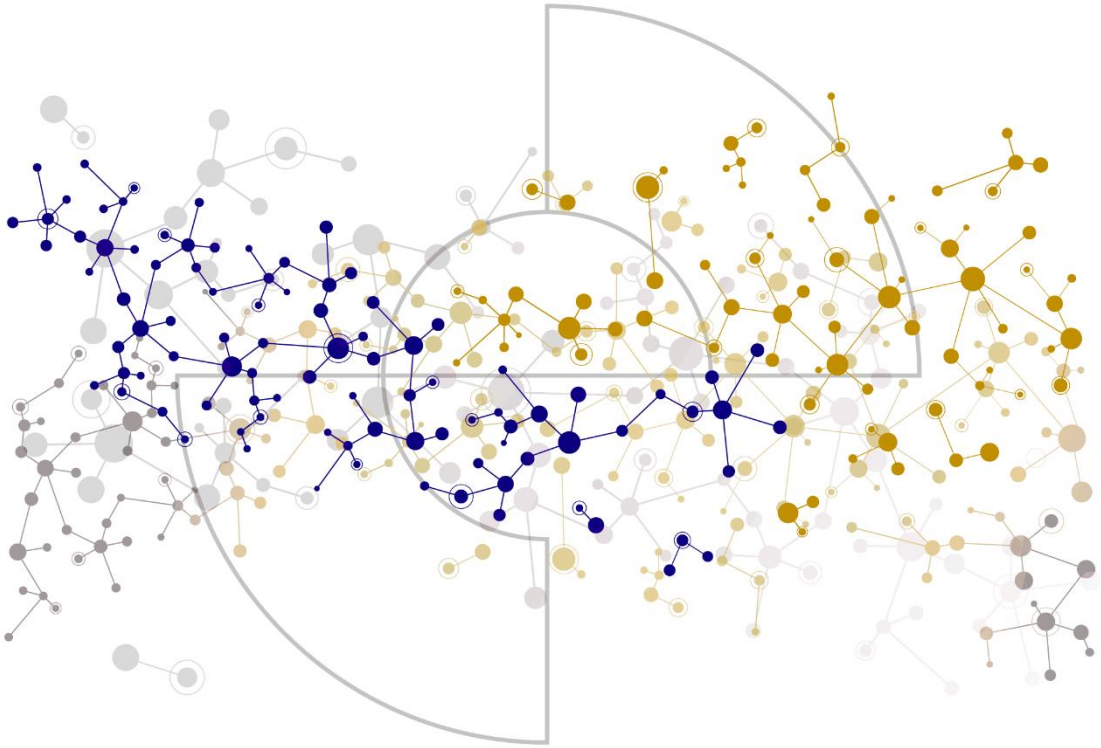
EMRC

Eastern Metropolitan Regional Council

Environmental Protection Authority Referral

Air Pollution Control Residue – Immobilisation Plant and Interim Disposal Solution



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1 Introduction

The Eastern Metropolitan Regional Council (EMRC) is proposing to accept, treat and dispose of Air Pollution Control Residue (APCr) at its Red Hill Waste Management Facility (RHWMF) (the Proposal). APCr is a by-product that is generated from flue gas treatment in Waste to Energy (WtE) Plants.

Avertas Energy (Avertas) is currently constructing a new WtE in Kwinana. The Avertas WtE facility is a State significant project worth $696 million that is under an extremely tight timeframe for delivery and acceptance of waste. The WtE is a key piece of waste management infrastructure required for WA to meet the targets within the *Waste Avoidance and Resource Recovery Strategy 2030* (WARR Strategy). The Avertas WtE facility is anticipated to be operational by late 2022 and at which point APCr will be generated which will require an environmentally appropriate treatment and disposal solution. The lack of an appropriate treatment and disposal location will impact the operation of the WtE facility likely resulting in the facility not being able to operate until a solution is approved.

APCr typically consists of fly ash, lime and activated carbon. Untreated APCr is considered hazardous due to high pH, metals and presence of persistent organic pollutants (POPs) and contains high levels of soluble salts. Given the nature of the material and current standards, the most environmentally acceptable method for treatment of APCr is immobilisation. Immobilisation alters the physical and chemical properties, making it safer for handling and reduces the concentration levels of hazardous constituents. Immobilisation of APCr is undertaken by mixing the APCr with cement and water at a specific ratio. To accept and treat APCr at the RHWMF, the EMRC is proposing to construct an Immobilisation Plant.

Following treatment, the APCr requires appropriate disposal. The Project Team which consists of the EMRC, Avertas, Ramboll and Talis Consultants (Talis), has collaborated to determine the best solution for the disposal of treated APCr for the immediate future. A range of factors including best practice standards, existing environment, environmental risks, time constraints, logistics, and costs were considered. The Interim Disposal Solution for disposal of the treated APCr is within the eastern cell of the existing approved Stage 2 Class IV landfill cell.

The EMRC has therefore prepared this Referral to outline the Proposal, provide justification, outline community consultation undertaken, identify the EPA Principles and factors relevant to the Proposal and undertake and holistic impact assessment.

Concurrently to the EPA Referral, the EMRC has submitted a Works Approval application to the Department of Water and Environmental regulation (DWER) for the construction of the Immobilisation Plant.

1.1 Objectives

The objectives of this Referral are:

- Notify the EPA of the Proposal;
- Provide justification for the Proposal;
- Outline the community consultation undertaken for the Proposal;
- Identify the environmental principles and factors relevant to the Proposal; and
- Provide a holistic assessment of the Proposal.

1.1 Proponent Details

The Proponent for this Project is the EMRC. The details for the Proponent are provided in Table 1-1.

Table 1-1: Proponent Details

Aspect	Details
Contact	Douglas Bruce
Position	Chief Project Officer
Physical Address	226 Great Eastern Highway, Ascot WA 6104
Postal Address	PO Box 234, Belmont WA 6984
Telephone	08 9424 2210 or 0400 413 415
Email	Douglas.Bruce@emrc.org.au

1.2 Project Location and Description

The RHWMF is located approximately 12 kilometres (km) north-east of Midland, on the southern side of Toodyay Road and east of the Darling escarpment in Western Australia. The RHWMF spans across Lot 1 on Diagram 15239, Lot 2 on Diagram 68630, Lot 8, Lot 9 and Lot 10 on Plan 10872, Lot 11 on Diagram 69105 and Lot 12 on Deposited Plan 26468.

The proposed location for the Immobilisation Plant is within Lot 10. The proposed location of the Immobilisation Plant will require a change to the authorized extent of the MS462 boundary to include the development area within Lot 10 as shown in **Figure 2 of the EAMP**.

The proposed disposal location for the Interim Disposal Solution is within the Class IV Stage 2 eastern cell which is located in the southern section which is covered by MS462 as shown in **Figure 2 of the EAMP**.

1.3 Project Design and Description

The EMRC propose to accept approximately 20,000 tonnes per annum to 40,000 tpa of raw APCr from the Kwinana WtE facility. When treated this will result in a throughput of approximately 25,000 tpa to 50,000 tpa. An overview of the Project including the pre-acceptance procedure, transport, acceptance, plant infrastructure, treatment process, laboratory testing, disposal and capping of landfilled APCr is provided in **Section 6 of the EAMP**.

1.4 Spatial Data, Maps and Figures

The required spatial data that identifies and verifies the site boundary and footprint of the Project has been provided with this Referral in electronic format. Figures and drawings showing the Project location and general arrangement are provided in the EAMP.

2 Justification

In March 2019, Avertas commenced construction of the WtE plant is located in the Kwinana Industrial Area and is expected to start operations in 2022. The facility will process up to 400,000 tonnes per annum of non-recyclable municipal solid, commercial and industrial waste generating and exporting approximately 36 megawatts of green electricity.

The EMRC is aware that the East Rockingham WtE plant is currently under construction with operations also to commence in 2022. At this stage, the EMRC has not held discussions with the owners or operators of the East Rockingham WtE facility about the acceptance and treatment of its APCr. With limited options available in the market for the acceptance of the APCr in Perth, EMRC recognises that they may be required to accept this material. Therefore, the APCr treatment plant to be developed at the RHWMF has sufficient capacity to process the APCr generated at the East Rockingham WtE facility.

The APCr by-product the WtE Plant produces comprises of a mixture of boiler fly ash and residue from the air pollution control system. APCr is comprised of approximately 52 per cent (%) hydrated lime, 3% activated carbon and 45% flue gas particles. Due to the characteristics of this material the options for the management of this material are limited to further processing to allow reuse or treatment prior to appropriate disposal at a suitably licenced facility.

To be accepted at a Class IV facility, the material requires suitable treatment to reduce its classification from Class V to Class IV in accordance with the Department of Water and Environmental Regulation (DWER's) *Landfill Waste Classification and Waste Definitions 1996* (as amended 2019) (Landfill Classification Guidelines). As mentioned previously, the treatment process involves mixing APCr with cement and water, thereby immobilising the material and altering its physical and chemical properties. The treated APCr material can then be disposed of into a future APCr dedicated Class IV landfill cell.

The Public Environmental Review (PER) submitted to the EPA for the Kwinana WtE Plant included the option for reuse of the by-products (bottom ash and fly ash) to manufacture bricks onsite. The *Report and recommendations of the Environmental Protection Authority – Kwinana Waste to Energy Project* (February 2015) recommended the fllowing condition:

7-8 In the event that that by-products fail to meet the criteria in the Ash Reuse Management Plan the proponent shall:

(1) reprocess the by-products; or

(2) dispose of the by-products to an appropriate class landfill.

The EPA stated that Condition 7-8 "has the effect of ensuring that all ash will be disposed of to an appropriate landfill until such time as it can be reliably demonstrated that brick products meet health, environmental safety and integrity requirements." (EPA, 2016). Therefore, until such time the reuse of the material in bricks is a viable option, Avertas investigated the options for appropriate disposal of this material at a licenced facility.

Avertas considered numerous options for the disposal of the material and transporting the material and deemed transporting the material approximately 65km to the EMRC's RHWMF for treatment and appropriate disposal to be the most viable option due to the closer proximity and therefore reduced environmental risks and costs.

2.1 APCr Disposal Options

It was recognised by Avertas that the EMRC is most appropriate Project partner for the acceptance, treatment and disposal of the treated APCr. The key reasons for this determination were:

- Recognition of EMRC as a long-term leader within Western Australia (WA) for the provision of waste services;
- Significant knowledge and experience in the handling of contaminated / hazardous materials; and
- Operation of the only Class IV landfill facility within Perth Metropolitan Region.

Given the urgency to provide an appropriate disposal option for the APCr and based on preliminary advice from the DWER and EPA, the EMRC, Avertas and Talis have devised an Interim Disposal Solution.

The Interim Disposal Solution is to dispose of the treated APCr within the eastern cell of the existing Stage 2 Class IV landfill at its RHWMF. The key reasons that support this approach include:

- Co-disposal of immobilised APCr and other Class IV hazardous waste streams is permitted and consistent with current legislation and policy in WA;
- Co-disposal of the APCr is consistent with proven practices in the UK (discussed further in **Section 2.3 of the EAMP**); and
- Monitoring of the leak detection layer of the eastern cell of the Stage 2 Class IV landfill has not found the presence of any liquids indicating that there are no integrity risks with the primary liner within this cell (discussed further in **Section 6.12.3 of the EAMP**).

In addition to the above, 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.

3 Stakeholder and Community Engagement

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.

The EMRC recently delivered information sessions to two key groups; Waste Management Community Reference Group (WMCRG) and the Gidgegannup Progress Association (GPA).

The WMCRG was created in 2002 to provide informed advice and feedback to the EMRC on behalf of the community on waste management and waste education issues. The group meets on a quarterly basis and consists of ten (10) members that reside from within the EMRC's member Councils. Since its inception, the WMCRG has assisted the EMRC progress several important waste education and waste communication initiatives.

The GPA consists of members within the locality of Gidgegannup who meet monthly. The aim of the group is to "promote, advance and secure the special and general welfare, interests and opinions of persons resident or owning land in or around the locality of Gidgegannup and to maintain and improve the lifestyle of such persons". The EMRC recognises the GPA as an ideal partner to assist with consulting the community on the developments and operations of the RHWMF.

The EMRC held an information session for each group on the 19 August 2021 and the 24 August 2021 respectively, regarding a range of current initiatives and future projects which included the acceptance, treatment and disposal of APCr at the RHWMF (the Project). A copy of the Presentation provided at these information sessions is provided in **Appendix E of the EAMP**.

The majority of the questions form the presentation were related to other key projects proposed for the RHWMF such as the long-term Food Organics and Garden Organics (FOGO) facility, Landfill gas to power plant and liquid waste facility.

A summary of the key questions raised during the information sessions in relate to the Project and the response provided by the EMRC and Talis are provided in **Table 7-1 of the EAMP**.

4 Environmental Principals and Factors

A review of the potential significant environmental factors was undertaken according to the EPA's *Statement of Environmental Principles, Factors and Objectives* (SEPFO) (EPA, 2016). The SEPFO document states that the terms "'significant impact' and 'significant effect' are not defined in the EP Act. Therefore, the ordinary or everyday meanings of these terms apply" (EPA, 2016).

The environmental attributes of the Project location and the potential impacts were considered in relation to the EPA's Factors and Objectives. The Factors and Objectives of relevance to the Project are shown in Table 4-1.

Table 4-1: EPA Factors and Objectives

Theme	Factor	Objective	Relevance	Comment
Sea	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	No	The Site is located approximately 32.5km from the coast. The EPA Factors associated with the Sea are not considered to be relevant to the Project.
	Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	No	
	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	No	
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	No	
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	No	The site has been historically cleared therefore no vegetation will be disturbed for the Project development.
	Landforms	To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.	No	Landform within the site is already disturbed through historical clearing and current operations. No significant changes to landforms will occur.
	Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	No	No subterranean fauna communities and species recorded within or surrounding the Site. Geology is not typical subterranean fauna habitat.

Theme	Factor	Objective	Relevance	Comment
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Yes	Potential impacts to underlying soils from seepage of leachate from the Stage 2 Class IV Landfill.
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	No	No clearing is required for the Project.
Water	Inland Waters	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.	Yes	Groundwater quality may be impacted from seepage of leachate from the Stage 2 Class IV landfill.
Air	Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	No	No significant impacts to air quality will occur. The generation of dust is addressed under Social Surrounds and vehicle emission under Greenhouse Gas Emissions
	Greenhouse Gas Emissions	To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.	Yes	Vehicle emissions will be generated from the transport of materials within the site.
People	Social Surroundings	To protect social surroundings from significant harm.	Yes	Dust and noise emissions will be generated from the construction and operation of the Project.
	Human Health	To protect human health from significant harm.	No	Potential exposure to dust emissions is addressed under Social Surrounds.

Each of the factors relevant to the Project are discussed in the following subsections. The EPA factor Terrestrial Environmental Quality and Inland Waters has been combined as the potential impacts to these factors would result from the same activity and therefore has the same mitigation measures.

4.1 Terrestrial Environmental Quality and Inland Waters

The EPA Factor Terrestrial Environmental Quality and Inland Waters are considered relevant to the Project due to the potential for contaminated surface water to enter the underlying soils and groundwater and impacts to soil and groundwater quality from seepage of leachate should the integrity of the landfill lining system be compromised.

EPA Objectives: To maintain the quality of land and soils so that environmental values are protected and; To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.

4.1.1 Existing Guidance Documentation

The following existing guidance documentation applies to the management of this factor with regard to the Project:

- *EPA Statement of Environmental Principles, Factors and Objectives (2016);*
- *Environmental Protection Authority (2016) Environmental Factor Guideline: Terrestrial Environmental Quality, EPA, Western Australia (December, 2016);*
- *Environmental Protection Authority (2018) Environmental Factor Guideline: Inland Waters, EPA, Western Australia (June, 2018);*
- *Environmental Protection Authority (Victoria) (2015) Siting, design, operation and rehabilitation of landfills (August, 2015);*
- *DWER Guidance Statement: Risk Assessments (February, 2017);*
- *EPA Victoria Environmental Protection Agency, Hydrogeological Assessment (Groundwater Quality) Guidelines (VEPA, 2006);*
- *AS 2368-1990 Australian Standard Test pumping of water wells;*
- *AS2870-2011 Residential slabs and footings;*
- *AS31000:2009 Risk Management - Principles and Guidelines;*
- *Australian Standard (AS) 1729:1993 Geotechnical Site Classification;*
- *Department of Environment Regulations, 2014-Assessment and Management of Contaminated sites, Contaminated sites guidelines (DER, 2014);*
- *Department of Water (DoW) - WQPN 52: Stormwater management at industrial sites;*
- *Department of Water (DoW) - WQPN 30: Groundwater Monitoring Bores;*
- *National Environment Protection (Assessment of Site Contamination) Measure, 1999-amended 2013 (NEPM, 2013); and*
- *UK Environment Agency - Landfill Directive, Landfill Technical Guidance Note 01 (LFTGN01), Hydrogeological Risk Assessments for Landfills (2003).*

4.1.2 Baseline Information

The following baseline information is relevant to these factors:

- Geology is described in **Section 4.3 and Appendix F of the EAMP**;
- Groundwater depth and chemistry is described in **Section 4.4 and Appendix F of the EAMP**;
- Waste types accepted in the Class IV Stage 2 is described in **Section 6.12.6 of the EAMP**;
- APCr waste characterisation, treatment trials, analysis and volumes is described in **Section 5 and Appendix B of the EAMP**;
- Landfill lining system is described in **Section 6.12.2 of the EAMP**;
- Landfill Lining System Integrity Assessment is described in **Section 6.12.3 of the EAMP**; and
- Hydrogeological Risk Assessment (HRA) is described in **Section 6.12.4 of the EAMP** and provided as **Appendix F of the EAMP**.

4.1.3 Relevant Proposal Activities

The key Project activities that are relevant to this factor are:

- Potential for hydrocarbon spills or leaks from vehicles and machinery used during construction and operations resulting in soil contamination;
- Potential for spills of APCr and cement powder during transport, acceptance and treatment resulting in soil contamination;
- Surface water contact with the Immobilisation Plant and hardstand resulting in contaminated surface water impacting the surrounding soils;
- Leachate generation from the disposal of treated APCr into the Stage 2 Class IV landfill; and
- Leachate seepage from the Stage 2 Class IV landfill in the event the lining system is compromised causing groundwater contamination.

4.1.4 Impacts and Mitigation

The key potential environmental risks are spills/leaks, contaminated surface water, leachate generation and groundwater contamination. The impacts and proposed management measures to mitigate these risks is outlined below.

Spills and Leaks

Hydrocarbon spills and leaks from vehicles and equipment can result in localised soil contamination and groundwater contamination should the spill be significant enough to reach the groundwater table. Groundwater below the proposed location for the Immobilisation Plant is approximately 254-258m AHD. Groundwater will not be intersected for the construction of the facility which will be at an elevation of 262.5m AHD with implied separation to the water table of approximately 4.5-8.5m. The elevation of the Stage 2 Class IV landfill pit floor is 275-269.5mAHD across the northern and southern sides respectively as indicated in Figure 2a of the RHWMF operating Licence L8889/2015/1. Based on the GWL recorded at SP48D and SP49D, along the southern side of the Stage 2 Class IV landfill, and a hydraulic gradient of 0.07 determined from the regional hydraulic contour the separation from the base of the Stage 2 Class IV landfill to the maximum (wet season) GWL is 4.2-5.7m. Spills of APCr and cement can contaminate surface water and surrounding soils. Dust impacts related to spills are discussed in **Section 4.3.**

To manage the potential for leaks and spills, the EMRC will implement the following measures:

During Construction

- an Environmental Management Plan will be developed and implemented by the Design and Construct Contractor;
- daily vehicle and equipment inspections;
- regular maintenance of vehicles and equipment;
- hydrocarbon spills will be managed through the use of hydrocarbon spill kits;
- the Site Supervisor will be notified immediately; and
- any contaminated soils removed and disposed of into the Class IIII or Class IV landfill depending on the waste characterisation.

During Treatment

- a bunded concrete hardstand area with slopes and sumps to capture any spills and leaks within the Immobilisation Plant;
- operation and management of the Immobilisation Plant will be undertaken by suitably skilled and qualified operators;
- induction and training for the APCr Immobilisation Plant will include spill and leak management;
- all residues and spills will be hosed down to ensure they are captured within the surface water management system and then returned to the process by pumping from the silt trap or surface water pond;
- regular inspection of the APCr Immobilisation Plant and associated equipment;
- clean up equipment will only be utilised within the APCr Immobilisation Plant;
- any leaks and spills will be reported to the Site Supervisor immediately; and
- operators will utilise appropriate personal protective equipment (PPE).
-

Further information on the management of spills and leaks are outlined in Section 8.2.2 and Section 8.3.3 of the EAMP.

Contaminated Surface Water

Excess surface water captured within the area of the Immobilisation Plant can result in flooding and overflow of contaminated surface water to the surrounding soils, and if stormwater volumes were substantial, it may present a contamination risk to groundwater.

To control surface water within the Immobilisation Plant area, the following management measures will be implemented:

- the perimeter of the hardstand is bunded to direct surface water away from the Immobilisation Plant to the surrounding area;
- the surface water management system consists of roof, hardstand slopes, sumps, main collection sump and a surface water pond:
  - designed to 1/100 year 72 storm event plus the capacity to hold one 46,000L tank;
  - adequate slopes on the hardstand area to direct all surface water to the sumps;

- water in the sumps is directed to the main collection sump that consists of a silt trap to collect any solids;
- the filtered water is then directed to the HDPE lined surface water pond with a total capacity of 376m^3 and operating capacity of 217m^3;
- filtered water in the storage pond is then pumped back into the process water tanks (2 x 46,000L) for reuse in process;
- roof over the Immobilisation Plant to capture rainfall which is pumped into the process water tanks for use in the treatment process;
- roof over the unloading area to capture clean stormwater that is directed away from the Immobilisation Plant;

- water used for the cleaning of the hardstand and washing out of the mixer will be captured on the hardstand which will be directed to the sumps and progresses through the system to end up in the process water tanks;
- water used in the washdown bay is contained and directed to the surface water management system to be reused in process;
- to minimise the generation of contaminated surface water generated from the cleaning of the agitator truck, the agitator truck will be cleaned within the Class IV landfill thereby containing the contaminated water within the cell. Any additional cleaning required for the agitator truck will be done at the washdown bay; and
- daily monitoring of weather conditions will be undertaken to monitor for inclement weather.

Further information on surface water impacts and management is outlined in **Section 8.3.2 of the EAMP**.

Leachate Generation and Groundwater Contamination

Leachate can be generated through the filtration of water through waste materials. Leachate contains contaminants that can result in soil and groundwater contamination if not managed appropriately. The management measures to manage leachate, reduce its generation and avoid groundwater contamination include:

- disposal of treated APCr above the leachate head thereby minimising the interaction of leachate contained within the base of the cell;
- a minimum of four (4) metres separation distance between the base of the landfill to groundwater (see **Section 6.12.1 of the EAMP**);
- ensure the appropriate mixing ratio is achieved at the Immobilisation Plant to obtain suitable viscosity results to achieve maximum volume to surface area ratio for the treated APCr;
- treated APCr will be deposited into designated filling areas to maximise the volume per surface area ratio minimising the exposed areas and the generation of leachate;
- any cracks within the treated APCr will be filled and covered with soils;
- any leachate generated within the Stage 2 Class IV landfill will be captured in the existing leachate collection system which consists of a double composite lining system, leachate collection pipework, sump and evaporation pond(s);
- a composite capping system including a linear low-density polyethylene (LLDPE) and/or Geosynthetic Clay Liner (GCL) will be installed to avoid rainfall infiltration and generation of leachate. The exact capping materials will be determined in the preparation of the Stage 2 Class IV Closure Plan;
- ongoing groundwater monitoring in accordance with the *Surface Water and Groundwater Environmental Management Plan* and Licence L8889/2015/1;
- implementation of management measures if groundwater contamination was detected (see **Section 8.4.4 of the EAMP**);

- continue to monitor groundwater monitoring wells in accordance with the Licence and Surface Water and Groundwater Environmental Management Plan; and
- conduct tracer testing within the Stage 2 Class IV landfill leachate sumps.

Further information on groundwater impacts and management is provided in **Section 8.4.4 of the EAMP**.

4.1.5 Predicted Outcome

The potential for impacts to Terrestrial Environmental Quality and Inland Waters is not anticipated to be significant due to:

- The Immobilisation Plant will be constructed, operated, maintained and inspected by qualified personnel according to the Licence conditions (once granted);
- Appropriate environmental controls listed above will be implemented to manage surface water and potential leachate;
- The HRA determined to risk to groundwater and sensitive receptors is low;
- Ongoing groundwater monitoring will be undertaken in accordance with the Licence L8889/2015/1 and the EMRC's *Surface Water and Groundwater Environmental Management Plan*; and
- Contingency management measures will be implemented in the event the groundwater contamination is detected.

Following implementation of these management measures, the residual risks were determined to be medium to low (see **Section 9 of the EAMP**).

4.2 Greenhouse Gas Emissions

The EPA's objective Greenhouse Gas Emissions is considered relevant to the Project as vehicle emissions will be generated during the construction and operational phases. These emissions will contribute to carbon dioxide (CO_2) levels in the atmosphere.

To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.

4.2.1 Existing Guidance Documentation

The following existing guidance documentation applies to the management of this factor with regard to the Project:

- *EPA Statement of Environmental Principles, Factors and Objectives (2016).*
- *Environmental Protection Authority (2016) Environmental Factor Guideline: Greenhouse Gas Emissions, EPA, Western Australia (March, 2019).*

4.2.2 Baseline Information

The following baseline information is relevant to this factor:

- Estimated Scope 1 GHG emissions are 156 tonnes per annum (tpa) (see **section 8.5.3 of the EAMP**)

4.2.3 Relevant Proposal Activities

The key Project activities that are relevant to this factor are:

- Vehicle emissions generated during construction works; and
- Vehicle emissions generated during operations (i.e. transport of cement and raw APCr to the Immobilisation Plant and transport of treated APCr to the Class IV landfill).

4.2.4 Impacts and Mitigation

The impacts from vehicle emissions generated from the Project is the contribution of CO_2 to overall atmospheric CO_2 levels which is one of the key contributing factors to climate change. Although vehicle emissions cannot be avoided the proposed management measures to reduce the generation of GHG emissions include:

- mobile machinery will have emission standard engines, particulate filters, catalytic converters and/or wet scrubbers;
- emissions will be reduced through minimising idling times;
- short internal transportation route to the Immobilisation Plant and to the Class IV landfill; and
- regular maintenance of mobile plant and vehicles will be undertaken to ensure emission controls are maintained. Low emission fuels and sulphur lubricants will be used as much as practicable.

Further information of the impacts and management measures are provided in Section 8.5.3 of the EAMP.

4.2.5 Predicted Outcome

The potential for significant impacts to GHG emissions is not anticipated to occur due to the following:

- the proposed management measures will minimise the GHG emissions as far as practicable; and
- estimated scope 1 GHG emissions will not exceed 100,000tpa.

Following implementation of these management measures, the residual risks was determined to be low (see section 9 of the EAMP).

4.3 Social Surroundings

The EPA's objective Social Surroundings is considered relevant to the Project as the establishment of the Immobilisation Plant may cause impacts to amenity from the generation of noise and dust emissions during construction activities and the transport, acceptance, treatment and disposal processes.

EPA Objective: To protect social surroundings from significant harm

4.3.1 Existing Guidance Documentation

The following existing guidance documentation applies to the management of this factor with regard to the Project:

- *Environmental Protection Authority (2016) Environmental Factor Guideline: Social Surrounds, EPA, Western Australia (December 2016);*
- *EPA (WA) – Guidance Statement 3: Separation Distances between Industrial and Sensitive Land Uses (June 2005);*
- *DWER's Guidance Statement: Risk Assessments (February 2017); and*
- *Environmental Protection (Noise) Regulations 1997.*

4.3.2 Baseline Information

The following baseline information is relevant to this factor:

- the separation distance from the boundary of the activity i.e. the proposed Immobilisation Plant and existing Class IV landfill to the nearest sensitive receptor (rural residence) is 958m and 621m respectively. The distance from the Prescribed Premises boundary to this sensitive receptor is 736m and 517m respectively.

4.3.3 Relevant Proposal Activities

The key Project activities that are relevant to this factor are:

- dust generated from earthworks during construction;
- accidental raw APCr dust emissions during transport, acceptance and treatment;
- accidental cement dust emissions during transport, acceptance and treatment;
- dust generated from damaged or cracked treated APCr within the landfill; and
- noise emissions generated during the construction and operational phases.

4.3.4 Impacts and Mitigation

Dust emissions

The potential impacts from exposure to dust generated during construction activities includes reduced visual amenity, eye and respiratory irritation and impacts to nearby vegetation. Reduced visual amenity from dust can cause general nuisance and potential safety risks. Exposure to dust from earthworks through inhalation can result in respiratory impacts such as coughing and eye and lung irritation. Dust emissions may result in impacts to nearby vegetation through dust settlement on plants impacting their ability to photosynthesise.

Accidental human exposure to raw APCr can result in health impacts due to the concentration of heavy metals (particularly lead and cadmium). Exposure to cement dust containing silica can also result in health impacts.

To manage or mitigate risks associated with dust emissions, the following proposed management measures will be implemented:

Construction

- the contractor will be required to prepare and implement an Environmental Management Plan for the Project to be approved by the EMRC's environment team;
- speed limit controls will be adopted across the construction area (similar to the Site);
- a water cart will be used as required to prevent dust emissions; and
- site operators will use appropriate PPE as required to manage potential impacts from dust emissions.

Operation

- enclosed transfer of material into the sealed storage silos (as described in **Section 6.9 of the EAMP**);
- use of reverse jet pulse dust filters on each storage silo to filter dust and release cleaned air (as described in **Section 6.8.4 of the EAMP);**
- storage silo overfill controls that includes (see **Section 6.8.5 of the EAMP**):
  - a weatherproof control box mounted on the silo leg at the fill pipe access point;

- audible alarm;
- strobe light;
- test circuit facility;
- vega high level probe mounted in the lid of each silo; and
- 100mm air actuated butterfly valve at the inlet end of the fill pipe.
- transfer of the APCr and cement into the mixer is a fully enclosed process (as described in **Section 6.9 of the EAMP**);

- operators will utilise appropriate PPE when operating the Immobilisation Plant;
- regular maintenance of the Immobilisation Plant by the Design and Construction Contractor on regular basis;
- wetting down of concrete pad and surrounding bare ground prior to each delivery (or as required);
- daily cleaning of the hardstand and inspection of the Immobilisation Plant;
- the agitator truck will be washed down each day within the Stage 2 Class IV landfill to 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 generation of 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 the surface water management system and any residue will be captured in the silt trap and reused in process;
- all staff involved in the APCr operations will be provided with appropriate training including the potential environmental and health and safety risks and the relevant environmental management measures;
- any cracks or damage to the treated APCr will be filled and covered with soils; and
- operators within the landfill will be located within machinery with suitable ventilation.

Further information on dust impacts and management is provided in **Section 8.2.1** and **8.4.2** of the **EAMP**.

Noise emissions

Noise emissions will be generated form the construction of the Immobilisation Plant and during operations. Exposure to excessive noise can reduce amenity and result in temporary or long-term impacts to hearing.

To manage or mitigate risks associated with noise emissions, the following proposed management measures will be implemented:

- all trucks and mobile equipment to be fitted with broadband noise reversing alarms to minimise the impact from vehicle reversing alarms;
- speed limit controls will be adopted across the construction area (as per current Site limits).
- all equipment and plant will be maintained in good working condition;
- operating hours will occur between 8am to 4pm Monday to Saturday and 10am to 4pm on Sundays;
- staff and visitors will be provided with appropriate PPE to mitigate any noise impacts associated with the construction and operation; and
- operation of the facility will comply with the *Environmental Protection (Noise) Regulations 1997*.

Further information on noise management is provided in **Section 8.5.1 of the EAMP**.

4.3.5 Predicted Outcome

The potential for impacts to Social Surrounds is not anticipated to be significant due to the following:

- the construction of the Immobilisation Plant will be undertaken by a qualified Design and Construct Contractor according to their Environmental Management Plan;
- the Immobilisation Plant will be operated, maintained and inspected by qualified personnel and in accordance with the Licence conditions (once granted);
- appropriate environmental and operational controls listed above will be implemented to manage dust and noise emissions; and
- there is no change to the current separation distances between the Prescribed Premises boundary and the nearest sensitive receptors. The Immobilisation Plant has been located further away than the distance between the sensitive receptors and the Class IV landfill.
- Following implementation of these management measures, the residual risks was determined to be medium to low (see **Section 9 of the EAMP**).

5 Holistic Impact Assessment

The Project in combination with the existing operations at the RHWMF is not anticipated to result in a significant or unacceptable cumulative impact. As mentioned previously, the RHWMF is currently managed under the various Ministerial and Licence (L8889/2015/1) conditions as well as the EMRC's EMS which aims to minimise environmental risks and emissions associated with waste management activities.

I relation to holistic / accumulative impact assessment, the Stage 2 Class IV landfill is an already DWER approved and established facility managed by the EMRC according to Licence (L8889/2015/1). The key consideration for this existing facility is the disposal of the treated APCr which has the potential to impact on Terrestrial Environmental Quality (soil contamination), Inland Waters (groundwater contamination) and Social Surrounds (noise and dust emissions).

Given consideration of the following, the disposal of treated APCr does not present an unacceptable environmental risk nor does it significantly increase the environmental risks associated with the operation of the current landfill:

- waste characterisation and laboratory trials indicated that APCr can be treated through immobilisation to achieve Class IV standard as per the DWER's *Landfill Waste Classification and Waste Definitions 1996* (as amended 2019) (Landfill Classification Guidelines) (**Appendix B of the EAMP**);
- the HRA (**Appendix F of the EAMP**) determined that the risk to environmentally sensitive receptors (groundwater and Christmas Tree creek) is low due to the:
  - underlying supportive geotechnical characteristics including 4.2-5.7m of unsaturated soils prior to the inferred maximum groundwater;
  - based on the calculated seepage velocity for the site of 8m/yr, the travel time of an un-retarded contaminant from the Stage 2 Class IV landfill to the receptor is estimated to be over 50 years;
  - all records to date suggest there is no hydraulic connection between the groundwater and the Christmas Tree Creek south of the Site; and
  - the result of the LandSim modelling using conservative assumptions has shown that the predicted concentration of the non-hazardous contaminants at the 95th percentiles do not exceed the relevant guidelines or background concentrations during the operational and post closure managed phases of the facility. Concentrations were also shown to remain within or near background ranges for the duration of the modelling (20,000 years).
- existing best practice environmental controls to manage leachate and potential impacts to groundwater:
  - double composite landfill lining system with leachate collection and treatment system;
  - groundwater monitoring is conducted in accordance with the Licence L8889/2015/1 and *Surface Water and Groundwater Environmental Management Plan*;
  - groundwater monitoring will continue post closure;
  - contingency measures will be implemented in the event groundwater contamination is detected.
- proposed management measures:
  - a filling plan has been prepared in order to:
    - to maximise the use of remaining void space;
    - ensure stability of the waste mass and to avoid safety risks;
    - protect the side wall lining system by using 300mm separation soils;
    - avoid filling over the leachate sump to protect the leachate collection system;

- dispose of treated APCr into designated filling areas (3m wide by 500mm high) to minimise the surface area to volume ratio and therefore reduce exposure to the elements; and
- the landfill cells will be capped in accordance with best practice landfill standards.

It should be noted that the sooner the Stage 2 Class IV landfill can be filled and capped the better the environmental outcome as the cap will inhibit the infiltration of rainfall into the waste mass. In turn, this will eliminate the source of future leachate generation from the Stage 2 Class IV landfill. Once the cell is capped, leachate will continue to be extracted until such time that leachate volumes presenting at the sump are negligible and the waste mass will be, and remain, relatively dry. The adoption of these measures will ensure that leachate generation is eliminated over time thereby reduce the potential for long-term environmental risks.

The main change to the overall operation of the RHWMF is the establishment of the Immobilisation Plant. However, the establishment and operation of this facility is not expected to result in significant local or cumulative impacts due to the following key considerations:

- the treatment location will be located in close proximity to the disposal location thereby reducing risks associated with transport and GHG emissions;
- the facility will be established within the RHWMF site boundary and further from the nearest sensitive receptor's current distance to the existing Stage 2 Class IV landfill therefore not presenting any significant impacts from noise;
- the facility will be designed and constructed by a qualified and experienced and qualified Contractor in accordance with an Environmental Management Plan;
- the prefabricated facility will be established in an area previously cleared of vegetation occupying a relatively small area of 22 metres (m) by 23m;
- the Immobilisation Plant will be operated by qualified and trained personnel and in accordance with the Licence conditions;
- the Immobilisation Plant will operate during current site operational hours five days a week;
- the Immobilisation Plant utilises an enclosed treatment process with strict environmental controls to manage any potential impacts (i.e. surface water, dust and noise); and
- existing environmental measures are implemented across the RHWMF to manage dust, noise and surface water in accordance with the Licence and EMS.

Given the proposed management controls, the operation of the Immobilisation Plant is not anticipated to result in significant impacts to Social Surrounds or Terrestrial Environmental Quality.

A minor change to the overall operations of the RHWMF associated with the Project is the movement of vehicles transporting materials (APCr and cement) to the Immobilisation plant and treated APCr to the Stage 2 Class IV landfill. The vehicles movements are not expected to result in a significant impact to the Social Surrounds in relation to noise nor will they contribute to significant GHG emissions.

In conclusion, from a holistic perspective, the Project is not anticipated to result in significant environmental impacts and can be managed appropriately under Part V of the EP Act.

6 References

Talis Consultants (2021). Environmental Assessment and Management Plan - Air Pollution Control Residue Treatment and Disposal – Interim Solution, September 2021

7 Appendix A – Environment Assessment and Management Plan