current		
Annual Leave	629,989	629,989
Long Service Leave	1,132,108	1,132,108
	\$1,762,097	\$1,762,097

Provisions

	31/05/2017	30/06/2016
Current	\$	\$
Workers Compensation	335,589	390,015
	\$335,589	\$390,015
Non Current		
Provision for Equipment Replacement PCEC	4,616,822	4,259,487
	\$4,616,822	\$4,259,487

8 Property, Plant and Equipment and Work in Progress

	31/05/2017	30/06/2016
	\$	\$
Land and Air Rights - at cost/fair value	380,133,677	380,133,678
Less: Accumulated Depreciation	(3,653,572)	(3,135,072)
	376,480,105	376,998,606
Buildings - at fair value	380,544,421	378,864,743
Less: Accumulated Depreciation	(161,214,534)	(154,004,183)
	219,329,887	224,860,560
Improvements - at fair value	52,478,227	52,659,661
Less: Accumulated Depreciation	(7,378,271)	(5,565,355)
	45,099,956	47,094,306
Infrastructure Assets - at cost/fair value	756,201,851	755,794,940
Less: Accumulated Depreciation	(280,239,634)	(270,615,444)
	475,962,217	485,179,496
Plant and Mobile Equipment - at cost/fair value	47,601,613	47,541,666
Less: Accumulated Depreciation	(31,329,075)	(29,432,643)
	16,272,538	18,109,023
Office Furniture and Equipment - at cost/fair value	44,285,351	41,871,404
Less: Accumulated Depreciation	(17,835,196)	(15,155,180)
	26,450,155	26,716,224
Agricultural - at cost	795,271	795,271
Less: Accumulated Depreciation	-	-
	795,271	795,271
Property, Plant and Equipment	1,160,390,129	1,179,753,486
Work in Progress - at cost	40,234,803	32,151,366
	40,234,803	32,151,366
Total Property, Plant and Equipment and Work in Progress	\$1,200,624,932	\$1,211,904,848

MUNICIPAL

Notes to the Balance Sheet for the 11 months ended 31 May 2017

8 Property, Plant and Equipment and Work in Progress - Movement at Cost

	Balance 30/06/2016	Acquisitions Actual YTD 31/05/2017	Transfers Actual YTD 31/05/2017	Disposals/ Write off/ Actual YTD 31/05/2017	Revaluation Actual YTD 31/05/2017	Balance 31/05/2017
	\$	\$	\$	\$		\$
Land and Air Rights	380,133,678	-	-	-	-	380,133,678
Buildings	378,864,743	545,040	1,473,583	(338,944)	-	380,544,422
Improvements	52,659,661	-	-	(181,433)	-	52,478,228
Infrastructure Assets	755,794,940	731,349	6,026,170	(6,350,607)	-	756,201,852
Plant and Mobile Equipment	47,541,666	2,819,620	275,293	(3,034,966)	-	47,601,613
Office Furniture and Equipment	41,871,404	268,296	2,246,454	(100,803)	-	44,285,351
Agricultural	795,271	-	-	-	-	795,271
Work in Progress	32,151,366	18,616,167	(10,532,730)	-	-	40,234,803
	\$1,689,812,729	\$22,980,472	(511,230)	(10,006,753)	-	\$1,702,275,218

9 Loan Liability

	31/05/2017	30/06/2016
Current	\$	\$
Loans - Western Australian Treasury Corporation	7,083,366	6,772,073
Non Current		
Loans - Western Australian Treasury Corporation	23,131,742	29,554,929

10 Reserve Funds

Purpose of Reserve Fund	Balance 30/06/2016	Transfer from Accumulated Surplus	Transfer to Accumulated Surplus	Balance 31/05/2017
	\$	\$	\$	\$
Refuse Disposal and Treatment	2,935,851	98,246	-	3,034,097
Concert Hall - Refurbishment and Maint.	4,835,978	154,683	(315,395)	4,675,266
Asset Enhancement	26,232,133	851,043	(970,455)	26,112,721
Street Furniture Replacement	371,375	14,619	(10,484)	375,510
Parking Levy	18,160,738	29,313	(17,278,906)	911,145
Art Acquisition	374,845	12,182	(40,911)	346,116
Heritage Incentive	618,109	20,403	-	638,512
Parking Facilities Development	23,671,273	765,345	(1,250,307)	23,186,311
Employee Entitlements	1,762,097	59,390	-	1,821,487
David Jones Bridge	292,381	9,641	-	302,022
Bonus Plot Ratio	613,783	20,330	-	634,113
PCEC Fixed Plant Replacement	4,244,225	372,597	-	4,616,822
Enterprise and Initiative	3,915,439	554,423	-	4,469,862
Public Art	200,017	6,626	-	206,643
	88,228,244	2,968,841	(19,866,458)	71,330,627
* Asset Revaluation	560,035,698	76,383	(55,183)	560,056,898
	\$648,263,942	\$3,045,224	(\$19,921,641)	\$631,387,525

* The Asset Revaluation Reserve is a non cash backed reserve and cannot be used ,except for adjustments to fixed assets on their revaluation, disposal or write off

MUNICIPAL**Notes to the Balance Sheet for the 11 months ended 31 May 2017****11 Cash Reconciliation**

	31/05/2017	30/06/2016
	\$	\$
Cash and Cash Equivalents	10,000,473	10,063,697
Short Term Cash Investments	126,435,882	100,249,402
	\$136,436,355	\$110,313,099

12 Reconciliation of Net Cash Provided By Operating Activities to Operating Surplus

	31/05/2017	30/06/2016
	\$	\$
Change in Net Assets Resulting from Operations	20,562,201	13,793,738
Adjustment for items not involving the movement of Funds:		
Depreciation	30,551,537	31,545,687
Doubtful Debts	78,387	369,586
Non Capitalised Work in Progress	511,230	(4,620,525)
(Gain)/Loss on Disposal/Write off/Contribution of Assets	2,344,233	1,569,290
	54,047,588	42,657,776
Revenues Provided By :		
Government Grants	(3,836,957)	(6,812,016)
Contribution from Other Parties	-	(49,890)
	(3,836,957)	(6,861,906)
Change in Operating Assets and Liabilities		
Add Back		
Decrease in Inventories	117,820	377,978
Decrease in Deposits and Prepayments	-	92,261
Decrease in Accrued Interest and Dividend Income	-	63,628
Decrease in Trade and Other Receivables	123,508	-
Decrease in Deferred Debtors	-	7,133
Decrease in Accrued Income	595,886	-
Increase in Income Received /Raised in Advance	-	99,641
Increase in Accrued Interest Payable	85,600	-
Increase in Accrued Expenses	909,501	-
Increase in Trade and Other Payables	78,943	-
Deduct		
Decrease in Trade and Other Payables	-	(2,565,858)
Decrease in Income Received /Raised in Advance	(201,639)	-
Decrease in Accrued Interest Payable	-	(41,167)
Increases in Deferred Debtors	(18,256)	-
Decrease in Provisions	(195,970)	(407,068)
Decrease in Accrued Expenses	-	(324,459)
Increase in Trade and Other Receivables	-	(2,033,367)
Increase in Prepayments	(1,740,703)	-
Increase in Accrued Income	-	(193,777)
Increase in Accrued Interest and Investment Income	(208,114)	-
	(453,424)	(4,925,055)
Net Cash Provided by Operating Activities	\$49,757,210	\$30,870,815

MUNICIPAL

Notes to the Balance Sheet for the 11 months ended 31 May 2017

13 Ratios

	31/05/2017	30/06/2016
1 Current Ratio		
<u>Current Assets minus Restricted Assets</u>		
Current Liabilities minus Liabilities associated with Restricted Assets	2.30	1.09
2 Debt Ratio		
<u>Total Liabilities</u>		
Total Assets	4.78%	5.20%
3 Debt Service Ratio		
<u>Debt Service Cost</u>		
Available Operating Revenue	4.10%	4.44%
4 Rate Coverage Ratio		
<u>Net Rate Revenue</u>		
Operating Revenue	47.18%	43.96%
5 Outstanding Rates Ratio		
<u>Rates Outstanding</u>		
Rates Collectable	0.76%	0.23%
6 Untied Cash to Unpaid Creditors Ratio		
<u>Untied Cash</u>		
Unpaid Trade Creditors	7.14	2.34
7 Gross Debt to Revenue Ratio		
<u>Gross Debt</u>		
Total Revenue	15.98%	18.99%
8 Gross Debt to Economically Realisable Assets Ratio		
<u>Gross Debt</u>		
Economically Realisable Assets	3.43%	4.24%

Restricted Assets includes reserve funds and tied contributions not utilised at 31.05.2017

**Agenda
Item 13.9****Nomination of Elected Member Representative and Deputy to
the Mindarie Regional Council****Recommendation:**

That Council considers nominations for an Elected Member and a Deputy as the City of Perth's representative(s) to the Mindarie Regional Council for the period 30 June 2017 to 20 October 2017.

The Committee recommendation to the Council for this report was resolved by the Finance and Administration Committee at its meeting held on 27 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1030366
REPORTING UNIT:	Governance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	29 May 2017
ATTACHMENT/S:	N/A

Legislation / Strategic Plan / Policy:

Legislation	Part 3, Division 4 of the <i>Local Government Act 1995</i>
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Integrated Reporting Implications	Planning and Framework	Corporate Business Plan
		Council Four Year Priorities: Living in Perth
		S11 Increase community awareness of environmentally sustainable ways of living
		11.1 Develop and implement a range of community awareness and partnership programs in relation to environmental sustainability

Purpose and Background:

The Mindarie Regional Council (MRC) is a legally constituted Regional Council formed under the provisions of the *Local Government Act 1995*. Its Constitution was established during 1987 in accordance with section 697 of the *Local Government Act 1960* (as amended). The mission of the MRC is to provide effective and cost efficient waste disposal consistent with safeguarding all environmental elements for the benefit of the constituent local governments and their residents, which form the regional district. The constituent local governments are the City of Joondalup, the City of Wanneroo, the City of Perth, the City of Stirling, the City of Vincent, the Town of Victoria Park, and the Town of Cambridge.

The Regional Council comprises 14 Councillors, with one representative from the City of Perth, the City of Vincent, the Town of Cambridge, the Town of Victoria Park and two representatives from the Cities of Joondalup and Wanneroo and four representatives from the City of Stirling.

The current City of Perth's representative on the MRC is Cr Jim Adamos with Cr Janet Davidson as Deputy. The Technical Officer representative is the Director Construction and Maintenance, Mr Paul Crosetta who is being represented by Nathan Ahern, Manager Waste and Cleansing.

Details:

Cr Adamos' term as the City's representative to the MRC expires on 30 June 2017.

Whilst correspondence received from the MRC seeks an appointment till the 30 June 2018, the City of Perth's endorsement until 21 October 2017 will ensure member representative continuity until the Local Government elections take place.

It is further noted that at the time, the *Local Government Act 1960* (as amended) did not provide power for Councils to appoint permanent deputies to Regional Councils. This is still the case, therefore where an alternate ad hoc attendance is required, powers contained in the *Interpretation Act 1984* (Section 52) are currently utilised.

In essence, Section 52 provides that where a body has a power to appoint a member to its Board, it also has the power to appoint an alternate member for a specified period in circumstances where the principal member is unable to act. Those circumstances are:

- (a) illness;
- (b) temporary absence from the State; and
- (c) conflict of interest.

A further restriction is that these appointments require a decision of Council on each occasion that a member is appointed to act for the permanent member.

In anticipation of future amendments to the MRC Constitution in regards to deputy membership, it is recommended that Council nominate a deputy member to ensure continuity of representation.

Financial Implications:

There are no financial implications related to this report.

Comments:

To ensure the City is appropriately represented on the MRC it is recommended that an Elected Member be nominated as delegate to the Regional Council from 1 July 2017. A deputy is also required for continuity of representation.

Agenda Item 13.10 **Amended Council Policy 1.9 – Media Policy – Media Statements, Press Releases and Social Media**

Recommendation:

That Council adopts amended Council Policy 1.9 – “Media Policy – Media Statements, Press Releases and Social Media” as amended in the revised Attachment 13.10A.

The Committee recommendation to the Council for this report was resolved by the Finance and Administration Committee at its meeting held on 27 June 2017.

FILE REFERENCE:	P1020415
REPORTING UNIT:	Governance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	16 June 2017
ATTACHMENT/S:	Attachment 13.10A - Amended Council Policy 1.9 Media Policy – Media Statements, Press Releases and Social Media

Legislation / Strategic Plan / Policy:

Legislation	2.8(1)(d) of the <i>Local Government Act 1995</i>
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Integrated Reporting Implications	Planning and Framework	Corporate Business Plan
		Council Four Year Priorities: Capable and responsive organisation
		S18 Strengthen the Capacity of the Organisation

Policy

Policy No and Name:	1.9 - Public Relations Policy – Media Statements and Press Releases
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Purpose and Background:

The current Public Relations Policy – Media Statements and Press Releases (Policy) has remained unchanged since 2007 and is due for review by Council to ensure its relevance and effectiveness remain appropriate.

The current policy was established under the premise that *“The Lord Mayor, or in his/her absence the Deputy Lord Mayor or the Chief Executive Officer, are the only persons authorised to provide comment to members of the media on Council decisions and activities.”*

This is a result of a literal interpretation of section of section 2.8 of the *Local Government Act 1995*, which reads;

“2.8 - Role of Mayor or President

1. The Role of Mayor or President –

(d) Speaks on behalf of the local government;”

The advantages of such an approach includes reducing the risk of reputational harm to the organisation and individuals by ensuring that all communications are performed through official channels.

The disadvantage is that the policy has been perceived to be a restriction on the freedom of speech of Elected Members.

At the Ordinary Council Meeting on the **6 June 2017** a revised Media Policy was presented for Councils consideration, this matter was deferred by the following procedural motion;

“That Council defer consideration of the report titled Amended Council Policy 1.9 – Media Policy – Media Statements and Press Releases, to enable social media to be considered in the policy.”

Details:

Media Statements & Press Releases

It has become evident that the current policy is not meeting the desired objectives of Council as the policy has not been complied with by the majority of Elected Members in some form or another.

It is considered more appropriate to expressly permit all Elected Members to speak to the media but also introduce appropriate clauses that will protect other Elected Members, Staff and the City of Perth from reputational harm.

The proposed new clauses are:

- Elected Members may make their own personal position known about any matter, which is pertinent to the business of the City, including Council decisions provided that it cannot be construed to be a statement on behalf of the Council;
- Elected Members will refrain from making personal statements to the media without clearly prefacing such remarks that they are personal views and not those of the Council;
- There shall not be any adverse reflection on Elected Members, External Members, Employees or a Council/Committee decision.

It is important that once a Council decision is made no adverse reflection is made on the final outcome. In the event a Council decision is passed by a majority of Council, then any Elected Member who did not agree with the decision should only make reference to the decision of Council and how they voted, no further comment should be made.

The proposed policy has been provided to the Department of Local Government and Communities for their comment and received confirmation that the amendments were consistent their application of the *Local Government Act 1995*.

Social Media

On-line communications and social media are now accepted practice, such has been the rise of social media, through smart phones and mobile communication technology.

One of the roles of Elected Members is to facilitate communications between the community and Council. Electronic communication means that our community has come to expect instant responses from its elected officials at the same time as holding them, as public officers, to a higher standard of behaviour than the general public. Where social media encourages short and attention grabbing statements, the community expects thoughtful, well-reasoned and responsible communications from its representatives.

These sometimes conflicting expectations can create confusion and result in weakening community trust in individual Members and Council as a whole.

The revised Media Policy provides Elected Members with a resource for decision making should they elect to use social media and:

- assist Elected Members to use social media to communicate effectively with the community and encourage discussion of issues in an informed and responsible manner;
- support Elected Members to use social media as part of their role while minimising the risk to them of loss of personal reputation or legal sanction;
- reduce the chance of possible ambiguities, particularly where confusion may occur between official comments and personal and private views by ensuring that social media comments are clearly identified as personal statements and not misconstrued as representing Council as a whole, elected members or staff;
- ensure that social media comments do not contain errors of fact;
- help ensure that social media comments are of a moderate and respectful tone that reflects well on Council as a whole; and
- are not intended to be prescriptive or to inhibit an open exchange of views.

This Policy should be read in conjunction with the Elected Member Code of Conduct and any breach of this policy may therefore be considered a breach of the City of Perth Code of Conduct.

Financial Implications:

There are no direct financial implications arising from this report.

Comments:

The effectiveness of the proposed policy will be measured on the commitment of all Elected Members to abide by it. The policy is hereby submitted for Councils consideration.



CP1.9 ~~PUBLIC RELATIONS~~ MEDIA POLICY - MEDIA STATEMENTS, PRESS RELEASES AND SOCIAL MEDIA

POLICY OBJECTIVE

To provide the Lord Mayor and the Council with a professional internal/external public relations service to ensure that the Council's decisions and activities are accurately and fully advised to the media and reinforce that the Lord Mayor is the authorised spokesperson of the City of Perth as prescribed in legislation.

This policy outlines the protocols and obligations for City of Perth Elected Members when using social media and applies to all social media accounts managed by an Elected Member, regardless of whether the account states the person is an Elected Member of the City of Perth or not.

POLICY STATEMENT

Media Statements & Press Releases

The Council's policy on delivery, content and availability of press releases and media statements is as follows:-

1. The Lord Mayor, or in his/her absence the Deputy Lord Mayor or the Chief Executive Officer, are the only persons authorised to provide comment to members of the media on Council decisions and activities behalf of Council and the City of Perth.
2. Elected Members may make their own personal position known about any matter, which is pertinent to the business of the City, including Council decisions provided that it cannot be construed to be a statement on behalf of the Council.
3. Elected Members will refrain from making personal statements to the media without clearly prefacing such remarks that they are personal views and not those of the Council;
4. There shall not be any adverse reflection on Elected Members, External Members, Employees or a Council/Committee decision.
5. All Elected Members of the Council shall be able to inspect and/or obtain a copy of any press release so filed, at any time.
6. Media statements and press releases must not include information of an electioneering or personal promotional purpose.

CITY of PERTH Council Policy Manual



CP 1.9 - MEDIA POLICY - MEDIA STATEMENTS, PRESS RELEASES AND SOCIAL MEDIA

- 7.** Press releases will be made available to Elected Members and the general public by publishing on the City's website on the day of release.

Social Media

Elected Members when using social media must:

- Expressly state on all social media platforms that the views stated are their own and are not those of the City of Perth or the Council;
- Not disclose confidential information;
- Ensure that all content published is accurate and not misleading and complies with all relevant City policies and legislative requirements;
- Not adversely reflect on Elected Members, External Members, Employees or a Council/Committee decision;
- Adhere to the guidelines of the relevant social media platform/website, as well as copyright, privacy, defamation, contempt of court, discrimination, harassment and other applicable law.

Notes: The Media Unit does not respond to questions on behalf of Elected Members, or Employees in their personal capacity. The role of the Media Unit is to represent the City of Perth as a whole.

This Policy should be read in conjunction with the Elected Member Code of Conduct and any breach of this Policy may also be considered a breach of the City of Perth Code of Conduct.

Document Control Box									
Document Responsibilities:									
Custodian:		Chief Executive Officer			Custodian Unit:		CEO Office		
Decision Maker:		Council							
Compliance Requirements:									
Legislation:		2.8(1)(d) of the <i>Local Government Act 1995</i>							
Industry:									
Organisational:									
Document Management:									
Risk Rating:		Medium	Review Frequency:		Biennial	Next Due:	2019	TRIM Ref:	P1007039
Version #	Decision Reference:			Synopsis:					
1.	11/12/89			Previous Policy No. F23, ST7, ST4					
2.	20/08/90								
3.	28/04/98								
4.	30/01/07								

Agenda **Third Party Travel Contribution – Speaking Invitation for 2017**
Item 13.11 **Australia Day National Conference**

Recommendation:

That Council:

- 1. notes that the Acting Director Economic Development and Activation has been invited to present about the 2017 Skyworks emergency to the 2017 Australia Day National Conference, being held in Adelaide, South Australia from Tuesday, 25 – Wednesday 26, July 2017.***
- 2. notes acceptance of a third party contribution to facilitate the presentation on Wednesday, 26 July 2017 at 2.00pm.***

FILE REFERENCE: P1029677
 REPORTING UNIT: Chief Executive Office
 RESPONSIBLE DIRECTORATE: Chief Executive Office
 DATE: 30 May 2017
 ATTACHMENT/S: N/A

Legislation / Strategic Plan / Policy:

Legislation s.5.83 of the *Local Government Act 1995*

Integrated Planning and Corporate Business Plan
Reporting Framework Council Four Year Priorities: Capable and Responsive Organisation
Implications S18 Strengthen the capacity of the organisation

Policy

Policy No and Name: Council Policy 10.1 – Code of Conduct

Financial Implications:

There are no financial implications for the City relating to the Acting Director Economic Development and Activation's presentation to the 2017 Australia Day National Conference.

The National Australia Day Council will cover a return airfare, one night's accommodation in Adelaide and attendance at the conference for the period of time relevant to the Director's presentation i.e. 12.00pm to 3.30pm.

Purpose and Background:

The City of Perth works closely with Australia Day WA, the Western Australian arm of the National Australia Day Council, on a number of major events, including the Australia Day Citizenship Ceremony at Council House and the annual Skyworks celebration.

The Australia Day National Conference is held each year in an Australian Capital City and is organised by the National Australia Day Council. The conference is attended by delegates from Australia Day Councils and Committees from all Australian States and Territories.

The conference seeks to support and enhance Australia Day celebrations and observances throughout the country, including through the Australia Day National Network, of which the City of Perth is a participant.

The National Australia Day Conference has invited the Acting Director of Economic Development and Activation – who was the 2017 Skyworks Director – to present to conference delegates about the plane accident and subsequent cancellation of the 2017 Skyworks, the first cancellation in the event's 33-year history.

Upon receiving the invitation from the Chief Executive Officer of the National Australia Day Council, the Acting Director Economic Development and Activation contacted the Australian Transport Safety Bureau (ATSB) to ensure acceptance of the invitation would not impact on the investigation into the plane accident. ATSB confirmed there was no issue and by mutual agreement, no specific details about the investigation would be shared as part of the presentation.

Details:

The Acting Director Economic Development and Activation has been invited to present about the 2016 Skyworks emergency to the 2017 Australia Day National Conference at 2.00pm on Wednesday, 26 July 2017 in Adelaide, South Australia.

The National Australia Day Council will cover a return airfare, one night's accommodation in Adelaide and attendance at the conference for the time period relevant to the presentation.

Comments:

As the Skyworks Director from April 2016, the Acting Director Economic Development and Activation led more than a dozen Consortium organisations in planning the months leading up to the 2017 Australia Day Skyworks. Consortium members include the WA Police, Mix 94.5, SevenWest Media, Lotterywest, Department of Mines and Petroleum, the Civil Aviation Safety Authority, Department of Fire and Emergency Services, the Cities of South Perth and Victoria Park, and other key stakeholder organisations.

The Acting Director also led the City's internal operations team, comprising more than 60 staff across all City Directorates.

In addition to leading the planning and execution of the event, the Acting Director led the management and operational response to the fatal plane accident and subsequent cancellation of the 2017 Australia Day Skyworks.

The Acting Director has since received widespread praise for their leadership of the crisis, both internally and externally, and has received both formal commendations and several speaker requests.

It is recommended that Council approve the third party contribution to travel to enable the Acting Director's participation in this speaking opportunity at the Australia Day National Conference.

Report to the Ordinary Council Meeting**Agenda
Item 13.12****Third Party Travel Contribution – Cr Green – Appointment as
Independent Chair – KIC Australia Ltd**

Recommendation:

That Council confirms approval of Third Party Travel Contribution to Cr Green by the Climate – KIC Australia as detailed in Attachment 13.12A.

FILE REFERENCE:	P1032862
REPORTING UNIT:	Governance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	27 June 2017
ATTACHMENT/S:	Attachment 13.12A - Letter of Appointment - Dr Green – Independent Chair of Climate – KIC Australia Ltd

Legislation / Strategic Plan / Policy:

Legislation	5.83 of the <i>Local Government Act 1995</i>
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Integrated Reporting Implications	Planning and Framework	Corporate Business Plan
		Council Four Year Priorities: Perth as a Capital City
		S6 Maintain a strong profile and reputation for the City of Perth as a city that is attractive for investment

Policy

Policy No and Name:	10.1 – Code of Conduct
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Purpose and Background:

Cr Green has been appointed as an Independent Director and Chair of the Governing Board of Climate – KIC Australia for a period of two years from June 2017.

The appointment of Cr Green (Dr Green) was undertaken in her private capacity as a Research Fellow at Curtin University who are also a Corporate Partner to Climate – KIC Australia.

The Climate-KIC Australia website states that Climate KIC “are a Knowledge Innovation Community (KIC) to catalyse a national response to climate change and the global-scale opportunities it presents. Our purpose: to help bring to market innovative climate change solutions by connecting key players across the whole innovation pathway.”

Details:

Council at its Ordinary Council Meeting held on **17 May 2016** resolved that;

“That Travel being paid for by a Third Party comes to Council for Approval”.

The contribution to Travel as determined in the *Local Government Act 1995* includes airfares and accommodation incidental to a journey. As part of this transparency motion no differentiation was made between council and private third party travel contributions.

This approach goes beyond the legislation which states the following;

“5.83(2) - Nothing in this Subdivision requires a relevant person to disclose a financial or other contribution to any such travel undertaken by a person if —

(c) the contribution was made in the ordinary course of an occupation of the person which is not related to his or her duties as a council member or employee; “

The requirement to seek Council approval for travel paid for by a third party in regards to a person's occupation was identified as onerous and problematic. Occupational travel can be required at short notice and additionally is seen as an unnecessary step of approval by Council as it would not be appropriate for Council to do anything but approve travel for occupational purposes as it is outside the scope and function of Local Government.

The new Code of Conduct that comes into effect on 1 July 2017, addresses this issue, whereby a disclosure of travel is not required for occupational travel and only for travel associated with the City of Perth or the Elected Member's role.

The new clause states;

“4.6.2 Third Party Travel Contributions

Any travel contribution from a third party related to the City of Perth or an individual's role (as an Employee, External Member or Committee Member) must be approved by Council prior to acceptance. The recipient must ensure the online third party travel register is updated with the details of their travel.”

Cr Green will be required to attend a number of Board meetings for Climate KIC Australia, the first being 25-26 June 2017. Contributed travel will include flights, accommodation and incidental travel expenses.

In order to have achieved Council approval prior to the first Board Meeting it would have necessitated a Special Council Meeting. Given the unnecessary costs and disruption that would have entailed a Special Council Meeting it was agreed by the Chief Executive Officer and Manager Governance that retrospective approval would be sought and if approved by Council then Cr Green will seek reimbursement from Climate – KIC Australia.

Financial Implications:

There are no direct financial implications to the City of Perth arising from this report.

Comments:

Supplementary disclosures may need to be made on the City of Perth Governance and Accountability section of the City of Perth website, including the Third Party Travel Contribution Register and the Gift Register.



8 June 2017

Dr Jemma Green
Research Fellow
Curtin University
Kent St Bentley
WA 6102

Dear Dr Green

Appointment as Independent Chair of Climate-KIC Australia Ltd

The Board of Climate-KIC Australia Ltd, is very pleased to offer you appointment as an Independent director and Chair of the Governing Board of Climate-KIC Australia for a period of two years from the date of the 26 June 2017 Board meeting.

Your appointment as a Director and Independent Chair is guided by the constitution of Climate-KIC Australia (attached). As discussed, Climate-KIC Australia will meet your travel (economy air travel) and accommodation expenses to attend Board meetings and where required provide an additional airfare (economy class) to cover the cost of child care support.

The Board looks forward to working with you to realise the vision for Climate-KIC Australia.

Your sincerely

Professor Mary Ritter
Acting Chair, Climate-KIC Australia

Agenda **Energy from Waste Tender Consideration**
Item 13.13

Recommendation:

That Council:

- 1. notes the resolution of the Mindarie Regional Council at its Special Council Meeting of 18 May 2017, including the nomination of Tenderer A and Tenderer B as the first and second preferred bidders for the Energy from Waste Tender respectively;***
- 2. endorses the Energy from Waste technology being proposed in the preferred bidders' submissions;***
- 3. confirms that pursuant to clause 5.1(a) of the Mindarie Regional Council Constitution (as amended 3 April 2017), it provides its agreement for the orderly and efficient treatment and/or disposal of waste delivered to such buildings or places as are specified in the tender submission of the preferred bidder, if any, that is awarded the tender by the Mindarie Regional Council;***
- 4. acknowledges that, subject to a Waste Supply Agreement being finalised in an acceptable form and the matter of any risk associated with the calorific value of the waste being delivered to the facility being resolved to its satisfaction, the Mindarie Regional Council may choose to award the tender; and***
- 5. acknowledges that if the Mindarie Regional Council chooses to award the tender, the Council will be required to enter into a Participant's Agreement with the successful tenderer, as will the Mindarie Regional Council's other member councils, that guarantees the Mindarie Regional Council's ability to meet its obligations under the Waste Supply Agreement with the successful tenderer.***

The Committee recommendation to the Council for this report was resolved by the Works and Urban Development Committee at its meeting held on 20 June 2017.

The Committee recommendation to the Council is the same as that recommended by the Officers.

FILE REFERENCE:	P1011777-71
REPORTING UNIT:	Waste and Cleansing
RESPONSIBLE DIRECTORATE:	Construction and Maintenance
DATE:	6 June 2017

ATTACHMENT/S:

Attachment 13.13A – Tender Evaluation Criteria

Attachment 13.13B – Investigation into the performance (Environmental and Health) of Waste to Energy technologies internationally (for the WA DEC) - 2013

Attachment 13.13C – Impact on health of emissions to air from municipal waste incinerators -2009

Attachment 13. 13D – and Health performance of Waste to Energy technologies (EPAWaste authority report to the Minister) - 2013

Confidential Attachment 13.13E – Probity Report (Confidential attachment distributed to Elected Members under separate cover)

Confidential Attachment 13.13F – Confidential Memo - Dated 23 May 2017 - EPA EfW recommendations, EfW Emissions and Ministerial Statements (Confidential attachment distributed to Elected Members under separate cover)

In accordance with Section 5.23(2)(e)(ii) of the *Local Government Act 1995*, this item is confidential and has been distributed to the Elected Members under separate cover.

1.16.1 COMPLIANCE CRITERIA

These criteria will not be point scored. Each Tender will be assessed on a Yes/No basis as to whether the criterion is satisfactorily met. An assessment of "No" against any criterion may eliminate the Tender from consideration.

Tenders that have been received by the Principal in compliance with the Conditions of Tender will be evaluated against the following compliance criteria.

Table 1-4: Compliance Criteria

Description of Compliance Criteria	Explanation	Yes/No
Compliance with the requirements of the RFT	Tenders will be checked for compliance with all the requirements of the RFT, including approved technology, the specification and technical requirements and the Conditions of Tender; that no collusion or corruption and no anti-competitive behaviour has occurred and that all mandatory requirements have been complied with.	Yes/No
No unacceptable changes to the Contract	Tenders will be assessed to determine the acceptability of any proposed amendments to the applicable Draft Contracts (WSA or DBOM Contracts).	Yes/No
Capacity and Comprehensiveness of information	Tenders will need to demonstrate a capacity (financial, project development capability, and other resources) to provide the Services in accordance with the Contract. Tenders must include all information requested as part of this RFT and provide fully developed and worked up proposals to demonstrate the Tenderer's capacity to provide the Services.	Yes/No
Proven Technology	Tendered technologies and designs will be assessed to determine if that combination of technology and design has a proven track record of treating waste of similar quantities, types and composition to that proposed in the RFT, at a full commercial scale of the size proposed in the Tender for a minimum period of four (4) years for a DBOM tender and two (2) years for a WSA tender.	Yes/No
Aligns with Approval Authority Advice	Tenders will be checked to ensure alignment, if applicable with the advice provided by the Environmental Protection Authority (EPA) to the Minister for Environment within the document: <i>Report and Recommendations of the Environmental Protection Authority and the Waste Authority - Environmental and health performance of waste to energy technologies</i> ; (Report 1468) (2013)	Yes/No

Description of Compliance Criteria	Explanation	Yes/No
Deliverability (Achievable Timeline)	The Tender will need to demonstrate that the Tenderer will be able to provide the RRF within the timeframe nominated in its Tender and in accordance with the requirements of this RFT. The strength of the Tenderer's consortium and existing facilities and/or approvals will influence the assessment of deliverability.	Yes/No

Tenders that do not comply with all of the Compliance Criteria may be rejected by the Principal at its sole discretion.

Tenders that have been received by the Principal at the time and location specified in the Request for Tender, but otherwise do not comply with the requirements of the Conditions of Tender will be deemed to be non-conforming, unless the submission is submitted clearly marked as an Alternative Tender in accordance with clause 1.19.5.

The Principal may accept more than one tender for different components of the available Wastes and is not obliged to accept any tender received.

1.16.2 QUALITATIVE CRITERIA

Tenders that have been determined to have complied with the Compliance Criteria will be evaluated using the Qualitative Criteria.

In determining the most advantageous Tender, the Evaluation Panel will score each Tenderer against the qualitative criteria.

It is essential that Tenderers address each qualitative criterion. The Tenders will be used to select the chosen Tenderer, and failure to provide the specified information may result in elimination from the Tender evaluation process.

The Qualitative Criteria for this Request are as follows:

Table 1-5: Qualitative Criteria

Description of Qualitative Criteria	Weighting
Financial Risk	17.5%
Commercial risks to the Principal and the Participants as demonstrated by the robustness and supporting evidence for the costs, revenue and other financial factors associated with the Tender.	
Technical	22.5%
Time (months/years) from the Acceptance of Tender to the nominated Scheduled Date of Practical Completion.	
Skills and experience of Tenderer's consortium members and Key Personnel	
Flexibility in feed stock quality/composition and how changes to waste composition, waste collection systems/services and practices would be accommodated, including in the event of: <ul style="list-style-type: none"> A Government requirement for a compulsory 3rd kerbside Bin (for green waste or food and green waste); or A Participant choosing to implement changes to their waste collection system/services. 	
Suitability of proposed site and deliverability of Planning and Permitting.	

Description of Qualitative Criteria	Weighting
Quality and acceptability of any Reports, Plans, Protocols and/or Standards provided in the Tender that shall form an Annexure of the Contract.	
Environmental and Occupational Safety & Health	30%
Net energy balance of the process.	
Percentage of all Wastes diverted from landfill by process.	
Net Greenhouse Gas emissions (calculated as a Kg CO ₂ equivalent over the Term).	
Local environmental impacts associated with the RRF and associated vehicle movements (e.g. light, noise, vermin and other pests, flies, dust, odour, visible emissions, air pollution, water pollution, ground pollution).	
The Contractor and Sub-Contractors Occupational Safety and Health performance for the previous 5 years.	
Quality and acceptability of the Contractors proposed Occupational Safety and Health Management Plan, as relevant to this tender.	10%
Social	
Compliance with the Waste Hierarchy.	
Assessment of the Tendered information relating to existing and/or future community engagement relating to the RRF and the Tenderer's ability to engage with members of the community throughout the Term.	20%
Legal	
Degree of compliance with / derogation from the Contract and/or Contracts and acceptability of the risk transfer to the Principal(s) of any potential changes.	
Robustness of contracting structure within a consortium including any sub-contracts and interface arrangements based on term sheets of key sub-contracts.	100%
Total	

Tenderers shall provide with their Tender, details in response to each of the Qualitative Criteria.

1.16.3 VALUE FOR MONEY

The Preferred Tenderer(s) will then be selected on the basis of providing the best value for money option for the Principal and the Participants taking into consideration:

- The total cost to the Principal and to the Participants (including, but not limited to, impacts on waste collection systems/services and additional cost of transport to the RRF);
- The assessment against the Qualitative Criteria; and
- The degree to which each Tender demonstrates that it achieves the Principal's objectives.




An Investigation into the Performance (Environmental and Health) of Waste to Energy Technologies Internationally.

Summary Report – Waste to Energy - A review of legislative and regulatory frameworks, state of the art technologies and research on health and environmental impacts.

January 2013

UNITED
BY OUR
DIFFERENCE



Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks				
Date	16th January 2013			
Prepared by	Kevin Whiting, Steve Wood and Mick Fanning			
Signature				
Checked by	Michael Berny			
Signature				
Authorised by	Kevin Whiting			
Signature				
Project number	00031427			
Report number				
File reference				

An Investigation into the Performance (Environmental & Health) of Waste to Energy Technologies Internationally

Summary Report compiled by WSP Environmental
for the Government of Western Australia
Department of Environment and Conservation

January 2013

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This report summarises the findings of three separate studies on the thermal Waste-to-Energy treatment of mixed non-hazardous and low-level hazardous solid waste, predominantly mixed municipal waste. The work incorporates a review of legislative and regulatory frameworks, state of the art technologies and research on health and environmental impacts.

There is now strong policy development within the EU shaping future legislation to ban specific waste categories from landfill disposal and ensure that waste materials that can be recycled are banned from waste-to-energy plants. At regulatory level, bans on certain waste materials being sent for landfill disposal are already established in some countries. This raises parallel debate on the issue of lifecycle assessment for specified waste materials in relation to the respective merits and environmental benefits of processing these at different levels of the waste hierarchy. The outcome of these long term objectives will have an impact on residual municipal waste composition and therefore the design, operational requirements and emission control for waste-to-energy facilities.

In order to showcase real examples of operational WtE plants a collection of fifteen case studies have been produced, which highlight modern state-of-the-art plants and developing technologies. These are presented in detail in the appended full Stage 2 report, but in this

report we briefly describe the work carried out and key findings. In terms of air emissions, it can be seen that all the plants considered in the case studies are within EU Waste Incineration Directive limits, with the exception of the Montgomery County plant for HCl and NO_x. This plant does however comply with the local regulatory requirements. In many cases the emissions are more than an order of magnitude below the regulatory limit.

Key considerations when evaluating the environmental or health effects of thermal treatment technologies include direct comparison of potential impact with other waste treatment options, consideration of relative impact when compared to non-waste related anthropogenic activities and specifically for emission to air, the potential relative impact on air quality conditions. Whilst it is accepted all emissions from whatever process should be minimised as far as possible, understanding and recognising the context in which facilities may operate has been an element in the assessment process or regulatory considerations in other jurisdictions.

Newer, well-operated Waste-to-Energy facilities i.e. those operated in compliance with the relevant regulations and emission standards seem to be more effective in mitigating potential risks from exposure to emissions. Considerable attention has however been given to the difference in emission profiles for dioxins and furans when

comparing steady state combustion and operational transients; one study found operational transients were found to considerably increase levels compared to steady state operation. A report by the UK's Department for Environment, Food and Rural Affairs suggests that whilst emissions above prescribed limits is of concern and should be investigated, it is unlikely to have a significant effect on emissions averaged over a long period such as a year.

There appears to be little convincing and unequivocal evidence that excess risk of contracting specific illnesses is associated with waste facilities such as Waste-to-Energy plants, especially newer, well operated facilities i.e. those operated in compliance with the relevant regulations and emission standards, which seem to be more effective in mitigating potential risks from exposure to emissions. There is however still some uncertainty in relation to interpretation of the results of some literature and academic studies e.g. lack of data or potential limitations in methodologies used (acknowledged by some of the authors of papers reviewed for this report). The UK Health Protection Agency 2009 report states

'...while it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable.'

List of Abbreviations

AIE	Italian Association of Epidemiology	MACT	Maximum Achievable Control Technology (US)
APC	Air Pollution Control residues	MBI	Mass Burn Incineration
ATT	Advanced Thermal Treatment	MBT	Mechanical Biological Treatment
BAT-AEL	BAT-Associated Emission Levels	MHT	Mechanical Heat Treatment
BAT	Best Available Techniques	MMTCE	Million Metric Tonnes Carbon Equivalent
BREF	Best Available Techniques reference document (EU)	MSW	Municipal Solid Waste
C&I	Commercial & Industrial	MSWI	MSW Incineration
CO ₂	Carbon Dioxide	MW	Megawatts
CO ₂ e	Carbon Dioxide equivalent	NO ₂	Nitrogen Dioxide
CO	Carbon Monoxide	NO _x	Nitrogen Oxides
CV	Calorific Value	NSPS	New Source Performance Standards (US)
DEFRA	Department for Environment, Food and Rural Affairs (UK)	PAH	Polycyclic Aromatic Hydrocarbons
EA	Environment Agency (England and Wales)	PCB	Polychlorinated Biphenyls
EASEWASTE	Environmental Assessment of Solid Waste Systems and Technologies	PBDD	Polybrominated Dibenzo-para-dioxins
EIA	Environmental Impact Assessment	PBDF	Polybrominated Dibenzofurans
EIS	Environmental Impact Statement	PCDD	Polychlorinated Dibenzo-para-dioxins
EPA	Environment(al) Protection Agency	PFCDF	Polychlorinated Dibenzofurans
EC	European Commission	PFR	Persistent Free Radicals
ELV	Emission Limit Values	PM	Particulate Matter
EU	European Union	RA	Risk Assessment
FP	Fine Particles	RDF	Refuse Derived Fuel
HPA	Health Protection Agency (UK)	rMSW	Residual MSW
IED	Industrial Emissions Directive (EU)	SIWMS	Stochastic Integrated Waste Simulator
IEH	Institute for Environment and Health (UK)	SO ₂	Sulphur Dioxide
GHG	Greenhouse Gas	SRF	Solid Recovered Fuel
IBA	Incinerator Bottom Ash	TDI	Tolerable Daily Intake
LEAP	Energy and Environment Laboratory Piacenza (Italy)	TEQ	Toxic Equivalent
LCA	Life Cycle Analysis	UFP	Ultra Fine Particles
LFD	Landfill Directive (EU)	VOC	Volatile Organic Carbon
LHV	Lower Heat Value	WFD	Waste Framework Directive (EU)
		WHO	World Health Organisation
		WID	Waste Incineration Directive (EU)
		WRATE	Waste and Resources Assessment Tool for the Environment
		YOLL	Years of Life Lost

In March 2012 the Waste Authority published the Western Australia Waste Strategy Creating the Right Environment. Central to the success of the strategy is the utilisation of high quality information to support effective decision making.

This review focusses on the thermal Waste-to-Energy treatment of mixed non-hazardous and low-level hazardous solid waste, predominantly mixed municipal waste. This summary report is divided into three main sections, each summarising the more detailed Stage 1-3 reports provided in the appendices to this report.

Stage One presents the findings of the international literature review encompassing prevailing international legislative and policy context together with scientific understanding with respect to waste-to-energy (WtE) technologies. The review considers how such legislative or policy instruments may affect the feedstock supply, constituents, subsequent storage, management and

the handling of waste feedstock. The review also considers 2011 State or National decisions relating to WtE and emissions standards, monitoring and abatement requirements and reference to any associated guidance documents.

Geographies within the scope of this study include:

- Australia, including the States of New South Wales, Queensland, Victoria and South Australia (Section 2);
- European Union (EU) and, in particular, the UK (Scotland, England and Wales), The Netherlands, Sweden, and Germany. Norway is included as part of wider Europe whilst not being an EU member (Section 3);
- Japan (Section 4); and
- USA (Federal and State level) and in particular Florida, Minnesota, New York and California (Section 5).

Stage Two reviews a collection of fifteen Case Studies highlighting modern state-of-the-art plants using the following selection criteria:

- modern plants with higher than normal thermal efficiency;
- modern plants achieving low environmental impacts;
- plants gaining acceptance via innovative architectural treatments;
- modern plants employing state-of-the-art furnace design;
- modern plants employing alternative thermal technologies, such as fluidised bed and gasification.

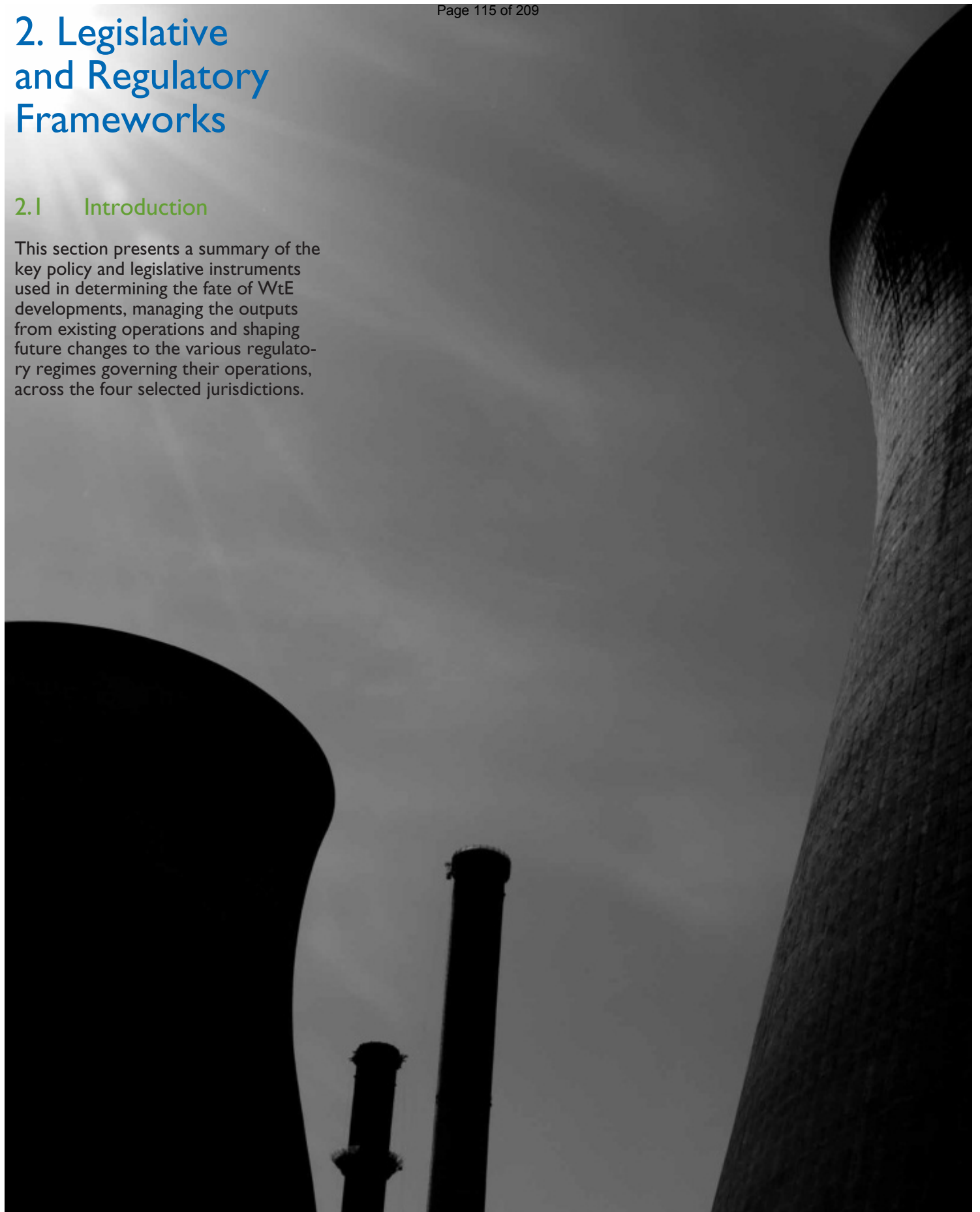
Stage Three presents the findings of the international literature review from the last 15 years encompassing potential environmental and health risks associated with emissions from Waste to-Energy (WtE) plants processing mixed non-hazardous and low-level hazardous solid waste. The report focuses necessarily on the incineration of mixed Municipal Solid Waste (MSW) as there is limited available information on the environmental or health impacts on alternative Advanced Thermal Treatment (ATT) technologies.



2. Legislative and Regulatory Frameworks

2.1 Introduction

This section presents a summary of the key policy and legislative instruments used in determining the fate of WtE developments, managing the outputs from existing operations and shaping future changes to the various regulatory regimes governing their operations, across the four selected jurisdictions.



2.2 Australia

The **Council of Australian Governments (COAG) Standing Council on Environment and Water (SCEW)** incorporating the **National Environmental Protection Council (NEPC)**, is the national intergovernmental body that has law-making powers as defined in the **National Environment Protection Council Act 1994 (Commonwealth)**.

Included in the Council's Priority Issues of National Significance, as agreed by COAG are:

- Pursuing seamless environmental regulation and regulatory practice across jurisdictions;
- Implementing the National Waste Policy, and
- Developing and implementing a National Plan for Clean Air to improve air quality and community health and wellbeing.

More specifically, the NEPC has two primary functions that are to:

- Make National Environment Protection Measures (NEPMs); and
- Assess and report on the implementation and effectiveness of NEPMs in participating jurisdictions.

NEPMs are broad framework-setting statutory instruments that are agreed on by Australian, State and Territory governments. They outline an agreed consistent national approach for protecting or managing particular aspects of the environment. Each of the State and Territory environment protection agencies have their own legislative frameworks to implement the NEPMs in their respective jurisdiction and are required to comply with the NEPMs.

It should also be noted that COAG has a priority aim to develop and implement a National Plan for Clean Air to improve air quality and community health and well-being.

The **National Waste Policy 'Less Waste, More Resources' (2009)** provides direction for Australia to produce less waste for disposal and manage waste as a resource to deliver economic,

environmental and social benefits until 2020. The associated 2010 Implementation Plan presents the aims, key directions, priority strategies and roles and responsibilities of governments (Federal and State) as outlined in the National Waste Policy: Less Waste, More Resources.

The National Waste Policy discusses the significance of WtE and its relevance to enhancing organic resource recovery and the opportunity to reduce greenhouse gas emissions from landfills. The Policy cites the important role of State and Territory Governments in building on their existing programs, including the need to consider the use of alternative waste treatment technologies, WtE plants and bio-digesters.

National Pollution Inventory

The **National Pollutant Inventory (NPI)** was developed under the National Pollution Inventory NEPM. The NPI tracks pollution across Australia, and provides the community information about the emission and transfer of toxic substances which may affect them locally.

The NPI is an internet database designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to the environment. The NPI contains data on 93 substances emitted to land, air and water that have been identified as important due to their possible effect on human health and the environment. The data comes from facilities like mines, power stations and factories, and from other sources such as households and transport.

National Fiscal Drivers

Australia has recently introduced a carbon tax, which came into effect on 1 July 2012. Under the scheme, approximately 500 of the biggest carbon polluters in Australia will be required to pay for pollution under a carbon pricing mechanism. Under the pricing mechanism, the carbon price will be fixed for the first three years, starting at AUS\$23 per tonne of carbon dioxide (CO₂). From year four it will be determined by the market.

Most landfills within Australia will be captured under the recently introduced carbon tax scheme so there is an expectation that landfill prices will increase across the board from 1 July 2012. Landfills which generate more than 25,000 tonnes of greenhouse gases a year will pay the carbon tax.

Moreover, landfills in Australia often have waste levies, which are set by each State or Territory.

As an incentive to increase the production of renewable energy, renewable energy power stations can produce large-scale generation certificates, which provide a revenue opportunity for facilities that can demonstrate renewable energy generation.

Renewable Energy (Electricity) Act 2000

The **Renewable Energy (Electricity) Act 2000** provides legislative basis for the uptake of renewable energy within Australia. It does this by legislating for the recognition and accreditation of renewable energy producers, liable entities that need to acquire renewable electricity and for the creation, transfer, and use of renewable energy certificates, either when the certificates are small-scale technology certificates (STCs) or large-scale generation certificates (LGCs).

Moreover, section 17 of the act sets out what is an eligible renewable energy source, and while materials or waste products derived from fossil fuels are not eligible renewable energy sources, several biogenic wastes are eligible with respect to obtaining large scale generation certificates for accredited power stations. These eligible renewable energy sources include:

- energy crops;
- wood waste;
- agricultural waste;
- waste from processing of agricultural products;
- food waste;
- food processing waste;
- bagasse;
- biomass based components of municipal solid waste; and
- biomass based components of sewage.

Although this differs somewhat to the Renewables Obligation Certificates (ROCs) employed in the UK, it is functionally similar and aims to achieve the same effect.

The **Renewable Energy Target (RET) Scheme** is an undertaking that by 2020, 20% of Australia's electricity supply will be sourced from renewable sources.

Carbon Pricing and Clean Energy Legislation

The National Greenhouse and Energy Reporting (Measurement) Determination 2008 (the Determination) supports the aims of the Clean Energy Act 2011 and the National Greenhouse and Energy Reporting Act 2007. In the Determination there are methods for calculating the covered CO₂e from waste incineration. The methods available to estimate emissions include:

- though derived means, using knowledge of the waste inputs and likely oxidising factors for waste inputs entering the incineration process (under 5.53), or
- through direct measurement (under Part 1.3 Method 4) or
- through another emissions calculation method that is consistent with the General principles for measuring emissions (under 1.13 of the determinations).

National Environment Protection Council Act 1994 (NEPC Act)

This Act establishes the NEPC which is a national ministerial body with the

responsibility to develop appropriate national legislation to be protective of the environment (media including - air (quality and noise), water, soil and groundwater). This Act is mirrored in all States and Territories.

Ambient Air Quality NEPM 1998

The **National Environment Protection Measure for Ambient Air Quality (Air NEPM)** was made in 1997 and specifies standards and goals for ambient levels of the 'criteria' air pollutants. The criteria pollutants are ubiquitous in urbanised areas and are general indicators of air quality.

The Air NEPM sets national standards for the six key air pollutants to which most Australians are exposed: carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, lead and particulates. Under the Air NEPM, all Australians have the same level of air quality protection.

Environment Protection and Biodiversity Conservation Act 1999 & Environment Protection and Biodiversity Conservation Regulations 2000

The Act is the primary Commonwealth legislation directed to protecting the environment in relation to Commonwealth land and controlling significant impacts on matters of national environmental significance. The Act requires assessment and approval of actions that either will significantly affect matters of national environmental

significance, or are undertaken by a Commonwealth agency or involve Commonwealth land and will have a significant effect on the environment.

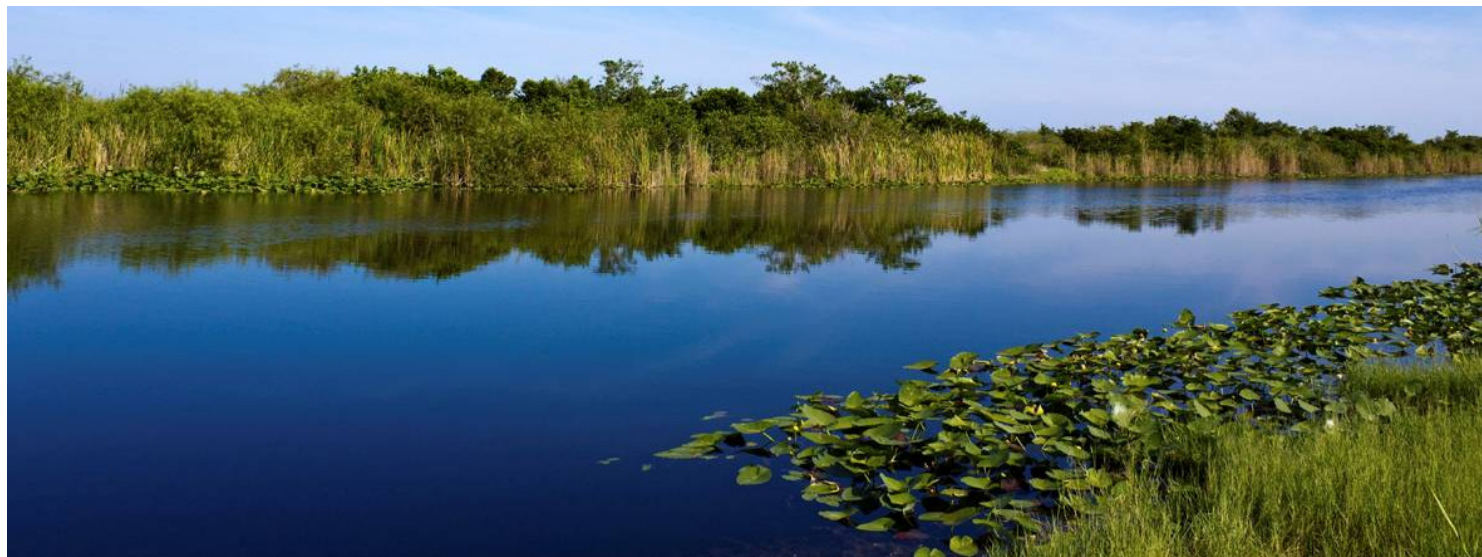
Air Toxics NEPM 2004

The **National Environment Protection (Air Toxics) Measure (Air Toxics NEPM)** establishes 'monitoring investigation levels' for five specified air toxics. Monitoring data gathered under the Air Toxics NEPM will inform future decisions on the management of these pollutants.

Air Emissions Standards

Australia does not have national air emissions standards applicable to industrial facilities such as WtE plants. Environment protection authorities in individual States and Territories set such standards. Specific air emission targets are generally set for a development as part of the licencing and permitting stage and are site specific with respect to location, adjacent uses and meteorology.

For State level implementation of National Standards, refer to the accompanying Stage 1 report Review of Legislative and Regulatory Frameworks for Waste to Energy Plants.



2.3 European Union (EU) and Wider Europe

EU waste policy aims to coordinate and contribute to increasing resource efficiency and reducing the negative environmental and health impacts over the life-cycle of resources throughout the EU, founded on the basic principles of preventing waste and promoting reuse, recycling and recovery so as to reduce the negative environmental impact.

'Towards a Thematic Strategy on the Prevention and Recycling of Waste' May 2003

The strategy specified a long-term goal for the EU to become a recycling society, seeking to avoid waste as far as possible and to use waste that is generated as a resource. It proposed a combination of measures promoting waste prevention, recycling and reuse in such a way as to produce the optimum reduction in the accumulated impact over the life cycle of resources, including:

- A renewed emphasis on full implementation of existing legislation;
- Simplification and modernisation of existing legislation;
- Introduction of life-cycle thinking into waste policy;
- Promotion of more ambitious waste prevention policies;
- Better knowledge and information;
- Development of common reference standards for recycling; and
- Further elaboration of the EU's recycling policy.

A 2011 review of the strategy concluded that it has played an important role in guiding policy development and improvement and gives specific reference to the simplification of legislation, the establishment and diffusion of key concepts, such as the waste hierarchy and life-cycle thinking, on setting focus on waste prevention, on co-ordination of efforts to improve knowledge and on setting new European collection and recycling targets.

Report on a Resource-Efficient Europe May 2012

In May 2012 the EC published a 'Report on a Resource-Efficient Europe'. As well as proposing an end to waste to landfill,

the plans approved in 2009, the EU will see a cap set on the amount of recyclable and compostable waste that can be sent for energy recovery via incineration imposed across the continent. The following is an extract from this report on this issue:

'...calls on the Commission to streamline the waste acquis (the accumulated legislation, legal acts, and court decisions which constitute the body of European Union law), taking into account the waste hierarchy and the need to bring residual waste close to zero; calls on the Commission, therefore, to make proposals by 2014 with a view to gradually introducing a general ban on waste landfill at European level and for the phasing-out, by the end of this decade, of incineration of recyclable and compostable waste; this should be accompanied by appropriate transition measures including the further development of common standards based on life-cycle thinking; calls on the Commission to revise the 2020 recycling targets of the Waste Framework Directive; is of the opinion that a landfill tax – as has already been introduced by some Member States – could also help achieve the above ends;...'

Environmental legislation and policy is well established within Europe. The EC is responsible for drafting proposals for new legislation within the EU, managing the day-to-day business of implementing policies and ensuring that the EU Member States abide by the numerous treaties and laws. Member States are obliged to implement EU Directives through national regulations and policy.

Integrated Pollution Prevention Control Directive (IPPC) 2008/1/EC

IPPC defines the obligations with which industrial and agricultural activities with a high pollution potential must comply. It establishes a procedure for authorising these activities and sets minimum requirements to be included in all permits, particularly in terms of pollutants released. The aim is to prevent or reduce pollution of the atmosphere, water and soil, as well as reducing the quantities of waste arising from industrial and agricultural installations, to ensure a high level of environmental protection. It also focuses on the prudent use of natural resources.

IPPC manages the activities of significant sites, called 'installations' by regulating and permitting:

- Raw material and energy use;
- How the site operates and the technology used;
- Emissions into air, water and land;
- How any waste produced is managed; and
- Accident prevention.

In order to receive a permit, an industrial or agricultural installation must comply with certain basic obligations and the decision to issue a permit must contain a number of specific requirements, including:

- Emission limit values for polluting substances (with the exception of greenhouse gases if the emission trading scheme applies);
- Any soil, water and air protection measures required;
- Waste management measures;
- Measures to be taken in exceptional circumstances (leaks, malfunctions, temporary or permanent stoppages, etc.);
- Minimisation of long-distance or trans-boundary pollution;
- Release monitoring; and
- All other appropriate measures.

Waste Framework Directive (WFD) 2008/98/EC

European Commission Directive 2008/98/EC (known as the **revised Waste Framework Directive**) entered into force in December 2008 and sets out the basic concepts and definitions related to waste management and lays down waste management principles such as the 'polluter pays principle' and the 'waste hierarchy'. It aims to set a framework for waste management in the EU, promoting both reuse and recycling, including energy recovery as a recovery activity within a revised waste management hierarchy and dealing with 'end of waste' classification.

The incorporation of lifecycle thinking in waste management solutions has caused some controversy in some Member States (refer to UK regulatory framework section for a specific example). The EC has recently ruled lifecycle impacts can take precedence over the waste

hierarchy for certain materials and has produced detailed guidance, legally binding for all EU Member States. The EC has declared that the rules can be deviated from if it can be proven that following the hierarchy would not be in the 'best environmental interest' of a product's lifecycle.

'For special waste streams Member States are allowed to depart from the waste hierarchy when this is justified by lifecycle thinking on the overall impacts of the generation and management of those specific waste streams.'

In general, it continued, the waste hierarchy should apply 'as a priority order in waste prevention and management legislation and policy' while allowing Member States a 'degree of flexibility'.

The EC is committed to developing end-of-waste criteria for materials such as aggregate, paper, glass, metal, tyres and textiles.

The **WFD** sets out a range of provisions in relation to recycling and reuse, setting targets for increasing recycling rates for both household and construction and demolition (C&D) waste.

The targets in the Directive are:

- To recycle or prepare for reuse 50% of household waste by 2020; and
- To reuse, recycle or recover 70% of non-hazardous C&D waste by 2020.

It also specifies a requirement to set up separate collection of 'at least the following: paper, metal, plastic and glass', from the household waste stream by 2015 and the separate collection of waste paper, metal, plastic and glass from businesses from January 2015, where technically, environmentally and economically practicable. This has been seen as controversial in its interpretation in some Member States e.g. the UK, where the relevant merits of co-mingled and source-separated recycling collections have been debated at Government level. In June 2012, the EC confirmed this requirement can be met by co-mingled collections of recyclables if high quality recycling is achieved.

RI Energy Recovery

The EU had considered the incineration

of waste in a **WtE** plant to be a 'disposal' activity and not a 'recovery' (of energy) activity. The revision of the WFD has caused this subject to be discussed at length in Brussels as it is related to the European policies on climate change. Proposals have been made to allow a WtE plant to be considered as a recovery operation if it meets a thermal efficiency index (RI) currently proposed to be 0.6 for existing plants and 0.65 for new plants. This outcome ensures that any new proposed WtE plant that demonstrates an RI value above 0.65 would be considered a 'resource recovery' plant and therefore sit higher up the waste hierarchy than less efficient plants. Such plants may also be at an advantage when seeking to gain political approval whereas for a project classified as a low efficiency 'disposal' plant may find political approval more challenging to secure.

Typically, the energy efficiency of a WtE plant, based on the ratio of 'useful energy out' to 'energy in', is in the range 18-22% for older plants producing electricity only. Modern plants, particularly at large scale, can meet the criterion on the basis of producing only electricity, due mainly to improved boiler design and enhancements to the high pressure steam cycle, achieving efficiencies in the region 25-27%. These plants readily achieve the RI criterion of >0.65 and are thereby classified in the EU as recovery operations. There are unique facilities such as the Amsterdam plant discussed in case study of the appended Stage 2 report that has taken steam cycle modification to the extreme and achieve a continuous efficiency of 30%.

The use of Combined Heat and Power (CHP) can dramatically increase the thermal efficiency and help to meet the RI recovery criterion.

In 2009, the Confederation of European Waste-to-Energy Plants (CEWEP) published its updated Energy Report II (status 2004-07) providing specific data for energy, RI plant efficiency factor and Net Calorific Value for 231 European Waste-to-Energy plants. It found 'electricity only' plants were achieving the lowest RI factor of 0.64 as a non-weighted average, and that only 46 out of 75 are reaching the RI standard i.e. ≥ 0.6 . In contrast, combined

heat and power (CHP) plants achieved the highest RI factors at 0.84 as a non-weighted average, and that 98 out of 115 are reaching the RI standard.

Landfill Directive

The **Landfill Directive** aims to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste, during the whole life-cycle of the landfill. It supplements the IPPC Directive by setting a variety of technical standards of operation for landfill and sets out a timetable for existing sites to be brought up to standard or close.

The Directive requires, amongst other objectives, that a biodegradable waste strategy is enacted by each member state that achieves the progressive diversion of biodegradable municipal waste from landfill. The Directive set targets for reducing the quantity of biodegradable material sent to landfill to 35% of 1995 figures by 2020.

It also required changes to the way waste was landfilled in the EU, including:

- Certain wastes were banned from landfill;
- All landfill sites were to be classified specifically for inert waste, hazardous waste or non-hazardous waste, the latter category covers most biodegradable waste;
- Outlined standard waste acceptance criteria (WAC) for different classes of landfill;
- Introduced the requirement to pre-treat waste going to landfill (treatment could include sorting); and
- Required the UK practice of co-disposal in landfills of hazardous and non-hazardous waste to end by July 2004.

Waste Incineration Directive (WID)

Whilst the **Industrial Emissions Directive (IED)** replaces **WID** as part of the overall recast of the seven specified established waste directives, in advance of Member States' implementation in their respective domestic regulations, this section

summarises the requirements of WID since implementation within the EU.

The aim of WID is to prevent or limit, as far as practicable, negative effects on the environment, in particular pollution by emissions into air, soil, surface and groundwater and any resulting risks to human health, from the incineration and co-incineration of waste. It aimed to achieve this high level of environmental and human health protection by requiring the setting and maintaining

of stringent operational conditions, technical requirements and emission limit values for plants incinerating and co-incinerating waste throughout the EU.

In order to guarantee complete waste combustion, WID requires all plants to keep the incineration or co-incineration gases at a temperature of at least 850°C for at least two seconds after the last injection of air. If hazardous waste with a content of more than 1% of halogenated organic substances, expressed as

chlorine, is incinerated, the temperature has to be raised to 1,100 °C for at least two seconds after the last injection of air. The heat generated by the incineration process has to be put to good use as far as practicable.

For emissions to air, the limit values for incineration plants are set out in Annex V to the Waste Incineration Directive and Table 1 compares the specific WID requirements with those adopted by Member States and Norway.

Table I: Air Emission Limit Values as applied in Europe for waste incineration plants

		Averaging Periods	EU WID/IED	Sweden	Norway	Germany	Netherlands	UK
Particulates	mg/Nm ³	Daily	10	10	10	10	5	10
TOC	mg/Nm ³	min 0.5 max 8hrs	10	10	10	10	10	10
HCl	mg/Nm ³	Daily	10	10	10	10	10	10
HF	mg/Nm ³	Daily	1	1	1	1	1	1
SO ₂	mg/Nm ³	Daily	50	50	50	50	50	50
NO _x	mg/Nm ³	Daily	200 /400 ¹	200 /400 ¹	200	200	200	200 /400 ¹
CO	mg/Nm ³	Daily	50	50	50	50	50-150 ²	50
Hg ³	mg/Nm ³	Daily	N/A	N/A	0.03	0.03	N/A	N/A
		min 0.5 max 8hrs	0.05	0.05	N/A	0.05	0.05	0.05
Cd,Tl	mg/Nm ³	min 0.5 max 8hrs	0.05	0.05	0.05	0.05	0.05	0.05
Metals	mg/Nm ³	min 0.5 max 8hrs	0.5	0.5	0.5	0.5	0.5	0.5
Dioxins and Furans ⁴	ng/Nm ³	min 6 hrs max 8 hrs	0.1	0.1	0.1	0.1	0.1	0.1

1 - 200 for existing waste incineration plants with a nominal capacity exceeding 6 tonnes per hour or new waste incineration plants, 400 for less than 6 tonnes per hour

2 - 97% of daily average is 50 mg/m³, all half-hourly average in any 24 hour period is 100 mg/m³ or 95% of all 10-minute average in any 24 hour period is 150 mg/m³

3 - WID specifies a min 0.5-max 8hrs averaging period for Hg. Germany also have a daily limit and Norway, who is not within the scope of WID, only have a daily average limit

4 - The emission limit value refers to the total concentration of dioxins and furans calculated using the concept of toxic equivalence in accordance with Annex I.

Member States may interpret and adapt WID to align with their own regulatory requirements e.g. the NO_x and CO emission limit values in the Netherlands.

For emissions to water, the ELVs for incineration plants are set out in Annex IV to the WID and Table 2 compares the specific WID

requirements with those adopted by Member States and Norway.

Table 2: ELVs for discharges of wastewater

	Suspended Solids	Hg	Cd	Tl	As	Pb	Cr	Cu	Ni	Zn	Dioxins & Furans
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ng/l
EU WID/IED	30-45	0.03	0.05	0.05	0.15	0.20	0.50	0.50	0.50	1.50	0.30
Sweden	30-45	0.03	0.05	0.05	0.15	0.20	0.50	0.50	0.50	1.50	0.30
Norway	30-45	0.03	0.05	0.05	0.15	0.20	0.50	0.50	0.50	1.50	0.30
Germany	30-45	0.03	0.05	0.05	0.15	0.10	0.50	0.50	0.50	1.00	0.30
Netherlands	30-45	0.03	0.05	0.05	0.15	0.20	0.50	0.50	0.50	1.50	0.30
UK	30-45	0.03	0.05	0.05	0.15	0.20	0.50	0.50	0.50	1.50	0.30

Industrial Emissions Directive (IED)

The IED entered into force in January 2011 and aims to reduce emissions from industrial activities with a major pollution potential defined within Annex I to the Directive; for the purpose of this report it specifically includes WtE installations. Operators of industrial installations undertaking the prescribed activities are required to obtain an integrated permit from the competent authority in each EU member country. It is important to note that the emissions limits to be contained in the IED will be identical to those currently defined in the Waste Incineration Directive (WID) and there are currently no specific plans to amend the emissions limits for WtE plants operating in the EU.

The IED is based on several principles, namely an integrated approach, best available techniques, flexibility, inspections and finally, public participation.

The primary aim of the IED is to achieve significant benefits for the environment and human health by reducing harmful industrial emissions. Permit conditions and pollutant emission limit values (ELVs) have to be set on the basis of the application of Best Available Techniques (BAT), as specified in the relevant BREF or 'BAT reference document'. Associated Emission Levels (BAT AEL) are the expected range of emissions where BAT is applied. BAT conclusions

become the reference point for applying permit conditions, specifying emission limit values less than or no greater than the BAT AELs.

The periodic review of BREFs and developments in BAT may lead to adoption of new technologies or improved abatement. This in turn may require industry to invest in new technology to ensure compliance.

Permits issued by the competent authority in each Member State must provide for the necessary measures to ensure compliance with the operator's basic obligations and environmental quality standards. These measures must comprise at least:

- ELVs for polluting substances;
- Rules guaranteeing protection of soil, water and air;
- Waste monitoring and management measures;
- Requirements concerning emission measurement methodology, frequency and evaluation procedure;
- An obligation to inform the competent authority of the results of monitoring, at least annually;
- Requirements concerning the maintenance and surveillance of soil and groundwater;
- Measures relating to exceptional circumstances (leaks, malfunctions, momentary or definitive stoppages, etc.);

- Provisions on the minimisation of long-distance or transboundary pollution; and
- Conditions for assessing compliance with the emission limit values.

The IED contains certain elements of flexibility by allowing the competent authorities to set less strict ELVs in specific cases, only applicable where an assessment shows that the achievement of emission levels associated with BAT as described in the BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to either geographical location, local environmental conditions or the technical characteristics of the installation. The competent authority however, must always document the reasons for the application of the flexibility measures in an annex to the permit including the result of the cost-benefit assessment and as with IPPC before, this is open for examination by the EC.

For State level implementation of National Standards, refer to the Appended Stage 1 main report.

2.4 Japan

Over the last decade, Japan has shifted from a waste management policy to an integrated waste and material management approach that promotes de-materialisation and resource efficiency. Landfill shortage and dependency on natural resources imports have been key drivers of these changes. There has been a considerable push to increase recycling by requiring households to sort waste into various fractions. Individual municipalities are free to establish sorting guidelines, so the level of separation varies quite widely. Waste is typically sorted into around eight fractions, though some municipalities require waste to be sorted into as many as 44 different categories. This leads to variations in the residual waste stream that may be treated via WtE as the recycling rate varies by municipality.

Japan currently has a surplus of thermal waste treatment capacity. This is a result of two main factors:

- the long-term reliance on incineration for waste disposal; and
- a recent decrease in the volumes of residual waste due to the substantial increase in recycling levels over the previous 10 years.

Fiscal Drivers

There is no national landfill tax. Historically, incineration has been the primary disposal route for waste in Japan due to a lack of space for landfills and the requirement for waste to be disposed of locally, so there is no strong driver to reduce landfill dependence in a country that has limited existing capacity and little potential for future capacity. Additionally, the recycling laws prevent much commercial biodegradable waste from entering landfills.

Regulatory Framework

Waste management in Japan is a responsibility of the Ministry of the Environment. The fundamental principles governing environmental protection are set out in the Basic Environmental Law (1994). Japan has three levels of governance:

- Central government
- Prefectures; and
- Municipalities.

Each level has different responsibilities relating to waste management. Central government oversees waste management with a duty to collect waste information, promote waste management technology development and provide funding to the prefectures and municipalities to allow them to carry out their duties. The prefectures formalise waste plans and grant licences for waste disposal facilities, and also have the power to set emissions limits. It is then for the individual municipalities within the prefecture to oversee the development of waste infrastructure.

Prior to the 1990s, waste regulation in Japan focussed on disposal and energy recovery whilst recycling was not prioritised. Incineration has historically been the primary disposal route for waste due to limitations on space for landfill in proximity to urban areas as a result of the country's geography. However, the introduction of a raft of new legislation in the late 1990s and early 2000s saw a major shift in policy to increase the recycling rate substantially as well as substantially improving the environmental performance of incineration and WtE facilities.

Permits are issued by the Prefectural Governments and Planning Control is the responsibility of the municipalities.

Basic Law for Promoting the Creation of a Recycling-Oriented Society (2000)

The basic framework law governing waste and resources is the [Basic Law for Promoting the Creation of a Recycling-Oriented Society \(2000\)](#), which came into force in January 2001. This law establishes the basic principles of waste management and sets out roles and responsibilities for national and local government with respect to the management, recovery and disposal of waste. At its core is the promotion of the 3Rs; Reduce, Reuse and Recycle. The law seeks to create a recycling-oriented society, promoting the priority order (the equivalent of the waste hierarchy in the EU Waste Framework Directive).

Waste Management and Public Cleansing Law (2001)

The law was first enforced in 1970 and has been updated numerous times. It is solely applicable to the final disposal of waste, covering the following:

- Proper waste disposal;
- Regulations for setting up waste disposal facilities;
- Regulations on waste disposal businesses;
- Establishment of criteria for waste disposal;
- Measures to control improper disposal; and
- Development of facilities through participation of the public sector.

Of note is that the incineration of waste without thermal energy recovery is considered a disposal operation. As such this law was relevant to many incineration plants prior to the introduction of the Basic Law for Promoting the Creation of a Recycling-Oriented Society, as the emphasis was strongly on incineration as a volume reduction and disposal process rather than an energy recovery operation. Many plants were small scale serving individual municipalities and the generation of electricity or recovery of heat was uneconomic. However, given the increasing emphasis on recycling and recovery, modern WtE plants are incentivised to recover energy (as well as recycling ash) an activity classed as 'thermal recycling', particularly the use of plasma melters to vitrify the bottom and fly ash from incineration plants to be recycled into construction applications. Hence modern WtE is not considered to be a disposal activity and this law therefore does not apply to WtE.

Law for Promotion of the Effective Utilisation of Resources (2001)

The law was first enforced in 2001 and includes the following:

- Prevention and recycling of by-products;
- Utilisation of recycled resources and parts;
- Self-collection and recycling of used products; and
- Promotion of effective utilisation of by-products.

The law is essentially a framework providing guidance to ensure minimisation, re-use and recycling of waste.

WtE Regulatory Framework

The regulatory regime governing environmental impacts from WtE plants in Japan is set out in the Japan Environmental Governing Standards (JEGS) 2010. There are a number of important definitions in the JEGS, and in many cases the definitions differ from the equivalent term in the EU and other regions:

- Municipal Solid Waste – includes 'any household, commercial/retail or institutional waste'; and

- Commercial and Industrial Solid Waste – limited to industrial wastes such as waste oils, sludges, construction and demolition residues etc.

The differences are important as there are different emissions limits depending on the type of feedstock being treated.

National air emissions limits are provided in Chapter 2 of the JEGS and these standards set out the minimum emissions levels that all new and existing incineration plant (and other industrial facilities) must achieve. There is no legislation that applies specifically to incineration as there is in the EU.

Certain emissions limits vary depending on a range of factors, including:

- Age of the plant;
- Feedstock (in particular whether the plant treats Municipal Solid waste or Commercial and Industrial Solid waste);
- Treatment capacity; and
- Technology type.

To enable comparison of JEGS emission limit values with EU WID, the values from JEGS (expressed as parts per million) have been converted to mg/Nm³ and all concentrations normalised to an 11% oxygen basis. A summary is provided in Tables 3, 4 and 5.

Table 3: Air Emission Limit Values

Incinerator Type		Existing Municipal Waste Combustion Plant		New or substantially modified Municipal Waste Combustion Plant		Commercial and Industrial Waste Incineration Plant
Rated Capacity	Units	35-250 tpd	>250 tpd	35-250 tpd	>250 tpd	All units
Particulate	mg/Nm ³	50	19	17	17	50
Opacity		10%	10%	10%	10%	10%
NO _x (expressed as NO ₂)	mg/Nm ³	None	Depends on technology	723	217	561
SO ₂	mg/Nm ³	155	58	60	60	40
Dioxins/Furans	ng/Nm ³	89.0	21.4	9.3	9.3	0.3
Cadmium	mg/Nm ³	0.07	0.03	0.01	0.01	0.00
Lead	mg/Nm ³	1.14	0.31	0.14	0.14	0.03
Mercury	mg/Nm ³	0.06	0.06	0.06	0.06	0.33
HCl	mg/Nm ³	287	33	34	29	71

Table 4 Carbon Monoxide Emission Limit Values

Incinerator Type		Existing Municipal Waste Combustion Plant		New or substantially modified Municipal Waste Combustion Plant		Commercial and Industrial Waste Incineration Plant
Rated Capacity	Units	35-250 tpd	>250 tpd	35-250 tpd	>250 tpd	All units
Fluidised Bed	mg/Nm³	137				214
Fluidised Bed, mixed Fuel (wood/ RDF)	mg/Nm³	274		274	137	
Mass burn rotary refractory	mg/Nm³	137		137		
Mass burn rotary waterfall	mg/Nm³	342				
Mass burn waterfall and refractory	mg/Nm³	137		137		
Mixed fuel fired (pulverized coal/ RDF)	mg/Nm³	205		205		
Modular starved-air and excess air	mg/Nm³	68		68		
Spreader stoker, mixed fuel fired (coal/RDF)	mg/Nm³	274		205		
Stoker, RDF	mg/Nm³					

Table 5: Dioxin Emission Limit Values

Capacity (tonnes per hr)	Units	New	Existing
=>4	ng TEQ/Nm ³	0.1	0.7
2-4	ng TEQ/Nm ³	0.7	3.6
<2	ng TEQ/Nm ³	3.6	7.1

A full version of the JEGS emission limit values for air and water is provided in the appended full Stage One report.

It is noteworthy that the national emissions limits are in many cases substantially less stringent than for WID. For example small plants can emit 50 times the level of dioxins/furans than an equivalent plant in the EU.

For 'existing' plants the dioxin/furan limits are higher still (note 'existing' plants are defined in the JEGS as those plants constructed prior to December 1997, 'new' plants are those constructed after this date).

The JEGS include two emissions limits tables specifically apply to incineration plant. However, plants must also comply with other emissions limits in a range

of other tables, leading in many cases to several emissions limits for the same pollutant. It is assumed that the figures in the incineration-specific tables take precedence.

However, the JEGS allow Prefectural Governments who plan to construct waste treatment facilities to decide on emissions limits in accordance with emission regulation of local government and/or agreement with communities.

Air Emissions Limits - Regional

The national emissions limits are a baseline minimum in the absence of more specific limits that may be set at a regional level. Prefectural governments are free to set their own, more stringent limits specific to their

jurisdiction. This results in significant differences across the country, with more heavily urbanised areas typically setting stricter limits than more rural prefectures. For example, predominantly urban Saitama Prefecture has a very strict dioxin limit, 50 times lower than the much more rural Aomori Prefecture. An implication of this is that certain WtE technologies may be appropriate in one prefecture but not in another due to an inability to comply with the emissions standards.

The differences between emissions limits in each prefecture results in a complex picture nationwide. Data for all 47 prefectures could not be obtained, but a sample of emission limits in four prefectures is provided in Table 6.

Table 6: Example of Emission Limit Variation by Prefecture

Pollutant	Unit	Prefecture			
		Kanagawa	Saitama	Miyagi	Aomori
Dust	g/Nm ³	0.005	0.02	0.02	0.01
SO _x	ppm	10	10	50	20
NO _x	ppm	30	50	60	150
HCl	ppm	10	10	50	50
CO	ppm	30 (4hr average)	30 (4hr average)	30 (4hr average)	30 (4hr average)
Dioxins	ng/TEQ/m ³ N	0.05	0.005	0.01	0.1
Capacity of plant	tonnes/day	525	265	230	60

Municipal Solid Waste - Local Government Responsibility

Incineration has historically been used to dispose of a far greater proportion of waste than in most countries. In 2008, 74% of all waste produced in Japan was thermally treated, with just 2% sent to landfill. This is primarily a result of a lack of available land for landfills near urban areas (a high population in a relatively small habitable area). Municipalities are required to dispose of their waste within their own boundaries where possible, though several neighbouring

municipalities Page 125 of 209
develop a common waste treatment plant if there are insufficient waste arisings.

The requirement to treat waste at a local municipality level (i.e. individual cities, towns and villages) has resulted in the construction of a very large number of relatively small scale incineration plants, typically based on grate combustion technology. In 2008 Japan had 1,269 waste incineration plants for the treatment of 35.7 million tonnes of Municipal Solid Waste, the average size of which is well below that of the

average Europe plant (less than 30,000 tonnes per year). Japan is one of the few countries with an overcapacity of incineration plant as recycling rates have increased substantially since the turn of the century.

Historically energy recovery was not a high priority for incineration plant in Japan. Only relatively recently has the focus changed from waste disposal (volume reduction) to energy recovery (or 'thermal recycling').



2.5 United States

The regulatory framework applicable to WtE operations in the US is at best complex. At the federal level (which covers all States, territories, and protectorates), there is no single body of laws that regulate WtE siting, construction, and operation. Instead, each aspect is governed by a series of laws and regulations that must be taken into consideration during all phases of selecting a facility location, constructing the facility, operating the facility, and closing down the operation at end of life.

The USEPA has identified the potential environmental impacts having the most significance with respect to WtE facilities to include air emissions (nitrogen oxides, sulfur dioxide, CO₂, and trace amounts of mercury compounds [and potentially other metals] and dioxins/furans), water use (for cooling water and steam generation), water discharges (cooling water, wastewater, and storm water runoff), solid waste generation (ash and other residue), and land resources (resulting from the physical location and operation of the plant and related ash landfill). There are individual federal laws that address each of these impacts and others that regulate specific aspects of facility operations such as management of the MSW fuel source and hazardous materials that may be used in the process.

Many of the federal laws require participation by the states with respect to enforcing federal regulations within each state including developing and implementing matching programs at the state level. States (many, but not all) also have promulgated laws that go well beyond the federal regulations and include stricter compliance criteria. For example, many states have passed regulations requiring the application of stricter air quality criteria to emissions than the federal government has included in the Clean Air Act. At the state level, there are also a number of additional laws that are applicable to WtE facilities to address regional issues including water use, groundwater protection, geological concerns (e.g., site stability), storage tank registration

and testing, commissioning, and emergency preparedness. Some states have developed a fairly comprehensive approach to regulation and permitting of WtE facilities and power generating facilities in general, while others have no formalised program.

In the US, there are also individual municipalities within the states that have enacted local environmental laws that would apply to and potentially further restrict WtE operations. The most significant of these municipal laws tend to be found in larger cities, such as New York (which has a robust set of environmental regulations that apply to various activities conducted within the city limits), Los Angeles, and Chicago, although many smaller cities and counties also have laws and ordinances that are applicable to WtE operations including those governing such issues as land use, water rights, occupancy permits, permits to operate, noise limits, control of odours, traffic-related impacts, water discharges, storm water impacts from construction activity, and operation of pollution control equipment.

National Environmental Policy Act (Federal Law)

The **National Environmental Policy Act (NEPA)** was passed in 1969 and requires an environmental review to be conducted before any major federal action is undertaken. Each federal agency has developed its own program for compliance with NEPA requirements and the USEPA plays a significant role in the NEPA process both for its own activities as well as for those of other agencies. Given the wide applicability of NEPA, it has been broadly interpreted over the years and may be applicable to any project that requires federal involvement such as the licensing of a power generation facility by the Federal Energy Regulatory Commission. The NEPA process is overseen by the federal Council on Environmental Quality and involves preparation of an Environmental Assessment (EA) and, if warranted, preparation of an Environmental Impact Statement (EIS).

The purpose of the EA is to determine whether the proposed project is likely to have a significant impact on the

environment. There is an opportunity for public involvement and comment during preparation and review of the EA and input is generally sought from applicable federal, state, and local agencies that have an interest in the project. Upon completion of the review, there is either a Finding of No Significant Impact or a determination that an EIS must be prepared.

The EIS involves a more detailed and rigorous evaluation of the potential environmental impacts of the proposed project and generally follows a more formal review process. It can be a lengthy process requiring the development of significant supporting studies and reports. There is an opportunity for public review and comment at both the draft and final EIS stage and participation by interested stakeholders is encouraged throughout. The final decision regarding the EIS is published in a Record of Decision (ROD) and any requirements for mitigation of potential environmental impacts are included in the ROD.

Resource Conservation and Recovery Act

The regulatory framework for managing solid and hazardous wastes is established by the **Resource Conservation and Recovery Act (RCRA)**, which was originally passed in 1976 and significantly amended in 1984. For solid (non-hazardous) waste, which by definition includes MSW, the RCRA regulations cover:

- Requirements for state permit programmes;
- Guidelines for thermal processing of solid wastes;
- Guidelines for storage and collection of solid wastes;
- Guidelines for source separation for materials recovery;
- Procurement guideline for products containing recovered materials;
- Prior notice of citizen suits;
- Identification of regions and agencies for solid waste management;
- Guidelines for development and implementation of state solid waste management plans;
- Criteria for classification of solid waste disposal facilities and

- practices; and
- Criteria for MSW landfills.

Within the RCRA regulations, there are specific requirements that govern the design and operation of both non-hazardous and hazardous waste management facilities. Individual States are encouraged by the USEPA to adopt State non-hazardous and hazardous waste management and permitting programmes that meet the minimum regulations established under RCRA. Currently, 50 States and territories have been authorised by the USEPA to implement baseline RCRA programmes.

Many States are also authorised to implement other parts of RCRA, including Corrective Action, but there is substantial variability among the States with respect to which parts of RCRA each is authorised to implement, and enforce. In cases where a State does not have an equivalent rule, the responsibility for enforcement under RCRA reverts to the federal level. As a result, it is possible to have solid waste management requirements for a site that are enforced jointly by a State regulatory agency and the USEPA.

Clean Air Act

The **Clean Air Act (CAA)**, originally passed in 1970, is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorises the USEPA to establish **National Ambient Air Quality Standards (NAAQS)** to protect public health and welfare and to regulate emissions of hazardous air pollutants.

One of the goals of the CAA was to set and achieve NAAQS in every state by 1975 to address the public health risks posed by certain widespread air pollutants. The setting of these standards was coupled with directing the states to develop state implementation plans (SIPs), applicable to appropriate industrial sources in each state, to achieve these standards. The CAA was significantly amended in 1977 and 1990 primarily to set new goals (i.e., dates) for achieving attainment of NAAQS since many areas of the US had failed to meet the original deadlines.

Although many provisions of the CAA are potentially applicable to WtE facilities, Title I, Part A, Section 129 (added to the CAA in 1990) is specific to solid waste combustion and includes requirements pertaining to emissions standards (including numerical limits as performance standards or emission guidelines), control methods and technologies, facility monitoring, operator training, and permits. Under Section 129, the USEPA is required to establish **New Source Performance Standards (NSPS)** for new units and emission guidelines (EG) for existing units pertaining to particulate matter, opacity, sulfur dioxide, hydrogen chloride, oxides of nitrogen, carbon monoxide, lead, cadmium, mercury, dioxins/furans, and dibenzofurans. Both the NSPS and EG under Section 129 use a **Maximum Achievable Control Technology (MACT)** approach.

The NSPS are federal regulations that apply directly to all new sources, i.e., new municipal waste combustor (MWC) units that start up after the effective date of the NSPS must comply with the federal NSPS. The EG establish requirements for limits to be included in SIPs; once the SIPs are approved by the USEPA, they become federally enforceable. In accordance with Section 129, SIPs must have emissions limits that are at least as protective as the EG, but may be more restrictive.

It is important to note that the USEPA initiated the rulemaking process to establish NSPS or EG for most solid waste combustor units in the mid-1990s. Many of the rules have been amended several times or stayed by judicial authority pending the outcome of litigation brought by various interested parties. For large MWCs, the most recent version of the final rule for NSPS and EG was issued in May 2006; in March 2007, the USEPA announced that it was reconsidering certain aspects of the final rule (not including the emissions limits). For small MWCs, the most recent versions of the final rules for NSPS and EG (issued separately) were issued in December 2000. For CISWI, the most recent version of the final rule for NSPS and EG was issued in March 2011; since then, the USEPA has delayed the effective dates for the rules and indicated

that it is reconsidering certain aspects of the final rule. For 'other' solid waste combustor units, the final rule for NSPS and EG was issued in January 2007.

Of recent and growing interest within the CAA are the regulatory initiatives developed to address greenhouse gas emissions from mobile and stationary sources. In 2009, the USEPA issued a finding under the CAA that six key greenhouse gases pose a threat to public health and welfare – carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. As a result, several actions were either proposed or completed by the USEPA to implement the CAA requirements for greenhouse gases for stationary sources that include: emissions reporting and establishing greenhouse gas emissions thresholds that define when permits under the New Source Review/Prevention of Significant Deterioration and Title V Operating Permit programs are required (currently subject to the final Greenhouse Gas Tailoring Rule).

Emission Limit Values for Air and Water

Under the CAA, there are several sets of emissions standards that may apply for specific hazardous air pollutants. The final rules for NSPS and EG for large combustors existing and new, small combustors existing and new, and Commercial and Industrial Waste Incinerators (CISWI) all apply different limits, including general modifying criteria.

For water discharges under the CWA, there is not a single set of effluent criteria that will apply. The NPDES permit programme and industrial wastewater discharge limits are state and location-specific and are driven by the specific discharge activity and nature of the discharge.

For State level implementation of National Standards, refer to the Appended Stage 1 main report.

2.6 Conclusion

This section summarises the key policy and legislative instruments relating to waste-to-energy plants across four separate geographies. It finds a complex and varied set of strategies within each, at Federal, State and Local Authority levels, to ensure the maximum level of resource efficiency is achieved whilst retaining a detailed focus on protection of human health and the environment.

At policy level, the implementation of fiscal drivers for change, such as environmental taxes, has been successful in achieving their objectives to varying degrees. For example, a landfill tax with on-going incremental increases, on the whole, appears to be a successful incentive to divert waste from landfill and in the longer term support investment of alternative processing technologies. Other environmental taxes such as the incineration tax in Norway was introduced, amended and later withdrawn.

There is now strong policy development within the EU shaping future legislation to ban specific waste categories from landfill disposal and ensure that waste materials that can be recycled are banned from waste-to-energy plants. At regulatory level, bans on certain waste materials being sent for landfill disposal are already established in some countries. This raises parallel debate on the issue of lifecycle assessment for specified waste materials and respective merits and environmental benefits of processing these at different levels of the waste hierarchy. The outcome of these long term objectives will have an impact on residual municipal waste composition and therefore the design, operational requirements and emission control for waste-to-energy facilities.

The introduction of the new recovery status given to waste to energy processes in the EU meeting specified thermal efficiency requirements (RI energy recovery criterion) is resulting

in tangible changes in the way certain waste fuels are being managed, to include increasing cross border activity.

Emissions control and regulation also varies across the selected geographies. Notably national air emission limit values in Japan are, in many cases, substantially less stringent than those under the EU Waste Incineration Directive. However, the Japanese national environmental regulations allow Prefectural Governments who plan to construct waste treatment facilities to decide on emissions limits in accordance with emission regulation of local government and/or agreement with communities, which may, in theory, be more stringent than the national requirement.



3.1 Introduction

This section presents a summary of the Stage Two report provided in the appendices to this report.

The utilisation of waste as a resource for the recovery of materials and energy is becoming an increasingly attractive option for local and national governments worldwide to allow diversion of large volumes of residual solid municipal solid waste (MSW) which cannot be recycled or composted from landfill to meet current and future obligations under relevant regulations, such as the EU Landfill Directive (discussed in Section 2). Waste to Energy (WtE) also offers the significant potential to contribute to the mitigation of climate change as part of Local and Regional Government energy strategies and policies to meet CO₂ reduction targets. Selection of the optimal WtE technology will require careful consideration of technical, environmental, regulatory and economic issues when evaluating life cycle costs and the impacts of WtE technologies.

Waste to Energy is the generic term given to a process by which the energy stored in waste (chemical energy) is extracted in the form of electricity, heat and/or a fuel for use in a decentralised energy generation plant. A number of technologies are commercially available and have been deployed, especially in Europe, Japan and the USA. These represent a number of fundamentally different technologies under two main groups: e.g. biological processing of biodegradable waste and thermal technology of residual

waste, including direct combustion (incineration), Advanced Conversion technologies (ACT - gasification and pyrolysis) or recovery of secondary fuel for subsequent energy recovery Solid Recovered Fuel (SRF) from Mechanical Biological Treatment (MBT) processes and biofuels from syngas produced by gasification processes). Maximising recycling and recovery from MSW and Commercial & Industrial (C&I) waste will have both environmental and economic impacts on WtE technologies and considerable technological developments have been taking place within the WtE space to optimise the performance of state-of-the-art facilities.

Thermal conversion processes can be divided into three different categories; combustion, gasification and pyrolysis with each process being dependent on the concentration of oxygen. Combustion takes place in an environment with an excess of oxygen, gasification is a partial oxidation process requiring an oxygen concentration slightly below the stoichiometric level (the stoichiometric air (oxygen) requirement is the exact amount of oxygen needed to balance all of the chemical reaction equations to convert the Carbon in the fuel to Carbon Dioxide and Hydrogen to water). Pyrolysis occurs in the absence of oxygen.

In order to showcase real examples of operational WtE plants a collection of fifteen case studies have been produced, which highlight modern state-of-the-art plants and developing technologies. These are presented in the appended full Stage 2 report, but in this chapter we briefly describe the work carried out and key findings.

3.2 Summary of Case Studies

WSP has selected plants suitable as state-of-the-art case studies using the following selection criteria:

- modern plants with higher than normal thermal efficiency;
- modern plants achieving low environmental impacts;
- plants gaining acceptance via innovative architectural treatments;
- modern plants employing state-of-the-art furnace design; and
- modern plants employing alternative thermal technologies, such as fluidised bed and gasification.

WSP has chosen to include two case studies that include more than one technology in order to provide the reader with a fuller understanding of current technical developments whilst still including interesting operating plants with innovative design elements:

- a review of the status of slagging gasification technologies in Japan; and
- a review of the status of plasma gasification technology developments.

Table 7: Plants used for case studies and reasons for inclusion

	Plant name	Country	Why included
1	AEB, Amsterdam	The Netherlands	The largest plant in the Netherlands. The most recent two lines added to the original four line facility employs a reheat Rankine steam cycle and produces electricity with a total thermal efficiency of 30% .
2	Lakeside, London	UK	A recently commissioned merchant incinerator developed by a major UK waste management company and located near to Heathrow Airport. The plant processes residual MSW and C&I waste and is the only plant supplied to date by a Japanese supplier.
3	Spittelau, Vienna	Austria	This is a relatively old conventional moving grate combustion plant. However, it was the first facility that used architectural treatment to gain public acceptance .
4	Allington, Kent	UK	One of the largest fluidised bed MSW incineration plants in the world . The plant was supplied by Lurgi Lentjes with technology licensed from the Ebara Corporation of Japan. Ebara has supplied more than 100 such plants in Japan.
5	Issy les Moulineaux, Paris	France	The newest and largest incineration plant in France. The plant is built on the side of the River Seine in the centre of Paris and the building only has a vertical profile of 27 metres as 30 metres of the plant is below ground. The roof is flat and covered with grass and shrubs and the exhaust stacks only protrude 5 metres above the building roofline.
6	Reno Nord, Aalborg	Denmark	Modern incinerator in CHP mode and providing district heating to the local city .
7	Sarpsborg II	Norway	The newest gasification plant using the Energos two stage gasification/combustion process, which operates with very high thermal efficiency by sending all steam to an adjacent industrial customer.
8	Zabalgari, Bilbao	Spain	High efficiency plant linked to an adjacent combined cycle plant. The steam from the combustion plant is passed to the adjacent power plant and converted to electricity at higher efficiency.
9	Brescia	Italy	New plant in Italy operating with high thermal efficiency .
10	Riverside, London	UK	The newest and largest combustion plant in the UK using state-of-the-art grate combustion technology and high steam pressure and temperature . The majority of the MSW is delivered to the site by barge via the River Thames.
11	Mainz	Germany	The new third line installed at this existing combustion facility operates with high efficiency due to integration with an adjacent gas turbine plant.
12	Lahti II	Finland	Metso Power has supplied many fluidised bed combustion plants via companies it has acquired over the years – Tampella Power, Gotaverken Miljo and Kvaerner. The company has developed a CFB gasification plant for RDF fuels that is operating in Finland. This plant has been included as a Case Study because it is the first large scale commercial gasification plant supplied by a large well capitalised company.
13	Montgomery County, Maryland	USA	Relatively old plant refurbished with the newest Martin grate and the LN deNO_x technology .
14	Slagging Gasification	Japan	A review of slagging gasification in Japan . There are currently 122 operating slagging gasifiers processing MSW with more under construction. This review describes the processes supplied by the leading Japanese companies.
15	Plasma Gasification	Various	A worldwide status review of plasma gasification technologies currently being marketed and close to commercialisation.

The full case studies can be found in the Stage 2 report, each of which contains a comprehensive review of the plant covering the following aspects:

- Overall plant description
- Process details
- Plant performance
- Emissions
- Visual impact
- Operation and reliability; and
- Economics

Though it is impossible to adequately summarise each case study in this summary report, a brief overview of each plant is provided in Table 8.

Table 8: Summary of case studies

	Plant name	Summary
1	AEB, Amsterdam	The newest two lines of the Amsterdam moving grate combustion plant really are state-of-the-art. Not only does the process produce electricity with a net efficiency of >30%, the highest of any WtE combustion plant in the world, but the plant also maximises recovery of materials for re-use in society such as bottom ash and fly ash, as well as producing calcium chloride and gypsum as secondary by-products of the flue gas cleaning process. The annual availability is reported to be >90%.
2	Lakeside, London	The Lakeside plant was developed by Grundon as a merchant facility and processes both residual MSW supplied by local Councils and C&I waste obtained from the market by Grundon's waste management. The plant employs innovative architecture and best-practice energy recovery techniques. We understand from the operators that the plant is performing well and meeting its regulatory requirements with respect to environmental impact.
3	Spittelau, Vienna	The Spittelau plant is a relatively old plant, but is notable for using extensive architectural treatment to help the plant gain public acceptance. Public perception and acceptance of WtE plants is very important, and innovative architecture can be one means of helping to overcome this hurdle.
4	Allington, Kent	The Allington plant is the largest fluidised bed combustion plant outside of Japan, which although it suffered from some initial teething problems has operated successfully for the past few years and met most of its environmental objectives. The plant has a very low building profile thanks to the fact that most of the fluidised bed combustors and boilers have been sunk 30 metres into the ground.
5	Issy les Moulineaux, Paris	The ISSEANE plant is a major feat of engineering. The plant is sunk about 30 metres into the bank of the River Seine with all the associated hydrogeological challenges of building the plant there. The exhaust gas chimneys protrude only 5 metres above the building but in order to do this the plant has had to guarantee emission limits to air of 50% of the WID values for all pollutants. It is truly a state-of-the-art WtE facility.
6	Reno Nord, Aalborg	The Reno Nord plant is a state-of-the-art example of a waste processing facility that delivers hot water into the district heating network of the area. The electrical conversion efficiency is 27% but the combination of that with the heat utilisation means the total efficiency of the plant is >40%.
7	Sarpsborg II	The two stage gasification/combustion process developed by Energos has been accepted as a gasification process by the UK regulator Ofgem. The plant supplies steam 'over-the-fence' to a heat customer, and so operates with very high thermal efficiency despite no electricity being generated. The low steam conditions (pressure and temperature) that would be not an issue.
8	Zabalgardi, Bilbao	The Bilbao combustion facility is an example of a modern plant utilising the exhaust heat from an adjacent gas turbine power plant to perform reheating of the steam produced by the heat recovery boiler and operate with a thermal efficiency >40%.
9	Brescia	The Brescia WtE facility is a true state-of-the-art plant with low emissions and high efficiency power production. The architectural look of the plant is also extremely modern.
10	Riverside, London	The Riverside WtE plants has been 18 years in development, facing significant opposition and having to be subjected to two Judicial review processes before it was finally constructed. The plant is an example of a modern state-of-the-art facility design and constructed by one of the leading companies – Hitachi Zosen Inova (formerly Von Roll Inova). The majority of the waste is delivered to the plant in barges via the River Thames. The plant operates with increased steam conditions (72bar and 427°C) and the boiler has been designed specifically to produce steam at these conditions without the significant boiler fouling and failure that would have been experienced in the past. The plant operates with a relatively high thermal efficiency of 27%.
11	Mainz	The Mainz WtE plant is another example of a modern German plant producing high efficiency power and meeting stringent emission limits.
12	Lahti II	The CFB gasification plant developed by Metso Power for the processing of RDF/SRF is a high efficiency, state-of-the-art development; which, in our opinion will change how gasification is perceived and utilised within the context of the waste management industry.
13	Montgomery County, Maryland	Although the Montgomery County Resource Recovery Facility in Maryland, USA is a relatively old plant it has been included as an example of a plant that has undergone a significant retrofit with modern moving grate combustors added to improve efficiency and equipment to significantly improve the de-NO _x capability of the plant. The plant achieves good emission control (in a USA context) and meets the local regulatory requirements. The facility has undergone a significant health impact assessment.

Table 9: Summary of Technical Parameters for plants used for case studies

Facility	Commenced Operations	Throughput Capacity	Process Type	Boiler Type	Steam Pressure (bar)	Steam Temperature (°C)	Gross Power	Overall Efficiency	Gas Cleaning System	Waste Processed	Plant Residues	Fate of Residues
AEB, Netherlands	1969, upgraded 1993 and 2007	1.37Mt	Moving grate	Horizontal	130	440	66MWe	30.6%	SNCR, ESP and Wet and dry scrubbers	Household, C&I	Bottom Ash	Sand-lime bricks, concrete
											Fly Ash	Asphalt concrete
Lakeside, UK	2010	410,000t	Mass burn	Horizontal	45	400	37MWe	Not available	Flue gas recirculation (FGR), SNCR and Semi-dry scrubbing	MSW, non-hazardous C&I	APC residues	Landfill after treatment
											Bottom Ash	Construction
Spittelau, Austria	Original 1969, 2nd generation 1986	250,000t	reverse-acting grate	Vertical	34	245	6MWe 60MWt	Not available	ESP, Scrubber (wet), SCR and EDV	Municipal; non-haz commercial	APC residues	Deep mine disposal
											Bottom ash	Landfill Engineering
Allington, UK	2008	500,000t	Rotating fluidised bed	Horizontal	65	420	43MWe	Not available	ESP and Dry Scrubbing	Non-haz MSW, Commercial and Industrial	Bottom Ash	Construction industry
											APC residues	Landfill after treatment
ISSEANE, France	2007	460,000t	Water-cooled grate	Horizontal	50	400	52MWe	30% electrical (theoretical) See Note: 1	ESP and SCR DeNOX System	Residual MSW	Bottom ash	Recycled
											Fly ash	Landfill after treatment
Reno Nord, Denmark (Line 4)	2005	160,000t	Moving grate	Horizontal	50	425	18MWe and 43MWt	27% electrical (theoretical) See note 2	Three-field electrostatic filter, wet and dry scrubbers and AFM's	MSW	Bottom Ash	Construction industry
											Fly Ash	Not specified
Energos, Norway	Sarpsborg II 2010	78000t	Staged combustion	Horizontal	23	217	32MWt	Not available	Semi dry cleaning system	Residual C&I waste	Bottom Ash	Landfill
											APC residues	Landfill
Zabalgardi, Spain	2004	250,000t	Moving grate	Horizontal	100	330	99.5MWe	42% See Note 3	SNCR and wet scrubber	MSW	Bottom ash	Construction industry
											Fly ash	Storage
Brescia, Italy	1998 (household waste) 2004 (biomass)	800,000t	Moving reverse thrust grate	Vertical	72	450	Up to 100MWe and 150MWt	>27.0% electrical	SNCR, activated carbon and dry lime scrubbing	2 lines MSW, 1 line biomass	Bottom Ash	Construction material
											APC residues	Deep mine disposal
Riverside, UK	2012	670,000t	Moving grate	Horizontal	72	427	66MWe	27.0%	Semi dry cleaning system	MSW	Bottom Ash	Construction
											APC residues	Landfill
Mainz, Germany (Line 3)	2008	110,000t	reverse-acting grate	Vertical	42	420	See Note 4	See Note 4	SNCR and Wet (pre) and dry scrubbers	Residual MSW	Bottom ash	Used in landfill and road construction as substitute materials for virgin aggregates
											APC residues	Infilling old salt mines
Lahti II, Finland	2012	250,000t	Circulating fluidised bed	Vertical	121	540	50MWe and 90MWt	31% thermal efficiency based on waste NCV	Gas cooling & filtration by ceramic filter; dry APC system and NOx control using SCR	SRF	Bed Ash	Landfill
											Filter (Fly) Ash	Treated as Hazardous

Table 9: Summary of Technical Parameters for plants used for case studies. Continued....

Facility	Commenced Operations	Throughput Capacity	Process Type	Boiler Type	Steam Pressure (bar)	Steam Temperature (°C)	Gross Power	Overall Efficiency	Gas Cleaning System	Waste Processed	Plant Residues	Fate of Residues
Montgomery County, USA	1995	573,000t	Reverse-reciprocating stoker	Not known	59.6	443	63MWe	Not available	LoNOX system, Semi-dry scrubbers and Thermal DeNOx	MSW	Bottom ash	Landfill Engineering
											Fly ash	Landfill
Shin-Moji, South Korea	2005	216,000t	Fixed bed	Vertical	39.2	400	23.5MWe	23%	Dry scrubber and SCR	Industrial waste	Fly ash	Recycled
											Vitrified slag	Re-used
Sagami-hara, Near Tokyo	2010	160,000t	Fluidised bed gasifier and melting furnace	Vertical	40	400	10MWe	Not available	dry scrubbing system and SCR	MSW	Vitrified slag	re-used
Fukuyama, Near Hiroshima	2004	92400	Slagging updraft gasifier	Vertical	60	450	20MWe	30%	Dry scrubbing system and SNCR	Pelletised RDF	Melted slag	Recycled
											Metal	Recycled
Plasma gasification technology	There are no large scale commercial plasma gasification plants currently operational.											

It is assumed metals will be extracted from bottom ash for recycling

Note 1: Annual average gross electrical efficiency estimated at around 10% due to high level of heat export - thermal efficiency of around 40%

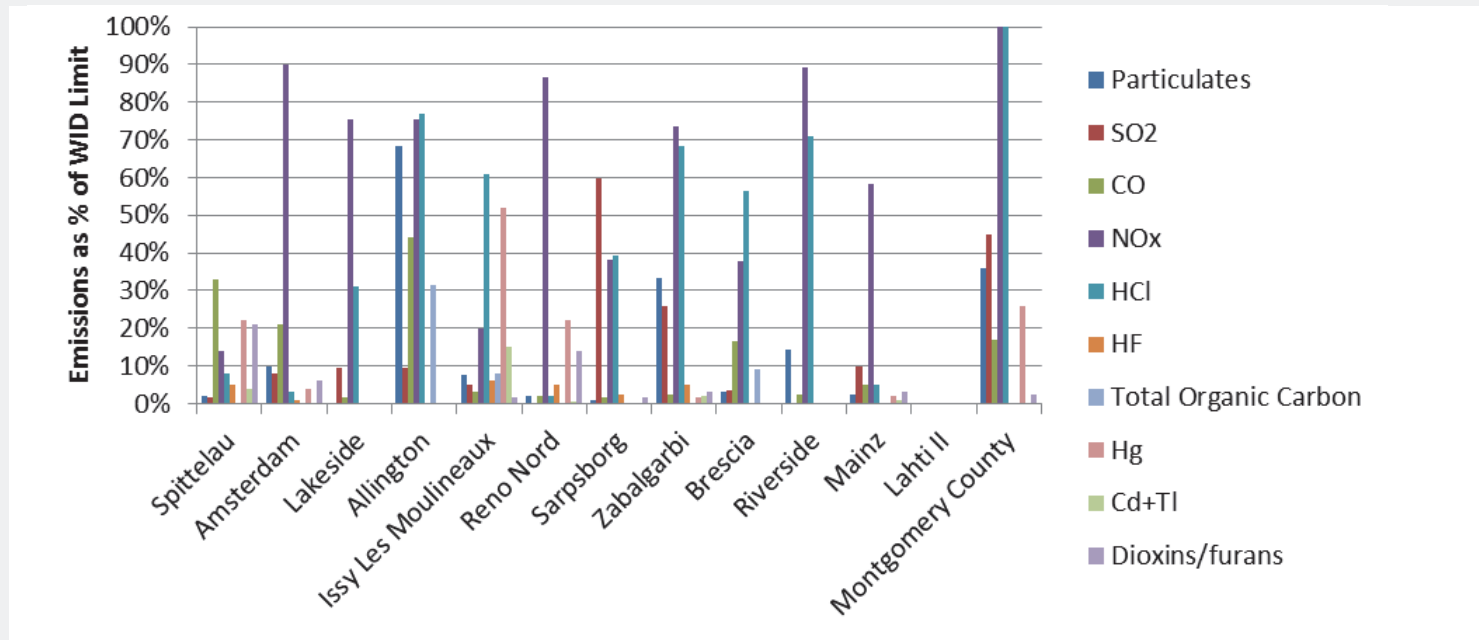
Note 2: High level of heat export means electrical efficiency lower in practice, but overall efficiency high (actual figure unknown), estimated >40%

Note 3: The efficiency achieved is only possible because the WtE plant provides steam to an on-site natural gas fired combined cycle plant

Note 4: The conversion of the steam to electrical energy is carried out in the neighbouring 400 MW combined cycle power plant (CCPP) owned by Mainz-Wiesbaden AG

A comparison of the emissions performance relative to emission limits in the EU WID is provided in Figure 1.

Figure 1: Summary emissions performance for plants reviewed in case studies



Note: Lahti II yet to release emissions data

It can be seen that the air emissions from all the plants considered in the case studies are within WID limits, with the exception of the Montgomery County plant for HCl and NOx,

however this plant complies with the local regulatory requirements. In many cases the emissions are more than an order of magnitude below the regulatory limit.

3.3 Maximising Efficiency of Steam Cycle WtE Plants

The steam conditions in a WTE combustion plant have typically been limited to 40bar, 400°C in most plants to avoid serious corrosion problems due to the high moisture content and plastics content of the waste; consequently, in conventional modern plants electrical efficiency is usually limited to around 22-25% (gross).

In the last decade we have seen the introduction of a range of technologies designed to increase the electrical efficiency of WTE plants, particularly in Europe and the USA. This has been driven by the desire to increase revenue from electricity sales, and legislative requirements to demonstrate high efficiency to secure premium prices paid for electricity generated from renewable (or partly renewable) sources.

There are a number of means by which the efficiency can be increased and these techniques have been developed by WTE suppliers, particularly for large scale moving grate combustion processes. The main techniques can be summarised as follows:

- Advanced combustion control – the use of enhanced process control will maximise combustion efficiency to ensure maximum burn-out of the organic waste content, reduced excess air levels; and optimum oxygen levels can be achieved using flue gas recirculation;
- High steam pressure and superheat temperature – increasing steam pressure and temperature will increase the enthalpy of the steam

and allow greater energy to be recovered in the steam turbine. Extreme care with the boiler design needs to be taken to protect the superheaters and increase the overall thermal efficiency of the plant. Locating the superheater tubes in the furnace can also boost steam temperatures beyond that usually possible. The tubes require considerable protection (Inconel) to avoid major corrosion problems, and may be located behind protective tiles;

- Reheat cycle – using a reheat cycle can increase the efficiency by several percent. Steam from the outlet of the high pressure stage of the turbine is sent back to the boiler where it is heated back to the original temperature, before being expanded in the low-pressure stage. This is a relatively high cost option, so the balance between cost and benefit of increased electricity generation has to be considered carefully;
- Reduced boiler exit temperature – the boiler exit temperature is established by sizing of the economiser and is typically set well above the dewpoints for hydrochloric and sulphuric acids and moisture. Preventing condensation of acid gases reduces corrosion and preventing condensation of moisture prevents agglomeration of particulate on the boiler tubes. However, keeping the exhaust gas temperature well above the dew points means that energy recovery from the flue gases is reduced. Careful control and reduction of this temperature has been employed on recent plants to maximise energy recovery with additional corrosion protection provided in the economisers;

- Reduced steam condenser pressure – the condenser temperature has a strong influence on the plant efficiency, the lower the condenser temperature, the greater the pressure drop across the turbine which increases power generation. Water cooled condensers can create the lowest temperatures but air cooled condensers are used where no water cooling source is available. However a review of ocean temperatures in Singapore indicate that the warmer water temperatures may not provide a significant improvement in power cycle efficiency and will not offset the increased maintenance effort of a pumped once-through ocean water cooling system;
- Integration with fossil fuelled fired power plant (external superheating) – there are some plants in Europe that are integrated with a gas turbine Combined Cycle Gas Turbine (CCGT) system using the high temperature exhaust gases from the GT to provide additional heat. This can help boost the efficiency of energy recovery from the combustion of waste; and
- Combined Heat & Power (CHP) operation – the recovery of heat as well as electricity can produce the greatest increase in efficiency. Steam can be extracted from the turbine and used directly for process heating in industry or used to produce hot water for a district heating network.

All of the above techniques come at a cost, and there will always be a balance between additional capital, operational cost and increased revenue from electricity (and potentially heat) sales. A number of the plants considered for case studies in the Stage 2 report incorporate one or more of the innovations in the list above.

3.4 Alternative Thermal Treatment Technologies

Our review has also considered the status of two technologies about which there is growing interest; slagging gasification (which has been developed almost entirely in Japan), and plasma gasification. Two case studies are devoted to these technologies and a brief summary is provided in this section.

Slagging Gasification

Many commentators consider gasification of waste to be unproven - they could not be more wrong. The Japanese have embraced gasification technologies for the processing of residual waste and waste derived fuels. Much of the interest around the world in waste gasification over the last fifteen years has originated

with political drivers seeking an alternative to incineration that achieved the following objectives, in order of political priority:

- produced demonstrably low emissions – particularly of dioxins;
- provided better resource recovery, in the form of materials and energy that could be re-used; and
- is fully proven at commercial scale.

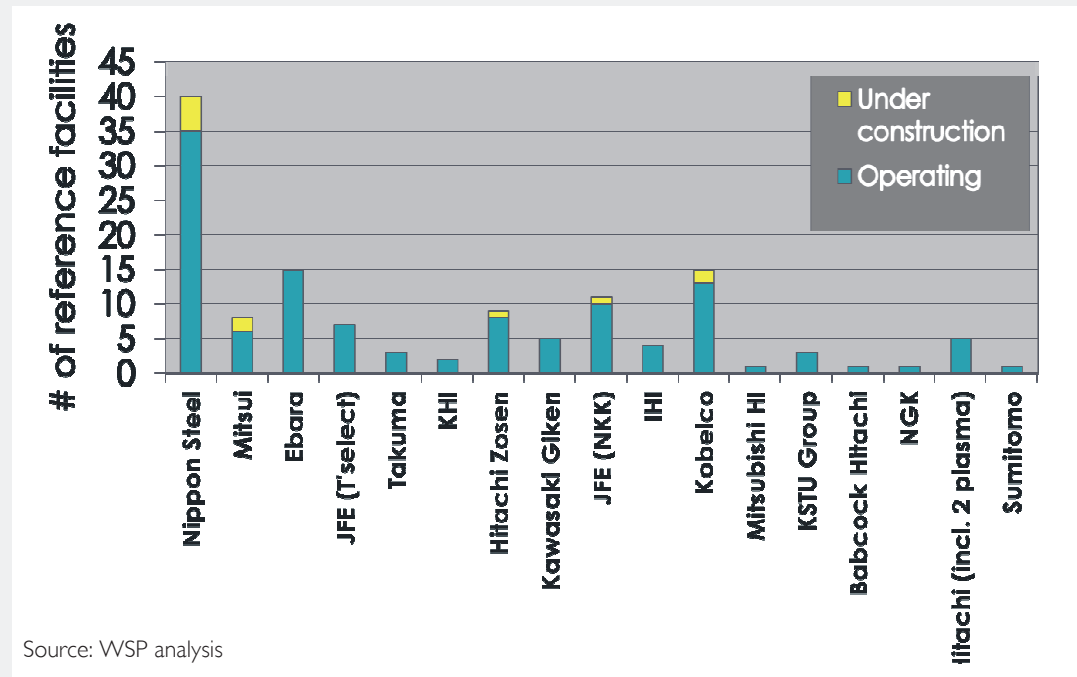
Over the last few years, the perception has arisen in Europe, Australia and parts of North America that gasification has failed against these objectives, principally because of the poor operational track record of gasification processes developed by smaller lowly capitalised companies. Waste gasification technologies developed in Japan are proof that this is a misconception. In WSP's view, the majority of the

processes operating in Japan deliver on each of those three key objectives:

- the reference plants have low emissions, particularly of dioxins;
- they do recover materials which have found viable and useful applications; and
- they are proven and therefore 'bankable' at least in a Japanese context, although it should be noted that the leading suppliers of slagging gasification technologies are actively seeking opportunities outside of their home markets.

The full Stage 2 report provides an overview of the current situation of slagging gasification and brief technical reviews of the leading companies. Figure 2 shows the leading companies and the number of plants currently operating and in construction.

Figure 2: The number of waste slagging gasification processes in Japan



The above chart shows that there are 122 operating waste slagging gasification plants processing 6,9 million tonnes per year of MSW/RDF. There are also nine plants under construction which will process a further 1 million tonnes per year of MSW/RDF.

Slagging gasification has taken off in Japan owing primarily to legislative and commercial drivers that require maximum diversion of waste (and the by-products of waste such as ash from thermal treatment) from landfill, due to the scarcity of void space. Such drivers

are not present in many other countries at present, but this may change in future as legislative measures make landfill an increasingly unattractive option.

Plasma Gasification

Although plasma gasification is often hailed as the next technology to convert waste to electricity without the need to employ incineration technologies there are no large scale plants using this technology in operation at present. We have chosen to produce a summary of the current status of the plasma gasification of waste but have included descriptions of processes that WSP considers the nearest to commercial operation and not all processes that are currently being promoted.

Unfortunately, there are no commercially operating plasma gasification plants that could be considered state-of-the-art and therefore we are providing a review of the current status of plasma gasification, which will allow the reader to understand where the technology sits within the panoply of WtE technologies.

A plethora of plasma gasification processes have been marketed over the past few years as alternatives to incineration for treating residual MSW and SRF/RDF and our in-house database includes 55 such plasma gasification processes. These processes vary considerably in the level of provenness, scale, credibility of supplier, costs and hence 'bankability' (the ability to secure project finance on normal commercial terms).

WSP has used its in-house knowledge to identify the most credible processes and suppliers who could develop a fully commercial process within five years, and an analysis of each process can be found in the Stage 2 report.

Driven by the size of the commercial opportunity some plasma process developers are anxious to compete directly with incineration for mass

processing of municipal solid waste. Below we discuss six key challenges associated with such applications:

- heat transfer;
- scale and modularity;
- heterogeneity;
- relatively low calorific value;
- relatively high moisture content; and
- high ash content.

Aside from these technical aspects there are also questions whether plasma processing of MSW is economically viable and whether potential customers can be convinced about its operational availability. Thus, when considering large-scale MSW applications there are technology risks and economic uncertainties. At the present time there is insufficient evidence available to allow a definitive judgement - either way - about the applicability of plasma processes for processing MSW.



4. Recent Health and Environmental Impact Studies

4.1 Introduction

This section presents a summary of the Stage Three report provided in the appendices to this report. It summarises a review of literature published over the last 15 years encompassing potential environmental and health risks associated with emissions from Waste-to-Energy plants, processing predominantly municipal solid waste. This focuses necessarily on incineration as there is limited available information on the environmental or health impacts on alternative advanced thermal treatment technologies.



4.2 Assessing the Impacts of MSW Thermal Treatment

Key considerations when evaluating the environmental or health effects of thermal treatment technologies include direct comparison of potential impact with other waste treatment options, consideration of relative impact when compared to non-waste related anthropogenic activities and specifically for emission to air, the potential relative impact on air quality conditions. Whilst it is accepted all emissions from whatever process should be minimised as far as possible, understanding and recognising the context in which facilities may operate has been an element in the assessment process or regulatory considerations in other jurisdictions.

Comparison with other waste processing options

A 2011 paper written for the [Waste Management Journal](#) studied the energy implications of the thermal recovery of biodegradable MSW materials in the UK and found very little prior research on the subject of the overall energy balance for the collection, preparation and energy recovery processes for different types of wastes. The study carried out energy balances for the thermal processing of food waste, garden waste, wood, waste paper and the non-recyclable fraction of MSW. The gross energy usage and production expressed per tonne of feedstock was summarised showing the chemical and electrical energy consumed by the collection and processing of each waste stream and by each process, with gross electrical energy generated by the process. It presented the overall energy balance for each process in terms of tonnes of oil equivalent, enabling comparison of the processes and stages for each process on an equivalent basis. Whilst the authors acknowledged certain limitations with the assessment e.g. the findings in this study were highly dependent on the composition of the waste streams. However, for all of the wastes included in the study, combustion in dedicated facilities or incineration with the MSW stream was the most energy-advantageous option.

A 2009 paper written for [Environment Technology Journal](#) considered trends in the management of residual municipal

solid waste and the environmental and health impacts of installations dedicated to the treatment of residual MSW. The scale of operations (treatment capacity) was not considered to be proportional to their potential environmental impact. The authors consider a more significant role is played by the qualitative aspects of the residual MSW. A combustion plant treating 50,000 tonnes per annum can have an environmental impact similar to that of a combustion plant treating 100,000 tonnes per annum, where the available potential energy within the material in each case significantly differs. The available potential energy within a material is often termed the Lower Heating Value (LHV) when used in reference to thermal processing and combustion systems. In the hypothetical example above, if the LHV of rMSW treated in the 50,000 tonnes per annum facility is twice as much as the LHV material entering 100,000 tonnes per annum facility, this has implications for environmental performance, as thermal power rather than capacity becomes an increasingly significant aspect when comparing the environmental performance of the two facilities.

A paper published in the [US Journal of the Air & Waste Management Association](#) (2002) evaluated potential greenhouse gas (GHG) emissions associated with various MSW management practices, using a LCA approach to track GHG emissions over time. The authors reported a substantial reduction in GHG emissions resulting from improvements in the management of MSW, including WtE operations, from 36 million metric tons of carbon equivalents (MMTCE) in 1974 to 8 MMTCE in 1997. The article noted that there were two important ways that waste combustion and energy recovery contributed to a reduction in GHG emissions - waste is diverted from landfills where there is a continuous release of GHG emissions over time, and the resulting energy replaces electricity generated from fossil-fuel burning facilities that contribute substantially higher GHG emissions.

A 2011 report published by an [EU Agency](#) used a life-cycle approach to assess GHG emissions in the EU, Norway and Switzerland and concurred with the general findings of the previous 2002 US paper. It concluded that

improved MSW management was deemed to have cut GHG emissions by 48M tonnes of CO₂e between 1995 and 2008, due mainly to landfill diversion and increases in recycling, but also attributable in part to waste as an energy source or secondary material and subsequent savings in virgin materials or fuels.

The National context in relation to policy and approach to waste management has been demonstrated to have a potential significant effect on GHG emission outcomes. A paper published in [Resources, Conservation and Recycling](#) (2011) compared carbon emissions associated with MSW management in Germany and the UK. The analysis indicated that the carbon emissions associated with MSW management in the UK are approximately five times higher than that for Germany, equating approximately to removing 1.2 million cars from the roads in England and Wales. Whilst acknowledging the use of assumptions and approximations, it concludes that the tightened waste acceptance criteria for landfills, increased use of WtE and a recycling policy enabled by a proven source separation system in Germany, were major reasons for the difference.

Using a simple methodology based on calculating primary energy savings resulting from export of energy, a 2009 paper published in [Engineering Transactions](#) concluded that thermal treatment of MSW with heat recovery represents one of the most efficient ways of treatment. The energy generated in WtE plants contributed to primary energy savings and a consequent reduction in GHG emissions.

Comparison with other industrial non-waste processing options

A [US University](#) publication (2009) evaluated emissions from thermal conversion technologies processing MSW and biomass and assessed emissions data from operational waste conversion plants in five countries, comparing this data with regulatory standards in California, the United States, the European Union and Japan. Results from the analysis indicated that pyrolysis and gasification facilities currently operating globally with waste feedstock met each of their respective air quality

emission limits. In the case of dioxins/furans and mercury, every process evaluated met the most stringent emission standards worldwide. The report stated that the environmental implications of these technologies are critically important to their feasibility and that information at the time (2009) suggested they can be operated in a manner that presents no greater threat to human health or the environment than other common industrial processes.

Air Impact Assessments

A US State Environmental Protection Agency regulates major air pollution sources in accordance with its Prevention of Significant Deterioration (PSD) programme. A PSD review is only required in areas currently in attainment with the National Ambient Air Quality Standard (AAQS) for a given pollutant or areas designated as "unclassifiable" for the pollutant. In their technical evaluation and preliminary determination for a specific new development the Department undertook a significant impact analysis for each specified pollutant to determine if the project could cause an increase in ground level concentration greater than the Significant Impact Level (SIL) for each pollutant.

In order to conduct this analysis, the applicant used the proposed project's emissions at worst load conditions as inputs to the impact model; if the modelling at worst-load conditions showed ground-level increases less than the SILs, the applicant was exempted from conducting any further modelling. If the modelled concentration's from the project had exceeded the SILs, then additional modelling including emissions from all major facilities or projects in the region (multi-source modelling) would have been required to determine the proposed project's impacts compared to the AAQS or PSD increments.

In this case the Department found the applicant's initial PM/PM₁₀, CO, NO_x and SO₂ air quality impact analyses for this project indicated that maximum predicted impacts from all pollutants were less than the applicable SILs for the area.

Risk Assessment Process

Another key consideration in evaluating

potential health effects of thermal treatment technologies based on published literature and academic studies is to assess any the limitations associated with these works. The following is an excerpt from a 2008 report published by a UK Independent School of Medicine:

Typically decisions are based on an inexact method called risk assessment. They tend to rely almost exclusively on this type of assessment and often have little understanding of its limitations. Risk assessment is a method developed for engineering but is very poor for assessing the complexities of human health. Typically it involves estimating the risk to health of just 20 out of the hundreds of different pollutants emitted by incinerators.

In 2004 a UK Government Agency report suggested the following:

There are a limited number of epidemiological studies on populations around incinerators and the results of these are typically inconsistent and inconclusive. Based on current epidemiological evidence it is difficult to establish causality, particularly once confounding factors such as socio-economic variables, exposure to other emissions, population variables and spatial/temporal issues are taken into account.

One such study published in the *Journal of Public Health* (2007) assessed the health risks associated with waste incineration and used a quantitative method to allow comparison with other health risks. This was based on a health impact assessment element of a planning application for an incinerator designed to annually treat 52,500 tonnes of RDF to generate electricity and focussed on those health aspects of greatest public concern i.e. particularly emissions of carcinogens and fine particles.

The authors acknowledged incineration is associated with considerable public concern which may have a significant harmful effect on the mental, physical and emotional health of local residents, regardless of whether emissions have any direct effect on health, therefore anxiety was considered as a potential effect. Employment, noise, road traffic accidents, occupational risks and reduced use of landfill were also considered

as potential effects. The report found that stack emissions over 25 years in a population of 25,389 within 5.5km distance of the stack would result in an additional 0.018 cancers, 0.46 deaths brought forward due to SO₂ and 0.02 deaths due to fine particles, with the overall risk of dying due to emissions in any one year being 1 in 4 million.

The authors also suggest the only way to develop a better understanding about the significance of these risks is through comparing them with other exposures to risks with which we are more familiar. The authors acknowledge limitations within the study to include the understanding of the health impact of environmental pollution and methods and assumptions used, as these were utilised for the purpose of illustration and not to provide epidemiological projections.

In the US, there have been very few epidemiological studies conducted that focus specifically on potential health risks associated with WtE facilities. Much of the relevant work that has been done was completed in the late 1980s to early 1990s, which represents the period that saw the most significant development of WtE facilities across the country. A US-government sponsored public-private study of health effects associated with waste incineration in the US and internationally published in 2000 included the following key findings:

'Few epidemiologic studies have attempted to assess whether adverse health effects have actually occurred near individual incinerators, and most of them have been unable to detect any effects. The studies of which the committee is aware that did report finding health effects had shortcomings and failed to provide convincing evidence. That result is not surprising given the small populations typically available for study and the fact that such effects, if any, might occur only infrequently or take many years to appear. Also, factors such as emissions from other pollution sources and variations in human activity patterns often decrease the likelihood of determining a relationship between small contributions of pollutants from incinerators and observed health effects. Lack of evidence of such relationships might mean that adverse health effects

did not occur, but it could also mean that such relationships might not be detectable using available methods and data sources.'

A review of waste management practices and their impact on human health published in *Waste Management Journal* (2009) suggests epidemiological studies dealing with the impact of waste management activities on human health are usually observational rather than experimental, due to ethical reasons. For observational studies, the most common types are listed as follows:

- Prospective cohort studies: Two cohorts of people, exposed and non-exposed, are assessed over a long period of time during which the degree of exposure of the population and the rate of development of disease is recorded, in addition to other information collected via questionnaires. These studies normally involve the collection of human fluid or tissue and to control possible confounding factors and ensure statistical significance, a large population is enrolled;
- Retrospective case controlled studies: A case group of people with a developed disease and a control group of healthy people are interviewed and past exposure investigated. Involves smaller groups but this type is more prone to bias; and
- Cross sectional studies: Conducted on a specific exposed sub-group of the population over a relatively short period of time. This can be useful to generate hypotheses that can be tested later in more comprehensive studies. It can be difficult to distinguish whether a particular illness developed before or after exposure the group was exposed.

'In most cases, environmental epidemiologists need to investigate the occurrence of clinical effects in a population that may have been affected by emissions slightly above natural background levels...becomes particularly difficult where [waste facilities] are state of the art, built with best available technology and are operated according to guidelines and in full compliance with legislation.'

The study concludes that existing epidemiological evidence linking waste management and human health is quite controversial; most studies are based on old types of waste facilities, especially in the case of incinerators. There is very little data on direct human exposure and most studies resort to surrogates such as residence information; most recent studies include data on potential exposure pathways. It also concludes that the overwhelming majority of epidemiological studies have not managed to prove convincingly and unequivocally that excess risk of contracting specific illnesses is associated with waste facilities.

'The level of significance of risk to develop cancers or other illnesses from emissions from waste facilities should be seen in the overall context of other risks to the local population...'

It is extremely important to have direct human exposure biomarkers, possibly collected before (not only during and after) a waste facility becomes operational.'

The *UK Government Agency* 2004 report estimated emissions from waste management operations, as a quantity of each substance emitted per tonne of waste processed. Using this information, it estimated the quantities emitted by an individual facility and derived a national total for these emissions, enabling consideration of the relative performance of different kinds of waste processing and disposal operations, and the potential environmental and health effects of MSW management compared to other activities. It highlighted areas where MSW management operations may give rise to health effects and areas where no health effects have been found, quantifying the significance of some of these effects. It also highlighted where further research could usefully be carried out to improve understanding of the relationship between waste processing and adverse environmental and health effects. In its conclusions, it summarises the findings on health impact as follows:

'We looked at evidence for ill-health in

people who might possibly be affected by emissions from MSW processes. For most of the MSW facilities studied, we found that health effects in people living near waste management facilities were either generally not apparent, or the evidence was not consistent or convincing. However, a few aspects of waste management have been linked to health effects in local people. We would need more research to know whether or not these are real effects. We also investigated the health effects of emissions of some important airborne pollutants from waste management facilities. Although the data was of moderate or poor quality, we found that these emissions are not likely to give rise to significant increases in adverse health effects.'

A paper published in the *Management of Environmental Quality* (2003) reviewed literature and evaluated evidence on the human impact of waste management practices, to include landfill, incineration, composting, land spreading, sewage sludge and sewer discharges. A protocol was applied to evaluate the strength and reliability of evidence using an algorithm with defined criteria. Key questions applied in this evaluation process were as follows:

- Have studies been done on human populations?
- Have hazards been identified? Does the appearance of the hazard precede the health outcome? Is the association biologically plausible?
- Are there any hypothesis-testing studies?
- Have any of the hypothesis-testing studies controlled for possible confounding factors?
- Are there more than 20 hypothesis-testing studies consistently showing strong or moderate relative risks?

The review found that the evidence linking any adverse health outcomes with incineration, landfill or land spreading sewage sludge was insufficient to claim causal association. The evidence is insufficient to link residence near a centralised composting facility with adverse health outcomes but it is possible that working at such a facility causes adverse health outcomes.

4.3 Dioxins and Furans

Dioxins and furans are common names used to describe two groups of complex organic compounds with similar properties:

- Polychlorinated Dibenzo-para-Dioxins (PCDDs); and
- Polychlorinated Dibenzofurans (PCDFs).

The terms dioxins and furans are often used in the generic sense to describe these compounds.

The group of dioxins is made up of a total of 75 PCDDs and 135 PCDFs. Dioxins occur as mixtures in related compounds (congeners) in varying composition. The most toxic form of dioxin is 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8 TCDD), which is sometimes referred to as Seveso poison after the chemical accident which polluted the environment in Seveso, Italy, in July 1976.

The other 2,3,7,8 chlorinated dioxins and furans which have additional chlorine atoms are also pertinent in a toxicological assessment of dioxins. These 17 compounds (7 dioxins, 10 furans) are used to assess toxicity, which is expressed as a toxic equivalent (TEQ) in relation to 2,3,7,8 TCDD.

Emissions of dioxins and furans from incineration plants have been greatly reduced due to better cleaning of the flue gases and improved incineration performance i.e. correct combustion conditions being maintained. A 2009 paper published in the Waste Management Journal reviewed the status and benefits of WtE as applied in the US and presented data on dioxin emissions from WtE between 1987 and 2002 i.e. pre and post Maximum Achievable Control Technology Regulations (MACT), demonstrating a 99.9% reduction in air emissions over this period.

A 2007 paper published in the Chemosphere Journal evaluated incremental lifetime health risks due to PCDD/F emitted from MSWI, for the resident population in the area

of specified plants. The 2009 risk assessment methodology was a multi-pathway combined probabilistic/deterministic approach for analysing the effects of uncertainty and intrinsic variability of the main PCDD/F emission related parameters on final predicted values. Exposure considered direct inhalation of contaminated air, soil ingestion, soil dermal contact and diet. This was applied to a case study based on two different technological scenarios i.e. modern facilities equipped with BAT flue gas treatment (selective non-catalytic reduction, electrostatic precipitators, dry system absorption with injected activated carbon and fabric filters), and older plants in northern Italy using flue gas treatment not specifically designed to remove trace organic pollutants (electrostatic precipitators and wet scrubbers).

The preliminary evaluation found the distribution functions for PCDD/F stack concentrations for plants equipped with BAT flue gas treatment were far lower than the current WID emission limit value, with associated risk values largely insignificant with respect to regulatory reference levels (10⁻⁶). The authors also note that plants not equipped with BAT flue gas treatment also showed reductions in expected risks, even with no specific PCDD/F control measures.

A 2011 US EPA publication investigated concentrations of Polybrominated Dibenzo-para-dioxins and Polybrominated Dibenzofurans (PBDD/F) and PCDD/F in the raw and clean flue gas during steady state and transient operation of a MSW combustor, pre- and post-Air Pollution Control (APC) system flue gas.

Operational transients were found to considerably increase levels of PBDD/F and PCDD/F compared to steady state operation, for both raw and clean flue gas. The profile of PBDD/F and PCDD/F in the raw flue gas (both steady and transient state) was dominated by hexa- and octa-isomers, while the clean gas profile was enriched with tetra- and penta-isomers. The APC system efficiency of removal was estimated at 98.5% for PBDD/F and 98.7% for PCDD/F. Finally, the

cumulative TEQ (PCDD/F+PBDD/F) from the stack was dominated by PCDD/F, the TEQ of PBDD/F contributed less than 0.1% to total cumulative toxic equivalency of the stack emissions.

In 2008 a UK Agency publication based on the investigation of waste incinerator dioxins during start-up and shutdown operating phases reported elevated emissions during shutdown and start-up relating to the waste was not being fully established on the combustion grate. Increases in emission concentration and rate were reported as less than one order of magnitude when compared to normal operations. The report also found that the mass of dioxins emitted during these stages as part of a four day planned outage was similar to the emissions which would have occurred during normal operation in the same period.

In 2004 a UK Government Department published a review of environmental and health effects of MSW and similar wastes management. The report examined the waste management options for treating MSW and similar waste and focussed on the principal types of facilities used for dealing with such waste in the UK and in Europe and on available scientific evidence for environmental and health effects. On this issue of abnormal operating conditions and associated emission fluctuations, it states the following:

'Any emission above prescribed limits is of concern, and it is important that these incidents are investigated and their recurrence prevented. However, the low frequency of these incidents and the lack of any consistent evidence for health effects in people living near Waste-to-Energy facilities (see Chapter 3) suggest that emissions above consented limits are not a significant issue for waste incinerators. Also, an exceedance over a short period is not likely to have a significant effect on emissions averaged over a long period such as a year. Exceedances may be more likely to occur from facilities which are undergoing commissioning, and particular attention should be paid to regulation of facilities in these circumstances.'

Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer.

Dioxins are persistent environmental pollutants and they are known to accumulate in the food chain, mainly in the fatty tissue of animals. It is estimated that greater than 90% of human exposure is through food, mainly meat and dairy products, fish and shellfish. A 2009 UK Government Agency publication stated that inhalation of dioxins was a minor exposure route and estimated that less than 1% of UK dioxin emissions arise from MSWI, suggesting the contribution of incinerator emissions to direct respiratory exposure of dioxins is a negligible component of the average human intake. It concludes:

'However, dioxins may make a larger contribution to human exposure via the food chain, particularly fatty foods. Dioxins from emissions could also be deposited on soil and crops and accumulate in the food chain via animals that graze on the pastures, though dioxins are not generally taken up by plants. Thus the impact of emissions on locally produced foods such as milk and eggs is considered in deciding whether to grant a permit. These calculations show that, even for people consuming a significant proportion of locally produced foodstuffs, the contribution of incinerator emissions to their intake of dioxins is small and well below the tolerable daily intake (TDI) for dioxins recommended by the relevant expert advisory committee, Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment.'

A health risk assessment of dioxin emissions from MSW incinerators in the Neerlandquarter of Belgium was published in *Chemosphere* in 2001. The authors performed a health risk assessment for local habitants of a residential area of Antwerp in the vicinity of two MSWI. The risk assessment combined chemical, toxicological assessments and model calculations, using historic emissions data for both plants with an emphasis on dioxins. The operational atmospheric transport and

deposition model of PCDD/Fs was used to calculate the deposition of dioxins in the vicinity of the incinerators.

The observed soil contamination pattern did not correspond to the calculated deposition pattern i.e. lower soil concentrations obtained via deposition modelling than those experimentally observed and soil concentration measurements not corresponding with meteorological statistics, indicating that other sources may contribute at least partly to the local PCDD/F contamination of the area. Dioxin exposure of residents as a function of food consumption behaviour was calculated using a mathematical model combined with other transfer factors and simply residing in the impact area did not result in a meaningful risk. Only if locally produced food was consumed (milk, meat, vegetables), exposure in the area was enhanced compared to the average dioxin exposure estimated for the Flemish population, resulting in the authors suggesting excessive locally produced food consumption should be avoided.

A long-term Portuguese University study used human bio-monitoring to evaluate selected pollutant levels in the general population living in the vicinity of two solid waste incinerators near Lisbon and Madeira Island. These environmental health surveillance programmes were launched in response to public and scientific concerns regarding these facilities. The former had been operating since 1999 in Metropolitan North Lisbon and the latter was an old incinerator retrofitted with modern technology in 2002. The selected pollutants and study matrices comprised PCDD/F in human milk, PCDD/F, lead, mercury and cadmium in human blood (including children under six years old) and lead in maternal and umbilical cord blood.

One study focussed on dioxin/furan body burden determined by PCDD/F levels in blood. The study was carried out on 138 adults from the general population living in the vicinity of the incinerators. The same questionnaire was administered to both populations and in the different examinations to gather data on individual characteristics

i.e. for specific features such as smoking, drinking and dietary habits, professional activity, past history of diseases and treatment etc.

'The overall conclusion points to a non-significant regional difference on dioxin levels when exposed and control populations relative to each incinerator are considered. This may indicate that dioxin exposure of global populations, as estimated by blood PCDD/F levels in the general population, cannot be related to the emissions from the studied facilities, meaning that dioxin sources control seems to be effective in relation to both incinerators.'

Dioxin/furan body burden by PCDD/F levels in human milk was also studied. This paper investigated differences between exposed and non-exposed subjects under study and possible covariates of the dioxin levels in human milk. The authors acknowledged that the study of mothers' milk in probability based surveys to extract results for the general population is questionable, as only a specific demographic segment i.e. breast feeding women at reproductive age.

'The results indicate that dioxin milk levels of the group living in the area of potential influence of each incinerator are not significantly increased by their PCDD/F stack emissions. This is both an important finding and accurate statement, supporting the dioxin sources control effectiveness.'

A 2008 case study published in *Waste Management Journal* used a risk assessment approach to assess air pollution from a MSWI plant in Italy. The authors noted that the major steps contributing to a risk assessment paradigm include determination of stack emission for selected persistent pollutants, evaluation of pollution transport in environmental media, exposure and dose assessment and health risk assessment.

Ground level air concentrations and soil deposition of PCDD/F, cadmium, lead and mercury pollutants were estimated using an atmospheric dispersion model.

Health risk values for air inhalation, dermal contact, soil and food ingestion were calculated based on a combination of these concentrations and a matrix of environmental exposure factors. Exposure of the surrounding population was addressed for different release scenarios based on four pollutants, four exposure pathways and two receptor groups (children and adults). Spatial risk distribution and cancer excess cases projected from plant emissions were compared with background mortality records. It concludes MSWI emissions based on this study show individual risk well below maximum accepted levels and very small incremental cancer risk compared with background levels. It also concludes:

- Pollutants concentration at ground level decreases very quickly with distance;

- Risk values for carcinogenic and non-carcinogenic pollutants for both receptors (children and adults) are well below maximum acceptable levels issued by USEPA (1990) in the clean air act;
- Food ingestion represents the most significant exposure pathway for both receptors; and
- Standardised rate for additional cancer mortality due to the considered carcinogenic pollutants over a lifetime is lower than background level for cancer diseases.

Whilst the previous studies focussed on residents living in the vicinity of the incinerators, another paper published in *Industrial Health* (2003) focussed on occupational exposure and evaluated exposure of MSWI workers to dioxins in Japan, describing the dioxin exposure concentration, daily dioxin intake and blood dioxin levels.

The difficulty in directly measure dioxin exposure concentrations during work activities was noted, because the flow rate of personal sampler was too low to collect enough airborne dust to quantitatively determine dioxins. Thus, total dust concentrations in the breathing zone of incinerator workers were measured and the dioxin exposure concentrations were estimated by multiplying the total dust exposure concentrations by the dioxin concentrations in deposited dust, fly ash and slag. Daily dioxin intake was estimated based on a set of stated assumptions and using the specified methodology, it was found that daily dioxin intake can exceed the Tolerable Daily Intake (TDI) in incineration plants with fly ash of high dioxin concentration.



4.4 Particulate Matter

Particulate matter arises from a variety of sources including traffic emissions, agricultural, domestic and industrial processes including MSWI. It is commonly categorised by size i.e. average diameter of particles as follows:

- PM_{10} - airborne particulate matter passing a sampling inlet with a 50 per cent efficiency cut-off at 10 μm aerodynamic diameter and which transmits particles below this size.
- $PM_{2.5}$ - airborne particulate matter passing a sampling inlet with a 50 per cent efficiency cut-off at 2.5 μm aerodynamic diameter and which transmits particles below this size; and
- $PM_{0.1}$ - particles smaller than 100 nm in diameter (often referred to as ultrafine particles).

A UK Trade Association published a report in 2012 reviewing research into the health effects of Waste-to-Energy facilities. In a section on process emissions, the authors provide a quantitative context for assessing the impact of PM by referring to a UK Government Agency 2009 dataset providing the following source contribution for UK emissions of fine particles ($PM_{2.5}$):

- MSW Incineration 0.042%;
- Road traffic 29%;
- Residential combustion 14%, and
- Electricity generation 5.5%

The authors discuss the relevance of nano or ultrafine particles ($PM_{0.1}$) in relation to concerns with regard to their effects on health and suggest it is plausible that risks to health associated with particulate matter are more closely linked with numbers of particles rather than mass of particles.

In 2009 the Waste Management Journal published a paper on size distribution and number concentration of particles at the stack of a MW incinerator, observing that fine and ultrafine particle stack emissions were not fully characterised at that time. They found the mass concentrations obtained were well below the imposed daily threshold value for both incineration lines tested (0.2mg/Nm³ dry) and the mass size distribution was on average very stable. The total

number of coarse particles was between 1×10^5 and 2×10^5 particles/cm³ and on average relatively stable from one test to another. The authors observed that particle size $PM_{2.5}$ is made up of 99% sub-micron particles and 65% (on average) of ultrafine particles and that these are insignificant in terms of mass since they represent less than 5% of the total mass of $PM_{2.5}$.

The measured values and the comparison with other point sources showed a very low total number concentration of particles at the stack gas, revealing the importance of the flue gas treatment also for ultrafine particles. Also in respect to linear sources (high and light duty vehicles), the comparison showed a negligible emission in terms of the total number of particles. The comparison tended to roughly estimate only equivalence for the total number of particles without consideration of the different chemistry of emissions and distance from source, important in assessing human health impacts. Finally, particle number concentration as with concentration of gaseous pollutants and other surrogates for very small particles decrease significantly with distance from the source.

In a subsequent 2010 study, the same authors investigated the dimensional and chemical characterisation of particles at a downwind receptor site of a WtE plant, specifically evaluating seasonal concentrations and size distributions of particles in the proximity of a modern RDF MSWI in terms of number, surface area, mass and chemical composition. They found annual mean values of $8.6 \times 10^3 \pm 3.7 \times 10^2$ particles/cm³ and 31.1 ± 9.0 $\mu g/m^3$ for number and mass concentration, typical of a rural site. Most of the elements can be attributed to long-range transport from other natural and/or anthropogenic sources.

A further study by the same authors (2011) investigated chemical, dimensional and morphological ultrafine particle characterisation from a WtE plant where particle size distributions and total concentrations were measured both at the stack and before the fabric filter inlet in order to evaluate the removal efficiency of the filter for ultrafine particles. The authors performed a chemical characterisation of ultrafine particles for heavy metal

concentration and a mineralogical investigation in order to evaluate shape, crystalline state and mineral compound of sampled particles.

The authors found maximum values of 2.7×10^7 particles/cm³ and 2.0×10^3 particles/cm³ for number concentration before and after the fabric filter respectively, showing a very high efficiency in particulate removal by the fabric filter (99.99%). The most frequent particle size before the filter was approximately 150 nm and after the filter, 90 nm. With regard to heavy metal concentrations, the elements with higher boiling temperature present higher concentrations at lower diameters showing incomplete evaporation in the combustion section and the consequent condensation of semi-volatile compounds on solid nuclei. In terms of mineralogical and morphological analysis, the most abundant compounds found in samples collected before the fabric filter were sodium, potassium and lead oxides followed by phyllosilicates (sheet silicates). Different oxides of comparable abundance were detected in the samples collected at the stack. These measurements were performed during stable combustion conditions.

An International Congress on Combustion By-products and their Health Effects was held in Italy 2007. A summary document based on the proceedings concluded that particle associated organics, metals and Persistent Free Radicals (PFRs) produced by combustion sources are the likely source of observed health impacts of airborne PM rather than simple physical irritation caused by the particles. Some of the key conclusions are as follows:

- Exposure to airborne fine particles is associated increased risk of cardiopulmonary disease and cancer;
- In urban settings, 70% of airborne fine particles result from combustion emissions and 50% due to primary emissions from combustion sources;
- In addition to soot, combustion produces one, maybe two classes of nanoparticles with mean diameters of approximately 10 nm and 1 nm;
- Most common metrics used to describe particle toxicity (surface area, sulphate concentration, total and organic carbon) cannot fully explain the observed health impacts;

- Metals contained in combustion generated ultrafine and fine particles mediate formation of toxic air pollutants such as PCDD/F, PFRs; and
- The combination of metal-containing nanoparticles, organic carbon compounds and PFRs can lead to a cycle of generating oxidative stress in exposed organisms.

It should be noted this document considers combustion per se i.e. not just MSWI.

The 2008 UK Independent School of Medicine report refers to strengthening evidence that fine particulate pollution plays an important role in both cardiovascular and cerebrovascular mortality. In the section on particulates it states that incinerators produce huge quantities of fine and ultrafine particulates and that measurement of the particle size distribution by weight gives a false impression of safety due to the higher weight of larger particles (PM_{10}). The authors suggest modern baghouse filters only remove 5-30% of $PM_{2.5}$ (particles with a diameter less than 2.5 microns) and virtually none of the $PM_{0.1}$ (particles with a diameter less than 0.1 microns).

In its evaluation of this report, a UK Environmental Consultancy made the following comments in relation to the comments on particulates:

'This means that, while the report may make valid comments about the risks to health associated with exposure to these substances, the conclusion should be to consider what needs to be done to deal with the main sources of these emissions. For example, emissions of PM_{10} from MSW incineration are approximately 100 tonnes per year, compared to 22,000 tonnes per year from electricity generation. Emissions of finer particles (e.g. $PM_{2.5}$ and PMI) and secondary particles would be expected to be in a similar proportion. If it is right to be concerned about fine particulate matter, then attention needs to be paid to controlling emissions from electricity generation, road transport, agriculture and domestic sources. No discernible benefit would be gained by any policy change relating to waste incineration, because the source is simply too small to be significant.'

A UK Government Page 145 of 209 published a position statement in 2009 and acknowledged that both long-term and short-term increases in exposure to particles can damage health and that no thresholds of effect can be identified for either the effects of long-term exposure or for the effects of short-term increases in concentrations. From this they suggest that any increase in particle concentrations should be assumed to be associated with some effect on health. However, they suggest the critical step in the assessment of health effects lies in estimating the size of the effect. The position statement responds to the claim that PM_{10} measurements ignore particles most likely to be deposited in the lung (specifically the gas exchange zone), claiming this is incorrect and based on a misunderstanding of the term PM_{10} .

' PM_{10} measurement is designed to collect effectively all those particles small enough to pass the upper airways (nose, mouth, pharynx, larynx) and thus of a size that allows a chance of deposition in the lung. $PM_{2.5}$ is intended to represent that fraction of the aerosol with a high probability of deposition in the gas exchange zone of the lung in vulnerable individuals. It will be obvious that PM_{10} includes $PM_{2.5}$ and that $PM_{2.5}$ cannot exceed PM_{10} in any given sample of air.'

It also responds to the claim that PM_{10} or $PM_{2.5}$ does not include nanoparticles present in the air, once again claiming this is incorrect.

'Nanoparticles are efficiently collected by PM_{10} and $PM_{2.5}$ samplers but make only a small contribution to the results expressed as PM_{10} or $PM_{2.5}$. If particles of less than 100 nm diameter alone were collected from a known volume of air and weighed, the resulting concentration could be expressed as $PM_{0.1}$ (100 nm = 0.1 microns). In a sample of air collected in a UK urban area on a typical day we might expect results similar to those given below:

PM_{10} 20 $\mu g/m^3$
 $PM_{2.5}$ 13 $\mu g/m^3$
 $PM_{0.1}$ 1-2 $\mu g/m^3$ '

The Agency confirmed that nanoparticles make a large contribution to the number of particles per unit volume of air, with

those of less than 500 nm in diameter dominating the number concentration of ambient particles. From this, it might be correctly suggested that if an incinerator or other specified source produced many nanoparticles, changes in local mass concentrations (PM_{10} and $PM_{2.5}$ to a lesser extent) would not reflect the increase in numbers of particles in the air. It suggests that although the evidence is as yet weak in comparison with that relating to mass concentrations, particle numbers will link with some effects on health better than mass concentrations. It goes on to state that no generally accepted coefficients that allow the use of number concentrations in impact calculations have yet been defined.

A 2010 study carried out by a consortium supported by an Italian Polytechnic reviewed issues relating to the emissions of fine and ultrafine particles from stationary combustion plants. The section on health effects reviews the epidemiological and toxicological approach to assessment. It concludes that there is emerging evidence that exposure to PM , no matter what size fraction, is associated not only with the aggravation of pre-existing disease, but represents a real risk factor for the development of chronic degenerative diseases. However, it acknowledges that whilst it would be desirable to isolate the effect of particles from that of other pollutants, this is generally impossible and moreover, in the majority of studies the effect of ultrafine particles is inseparable from that of other co-pollutants generated by traffic such as oxides of nitrogen, CO and that of fine particles. Furthermore, the following statement closes this section of the report:

'To summarise, while attention should be paid to the environmental role of ultrafine particulate and its components, no indication emerges from analysis of the toxicological implications of studies in this area, of special risk which can be attributed to UFP [ultrafine particles] from the incineration of waste with energy recovery, if this is carried out in line with best available technology.'

In addition to particulate matter and dioxins/furans, other potential pollutants found in emissions to air include toxic elements such as mercury. Levels of mercury released to atmosphere in waste-to-energy plant emissions, like dioxins/furans, have decreased over recent years, due in part to greater control over segregating mercury containing items from MSW, greater regulatory control and improved abatement systems for plant emissions.

A 2009 US paper suggests the implementation of the Maximum Achievable Control Technology (MACT) regulations decreased mercury emissions from waste-to-energy plants in the US from 81 tonnes of mercury in 1989 to less than 1.2 tonnes per year by 2009, with the major sources of mercury in the atmosphere attributed to coal-fired power plants.

Whilst modern well managed waste-to-energy plants implement control systems to ensure the release of mercury is minimised and kept within the emission limit values specified in the relevant regulations and associated environmental permits, similar to the previous dioxin/furan exceedance discussions, mercury levels in emissions may also fluctuate during periods of abnormal operating conditions e.g. bag house failure.



4.6 Solid Process Residues

It is proven that modern compliant and well run MSWI now emit significantly less pollutants in stack gases compared to older plants previously operated under less stringent regulatory regimes. For non-gaseous emissions i.e. process solids such as IBA and APC residues, there is an increasing interest in studying the potential long term environmental impacts based predominantly on leaching of pollutants from either landfill sites used for final disposal or from products used in the construction sector e.g. road applications.

Incinerator Bottom Ash (IBA)

In 2003 a UK Consultancy carried out a study entitled 'Environmental and Health Risks Associated with the Use of Processed Incinerator Bottom Ash in Road Construction'. The commission was part funded under the terms of the Landfill Tax Credit Scheme. The scope of the study was limited to consideration of the risk which might arise from the use of processed IBA in asphalt or cement-bound material in the road base (the study excluded the use of IBA in unbound applications or in the surface course of the road). In the case of the bound applications, the leaching potential is greatly reduced, seen as a key environmental advantage as the most significant ecosystem exposure route during the existence of the road was considered likely to be through leaching of metals into local surface waters.

The report also makes the following key findings in relation to dioxin content:

'A major area of public concern appears to be the dioxin content of IBA and the likely effects of exposure resulting from this. The concentration of dioxins present, in the IBA samples for which information is available, fall within the

range of rural soils. As such the risks arising from the dioxins present in the IBA will be no different to those risks arising from natural materials and are likely to be very low.'

The executive summary concludes:

'The future use of unmixed municipal waste incinerator bottom ash to dilute or replace primary aggregates will offer benefits in improving the sustainable use of waste materials and reducing primary aggregate demand. If used in an appropriate manner the risks to human health and the environment from municipal waste incinerator bottom ash use in road construction in hard water areas are likely to be minimal and certainly undetectable in a typical UK situation.'

A collection of Danish research and development projects from 1997 to 2005 investigated important techniques for IBA upgrading. The primary focus was on curing/aging, washing with and without additives, organic matter, sampling techniques, utilisation options, and assessment tools. A 2007 summary paper provides an overview of these projects and found that no single process ensured compliance with Danish limit values on leaching at the time, however extended curing along with washing could, in most cases, decrease leaching significantly.

A paper published in Aquatic Ecosystem Health & Management journal (2005) presented an ecological assessment of pollutant flux released from IBA reused in road construction to test the impact on lentic ecosystems. It applied a methodology to determine the ecocompatibility of this reuse option using a laboratory lysimeter (instrument for measuring water percolating through soil or other media) to simulate a road embankment and from this produced IBA leachate. The results from the associated bioassay test demonstrated all

three species tested were impaired, with toxicity effects increasing with leachate concentration from 1.56% to 8%. The predicted environmental concentration is close to the concentration that caused first effects in microcosms. The leachate toxicity was due mainly to the presence of copper. The authors make the following recommendations:

- IBA could be weathered for several weeks before being used in road construction to stabilise most of the pollutants;
- The road embankment could be covered or protected by a plant cover;
- Leachate from the road embankment could be collected in a basin; and
- Leachate could be partly treated before discharged into aquatic ecosystems at a flow rate which would keep pollutant concentrations at non-hazardous levels.

Air Pollution Control Residues

The UK School of Medicine report states that modern abatement equipment delivering improvements to gaseous emissions merely transfer the toxic load from gaseous emissions to process residues.

It is correct that the residues of abatement processes contain toxic pollutants, for this reason Air Pollution Control (APC) residues for example are treated as hazardous waste, in accordance with the regulatory framework applicable to the jurisdiction of origin. The treatment and subsequent disposal or reuse of these residues should be regulated to prevent release of any polluting species to the environment. For example, in the EU, most APC residues will not meet the waste acceptance criteria for landfill disposal in hazardous waste cells without pre-treatment to reduce the leaching potential of certain polluting species.

4.7 Conclusions

Key conclusions arising from this review are as follows:

- There appears to be little convincing and unequivocal evidence that excess risk of contracting specific illnesses is associated with waste facilities such as Waste-to-Energy plants, especially newer, well operated facilities i.e. those operated in compliance with the relevant regulations and emission standards, which seem to be more effective in mitigating potential risks from exposure to emissions;
- There is however still some uncertainty in relation to interpretation of the results of some literature and academic studies e.g. lack of data or potential limitations in methodologies used (acknowledged by some of the authors of papers reviewed in this report);
- The UK Health Protection Agency 2009 report states ...while it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable.
- In relation to Particulate Matter (PM), there is on-going debate about whether it is their mass concentration that should be assessed in relation to health impacts, especially for fine and ultrafine particles, or whether

it is the particulate size that could potentially have a greater impact;

- Dioxin and furan emissions from the thermal treatment of MSW have decreased significantly over recent decades e.g. pre and post Maximum Achievable Control Technology (MACT) regulations in the United States demonstrates a 99.9% reduction, the Germans have also reported a reduction of three orders of magnitude;
- Considerable attention has been given to the difference in emission profiles for dioxins and furans when comparing steady state combustion and operational transients; one study found operational transients were found to considerably increase levels compared to steady state operation. A report by the UK Department for Environment, Food and Rural Affairs suggests that whilst emission above prescribed limits is of concern and should be investigated, it is unlikely to have a significant effect on emissions averaged over a long period such as a year;
- Incinerator Bottom Ash (IBA) has the potential to leach certain pollutants such as heavy metals. The recycling of IBA in bound applications shows a greatly reduced leaching potential and in Japan, slagging gasification processes and the use of plasma melting systems with conventional incineration systems produce a vitrified slag which locks the leachable heavy metals within the slag;

- The environmental impact of installations dedicated to the treatment of residual MSW may not be strictly proportional to treatment capacity. A significant role is played by the qualitative aspects of the waste feedstock; and
- Incineration with energy recovery is considered to generate greenhouse gas savings based on the studies reviewed for this report and is considered one of the most efficient processes for treating MSW when heat recovery is achieved.

The Government of Western Australia may be in a unique position to continue some of the studies and assessments detailed in this report. Should approval be granted for a local MSW thermal treatment plant in the future, the relevant authority could apply some of this analysis to what could be considered the 'baseline case' i.e. prior to operations, undertaking on-going analysis thereafter for years/decades to monitor and evaluate findings for any statistically significant impact.

It is therefore clear that the shaping of policy, legislation and guidance to ensure the most appropriate future waste treatment infrastructure needs to remain mindful of these and related key issues and the impact on all stakeholders and the environment.



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The Impact on Health of Emissions to Air from Municipal Waste Incinerators

September 2009

Summary

The Health Protection Agency has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that modern and well managed municipal waste incinerators make only a very small contribution to local concentrations of air pollutants. The Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment has reviewed recent data and has concluded that there is no need to change its previous advice, namely that any potential risk of cancer due to residency near to municipal waste incinerators is exceedingly low and probably not measurable by the most modern techniques. Since any possible health effects are likely to be very small, if detectable, studies of public health around modern, well managed municipal waste incinerators are not recommended.

The Agency's role is to provide expert advice on public health matters to Government, stakeholders and the public. The regulation of municipal waste incinerators is the responsibility of the Environment Agency.

Introduction

1. The use of incineration for waste disposal in the UK is increasing. Applications for permits to build and operate incinerators give rise to local concerns about possible effects on health of emissions. Responsibility for the environmental permitting of municipal waste incinerators lies with the Environment Agency. The Health Protection Agency (HPA) has a statutory responsibility to advise Government and Local Authorities on possible health impacts of air pollutants.

2. The operators of modern waste incinerators are required to monitor emissions to ensure that they comply, as a minimum, with the limits in the EU Waste Incineration Directive (2000/76/EC), which sets strict emission limits for pollutants. This Directive has been implemented in England and Wales by the Environmental Permitting (EP) (England and Wales) Regulations 2007 (note

that from April 2008 these replaced the Pollution Prevention and Control (PPC) (England and Wales) Regulations 2000).

3. Under the EP Regulations, the operator is required to apply for an environmental permit. Consideration of this application will include such issues as health effects and organisations such as the local Primary Care Trust (PCT); the HPA and Food Standards Agency (FSA) are usually consulted. The permit itself will set out strict operating requirements which must be complied with, this will include monitoring. Should a breach of the permit occur, action may be taken by the regulator.

4. Applications to build and operate incinerators invariably include an assessment of likely emissions to air. Modern incinerators emit only small amounts of chemicals to air (see para 16) in comparison with older incinerators and, although no absolute assurance of a zero effect on public health can be provided, the additional burden on the health of the local population is likely to be very small. Studies published in the scientific literature showing health effects in populations living around incinerators have, in general, been conducted around older incinerators with less stringent emission standards and cannot be directly extrapolated with any reliability to modern incinerators (see paras 6 and 26)

5. The incineration process can result in three potential sources of exposure, (1) emissions to the atmosphere, (2) via solid ash residues, and (3) via cooling water. Provided that solid ash residues and cooling water are handled and disposed of appropriately, atmospheric emissions remain the only significant route of exposure to people. This paper is thus concerned only with the health effects of emissions to air.

6. The comparative impacts on health of different methods of waste disposal have been considered in detail in a report prepared for the Department of Environment, Food and Rural Affairs (Defra 2004). This work was undertaken by a group of consultants led by the independent consultants Enviro and included experts in the air pollution field. The report was reviewed by The Royal Society and its comments were incorporated by the authors of the report. This report is the most extensive available in the field and concludes that well managed, modern incinerators are likely to have only a very small effect on health. Since the evidence base has not changed significantly since 2004 it would be an inefficient use of resources to repeat the work undertaken by Enviro (see above) for Defra when applications to build and operate individual incinerators are being considered. The HPA's view is that the study undertaken for Defra by Enviro can be relied on although, like all scientific findings, it may be subject to revision if new data were to emerge.

7. Concerns about possible effects on health of emissions to air tend to focus on a few well known pollutants: particles, polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzo-*p*-furans (commonly referred to as "dioxins") and other carcinogens such as the polycyclic aromatic hydrocarbons (PAH). Much is known about the effects on health of these

compounds. Detailed reports prepared by expert advisory committees are available: these include reports by the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) on particulate matter (COMEAP, 1995, 1998, 2001a, 2009); by Defra's Expert Panel on Air Quality Standards (EPAQS) on benzene, 1,3-butadiene (reports 1 and 2), particles (reports 1 and 2), PAH compounds, and metals and metalloids¹ (Department of the Environment, 1994a,b, 1995; Department of the Environment Transport and the Regions, 1999, 2001; Department for the Environment, Food and Rural Affairs, 2002, 2009) and the Committee on the Toxicity of Chemicals in Food, Consumer Products and the Environment's statement on dioxins and dioxin-like polychlorinated biphenyls (Committee on Toxicity, 2001).

Particles

8. Questions are often asked about the possible effects on health of particles emitted by incinerators. The Committee on the Medical Effects of Air Pollutants (COMEAP) has published a series of statements and reports on the effects of air pollutants on health in the UK. It is accepted that exposure to current levels of common air pollutants damages health. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland seeks to reduce concentrations of air pollutants. Where concentrations of air pollutants are raised, Air Quality Management Areas are defined and plans to reduce concentrations are developed by Local Authorities. Details of the Air Quality Strategy can be found on the Defra website:

<http://www.defra.gov.uk/environment/airquality/strategy/index.htm>

9. Both long-term exposure and short-term increases in exposure to particles can damage health. This is widely accepted (World Health Organization, 2006). Long term exposure affects the risk of mortality, especially from cardiovascular disease and from lung cancer (COMEAP, 2009, COMEAP, 2006; Health Effects Institute, 2000). Short-term increases in concentrations cause cardio-respiratory effects including an increase in deaths from heart attacks and from respiratory disease, increased hospital admissions for treatment of these disorders and increases in related symptoms. No thresholds of effect can be identified for either the effects of long-term exposure or for the effects of short-term increases in concentrations. Thus, any increase in particle concentrations should be assumed to be associated with some effect on health. The critical step in assessment of effects on health is not simply making the correct assertion that some effect is possible but in estimating the size of that effect. This is discussed below.

10. Evidence of the effects of particles on health comes, in the main, from epidemiological studies. For the effects of long-term exposure attention has been focused on PM_{2.5}; for the effects of short-term increases in concentrations both PM_{2.5} and PM₁₀ have been extensively used as metrics of the ambient aerosol. PM₁₀ is defined as the mass of particles of less than

¹ Arsenic, chromium, nickel and beryllium

(about) 10 microns in diameter per cubic metre of air. $PM_{2.5}$ is an analogous measure: in this case, the mass of particles of less than about 2.5 microns in diameter per cubic metre of air. The exact definitions are given in the recent Defra report on ambient particles (Defra, 2005). The exact mechanisms of effect of particles on health are incompletely understood but several plausible hypotheses are being pursued; the generation of free radicals in the respiratory system and more widely in the body, the induction of an inflammatory response in the lung, effects on clotting factors in the blood, effects on the rate of development of atherosclerotic plaques in coronary arteries and effects on the regulation of the heart beat are all being studied intensively. It is possible that metals found in association with particles play an important role. It is also possible that the ultrafine component of the ambient aerosol plays an important role. These, and other, possibilities are not yet proven.

11. The lack of a complete understanding of the mechanisms of effects of particles does not prevent prediction of the effects on health of increased concentrations of particles monitored as PM_{10} and/or $PM_{2.5}$. Meta-analytical techniques have been applied to the results of primary studies and summary coefficients linking PM_{10} and $PM_{2.5}$ with effects on health have been derived (COMEAP, 1998, 2009; World Health Organization, 2006). If these coefficients are applied to the small increases in concentrations of particles produced, locally, by incinerators, the estimated effects on health are likely to be small. This is because the coefficients themselves are small, the increase in concentration due to operation of the incinerator is likely to be small, and so is the size of the potentially exposed local population.

12. It is sometimes claimed that the “wrong particles” are considered when estimating the possible effects on health of emissions from incinerators. It should be understood that impact calculations of the effects on health of emissions from incinerators are done by using the coefficients derived from epidemiological studies. Because we do not know with certainty the active components of the ambient aerosol, coefficients linking effects on health with changes in mass concentrations (PM_{10} and/or $PM_{2.5}$) are used in the impact calculations. At present we have no clear epidemiological evidence to distinguish between the toxicity of samples of particles collected for PM_{10} or $PM_{2.5}$ measurements in different areas. National policy (Defra, 2007a,b) and the EC Directive on Ambient Air Quality and Cleaner Air for Europe (European Parliament and Council of the European Union, 2008) are based on the assumption that particles collected for PM_{10} and $PM_{2.5}$ measurements do not differ in their effects on health from place to place. In this context it is worth noting that PM_{10} and $PM_{2.5}$ samples from around the world can vary substantially in their chemical composition and size distribution but nonetheless exhibit similar concentration-response coefficients in time-series epidemiological studies. It is accepted that this view could change and that monitoring of chemical characteristics of the ambient aerosol (for example, its metallic components), the number of particles per unit of volume of air, the total surface area of particles per unit volume of air, or the capacity of particles to generate free radicals could prove more valuable than measurements of mass concentrations (PM_{10} and $PM_{2.5}$). But none of this is yet well

established and international and national regulations are currently framed in terms of mass concentrations. It seems reasonable that these regulations and the approaches upon which they are based should be applied to considerations of the effects on health of particles emitted by incinerators. It may be asked why studies of the specific impacts on health of the small increases in local concentrations of particles produced by incinerators are not done routinely. The main reason for this is that the concentration increment produced by incinerators is likely to be too small to allow an impact on health to be identified in the local population.

13. It is sometimes claimed that PM_{10} measurements ignore particles most likely to be deposited in the lung, or, more specifically, in the gas exchange zone of the lungs. This is incorrect and stems from a misunderstanding of the term PM_{10} . Tapered element oscillating microbalance (TEOM) monitors are equipped with a sampling head that selects essentially all particles of less than $10\text{ }\mu\text{m}$ aerodynamic diameter. PM_{10} measurement is designed to collect effectively all those particles small enough to pass the upper airways (nose, mouth, pharynx, larynx) and thus of a size that allows a chance of deposition in the lung. $PM_{2.5}$ is intended to represent that fraction of the aerosol with a high probability of deposition in the gas exchange zone of the lung in vulnerable individuals. It will be obvious that PM_{10} includes $PM_{2.5}$ and that $PM_{2.5}$ cannot exceed PM_{10} in any given sample of air.

14. It is sometimes, further, claimed that PM_{10} or $PM_{2.5}$ do not include nanoparticles present in the air. This is also incorrect. Nanoparticles are efficiently collected by PM_{10} and $PM_{2.5}$ samplers but make only a small contribution to the results expressed as PM_{10} or $PM_{2.5}$. If particles of less than 100 nm diameter alone were collected from a known volume of air and weighed, the resulting concentration could be expressed as $PM_{0.1}$ ($100\text{ nm} = 0.1\text{ }\mu\text{m}$). In a sample of air collected in a UK urban area on a typical day we might expect results similar to those given below:

PM_{10}	$20\text{ }\mu\text{g/m}^3$
$PM_{2.5}$	$13\text{ }\mu\text{g/m}^3$
$PM_{0.1}$	$1\text{-}2\text{ }\mu\text{g/m}^3$

PM_{10} includes and exceeds $PM_{2.5}$ which in turn includes and exceeds $PM_{0.1}$.

15. It is quite correct to say that nanoparticles make a large contribution to the number of particles per unit volume of air. Particles of less than about 500 nm in diameter dominate the number concentration of ambient particles. It might be correctly suggested that if a specified source, for example an incinerator, produced mainly nanoparticles, changes in local mass concentrations (PM_{10} and to a lesser extent $PM_{2.5}$) would not reflect the increase in numbers of particles in the air. We do not, however, know how to interpret measurement of number concentrations of particles in health terms. Work in this area is developing. It may be that, although the evidence is as yet weak in comparison with that relating to mass concentrations, particle numbers will link with some effects on health better than mass concentrations. No generally accepted coefficients that allow the use of number

concentrations in impact calculations have yet been defined. As stated above, regulations are currently framed in terms of mass concentrations and it is unreasonable to expect local health professionals to interpret number concentrations in quantitative health terms when national experts have not yet judged that the evidence is sufficient to do so. COMEAP will be looking at whether quantification of the effects of particle number concentrations is possible as part of its work on the quantification of the health effects of air pollution. No Air Quality Standards are defined in terms of number concentrations of particles.

16. The contribution made by waste incineration to national emissions of particles is low. Data provided by Defra (National Emissions Inventory www.naei.org.uk) show that 2006 national emissions of PM₁₀ from waste incineration are 0.03% of the total compared with 27% and 25% for traffic and industry respectively². This low proportion is also found at a local level – the Environment Agency have informed HPA of one incinerator modelling study that found a modelled ground level increment in PM₁₀ of 0.0005 µg/m³ as an annual average (Environment Agency, 2009). The increment in PM_{2.5} could not exceed this, and would be likely to be lower. In addition, Defra is expanding its general PM_{2.5} monitoring and will scrutinise this to see if any individual sources make a noticeable addition to measured concentrations.

17. Questions are often asked about the effects of air pollutants, including those emitted by waste incineration, on children's health. The World Health Organization (WHO) in its 2005 report on Air Pollution and Children's Health and Development, concluded that there was an association between air pollution and infant mortality that appeared to be mainly due to particulate air pollution. COMEAP, in a 2008 statement on Air Pollution and Children's Health, endorsed WHO's general conclusions although the COMEAP statement does not comment on which pollutant is likely to be responsible. Annexes to the statement indicate that, of the studies published since the WHO report, some find effects of particulate air pollution and some do not. Metrics of particulate air pollution used in these studies included PM₁₀ and total suspended particulates, as well as PM_{2.5}. The size of the effects reported in these studies relates to large changes in PM_{2.5}, larger than would be expected to be caused by the operation of an incinerator. Given the small effects of incinerators on local concentrations of particles, it is highly unlikely that there will be a detectable effect of any particular incinerator on local infant mortality.

18. When carrying out studies which investigate health effects around point sources of pollution such as incinerators, or when mapping health effects around such sources, it is important to control for other factors which can influence the health outcomes under investigation before drawing any conclusions. So when investigating the effect of a source of PM_{2.5} emissions on infant mortality rates, it would be important to control for other sources of PM_{2.5} emissions, and for factors which are known to influence infant mortality

² National Atmospheric Emissions Inventory PM₁₀
http://www.naei.org.uk/emissions/emissions_2006/summary_tables.php?action=unece&page_name=PM1006.html

rates, for example, socio-economic factors or ethnicity. Maps showing death rates or levels of morbidity are useful in raising hypotheses, but they do not supply evidence of cause and effect.

Carcinogens

19. Chemicals which cause cancer are described as carcinogens. For risk assessment purposes, carcinogens are divided into two groups depending on their mechanism of action:

- (a) Genotoxic carcinogens: these induce cancer by a mechanism that involves the compound itself, or a metabolite, reacting directly with the genetic material of cells (DNA), producing a mutation. This process is called mutagenicity. It is theoretically possible that one “hit” on DNA may produce a mutation that can eventually develop into a tumour. The assumption is thus made for genotoxic carcinogens that they do not have a threshold and that any exposure is associated with an increase in risk, albeit this may be very small. Most of the known human chemical carcinogens are in this group, e.g. aflatoxins, benzene, 1,3-butadiene, 2-naphthylamine, polycyclic aromatic hydrocarbon (PAH) compounds.
- (b) Non-genotoxic carcinogens: these induce cancer by mechanisms that are not based on mutagenicity. These chemicals give negative results in the well recognised tests for mutagenicity. Unlike the genotoxic carcinogens, which are characterised by a common mechanism, there are a number of different mechanisms involved. Examples include sustained cell proliferation in a sensitive tissue (resulting in expression of a spontaneous mutation) due to cytotoxic effects, hormonal stimulation or immunosuppression. These effects have a threshold based on the precursor toxicological effect such as cytotoxicity, i.e. there is a level of exposure below which they do not have an effect. Examples of such compounds are oestrogens and 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD or “dioxin”).

20. In the air pollution field, genotoxic carcinogens are the major focus of interest. In the following discussion, the term “carcinogens” is used to represent genotoxic carcinogens.

21. The carcinogenic effects of PAH compounds can be identified by means of studies in experimental animals only at very much higher concentrations than occur in ambient air. These high exposures are necessary because practical limitations regarding the number of animals used in these tests mean that they cannot reliably detect increases in tumour incidence below a few percent. However, for public health purposes, the principal concern is about effects that occur at a much lower incidence in the human population, but are undetectable in animal studies. The calculation of cancer risk at low environmental exposures from mathematical modelling of

the results from the high dose animal data presents great difficulty. The expert advisory committee, the Committee on the Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) has consistently expressed concern at the use of such modelling to extrapolate to levels of exposure that are orders of magnitude lower than the observed range. This was most recently stated in the 2004 guidelines. (The reasons are based on the fact that the various models available do not take into account the biological complexity of the carcinogenesis process, the extrapolations are based on a few data points over a very narrow and high dose range, and very wide variations in risk estimates are produced depending on the models used. Their use gives an impression of precision that cannot be justified). The COC does not recommend their use for routine risk assessment.

22. In some cases, carcinogenic effects have been demonstrated in epidemiological studies in humans. Such studies have almost always involved occupational exposure where workplace levels in the past may have been much higher than those in ambient air. It is difficult to demonstrate the effects of exposure to ambient concentrations of carcinogens (the concentrations are so low that vast numbers of people would need to be studied to produce clear results) but such effects are assumed to be possible, on the grounds that there is no threshold for the effects of many of these compounds. If good quality epidemiological studies are available it is possible to derive models of the relationship between exposure and effect that allow prediction, with some confidence, of likely cancer incidence at ambient concentrations. It should be noted, however, that the actual accuracy of such predictions cannot be assessed and such extrapolations still involve some considerable uncertainty and should be used with caution.

23. The Expert Panel on Air Quality Standards (EPAQS) has recommended air quality standards for benzene, 1,3-butadiene and PAH compounds using a different approach from that used by the World Health Organization (WHO), which is based on quantitative risk assessment. This is because of the concerns of the COC regarding the use of mathematical models to estimate cancer risk. Indeed, the COC endorsed the approach used by EPAQS. This involved the application of Uncertainty Factors to the results of studies of the effects on man of exposure to high concentrations of the carcinogens specified above. Standards derived in this way do not offer a complete guarantee of safety (this is impossible with non-threshold compounds) but do define concentrations at which the risks to health are likely to be very small and unlikely to be detectable. If it is found that incinerators emit the carcinogens considered by EPAQS, it is reasonable to compare the augmented local concentration (i.e. the local background concentration plus the increment contributed by the incinerator) with the EPAQS standard. If this is not exceeded it may be reasonably assumed that the additional risk imposed by the emissions is minimal. If, on the other hand, the emissions cause the local concentrations to exceed the EPAQS standard(s), the appropriate regulator would need to decide whether the additional risk posed by the incinerator was a cause for concern and what further reductions may be necessary.

Dioxins

24. It is recognised that there are particular concerns about emissions of dioxins from incinerators. The HPA and DH are advised on the health effects of such compounds by the independent expert advisory committee, the Committee on the Toxicity of Chemicals in Food, Consumer Products and the Environment (COT). The COT has recommended a tolerable daily intake (TDI) for dioxins, which is the amount which can be ingested daily over a lifetime without appreciable health risk. This TDI is based on a detailed consideration of the extensive toxicity data on the most well studied dioxin, TCDD, but may be used to assess the toxicity of mixtures of dioxins and dioxin-like PCBs by use of Toxic Equivalency Factors, which allow concentrations of the less toxic compounds to be expressed as an overall equivalent concentration of TCDD. These toxicity-weighted concentrations are then summed to give a single concentration expressed as a Toxic Equivalent (TEQ). The system of Toxic Equivalency Factors (TEFs) used in the UK and a number of other countries is that set by the World Health Organization (WHO)³, and the resulting overall concentrations are referred to as WHO-TEQs (van den Berg, 2006). Thus, the COT has recommended a tolerable daily intake for dioxins of 2 picograms WHO-TEQ/kg body weight/day based on the most sensitive effect of TCDD in laboratory animals, namely, adverse effects on the developing fetus resulting from exposure *in utero*. As this was the most sensitive effect it will protect against the risks of other adverse effects including carcinogenicity. The advice of the other sister committees, COC and the Committee on Mutagenicity of Chemicals in Food, Consumer Products and the Environment (COM), informed the conclusion, namely that dioxins do not directly damage genetic material and that evidence on biological mechanisms suggested that a threshold based risk assessment was appropriate. The full statement is available (COT, 2001).

25. The majority (more than 90%) of non-occupational human exposure to dioxins occurs via the diet, with animal-based foodstuffs like meat, fish, eggs, and dairy products being particularly important. Limited exposure may also occur via inhalation of air or ingestion of soil depending on circumstances. Regarding emissions from municipal waste incinerators, the current limit for dioxins and furans is 0.1 nanogram per cubic metre of emitted gases. A nanogram is one thousand millionth of a gram. Inhalation is a minor route of exposure and, given that Defra has calculated that incineration of municipal solid waste accounts for less than 1% of UK emissions of dioxins⁴, the contribution of incinerator emissions to direct respiratory exposure of dioxins is a negligible component of the average human intake. However, dioxins may make a larger contribution to human exposure via the food chain, particularly fatty foods. Dioxins from emissions could also be deposited on soil and crops and accumulate in the food chain via animals that graze on the pastures,

³ Note: The Waste Incineration Directive (2000/76/EC) sets Air Emission Limit Values for dioxins using a slightly different system of TEQs i.e. international- or I-TEQs, which vary slightly from WHO-TEQs.

⁴ Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes. Extended Summary. Enviro, University of Birmingham and Defra. May 2004.

though dioxins are not generally taken up by plants. Thus the impact of emissions on locally produced foods such as milk and eggs is considered in deciding whether to grant a permit. These calculations show that, even for people consuming a significant proportion of locally produced foodstuffs, the contribution of incinerator emissions to their intake of dioxins is small and well below the tolerable daily intake (TDI) for dioxins recommended by the relevant expert advisory committee, Committee on Toxicity of Chemicals in Food, Consumer (see <http://cot.food.gov.uk/cotstatements/cotstatementsyrs/cotstatements2001/dioxinsstate>).

Epidemiological studies: municipal waste incinerators and cancer

26. The COC has issued two statements on the cancer epidemiology of municipal waste incinerators. The initial statement followed a review of a large study by the Small Area Health Statistics Unit which examined cancer incidence between the mid 1970s and the mid 1980s in 14 million people living within 7.5 km of 72 municipal solid waste incinerators in Great Britain⁵ (Elliott *et al*, 1996; COC, 2000). Prior to this there had been very few studies of cancer mortality around municipal waste incinerators and none in the UK. The incinerators studied by Elliott *et al* (1996) were the older generation operating prior to introduction of strict emission controls and were more polluting than modern incinerators. After considering this study, the COC concluded that: *“any potential risk of cancer due to residency (for periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low, and probably not measurable by the most modern techniques”* (COC, 2000).

27. In 2008, the Committee reviewed seven new studies on cancer incidence near municipal solid waste incinerators which had been published since 2000 (Comba *et al*, 2003; Floret *et al*, 2003; Knox E, 2000; Viel *et al*, 2000; 2008a and 2008b; Zambon *et al*, 2007). All had studied the older generation of incinerator and three studies were of an incinerator for which emissions of dioxins were reported to have exceeded even the older emission standard. There were problems interpreting most of these studies due to factors such as failure to control for socio-economic confounding or inclusion of emission sources other than municipal waste incinerators. The COC concluded that *“Although the studies indicate some evidence of a positive association between two of the less common cancers i.e. non-Hodgkin’s lymphoma and soft tissue sarcoma and residence near to incinerators in the past, the results cannot be extrapolated to current incinerators, which emit lower amounts of pollutants. ...Moreover, they are inconsistent with the results of the larger study...carried out by the Small Area Health Statistics Unit.”* It concluded that there was no need to change its previous advice but that the situation should be kept under review (COC, 2009).

⁵ These included all known municipal incinerators which opened before 1976. Incinerators starting from 1976 were excluded, to ensure an appropriate lag period for development of any cancer associated with the emissions.

Conclusions

28. Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable. The Agency, not least through its role in advising Primary Care Trusts and Local Health Boards, will continue to work with regulators to ensure that incinerators do not contribute significantly to ill-health.

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Glossary

Aflatoxins

Naturally occurring toxins produced by the fungus *Aspergillus sp.*

Aerodynamic diameter

The actual diameter of a spherical particle of unit density with the same terminal velocity as the particle under consideration. The term aerodynamic diameter allows particles of differing densities and shapes to be compared in terms of their likelihood of depositing in the lung.

Air Quality Standard (AQS)

The concentration of a pollutant (expressed, generally, as mass per unit volume) and qualified by an averaging time, regarded as acceptable by an Expert Group or other standard setting body. Air Quality Standards do not provide an absolute guarantee of safety for health.

Ambient aerosol

An aerosol is a suspension of fine particles or liquid droplets in a gas. Ambient refers to the surroundings. In the air pollution context, this refers to the suspension of fine particles in the general outdoor air.

Atherosclerotic plaques

The discrete lesions of the arterial wall in atherosclerosis i.e., disease of the blood vessels involving the accumulation of fatty material in the inner layer of the arterial wall resulting in narrowing of the artery. These fatty deposits are known as plaques.

1,3-butadiene

An industrial chemical used in the production of synthetic rubber. It is also produced by the combustion of petrol and diesel. It is efficiently removed by catalytic converters.

Carcinogens

Agents that cause cancer. Chemical carcinogens are chemicals that may produce cancer.

Cell proliferation

An increase in the number of cells as a result of cell growth and cell division.

Clotting factors

Substances (proteins) in blood that act in a complex series of reactions to stop bleeding by forming a clot.

Coefficients

A constant multiplication factor. For example, a health effect might increase by 0.5% for every unit increase in the concentration of a pollutant. This can be derived as the slope from a graph relating health effects and pollutant concentrations.

Coronary arteries

The network of blood vessels that supply heart muscle with oxygen-rich blood.

Cytotoxic

Toxic to cells.

Dioxins

This refers to a large group of chemicals with similar chemical structure (chlorinated dibenzo-p-dioxins and chlorinated dibenzo-p-furans). They vary greatly in toxicity, some being very toxic, others showing a similar pattern of toxicity but of lower potency. They are not produced commercially but are formed in small amounts in most forms of combustion (fires etc.). The most studied compound in this series is the highly toxic TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin).

Dioxin-like PCBs

Polychlorinated Biphenyls (PCBs) are another group of substances, some of which have similar biological activity to dioxins. These are referred to as Dioxin-like PCBs. There are many other PCBs that do not have dioxin-like properties.

Epidemiological studies

Studies of the distribution and the aetiology (causes) of disease in humans.

Free radicals

Highly reactive chemical structures (due to the presence of a chemical species that has lost an electron and thus contains an unpaired electron in the outer shell of the molecule). They are unstable and can react in biological systems with nearby substances such as lipids, proteins or DNA producing damage.

Furans

Chemicals related to furan. Furan contains carbon, hydrogen and oxygen with the carbon atoms and an oxygen atom forming a 5 sided ring.

Gas exchange zone

The part of the lung in which oxygen diffuses from the air to the blood and carbon dioxide diffuses from the blood to the air. The alveoli, alveolar ducts and respiratory bronchioles make up the gas exchange zone.

Immunosuppression

Suppression of the immune system.

Incidence

New occurrence of a disease over a specified time period.

In-utero

In the uterus (womb).

Larynx

Dilated region of the airway above the upper end of the trachea or windpipe. The vocal cords lie within the larynx.

Mass concentration of particles

The mass of particles per unit volume of air. Usually expressed as $\mu\text{g}/\text{m}^3$ (micrograms per cubic metre).

Metabolite

Chemicals that enter the body can be changed by processes in the body into different chemicals. These are described as metabolites of the original chemical.

Metalloid

An element that is not clearly a metal or non-metal but has some intermediate properties in terms of malleability, ductility, conductivity and lustre. The following elements are generally considered to be metalloids: boron; silicon; germanium; arsenic; antimony; tellurium; polonium.

Meta-analysis

In the context of epidemiology, a statistical analysis of the results from independent studies which aims to produce a single estimate of an effect.

Metric

A measure for something. PM_{10} is a measure (or metric) of the concentration of particles in the air.

Microgram (μg)

One microgram is $1 \times 10^{-6}\text{g}$. There are 1,000,000 (1 million) micrograms in a gram.

Micron (µm)

This is a unit of length that equals one thousandth of a millimetre.

Mortality

Deaths.

Mortality rate

The number of deaths in a population.

Morbidity

Ill health.

Mutation

A permanent change in the amount or structure of the genetic material (DNA) in a cell or organism which can result in a change in its characteristics. A mutation in the germ cells of sexually reproducing organisms may be transmitted to the offspring, whereas a mutation that occurs in somatic cells may be only transferred to descendent daughter cells.

Nanogram (ng)

One nanogram is 1×10^{-9} gram. There are 1,000,000,000 ng in one gram.

Nanoparticles

These are usually considered to be particles of less than 100 nanometres diameter. One nanometre is a millionth of a mm. To put into some context this is about a ten thousandth of the width of a human hair.

2-naphthylamine

A chemical used in the past in the manufacture of dyes. It is made up from 2 benzene rings with a nitrogen and hydrogen side chain.

Non-Hodgkin lymphoma

A type of malignant cancer of the lymphatic system or lymphoid tissue. Most lymphoma are of this type (as opposed to being Hodgkin lymphoma).

Number concentration of particles

The number of particles found in a specified volume of air, usually 1 cubic metre.

Pharynx

The throat and back of the nose.

Point sources

Sources of pollution from a fixed point in space e.g. an industrial site. The term is used in contrast to mobile sources of pollution e.g. cars.

Polycyclic aromatic hydrocarbons (PAHs)

These are a group of structurally related organic compounds that contain 2 or more fused rings. They are formed as a result of combustion/pyrolysis.

PM₁₀, PM_{2.5}

The concentration (expressed in $\mu\text{g}/\text{m}^3$) of particles generally less than 10µm and 2.5µm respectively⁶. The terms PM₁₀ and PM_{2.5} are sometimes used to describe particles of diameter of less than 10 and 2.5 µm respectively but this is not strictly correct: the terms refer to the concentrations of particles and not to the particles themselves.

Picogram (pg)

A picogram is 1×10^{-12} gram. There are 1,000,000,000,000 pg in one gram.

⁶ Strictly, particles that pass a sampler entry with 50% efficiency at 10 micrometres or 2.5 micrometres respectively.

Spontaneous mutation

A mutation that occurs as a result of natural processes in cells, as opposed to those that arise because of interaction with an outside agent or mutagen.

Soft tissue sarcomas

These are a rare type of cancer that develop from cells in the soft, supporting tissues of the body such as muscle, fat and blood vessels. They may occur in limbs, chest, abdomen or pelvis and less commonly in head and neck.

TCDD

The most studied dioxin, and the one that is used as a reference compound when considering the toxicity of mixtures of dioxins, is often referred to simply as TCDD. This is an abbreviation of its full chemical name, 2,3,7,8-tetrachlorodibenzo-p-dioxin. It is considered the most toxic dioxin.

TEOM

Tapered Element Oscillating Micro-balance. An instrument used to measure the mass concentration of particles in the air. Particles are collected on a vibrating rod: the mass deposited affects the frequency of vibration of the rod and this, being recorded, allows the mass of particles in the air to be calculated.

Tolerable Daily Intake (TDI)

An estimate of the amount of contaminant, expressed on a body weight basis (e.g., mg/kg body weight) that can be ingested daily over a lifetime without appreciable health risk.

Total suspended particulates

A measure of particles derived by collecting particles of approximately 100 µm or less in a sampler. This includes particles that are too large to enter the lung. The measurement method has generally been superseded by measurement of PM₁₀.

Toxic Equivalency Factor (TEF)

A measure of the relative toxicological potency of a chemical compared to a well characterised reference compound. TEFs can be used to sum the toxicological potency of a mixture of chemicals which are all members of the same chemical class, having common structural, toxicological and biochemical properties e.g. dioxins. In the case of dioxins the reference compound is TCDD.

Toxic Equivalent (TEQ)

This is a method of comparing the total relative toxicological potency within a mixture using TEFs (see above). It is calculated as the sum of the products of the concentration of each chemical multiplied by the TEF.

Ultrafine component

The component of particles less than about 100 nm in diameter.

Uncertainty factors

Value used in extrapolation from experimental animals to man (assuming that man may be more sensitive) or from selected individuals to the general population; for example, a value applied to the No Observed Adverse Effect Level (NOAEL) to derive a TDI. The value depends on the size and type of population to be protected and the quality of the toxicological information available.



Report and recommendations of the Environmental Protection Authority and the Waste Authority



Environmental and health performance of waste to energy technologies

Advice of the Environmental Protection Authority to
the Minister for Environment under Section 16(e) of the
Environmental Protection Act 1986

Report 1468

April 2013

Strategic Advice Timelines

Date	Progress stages	Time (weeks)
16/11/2011	Request for advice from the Minister for Environment	
4/04/2013	EPA section16(e) advice released	72

There is no appeal period on s16(e) advice

ISSN 1836-0483 (Print)
ISSN 1836-0491 (Online)

Foreword from the Chairmen

We are pleased to transmit this advice to the Minister for Environment on behalf of the Environmental Protection Authority and the Waste Authority on the environmental and health impacts associated with waste to energy technologies. This advice is provided under section 16(e) of the *Environmental Protection Act 1986*.

To assist in the development of this advice, a technical report was commissioned focussing on different regulatory regimes across jurisdictions, profiling operating state-of-the-art waste to energy plants and presenting a review of environmental and health literature. The key findings identified in this technical report supported the Authorities in formulating this advice to the Minister for Environment.

Waste to energy is a recognised recovery option in the waste hierarchy and is likely to play an important role alongside other waste management options in contributing to Western Australia's resource recovery targets.

The EPA and Waste Authority are confident that, subject to conditions and matching suitable technologies to types of waste input and appropriate plant scale, waste to energy plants employing best practice can be operated with acceptable impacts to our community. Nevertheless, engagement with the community through the full planning, design, environmental approvals and commissioning process for waste to energy plants is essential to build community confidence and acceptability. This advice identifies six principles that the EPA and Waste Authority see as key to the successful operation of waste to energy plants in Western Australia:

- Only proven technology components should be accepted for commercially operating waste to energy plants.
- The expected waste input should be the main consideration for the technology and processes selected.
- Proposals must demonstrate best practice that, at a minimum, meets the European Union's Waste Incineration Directive standards for emissions at all times.
- The waste sourced as input must target genuine residual waste that cannot feasibly be reused or recycled.
- Continuous emissions monitoring must occur where feasible, and non-continuous emissions monitoring must be required for all other emissions of concern.

- Residual by-products must be properly treated and disposed of to an appropriate landfill, except where it is demonstrated that they can be safely used elsewhere with acceptable impacts to the environment or human health.

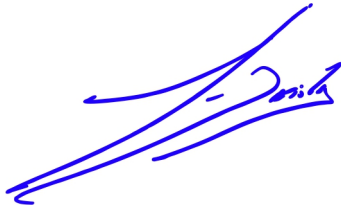
This advice is provided to guide the emerging waste to energy industry in Western Australia. It recommends a precautionary approach, which could be revised once the industry develops and demonstrates it can successfully operate under Western Australian conditions.

The Waste Authority has a role in promoting the most efficient use of resources, including resource recovery. While beyond the scope of this advice, the Waste Authority notes the importance of developing appropriate contracting and governance models within a suitable planning framework to ensure the long term outlook for this industry aligns with the waste strategy for the State.



Dr Paul Vogel

Chairman, Environmental Protection Authority



Mr Marcus Geisler

Chairman, Waste Authority

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Conclusions and recommendations

Conclusion 1 Waste to energy plants have the potential to offer an alternative to landfill for the disposal of non-recyclable wastes, with the additional benefit of the immediate capture of stored energy.

Conclusion 2 It has been demonstrated internationally that modern waste to energy plants can operate within strict emissions standards with acceptable environmental and health impacts to the community when a plant is well designed and operated using best practice technologies and processes.

Recommendation 1 Given the likely community perception and concern about waste to energy plants, a highly precautionary approach to the introduction of waste to energy plants is recommended.

Recommendation 2 As part of the environmental assessment and approval, proposals must address the full waste to energy cycle - from accepting and handling waste to disposing of by-products, not just the processing of waste into energy.

Recommendation 3 Waste to energy proposals must demonstrate that the waste to energy and pollution control technologies chosen are capable of handling and processing the expected waste feedstock and its variability on the scale being proposed. This should be demonstrated through reference to other plants using the same technologies and treating the same waste streams on a similar scale, which have been operating for more than twelve months.

Recommendation 4 Waste to energy proposals must characterise the expected waste feedstock and consideration made to its likely variability over the life of the proposal.

Recommendation 5 The waste hierarchy should be applied and only waste that does not have a viable recycling or reuse alternative should be used as feedstock. Conditions should be set to require monitoring and reporting of the waste material accepted over the life of a plant.

Recommendation 6 Waste to Energy operators should not rely on a single residual waste stream over the longer term because it may undermine future recovery options.

Recommendation 7 Regulatory controls should be set on the profile of waste that can be treated at a waste to energy plant. Plants must not process hazardous waste.

Recommendation 8 In order to minimise the discharge of pollutants, and risks to human health and the environment, waste to energy plants should be required to use best practice technologies and processes. Best practice technologies should, as a minimum and under both steady state and non-steady state operating conditions, meet the equivalent of the emissions standards set in the European Union's Waste Incineration Directive (2000/76/EC).

Recommendation 9 Pollution control equipment must be capable of meeting emissions standards during non-standard operations.

Recommendation 10 Continuous Emissions Monitoring must be applied where the technology is feasible to do so (e.g. particulates, TOC, HCl, HF, SO₂, NO_x, CO). Non-continuous air emission monitoring shall occur for other pollutants (e.g. heavy metals, dioxins and furans) and should be more frequent during the initial operation of the plant (minimum of two years after receipt of Certificate of Practical Completion). This monitoring should capture seasonal variability in waste feedstock and characteristics. Monitoring frequency of non-continuously monitored parameters may be reduced once there is evidence that emissions standards are being consistently met.

Recommendation 11 Background levels of pollutants at sensitive receptors should be determined for the Environmental Impact Assessment process and used in air dispersion modelling. This modelling should include an assessment of the worst, best and most likely case air emissions using appropriate air dispersion modelling techniques to enable comparison of the predicted air quality against the appropriate air quality standards. Background monitoring should continue periodically after commencement of operation.

Recommendation 12 To address community concerns, proponents should document in detail how dioxin and furan emissions will be minimised through process controls, air pollution control equipment and during non-standard operating conditions.

Recommendation 13 Proposals must demonstrate that odour emissions can be effectively managed during both operation and shut-down of the plant.

Recommendation 14 All air pollution control residues must be characterised and disposed of to an appropriate waste facility according to that characterisation.

Recommendation 15 Bottom ash must be disposed of at an appropriate landfill unless approval has been granted to reuse this product.

Recommendation 16 Any proposed use of process bottom ash must demonstrate the health and environmental safety and integrity of a proposed use, through characterisation of the ash and leachate testing of the by-product. This should include consideration of manufactured nanoparticles.

Recommendation 17 Long term use and disposal of any by-product must be considered in determining the acceptability of the proposed use.

Recommendation 18 Standards should be set which specify the permitted composition of ash for further use.

Recommendation 19 Regular composition testing of the by-products must occur to ensure that the waste is treated appropriately. Waste by-products must be tested whenever a new waste input is introduced.

Recommendation 20 Waste to energy plants must be sited in appropriate current or future industrial zoned areas with adequate buffer distances to

sensitive receptors. Buffer integrity should be maintained over the life of the plant.

Recommendation 21 For a waste to energy plant to be considered an energy recovery facility, a proposal must demonstrate that it can meet the R1 Efficiency Indicator as defined in WID.

1 Introduction

Background

On 16 November 2011, the Minister for Environment wrote to the Chairman of the Environmental Protection Authority (EPA) and the Chairman of the Waste Authority, requesting that the two Authorities investigate the environmental and health performance of waste to energy technologies internationally.

This request sought information on:

- legislation for the establishment and operation of waste to energy facilities, focussed on emissions, in jurisdictions where these facilities currently exist;
- current emissions from established and operating best practice facilities; and
- current and historical level of compliance of these facilities.

The Minister requested that the information gathered be from full-scale, commercial plants that process municipal solid waste (MSW) and from a variety of technology types.

To assist with this investigation, WSP Environment and Energy Ltd were engaged to undertake a technical review of waste to energy plants around the world. These technical reports are attached. The reports provide detailed information to address the issues identified by the Minister for Environment. This advice from the EPA and Waste Authority draws on the technical advice to make recommendations that are relevant to the Western Australian situation.

What is waste to energy?

Waste to energy is the process of converting waste products into some form of energy. This energy could be heat, steam or synthetic gas (syngas). These primary energy sources can either be used directly or further converted into products such as electricity or synthetic fuels. Waste to energy technologies transform the calorific energy in waste products into usable energy. For example, unrecoverable items in residual solid waste such as scrap timber, textiles, nappies, organic waste mixed with packaging, soiled paper and unrecovered packaging still contain energy bound within them. The waste to energy process frees this energy.

Waste incinerators have existed since the 19th century, with renewed interest across the United States, Europe and Asia since the 1970s. These incinerators were designed to reduce the volume of waste going to landfill (as the resulting ashes would normally be less than 30% of the original mass of the input waste). Most plants built up until the 1990s were basic mass burn incineration plants. A number of these incineration plants were only later

retrofitted to also produce energy.

In the 1990s, major regulatory reform occurred across the world to reduce the environmental and health impacts of mass burn incinerators and waste to energy plants. As opposed to older plants, modern plants have been designed to produce energy as the primary objective, and dispose of waste as a secondary objective. For example, in Europe there are set energy recovery levels that must be reached if a plant is to be classed as a legitimate waste to energy resource recovery operation rather than a disposal operation. The energy recovery level varies depending on the age of a plant.

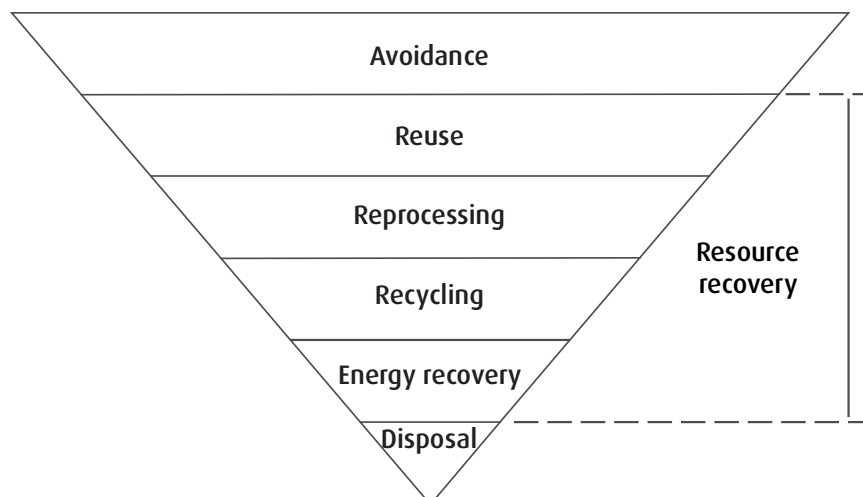
Waste to energy processes generally include combustion, gasification and pyrolysis. These are discussed in Section 2.

Waste to energy in the Western Australian context

Waste generation in Western Australia is growing. This is largely the result of population and economic growth. It is estimated that in 2011-12 total solid waste generation in the Perth and Peel regions was 5.23 million tonnes, and will increase to 5.6 million tonnes in 2014-15 and 6.1 million tonnes in 2019-20. When the population of the Perth and Peel regions reaches 3.5 million people, waste generation could be approximately 9.7 million tonnes per year or more.

The Waste Authority has identified that, not only is the current rate of disposal to landfill a poor use of resources, the current waste and recycling infrastructure is not sufficient to meet the population's needs in the medium to long term.

In 2012, the Western Australian Government released the State Waste Strategy, *Creating the Right Environment*, which aims to move Western Australia to a low waste society. The strategy supports the management of waste consistent with the waste hierarchy which aims to maximise the value of waste and minimise its environmental impact. The waste hierarchy is set out in the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act).



The strategy contains landfill diversion targets for the three main waste streams:

- Municipal Solid Waste: 65% diversion of metropolitan waste by 2019-20 (50% diversion from major regional centres)
- Construction and Demolition Waste: 75% diversion by 2019-20
- Commercial and Industrial Waste: 70% diversion by 2019-20

The growth in waste generation and the preference to divert waste from landfill has significant implications for waste management infrastructure planning and investment into the future. In order to meet policy objectives and strategy targets, a range of waste management options will need to be pursued along different points of the waste hierarchy.

Energy recovery is a recognised option at the lower end of the hierarchy. It is generally considered more favourable than landfill, but less favourable than options such as recycling, re-use and avoidance.

Waste to energy technologies should not replace management options higher up the waste hierarchy. However, where no viable alternatives exist, waste to energy could play an important role in diverting residual waste from landfill and contribute to policy objectives and strategy targets.

Conclusion 1 Waste to energy plants have the potential to offer an alternative to landfill for the disposal of non-recyclable wastes, with the additional benefit of the immediate capture of stored energy.

Regulatory regime in Western Australia

The *Environmental Protection Act 1986* (the EP Act) provides the primary mechanisms to regulate environmental and health aspects of waste to energy plants in Western Australia.

Part IV of the EP Act provides for environmental impact assessment of proposals which are likely, if implemented, to have a significant impact on the environment. Under Part IV, the EPA provides advice to the Minister for Environment, and the Minister may set conditions on a proposal.

Part V of the EP Act requires prescribed premises (including waste to energy plants) to hold a works approval prior to commencing any works on site, and to hold a licence prior to the commencement of any operation of the facility. Works approvals and licences can include conditions relating to the design and construction of facilities, the installation of pollution prevention equipment, the emissions criteria or limits that must be complied with, monitoring requirements, waste disposal, and regular reporting.

The EPA's preference is that proponents present proposals when they are in

the detailed design stage so that the EPA can assess the fully designed proposal. However, the EPA accepts that in some instances it may be asked to assess proposed waste to energy plants while they are at the preliminary design stage. In such circumstances, the environmental assessment and regulatory approval process will need to proceed cautiously through the preliminary design, detailed design, engineering procurement and construction phase and, importantly, commissioning phase. In these circumstances, there will be an increased reliance on the Part V process of the EP Act, i.e. Works Approval and Licensing, to assess the detailed design, including the final combination and configuration of technologies chosen for the plant, to ensure environmental criteria are met.

The EPA and the Waste Authority are confident that the regulatory regime provided under the EP Act is well equipped to minimise and manage the environmental and health risks associated with waste to energy plants in Western Australia. Some of the recommendations made in this advice focus on how the regulatory regime should be applied in Western Australia, for example through the application of emission standards. These recommendations are consistent with the approach taken in the European Union, United States and Japan, and are based on the establishment and operation of waste to energy plants in existence in these jurisdictions.

Current situation

The EPA is currently assessing four waste to energy proposals and has set the level of assessment at Public Environmental Review. This means that there is an opportunity for the community to provide comments on each of the proposals. This is the most in-depth level of assessment.

In the past, there has been deep community concern in Western Australia about the health impacts of waste incinerators. Although waste to energy plants have improved significantly on these older incinerators, this concern is likely to continue. There is mixed community opinion about waste to energy plants across the jurisdictions investigated in the WSP Report (see Stage Two Report). However the common opinion and comments put forward by the community appear to relate primarily to older incinerators. Modern state-of-the-art plants are often located in densely populated areas, and operate successfully to meet stringent emission standards.

As stated in the WSP report (Stage Two Report – page 18):

Modern waste to energy plants are required to meet among the most stringent emissions requirements of any industrial process. Concerns around airborne pollutants, in particular dioxins, have led to a considerable tightening in the environmental regulation of such facilities over the last few decades, and as a result the emissions to air from modern plants are very low. Some plants even claim to produce flue

gases that are cleaner than the surrounding air.

In some cases, other non-technical aspects have been used by proponents to gain community acceptance of a plant. This has included both architectural design to make the plants more aesthetically pleasing and having real time monitoring displays at the entrance to the plant to provide transparency and demonstrate compliance with emissions standards and build community confidence.

Recommendation 1 Given the likely community perception and concern about waste to energy plants, a highly precautionary approach to the introduction of waste to energy plants is recommended.

Effective community engagement will be paramount for the successful establishment of a waste to energy industry in Western Australia.

It is essential that proponents of waste to energy proposals engage fully with stakeholders, especially local communities, as early as possible in the planning of their proposals. Consultation should be ongoing through the design, environmental approvals, commissioning and operating phases. The history of waste to energy in Australia and internationally suggests that working with the community through the process leads to better community acceptance of a facility.

Scope of advice

This advice focuses on waste to energy using thermal treatment technologies only. Biological treatment of waste using technologies such as composting or anaerobic digestion to obtain heat or methane gas is not included. The scope of the advice is limited to the environmental and health impacts of thermal treatment plants. While economic, waste availability, landfill availability and other factors play a significant role in the feasibility of waste to energy plants, they are not the focus of this advice. These factors however are important drivers of the need to consider waste to energy facilities in the broader waste management hierarchy.

How this advice will be used

This advice discusses the potential environmental and health impacts and risks of waste to energy plants around the world, and offers recommendations to minimise and manage these.

This advice provides useful context for proponents developing waste to energy plants to understand the key issues that the EPA will consider in undertaking its environmental impact assessment. The advice and attached technical report also provides information for the community to support open and informed public discussion about waste to energy.

The recommendations relate to the six key principles outlined in the foreword. These recommendations will provide the basis for the EPA's assessment of the current and future proposals. It will assist the Minister in making a decision on whether to approve a proposal under Part IV of the EP Act). It will also provide guidance on decisions made under Part V of the EP Act for Works Approval and Licensing of prescribed premises. The recommendations emphasise the importance of integration of Part IV and Part V processes of the EP Act to allow a life cycle approach to the assessment and approval of these plants. This allows the assessment of different components of the proposal to occur at the most appropriate time, including during commissioning. This will ensure that before a plant is licenced to operate, it has demonstrated its environmental acceptability.

2 Waste to energy process

Components of waste to energy

In simple terms, the waste to energy process generally has the following five components:

1. Waste arrival and storage
2. Core reactor (i.e. where the waste is converted to energy)
3. Energy recovery
4. Air pollution control
5. Residual product processing.

Component 1 is comparable to a waste transfer station where waste is brought in by truck and deposited on the tipping floor. It is then processed, sorted and stored.

Component 2 is the main unique component of waste to energy plants. This is where the actual conversion of waste into energy occurs. The types of modern waste to energy technologies include direct combustion, gasification and pyrolysis and other more novel technologies. Direct combustion technologies include moving grate mass burn facilities, rotary kiln facilities and fluidised bed facilities. Combustion is the dominant technology for processing solid waste through thermal treatment globally.

A range of approaches are taken to gasification or pyrolysis. Many gasification or pyrolysis technologies need to manage the characteristics of input waste and may use one or more of the following techniques: mechanical separation, bio-drying, particle size reduction, co-processing with more suitable materials and increased residence time in process.

Process	Description
Combustion	This is the dominant waste to energy approach taken globally. Combustion uses excess air or oxygen to drive the reaction in combusting waste into heat, ash and a flue gas. The heat is often then used to produce steam to drive a steam turbine to generate electricity. The specific reaction conditions and the systems for extracting useful energy from the process are critical factors that determine the efficiency of a facility.
Gasification	Involves the conversion of waste into synthetic gas (syngas) using a limited amount of oxygen. The process is more efficient than direct combustion and converts about 80 per cent of the energy in the waste into syngas. Most gasification plants use air in the process rather than pure oxygen as it is cheaper, however it produces a lower quality syngas. Most gasification is undertaken at high temperature (at least 900°C), although certain technologies run at lower temperatures where the waste is treated for a longer period of time. Gasification can be undertaken in combination with combustion in modular plants.
Slagging gasification	Some gasification plants operate at a higher temperature and are known as slagging gasification. These higher process temperatures are produced using oxygen injections or plasma, which melt the by-products (ash or char) into an inert vitrified glass-like product. In some jurisdictions this vitrified material is recycled into construction materials such as road base, as extensive testing has shown the material has very low leaching characteristics and is considered to be safe for use. Globally, the majority of commercially-sized operating slagging gasification plants are located in Japan.
Plasma gasification	Plasma gasification is a new technology currently being tested, but as yet has not been commercially proven. This type of gasification involves no air or oxygen. Plasma gasification is carried out by exposing waste to intense temperature conditions (4,000 – 7000°C) from a plasma arc which results in the production of syngas, a vitrified slag and molten metal. The proportions and composition of the products will depend on the composition of the input waste. Emissions of pollutants such as nitrogen oxides and sulphur dioxide are effectively avoided, but other contaminants such as hydrogen sulphide, ammonia and carbonyl sulphide may have to be abated.
Pyrolysis	Pyrolysis does not involve any oxygen or air. In this case

	<p>waste is placed into an air-free reactor and heated using an external source of energy. The waste is then converted into solid char, pyrolysis oil and syngas through physical and chemical processes. True pyrolysis is undertaken at a low temperature (around 400°C), however, pyrolysis undertaken at a higher temperature (around 800°C) changes the amount of each product produced – at higher temperatures more syngas is produced. For waste to energy purposes, syngas is the currently preferred energy product as it is easier to convert into electricity.</p>
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Within each of these processes, there are various designs such as fluidised bed, rotary kiln, updraft and downdraft reactors, each of which is tailored to give certain benefits when processing various types of wastes. Further details are available in the attached report (see Stage Two Report – Overview section).

Component 3 involves the recovery of energy from the process. This may be heat, steam, syngas or oil, which can be used directly or converted into electricity.

Component 4 controls the emissions from the process and uses technologies already in existence for other industries. This includes flue gas cleaning systems such as fabric filters, electrostatic precipitators, cyclones, selective non-catalytic reduction, selective catalytic reduction, wet, semi-dry and dry scrubbers, activated carbon injectors, etc. These are used to remove or capture air emissions.

Component 5 involves dealing with the residual products from the process. These are generally bottom ash (char), fly ash (the major hazardous waste collected through air pollution control systems) and recovered metals. In some jurisdictions, some of these by-products are marketable products for use in, for example, road base. Others, particularly fly ash, are generally hazardous and need to be disposed of to an appropriately licensed landfill. Disposal of residual products are discussed further in Section 3.

Recommendation 2 As part of the environmental assessment and approval, proposals must address the full waste to energy cycle - from accepting and handling waste to disposing of by-products, not just the processing of waste into energy.

Technology and operation

There are many waste to energy technologies available around the world, but not all of them are proven technologies in jurisdictions that set strict emissions

standards, or have been demonstrated across the full spectrum of waste streams. Many of the emissions related to waste to energy plants occur during start-up, shutdown and non-standard operation. To minimise the risk to humans and the environment, commercially operating plants should only use proven technology.

In assessing waste to energy proposals, the EPA will seek for proponents to demonstrate that:

- The technology for each component in the proposed configuration of the plant has operated reliably elsewhere;
- The combination of technologies for the components can operate well within emissions standards equal to the European Union's Waste Incineration Directive (WID);
- The technology for each component has a successful track record in treating the same waste streams as those proposed;
- If possible, the technology for each component has been operated at a similar scale or have a track record at a lower scale that can be reasonably upscaled; and
- If possible, the configuration of components of the plant has also been previously demonstrated elsewhere.

Recommendation 3 Waste to energy proposals must demonstrate that the waste to energy and pollution control technologies chosen are capable of handling and processing the expected waste feedstock and its variability on the scale being proposed. This should be demonstrated through reference to other plants using the same technologies and treating the same waste streams on a similar scale, which have been operating for more than twelve months.

Variation in waste streams poses one of the greatest risks to the ability of waste to energy plants to meet emissions standards. It is important that the intended waste stream is carefully characterised to ensure that it can meet the specifications of the plant. When considering the life of a waste to energy plant, it is likely that the waste stream will vary in line with population growth, uptake of recycling and re-use of materials, change in markets for recycling, change in waste streams, availability of new waste streams, introduction of other waste processing facilities, etc. Variation will not only occur over these longer timeframes, but variation in municipal solid waste is also known to occur seasonally. Therefore, the type of technology and processes should be chosen to best align with the expected waste stream.

Recommendation 4 Waste to energy proposals must characterise the expected waste feedstock and consideration made to its likely variability over the life of the proposal.

Waste to energy plants should only process residual waste. Residual waste generally refers to material that is left over after processing, and which would otherwise be sent to landfill. Residual waste streams may vary from region to region depending on availability of recycling and recovery options. Ultimately, residual waste should have no viable higher value use.

The viability of higher value waste management options (such as source separated collection and processing) will change over time as population, technologies, markets for materials and other factors change. Waste to energy plant operators should not adversely affect future higher value recovery options by relying on a single residual waste stream over the longer term.

As sources of waste are removed when other high order uses become available, new waste streams may need to be introduced to enable plants to continue operating at capacity. The likely sources of these new waste streams need to be considered in plant design to ensure that the plant technology is adequate to treat these wastes.

Recommendation 5 The waste hierarchy should be applied and only waste that does not have a viable recycling or reuse alternative should be used as feedstock. Conditions should be set to require monitoring and reporting of the waste material accepted over the life of a plant.

Recommendation 6 Waste to energy operators should not rely on a single residual waste stream over the longer term because it may undermine future recovery options.

The waste stream put into the waste to energy process will determine the characteristics of the process residues and emissions. Certain types of waste will increase the amount of certain emissions (e.g. within MSW there may be plasterboard offcuts which will result in higher sulphur dioxide emissions) and the content of process residue (e.g. batteries will increase the amount of heavy metals). While some of these are inevitable with the collection of MSW, it is important that large quantities of identified hazardous waste are not processed together with MSW. This will prevent large amounts of process residue potentially being classified as hazardous. The reference to hazardous waste here refers to any waste which could not be landfilled without prior treatment and includes dangerous goods, biomedical waste, pharmaceutical waste, poisons, quarantine waste, radioactive waste, significantly

contaminated soils and asbestos waste.

Recommendation 7 Regulatory controls should be set on the profile of waste that can be treated at a waste to energy plant. Plants must not process hazardous waste.

The attached Stage Two Report discusses thirteen case studies of operating plants to demonstrate the wide variety of technology types and processes in existence, as well as two reviews of slagging and plasma gasification plants. Generally the report shows that these modern plants can operate well within acceptable standards. The table at the end of this advice summarises these plants and full details on the operation of these plants are available in the attached report. By allowing the operation of state-of-the-art plants, waste to energy can contribute to meeting Western Australia's resource recovery targets while building community confidence in the waste to energy industry.

Conclusion 2 It has been demonstrated internationally that modern waste to energy plants can operate within strict emissions standards with acceptable environmental and health impacts to the community when a plant is well designed and operated using best practice technologies and processes.

3 Environmental and health impacts

The two main environmental and health issues associated with waste to energy plants are emissions from the process and handling the process residues. Air emissions can be controlled through technology and process similar to that in other industries. Process residues can be managed through controlling the waste input and disposing of waste in accordance with regulatory guidelines.

Air emissions

The EPA's objective for air is to maintain air quality for the protection of the environment and human health and amenity. In order to achieve this, waste to energy plants should be designed to meet best practice, both in terms of technology and process. Best practice is defined by the EPA as:

- All relevant environmental quality standards must be met.
- Common pollutants should be controlled by proponents adopting Best Practicable Measures (BPM) to protect the environment.
- Hazardous pollutants (like dioxins) should be controlled to the Maximum Extent Achievable (MEA), which involves the most stringent

measures available. For a small number of very hazardous and toxic pollutants, costs are not taken into account.

- There is a responsibility for proponents not only to minimise adverse impacts, but also to consider improving the environment through rehabilitation and offsets where applicable and practicable.

The technical review by WSP provides a comparison of air emissions standards from three jurisdictions being the European Union, the United States and Japan. The European Union's Waste Incineration Directive (WID) standards are generally the strictest across the range of typical emissions. Individual States or local authorities may have stricter emissions limits on certain emissions of concern where appropriate to the local context (e.g. the plant is located within an urban setting). The EPA and the Waste Authority agree that the WID standards should be the minimum accepted in Western Australia.

Recommendation 8 In order to minimise the discharge of pollutants, and risks to human health and the environment, waste to energy plants should be required to use best practice technologies and processes. Best practice technologies should, as a minimum and under both steady state and non-steady state operating conditions, meet the equivalent of the emissions standards set in the European Union's Waste Incineration Directive (2000/76/EC)¹.

The figure on the next page shows the air emissions from all the European and United States case studies considered in the attached technical report (see Stage Two Report). All European case studies are within WID limits. In many cases the emissions are more than an order of magnitude below the regulatory limit.

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0076:EN:NOT>

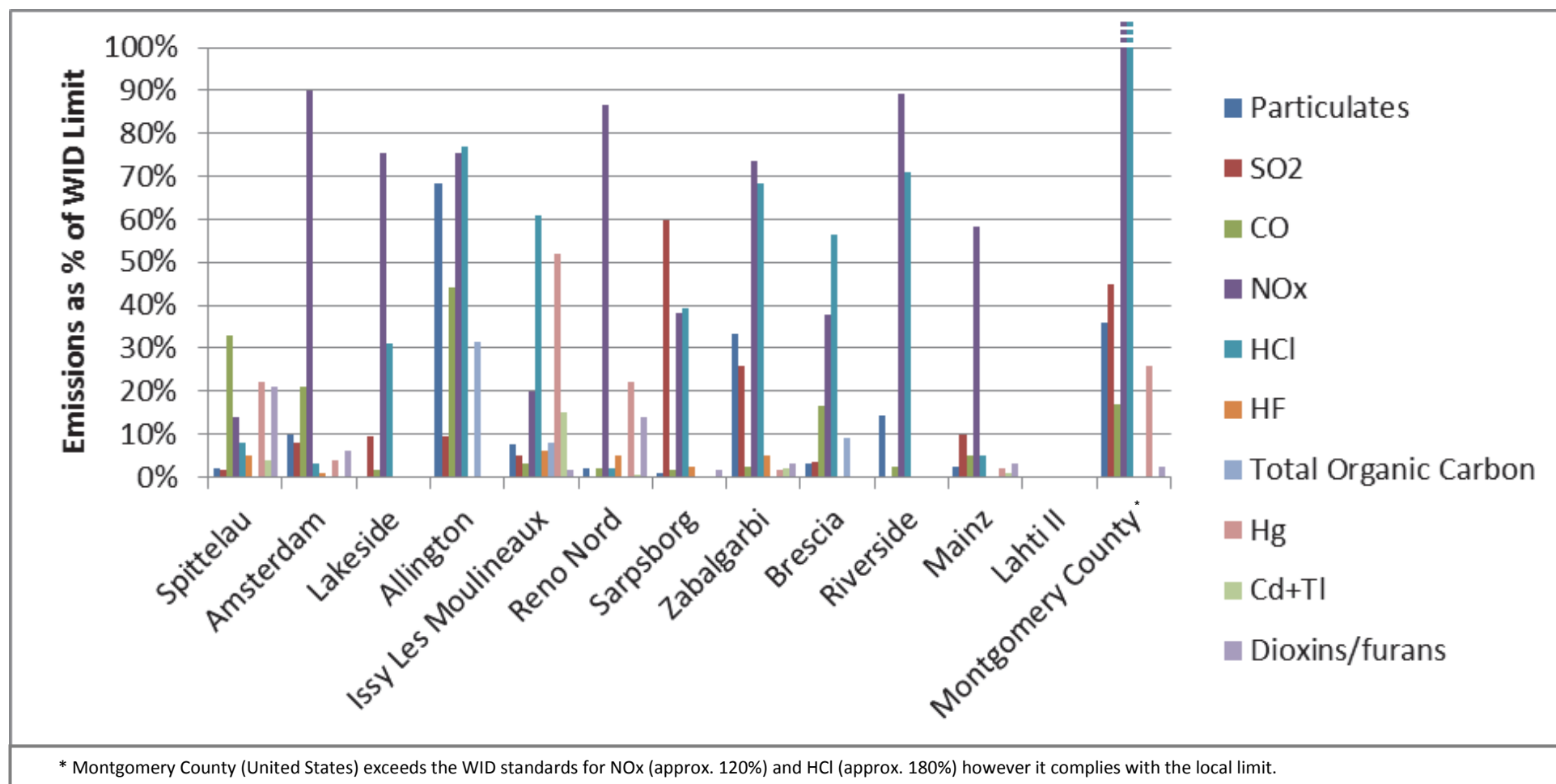


Figure 1: Summary emissions performance for plants reviewed in case studies (Note: Lahti II yet to release emissions data)

Of those jurisdictions investigated, most specify minimum pollutant emission standards which must be met. However, there is a trend internationally to also require best available technologies to prevent or minimise pollution, in addition to specifying minimum standards.

It has been demonstrated that plants employing best practice technologies operating under steady state conditions can readily meet the strictest emissions standards set by the European Union's WID.

Peak emissions generally occur during start up, shut down and non-standard operation (e.g. when the temperature of the furnace is too low). Any waste to energy proposal should demonstrate how it will minimise emissions during non-standard operation, start up and shut down. Generally, for start up and shut down, this is managed by excluding waste from the combustor. Waste to energy plants will be required to meet emission standards during non-standard operations.

<p>Recommendation 9 Pollution control equipment must be capable of meeting emissions standards during non-standard operations.</p>
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To demonstrate that a waste to energy plant is in full compliance with emissions limits, continuous emissions monitoring of emissions of concern should be undertaken where the technology to do so is available. Where this is not available, non-continuous emissions monitoring should be undertaken. The emissions monitored should include all those relevant to the waste feedstock and air pollution control techniques. The main emissions of concern generally include particulates, heavy metals, dioxins and furans.

The extent of non-continuous monitoring required will initially be set more frequently, particularly during the commissioning phase of the plant. This phase is most likely to have emissions closer to the limits and so is a key point to closely monitor emissions. Once the plant is fully commissioned and has demonstrated continuous operation within the limits, the non-continuous emissions monitoring frequency may be reduced. These monitoring requirements will form part of the Works Approval and Licence issued for a prescribed premises under Part V of the EP Act.

Recommendation 10 Continuous Emissions Monitoring must be applied where the technology is feasible to do so (e.g. particulates, TOC, HCl, HF, SO₂, NO_x, CO). Non-continuous air emission monitoring shall occur for other pollutants (e.g. heavy metals, dioxins and furans) and should be more frequent during the initial operation of the plant (minimum of two years after receipt of Certificate of Practical Completion). This monitoring should capture seasonal variability in waste feedstock and characteristics. Monitoring frequency of non-continuously monitored parameters may be reduced once there is evidence that emissions standards are being consistently met.

Measuring background levels of emissions of concern is important to set the baseline for comparison. These background levels must be obtained far enough in advance so that they can be used in air dispersion models as part of the assessment of a plant.

Recommendation 11 Background levels of pollutants at sensitive receptors should be determined for the Environmental Impact Assessment process and used in air dispersion modelling. This modelling should include an assessment of the worst, best and most likely case air emissions using appropriate air dispersion modelling techniques to enable comparison of the predicted air quality against the appropriate air quality standards. Background monitoring should continue periodically after commencement of operation.

Dioxins and furans

The emission of dioxins and furans has been one of the community's greatest concerns with waste incinerators and is likely to continue with waste to energy plants. However, since the 1990s reform of the regulations, the emission of dioxins and furans has decreased significantly. In the United States, between 1987 and 2002, emissions of dioxins reduced by 99.9% with the introduction of Maximum Achievable Control Technology regulations, while in Germany, emissions were reduced by three orders of magnitude. Air pollution control technologies, waste acceptance criteria and appropriate process controls (e.g. maintaining a high temperature) are able to limit the amount of dioxins emitted.

The majority of dioxin emissions occur during start-up, shutdown and non-standard operation. These spikes in emissions can relate to waste not being fully established on the combustion grate during start-up and shutdown.

Where there are increases in emissions during non-standard operation, these should be investigated to determine the cause and changes made to prevent this issue occurring again.

Recommendation 12 To address community concerns, proponents should document in detail how dioxin and furan emissions will be minimised through process controls, air pollution control equipment and during non-standard operating conditions.

Particulates (dust)

The main concern relating to particulate emissions is the impact of ultrafine and nanoparticles on human health. While it is accepted that ultrafine particles do have an impact on human health, there is still uncertainty as to the mechanism. There has been some debate about whether the mass of particles should only be assessed in relation to health impacts or if the total number of particles needs to be considered as well. There are still significant questions about the feasibility of obtaining robust data to make inferences relating to health risks from fine and ultrafine particle counts.

Waste to energy plants will have both nanoparticles already contained within the input waste feedstock as well as new nanoparticles created during combustion.

The potential impact of nanoparticles in the waste industry will increase in the future as the use of nanoparticles in manufactured goods becomes more common. Nanoparticles do not appear to be changed by combustion or by adhering to larger particles. The literature suggests that manufactured nanomaterials in the waste stream may be efficiently filtered during combustion by filter systems designed to capture small particles. This occurs because nanoparticles bind loosely to each other and other particles and to solid residues which are in turn captured during filtration. As a consequence, the bulk of the nanoparticles are found in the fly ash and bottom ash. This suggests potential exposure to nanoparticles could occur predominantly during disposal and deposition of the ash.

At this stage, products containing manufactured nanoparticles should be treated with caution. Large quantities of known manufactured nanoparticles should not be accepted by waste to energy plants.

The fate and behaviour of nanoparticles formed during combustion is also not known. Neither nanoparticle numbers nor concentrations have been routinely monitored. The health effects of nanoparticles cannot be separated from those associated with fine particles although the evidence strongly suggests ultrafine particles present a real risk in the development of chronic diseases. The absence of any evidence of harm directly attributable to nanoparticles should not be taken as evidence of no harm.

However, it is important to remember that waste to energy plants are only one source of nanoparticles and would only contribute a small amount when compared with other sources, including industrial, transport and natural.

Waste to energy plants will have three potential exposure pathways – the handling of process residues (ash) by workers, emissions to air and potential leaching from re-use of process residues.

In order to increase the knowledge of the effects of nanoparticles, better data is required and consideration should be given to monitoring nanoparticles from newly established industrial facilities. This increased knowledge should feed back into the development of appropriate management of nanoparticles. Emissions monitoring data should be made available so that this can occur.

Odour

Odour has the potential to significantly disrupt community comfort and amenity. Odour is generally one of the most complained about environmental pollution issues. Waste to energy plants can be designed to minimise odours as the entire process is generally contained within a building. Doors are designed to close behind vehicles to reduce the chance of odours escaping the plant. Typical installations keep the building under negative pressure by extracting air from the waste tipping hall and feeding it into the combustion process.

Other potential sources of odour are emissions from vehicles and emissions during downtime of the combustion process. Appropriate siting of waste to energy plants will reduce the impact of fugitive odours from garbage trucks. Siting is discussed further in section 4. During extended downtime this odour can be managed through either air pollution technology such as biofilters or process controls such as diverting incoming waste.

It is essential that odour management is adequately planned to ensure that control systems are built into the design of the plant.

Recommendation 13 Proposals must demonstrate that odour emissions can be effectively managed during both operation and shut-down of the plant.

Process residues

There are two main types of process residue from a waste to energy plant – bottom ash and air pollution control (APC) residue (APC residues mostly consist of a material known as fly ash). Depending on the type of air pollution control technology used, waste water may also require disposal. In some cases overseas these residues have been used as products in the construction industry rather than being disposed of to landfill. This advice

deals with the bottom ash and air pollution control residue separately as the content of each of these varies.

Air pollution control residue

The residues captured in air pollution control equipment can be highly toxic. It is essential that this material is characterised and disposed of in accordance with waste guidelines. This includes appropriate transport to a licensed landfill.

Overseas, particularly in Japan, vitrification of process residues including APC residue has been used to treat the waste. Vitrification means heating the waste to a very high temperature and adding silicon dioxide to melt the waste into a glass-like product. This product can then be used in the construction industry replacing aggregate material. This process occurs using slagging gasification or plasma technology.

While vitrification of APC residues has been found to limit leaching of toxins into the environment, there is likely to be higher level of risk associated with any lesser treatment of air pollution control residues. In the European Union, most APC residue does not meet waste acceptance criteria for disposal in hazardous landfill unless it has been pre-treated.

The EPA and the Waste Authority recommend that a precautionary approach must be taken in relation to the use of any APC residue. At this stage, it is recommended that all APC residue be disposed of to an appropriate landfill.

Recommendation 14 All air pollution control residues must be characterised and disposed of to an appropriate waste facility according to that characterisation.

Bottom ash

Bottom ash is the generally inert non-combustible residue that remains after treatment of waste in the plant. It also contains ferrous and non-ferrous metals which are usually extracted and recycled. Bottom ash is increasingly being processed into new materials for the construction industry rather than being disposed of to landfill. Bottom ash is typically used as a bound material in asphalt or cement. When bound, the potential for leaching is greatly reduced.

The content of dioxins in bottom ash is considered to be very low and no greater than alternative materials already used in the construction industry. The content of the bottom ash is a direct result of the waste input. It is important to regularly test both the waste input characteristics and bottom ash composition to ensure that any use of bottom ash will be within contaminant limits. Nanoparticles are a known component of bottom ash and need to be considered in the handling and use of any product.

The end product can be processed further to reduce any potential for

contaminant leaching. This could be through weathering of the bottom ash before use to stabilise most of the pollutants. The use of the product can also be controlled.

Before any re-use is proposed, issues need to be considered beyond the creation of a stable product to the whole life cycle of the product. This includes both leaching while the product is in use and the potential impacts when the product is disposed of.

If used appropriately the risks of these products to human health and the environment are likely to be minimal. Until it can be demonstrated that the material used in specific applications can meet acceptable contaminant release thresholds, the EPA and the Waste Authority recommend that bottom ash be disposed of to landfill. In the future, re-use of the bottom ash may be acceptable once proponents can demonstrate that the product does not pose unacceptable risks to the community or the environment.

Recommendation 15 Bottom ash must be disposed of at an appropriate landfill unless approval has been granted to reuse this product.

Recommendation 16 Any proposed use of process bottom ash must demonstrate the health and environmental safety and integrity of a proposed use, through characterisation of the ash and leachate testing of the by-product. This should include consideration of manufactured nanoparticles.

Recommendation 17 Long term use and disposal of any by-product must be considered in determining the acceptability of the proposed use.

Recommendation 18 Standards should be set which specify the permitted composition of ash for further use.

The waste input will change over the life of a waste to energy plant. There will be both gradual changes to the composition of the MSW mix as well as immediate changes where a new waste input stream is accepted. By-products should be tested regularly and every time there is a major change, such as a new waste input source, to ensure they still fit within the standards.

Recommendation 19 Regular composition testing of the by-products must occur to ensure that the waste is treated appropriately. Waste by-products must be tested whenever a new waste input is introduced.

Waste water

Waste water discharge, like air emissions, will be regulated under Part V of the EP Act. However, not all plants will discharge water, and some will only discharge water from independent cooling systems, where temperature will be the main emission of concern. Others will discharge water after treatment from air pollution control equipment used (e.g. wet scrubbers). Contaminant levels for water discharge will be set through Part V licence conditions in the local context.

4 Planning and efficiency

Siting

Appropriate siting of waste to energy plants is essential to minimise community concerns and health and environmental risks. While internationally many waste to energy plants exist within densely populated and urban areas, this is unlikely to be acceptable to the Western Australian community at this point.

Planning controls in Western Australia require waste to energy plants to be located in industrial zoned land. Generally, these industrial estates are separated by a buffer from other sensitive land uses. Modelling of noise, odour and air pollution will need to demonstrate that adequate buffers exist. Furthermore, to ensure the separation of incompatible land uses, the integrity of the buffer must be maintained over the life of the plant.

Appropriate siting can also ensure that ancillary impacts, such as noise, odour and greenhouse gas emissions from the transport of waste, are minimised.

Recommendation 20 Waste to energy plants must be sited in appropriate current or future industrial zoned areas with adequate buffer distances to sensitive receptors. Buffer integrity should be maintained over the life of the plant.

Energy efficiency

In the Western Australian context, it is understood that the current waste to energy proposals have the dual primary purpose of generating energy and reducing the amount of waste going to landfill. Proponents should select a technology that, while being appropriate for the expected waste stream, also maximises the efficiency of energy recovery. Waste to energy plants should meet the efficiency criteria as defined by the European Union, which separates incineration facilities from genuine energy recovery facilities. This is

known as the R1 Efficiency Indicator and is explained further in the attached technical report (see Stage Two Report – Section 3).

Recommendation 21 For a waste to energy plant to be considered an energy recovery facility, a proposal must demonstrate that it can meet the R1 Efficiency Indicator as defined in WID.

Greenhouse gases

The greenhouse gas emissions from each individual waste to energy plant will vary depending on a number of factors including the composition of its waste input, the efficiency of the technology used, the source of any energy inputs and the substituted energy mix. However, because waste to energy plants produce energy that displaces emissions from the use of conventional emissions intensive fossil energy sources, they are considered beneficial in minimising greenhouse gas emissions.

Waste to energy plants can also produce heat which can be exported to other commercial users. This could reduce other's greenhouse gas emissions and should be considered as part of the siting of a plant.

It should be noted that waste to energy facilities that emit over 25,000 tonnes of carbon dioxide equivalent are liable under the Australian Government's Carbon Pricing Mechanism and have reporting obligations under the *National Greenhouse and Energy Reporting Act 2007*. Waste to energy facilities may be eligible to create large-scale generation certificates under the Renewable Energy Target depending on their feedstock².

5 Conclusions

While there is still uncertainty about the impacts of nanoparticles on human health, overall, the international waste to energy plants studied in the WSP Report have performed well within emissions limits at levels acceptable to the community. The distinction between modern state-of-the-art plants and older incinerators is significant and an important factor in the recommendations contained in this advice. Western Australia should be focussed on ensuring application of best practice for any waste to energy proposals and continually improving the standards of this industry as further knowledge is gained. This precautionary approach will provide the opportunity for a successful, long term contribution of waste to energy plants to the management of waste in Western Australia, without unacceptable environmental consequences.

² Biomass-based components of municipal solid waste are considered an eligible renewable energy source under the *Renewable Energy (Electricity) Act 2000*.

<http://ret.cleanenergyregulator.gov.au/For-Industry/Renewable-Energy-Power-Stations/LGC-Eligibility-Formula/lgc-eligibility-formula>

6 Case studies

Facility	Commenced Operations	Throughput Capacity	Process Type	Boiler Type	Steam Pressure (bar)	Steam Temp (°C)	Gross Power	Overall Efficiency	Gas Cleaning System	Waste Processed	Plant Residues	Fate of Residues
AEB, Netherlands	1969, upgraded 1993 & 2007	1,370,000t	Moving grate	Horizontal	130	440	66MWe	30.6%	SNCR, ESP and wet and dry scrubbers	Household, C&I	Bottom ash	Sand-lime bricks, concrete
											Fly ash	Asphalt concrete
Lakeside, UK	2010	410,000t	Mass burn	Horizontal	45	400	37MWe	Not available	FGR, SNCR and semi-dry scrubbing	MSW, non-hazardous C&I	Bottom ash	Construction
											APC residues	Landfill after treatment
Spittelau, Austria	Original 1969, 2nd generation 1986	250,000t	Reverse-acting grate	Vertical	34	245	6MWe 60MWt	Not available	ESP, scrubber (wet), SCR and EDV	Municipal; non-hazardous commercial	Bottom ash	Landfill Engineering
											APC residues	Deep mine disposal
Allington, UK	2008	500,000t	Rotating fluidised bed	Horizontal	65	420	43MWe	Not available	ESP and dry scrubbing	Non- hazardous MSW, C&I	Bottom ash	Construction industry
											APC residues	Landfill after treatment
ISSEANE, France	2007	460,000t	Water-cooled grate	Horizontal	50	400	52MWe	30% electrical (theoretical) See Note 1	ESP and SCR DeNOX system	Residual MSW	Bottom ash	Recycled
											Fly ash	Landfill after treatment
Reno Nord, Denmark (Line 4)	2005	160,000t	Moving grate	Horizontal	50	425	18MWe 43MWt	27% electrical See Note 2	Three-field electro-static filter, wet and dry scrubbers and AFMs	MSW	Bottom ash	Construction industry
											Fly ash	Not specified
Energos, Norway	Sarpsborg II 2010	78000t	Staged combustion	Horizontal	23	217	32MWt	Not available	Semi dry cleaning system	Residual C&I waste	Bottom ash	Landfill
											APC residues	Landfill
Zabalgardi, Spain	2004	250,000t	Moving grate	Horizontal	100	330	99.5MWe	42% See Note 2	SNCR and wet scrubber	MSW	Bottom ash	Construction industry
											Fly ash	Storage
Brescia, Italy	1998 (household waste) 2004 (biomass)	800,000t	Moving reverse thrust grate	Vertical	72	450	Up to 100MWe 150MWt	>27% electrical	SNCR, activated carbon and dry lime scrubbing	2 lines MSW, 1 line biomass	Bottom ash	Construction material
											APC residues	Deep mine disposal
Riverside, UK	2012	670,000t	Moving grate	Horizontal	72	427	66MWe	27%	Semi dry cleaning system	MSW	Bottom ash	Construction
											APC residues	Landfill
Mainz, Germany (Line 3)	2008	110,000t	Reverse-acting grate	Vertical	42	420	See Note 4	See Note 4	SNCR and wet (pre) and dry scrubbers	Residual MSW	Bottom ash	Used in landfill and road construction as substitute materials for virgin aggregates
											APC residues	Infilling old salt mines
Lahti II, Finland	2012	250,000t	Circulating fluidised bed	Vertical	121	540	50MWe and 90MWt	31% thermal efficiency based on waste NCV	Gas cooling and filtration by ceramic filter; dry APC system and NOx control using SCR	SRF	Bed ash	Landfill
											Filter (Fly) ash	Treated as hazardous

Facility	Commenced Operations	Throughput Capacity	Process Type	Boiler Type	Steam Pressure (bar)	Steam Temp (°C)	Gross Power	Overall Efficiency	Gas Cleaning System	Waste Processed	Plant Residues	Fate of Residues
Montgomery County, USA	1995	573,000t	Reverse-reciprocating stoker	Not known	59.6	443	63MWe	Not Available	LoNOx system, semi-dry scrubbers and thermal DeNOx	MSW	Bottom ash	Landfill engineering
											Fly ash	Landfill
Shin-Moji, South Korea	2005	216,000t	Fixed Bed	Vertical	39.2	400	23.5MWe	23%	Dry scrubber and SCR	Industrial waste	Vitrified slag	Re-used
											Fly ash	Recycled
Sagamihara, Japan	2010	160,000t	Fluidised bed gasifier and melting furnace	Vertical	40	400	10MWe	Not available	Dry scrubber and SCR	MSW	Vitrified slag	Re-used
Fukuyama, Japan	2004	92,400t	Slagging updraft gasifier	Vertical	60	450	20MWe	30%	Dry scrubber and SNCR	Pelletised RDF	Melted slag	Recycled
											Metal	Recycled

MWe – Megawatt electrical

MWt – Megawatt thermal

SCNR – Selective Non-Catalytic Reduction

SCR – Selective Catalytic Reduction

ESP- Electrostatic Precipitator

FGR – Flue Gas Recirculation

EDV – Electrodynamic Venturi

AFM – Agglomeration Filtration Modules

C&I – Construction and Industrial waste

RDF – Refuse Derived Fuel

Note 1: Annual average gross electrical efficiency estimated at around 10% due to high level of heat export - thermal efficiency of around 40%

Note 2: High level of heat export means electrical efficiency lower in practice, but overall efficiency high (actual figure unknown), estimated >40%

Note 3: The efficiency achieved is only possible because the waste to energy plant provides steam to an on-site natural gas fired combined cycle plant

Note 4: The conversion of the steam to electrical energy is carried out in the neighbouring 400MW combined cycle power plant owned by Mainz-Wiesbaden AG

**CONFIDENTIAL ATTACHMENTS 13.13E AND 13.13F
ITEM 13.13 – ENERGY FROM WASTE TENDER CONSIDERATION**

FOR THE ORDINARY COUNCIL MEETING

4 JULY 2017

DISTRIBUTED TO ELECTED MEMBERS UNDER SEPARATE COVER

Report to the Ordinary Council Meeting

Agenda
Item 13.14 **Confidential Item - Appointment of Designated Senior Employee – Director Economic Development and Activation**

Recommendation:

That Council, in accordance with Section 5.37(2) of the Local Government Act 1995, accepts the Chief Executive Officer's recommendation to appoint the recommended applicant as detailed in this report to the position of Director Economic Development and Activation for a period of five years under the standard contract of employment for Directors.

FILE REFERENCE:	P1029377
REPORTING UNIT:	Executive Support
RESPONSIBLE DIRECTORATE:	Chief Executive Office
DATE:	28 June 2017
ATTACHMENT/S:	Attachment 13.4A – Advertisement - Director Economic Development and Activation Confidential Attachment 13.4B – Recommended Applicants' Submission

In accordance with Section 5.23(2)(b) of the *Local Government Act 1995*, this item is confidential and has been distributed to the Elected Members under separate cover.



City of Perth

Director Economic Development and Activation

Cash component \$213,150 plus superannuation, vehicle and parking or vehicle allowance

Total Salary Package up to \$259,679 per annum

Negotiated term up to 5 years

Directorate Overview

The Economic Development and Activation Directorate delivers opportunity and vitality to our City; striving to create and maintain the conditions for a vibrant, yet sustainable lifestyle for our community.

The Directorate brings the world's best to our doorstep by developing and deploying strategic policies, plans and projects to guide the future economic prosperity of the City.

This is achieved through the attraction, growth and support of businesses in the City. Further, through direct investment in Arts and Cultural activities; the Directorate is a leader in the development of our rich cultural landscape.

The Directorate facilitates and presents a wide range of events that enliven our City and makes it the greatest place to live, work and visit.

Position Objectives

The primary function of the Director Economic Development and Activation is to enrich the lifestyle offered by Perth and facilitate continued growth in the Perth economy and enhancement of its reputation.

The prime focus will be to enhance a consultative, high performance culture and an integrated, customer responsive and cohesive group. Taking the current strong capabilities of the organisation's existing units and building on that basis to develop a standard of best practice will also be important.

Further, the Director will be required to develop a strong Capital City in partnership with the Chief Executive Officer and other Directors; by creating a collaborative, productive and valued organisation.

How to apply

To apply or find out more information about the position and the application requirements, please click on the 'apply now' button where you will be redirected to our website.

Applications close: 5pm, Friday 5 May 2017.

The City only accepts applications direct from the individual and not via recruitment agencies unless expressly invited.

Canvassing of Councillors will disqualify.

perth.wa.gov.au/careers

**CONFIDENTIAL ATTACHMENT 13.14B
ITEM 13.14 – CONFIDENTIAL ITEM - APPOINTMENT OF
DESIGNATED SENIOR EMPLOYEE – DIRECTOR ECONOMIC
DEVELOPMENT AND ACTIVATION**

FOR THE ORDINARY COUNCIL MEETING

4 JULY 2017

DISTRIBUTED TO ELECTED MEMBERS UNDER SEPARATE COVER

Report to the Ordinary Council Meeting

Agenda **Confidential Item - Appointment of Designated Senior**
Item 13.15 **Employee – Director Planning and Development**

Recommendation:

That Council, in accordance with Section 5.37(2) of the Local Government Act 1995, accepts the Chief Executive Officer's recommendation to appoint the recommended applicant as detailed in this report to the position of Director Planning and Development for a period of five years under the standard contract of employment for Directors.

FILE REFERENCE:	P1029377
REPORTING UNIT:	Executive Support
RESPONSIBLE DIRECTORATE:	Chief Executive Officer
DATE:	27 June 2017
ATTACHMENT/S:	Attachment 13.15A – Advertisement - Director Planning and Development Confidential Attachment 13.15B – Recommended Applicants Submission

In accordance with Section 5.23(2)(b) of the *Local Government Act 1995*, this item is confidential and has been distributed to the Elected Members under separate cover.



City of Perth

Director Planning and Development

Cash component \$213,150 plus superannuation, vehicle and parking or vehicle allowance

Total Salary Package up to \$259,679.25 per annum

Negotiated term up to 5 years

Directorate Overview

The Planning and Development Directorate is responsible for setting and implementing the strategic direction for the planning and design of the natural and built environment of the Capital City.

It does this through setting long term direction for the sustainable development of the city and the enhancement of the city's spaces.

It also ensures the City's future achieves sustainable transport outcomes to help deliver a liveable city.

The Directorate delivers a strong customer focus in the development, building, health and activity approval process; managing the growth of an attractive and active city.

Position Objectives

The Director is required to establish greater capacity and capability to deliver programmed objectives ensuring the City remains at the forefront of industry practice and retains sector-leading skills.

This position will be required to strengthen community and business confidence in the City.

This will be achieved through the integration of temporary works, events and activities conducted in or impacting the public domain; and through the provision of a comprehensive approvals service with strong emphasis on customer focus.

Further, the Director will be required to develop a strong Capital City in partnership with the Chief Executive Officer and other Directors; by creating a collaborative, productive and valued organisation.

How to apply

Please apply online to submit your application. To find out more information about the position and the application requirements, please click on the 'apply now' button to be redirected to our website.

Applications close: 5pm, Friday 21 April 2017.

The City only accepts applications direct from the individual and not via recruitment agencies unless expressly invited.

Canvassing of councillors will disqualify.

perth.wa.gov.au/careers

**CONFIDENTIAL ATTACHMENT 13.15B
ITEM 13.15 – CONFIDENTIAL ITEM - APPOINTMENT OF
DESIGNATED SENIOR EMPLOYEE – DIRECTOR PLANNING AND
DEVELOPMENT**

FOR THE ORDINARY COUNCIL MEETING

4 JULY 2017

DISTRIBUTED TO ELECTED MEMBERS UNDER SEPARATE COVER

Report to the Ordinary Council Meeting

**Agenda
Item 13.16**

**Confirmation of Interim Key Performance Indicators for the
Chief Executive Officer**

Recommendation:

That Council notes the CEO Performance Review Committees' Interim Key Performance Indicators for the Chief Executive Officer up to and including October 2017.

FILE REFERENCE:	P1032898
REPORTING UNIT:	Governance
RESPONSIBLE DIRECTORATE:	Corporate Services
DATE:	20 June 2017
ATTACHMENT/S:	Confidential Attachment 13.16A – Interim CEO KPI Measurements

In accordance with Section 5.23 (2)(e)(b) of the *Local Government Act 1995*, this item is confidential and has been distributed to the Elected Members under separate cover.

CONFIDENTIAL ATTACHMENT 13.16A
ITEM 13.16A – CONFIRMATION OF INTERIM KEY PERFORMANCE
INDICATORS FOR THE CHIEF EXECUTIVE OFFICER

FOR THE ORDINARY COUNCIL MEETING

4 JULY 2017

DISTRIBUTED TO ELECTED MEMBERS UNDER SEPARATE COVER