Enquiries: [redacted]
Direct Line:
Our Ref: D2025/22500

Eastern Metropolitan Regional Council

226 Great Eastern Hwy
ASCOT WA 6104
PO Box 234 Belmont WA 6984

t: (08) 9424 2222
e: mail@emrc.org.au
w: emrc.org.au

3 October 2025

Dan Endacott
Director, Major Project Assessments
EIA South Branch
EPA Services
Prime House
8 Davidson Terrace
JOONDALUP WA 6027

Dear Mr. Endacott

APCr Immobilisation Plant and Interim Disposal Solution – Assessment No: 2337 – Environmental Review Document —Summary of Submissions

Please find enclosed the Eastern Metropolitan Regional Council's (EMRC) formal Response to Summary of Submissions for the Environmental Review Document (ERD) relating to the APCr Immobilisation Plant and Interim Disposal Solution (Assessment No. 2337).

This document addresses the matters raised during the public consultation period held from 13 to 28 January 2025, as summarised in your letter dated 17 March 2025 and detailed in Attachment 1 – Summary of Submissions. The response is structured to align with the table provided in Attachment 1 of the EPA's letter, with each comment grouped by theme and addressed accordingly.

To assist with navigation, a table of contents has been provided that corresponds directly to the structure of the Response to Summary of Submissions document, including terrestrial environmental quality, inland waters, air quality, greenhouse gas emissions, social surroundings, and human health.

The EMRC has provided full and reasoned responses to each issue raised, including additional supporting documentation where relevant. This submission is intended to support the EPA's assessment process and ensure that all public and agency concerns have been appropriately considered.

Should you require any further information or clarification, please contact us at 9424 2208 or wendy.harris@emrc.org.au.

Yours sincerely

[redacted]

Chief Transformation Officer
On behalf of the Eastern Metropolitan Regional Council

Enclosed: Attachment A – Response to Summary of Submissions

Attachment A

APCr Immobilisation Plant and Interim Disposal Solution

Environmental Review Document
Assessment No. 2337

Response to Summary of Public Submissions

This document forms Eastern Metropolitan Regional Council's response to the summary of public submissions and advice received regarding the Public Environmental Review document for the APCr Immobilisation Plant and Interim Disposal Solution proposed by Eastern Metropolitan Regional Council.

The public review period for the proposal commenced on 13 January 2025 for a period of 2 weeks, ending on 28 January 2025. A total of three agency submissions and 16 public submissions were received.

Contents

The proposal – General comments

No.	Submitter	Submission and/or issue	Response to comment
1.	DWER	DWER recommends further advice be obtained from the Department of Fire and Emergency Services with regards to emergency management and contingency measures for transport of hazardous waste and preparation of the emergency response.	The transport of the APCr material to RHWMF is not EMRC's responsibility. However, EMRC have contacted Department of Fire and Emergency Services (DFES) to ensure appropriate emergency management and contingency measures for transport of hazardous waste and preparation of the emergency response have been considered. A copy of DFES' advice has been provided to the DWER for its consideration as part of this response (Refer to Attachment 1). Transport of the APCr material by road tanker at Red Hill Waste Management Facility involves the use of main roads and a relatively short trip of approximately 60 km from Thomas Road/Kwinana Freeway/Roe Highway/Toodyay Road compared to a 600 km route from Kwinana to the Tellus Sandy Ridge site via Thomas Road/Kwinana Freeway/Roe Highway/Great Eastern Highway/Sandy Ridge Project Access Road. The last 100 km of this journey along the Sandy Ridge Project Access Road is unsealed road (I think). So the transport of APCr from the Acciona Kwinana Plant will be one tenth of the distance to Sandy Ridge, which will significantly reduce transport emissions (CO2 and particulates from diesel engines), road congestion as the tanker trucks will be on multi-lane sealed roads with traffic controls. This shorter transport route to Red Hill will also reduce the possibility of a tanker incident, loss of containment and risk to the public. Any required emergency response will be readily available compared to the very long Sandy Ridge route.
2.	DWER	Provide the review regarding the APCr feedstock that has been undertaken and outline how this review has covered the potential feedstock and chemicals likely to occur on the proposal site. Outline how feedstock with changing chemical characteristics would be managed adaptively during operations, including contingency actions for when feedstock materials represent a higher risk.	A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. In addition, the immobilisation process stabilises the APCr material in low-heat concrete regardless of whether the material's chemical characteristics fluctuate, and all the same health and safety measures are followed since they are developed assuming the worse-case, high risk scenario.
3.	DWER	Undertake a peer review to show that the proposal is an appropriate practice design and construction will minimise leachate from entering the environment, the management and contingencies th at have been proposed are appropriate, including benchmarking with other similar sites and/or against applicable standards.	To date, EMRC has made a considerable effort to ensure appropriate stakeholder engagement and consultation, leading to multiple parties, including regulatory bodies, specialist contractors, being involved in the development of the application. EMRC has ensured that construction and proposed operations are in line within international standards for landfilling of hazardous waste and actually going beyond what is done in the UK, since EMRC is proposing to immobilise the APCr material prior to disposal instead of disposal of dry fly ash, which is an approved method in the UK. In addition, the technology proposed is a proven design by a company with experience in Australia for immobilisation of hazardous wastes. Peer review was undertaken by Ramboll and completed in July 2025. A copy of the peer review has been provided to the EPA.
4.	ANON-D6CH-YSK1-D	The financial and legal risks of a regional council (including four local governments) and a state-owned waste management facility have not been considered and nor has the public been made aware of these or the potential impacts of the project on human health and the environment. The EMRC website provides no summary or explanation of the project to the public and none of the associated Local Government authorities have provided any notification to the public about the opportunity to provide a submission. The assessment and regulation of a class 5 hazardous waste processing facility is deserving of a more robust and transparent public process.	EMRC understands the importance of undertaking stakeholder and community engagement and ensure ongoing consultation is maintained between both government authorities and the community. This includes EMRC consultations with The Waste Management Community Reference Group (WMCRG), Gidgegannup Progress Association (GPA), The Stoneville and Parkerville Progress Association (SPPA), public comment periods through both DWER and the EPA's processes. Thus, sufficient consultation has been undertaken and future consultations might occur as the approval process progresses. Local Governments: EMRC had a meeting with EPA starting in 2021, DWER in 2021. Community: EMRC held information sessions in August 2021 and February 2023 Public: EPA advertised the proposal initially in January 2022 for public comment - 9 submissions were received, DWER will also advertise the application for Works Approvals for a minimum of 21 days. During the EPA public review period, EMRC followed all instructions provided by the EPA to ensure a compliant review period.
5.	ANON-D6CH-YSK1-D	It is deeply disheartening to read that the proponents' consultants for these ERD's refer to UK legislation which prohibits such practices (i.e. mixing hazardous wastes) but has found three landfills in the UK doing it anyway, as some kind of justification for the project. The submitter considers this an extremely low bar for any industrial project justification, and it should be investigated to ascertain if it is legal for a consultant or proponent in Australia to do this. Similarly, Appendix I which details this case study, has not been included nor provided to the public. Should it be of interest, Toxics Free Australia authored a recent report on Waste Incineration and the Environment with international colleagues which documents the latest research on this industry including chapters on APCr and bottom ash impacts around the world which may be of interest.	EMRC has specifically chosen to construct a monocell as the dedicated disposal solution which isolates a particular waste stream to minimise risk, enhance safety, and ensure compliance with environmental regulations. The interim disposal solution would only be required for a limited time and depending on timeframes may not be needed. Regardless, the immobilised APCr will be disposed of in one specific location within the existing general Class IV cell to mitigate the mixing of waste and subsequent leachate. The interim and dedicated disposal solutions are classified as a Class IV hazardous landfill (as per WA's Waste Classification Guidelines), even though the immobilised APCr will be predominantly a Class III waste according to the research done as part of this assessment process. Therefore, each piece of infrastructure is constructed with a double-composite lining system with a leak detection layer between the two geomembranes and a leachate collection system to mitigate groundwater contamination. The monocell will proved a controlled environment which helps manage long-term stability, leachate production and gas emissions more effectively.
6.	ANON-D6CH-YSKV-J	It is unclear why Red Hill, located more than 60km away from Kwinana, is an appropriate site for a facility to immobilise and dispose of toxic waste generated by the Kwinana and East Rockingham WtE facilities. The only justification appears to be that EMRC's operations at Red Hill include the only Class IV landfill facility within the Perth Metropolitan Region. Surely the waste should be treated and immobilised at its point source before being transported to a secure landfill facility licensed to take such waste? The proposed landfill cell at Red Hill is located on the edge of the John Forrest National Park, just 200m uphill from the park's Christmas Creek. It is also located within 500 metres of homes on Hidden Valley Road.	The APCr material that is currently being generated within WA is being transported to Tellus' Sandy Ridge Class V facility which is approximately 600km one-way from the Kwinana/Rockingham area. EMRC is offering a better long-term environmentally sustainable solution. The separation distance from the boundary of the activity the proposed Immobilisation Plant and existing Class IV landfill to the nearest sensitive receptors (rural residences) is 958m and 621m, respectively. The distance from the Prescribed Premises boundary (near the activity) to these sensitive receptors is 736m and 517m, respectively.

The proposal – Terrestrial environmental quality

No.	Submitter	Submission and/or issue	
7.	ANON-D6CH-YSKK-7	Concrete Agitator Trucks are notorious for concrete spilling out of the rear end of the Agitator Barrel and spilling out over the roads. Any concrete road spillage on site will contain the Class 5 Hazardous Toxic Waste Material and this material will likely breakdown and be transferred via any vehicle tyres and out onto public roads. There is a lack of site facilities for washing out Concrete Agitator Trucks containing spillage and/or wet concrete contaminated with Class 5 Hazardous Toxic Waste Material once unloaded. The existing wheel wash facility on site will not suffice to clean the exterior of all vehicles and transport equipment involved in the transport of Class 5 Hazardous Toxic Waste Material or Class 5 Concrete. The wheel wash facility is shared by all other vehicles on site. The EMRC consultants have failed to prepare and submit any details of how and where any contaminated Powder (Pressure Tankers) & Prime Movers or Concrete Agitator Trucks can be decontaminated and washed clean without spreading any further contamination to other parts of the Red Hill site and out onto public roads.	EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. It should be noted that the transport of the APCr material to RHWMF is not EMRC's responsibility. Once the APCr material is accepted at the Site, the material both in its untreated and treated forms will be transported using RHWMF's internal road network and will no longer be on public roads. Once the APCr material is immobilised, the waste will be classified as Class III/IV according to WA's Waste Classification Guidelines. To minimise the generation of contaminated surface water generated from the cleaning of the agitator truck, each agitator truck will be cleaned each day within the Class IV landfill, thereby containing the contaminated water within the cell. The washdown process will remove any remaining treated APCr within the barrel to ensure it is not carried back to the Immobilisation Plant. The washdown residue will be covered with soils immediately to reduce potential for spreading or generating dust. Any additional cleaning required of the agitator truck will be conducted in the washdown bay at the Immobilisation Plant. Washdown water will be collected in a sump and any residue will be captured in the silt trap. At the washdown bay the solid residues will be disposed of at the Class IV landfill and the liquid residual will be pumped into EMRC leachate evaporation pond system. The Immobilisation Plant will be constructed on a reinforced concrete hardstand, equipped with a variety of drainage sumps to contain surface water and any spills. Additionally, the unloading area is bunded and also equipped with a sump to capture any contaminated water or spills. Any spills will be managed and contained using appropriate spill management equipment, cleaned up and materials disposed to Class IV landfill, ensuring effective spill response and minimising environmental impact. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. In the rare event that a spill does occur, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF.

8.	ANON-D6CH-YSKK-7	Although the Powder (Pressure Tankers) containing dry Class Hazardous Toxic Waste Materials are to be discharged (pumped via an air compressor) directly into a silo at the Red Hill site, it is likely that some spillage will occur during the unloading process. The intended shed to house the unloading facilities must be kept in a negative pressure to ensure that any escape or spillage of dry Class 5 – Hazardous Toxic Waste Material is contained within the unloading shed and it is not able to be discharged into the atmosphere. Any spillages or accidental discharges of dry Class 5 Hazardous Toxic Waste Material must be prevented from leaving the unloading facility by cleaning and thoroughly removing any contaminates from the Powder (Pressure Tankers) and its Prime Mover, before being permitted to depart the site.	The equipment within the Immobilisation Plant will consist of various alarms and automatic shut-off valves that can be programmed/controlled. These systems will be outlined in the manufacturer's commissioning plans provided to EMRC once the plant has been constructed. In general the process for managing a powder material through a pressurised system is well-established at standard cement & lime plants and the same industry design principles will apply at the Immobilisation Plant. A negative air pressure building is not required as the APCr material will be fully contained throughout the transfer process. In the rare event that a spill does occur from the decoupling of the tankard and the silo, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill.
9.	ANON-D6CH-YSKB-X	The Proposal is in proximity to sensitive receptors. The Proposal area at RHWMF contains a 500m buffer to residential properties (as required for Class II and III landfills). The future Class IV Stage 3 disposal area at the north-eastern corner of RHWMF is in closest proximity to residential properties to the east. There is no buffer between the RHWMF and John Forrest National Park, which has already been impacted by past containment breaches. The buffers between the Immobilisation Plant and the National Park are insufficient. The buffers for areas accepting and storing intractable waste require review, especially in regard to risks to groundwater, the National Park, and the other operations of RHWMF. The submitter maintains that the risks from intractable waste are significant at this site. APCr is too hazardous to be accepted at RHWMF and should be transported to a purpose-built intractable waste facility, away from residential and sensitive environmental receptors.	The separation distances from the proposed Immobilisation Plant and existing Stage 2 Class IV landfill to the nearest rural residences is approximately 900 and 620m respectively. The eastern edge of the proposed Class IV APCr monocell is adjacent to the 500m internal buffer from the eastern boundary of the RHWMF and the Site's closest residential premises, noting that no waste disposal activities will occur within the 500m buffer. The separation distance from the Class IV APCR monocell is approximately 520m to the nearest sensitive receptor. Thus, all proposed infrastructure for the Project is well sited as per the EPA Guidance Statement No. 3 Guidelines. It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.
The proposal – Inland Waters			
No.	**Submitter**	**Submission and/or issue**	
10.	ANON-D6CH-YSKT-G	Did slump testing determine if cracking was present in the immediate aftermath or following full curing on the geopolymer? Hence, were preferred pathways for leachate transport developed within the geopolymer that may influence contaminant mobility and also influence modelling outcomes?	The slump testing was not undertaken on a geopolymer was it is not relevant to this Project. The Class IV landfill (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. During operations, the immobilised APCr will not be deposited directly onto the lining system. A layer of protection soils will be placed first to prevent damage to the lining system. Once the immobilised APCr is fully cured additional soils will be placed on top to build the platform/lift within the landfill cell and to mitigate exposure to rainfall and potential generation of leachate.
11.	ANON-D6CH-YSKK-7	No studies have been provided by the EMRC consultants to examine the effect of storing up to 35,000 tonnes of concrete waste in a localised area within a Class 4 or Class 5 Cell. It is feasible that the heavyweight of the concrete may introduce local pressure points within the Cell and over time, may cause a breach of the Cell liner membrane. Once the Cell liner membrane is breached, the foundation ground underneath will soften and further promote the breach, increasing the amount of discharge volume. Such a breach of Class 5 Material will be extremely difficult, if not impossible to locate and contain. Given the weight of 35,000 tonnes of Class 5 concrete waste, Recovery Bores may not cope with the amount of leakage, as the bores must take some time for the groundwater to seep through into the bore holes and may not match the rate of leakage Vs the rate of recovery. There will be a potential for Long Term Leaching from the APCr.	The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. As DWER requirements, a valid Stability Risk Assessment (SRA) must be submitted as part of the application. The SRA for the dedicated monocell confirms that the long-term geotechnical stability once the cell is filled and capped will not be compromised within industry standard factors of safety.
12.	ANON-D6CH-YSKU-H	The Red Hill Waste Management Facility is not a suitable location for the storage of Class V waste as it is located within the catchment of multiple watercourses including Jane Brook, Susannah Brook and other unnamed tributaries. The modelling suggests that the Class V waste will not impact the Swan River for 20,000 years. Whether the theoretical modelling turns out to be correct, or whether contamination occurs sooner, we don't know. What is certain is that the Class V waste (including "forever chemicals") stored at Red Hill will make its way to the Swan River.	The long-term storage of Class V waste is not relevant to this Project. The raw APCr material will be classified as Class V/IV and then immobilised in low-heat concrete which downgrades the material to Class IV/III which is then disposed of in a designated Class IV landfill cell. The Class IV landfill cell (both interim and dedicated solutions) will have a minimum separation distance from groundwater of 2m and will be constructed with a double composite lining system to minimise the risk to groundwater. The double-composite liner consists of a primary and a secondary liner with a leak detection layer between the composite liner, providing a higher level of protection to the environment in comparison to a single composite. It is anticipated that this will provide sufficient protection for the underlying groundwater.
13.	ANON-D6CH-YSKK-7	Washdown water draining into existing leachate ponds on site must not used for cleaning or decontaminating any Class 5 Waste Material as the leachate ponds are for lower classes of waste only and are not suitable for any Class 5 Hazardous Toxic Waste Material.	To minimise the generation of contaminated surface water generated from the cleaning of the agitator truck, each agitator truck will be cleaned each day within the Class IV landfill, thereby containing the contaminated water within the cell. The washdown process will remove any remaining treated APCr (classified as Class IV/III at this point of the process) within the barrel to ensure it is not carried back to the Immobilisation Plant. The washdown residue will be covered with soils immediately to reduce potential for spreading or generating dust. Any additional cleaning required of the agitator truck will be conducted in the washdown bay at the Immobilisation Plant. Washdown water will be collected in a sump and any residue will be captured in the silt trap. At the washdown bay the solid residues will be disposed of at the Class IV landfill and the liquid residual will be pumped into EMRC leachate evaporation pond system. EMRC will be allowed to accept this specific Class IV/V waste stream on the condition that the material undergoes a suitable treatment to reduce its classification from Class V/IV to Class IV/III in accordance with the WA's Waste Classification Guidelines. As mentioned previously, the treatment process involves mixing APCr with cement and water, thereby immobilising the material in low-heat concrete and altering its physical and chemical properties. The treated APCr material which will be classified as Class IV or lower, will then be disposed of into a Class IV landfill cell at RHWMF.
14.	ANON-D6CH-YSKA-W ANON-D6CH-YSKK-7 ANON-D6CH-YSK2-E	Highly toxic Air Pollution Control Residues from the incinerator will be mixed with cement and pumped into a cell at the Redhill waste management facility. This would require 70,302 tonnes of cementised ash poured into landfill every year. This landfill cell is on the edge of the John Forrest National Park, overlooking the valley and just 500m from homes and Christmas Creek located in the national park. Cement will not prevent leaching of toxic substances into the environment. The potential for leakage is considerable and the public and worker health and safety has not been adequately taken into account.	The Class IV landfill cell (both interim and dedicated solutions) will have a minimum separation distance from groundwater of 2m and will be constructed with a double composite lining system to minimise the risk to groundwater. The double-composite liner consists of a primary and a secondary liner with a leak detection layer between the composite liner, providing a higher level of protection to the environment in comparison to a single composite. It is anticipated that this will provide sufficient protection for the underlying groundwater. Additionally, new groundwater monitoring wells will be established as necessary when Class IV landfill operations expand. Ongoing groundwater monitoring will also be undertaken in accordance with the Licence L8889/2015/2 and the EMRC's Surface Water and Groundwater Environmental Management Plans. It should be noted that the immobilisation process does prevent the leaching of many parameters of concern as shown in the extensive testing/research undertaken as part of this Project. All of this information has been provided to the regulatory authorities for their assessment.

15.	ANON-D6CH-YSK1-D	The location of this hazardous waste processing facility is already identified as a PFAS contaminated site on the DWER contaminated sites register. The proponents have not included PFAS chemicals in their assessments nor the implications of building and operating a hazardous waste treatment facility on an existing PFAS contaminated site. dow.maps.arcgis.com/apps/webappviewer/index.html?id=c2ecb74291ae4da2ac32c441819c6d47 Therefore, a full assessment of the geological integrity of this site and the associated existing contamination zones and landfill cells needs to be assessed for their potential impacts on the existing and future class 4 landfill cells and monocell. Should the 2mm landfill membrane be breached, considering at least 350 000 tonnes of cement will be placed into the existing class 4 cell, there is potential for significant chemical contamination of the neighbouring environment. The toxicity and hazardous nature of the existing class 4 waste that may come into contact with the hazardous waste cement, could induce further leachability and a breach of the lining. None of this has been assessed.	The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. A Hydrogeological Risk Assessment was undertaken and accepted by the approval authorities as it met their requirements. Additionally, Human Health Risk Assessment was undertaken for the Site and the surrounding area. The assessment found that surrounding users are not at risk. It should be noted that the PFAS in feedstock to the WtE plant will be largely destroyed in the facility's furnace as shown in the extensive testing/research undertaken as part of this Project. All of this information has been provided to the regulatory authorities for their assessment.
16.	ANON-D6CH-YSKT-G ANON-D6CH-YSKP-C	While PFAS will tend to be destroyed or volatilised during combustion, a full pre-and post-combustion analysis of representative samples is required. Ideally this will comprise 30+ PFAS compounds plus TOPA analysis. PFAS can and does readily leach from cementitious/geopolymer materials, so if residues are indeed present, the extent of leaching (including TOPA compounds) needs to be determined and incorporated into modelling scenarios for the Red Hill site. The submitter indicates, through past experience and qualified scientific and public health assessments and investigations, that no community should ever be at risk of PFAS exposure - a 'forever chemical'. The PFAS risks and actions to be applied to mitigate the risk - entirely, need to be spelt out clearly for this site and its proposal. If none can be provided, the application should be refused.	A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. The MASP includes testing for PFAS as required by DWER. The immobilisation process stabilises the APCr material in low-heat concrete encapsulating its chemical characteristics. If leaching does occur, the Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite.
17.	ANON-D6CH-YSKK-7	Class 5 Hazardous Toxic Waste Materials are a forever chemical and are the final ash waste product from the WTE process containing very high super-concentrated levels of dioxins, furans and other highly toxic materials including PCBz (polychlorinated benzenes & PCPh (polychlorinated phenols) Table 1: Concentration of selected groups of substances in some residues after waste incineration: (source: Stockholm Convention on POP's (2019) The hazardous waste material from the Kwinana & Rockingham WTE Plants is highly toxic and is the worst waste material to be produced from WTE plants. Note: It is not possible to control the waste emissions outputs from a WTE Plant as the waste inputs are uncontrollable and therefore contaminates including any Mercury, Lithium and many other chemicals, all end up being fed into the WTE Plant, resulting in highly toxic waste being produced. The EMRC consultants have not adequately accessed the impacts of dioxin and other POP's chemicals in their PER assessments and their statements regarding waste substances are completely understated and incorrect.	APCr material is currently being generated in WA and EMRC intends to provide a long-term environmentally sustainable solution that does not require the material to be transferred to a facility that is 600km one-way from the Kwinana/East Rockingham Facility. This is what is currently happening and will continue to happen unless RHWMF, an approved Class IV facility already, can accept this material. Additionally, a Human Health Risk Assessment (HHRA) was undertaken for the Site and the surrounding area and provided to the regulatory authorities. The HHRA did consider dioxins/furans. The assessment found that surrounding users are not at risk. Lastly, it should be noted that any dioxins/furans will be bound up in the APCr material with activated carbon and lime and then immobilised with cement to form low-heat concrete which will be deposited in a double-composite lined Class IV landfill cell.
18.	ANON-D6CH-YSKK-7	The site at Red Hill has previously experienced Groundwater Contamination from Cell 3 and the underground plume could have caused extensive pollution further into the John Forrest National Park and downstream waterways. The known local area Hydrology is known to be on fractured bedrock along many fault lines and any groundwater contamination is possible to move downstream of the Red Hill site and into the Swan River catchment. Uncontrolled springs may also develop if groundwater/ leachate is released. Local and Quarry blasting may also contribute to further degrading of the known hydrology. The EMRC consultants have failed to provide any credible independent studies regarding the local Hydrology and potential impacts upon groundwater pollution from any escapes of Class 5 Material being disposed of. It is noted that when the Class 5 Hazardous Toxic Waste Material is stored in concrete, it is still possible for the hazardous waste contained in the concrete to leach out when the concrete is wet or immersed in water. It is also noted that the Concrete containing Class 5 Hazardous Toxic Waste Material is intended to be stored in an open Cell for up to five (5) years before eventually being capped over. Therefore, it remains foreseeable that the Class 5 Waste concrete is capable of polluting any rainwater in the cell and may leak into the local groundwater. **Group of Substances / Unit**: Bottom Ash Ng-kg1; Boiler Ash Ng-kg1; Fly Ash Ng-kg1 PCDD/PCDF (1-TEO): <1-10; 20-500; 200-10,000 PCBza: <0.002-0.05; 200,000-1,000,000; 100,000-4,000,000 PCPhb: <0.002-0.005; 20,000-500,000; 50,000-10,000,000 PAH: <0.005-0.01; 10,000-300,000; 50,000-2,000,000 PCBz (polychlorinated benzenes) PCPh (polychlorinated phenols)	All of the RHWMF's surface water / groundwater compliance reports /contaminated site investigation reports and associated hydrogeological reports are part of an ongoing (mandatory) contaminated site audit. The audit is being conducted by WA accredited Contaminated Site Auditor in compliance with the Contaminated Sites Act 2003. The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. Lastly, it should be noted that the APCr material will be classified as Class IV/III once it is immobilised and disposed of within a Class IV landfill cell.
19.	ANON-D6CH-YSKV-J	There is a history of leakage from landfill cells at the Red Hill Waste Management Facility as reported in The West Australian in 2009 (see https://thewest.com.au/news/wa/toxic-waste-bleeds-into-national-park- ng-ya-228582). Leachate escaped containment and the contaminated groundwater plume extended into the adjoining national park. It is puzzling therefore why the new landfill cells in this proposal will be located even closer to the national park boundary than the earlier cells which leaked. There is no justification for locating these new landfill cells so close to the national park.	The previous breach mentioned occurred in the old historic Class III landfill cells and is contained within the Site with no evidence of migration offsite. Landfill design and technology has advanced in the last 20 years. The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells.
20.	ANON-D6CH-YSKJ-6	Potential impact on water quality from surface runoff, specifically the nearby creek(s) in nearby properties and the wider catchment. The document "Environmental Assessment and Management Plan" cites: □ "Groundwater contamination may occur if there was a breach in the landfill lining system" noting that concerns have been raised by DWER and the EPA in relation to the potential integrity of the liner" □ "If groundwater contamination should occur, the impacts would be localised only and occur down hydraulic gradient of the cell. As the potential for groundwater contamination at the RHWMF occurs downstream of the various waste management activities it is not physically possible to cause a cumulative impact to the entire groundwater table under the site. Typically, any contaminants detected down hydraulic gradient of landfills return to background concentrations as the contaminant moves further away from the facility." Would this creek line be considered "down gradient", what are the worst case potential impacts, and is the monitoring proposed sufficient to ensure an adequate, timely response?	The RHWMF can be split into three creek catchments, and each creek would be considered down-gradient. The groundwater and surface water monitoring network is extensive and is managed in accordance with the Site Licence with sampling and testing occurring bi-annually. Annual Environmental Reports, which outline the monitoring results, are provided to the DWER every year. In addition, all of the RHWMF's surface water / groundwater compliance reports /contaminated site investigation reports and associated hydrogeological reports are part of an ongoing (mandatory) contaminated site audit. The audit is being conducted by WA accredited Contaminated Site Auditor in compliance with the Contaminated Sites Act 2003. Whether the current network is sufficient for the proposed new infrastructure will be determined by the DWER and any amendments will be undertaken by EMRC as needed.

<table>
<tr><td>21.</td><td>ANON-D6CH-YSKU-H</td><td>Unlike the Sandy Ridge facility, the Red Hill facility will not have a canopy to protect it from rainfall and sunlight. This means that the treated APCr and the lining of the cell will degrade much faster and in the event of heavy rain, contaminated water will flow into the containment ponds, and possibly beyond that into the National Park and adjacent waterways.</td><td>Unlike at the Sandy Ridge facility, the APCr material will be immobilised in concrete prior to disposal at RHWMF.
Waste cover requirements will be followed by EMRC operators which will reduce leachate generation. All rainfall that falls with the landfill cell is considered leachate which will be collected and extracted to a designated leachate evaporation pond that is lined with HDPE geomembrane.
The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners.
The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells.</td></tr>
<tr><td>22.</td><td>ANON-D6CH-YSKB-X</td><td>EMRC have indicated that there can be no leachate generated from the immobilised product and there will be no point of entry for water to infiltrate the containment cell. No clear evidence to support these claims has been presented for the Proposal.
The entry of water to the containment cell; the degradation of the concrete/waste mix over time; lost records of disposal areas; inadvertent disturbance and damage to the concrete containment; future change of landuse; and/or geological events, could all result in the waste being mobilised or exposed. The Proposal's location near a large metropolitan centre further complicates strategies for risk management.
The long-term security of contained and/or diluted intractable waste should not be left for future generations to manage. Accordingly, the principle of intergenerational equity must be applied to this Proposal.</td><td>The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners.
The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells.
Any leachate generated will be extracted and contained within a designated leachate pond, which is lined accordingly to Best Practice Landfill Guidelines.
To ensure the integrity of the lining systems, a geophysical geomembrane leak detection survey will be undertaken, as well as a dipole survey in accordance with ASTM D7007. Thus, all management measures are being undertaken to ensure leachate is contained within the proposed containment infrastructure.
As waste levels reach the final fill profile, the landfill cell will be progressively capped with a low-permeability clay system in accordance with the Site Licence, which will reduce leachate generation. Following full closure, leachate will continue to be extracted and managed appropriately until generation reduces to minimal volumes.
It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.</td></tr>
<tr><td>23.</td><td>ANON-D6CH-YSK1-D</td><td>Given the EMRC APCr immobilisation project is to be sited adjacent to the John Forest National park, on the same land lot as the FOGO processing facility, effectively via cement industry agitation trucks parked in what appears to be the equivalent of a carport, the submitter requests scrutiny as to the effectiveness and stability of the resulting cementised hazardous waste which will go within 15 minutes, into a landfill cell. Normally cement requires more time than this to set, suggesting that during winter especially, the potential for increased leaching of heavy metals and dioxins will be exacerbated. Please refer to the correspondence from the NSW EPA to the NSW Planning department in their recent assessment of the Woodlawn incinerator project in NSW SSD_SSI_EIS_response_to respond to the public exhibition of an EIS for State Significant projects.</td><td>All operations for the APCr project at RHWMF will be overseen by DWER and will be undertaken in accordance with the Site Licence.
The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners.
The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells.</td></tr>
<tr><td>24.</td><td>ANON-D6CH-YSK1-D</td><td>The APCr leachate trial data referred to as being in appendix H, has not been provided by the proponent in the (redacted) ERD or placed on the WA EPA consultation hub website.
This is deeply concerning given the updated ERD document does not include this appendix either nor any of the APCr characterisation and leachate testing information.
The NSW EPA provides Technical Notes on cement-based solidification/stabilisation treatment of organic chemical contaminants in waste.
This technical note provides advice and guidance on the methods and standards for cementisation of such hazardous waste.
Please see - https://www.epa.nsw.gov.au/your- environment/waste/tracking-transporting-hazardous- waste/immobilisation/technical-notes-immobilisation/immobilisation- note2
None of these ERD's provide any information about Mercury and Arsenic leachate potential or data found during the trials.
Is this a deliberate oversight and how will the assessment address the lack of this information being made publicly available? What potential impacts could be caused by putting cement with increased Arsenic and Mercury potential in a landfill cell containing shredded arsenic treated power poles?</td><td>Some redactions of the application were required due to proprietary (commercially sensitive) information contained with the documentation. However, the EPA and DWER have reviewed the application in its entirety and are making their assessments based on all available information.
The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners.
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<tr><td>25.</td><td>ANON-D6CH-YSK1-D</td><td>The EMRC have identified a range of sensitive receptors in previous projects on this site.
<table><tr><td>Table 3: Sensitive human and environmental receptors and distance from</td><td>Distance from prescribed activity</td></tr><tr><td>prescribed activity Human receptors</td><td></td></tr><tr><td>Semi-rural residential areas and farms</td><td>Approximately 38 semi-rural residences bordering the prescribed premises boundary on the north, east (Barbarich Estate) and southern sides. The separation distance from the boundary of pond L10-B (subject to works) to the nearest sensitive receptor (semi- rural residence) is approximately 700m south.
Lots are separated from the Premises by a vegetation buffer (approximately 260m to 400m wide) located on Lot 82 on Diagram 18309 and Lot 501 on Plan 40105, Parkerville (owned by EMRC), followed by a drainage/public recreation reserve (approximately 50m to 125m wide) on Lot 62 on Plan 23731 and Lot 15403 on Plan 40033, Parkerville (vested in the Shire of Mundaring).</td></tr><tr><td>Environmental receptors</td><td>Distance from prescribed activity</td></tr><tr><td>Parks and Wildlife Management Lands and Waters</td><td>John Forrest National Park: adjacent to the southern boundary of the premises.</td></tr><tr><td>Threatened/Priority Fauna</td><td>The following species were identified within 2km of the premises boundary:
• Two endangered species (Baudin's cockatoo and Carnaby's cockatoo).
• One vulnerable species (forest red-tailed black cockatoo).
• One species of migratory bird protected under an international agreement (fork-tailed swift).
• One Priority 4 species (quenda).
• One species of special conservation interest (south- western brush-tailed phascogale).</td></tr></table></td><td>EMRC has considered separation distance to sensitive receptors as outlined in EPA's Guidance Statement No.3 (2005).

The separation distances from the proposed Immobilisation Plant and existing Stage 2 Class IV landfill to the nearest rural residences is approximately 900 and 620m respectively.
The eastern edge of the proposed Class IV APCr monocell is adjacent to the 500m internal buffer from the eastern boundary of the RHWMF and the Site's closest residential premises, noting that no waste disposal activities will occur within the 500m buffer. The separation distance from the Class IV APCR monocell is approximately 520m to the nearest sensitive receptor.

Thus, all proposed infrastructure for the Project is well sited as per the Guidelines.</td></tr>
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		Groundwater	There is a groundwater divide extending across the northern part of the premises trending west-northwest parallel with the premises surface water catchment divide. Due to this divide, there is a generally southerly to south- westerly groundwater flow across most of the premises, largely within the catchment for Christmas Tree Creek to the south. A total of 49 groundwater monitoring bores are active across the premises, of which eight bores are located near the pond L10-B redevelopment area. The highest static water level recorded within the pond L10-B redevelopment footprint ranges from 275- 270mAHD or approximately 15mbgl at a minimum. From the lowest point in the redeveloped pond to the groundwater is approximately 4.74m. The applicant intends to maintain an undisturbed separation distance of at least 3m below the base of the deepest excavation point to the highest recorded static groundwater level in line with best practice landfill infrastructure design standards.	
		Surface water	Susannah Brook (minor, non- perennial watercourse) • Approximately 2km to the north of the leachate pond redevelopment area. Christmas Tree Creek (minor, non- perennial watercourse) • Approximately 650m to the south of the leachate pond redevelopment area.	
		It is therefore clear that there is a foreseeable risk to the John Forest National Park, wildlife and endangered species, associated waterways (such as Christmas Creek) as well as residents, onsite workers and visitors to the site. Given the ground and surface water flows are in the south and south-westerly direction, with all the landfills upgradient, potential impacts from the other landfill cells leachate, coming into contact with the class 4 landfill cell, potentially impacting the mud and HDPE liner, potentially impacting the hazardous waste cement and causing contamination to leach and migrate offsite, none of these scenarios have been assessed.		
26.	DWER	Limitations identified in the initial hydrogeological risk assessment is to be managed and controlled through the Part V assessment. Regulatory controls relating to containment infrastructure, associated construction quality assurance verification and groundwater monitoring requirements will form the basis for the mitigation of impact to groundwater.		EMRC acknowledges this statement from the DWER. No further response or clarification required.

The proposal – Air Quality

No.	Submitter	Submission and/or issue		
27.	DWER	Limitations identified within the report will be managed through the implementation of an Operational Air Quality Monitoring Plan condition in the draft works approval, to be completed prior to time-limited operations (as part of the Critical Containment Infrastructure Report), to assess the adequacy of controls to prevent and mitigate point source and fugitive particulate emissions from the immobilisation plant. The plan will need to include the following information: a) the air quality sampling method that will be followed, in accordance with AS 3580.9 and US EPA Method TO-9A; b) monitoring device locations (including at least one at the immobilisation plant and one on the boundary of the premises), informed by AS 3580.1.1 and justified based on meteorological conditions, terrain and the location of sensitive receptors; c) monitoring parameters, including the following at a minimum: (i) total suspended particulate matter, PM10 and PM2.5; (ii) antimony, arsenic, cadmium, chromium (VI), lead, manganese and nickel; (iii) polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, d) method detection limits and instrument capabilities; e) monitoring duration (averaging period); f) monitoring frequency, including at least quarterly monitoring during the first two years of immobilisation plant operations; g) timing of operational monitoring in relation to activities at the immobilisation plant (with consideration of the likely intermittent nature of point source and fugitive emissions); h) method to characterise background ambient air quality, for example monitoring during the construction phase before receipt of air pollution control residue and cement commences and/or during the operations phase when the immobilisation plant is closed and not receiving or processing air pollution control residue or cement; i) a framework for assessing operational monitoring results, including the following at a minimum: (i) ambient air quality guideline values suitable to assess human health risk from for each monitoring parameter; (ii)comparison with background ambient air quality; and (iii) assessment of temporal trends, and j) quality assurance and quality control (QA/QC) procedures.		JBS&G has provided a formal response to the DWER's comments. Please refer to Attachment 2. An updated HHRA has also been provided. Please refer to Attachment 3. It should be noted that following the requested changes by DWER, there are no changes made to the previous conclusions (i.e., low risk to human health from the APCr Immobilisation Plant air emissions).
28.	DWER	Errors in boundary concentrations of principal and individual toxic substances need to be corrected, and concentrations be reported as a percentage of air quality criteria: □ Tabulation at site boundary was provided in the HHRA (Table 6.2, pdf page 17/37). This is acceptable as a proxy for maximum on model domain as the elevation of the sources and building downwash effects mean that concentrations further from the boundaries are likely to be lower than those on the boundary. However, concentrations were not reported as a percent of the air quality criteria, as requested. □ Dioxins and furans site boundary maximum concentrations were tabulated in the Table 6.2 of the HHRA but were not reported as a percent of the criteria as requested. The highest concentration of Dioxins/furans (I-TEQ) was listed as 9.6E-02 □g/m3 ¬at the west boundary and appears to be misreported. The hourly standard in DWER's draft Guideline: Emissions to Air (2019) lists the 1 hourly criterion as 2E-06 □g/m3. The reported concentration at the west boundary would be 0.096/0.000002 or 48,000 times the criterion concentration. By comparison, the highest dioxins and furans 1 hourly concentration at sensitive receptors is listed as being 4.16E- 08 □g/m3 (Receptor R27). This value is 2% of the criterion as documented in Table 7.1 of the HHRA (pdf page 19/37). □ The years 2019-2023 are acceptable years to use for meteorology. It is not clear why Perth airport data is used for assimilation ("hybrid" mode) as the airport is located approximately 15km away on the relatively flat terrain of the Perth coastal plain. Site-local meteorological data collected at the EMRC WMF site has not been assimilated as requested. These dot-points are suitable for inclusion during the Part V assessment as it is yet to be shown that all pollutants meet the relevant criteria on the model domain outside of the premises as per DWER's draft Guideline: Emissions to Air (2019).		JBS&G has provided a formal response to the DWER's comments. Please refer to Attachment 2. An updated HHRA has also been provided. Please refer to Attachment 3. It should be noted that following the requested changes by DWER, there are no changes made to the previous conclusions (i.e., low risk to human health from the APCr Immobilisation Plant air emissions). EAQ has also provided the following response with regards to the Site-local meteorological data collected at the RHWMF, it was not assimilated as requested by the DWER during the latest EPA RFI process because the data files provided by SLR were not all compatible to allow the model to run. Regardless, all files ended up being in 250m resolution and could not be used as a 100m resolution was requested. Further discussions can be had regarding the execution of the air quality model during the Part V approval process.
29.	Department of Health	Areas intended for future development that are adjacent to the proposed facility will need to take account potential emissions from the facility's operations.		EMRC acknowledges this statement from the DoH. No further response or clarification required.

30.	ANON-D6CH-YSKJ-6	The submitter raises concerns regarding Appendix C “OPERATIONAL MANAGEMENT & AIR QUALITY IMPACT ASSESSMENT OF AIR POLLUTION CONTROL RESIDUE (APCR) TREATMENT & DISPOSAL FACILITY” and whether the assessment is sufficient and in line with current best practice. For example, the use of TAPM modelling is a cause for concern for the following reasons: 1. CSIRO appear to no longer support this model, and have not done so since 2011. 2. In some instances, the Department of Environment do not accept the use of TAPM modelling 3. There appears to be no validation of TAPM output with observed data In addition: 4. The assessment does not adequately explain or justify the use of the hybrid model 5. Data utilised may in some cases be insufficient: for example, 2023 Perth Airport data has been utilised in the assessment. There appears to be no justification as to why this year is appropriate and if it is truly representative of meteorological conditions in the region.	EAQ has provided the following response: The technical matters raised by the submitter are matters that have been discussed in detail with EMRC and the DWER/EPA as part of assessment process. The methodology utilised in the Operational Management & Air Quality Impact Assessment was therefore developed in consultation with the EPA/DWER to ensure that the most accurate modelling was undertaken given the best available data for RHWMF. All technical detail has been submitted and/or reported to the DWER/EPA as part of the assessment process.
31.	ANON-D6CH-YSKR-E ANON-D6CH-YSKU-H ANON-D6CH-YSKB-X	The transferring/ unloading of fly ash/ Class V powder from the truck to the batching plant/ Immobilisation Plant at Red Hill is an unnecessary risk, fraught with the likelihood that there will be a leak (disaster) into the environment and be blown across the residents of Perth on an easterly wind. With residences nearby and the national park next door, it is only a matter of time until these have been compromised. As it stands now, the EMRC is still "managing" a toxic plume in the national park. We cannot add to this disaster. The controls related to the Proposal should also include a spills management strategy.	EMRC is committed to ensure a safe operations of the Immobilisation Plant. All APCr generators will conduct periodic laboratory testing on raw APCr to verify ongoing compliance with the ash characterisation plan. This testing will occur at specified intervals before transport to the RHWMF. The laboratory results will be submitted to RHWMF at each interval to confirm that the accepted material meets the required characteristics. The Reverse Jet-Pulse Filters will be installed on top of the silos, with APCr silo filters positioned approximately 14.2m above ground level and the cement silo filter at 12.6m above ground level. These filters, which have a 150mm outlet diameter, will be connected to a duct extending 1m above ground level to minimise the dispersion of APCr and cement dust. Some contingency measures are also applied, including fitting silos with: * A relief valve to prevent overfilling * A level indicator and alarm that activates if cement (or product) reaches a particular height below the inlet to the silo’s air cleaning system * A reverse pulse air cleaning system designed to reduce dust emissions below a particular density * A pressure differential device to detect blockages and holes in filters There will also be the inclusion of appropriate dust management measures; regular visual inspection of the baghouse and immediate replacement of filters when damaged; regular inspection of automatic systems such as a level indicator or pressure gauge to allow for timely removal of particle build-up; regular testing of the air cleaning system for the silos and if not working efficiently, pausing operations until the system is repaired; keeping sufficient spare filters or bags to replace all filters or bags used in the cleaning system at any given time; and keeping stored aggregates covered or damp to minimise airborne dust. Additionally, an Operational Management and Air Quality Impact Assessment prepared by Environmental and Air Quality Consulting Pty Ltd (EAQ) stated that: - The design of the dust filtration system will ensure that emissions, once treated, will be less than 10mg/nm3 - Based on the volumetric flow and exit velocity of the exhausts from the dust filters, the mass emission rate performance guarantee for dust particles is 0.005g/s These measures are common among many batching plants and as such are considered to be modern operational practices for such facilities and sufficient to ensure that risks to the environment are minimised. Lastly, the manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will be incorporated in RHWMF's existing Emergency Response Plan to ensure there are contingencies for managing exposure, spills, etc.
32.	ANON-D6CH-YSK1-D	This project comes under a range of associated legislation. https://www.wa.gov.au/government/publications/guideline-industry- regulation-guide-licensing Under the DWER Industry Regulation Guide to Licensing this project requires consideration for: Regulation of emissions and discharges, (Part V, Division 3, *Environmental Protection Act 1986*). The proponent has failed to provide adequate data on the expected emissions of dust and particulates generated onsite and through the process of cementation. The exact toxicity and hazardous properties of waste incineration APCr is heavily dependent on the types and volumes of waste incinerated. The heterogenous nature of waste and the resulting emissions and discharges can never be fully known. Therefore, it is essential that any project handling an incinerators APCr has access to that material to determine its properties and leachability. This project has not provided that data. The generation of Unintentional Persistent Organic Pollutants is defined under both the Stockholm and Basel conventions. Waste incinerators are known globally, in a significant number of publicly accessible reports from existing operations, to produce a range of highly hazardous and toxic emissions and discharges which include Dioxins, Furans, Bromines, PFAS, micro and nano-plastics, heavy metals and PAH’s. Therefore, any APCr from an incinerator can be expected to contain these pollutants. The proponents have not provided any data or assessment for most of these highly hazardous pollutants in their consideration of potential emissions during the transport, handling, processing of the ash and potential leaching into the environment.	EMRC only manages the APCr material once it is onsite. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. All APCr generators will undertake periodic laboratory testing on the raw APCr to verify continuing compliance with the ash characterisation plan at a specified interval prior to transport and acceptance at the RHWMF. The laboratory results will be submitted to the RHWMF at each testing interval to confirm the characteristics of the materials been accepted at the Site. A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC’s RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. In addition, the immobilisation process stabilises the APCr material in low-heat concrete regardless of whether the material's chemical characteristics fluctuate, and all the same health and safety measures are followed since they are developed assuming the worse-case, high risk scenario. The specific data on the APCr composition was redacted. Some redactions of the application were required due to proprietary (commercially sensitive) information contained with the documentation. However, the EPA and DWER have reviewed the application in its entirety and are making their assessments based on all available information.
33.	ANON-D6CH-YSKJ-6	There is potential for increased dust emissions from transport and operations. Appendix C cites the use of existing dust control measures by EMRC, however this may be inadequate given issues currently experienced by nearby residents as a result of ERMC operations.	The EMRC regularly addresses any concerns raised by the community and in accordance with its DWER Licence conditions, maintains a written complain register at the RHWMF. The register is used to document any complaints received regarding the RHWMF, record the complainant’s name and address, the nature of the complaint, action(s) taken by EMRC to resolve the issue, and the final outcome. This ensures that community concerns are addressed in a prompt and transparent manner. Concerns and formal complaints are investigated with continuous liaison occurring between EMRC and the complainant until the issue is resolved. From 2016-2024, EMRC has not received a complaint regarding dust. Regardless, EMRC is committed to safe operations at RHWMF and will compile with any additional dust management measures as required in its Site Licence, which is overseen by the DWER.
The proposal – Greenhouse Gas Emissions			
No.	**Submitter**	**Submission and/or issue**	

34.	ANON-D6CH-YSKV-J	Currently, the ERD fails to quantify the GHG emissions associated with the following aspects of the proposal: *Scope 1 operational emissions: Transportation of APCr to the facility* According to the ERD, section 2.1.1, the main source of APCr will be the Kwinana and East Rockingham Waste to Energy (WtE) facilities. These facilities are located over 60km away from the waste management facility, on roads that traverse through the south-western suburbs of Perth. The greenhouse gas emissions associated with this transport are not considered. It is almost as if the waste material will magically arrive at Red Hill without generating any GHGs. I assume that the GHG emissions of transportation would be considered the responsibility of the WtE facility rather than EMRC. However, they were not considered in the assessments for either WtE facility and the scale of these emissions are directly related to EMRC's decision to modify Red Hill to accept the APCr waste from these WtE facilities. *Scope 2 construction emissions: Supply and use of concrete in construction* Concrete production is a major contributor to global carbon emissions, accounting for approximately 8% of global GHG emissions in 2021. This makes it the world's largest industrial source of carbon pollution. The proposal involves construction utilising concrete, in the hardstands and buildings. And, yet, the GHG emissions associated with that use of concrete is not considered at all. *Scope 2 operational emissions: Supply and use of cement in operation* The high level of GHG emissions in concrete production primarily arise from the manufacture of Portland cement. It is assumed that Portland cement will be the type of 'cement' used for the immobilisation of the APCr.	With regards to Scope 1 emissions, all risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. Therefore, the EMRC is not obligated to include GHG emissions for the transport of APCr to RHWMF in its application. With regards to GHG emissions from the generation of concrete, the immobilisation of APCr material will utilise Cockburn Cement. According to Cement Concrete & Aggregates Australia, a prominent Australian concrete organisation, "In a modern cement plant, the CO2 emission intensity is about 0.82 tonnes of CO2 per tonne of cement produced." (refer to Attachment 4). Initially, EMRC will be accepting 20,000 tonnes per annum of APCr material. The cement and water will constitute approximately 20% by weight of the mixture and the APCr will be approximately 80% by weight of the mixture. Therefore, approximately 24,000tpa of concrete will be generated which equates to approximately 19,680 tonnes CO2-e per year. According to the EPA's Environment Factor Guideline for GHG Emissions, generally, GHG emissions from a proposal will be considered where they are reasonably likely to exceed: • 100,000 tonnes CO2-e of scope 1 emissions in any year; or • 100,000 tonnes CO2-e of scope 2 emissions in any year. Even with the consideration of the estimated annual concrete generation, the Project is below this threshold and therefore the GHG emissions from the Project are not considered significant. The Project's GHG emissions will be reported on an annual basis as part of the National Greenhouse and Energy Reporting Scheme (NGER), which will be in line with Site Licence requirements and managed through the DWER.
35.	ANON-D6CH-YSK4-G	The assessment of the greenhouse gas emissions for the project does not include those produced by the use of concrete to immobilize toxins. Climate experts at the UN's global climate conference held last year called for a reduction in greenhouse emissions from concrete, which are responsible for over 7 per cent of the world's carbon emissions.	With regards to GHG emissions from the generation of concrete, the immobilisation of APCr material will utilise Cockburn Cement. According to Cement Concrete & Aggregates Australia, a prominent Australian concrete organisation, "In a modern cement plant, the CO2 emission intensity is about 0.82 tonnes of CO2 per tonne of cement produced." (refer to Attachment 4). Initially, EMRC will be accepting 20,000 tonnes per annum of APCr material. The cement and water will constitute approximately 20% by weight of the mixture and the APCr will be approximately 80% by weight of the mixture. Therefore, approximately 24,000tpa of concrete will be generated which equates to approximately 19,680 tonnes CO2-e per year. According to the EPA's Environment Factor Guideline for GHG Emissions, generally, GHG emissions from a proposal will be considered where they are reasonably likely to exceed: • 100,000 tonnes CO2-e of scope 1 emissions in any year; or • 100,000 tonnes CO2-e of scope 2 emissions in any year. Even with the consideration of the estimated annual concrete generation, the Project is below this threshold and therefore the GHG emissions from the Project are not considered significant. The Project's GHG emissions will be reported on an annual basis as part of the National Greenhouse and Energy Reporting Scheme (NGER), which will be in line with Site Licence requirements and managed through the DWER.
The proposal – Social Surroundings			
No.	**Submitter**	**Submission and/or issue**	
36.	ANON-D6CH-YSKJ-6	Proposed elevations appear to indicate that the highest point will be above the natural ridgeline. What are the potential impacts on visual amenity to nearby residents, and if there is increased potential for other impacts as a result of change in elevation.	The EMRC and our team of specialist consultants has assessed all potential risks associated with the proposed locations and design. In determining the preferred location and design for the APCr immobilisation plant, EMRC gave careful consideration to minimising potential visual amenity impacts as a result of this Project. The proposed location for the APCr immobilisation plant is one of the lower parts of the RHWMF site and also well screened by mature trees on all sides. It is anticipated that the APCr immobilisation plant will have a maximum height less than 15m and will not break the natural ridge line. The proposed final landfill formations will not be higher than existing Class III landfill formation. If it does become visible to surrounding land users, it should be noted that once the landfill has reached capacity it is rehabilitated with native vegetation from local seed mix and selective tubestock.
37.	ANON-D6CH-YSKJ-6	In addition to noise potentially produced by EMRC, the submitter also has concerns regarding increased traffic noise should the project be approved noting that the submitter states that traffic noise experienced at residents properties has already increased significantly over the past few years.	Traffic management is not a factor considered by the EPA. Instead, this will be managed through the DWER approval process. With regards to the external road network, it is estimated that initially two extra trucks per day, 5-6 days a week will be entering RHWMF to drop-off APCr material at the Immobilisation Plant. Currently, 110 refuse collection vehicles (RCVs) from the City of Swan and 30 RCVs from the Shire of Mundaring enter the RHWMF to dispose of waste from their collection runs. Once the Rockingham WtE facility is operational, those RCVs will no longer be travelling on Toodyay Rd. Therefore, the immediate extranal road network outside of RHWMF will experience a significant reduction in traffic. With regards to the internal road network, any potential impacts and noise mitigation measures will be discussed with the DWER during its assessment process.
The proposal – Human Health			
No.	**Submitter**	**Submission and/or issue**	
38.	ANON-D6CH-YSKB-X	The Proposal sets a precedent for acceptance of other Class V wastes. The submitter wants assurances that other Class V wastes will not be accepted to RHWMF in the future, for example, waste from mineral sands processing. Contaminated Sites database recognises that radioactive waste has been accepted at RHWMF and this is also supported by Parliamentary records A39 S1 20140801 p4788d-4789a.pdf	The waste acceptance requirements are outlined in RHWMF's Site Licence. Any time a new waste stream wants to be added, a licence amendment is required through the DWER and an application and risk assessment is submitted which will be assessed through DWER's standard framework. EMRC has only applied to accept the APCr material to treat it, downgrading it to a Class III/IV before it is disposed of in a double-composite lined Class IV landfill cell.
39.	ANON-D6CH-YSKB-X	RHWMF has a history of containment failures. In 2004, Class III and IV containment cells at RHWMF were found to have been leaking, sending a plume of metals contamination into the adjoining National Park and into groundwater. While RHWMF was also required to assess leachate and groundwater for radionuclides, given the 2004 contamination event, it is not clear from the Contaminated Sites Database records whether this monitoring has been undertaken. Moreover, the submitter questions whether DWER or EMRC have the necessary expertise to carry out monitoring for radionuclides or for other intractable wastes.	The breach mentioned occurred in the old historic Class III landfill cells and it was maintained within the Site boundary with no migration offsite. Landfill design and technology has advanced in the last 20 years. The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.

40.	ANON-D6CH-YSKT-G	U- and Th-series radionuclides, by virtue of U and Th-series radionuclides tending to be concentrated in the combustion residue components, a full series count is required to determine activity.	The testing that was undertaken as part of the approvals application for this Project, the total or ASLP tests using DI water did not record concentrations of U or Th above LOR in raw or treated APCr. Radionuclides will only arise if items like smoke detectors are disposed of in waste; however, the WtE facility has a nuclear gauge on the weighbridge to detect these contaminants and reject them. The monitoring and testing for these parameters is undertaken at the WTE facility. The weighbridge into the WTE has a radiation detector and management measures are in place if it is detected. A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. In addition, the immobilisation process stabilises the APCr material in low-heat concrete regardless of whether the material's chemical characteristics fluctuate, and all the same health and safety measures are followed since they are developed assuming the worse-case, high risk scenario.
The proposal – Other			
No.	**Submitter**	**Submission and/or issue**	
41.	ANON-D6CH-YSKV-J	Class V waste is the most toxic category of waste. Otherwise known as incinerator fly ash, this highly hazardous material contains persistent organic pollutants such as Dioxins, Furans and brominated dioxins, PFAS, microplastics and a range of heavy metals including cadmium, zinc and chromium. The operators of the WtE facilities located south of Perth and EMRC (as proponent of the Red Hill 'solution' to the waste problem posed by these incinerators) are willing to truck this highly hazardous waste through the suburbs of Perth. Where is the emergency response plan and traffic management plan for transporting that hazardous waste?	EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will be incorporated in RHWMF's existing Emergency Response Plan to ensure there are contingencies for managing exposure, spills, etc. It should be noted that EMRC only manages the APCr material once it is onsite. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. All APCr generators will undertake periodic laboratory testing on the raw APCr to verify continuing compliance with the ash characterisation plan at a specified interval prior to transport and acceptance at the RHWMF. The laboratory results will be submitted to the RHWMF at each testing interval to confirm the characteristics of the materials been accepted at the Site.
42.	ANON-D6CH-YSKT-G ANON-D6CH-YSKC-Y ANON-D6CH-YSKP-C ANON-D6CH-YSKA-W ANON-D6CH-YSK2-E ANON-D6CH-YSKJ-6 ANON-D6CH-YSKH-4	Section 7 of the Environmental Assessment and Management Plan document cites "The EMRC understands the importance of undertaking stakeholder and community engagement and ensure ongoing consultation for all new projects and developments at the RHWMF. The EMRC has been proactive in consulting both government authorities and the community regarding the Project". However, it appears that the only consultation that has occurred were once-off information sessions held by the EMRC for the Waste Management Community Reference Group (WMCRG) and the Gidgegannup Progress Association (GPA) in 2021. It is worth noting that this occurred over three years ago, with many residents moving in and out of the area during this time. In addition, the GPA consists of 10 members of the community, and a once off consultation with this group should not be considered extensive. The submitter advises that no direct notification or consultation has been undertaken with nearby residences, and residents were unaware of the proposal until late in the public review period, finding out only by chance through a post on the local community Facebook page. To date, the submitter states that residents have seen no advertisements or similar undertaken directly by the proponent. The information itself is spread over no less than 9 documents, which are highly technical in nature, and in some cases, difficult to read due to poor wording and structure. This presents an additional barrier for members of the general public to understand the proposal and its implications. Combined with short period for comment, lack of notification/advertisement and the timing of the public comment period, The submitter would consider the public consultation for this project as insufficient at best and at odds with the claims of "proactive" community consultation cited above.	Community consultation has been held with Waste Management Community Reference Group (WMCRG) in more recent times since the 2021 consultation referenced. Consultation with this group occurered in August 2023 and again in February 2024. In addition to the WMCRG consultation, wider consultation was held at the Red Hill Waste Management Facility Education Centre for local residents and local community groups in February 2023, in March 2023 and again in February 2024. To ensure local residents were aware of these consultation sessions letter drops were done and also emails were sent to all local residents who were in the EMRC's community database.
43.	ANON-D6CH-YSKB-X	The submitter is concerned about the collection, immobilisation and disposal of Class V wastes at a site not originally designed to accept these kinds of wastes. Content of the intractable incinerator waste is not presently known. Apart from knowing that the APCr will be classified as intractable waste, there is little information available on the composition of the waste that will be received at RHWMF. Presently, the characterisation criteria of raw APCr are not known because the WtE facilities in Kwinana and East Rockingham are not yet operational. The WtE facility PER document has suggested that "…at a minimum, monthly testing is conducted for the first year of the facility's operations to determine the particle size and composition…" (WtE ERD p7). Accordingly, it cannot be determined with any certainty the kinds of treatments, management controls, and containment measures that would be required, or if the proposed controls for the waste will meet the required standards for Class IV disposal at RHWMF. It is not possible to provide an accurate risk assessment for the management controls proposed without knowing the composition of the APCr.	EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. A series of testing has been undertaken of raw APCr material as part of the approvals application process for this Project and the general composition of the APCr is known. This information has been provided to the DWER and EPA for their assessment. A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. The MASP was developed based on the APCr trial testing which was made confidential in the application since it is commercially sensitive information. Therefore, the likely composition of the APCr material is known and once EMRC begins accepting the material, it will be tested regularly to ensure that it meets Site Licence requirements. The Class IV landfill cell (both interim and dedicated solutions) will maintain a minimum separation distance of 2 meters from the groundwater. Additionally, it will be constructed with a double composite lining system to reduce the risk of contamination. This design is expected to offer adequate protection for the underlying groundwater. The Immobilisation Plant will be constructed on a reinforced concrete hardstand, equipped with a variety of drainage sumps to contain surface water and any spills. Additionally, the unloading area is bunded and also equipped with a sump to capture any contaminated water or spills. Any spills will be managed and contained using appropriate spill management equipment, cleaned up and materials disposed to Class IV landfill, ensuring effective spill response and minimising environmental impact. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. In the rare event that a spill does occur, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF. It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.

44.	ANON-D6CH-YSKT-G	The mineralogy of both the fly ash and post APCR (suitably aged) should be determined to understand the potential range of host/adsorbent phases present Calcined magnesia (MgO) should also be considered for addition to the APCr. This provides a superior pH buffering material to lime with a lower leachate pH than lime (thus limiting mobility/leaching of amphoteric and anionic compounds) and its reaction, unlike lime, its reaction is mediated by a passivating surface layer. The resulting mineralogy from MgO addition, including a range of Layered Double Hydroxide (LDH) phases, is considered advantageous over those LDH minerals such as ettringite forming from lime addition alone. A final pH of ca. 11-12 of the APCr would seem to be very high and not optimised to contaminant retention. This final pH cannot from LEAF trials be considered to be a "favourable result" even if an evaporation leachate disposal pathway is proposed. Hence, modelling of leachate geochemistry should also include the calculation of Saturation Indices for major minerals to determine those that will influence major and trace element mobility from the APCr. Similarly, geochemical modelling of evaporation scenarios should be undertaken and results analysed.	EMRC acknowledges that MgO was considered as part of the treatment process for the raw APCr material however it is more expensive and harder to obtain than lime. Based on the testing undertaken as part of the approval application process for this Project, lime was considered to be sufficient as part of the treatment process. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF and the Site Licence. The EMRC will consider any requirements that the EPA and DWER outline in their Ministerial Statement and Site Licence conditions, respectively.
45.	ANON-D6CH-YSKT-G	Metals vs Metalloids. Arsenic (As) is not a metal, nor a heavy metal, but is a metalloid. It is a cause for concern when basic errors are contained in a report. The report should be revised accordingly.	In the DWER's Guideline - Assessment and Management of Contaminated Sites (2021), metals and metalloids are grouped together as one assessment/analysis suite and tends to be regarded as a heavy metal. Regardless, EMRC acknowledges this minor oversight; however, as this is an academic point, it does not make a difference with regards to the arguments and findings of the Project.
46.	ANON-D6CH-YSKT-G ANON-D6CH-YSKC-Y ANON-D6CH-YSKP-C ANON-D6CH-YSKA-W ANON-D6CH-YSK2-E ANON-D6CH-YSKJ-6 ANON-D6CH-YSKH-4	The 2-week public submission period during the middle of the Christmas and summer school holiday period was not adequate. The proposal needs to be refused - or deferred and re-submitted with appropriate time and public information supporting it, to enable a considered and careful response by those who could be impacted. Specifically, we respectfully ask, if a deferral is chosen, that the proposal is re-summited with a more considerate response timeline. The two-week time frame, applied over a busy time of year when many people are on holiday, pays lip service to the perception of community input and participation, as well as the notion of social licence. Unfortunately, this reinforces a perception that it is intended to reduce the capacity for members of the community to respond. When the United Nations Special Rapporteur on Toxics and Human Rights, Dr Marcos Orellana, visited Australia in 2023, his End of Mission Statement, stated: Underlying the distance between the State and communities is the perception of tokenistic engagement. When public participation is reduced to a checklist, instead of being conducive to genuine dialogue, then one of the fundamental pillars of sustainable development begins to collapse. And when that happens, dialogue is replaced by anger and distrust. (p.2, 3) The submitters have expressed their concerns regarding the lack of consultation that has been undertaken for this project.	Community consultation has been held with Waste Management Community Reference Group (WMCRG) in more recent times since the 2021 consultation referenced. Consultation with this group occurered in August 2023 and again in February 2024. In addition to the WMCRG consultation, wider consultation was held at the Red Hill Waste Management Facility Education Centre for local residents and local community groups in February 2023, in March 2023 and again in February 2024. To ensure local residents were aware of these consultation sessions letter drops were done and also emails were sent to all local residents who were in the EMRC's community database.
47.	ANON-D6CH-YSKP-C	In addition to limited and unfair timing of the submission opportunity, Mundaring, Parkerville and Stoneville, and Mt Helena residents, who will border or live within proximity of fumes and fallout from this plant, have been denied direct access to hard copies of this plan. None has been made available to Mundaring Library (yet distributed much further out), thereby denying those, who could be impacted most, access to vital information in a hard copy form that would suit many of the older demographic of this region. They have been denied a fair and equitable opportunity to be informed and to respond, and this serious 'oversight' requires to be remedied. This application needs to be, at the very least, deferred indefinitely due to insufficient distribution of pertinent information to the specific local community, which would be most impacted by this plant.	Community consultation has been held with Waste Management Community Reference Group (WMCRG) in more recent times since the 2021 consultation referenced. Consultation with this group occurered in August 2023 and again in February 2024. In addition to the WMCRG consultation, wider consultation was held at the Red Hill Waste Management Facility Education Centre for local residents and local community groups in February 2023, in March 2023 and again in February 2024. To ensure local residents were aware of these consultation sessions letter drops were done and also emails were sent to all local residents who were in the EMRC's community database.
48.	ANON-D6CH-YSKU-H ANON-D6CH-YSKJ-6	Section 2.2.2 stated that the "preferred and proposed Dedicated Solution for the APCr is disposed into a Class IV landfill designed and constructed to best practice standards". This implies that the interim solution, where APCr will be stored in an existing Stage 2 Class IV landfill cell, is not considered to be best practice for the proposed purpose. The reason for this is stated in 2.1: "the Project Team believe that due to the significant time constraints associated with the pending generation of APCr from the Kwinana WtE, the Interim Disposal Solution can be regarded as the only viable appropriate disposal option for the treated APCr at this stage". It is anticipated that the Dedicated Solution will take approximately 2 years to construct. It could be 3 years or more. The proposal does not provide anything to justify the increased risk of catastrophic contamination of surrounding residential areas and water catchments. The project has been cited as an interim solution to "provide the EMRC with sufficient time to deliver the Dedicated Solution including design, approvals and construction" noting that "...EMRC's priority to ensure the Dedicated Solution is implemented as soon as possible." This raises questions as to whether the project proposed has adequately considered the potential impacts or if the design and impact assessment process has been "rushed". Specifically, if any issues are found through the assessment of the Dedicated Solution, how would potential legacy impacts from the interim solution be addressed?	The Class IV landfill cell (both interim and dedicated solutions) will be double-composite lined, consisting of a primary and a secondary liner with a leak detection layer between the composite liner, to provide a higher level of protection to the environment in comparison to a single composite. Double composite lining system includes a primary and secondary geosynthetic clay liner (GCL), a primary and secondary high-density polyethylene (HDPE) geomembrane, cushion/protection geotextile, and a drainage geocomposite leak detection layer between the composite liners. The primary lining system has direct contact with the leachate produced from the waste mass, while the secondary lining system is considered a failsafe if the primary liner was to lose its integrity. The proposed basal lining system adheres with the Class IV requirements of the Best Practice Landfill Standards which are also consistent with international standards for hazardous waste landfill cells. Any legacy impacts will be managed through the DWER and the Site Licence. EMRC will be required to submit all monitoring and reporting to the DWER on an annual basis during the life of the Project.
49.	ANON-D6CH-YSKH-4 ANON-D6CH-YSKB-X	No amount of reassurances in relation to safety procedures & protocols to be followed in relation to the handling of this material can be trusted, there will always be the huge possibility of both human error & faults within the equipment/concrete materials containing the waste. The Proposal is poorly placed in a geologically active area and near a large human population who will all be placed at risk if there was an accident to occur with this material & it poses a detrimental environmental threat to John Forrest National Park. Surely there are disposal sites that are far more suitable that do not pose such a threat to people & the surrounding local environment, also ones that do not involve large amounts of travel.	As mentioned in the proposal, EMRC has considered separation distance to sensitive receptors as outlined in EPA's Guidance Statement no.3 (2005). The separation distances from the proposed Immobilisation Plant and existing Stage 2 Class IV landfill to the nearest rural residences is approximately 900 and 620m respectively. The eastern edge of the proposed Class IV APCr monocell is adjacent to the 500m internal buffer from the eastern boundary of the RHWMF and the Site's closest residential premises, noting that no waste disposal activities will occur within the 500m buffer. The separation distance from the Class IV APCR monocell is approximately 520m to the nearest sensitive receptor. Thus, all proposed infrastructure for the Project is well sited as per the Guidelines. Additionally, this type of waste is only allowed to be disposed at a Class IV or V facility as per DWER's requirements. EMRC RHWMF is the only waste management location in Perth metropolitan area that is licensed to receive Class IV waste. The second nearest facility is Sandy Ridge, which is located approximately 600km away from the Perth metropolitan area. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. Lastly, the RHWMF is not located a geologically active area according to the seismic hazard mapping in Australian Standard 1170.4 and the population density within the Perth hills would be considered low with less than 500 ppl per one square kilometre according the Australian Bureau of Statistics.
50.	ANON-D6CH-YSKP-C ANON-D6CH-YSK4-G	The proposed (unresolved) 'North Stoneville' townsite (Roland Rd) is just minutes from this proposed plant. The SAT appeal hearing into this proposed development (North Stoneville - SP34) is scheduled to be heard over 4 weeks, in September 2025. If the appeal is upheld and the development proceeds, a further 3000+ EXTRA people (in addition to current population), would be put at potential risk and / or impacted by this proposed plant. Bushfire risk is a paramount consideration - with traffic gridlock an identified high risk of this townsite proposal. If a bushfire emergency, involving the adjacent John Forrest National Park occurs, compromising any EMRC operations involving Class 4 materials at Red Hill, an additional 3000+ people will be at risk. On that basis, the application requires indefinite deferment to await the SAT outcome.	The proposed North Stoneville development is located approximately 2km away from RHWMF boundary. The Department of Biodiversity, Conservation and Attractions' (DBCA) prescribed burning program protects lives, property and infrastructure from bushfires through a carefully planned regime of controlled burns. These controlled or planned burns create and maintain Asset Protection Zones, a low-fuel area around buildings. The benefits of prescribed burning include lower fuel loads across larger areas of the WA's south-west helping the department to reduce the severity and size of bushfires. In addition, the development of 'North Stoneville' townsite is yet to be approved and there is not a guarantee that it will. EMRC will continue to observe the development, and will adjustment any procedures as needed and in consultation with the DWER.

51.	ANON-D6CH-YSKV-J ANON-D6CH-YSKA-W ANON-D6CH-YSK2-E	Both WtE projects in Kwinana and East Rockingham boast on their website that incinerating waste diverts it from landfill but, as this proposal demonstrates, incinerators do not eliminate landfills. Instead, they turn about 25% (by volume) of normal municipal waste into highly hazardous waste ash requiring further treatment and a secure hazardous waste landfill – a toxic legacy for future generations. As the East Rockingham WtE facility is currently in administration and the Kwinana facility is yet to be completed, now is the time to reconsider waste management in metropolitan Perth. For example, food and garden organics (which form a large component of municipal waste) should be diverted to commercial composting facilities rather than being burnt. And yet some of the Councils who are contracted to provide waste to the WtE facilities are refusing to introduce FOGO bins. Class 5 waste otherwise known as incinerator fly ash, is the most toxic category of waste as it contains persistent organic pollutants such as Dioxins, Furans and brominated dioxins, PFAS, microplastics and a range of heavy metals including cadmium, zinc and chromium. The proposed facility already has a record of leaching toxic substances into the environment and if approved this facility will pose a significant to anything in close proximity, including nearby dwellings.	As mentioned in the proposal, EMRC has considered separation distance to sensitive receptors as outlined in EPA's Guidance Statement no.3 (2005). The separation distances from the proposed Immobilisation Plant and existing Stage 2 Class IV landfill to the nearest rural residences is approximately 900 and 620m respectively. The eastern edge of the proposed Class IV APCr monocell is adjacent to the 500m internal buffer from the eastern boundary of the RHWMF and the Site's closest residential premises, noting that no waste disposal activities will occur within the 500m buffer. The separation distance from the Class IV APCR monocell is approximately 520m to the nearest sensitive receptor. Thus, all proposed infrastructure for the Project is well sited as per the Guidelines. Additionally, this type of waste is only allowed to be disposed at a Class IV or V facility as per DWER's requirements. EMRC RHWMF is the only waste management location in Perth metropolitan area that is licensed to receive Class IV waste. The second nearest facility is Sandy Ridge, which is located approximately 600km away from the Perth metropolitan area. EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. It should be noted that at the time of this response, Kwinana WtE facility is in its commissioning phase and the East Rockingham WtE facility is under construction whist under the supervision of administrators.
52.	ANON-D6CH-YSKA-W ANON-D6CH-YSK2-E	In his 2024 presentation to the UN, Marcos Orellana's, Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes stated that: 'While waste incineration could reduce the volume of waste going to landfill sites, even the most modern incinerators impose heavy environmental and health costs.' (p.14). He also noted that 'waste incineration is the end of the line for fossil fuels. It reflects a linear process that is incompatible with a chemically safe circular economy'. (p.14) One of his many recommendations was 'to transition to zero waste and a chemically safe circular economy, and to make the right to live in a toxic-free environment a reality for all'. (p.19). I strongly support this recommendation and find it hard to believe that any government truly committed to a circular economy would permit such a dangerous process as proposed by this development.	EMRC acknowledges this comment; however, it is noted that it does not directly discuss the proposed Project. It should be noted that the two WtE facilities have to comply with EPA/DWER emission limits, based around their own site-specific health assessments.
53.	ANON-D6CH-YSK1-D	This project is more factually described as a project to build and operate a Class 5 hazardous waste processing facility and associated Class 4 disposal cell. As such this project has not been adequately described as a Prescribed Premises (part 1. high risk) project nor has the proponent provided the necessary associated assessments and reports for the EPA to be able to adequately assess the project for both a works approval and license under the WA EP Act. The DWER's regulatory role is defined under the EP Act. https://www.wa.gov.au/government/publications/regulatory-services- fact-sheet As a prescribed premises – a class 5 hazardous waste processing facility – this project requires a works approval and license. Given the project has not been correctly described, it should be given a full and separate PER to the original waste to energy incinerator project by New Energy, given that the Rockingham incinerator owners and operators will not be the proponent or operator for this project. It appears (although it is unclear) that the EPA is merely assessing this project as a referral with additional advice to the original PER. This is a separate project to the New Energy waste to energy incinerator project. Furthermore, the fact that the documentation submitted to the EPA by the EMRC includes (grossly inadequate) APCr data reports from an unrelated and barely operational existing facility, critical information needed for any assessment of the handling, management, use and disposal of class 5 hazardous waste, only adds to the lack of credibility and failure of this project.	RHWMF is already licenced as a Class IV landfill facility. EMRC will be allowed to accept this specific Class IV/V waste stream on the condition that the material undergoes a suitable treatment to reduce its classification from Class V to Class IV in accordance with WA's Waste Classification Guidelines. The treatment process involves mixing APCr with cement and water to generate a low-heat concrete, thereby immobilising the material and altering its physical and chemical properties. The treated APCr material can then be disposed of into a Class IV landfill cell at RHWMF. Some redactions of the application were required due to proprietary (commercially sensitive) information contained with the documentation. However, the EPA and DWER have reviewed the application in its entirety and are making their assessments based on all available information, including detailed information on the APCr composition.
54.	ANON-D6CH-YSK1-D	According to the DWER's own guidelines for the regulation of industry a Critical Containment Infrastructure Assessment is required but this has not been provided by the proponent. A hazardous waste processing facility would be expected to provide such as assessment given the high risk associated with this kind of prescribed premises. As the DWER notes: *Similar to the Environmental Compliance Report, the CCIR may require a declaration from a professional with suitable qualifications or experience, to confirm that each item or component of infrastructure has been constructed with no material defects, and that all works approval conditions relating to the construction and installation of the infrastructure have been complied with. Where this is required, it will be detailed in the conditions of the works approval .* This assessment is extremely important given the location of the hazardous waste processing facility which is located very close to the Food and Organics processing site. It seems unbelievable that a hazardous waste processing facility could be co-located on the same site as a composting facility where the compost is sold to the public and may be used for food growing. The impact of ash residues containing Dioxins, heavy metals, PFAS and microplastics, could be significant and extremely harmful to the public, yet this has not been assessed. Similarly, the location of this project on a site that has existing contamination issues, both above and below ground, where the public are invited and attend regularly, where workers are located for long periods of time, where vehicles access and where environmental rehabilitation is occurring, adjacent to a national park, all points to this project being in the wrong place.	Critical Containment Infrastructure Report (CCIR) is only completed following construction. The specific deadline depends on regulatory approvals and Site Licence conditions set by DWER. DWER currently has the report from the interim solution (Stage 2 Class IV cell) and it will receive one for the dedicated solution when constructed (monocell). As mentioned in the proposal, EMRC has considered separation distance to sensitive receptors as outlined in EPA's Guidance Statement no.3 (2005). The separation distances from the proposed Immobilisation Plant and existing Stage 2 Class IV landfill to the nearest rural residences is approximately 900 and 620m respectively. The eastern edge of the proposed Class IV APCr monocell is adjacent to the 500m internal buffer from the eastern boundary of the RHWMF and the Site's closest residential premises, noting that no waste disposal activities will occur within the 500m buffer. The separation distance from the Class IV APCR monocell is approximately 520m to the nearest sensitive receptor. Thus, all proposed infrastructure for the Project is well sited as per the Guidelines. The composting facility at RHWMF is in a separate part of the Site from the proposed infrastructure for this Project. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur, but there is a contingency for any spills to be appropriately managed to limit risk to environment and health and safety of Site staff.
55.	ANON-D6CH-YSK1-D	It is clear that climate change impacts are occurring in Australia and globally, at increasing frequency and severity. This is an issue that can no longer be ignored and must be included in any assessment of high- risk projects such as hazardous waste processing facilities and disposal sites, that are sited on unstable geological ground, on steep inclines overlooking our city. The proponents environmental review documents have not addressed this issue. International experts are warning that national and subnational governments should address the issue of climate threats and associated disasters through coordinated implementation of associated conventions and dedicated inventories and databases of Persistent Organic Pollutant sources including hazardous waste sites. They conclude in their recent paper: Addressing the pollution risks and mitigation within the synergy of chemicals and climate change conventions Climate change has important implications for the release of POPs, heavy metals and other PBTs from contaminant reservoirs. Conventions have been established for globally addressing climate change challenges, and POPs and mercury pollution. For effectively addressing the Triple Planetary Crises (UNEP 2020), coordinated implementation of Conventions and synergies of climate change conventions and chemical conventions are needed (UNEP 2021). The Stockholm Convention on	EMRC acknowledges this comment; however, it is noted that it does not directly discuss the proposed Project. RHWMF is already licenced as a Class IV landfill facility. EMRC provides no further response.

		POPs and the Minamata Convention on mercury are both triggering global inventory and management activities for POPs for 186 and for mercury for 147 parties/countries, respectively. The inventory activities for POPs and mercury in these countries also trigger contaminated sites inventories, which – considering the synergy with the climate change convention – should be included in the assessment of the climate change risk and impacts described above. For both chemical conventions contaminated sites guidance documents have been developed (UNEP 2019d; UNEP 2025a). The BAT/BEP guidance on POPs contaminated sites (UNEP 2025a) include dedicated paragraphs (e.g. conceptual site model part and environmental risk assessment part) where different flooding and sea level rise aspects of POPs contaminated sites can be considered. By this guide, countries may appropriately consider the climate change risks within the assessment of POPs contaminated sites and beyond as a step towards global action. From perspective of the climate convention, the inventories and the assessments can contribute to the CIEWS and by securing and remediation also to disaster risk reduction. Furthermore, flooding risk-informed inventories of POPs and other PBTs can contribute to the impact-based people-centred Multi- Hazard Early Warning Systems, including risk for food and drinking water. This could also be an important contribution to SDG 2 (Zero Hunger), SDG3 (Good Health and Well-Being) and SDG (Clean Water). Reference: Weber R, Girones L, Förstner U, Tysklind M, Laner D, Hollert H, Forter M, Vijgen J (2025) Review on the need for inventories and management of reservoirs of POPs and other persistent, bioaccumulating and toxic substances (PBTs) in the face of climate change. Environ Sci Eur. Accepted. (will be open access) Further information on the potential impacts of floods on contaminated sites and hazardous waste sites can be found here: Crawford SE, Brinkmann M, Ouellet JD, Lehmkuhl F, Reicherter K, Schwarzbauer J, Bellanova P, Letmathe P, Blank LM, Weber R, Brack W, van Dongen JT, Menzel L, Hecker M, Schüttrumpf H, Hollert H. (2021)	
		Remobilization of pollutants during extreme flood events poses severe risks to human and environmental health. J Hazard Mater. 421, 126691. doi: 10.1016/j.jhazmat.2021.126691 The location of hazardous waste facilities in Western Australia requires much more consideration. The best way to resolve the generation of hazardous waste is to not produce it in the first place. The Rockingham waste to energy facility has no real justification or benefit for Western Australia and should be prevented. The WA government should instead invest in safer, non-combustion technologies to safely dispose of problematic wastes, which can include residual MSW, industrial and mining wastes, agricultural waste, chemical waste and hazardous wastes – wastes that are set to increase through WA's mining and mineral and rare earth processing, plastics, batteries, tyres and chemicals processing. These non-combustion technologies do not generate toxic air emissions or hazardous waste ash. This is a far greater (and relatively cheaper) investment for the government to invite into Western Australia and would fit with the governments claims of pursuing a green energy and manufacturing future. You can find more on these technologies here: https://ipen.org/documents/non-combustion-technology-already- available https://ipen.org/documents/non-combustion-technology-pops-waste- destruction https://ipen.org/non-combustion-techniques	
56.	ANON-D6CH-YSK1-D ANON-D6CH-YSKB-X ANON-D6CH-YSKA-W ANON-D6CH-YSKK-7	The handling, loading, unloading and processing of the APCr from the incinerator site to the hazardous waste processing site has the potential to create significant public health and environmental risks. This has not been addressed in the proponent's environmental review documents. The Proposal relies on the transport of Class V intractable waste through Perth. The 66 km transport route for the intractable waste from industrial areas in East Rockingham/Kwinana to RHWMF will be through environmentally sensitive areas, including wetlands (e.g., the Spectacles and Brixton Street Wetlands) and river systems (Canning R. and Helena R.) and through the densely populated suburbs of metropolitan Perth. The journey from the incinerator to the Redhill waste management facility goes through numerous residential areas, significant and sensitive natural environments posing a significant potential risk to the John Forest National Park. The significant risks posed during the transfer of ash into the cement hopper and the transit into and out of the hazardous waste processing facility have not been adequately addressed. Yet there is no public health or ecological emergency response plan provided or referred to. Should there be an accident or failure of the vehicle to contain the hazardous waste ash, significant public health and environmental impacts could occur. Ash is highly hazardous and extremely difficult, if not impossible, to clean up. The environmental impacts could be catastrophic and irreversible. Anecdotal evidence from existing cement operators has shown significant leakage and offsite dust impacts at all stages of the transport and processing of cement.	EMRC acknowledges this comment; however, it is noted that it does not directly discuss the proposed Project since the transport of the material to Site is not within EMRC's purview. The transport contractor will have to comply with transport regulations and have a safety management plan to deal with any traffic incidents/loss of containment and they will be using main roads for the transport along with all other dangerous goods transport (petrol, diesel, chemicals and so on) Regardless, EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material once it arrived onsite. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. All APCr generators will undertake periodic laboratory testing on the raw APCr to verify continuing compliance with the ash characterisation plan at a specified interval prior to transport and acceptance at the RHWMF. The laboratory results will be submitted to the RHWMF at each testing interval to confirm the characteristics of the materials been accepted at the Site. It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.
57.	ANON-D6CH-YSKR-E ANON-D6CH-YSKU-H ANON-D6CH-YSKB-X	Toxic waste in the form of ash being transported on roads, in trucks, across the city, is a disaster waiting to happen, eg. accidents, human fallibility, mechanical breakdowns, etc. The Proposal will involve the transport of intractable waste past sensitive environmental receptors and through densely populated areas of Perth. The transport route will also take intractable wastes through environmentally sensitive areas. According to section 2.8 of the proposal, each truck will carry 27 tonnes of the Class V powder on public roads between Kwinana/East Rockingham and Red Hill. To deliver the 50,000 tonnes per year there would be 5 trucks a day 7 days a week. If one of these trucks were to crash and the tanker was compromised the result would be a catastrophic exposure for surrounding residents and environment to this extremely concentrated and harmful wind borne and water-soluble powder. Remediation would be next to impossible. These risks would have been eliminated by constructing the Immobilisation Plant at the site of the incinerator. The controls related to the Proposal should also include specific public health and surface waters risk assessments for the transport route.	EMRC only manages the APCr material once it is onsite. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. All APCr generators will undertake periodic laboratory testing on the raw APCr to verify continuing compliance with the ash characterisation plan at a specified interval prior to transport and acceptance at the RHWMF. The laboratory results will be submitted to the RHWMF at each testing interval to confirm the characteristics of the materials been accepted at the Site. A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures. Transport will occur using 27-tonne capacity pneumatic dry powder tanker trailers (or similar) operating in accordance with the Dangerous Goods Safety (Storage and Handling of Non explosives) Regulations 2007. The carrier will hold a bulk controlled waste driver licence and a bulk controlled waste vehicle or tank licence as per the Controlled Waste Regulations. The APCr and cement will be transferred from controlled waste vehicles into designated storage silos using a sealed vacuum system. It should be noted that according to WA's Waste Classification Guidelines, "intractable waste" means waste whose toxicity or chemical or physical characteristics make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities. Waste that is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely and is not suitable for disposal in a Class I, II, III or IV landfill. Provided there is no practical alternative destruction or treatment technology, these are disposed of in Class V facilities. APCr material is not considered an "intractable waste" by the WA regulatory bodies. It is instead a Class V/IV waste that will be treated to a Class IV/III level through immobilisation in low-heat concrete.

58.	ANON-D6CH-YSKK-7	Whilst Powder (Pressure Tankers) are commonly used for the transport of materials such as food enzymes, powdered cement and lime, they are not immune to issues with product leakages, spillage and can also present serious risks at road accidents. Powder (Pressure Tankers) are subject to rollovers, sideswipes and other vehicle impacts that may breech or tear the tanker shells open and result in significant roadside and/or waterway pollution. Any accident involving cement or lime is likely to have a serious impact upon the local environment, however, forever chemicals such as Class 5 – Hazardous Toxic Waste Materials, are almost impossible to clean up and remove from site without any remaining contamination. Closed tippers are also not an option for the transport of Class 5 – Hazardous Toxic Waste Materials as they will leak waste materials during transport and when discharging into feed hoppers. Powder (Pressure Tankers) are a better transport solution than closed tippers.	EMRC only manages the APCr material once it is onsite. The transport contractor will have to comply with transport regulations and have a safety management plan to deal with any traffic incidents/loss of containment and they will be using main roads for the transport along with all other dangerous goods transport (petrol, diesel, chemicals and so on). In general, the tankers would be designed to withstand significant impacts, such as rollovers. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. All APCr generators will undertake periodic laboratory testing on the raw APCr to verify continuing compliance with the ash characterisation plan at a specified interval prior to transport and acceptance at the RHWMF. The laboratory results will be submitted to the RHWMF at each testing interval to confirm the characteristics of the materials been accepted at the Site. A material acceptance and sampling plan (MASP) has been provided to the EPA as part of the approval process. This MASP was prepared to guide APCr treatment and disposal procedures at the EMRC's RHWMF in order to: • Document the duty of care in receipt of the raw APCr from Avertas; • Minimise the risk of unacceptable material being treated or disposed of at the RHWMF; • Confirm Waste Acceptance process and periods during the WtE facility lifecycle; • Provide sampling and testing requirements; and • Provide ongoing documentation procedures.
59.	ANON-D6CH-YSKJ-6	Regarding traffic on Toodyay Road: with multiple collisions, in some cases involving vehicles entering/leaving EMRC, has sufficient consideration been given to potential increased traffic, specifically heavy vehicles along Toodyay Road?	Traffic management is not a factor considered by the EPA. Instead, this will be managed through the DWER approval process. With regards to the external road network, it is estimated that initially two extra trucks per day, 5-6 days a week will be entering RHWMF to drop-off APCr material at the Immobilisation Plant. Currently, 110 refuse collection vehicles (RCVs) from the City of Swan and 30 RCVs from the Shire of Mundaring enter the RHWMF to dispose of waste from their collection runs. Once the Rockingham WtE facility is operational, those RCVs will no longer be travelling on Toodyay Rd. Therefore, the immediate extranal road network outside of RHWMF will experience a significant reduction in traffic.
60.	ANON-D6CH-YSKK-7	The EMRC consultants have failed to prepare and submit a detailed Emergency Hazard Response & Recovery Plan for the Transport of Class 5 – Hazardous Toxic Waste Materials. This omission by the consultants does not mean that the transport method is considered to be safe and will not harm the environment should an accident occur. Any accident resulting in any damage to Powder (Pressure Tankers) or closed tippers loaded with Class 5 Hazardous Toxic Waste Material will contaminate the local environment.	EMRC only handles the processing onsite. All risks associated with the transport of the raw APCr are the responsibility of the APCr generator and/or designated transport contractor. The transport contractor will have to comply with transport regulations and have a safety management plan to deal with any traffic incidents/loss of containment and they will be using main roads for the transport along with all other dangerous goods transport (petrol, diesel, chemicals and so on) . In general, the tankers would be designed to withstand significant impacts, such as rollovers.
61.	ANON-D6CH-YSKB-X	The management of the long-term security of the waste containment and the risks/impacts associated with the Proposal will become the responsibility of future generations. The principle of intergenerational equity should be applied to the Proposal.	As the Class IV landfill is filled to its final fill profile, it will be permanently capped progressively in accordance with modern best practices guidelines for landfills which is consistent with international standards. This approach will ensure that all potential impacts are minimised to appropriate standards. The DWER will be notified at each stage of the capping process and the after-care period will be managed by the EMRC and DWER through the Site Licence. Post-closure site management has already been factored in by the EMRC. The Site is already registered under the Contaminated Sites Act 2003, which will ensure that long-term management is maintained.
62.	ANON-D6CH-YSK2-E	Why should the eastern suburbs and hills area be made responsible for the toxic legacy out of Rockingham? Why was there no plan to accommodate closer landfill requirements in the initial stages of the incinerator development?	The APCr material that is currently being generated within WA is being transported to Tellus' Sandy Ridge Class V facility which is approximately 600km one-way from the Kwinana/Rockingham area. EMRC is offering a better long-term environmentally sustainable solution as RHWMF is the only waste management location in Perth metropolitan area that is licensed to receive Class IV waste. It should be noted that City of Swan, Shire of Mundaring, City of Kalamunda and City of Belmont are all participants in the East Rockingham WtE facility with waste supply agreements in place.
63.	ANON-D6CH-YSKP-C	The submitter is dedicated to keeping the region safe from bushfire threats (including 'planning and development' threats that could escalate the bushfire risk to people). So they are extremely concerned that there is no Bushfire Management Plan (BMP) outlined in this considerable proposal, for a site that sits right alongside and is surrounded by the highly volatile, and difficult to access, John Forrest National Park. The submitter considers, strongly, that this proposal requires a BMP, as identified under the recently updated State Bushfire Planning Policy 3.7 - 'landscape bushfire risks' - which assesses an area ""external to the planning proposal"" - in this case, being a National Park. See excerpt - Page 1 DPLH Explanatory note - State Planning Policy 3.7 Bushfire and the Planning for Bushfire Guidelines: - "Broader Landscape Assessment: This assessment examines the area external to the planning proposal and provides a means of quantifying the characteristics and potential impacts of bushfire in the broader landscape when considering the suitability of a location for development, particularly at the strategic levels of land use planning. The broader landscape assessment aims to ensure the resilience of communities to increased risk of bushfire due to climate change impacts, by directing population growth towards safer locations. The methodology assesses the bushfire risk within the broader landscape to demonstrate whether a proposal can comply with Element 1: Location." (DPLH Explanatory Note Link) - chrome- extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.planning.wa. gov.au/docs/default-source/policy/spp-3-7-explanatory- note.pdf?sfvrsn=d4ec204e_8	The EMRC conducts annual walkovers to assess fuel loads, both in operational areas and Bush Lots, with the City of Swan fire department. In addition small controlled burns are normally conducted each year in specific areas, and existing fire-tracks and Firebreaks are maintained. a New firebreak was installed in Spring 2024 with another is proposed for Spring 2025. The EMRC also works with our neighbours to address their concerns. Most recently (2024) the EMRC conducted an assessment and controlled burn (Boundary of Lot 3 and Red Hill Auditorium) following concerns from the neighbouring Red Hill Auditorium. This was completed to the satisfaction of both parties. The EMRC is also attempting to obtain permission from TO's to install a new firebreak along the northern edge of Lots 3/4, bordering Toodyay Road in Spring 2025.
64.	ANON-D6CH-YSKK-7	The EMRC consultants have failed to prepare and submit any details of how to prevent or recover any spillages of any Class Hazardous Toxic Waste Materials at the WTE Loadout Facilities for either of the intended WTE sites. Powder (Pressure Tankers) are noted for spillages occurring when loading via top hatches or from discharging Class 5 – Hazardous Toxic Waste Materials into the Pressure Tanker Vessels. Any waste product overspill is likely to remain deposited outside the Powder (Pressure Tankers) and it's Prime Mover so that the dry Class 5 – Hazardous Toxic Waste Materials can be transported out of the site gates and off site and pollute the roadways enroute to the Red Hill site.	EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. The Immobilisation Plant will be constructed on a reinforced concrete hardstand, equipped with a variety of drainage sumps to contain surface water and any spills. Additionally, the unloading area is bunded and also equipped with a sump to capture any contaminated water or spills. Any spills will be managed and contained using appropriate spill management equipment, cleaned up and materials disposed to Class IV landfill, ensuring effective spill response and minimising environmental impact. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. In the rare event that a spill does occur, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF. The WtE facilities will also have processes and procedures to address spillages and clean up.
65.	ANON-D6CH-YSKK-7	The submitter objects to the Batch mixing of cement with Class 5 Hazardous Toxic Waste Material. The mixing via a pug mill to produce Class 5 Concrete Waste for onsite disposal, has (after mixing) been declassified by the EMRC down to Class 4 so that the existing Class 4 Cell can be used for the disposal of Class 5 Hazardous Toxic Waste Material.	The immobilisation of APCr material is an internationally accepted practice and a significant amount of research and trial APCr treatments were conducted by qualified professionals. Some redactions of the application were required due to proprietary (commercially sensitive) information contained with the documentation, including the aforementioned testing results. However, the EPA and DWER have reviewed the application in its entirety and are making their assessments based on all available information. In general, the raw APCr material will be classified as Class V/IV and then immobilised in low-heat concrete which downgrades the material to Class IV/III which is then disposed of in a designated Class IV landfill cell.
66.	ANON-D6CH-YSKK-7 ANON-D6CH-YSKB-X	The proposed location of the Unloading / Mixing & Batching Plant is directly adjacent to FOGO facility and Resource Recovery Centre. Any cross contamination of Class 5 Waste Material from the Unloading / Mixing & Batching Plant will impact upon the by products of the FOGO for reuse in gardens, fertilisers or organic food production. Similarly, any cross contamination of Class 5 Waste Material from the Unloading / Mixing & Batching Plant may cause serious health risks to anyone visiting or working in the Resource Recovery Centre. FOGO operations and the Immobilisation Plant should be more clearly separated. The EMRC consultants have failed to provide any management plans for safe handling or for prevention of exposures to any potential acute and/or chronic health risks to the public and/or site worker.	EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. In the rare event that a spill does occur, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF. EMRC undertakes testing of FOGO and GO products in accordance with AS4454 and as per its Site Licence. If there is any contamination, the product will not be taken offsite for use. In general, the raw APCr material will be classified as Class V/IV and then immobilised in low-heat concrete which downgrades the material to Class IV/III which is then disposed of in a designated Class IV landfill cell.

67.	ANON-D6CH-YSKH-4	The submitter is disturbed at the amount of leakages experienced at sites and the follow on effects. To think the government would place a large population at this risk as well as the surrounding environment is very disappointing. The health impacts on people are quite alarming and the submitter questions, who will pick up the costs in healthcare if there was a finding that this exposure to toxic waste was the cause? Any environmental impacts will be irreversible.	There was a previous breach which occurred in the old historic Class III landfill cells and is contained within the Site with no evidence of migration offsite. Landfill design and technology has advanced in the last 20 years. EMRC reports annually to the DWER with regards to monitoring, management and operations and any issues are addressed in a timely manner. EMRC recognises the hazardous nature of this material. Thus, EMRC is committed to apply suitable engineering design and management and monitoring system for the disposal of this material. The manufacturer of the equipment within the Immobilisation plant will provide Safe Work Method Statements and Commissioning Plan during the commissioning phase following construction. These operational procedures will ensure that overfilling and other potential spillage events are unlikely to occur. In the rare event that a spill does occur, it will be cleaned up as soon as practicably possible and materials disposed of the Class IV landfill. Any required monitoring will be covered by EMRC's ISO accredited Environment Management System for RHWMF. The Site is already registered under the Contaminated Sites Act 2003, which will ensure that long-term management is maintained. It should be noted that the population density within the Perth hills would be considered low with less than 500 ppl per one square kilometre according the Australian Bureau of Statistics.
68.	ANON-D6CH-YSK1-D	The submitter points to the Basel Convention as highlighting the practice of mixing APCr's with cement as a form of hazardous waste treatment as being "not environmentally sound". Basel Convention Technical Guidelines - https://www.basel.int/Implementation/TechnicalMatters/DevelopmentofT echnicalGuidelines/Technical Guidelines/tabid/8025/Default.aspx *65. The mixing and blending of wastes with a content of PCB, PCDD/PCDF, HCB, PeCB, or PCN above the values specified in paragraph 52 with other materials solely for the purpose of generating a mixture with a POP content at or below the values specified in paragraph 52 is not environmentally sound. Nevertheless, the mixing or blending of materials before waste treatment may be necessary in order to enable treatment or to optimize treatment efficiency* . Depositing cemented hazardous waste into a landfill is not treatment, rather it is disposal. Furthermore, the Basel and Stockholm conventions also highlight the importance of generating dedicated action plans and inventories for such hazardous waste. The proponent has not provided any such data. *71. According to Article 5, paragraph (a) (i), of the Stockholm Convention, action plans have to be developed for unintentionally produced POPs (i.e., chemicals listed in Annex C to the Convention) that should include an evaluation of current and projected releases of those chemicals, including the development and maintenance of source inventories and release estimates, taking into consideration the sources of unintentionally produced POPs listed in Annex C. Such inventories are important for identifying, quantifying and characterizing wastes.*	Considering the properties of the material and current regulatory standards, immobilisation is the most environmentally suitable method for treating APCr. This process modifies the physical and chemical characteristics of the material, enhancing safe handling while reducing the concentration of hazardous components. APCr immobilisation involves blending it with cement and water in a precisely controlled ratio to ensure effective stabilisation through the generation of low-heat concrete. In general, the raw APCr material will be classified as Class V/IV and then immobilised in low-heat concrete which downgrades the material to Class IV/III which is then disposed of in a designated Class IV landfill cell. After thorough trials, the contaminants of potential concern (COPC) have been identified as lead (Pb) and soluble salts, specifically sulfate (SO_4) and magnesium (Mg). Following immobilisation, testing results consistently showed a decrease in leachable lead levels, with all samples measuring well below 10 mg/L-Pb—the acceptable Leachable Concentration (ASLP4) threshold outlined in WA's Waste Classification Guidelines for Class IV waste.
69.	ANON-D6CH-YSK1-D	The NSW EPA provides Technical Notes on cement-based solidification/stabilisation treatment of organic chemical contaminants in waste. This technical note provides advice and guidance on the methods and standards for cementisation of such hazardous waste. Please see - https://www.epa.nsw.gov.au/your- environment/waste/tracking-transporting-hazardous- waste/immobilisation/technical-notes-immobilisation/immobilisation- note2 In addition, as Veolia will operating both the Kwinana and East Rockingham incinerators in Western Australia, they would or should know this information given the number of facilities they operate in the UK and in relation to their Woodlawn project proposal in NSW. It's interesting to note that their proposal in NSW requires that the APCr treatment be finalised prior to any approval by the NSW EPA for the incinerator project, unlike WA. This of course makes sense given the significant quantities and toxicity characterisation of APCr and other incinerator waste residues and the foreseeable risks to the environment and human health. *Heavy metals are known to retard cement hydration particularly Pb and Zn due to their conversion to hydroxy species which consumes calcium and hydroxide ions delaying surrounding porewater supersaturation and C-S-H gel precipitation. Ordinary Portland Cement is also not considered a suitable medium to capture mercury (Hg) and arsenic (As) compared with sulphate-rich cements. Further, phosphate stabilisation is also unsuitable for arsenic as it can mimic the phosphate anion (as arsenate, AsO 43-) and form soluble metal arsenate complexes. If Hg and As are potential contaminants of concern in the APCr, the treatment technology will need careful selection (and demonstration) to immobilise them.*	EMRC is committed to minimising environmental and social impacts by implementing effective treatment of APCr using best practice standards to ensure safe and responsible disposal, while continually improving operational efficiencies. EMRC proposed management/immobilisation of the APCr material by mixing cement and water to the correct ratio to generate low-heat concrete is in general accordance with the technical note referenced. The testing undertaken as part of the approval application process verified the effectiveness of the proposed immobilisation process.
70.	ANON-D6CH-YSKP-C ANON-D6CH-YSK1-D	*Get the housekeeping in order - unacceptable risks to taxpayers and EMRC member councils - who represent ratepayers.* Tens of millions of WA taxpayer dollars are already deeply immersed into the currently financially crippled East Rockingham Resource Recovery Facility Project. The Business is in Administration. This is NOT the time for this financially strapped business to seek new external financial business ventures or 'opportunities', that require financial input or future support and investment from a local council (ratepayer) member entity (EMRC), and WA taxpayers. Creditors are claiming more than $740 million debt https://www.businessnews.com.au/article/Waste-to-energy- plant-owes-740m. The project has not yet become operational and may never do so. It is therefore inappropriate to grant approval for an associated project that will rely on the hazardous waste this incinerator plant will produce. The detailed toxicity and hazardous waste properties of the APCr cannot be determined and yet is needed to be able to undertake a credible environmental impact assessment. WA taxpayer dollars - and potentially, local government Council members who are responsible for ratepayer funds, are already at risk with this business uncertainty, and further public money must not be gambled on the 'prospect' that a future settlement or buy out 'might' occur. This is not the time to be considering an environmental approval - which in itself is also costing WA taxpayers to seek and determine, when the core business seeking the approval is in Administration. The Administrators are seeking to secure a sale, under a court-imposed tight timeline and complex corporate implications remain unresolved. - In late 2024, in WA's Supreme Court, KordaMentha administrators John Bumbak and Richard Tucker sought a 9-months' extension but instead were granted only until June 30 2025 to hold the second creditors' meeting. This corporate and financial uncertainty - and	EMRC is committed to minimising environmental and social impacts by implementing effective treatment of APCr using best practice standards to ensure safe and responsible disposal, while continually improving operational efficiencies.

		complexity', has been noted by the Court, and already involves considerable investment of taxpayer dollars. Published media reports in May 2024 stated: - 'The court heard that lawyers for the parties had fronted 11 hearings and had two unsuccessful attempts at mediation over the past 14 months with the conduct of the case drawing the ire of Justice Craig Colvin, who used a hearing on Tuesday to lambast the deep- pocketed parties for the burden it had placed on a publicly funded resource.' - And further - "The evidence before the court shows this is one of those matters that could be weighed down in very complex interlocutory applications." (WA Supreme Court). This application, which by virtue of the parties involved, (passive and active), implicates and could place, at unacceptable financial risk, WA taxpayers and LG councils and their ratepayers. It therefore should be set aside to await confirmation and final settlement of court proceedings to enable clear and concise insight into the long- term future of this business and its ventures, with protection of public investment a priority. The level of Corporate uncertainty requires a refusal and for the re- issuing of the application when the court case is finalised and outcomes appropriately confirmed. This would provide the Community accountability and transparency, that enables the Community (taxpayer/ Member councils and their ratepayers) to have confidence in the processes to protect public investment.	
71.	ANON-D6CH-YSKP-C	The submitter is concerned that the ownership of the EMRC is experiencing issues, noting the City of Kalamunda withdrew in 2023 and City of Belmont withdrew in 2021. Only 4 LG Council members currently remain. We understand that number could reduce further, this year. This is another reason why this application needs to be refused.	EMRC is a going concern and the ownership is irrelevant to this Project.
72.	ANON-D6CH-YSKP-C	Throughout 2024 Woodside was considering to establish a facility at Red Hill, in partnership with the EMRC, to convert greenhouse gases, such as methane and carbon dioxide, into ethanol. The local community was not convinced the site was appropriate, including increased bushfire risks right next door to, and surrounding, John Forrest National Park. After further investigation into the site suitability and potential viability of the pilot-plant with the EMRC, Woodside pulled out of the plan.	Woodside made a commercial decision not to proceed with the methane to ethanol plant which was independent of the site suitability.

Attachment 1 - DFES Advice (Redacted)

[redacted]

From: [redacted]@dfes.wa.gov.au>
Sent: Thursday, April 17, 2025 2:45 PM
To: [redacted]
Cc: [redacted]
Subject: RE: Emergency Management re Transport

Hi [redacted],

It was good to catch you on the phone once it was receiving calls. Following up from our phone conversation last week, I can advise / suggest as follows:

1. Ensure that the dangerous goods classification of the material is correct, independent of any relevant waste classification/s. This may seem obvious, but other product streams have previously inadvertently been mis classified as non – dangerous goods when they were dangerous goods. If material is a waste and a dangerous good, BOTH regulatory regimes apply. There is a requirement under the WA *Dangerous Goods Safety (Road and rail transport of non-explosives) Regulations 2007* to ensure that a prime contractor either is or has a contractual agreement with a DEMIRS approved emergency responder to assist with response to and recovery from a road or rail transport incident involving a placed load of dangerous goods. This requirement is in place to reduce the need for emergency services resources once

the immediate hazard from an incident is addressed, and to eliminate / minimise costs to the road owner. Further advice in this regard can be sought from DEMIRS Dangerous Goods staff on [redacted]

2. Depending on this nature of the waste, it may be prudent and represent good product stewardship/corporate citizenship for the producer/ consignor / receiver to develop and agree on processes to occur in the event of a loss of containment of product in transit from source (waste to energy plant) to destination (EMRC Red Hill Facility?). Whilst this may not come under the statutory remit of the abovementioned regulations if the material is not a dangerous good, community / public impact and scale of emergency services response may be minimised if a similar response arrangement were to be voluntarily and proactively put in place for the transport, including processes to liaise with road owners (LGs / MRWA).

3. I would envisage that any content for an EM Plan for the Red Hill Facility related to this material should be relatively straightforward with regard to how spilled material of this nature will be recovered and disposed of (I would envisage entirely on site). This may address any requirement for additional PPE/PPC above what is usually worn/used by staff, how spills are isolated and marked, who will respond, how to recover the product and with what, what it will be packed/recovered into, and how it will be disposed of. This may be able to draw on content from extant procedures at the waste to energy site, and may also cover any washdown process/es for vehicles / equipment.

Feel free to contact me if any clarification is needed.

Regards

[redacted]

[redacted] | Department of Fire & Emergency Services

[redacted]

Attachment 2 - JBS&G Response to Items 27 & 28

67102 Response to DWER Items 27 and 28 Rev A1

Name: [redacted]

Company:

Email:

Date: 15 April 2025

Job/Doc No: 67102/166,940 (Rev A)

Inquiries: [redacted]

Technical note - EMRC APCr ERD - Responses to Submissions 27 and 28

1. Background

The Eastern Metropolitan Regional Council (EMRC) is seeking environmental approvals to accept, immobilise and store (in landfill) air pollution control residue (APCr) produced by the Kwinana Waste to Energy project. The risks from airborne emissions of APCr that may occur from an Immobilisation Plant which EMRC proposes to construct at the Red Hill Waste Management Facility (WMF), have been assessed via dispersion modelling and a screening level health risk assessment (HRA). Public and regulator submissions have been received on the project proposal including two submissions (Numbers 27 and 28) concerning air quality impacts.

The issues raised in these submissions have been reviewed and responses provided to address those issues in this technical note.

2. Submission 27

This submission was provided by the Department of Water and Environmental Regulation (DWER). Details are shown in Table 2.1 below.

The issues raised in this submission relate to the assessment of efficiency of controls to mitigate point source and fugitive air emissions. That assessment will be carried out via implementation of an Operational Air Quality Management Plan (OAQMP) that includes air quality monitoring. DWER has provided details of the pollutants to be monitored and specified various requirements for the monitoring methodology.

An assessment of the specifications and requirements provided by DWER is provided below to identify the feasibility of implementation in the OAQMP for consideration by the regulators.

Table 2.1: Submissions 27 from DWER

Submission and/or issue
Limitations identified within the report will be managed through the implementation of an Operational Air Quality Monitoring Plan condition in the draft works approval, to be completed prior to time-limited operations (as part of the Critical Containment Infrastructure Report), to assess the adequacy of controls to prevent and mitigate point source and fugitive particulate emissions from the immobilisation plant. The plan will need to include the following information: a) the air quality sampling method that will be followed, in accordance with AS 3580.9 and US EPA Method TO-9A; b) monitoring device locations (including at least one at the immobilisation plant and one on the boundary of the premises), informed by AS 3580.1.1 and justified based on meteorological conditions, terrain and the location of sensitive receptors; c) monitoring parameters, including the following at a minimum: (i) total suspended particulate matter, PM10 and PM2.5; (ii) antimony, arsenic, cadmium, chromium (VI), lead, manganese and nickel; (iii) polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, d) method detection limits and instrument capabilities; e) monitoring duration (averaging period); f) monitoring frequency, including at least quarterly monitoring during the first two years of immobilisation plant operations; g) timing of operational monitoring in relation to activities at the immobilisation plant (with consideration of the likely intermittent nature of point source and fugitive emissions); h) method to characterise background ambient air quality, for example monitoring during the construction phase before receipt of air pollution control residue and cement commences and/or during the operations phase when the immobilisation plant is closed and not receiving or processing air pollution control residue or cement; i) a framework for assessing operational monitoring results, including the following at a minimum: (i) ambient air quality guideline values suitable to assess human health risk from for each monitoring parameter; (ii) comparison with background ambient air quality; and (iii) assessment of temporal trends, and j) quality assurance and quality control (QA/QC) procedures.

2.1 Submission 27 Assessment and Response

An assessment of the specifications and requirements provided by DWER is summarised in Table 2.2. The Item numbers references the labels used in the DWER submission. Comments and suggested responses are provided for EMRC review. **Note that only the suggested responses are to be considered for inclusion in EMRC's formal response document that addresses all submissions**.

Table 2.2: Assessment of Submission 27 from DWER

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
27a)	Specify air quality sampling method	Method in accordance with AS 3580.9 and US EPA Method TO-9A	AS3580.9 is a series of Australian/New Zealand standards methods for sampling and analysis of airborne particulate matter.	Specific details of the Australian/New Zealand standards to be utilised for monitoring of ambient airborne particulates are provided below.	See responses in following sections
			US EPA method TO-9A is a method used for measurement of dioxins and furans in ambient air.[1]	This method utilises high volume air sampling (HVAS) with airborne dioxins and furans captured on a PUF adsorbent for analysis in the laboratory using high resolution gas chromatography – high resolution mass spectrometry	See responses in following sections
27b)	Monitoring locations	Location to be informed by AS3580.1.1 and meteorology, terrain and locations of sensitive receptors	AS3580.1.1 provides guidance for location of siting of air monitoring equipment	This is an appropriate method for siting of equipment	A requirement to utilise AS3580.1.1 for siting of monitoring equipment is noted.
		At least one monitoring device at the Immobilisation Plant and one on the boundary of the premises.	The purpose of monitoring at the Immobilisation Plant has not been indicated by DWER.	See response to submission for this item	Point source APCr dust emissions from the silos will be emitted from the filters located on the top of the silos, nominal 16 m above ground level. As such impacts at ground level are more likely to occur further away from the plant. The risk from fugitive emissions are mitigated by plant design (enclosed pneumatic conveying of materials). As such, JBS&G concludes that monitoring at the Immobilisation Plan will not provide any useful data to inform the potential risk of adverse impacts at off-site locations. Impacts to employees at the WMF are an occupational health and safety matter and not relevant to the assessment of risk off-site.

[1] United States Environmental Protection Agency method for determine of polychlorinated, polybrominated and brominated/chlorinated dibenzo-p-dioxins and dibenzofurans in ambient air

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
				In principle, boundary monitoring may provide data to inform risks at off-site locations. However, the feasibility of such monitoring for the indicated pollutants described below, to coincide with the Immobilisation Plant operation and prevailing winds from the Plant direction is problematic.	JBS&G suggest that boundary monitoring to coincide with the operation of the Immobilisation Plant and prevailing winds from the Plant to the monitoring location is not logistically feasible approach to identifying potential risk of adverse impacts form the emissions at sensitive receptors. This is discussed in greater detail below
				The 2011 monitoring was carried out at sensitive receptors (on the eastern boundary of the WMF directly opposite a residence and another location in the front yard of a residence on Toodyay Rd). These locations would be appropriate for longer term monitoring of particulates, metals and dioxins in the vicinity of the WMF	JBS&G suggest that a more appropriate location for ambient monitoring of particulates, metals and dioxins would be a residence located nearby the WMF. That reflects the actual air quality status in the nearby community from all sources of pollutants, including the Immobilisation Plant. Monitoring could be conducted over an extended duration (48 hours) to capture the impacts of variance in prevailing winds.
27(c)(i-iii)	Monitoring parameters	Total suspended particulate matter, PM_{10}, $PM_{2.5}$, antimony, arsenic, cadmium, chromium (VI), lead, manganese, nickel, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans	DWER has not advised the reasons for selection of these parameters for monitoring.	TSP and $PM_{2.5}$ are not included in the HRA. TSP impacts amenity and is not a measurand to inform health risk. $PM_{2.5}$ is a measurand for human health impacts, primarily from combustion sources. The other parameters have been assessed in the HRA.	JBS&G concurs that the parameters of interest for ambient air monitoring at location nearby the WMF are PM_{10}, metals, dioxins and furans. JBS&G submits that TSP and $PM_{2.5}$ are not parameters of relevance to inform the risks from emissions from the Immobilisation Plant. TSP is a indicator of potential amenity risk and $PM_{2.5}$ is a measure of health impact risk from combustion sources. JBS&G propose that the metals are determined from analysis of thePM_{10} samples since any metals in that fraction are inhalable. The relevant parameters are monitored using the following methods: **PM_{10}**: Sampling and analysis by AS/NZS3580.9.6 (HVAS)

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
					Metals: Sampling by AS/NZS3580.9.6 (PM_{10} HVAS), analysis of filter for metals by ICP/MS (as per USEPA Compendium Method IO-3.5 or equivalent) **Dioxins and furans**: Sampling and analysis by USEPA method TO9A. The laboratories may also utilise USEPA SW846 method 8280B or USEPA method 23 for analysis of PUF cartridges from HVAS.
27(d)	Method performance	Method detection limits and instrument capabilities	Details of MDLs are provided in the methods. It is not clear as to the nature of information required in respect of "instrument capabilities".	Actual MDLs are determined from the duration of sampling, laboratory blanks and method validation tests. Laboratories also can provide MDLs and practical quantitation limits (PQLs), which have different measurement uncertainties.	A monitoring program will be designed to provide the lowest possible MDLs from the indicated methods. Details of instrument capabilities are (to a limited extent) provided in the individual sampling and analysis methods. Actual capabilities in respect of precision, accuracy, analyte recoveries are a function of the analytical method and type of instruments utilised for the analysis. These are considered in the NATA accreditation process. Such information can be provided by the laboratories.
27(e)	Monitoring duration	Averaging period	All methods will involve high volume air sampling (HVAS).	The "standard" HVAS sampling period is 24 hours. However, longer durations can be utilised for analytes that are likely to be present in very low concentrations (in particular dioxins and furans).	Actual sampling periods will be determined from consideration of historical monitoring data and method detection limits. An example of an appropriate sampling program could involve the following: Sampling could be conducted seasonally (quarterly) for the first year of operation of the Immobilisation Plant at times when prevailing winds that are typical of the seasons occur. Three samples would be collected in one week in each quarter. Monitoring would be postponed if consistent rainfall is forecast so that the measured concentrations reflect a conservative understanding of ambient concentrations. An extension of the monitoring to a second year could be contemplated if the results show concentrations that exceed air guideline values.
27(f)	Monitoring frequency	At least quarterly monitoring during the first two years of immobilisation plant operations	DWER has not advised the reason for the indicated frequency	See response to Item 27(e)	See response to Item 27(e)
27(g)	Timing of operational monitoring	In relation to activities at the Immobilisation plant (with consideration of the likely	DWER is correct to consider the intermittent nature of	The timing of monitoring is dictated by operations, but also prevailing winds and	This is a key constraint for boundary monitoring suggested by DWER of the indicated parameters. The logistics involved in HVAS require certainty in timing of operation of the sampling

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
		intermittent nature of point source and fugitive emissions)	emissions as a factor in timing of monitoring.	rainfall. The (minimum) 24 hour sampling duration requirement is problematic for source monitoring in that constant winds from the direction of the Plant to the monitoring location are required.	equipment. Particulate sampling requires a technician to install a pre-weighed filter into the sampler, conduct a flow check and then either initiate sampling or program a delayed start to a suitable time. The sampling progresses for the selected time (minimum 24 hours) then the sampler automatically shuts down. The technician then returns to the sampling location to run a post-sampling flow check and recover the filter for analysis, and if required, to install a new filter for the next sampling run. Several issues arise from consideration of the sampling methodology: 1. It is unlikely that winds of constant direction will prevail continuously for at least 24 hours. 2. This means that the sampling will reflect a combination of any contribution from Plant emissions and background levels of pollutants. 3. The inherent natural variability in background concentrations and the intermittent nature of Immobilisation Plant operations means that the measured concentrations cannot inform the significance of the Plant emissions from any one sampling event. 4. Sampling could be delayed until a weather forecast shows consistent wind conditions, however, the dioxins PUF sampling cartridge has a shelf life before it cannot be utilised (presumably due to stability issues with the ^{13}C and ^{37}Cl labelled surrogates that are spiked onto the cartridge by the laboratory prior to shipment for sampling. At some point any stockpiled PUF cartridges would become unusable and additional cartridges required. Lead times for replacements then become an issue, as well as cost considerations. Overall, JBS&G concludes that attempts to align the monitoring for timing of operations would be problematic and logistically unfeasible. An alternative approach is suggested involving quarterly monitoring at an off-site location (nearby residential property), as was utilised for the 2011 monitoring program conducted by EMRC.

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
27(h)	Background air quality monitoring	Includes monitoring during the construction phase before receipt of APCr and cement commences and/or during the operations phase when the immobilisation plant is closed and not receiving or processing APCr or cement	It is unclear why monitoring during the construction phase is required.	Dust emissions from construction are managed under a Construction Dust Management Plan (CDMP)	A CDMP can be prepared for the construction phase of the project, as an addendum to the WMF site Dust Management Plan (DMP). Monitoring during construction is not supported by the risks associated with construction activities.
			Background air quality monitoring from 2011 has informed the levels of particulates, metals and dioxins in the vicinity of the WMF. Those levels are insignificant in respect of risk to human health. The risk assessment finding does not support a requirement for additional monitoring	The HRA has considered the relevance of 2011 particulate, dioxins and metals monitoring to present day. Aside from increase in motor vehicle gaseous exhaust emissions, the background levels of particulates, metals and dioxins are more likely influenced by smoke from biomass combustion (wood fired heaters, controlled burns and bushfires).	Issues with the feasibility of monitoring to detect the contribution of the Immobilisation Plant emissions to ambient concentrations of particulates, metals and dioxins has been discussed for Item 27(g). Notwithstanding the findings from the 2011 monitoring program, the proposed operational monitoring program in Item 27(e) (with samplers located at a nearby sensitive receptor) could be commenced in the quarter prior to commencement of construction and commissioning of the Immobilisation Plant to provide a baseline understanding of the ambient concentrations of relevant pollutants.
27(i)(i-iii)	Framework for assessing operational monitoring results	Includes air quality guideline values, comparison with background ambient air quality, assessment of temporal trends	Draft air guideline values (AGVs) provided by DWER in 2019 are out of date, with some superseded by values from other jurisdictions (Australian and international).	It may be appropriate to utilise more up to date guidelines, such as those from EPA Victoria released in 2022 (and utilised in the HRA). A discussion is required with DWER to establish appropriate values for on-going assessment of results from ambient monitoring.	The results from monitoring will be assessed as follows: • Compared with appropriate air guideline values • Comparison of baseline data • Comparison with 2011 data • Comparison of data from season to season. All data will be considered in respect of actual operating activities such as the frequency of APCr deliveries, any failure of dust filters, spills, loss of containment of pneumatic handling equipment, etc, as well as external sources of emissions that may arise during the sampling periods, for example, smoke from a bushfire or controlled burn, or dust from roadworks, clearing, dust erosion events from strong winds during dry months, etc.
27(j)	Quality assurance and quality control	Details of QA/QC procedures	This is an appropriate requirement	QA/QC procedures are inherent component of sampling and analysis methods	A monitoring program will include requirements and specifications for QA/QC which will be included in QA/QC procedures documentation for sampling technicians and laboratories.

3. Submission 28

This submission was also provided by the Department of Water and Environmental Regulation (DWER). Details are shown in Table 3.1 below.

The issues raised in this submission relate to the assessment of efficiency of controls to mitigate point source and fugitive air emissions. That assessment will be carried out via implementation of an Operational Air Quality Management Plan (OAQMP) that includes air quality monitoring. DWER has provided details of the pollutants to be monitored and specified various requirements for the monitoring methodology.

An assessment of the specifications and requirements provided by DWER is provided below to identify the feasibility of implementation in the OAQMP for consideration by the regulators.

Table 3.1: Submissions 28 from DWER

Submission and/or issue
Errors in boundary concentrations of principal and individual toxic substances need to be corrected, and concentrations be reported as a percentage of air quality criteria: • Tabulation at site boundary was provided in the HHRA (Table 6.2, pdf page 17/37). This is acceptable as a proxy for maximum on model domain as the elevation of the sources and building downwash effects mean that concentrations further from the boundaries are likely to be lower than those on the boundary. However, concentrations were not reported as a percent of the air quality criteria, as requested. • Dioxins and furans site boundary maximum concentrations were tabulated in the Table 6.2 of the HHRA but were not reported as a percent of the criteria as requested. The highest concentration of Dioxins/furans (I-TEQ) was listed as 9.6E-02 µg/m3 ¬at the west boundary and appears to be misreported. The hourly standard in DWER's draft Guideline: Emissions to Air (2019) lists the 1 hourly criterion as 2E-06 µg/m3. The reported concentration at the west boundary would be 0.096/0.000002 or 48,000 times the criterion concentration. By comparison, the highest dioxins and furans 1 hourly concentration at sensitive receptors is listed as being 4.16E-08 µg/m3 (Receptor R27). This value is 2% of the criterion as documented in Table 7.1 of the HHRA (pdf page 19/37). • The years 2019-2023 are acceptable years to use for meteorology. It is not clear why Perth airport data is used for assimilation ("hybrid" mode) as the airport is located approximately 15km away on the relatively flat terrain of the Perth coastal plain. Site-local meteorological data collected at the EMRC WMF site has not been assimilated as requested. These dot-points are suitable for inclusion during the Part V assessment as it is yet to be shown that all pollutants meet the relevant criteria on the model domain outside of the premises as per DWER's draft Guideline: Emissions to Air (2019).

3.1 Submission 28 Assessment and Response

An assessment of the specifications and requirements provided by DWER in Submission 28 is summarised in Table 3.2Table 2.2. The Item numbers references the labels used in the DWER submission. Comments and suggested responses are provided for EMRC review and inclusion in a response document to all submissions. **Note that only the suggested responses are to be considered for inclusion in EMRC's formal response document that addresses all submissions**

Table 3.2: Assessment of Submission 28 from DWER

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
28	Errors in boundary concentrations of principal and individual toxic substances	Errors to be identified and corrected	DWER has not specified exactly which substances are reported incorrectly	Calculations have been reviewed and checked to identify errors	See responses in following sections
	Reporting of model concentrations	Concentrations be reported as a percentage of air quality criteria	The highest predicted ground level concentrations (GLCs) at sensitive receptors for all substances are reported as a percentage of the criteria in Table 7.1 as part of the risk assessment	Predicted GLCs for all other receptors can also be reported as a percentage of the criteria. However, they will all be lower than the percentages reported in Table 7.1.	The report has been amended to include additional tables showing predicted GLCs for all substances at all receptors as percentages of the respective air quality criteria.
28(1st dot point)	Tabulation of GLCs at site boundary (Table 6.2, pdf page 17/37 of HHRA report)	DWER noted that values were provided in the HHRA, however concentrations were not reported as a percent of the air quality criteria	DWER commented that tabulated values were: *…acceptable as a proxy for maximum on model domain as the elevation of the sources and building downwash effects mean that concentrations further from the boundaries are likely to be lower than those on the boundary*.	DWER comment is noted and agreed	The report has been amended to include additional tables showing predicted GLCs for all substances at all receptors as percentages of the respective air quality criteria.
28(2nd dot point)	Dioxins and furans site boundary maximum concentrations were tabulated in the Table 6.2 of	Concentrations be reported as a percentage of air quality criteria	Requested data can provided	Requested data can provided	The report has been amended to include additional tables showing predicted GLCs for all substances at all receptors as percentages of the respective air quality criteria.

Item	Subject	Description	Assessment	Comment	Suggested Response to Submission
	the HHRA but were not reported as a percent of the criteria as requested.				
	The highest concentration of Dioxins/furans (I-TEQ) was listed as 9.6E-02 µg/m3 at the west boundary and appears to be misreported.	The hourly standard in DWER's draft Guideline: Emissions to Air (2019) lists the 1 hourly criterion as 2E-06 µg/m3. The reported concentration at the west boundary would be 0.096/0.000002 or 48,000 times the criterion concentration. By comparison, the highest dioxins and furans 1 hourly concentration at sensitive receptors is listed as being 4.16E-08 µg/m3 (Receptor R27). This value is 2% of the criterion as documented in Table 7.1 of the HHRA (pdf page 19/37)	DWER is correct in identifying the error with dioxins/furnace GLCs in Table 6.2.	JBS&G has identified the source of the error in transcription from the calculation spreadsheet to Table 6.2 in the HHRA report.	JBS&G wishes to apologise for the error and any inconvenience caused. Table 6.2 has been amended with the correct concentrations in the revised report. The HHRA utilised the correct data and no changes in the findings are required.

Prepared by”	Reviewed by:
[redacted]	
Principal & Affiliate JBS&G Australia Pty Ltd	Associate JBS&G Australia Pty Ltd

Attachment 3 - Excerpt of Revised Human Health Risk Assessment by JBS&G

Human Health Risk Assessment – EMRC Red Hill APCr Immobilisation Project

Talis Consultants

Revised report

JBS&G 67102 | 163753

16 April 2025

We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.

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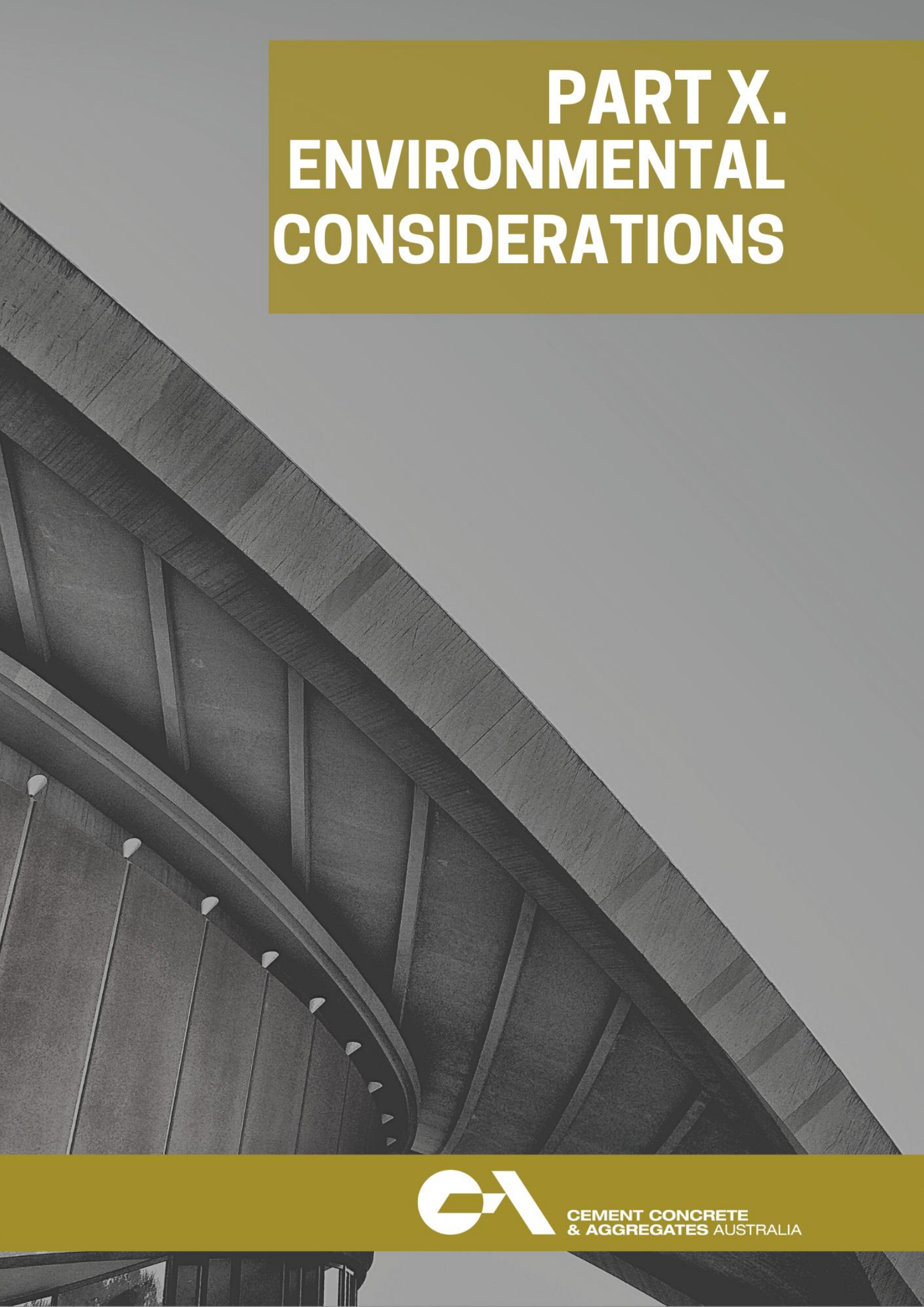
PART X. ENVIRONMENTAL CONSIDERATIONS



CEMENT CONCRETE & AGGREGATES AUSTRALIA

This section aims to discuss a range of matters related to 'environment' that affect, or are affected by, the cement and concrete industries. Whether it is from a technical perspective or a community perspective, matters related to 'environment' are topical in both politics and society in general. Since concrete is the most widely used manufactured material in the world, and the second most consumed product next to water, it has the potential to have a major impact on society and on the environment. This section will attempt to consider the wide range of issues that are involved.

CONTENTS

1. INTRODUCTION

Given the global scale of cement and concrete manufacture and use, environmental factors relating to these materials need to be considered at several levels. With about 33 billion tonnes of concrete being produced per annum across the globe, supported by more than 4 billion tonnes of cement manufacture, the potential for global environmental impacts exists. However, concrete is also produced and used on a very local scale – with concrete plants in most towns and certainly in most cities – so consideration of concrete's presence at a local level also needs to be considered.

Whereas once the potential impacts of industrial materials were solely the concern of various levels of Government, through their granting of approvals and licences to build and operate plants, this is no longer the case. 'Environment' is a 'hot issue' in the community, with community concerns extending from local effects related to noise and dust and traffic movement to awareness of and concern about global issues like climate change and pollution of land and sea. To further complicate matters, all levels of Government seem to be increasingly influenced by these community concerns, whether solidly based or not. This means that 'industry' now has to have a strong awareness of the environmental issues that may result from their activities and be seen to be reacting to them in practical and demonstrable ways.

This section will examine both global and local 'environmental' issues affecting cement and concrete production and use; as well as provide some information about the responses that are being taken to understand and minimise environmental impacts.

2. GLOBAL ISSUES

2.1 CONCRETE USE

Concrete use globally has risen to a level of about 33 billion tonnes per annum. The recent rise in concrete use has been dramatic – having doubled since about 2000. Concrete as we know it came into being in the mid-1800's and has become increasingly popular since then. The re-building of cities after World War Two was made faster and more economically effective through the use of concrete, and presently, population growth in countries like China and India is fuelling further rapid growth.

Concrete has many advantages over alternative building materials like steel and timber. Concrete is produced locally, using local materials (except for cement), and employs local labour (both skilled and unskilled) in the task of concrete construction. Relatively speaking, concrete is also 'cheap'.

***NOTE**: Poor quality concrete construction is also a problem in unsupervised construction situations and can lead to serious structural failures when its use is abused, particularly in earthquake regions or areas that suffer serious weather events.*

While the performance of concrete structures has many advantages, some environmental concerns arise. The large volumes of concrete consume large volumes of raw materials and water. In some parts of the world, for example, sand has become a scarce resource and its recovery and sale have led to illegal mining and 'sand smuggling' operations with consequent environmental degradation. The requirement for large amounts of aggregate materials can lead to poor operation of quarries in some regions. While quarrying activities are very well managed in Australia, this is not always the case globally.

Overall, concrete has assisted countries to grow and house their populations in much more habitable structures, reducing disease and poverty. The simply huge volumes of concrete use make it a target for environmental concerns despite the positive benefits it brings.

2.2 CEMENT MANUFACTURE

The huge rise in concrete production and use has been made possible by the parallel development of cement production capability worldwide. Cement manufacturing capacity has risen from about 1.5 billion tonnes per annum in 2000 to over 4 billion tonnes per annum now. Cement manufacture is a capital and energy-intensive activity that creates considerable concern over the emission levels of CO_2 – a Greenhouse Gas (GHG) – which is believed to be responsible for global climate warming.

In a modern cement plant, the CO_2 emission intensity is about 0.82 tonnes of CO_2 per tonne of cement produced. About 60% of the CO_2 comes from the calcination of limestone, while the remaining 40% comes from the burning of fossil fuels to heat cement kilns and for electricity production used to power the cement plants, including cement milling. The about-60% proportion is an inescapable component due to the chemistry involved. Improved plant efficiencies can reduce the 40%, though the level of improvement has reached close to its limits in recent decades.

From a global perspective, the cement industry is considered to produce about 7-8% of anthropogenic CO_2. If the global cement industry was a country, it would be about the third-largest emitter of CO_2. While at 7-8% the cement industry is well behind industry sectors like transport and energy production in terms of CO_2 emissions, it still comes under considerable scrutiny.

Recognition of the concerns about CO_2 has led the industry to improve its processes over the last few decades, including its expanded use of supplementary cementitious materials like fly ash and slag to partially substitute for cement in concrete production. In Australia, this has led to CO_2 levels in overall cementitious materials used in concrete to be reduced by about 30-35% relative to the use of cement only (i.e. from about 0.82 tonnes of CO_2 per tonne of cement to <0.6 tonnes of CO_2 per tonne of cementitious material).

The concerns about GHG emissions have also led to a huge amount of research work being carried out on alternative cements (or alternative binders), and some limited commercialisation of these 'new' concretes. This work and the nature of these materials are discussed in Section 23 of this Guide. In addition, the cement industry is involved in research to determine if 'carbon capture' is a viable process with which to capture and store the CO_2 produced during cement manufacture.

3. LOCAL ISSUES

3.1 CONCRETE PLANTS

From a community perspective, concrete plants provide some insight into the presence of concrete which otherwise, relative to the widespread use of the material, tends to be taken for granted. Plastic concrete is a 'perishable' product, with only a finite time available to move it from the batch plant to the job site. Since much of the concrete construction is located in community areas, it follows that concrete plants need to be located within these areas, or close to them. As urban sprawl continues (in most places) it is only a matter of time before the community and concrete production overlap. Given the 'time imperative', there is no real option to move concrete production further away from development areas, so it has meant that the concrete industry has had to 'lift its game' to win the confidence of the community. Generally, this has been achieved, and the industry has a strong awareness of community needs and expectations, and the need to abide by local Government requirements, particularly related to environmental issues.

***NOTE**: There is one area that does create tension and that is truck movement. It is inescapable that transporting concrete to job sites requires truck movements, and this is often at peak hours. Even this aspect of industry/community interaction is being addressed where it can be. Truck movements are also associated with the delivery of raw materials to concrete plants – aggregates and cementitious materials particularly – and in some cases these are carried out at night to minimise truck movements in otherwise busy periods.*

Modern concrete plants are generally well screened from the community, and past concerns like high levels of noise and dust have been addressed quite successfully. Some basic environmental concerns like water run-off and water re-use are also being properly addressed. This work is being done both at plant and industry levels, and the range of Guideline documents prepared for use by concrete producers is testament to the seriousness of the industry in addressing these issues. These guidance documents include:

- CCAA, *'Environmental Management Guideline for Concrete Batch Plants'* (October 2019);
- CCAA, *'First Flush and Water Management Systems: Guide and Principles'* (August 2013);
- CCAA, *'Use of Re-Cycled Water in Concrete Production'* (August 2007);
- CCAA, *'Best Practice Guidelines for Concrete By-Product Re-Use at Concrete Batch Plants – Queensland'* (June 2012);
- CCAA, *'Guidelines for Delivery of Bulk Cementitious Materials to Premixed Concrete Plants' (*March 2018);
- CCAA, *'Guideline for Pedestrian and Traffic Management at Concrete Batch Plants'* (November 2018).

There are many examples of concrete producers ensuring that their operations 'fit' within their community and plant siting and operation are often undertaken to ensure that the concrete industry is seen as a good citizen.

3.2 RESOURCE USE

From an economic perspective, it is essential that the large volumes of raw materials, particularly aggregates, are sourced from as close to the concrete plant as possible. This also has environmental benefits through requiring less travel distances for trucks carrying out these deliveries. The concrete industry is supported by large quarrying activities, and these are also a source of community concern. Generally, quarry operations do not gain the attention of the community as these operations are typically well screened, and dust and noise issues (from blasting) are very well managed. From a quarry operation perspective, the main area of contention is when quarries seek to expand their resource and the community becomes aware of this through consultation processes. Often protracted battles are waged to prevent or limit quarry expansion. This has the effect of forcing quarries further away from the areas where their products are used and hence increasing truck movements and costs.

It is truck movements that, once again, make the quarry industry visible. The reality is that in Australia, quarry products are used at the rate of about 8 tonnes per person per year, so large quantities are being moved on our roads. Development of housing, industry and infrastructure as we know it cannot occur without these quarry products.

The various concerns about quarry activities has again resulted in a strong industry response to ensure quarry operators understand the issues and have tools to address them. Some of the guidance documents available to industry include:

- CCAA, *'CCAA Guideline – Assessment and Control of Environmental Noise Emissions from Quarries – Qld.'* (May 2105);
- CCAA, *'Extractive Industry Model Codes Version 1.0 and Guideline for the Extractive Industry Model Codes Version 1.0'* (August 2012);
- CCAA, *'Safety Data Sheets for Products Containing Respirable Crystalline Silica'* (December 2018);
- CCAA, *'Workplace Health and Safety Guideline – Management of Crystalline Silica in Quarries'* (January 2020).

The availability of natural sands is also decreasing, forcing the industry to look further afield for suitable sources, and also to look at alternatives to the natural products. The use of manufactured sands is now a 'norm' in concrete production. Approvals from specifiers for the use of manufactured sand as a partial replacement for natural sands came after a large body of industry research had been carried out to (a) technically describe appropriate properties for manufactured sands, and (b) develop and assess appropriate test methods to assess them. This work is described in a CCAA Research Report *'Manufactured Sands – National test methods and specification values'* (January 2007). The use of manufactured sands not only reduces the pressure on natural sand sources but also increases the efficiency of use of quarry resources.

3.3 USE OF INDUSTRIAL WASTES

For several decades, the concrete industry has been a large recycler through its significant use of 'waste' materials in its products. Fly ash and slag, nominal 'wastes' from coal-fired electricity generation and iron blast furnaces respectively, have been used as partial cement substitutes in Australian concrete. Their use has seen about a 35% reduction in the embodied CO_2 levels in concrete – this CO_2 deriving from cement. As well as directly improving the environmental credential of concrete, the use of these supplementary cementitious materials also improves concrete quality – particularly durability performance and also reduces the volumes of waste materials that would otherwise be landfilled. Fly ash and slag also form the basis of much of the development work on alternative binders as discussed in Section 23 of this Guide.

Recycling of concrete demolition wastes is carried out in Australia, but probably not to the extent that it is in other countries. Market size and transport distances mitigate against the broader re-use of concrete demolition wastes, though the level of re-use is increasing.

Some other recycled materials are being used in concrete and trials are underway to expand that use where possible. Crushed, recycled glass is used to a small extent as a partial sand replacement in concrete. Further test work is required to validate this use. Recycled glass can also be used as a cementitious material if crushed to a high degree of fineness (similar to cement) but this is not economical at this time. Other materials that have been the subject of research and field trials include (a) crumbed rubber (from tyres) as a partial aggregate replacement, (b) recycled plastics converted into plastic fibres for use in reinforcing, (c) sintered fly ash and bio-chars as aggregate replacements and (d) rice husk ash (waste from combustion of rice husks or hulls) for use as a supplementary cementitious material.

4. CONCRETE AS A BUILDING MATERIAL

4.1 CONCRETE PROPERTIES

Concrete has a number of inherent properties that make it an ideal building material, and it compares very favourably with other materials in terms of being strong and resistant to fire and pests; it is durable; it is inert and non-toxic (with no volatile emissions); it has a high thermal mass and good (sound and thermal) insulation properties; it is versatile and has the distinct advantage of being able to be moulded to many shapes and then subsequently harden in that shape; it is re-cyclable; and it is of relatively low cost. These various properties have contributed to the huge and increasing growth in concrete construction worldwide.

While cement manufacturing is capital intensive, concrete production is a low capital cost, simple process that is carried out locally and supports local economies. Properly designed and constructed concrete structures are very strong and very durable and can provide good long-term value to users.

When properly designed, concrete buildings impart environmental benefits as a result of several important characteristics, namely:

1. Concrete can store heat which then later flows into the building as it cools down in the evening resulting in reduced air conditioning loads through creating a more consistent temperature environment;
2. Concrete can act as a thermal insulator;
3. Concrete reduces sound transmission in commercial and residential structures; and
4. If there are concerns about a 'heat island' effect in built-up areas then concrete roofs, roads and footpaths can be made reflective through using light coloured (or white) concrete.

More detailed reviews of concrete properties important for building and construction appear in the following:

- CCAA Briefing 10, *'Building in bushfire-prone areas'* (July 2007);
- CCAA Briefing 12, *'Thermal mass benefit for housing'* (July 2007);
- CCAA Briefing 16, *'Quiet and comfortable concrete homes'* (July 2007);
- CCAA Briefing, *'Handy hints in specifying concrete buildings'* (March 2018).

4.2 LIFE CYCLE ASSESSMENT

There is no doubt that the manufacture of cement is both energy intensive and results in significant CO_2 (GHG) emissions. However, stand-alone this does not imply that cement or concrete use is environmentally unsound. If a structure is required, then it needs to be constructed from one material or another, and in any assessment a comparison is required. Moreover, it is the structure as a whole that should be assessed, not simply one component of it, and for its whole life cycle.

A technique known as Life Cycle Assessment (LCA) can be carried out to assess the energy use and GHG emissions associated with the construction, operation and ultimate demolition of any structure. To make sense of this assessment it should be done on a comparative basis to assess the relative performance of various construction material options.

An independent study carried out to compare various construction material options used in the construction of a domestic dwelling, an office building and a warehouse was carried out. The results showed that:

- There was no significant difference between the material options studied in terms of energy intensity and GHG emissions for the three building types reviewed;
- The energy use associated with the construction and maintenance of the structures was only about 10% of the total energy used during its lifetime, with energy use associated with building operation being by far the greatest component;
- Consideration of any single structural or operational element did not give a

realistic assessment of materials or structure comparisons; and
- LCA gives a balanced assessment of the energy and emissions performance for the entirety of the structure and life cycle including materials, construction and operational activities.

A more comprehensive review of the material properties of concrete and their environmental significance, as well as details of the LCA study, has been reported in the following:

- CCAA, *'Concrete – The responsible choice'* (July 2012).

4.3 GREEN STAR

The Green Building Council of Australia has developed a sustainability rating system known as Green Star that allows a sustainability score to be ascribed to a building – though the system is currently limited to office buildings and apartment blocks. Star ratings can range from 1 Star = Minimum Practice to 4 Stars = Best Practice; 5 Stars = Australian Excellence and 6 Stars = World Leadership in sustainable practices in building design, construction and operation. Star ratings are earned through scores derived from a wide range of sustainability initiatives that are included in the building. The total score determines the Star-rating.

From a concrete perspective, there are up to 3 Green Star points available as follows:

- One point – where 'Portland' cement use is reduced by 30% in all concrete used across the project – relative to a reference mix;
- Two points – where 'Portland' cement use is reduced by 40% in all concrete used across the project – relative to a reference mix;
- One point – where at least 50% of the water used in concrete is captured or reclaimed water, plus **either** of at least 40% of coarse aggregate is crushed slag aggregate or other alternative materials (provided this does not increase the Portland cement content of the mix by more than 5 kg/m^3), **or** at least 25% of the fine sand is manufactured sand or other alternative material (provided this does not increase the Portland cement content of the mix by more than 5 kg/m^3).

***NOTE**: A series of reference Portland cement contents are listed in the Green Star documentation for all concrete grades from 20-100 MPa and claimed Portland cement reductions are measured against the nominated cement content in these references mixes.*

More detail on the Green Star system and its application are provided in the following references:

- CCAA Industry Guide, *'Green Star – Life Cycle Impacts – Concrete Credit 19B1 User Guide'* (August 2017);
- CCAA Industry Guide, '*Green Star Mat-4 Concrete Credit User Guide'* (June 2015);
- CCAA Technical Note 70, *'Six-Star Concrete Housing'* (April 2013).

While the Green Star system is currently used for offices and apartments, there is a system under development called 'Future Homes' that intends to extend the Green Star system to domestic housing.

4.4 LEED RATING SYSTEM

The LEED system is an American sustainability rating system that has been in place for many years and which is sometimes referred to in Australian projects. The latest version, Version 4, has changed from a system that focussed on single attributes of materials (e.g. recycled content or regional materials) to one that takes a more holistic approach through the use of LCA and product disclosure and optimisation. Product disclosure means reporting environmental, social and health impacts associated with use of materials using third-party assessments, examples being Environmental Product Declarations (EPD) (see 4.5) and Health Product Declarations (HPD). Projects are required to use at least 20 products for which EPD's and/or HPD's exist, and concrete has an advantage here because if concrete is used in slabs, paths,

walls etc., each constitutes a 'product'. Use of locally produced (within 100 miles/ 160 km) products is also encouraged, which again favours concrete. A Construction Waste Management credit that is included is also beneficial provided construction wastes are used for alternative purposes and not landfilled. The system also includes a Global Warming Potential (GWP) assessment which requires, much like the Green Star system, project concrete mix designs to incorporate binder and aggregate components that have a lower GWP than baseline mixes that might otherwise be used.

4.5 ENVIRONMENTAL PRODUCT DECLARATIONS (EPD's)

EPD's are independently verified and registered documents that communicate transparent and comparable information about the life-cycle environmental impacts of products. There is an ISO Standard (ISO 14025) that details the requirements for preparing EPD's. Certified EPD's need to be prepared in accordance with Product Category Rules which describes the scope of the LCA that needs to be carried out and identifies the types of potential impacts that need to be evaluated and reported. The LCA's must be carried out by a neutral third-party. There is no 'global' EPD for concrete and individual companies must develop an EPD for their product(s) as manufactured in their plants and using the suite of materials available to them.

EPD's are useful in achieving accreditation in systems like LEED (as noted above) and will likely become a fundamental part of bidding processes for projects funded, for the time being at least, by large corporations and Government bodies.

5. SUMMARY – CONCRETE AND THE ENVIRONMENT

In the last (almost) 200 years, concrete has become the most popular building and construction material used throughout the entire world. That this is the case is testament to its relative simplicity of manufacture and use, its design versatility, its strength and its durability. The use of concrete is common in both the developed and under-developed worlds and the recent strong growth in its use is associated largely with the growing wealth of previously poor countries. Concrete is, by volume, the most commonly consumed material in the world after water, with recent production estimates being about 33 billion tonnes per annum. Almost any material used to this extent will bring with it concerns about impacts on the environment. That concrete uses large volumes of natural resources (e.g. aggregates) and contains a proportion of an energy and GHG-intensive product like cement adds to the environmental concerns. It is estimated that the cement industry contributes about 7-8% of the world's man-made CO_2.

In response to concerns about environmental impacts, the cement and concrete industries have made concerted efforts to (a) understand the nature and performance of its products, and (b) to find ways to mitigate any environmental concerns. While much of this work has been very successful and the concrete industry generally works well within its local communities, the concerns about GHG emissions remain and are largely insurmountable with current technologies. Work is underway to develop new cement types that give lower GHG emissions (see Section 23 of this Guide).

The reality for the moment is that concrete use will continue to grow, as will cement manufacture. Despite concerns, concrete is an effective and efficient building material from both engineering and environmental perspectives and its ongoing use reflects this. It remains a challenge for the cement and concrete industries to find a way to ensure that concrete – as we know it or in a modified form – remains the first choice for most future building activities.

CCAA OFFICES

NATIONAL OFFICE (NSW)
Level 10
163 -175 O'Riordan Street
Mascot NSW 2020

POSTAL ADDRESS
PO Box 124
Mascot NSW 1460
Telephone: (02) 9667 8300

QUEENSLAND
Level 14, 300 Ann Street,
Brisbane QLD 4000
Telephone: (07) 3227 5200

VICTORIA
Suite 910/1 Queens Road
Melbourne VIC 3004
Telephone: (03) 9825 0200

WESTERN AUSTRALIA
45 Ventnor Avenue
West Perth WA 6005
Telephone: (08) 9389 4452

SOUTH AUSTRALIA
Level 30, Westpac House
91 King William Street
Adelaide SA 5000
Telephone: (02) 9667 8300

TASMANIA
PO Box 1441
Lindisfarne TAS 7015
Telephone: (03) 6491 2529

ONLINE DETAILS
www.ccaa.com.au
Email: info@ccaa.com.au

CEMENT CONCRETE & AGGREGATES AUSTRALIA