This document has been prepared for **Polytrade Operations Pty Ltd** by:

Northstar Air Quality Pty Ltd,
Suite 1504, 275 Alfred Street, North Sydney, NSW 2060

northstar-env.com | Tel: 1300 708 590

Strathfield South MRF Expansion

Air Quality Impact Assessment & Greenhouse Gas Assessment

Addressee(s):	Polytrade Operations Pty Ltd
Site Address:	40 Madeline Street, Strathfield South NSW
Report Reference:	22.1070.FR2V1
Date:	25 June 2026
Status:	Final

air quality | environment | sustainability

Quality Control

Report	Reference	Status	Prepared by	Checked by	Authorised by
Strathfield South MRF Expansion - Air Quality Impact Assessment & Greenhouse Gas Assessment	22.1070.FR2V1	Final	Northstar	GCG, MD, VM	VM

Report Status

Northstar References		Report Status	Report Reference	Version
Year	Job Number	(Draft: Final)	(R*x*)	(V*x*)
22	1070	Final	R2	V1
Based upon the above, the specific reference for this version of the report is:				22.1070.FR2V1

Final Authority

This report must by regarded as draft until the above study components have been each marked as final, and the document has been signed and dated below.

pp **Varun Marwaha** **25 June 2026**

Non-Technical Summary

Northstar Air Quality Pty Ltd has been commissioned by Polytrade Operations Pty Ltd to perform an air quality impact assessment and greenhouse gas assessment to support an environmental impact statement for the proposed expansion of a material recovery facility located at 40 Madeline Street, Strathfield South NSW.

This assessment identifies and examines potential air quality impacts associated with the operation of the facility in accordance with regulatory requirements, and identifies mitigation and monitoring requirements commensurate with those anticipated impacts.

The prediction of potential impacts associated with operational activities has been performed in general accordance with the requirements of the Approved Methods, using an approved and appropriate dispersion modelling technique. The estimation of emissions has been performed using referenced emission factors.

The results of the assessment indicate that all air quality criteria are predicted to be achieved at the identified sensitive receptor locations. Modelled concentrations associated with the operation of the facility including the approved development at nearby receptors are minimal, and would not result in any additional exceedances of the air quality criteria.

Further to the above, it is noted that good site management practices, such as keeping building doors closed when possible to reduce the egress of uncontrolled emissions, and operation and maintenance of the baghouses to manage emissions, should be sufficient to ensure that no exceedances of the relevant air quality and odour criteria are observed during normal Project operation.

Assessment of the estimated greenhouse gas emissions indicates operation of the facility would contribute up to 0.0003 % of NSW total GHG emissions in 2024 and up to 0.00006 % of Australia total GHG emissions in 2024. Opportunities for greenhouse gas reduction are provided, and emissions of greenhouse gas resulting from operation of the facility will be minimised to the maximum extent practical.

CONTENTS

FIGURES

TABLES

1. INTRODUCTION

Northstar Air Quality Pty Ltd (Northstar) has been commissioned by EME Advisory on behalf of Polytrade Operations Pty Ltd (Polytrade) to perform an air quality impact assessment (AQIA) and greenhouse gas assessment (GHG) assessment to support an Environmental Impact Statement (EIS) for the proposed expansion of a material recovery facility (MRF) (the Project) located at 40 Madeline Street, Strathfield South NSW (the Project site).

This AQIA identifies and examines potential air quality (including odour impacts) associated with the Project, in accordance with the NSW Planning Secretary's Environmental Assessment Requirements (SEARs) and identifies mitigation and monitoring requirements commensurate with those anticipated impacts.

The GHG assessment provides a summary of greenhouse gas (GHG) emissions associated with the Project and compares these totals with national and state emissions. Opportunities for GHG reduction are also provided.

1.1. Secretary Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) have been provided for the Project by the NSW Department of Planning and Environment (DPE) on 29 March 2023. NSW Environment Protection Authority (EPA) has also provided a number of requirements. Table 1 provides a summary of the SEARs relevant to this AQIA, and where they have been addressed in this report.

Strathfield Council has also requested that an air quality impact assessment is provided to support the Project, and that assessment:

> *"…considers the cumulative impacts of materials recycling facilities in the southern portions of the Local Government Area, with existing operations occurring at 84 Madeline Street, Strathfield South (Aussie Skips), as well as the subject Waste Transfer Station at 40-42 Madeline Street."*

This has been addressed in Section 4.5.

Table 1 Coverage of SEARs and other Government Agency requirements (SSD-55775721)

Authority	Requirement	Section
DPE	Air Quality and Odour - a quantitative assessment of the potential air quality, dust and odour impacts of the development (construction and operation) on surrounding landowners, businesses and sensitive receptors, in accordance with relevant Environment Protection Authority guidelines, including:	Section 6
	Details of buildings and air handling systems and strong justification for any material handling, processing or stockpiling external to buildings.	Section 8.1
	Evidence of appropriate meteorological data for use in dispersion modelling, using real and local meteorological data where possible.	Section 4.2
	Inclusion of worst-case emission scenarios and sensitivity analyses.	Section 5.1.2
	A contingency plan to address unpredicted operational odour impacts.	Section 8.1
	Details of proposed mitigation, management and monitoring measures.	Section 8
	A cumulative impact assessment inclusive of impacts from other developments.	Section 4.5
	Greenhouse Gas and Energy Efficiency – including an assessment of the energy use of the proposal and all reasonable and feasible measures that would be implemented on site to minimise the proposal's greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050).	Section 7 Section 8.3
NSW EPA	The EIS must include an assessment of air quality which identifies all potential air emissions from the Premises including, but not limited to, coarse particulates, PM_{10}, $PM_{2.5}$ and odour. The Applicant must assess the impact of these discharges and demonstrate effective controls of all identified air emission from the Premises. Note: In relation to air impacts, all sensitive receivers need to be considered when conducting air quality and odour impact assessments. A sensitive receiver includes a place where someone works. Therefore, any industrial neighbours to the Premises must be included as a sensitive receiver.	Section 6 Section 4.1
	Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.	Section 2.5
	Estimate the resulting ground level concentrations of all pollutants. Where necessary, use an appropriate dispersion model to estimate ambient pollutant concentrations.	Section 6
	Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.	Section 6
	Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations.	Section 6
	For potentially odorous emissions, provide the emission rates in terms of odour units.	Section 5.1.2

1.2. Purpose of the Report

The purpose of this report is to perform an assessment to understand the risks and potential impacts of air emissions resulting from the operation of the Project.

To allow assessment of the level of risk associated with the Project, this assessment has been performed in accordance with and with due reference to the following relevant legislation and guidelines:

- *Protection of the Environment Operations Act* 1997;
- *Protection of the Environment Operations* (Clean Air) Regulation 2022;
- *Approved Methods for the Modelling and Assessment of Air Pollutants in* NSW (NSW EPA, 2022); and
- *Technical Framework and Notes - Assessment and Management of Odour from Stationary Sources in NSW* (NSW DEC, 2006).

2. THE PROJECT

The following provides a description of the context, location and scale of the Project, and a description of the processes and development activities on site. It also identifies the potential for emissions to air associated with the Project.

2.1. Environmental Setting

The Project site is located at 40 Madeline Street, Strathfield South NSW in the Strathfield Local Government Area (LGA). A map showing the location of the Project site is provided in Figure 1.

The closest residential property is located approximately 210 meters (m) to the south-east of the Project site on the corner of Excelsior Avenue and Chisholm Street. The immediate area surrounding the Project site is commercial/industrial in nature (refer Section 4.1).

2.2. Overview

Polytrade is seeking a new development consent to increase the co-mingled recyclables beneficiation capacity at the existing MRF by an additional throughput of 100 100 tonnes per annum (tpa). The additional co-mingled recyclables throughput will be processed through the existing approved facility. No additional buildings, plant or equipment or changes to the site layout will be required. The Project will increase the total materials received and processed on the site from the currently approved 99 900 tpa to 200 000 tpa.

The Project represents an intensification of operations utilising existing buildings, infrastructure, and site layout arrangement. Other than the additional co-mingled recyclables throughput, the Project will not involve any significant changes to the existing approved operations, site layout, or built form. Notably:

- There will not be any changes to the existing approved throughputs and processing activities for the paper/cardboard.
- There will not be any construction works or any additional buildings, plant or equipment required to accommodate the additional waste processing capacity of the existing facility.
- While there will be an increase in traffic generation (i.e. approximately 58 additional trucks per day delivering co-mingled recyclables, 13 additional trucks per days transporting processed material off-site (assumed to be 50 % from glass, 50 % from paper and cardboard), plus 6 additional employee vehicles per day), there will not be any changes to the existing approved site access arrangements, on-site traffic circulation, or external transportation routes currently used by trucks/vehicles to and from the site.
- There will be a minor change to the existing approved hours of operation (see Section 2.4.5).

- There will not be any changes to existing off-street car parking requirements or arrangements. The existing approved car parking provision is sufficient to accommodate the proposed car parking needs.
- There will not be any changes to existing customer/visitor access arrangements.

Figure 1 Project site location

Source: Northstar

2.3. Development History

2.3.1. Original Development Application

On 26 October 2016, the (former) Sydney East Joint Regional Planning Panel granted consent for use of the site as a waste management facility with an annual capacity of 30 000 tonnes of paper and cardboard and 69 900 tonnes of mixed metals, glass and mixed plastic.

DA 2015/177 was supported by an AQIA (SLR, 2015), which calculated emissions of particulate matter resulting from the MRF operation and predicted potential impacts at a number of proximate residential and industrial receptors. Impacts associated with odour were anticipated to be minimal and were not quantitatively assessed but determined to be manageable through the implementation of an Odour Management Plan. All particulate matter criteria were predicted to be achieved, with the exception of annual average $PM_{2.5}$ concentrations which were shown to be dominated by existing high and exceeding background conditions.

Condition 10 (b) and (c) of DA2015/177 required an odour audit program to be undertaken upon commencement of the proposed use, in order to verify compliance (or otherwise) with the criteria set out in the AQIA (SLR, 2015)(refer Section 2.5).

2.3.2. Modifications to Approval

A subsequent application to modify DA 2015/177 (i.e. DA2015/177/2) sought approval for alterations and additions to the approved development, including a revised carparking layout, relocation of a substation, change of use of two external storage bunkers, construction of minor additions to Buildings 1 and 2, and construction of a new external bunker for glass storage adjacent to Building 1.

A Statement of Environmental Effects (SEE) was submitted to support this modification (MRA, 2021) which stated:

> *"Proposed alterations and additions would not increase the exposure of MRF and PCR operations as these would continue to be conducted entirely inside a building or storage in enclosed structures. Alterations and additions aim to ensure all MRF, and PCR relocation remain appropriately enclosed and limit the potential for odour or particulates from escaping the site and affecting the nearby receptors.*
>
> *Overall, considering that material handling and processing would continue to be conducted inside buildings, and that the throughput will remain the same, the potential for emissions into the ambient environment is expected to be consistent with the previous assessment and consent."*

Modification 2015/177/2 was approved on 16 December 2022.

2.4. Current Operations

The site currently processes 69 9000 tpa of domestic commingled recycling and 30 000 tpa of source separated paper and cardboard. The existing site layout is illustrated in Figure 2.

Source separated paper and cardboard is received only on the southern side of the site, via the southern driveway ('Gate 2') and weighbridge ('Weighbridge 2') and is unloaded within the Paper and Cardboard Facility (Building 3). This material is compacted into bales and stored within Building 3, before being loaded onto semi-trailers for transport off-site.

The MRF receives comingled recycling from kerbside and commercial recycling collections, which are cleaned, sorted into material groups, sized, and baled ready for transport off-site and subsequent manufacturing into recycled packaging and other products.

Glass currently processed on site is sourced from Council kerbside collections (direct or via contractors), other MRFs, and commercial glass collections.

The 100 100 tpa of co-mingled recyclables throughput will continue to be sourced from the above sources, as well as Container Deposit Scheme (CDS) co-mingled recyclables from various network operators, and from Re.Group's expanding network of MRFs in NSW and the ACT.

The following describes the current processing activities performed at the MRF, which will not change as a result of the Project.

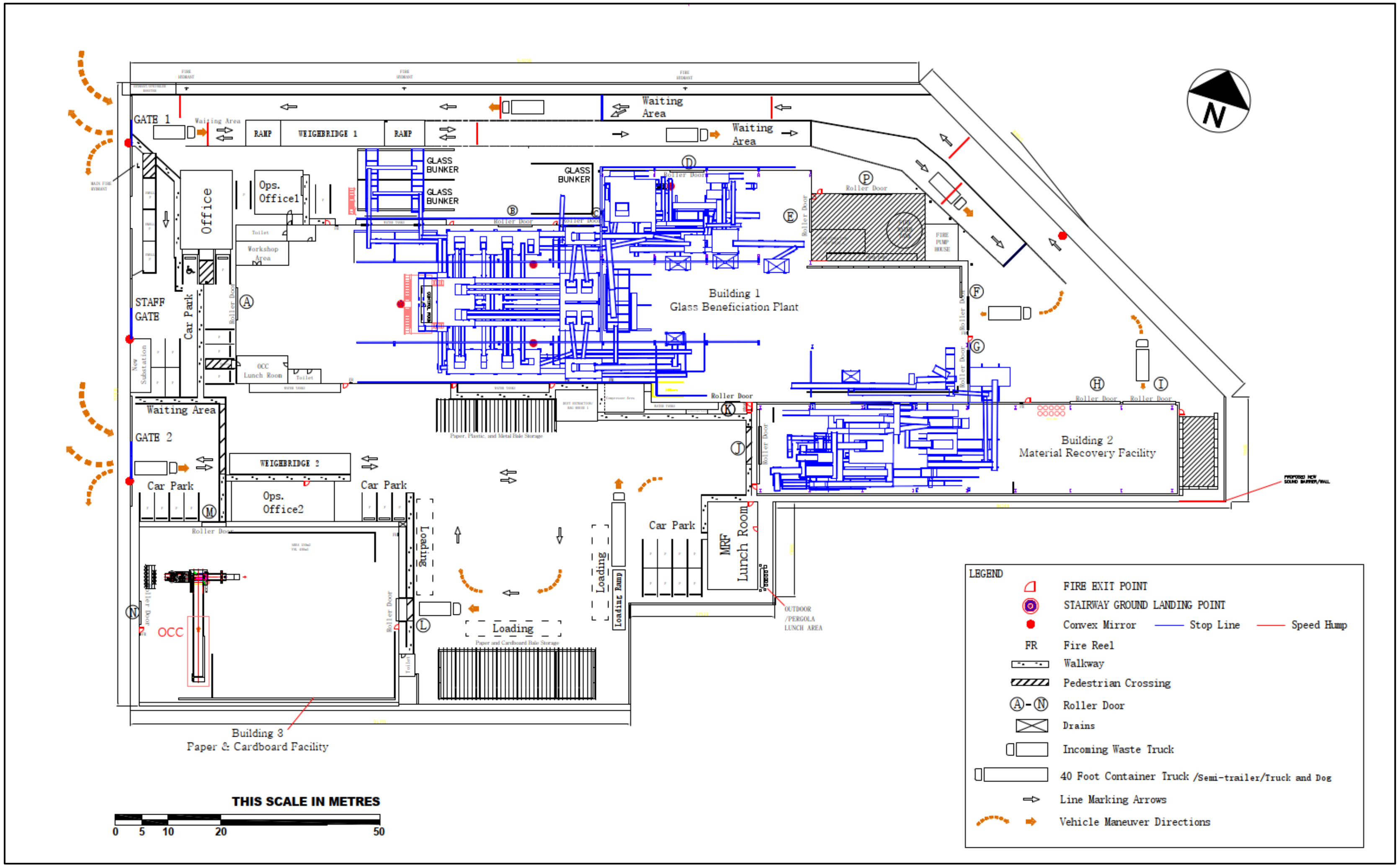
2.4.1. Material Receival

Vehicles carrying comingled recyclables currently enter the site from the adjoining Madeline Street via the main site access ('Gate 1') and pass over the weighbridge ('Weighbridge 1') to record tonnes received. After being weighed, incoming trucks containing mixed recyclables drive to the rear of the site and discharge their load at the MRF Receival Area within Building 2.

The MRF includes a series of conveyors that provide a constant and controlled flow of material through the system. Mixed recyclable material is sent through a series of trommel screens, an optical sorting system and an eddy current separator to separate material according to size and type (plastics, paper/cardboard, steel, aluminium, glass, and residual contaminants for disposal).

Non-recyclable contaminants are removed, baled and transported to a facility that is licensed to receive that waste.

Figure 2 Project site layout



Source: Re.Group

Once separated, plastics, metal (aluminium and steel) and paper/cardboard are sent via conveyor to a separate baler to be baled and temporarily stored. Once baled, recovered materials (excluding glass) are transferred by forklift and stored in the enclosed material bunkers located on the southern side of Building 1 before being loaded onto trucks and transferred to relevant destinations for further reprocessing.

Glass outputs from the MRF are transferred via internal conveyors to the glass beneficiation plant (GBP) in Building 1 for further processing and separation into different colour fractions. The MRF glass output is manually loaded into a hopper that is directly positioned on a vibratory feeder, which in turn feeds onto a conveyor. This conveyor then carries a controlled flow of the feed material to the next stage of the process.

Single-stream glass is sent directly to the GBP in Building 1. This includes glass from CDS collections or other independent collections of glass bottles. Inputs are deposited onto an intake stockpile on the floor of Building 1.

2.4.2. Cleaning

Glass is subject to a cleaning process to remove lids, labels and other contaminants. This process includes:

- Optical equipment to shoot out plastic and paper;
- An X-ray machine to shoot out ceramic, stone and porcelain (CSP);
- Magnets to pull ferrous metals; and
- Eddy currents to repel non-ferrous metals.

2.4.3. Processing and Sorting

Glass is sorted by colour and size using advanced glass optical sorting technology. This system sorts the glass into three colour categories, being green, amber and flint and into two size categories, being large glass (8 millimetre [mm]-50 mm) and small glass (3 mm-8 mm).

A crusher reduces the size of the glass to a regular, consistent size. This enables more accurate separation and thus cleaner, higher quality products will be produced.

The material then passes over a screening machine to remove the fines from the glass fragments (any material < 14 mm). This fine material is carried via an enclosed conveyor to the fines bunker.

The > 14 mm material is transported to the next stage of the process where it is separated via density separation, removing materials that are lighter than glass. To reduce the exposure to dust, this separation unit is kept under negative pressure.

During the process, the light organic material moves through a rotary valve onto a conveyor belt and carried into the specified bunker. A clean air stream is then recycled through the system, via a dust filter.

Glass and any other heavy residual materials not screened out by the separator fall to the bottom of the chamber and are transported to the next stage of the process via conveyors and bucket elevators.

The material then enters the first sorting unit via a vibratory feeder. The sorter separates the lead glass and glass ceramics and analyses the elemental composition of the glass fragments to detect the composition in relation to elements such as zinc, zirconium, strontium, and lead. These elements allow accurate separation of lead glass and ceramic glass.

The glass ceramics are ejected from the process and via a conveyor, are disposed of into the ceramics bunker. The lead glass fragments are then transferred via conveyor and bucket elevator to the next sorting steps to separate the glass fragments from any metal fragments remaining in the material.

The lead glass fragments then enter a second sorting unit via a vibratory feeder. The material enters the unit and falls under gravity down a glass slide. During their path down the glass slide, a camera detects any materials that are not glass (e.g. metals, stones, and ceramics), called CSP. If any of these materials are detected, they will be ejected by air valves into a discharge chute.

The fragments of glass continue their regular trajectory from the bottom of the glass slide and fall onto a conveyor and are transported downstream. The CSP fragments fall onto a conveyor and are transported to their specific bunker.

A unique combination of separators is then used to separate the glass fragments (cullet) into their specific colour streams of amber, green, and flint (clear/opaque). Then, similar to the sorter in stage 2, air valves and nozzles separate the desired colours. Each colour-separated cullet (green, amber, and flint) is transported by conveyors that run through the outer walls on the north side of Building 1 to their respective bunkers, ready for shipment from site.

2.4.4. Offtake

The processed glass streams are stored in separate glass storage bunkers, located on the northern side of Building 1 prior to being collected and transported via B-doubles and/or semi-trailers to glass manufacturing facilities in South Australia, Victoria and NSW to make new recycled glass bottles.

2.4.5. Summary

The following provides a summary of the proposed operations:

- No change to the existing approved throughputs and processing activities for the paper/cardboard and mixed plastics. The Project will only increase the throughput capacity for co-mingled recyclables.
- No construction works or any additional buildings, plant, or equipment required to accommodate the additional waste processing capacity of the existing facility.
- An increase in traffic generation (i.e. approximately 58 additional trucks per day delivering co-mingled recyclables, 13 additional trucks per day transporting processed glass off-site, plus 6 additional employee vehicles per day);
- No changes to the existing approved site access arrangements, on-site traffic circulation, or external transportation routes currently used by trucks/vehicles to and from the site.
- Minor change to the existing approved hours of operation. Currently, receipt of materials at the MRF must only take place between the hours of 4.30 am and 3 pm, Monday to Saturday. Proposed operation to allow co-mingled recyclables to be received at the MRF from 4.30 am to 6 pm, Monday to Saturday.
- No changes to existing off-street car parking requirements or arrangements. The existing approved car parking provision is sufficient to accommodate the proposed car parking needs.
- No changes to existing customer/visitor access arrangements.

A summary of the approved and proposed development operational parameters is presented in Table 2 (MRF) and Table 3 (paper cardboard recovery [PCR]).

Assumptions adopted in the construction of Table 2 and Table 3 are presented below:

- An average of 58 trucks per day delivering co-mingled recyclables to site at an average weight of 13 t;
- An average of 13 trucks per day collecting processed materials from site at an average weight of 38 t;
- The average truck capacity has been assumed to consist of (58 × 13 + 13 × 38) / (58 + 13) t (17.6 t);
- The existing annual glass beneficiation rate is 26 % of 69 900 tpa of recyclable material per year as approved (18 174 tpa) according to approximate product break down for the MRF;
- Maximum daily rates have been calculated to be 1.824 times higher than daily average rates to be consistent with estimated emissions presented in (SLR, 2015) for approved operations.

Note that for the purposes of the assessment, all of the glass received at the Project site is assumed to progress through all stages of processing, which represents a conservative assumption.

Table 2 Summary of approved and proposed MRF operations

Parameter	Existing	Project
Receipt	4:30 am – 3 pm Monday to Saturday	4:30 am – 6 pm Monday to Saturday
Processing	5am to 10pm Monday to Saturday	
Dispatch	5am to 6pm Monday to Saturday	
Maintenance	10pm to 5am Monday to Saturday	
Co-Mingled Recyclable Material Receival and Processing		
Annual rate	69 900 tpa	+100 100 tpa
Paper	30 000 tpa	No change
Maximum daily rate	350 tpd	+500 tpd
Equipment	Mechanical loader Conveyors Trommel screens 1 × Optical sorting system 1 × Eddy current separator	No change
Glass Recycling Receival, Processing and Sorting		
Equipment	In-feed hopper system 1 × Double Roll Crusher 1 × Screen 1 × Zigzag separator 4 × Sorting units Vibratory feeders Conveyors Buckets elevators 2 × Baghouses	No change
Disposal of Non-Recyclable waste		
Annual rate	6 990 tpa	No additional
Maximum daily rate	21 tpd	No additional
Consolidation of Recyclables (exc. Glass)		
Annual rate	44 736 tpa	No additional
Maximum daily rate	224 tpd	No additional
Transport of Processed Material Off-Site		
Average haulage truck capacity	17.3 t	No change
Annual vehicle trips	3 285 no.	+4 745 no.
Daily average vehicle trips	9 no.	+13 no.
Peak daily vehicle trips	17 no.	+18 no.
Storage Capacity		
Glass Bunkers	0.031 ha	No additional storage
Bale storage	0.014 ha	No additional storage

Note: Glass and bale storage areas are located external to the building but are enclosed (cf. Figure 2).

Table 3 Summary of approved and proposed PCR operations

Parameter	Existing	Proposed
Receipt, processing and dispatch	6 am to 10 pm Monday to Saturday	
Paper & Cardboard Receival and Processing		
Annual rate	30 000 tpa[1]	No additional
Maximum daily rate	350 tpd	No additional
Equipment	Front end loader Conveyor Baler	No change
Transport of Baled Material Off-Site		
Average haulage truck capacity	17.3 t	No change
Annual vehicle trips	1 825 no.	No additional
Daily average vehicle trips	5 no.	No additional
Peak daily vehicle trips	9 no.	No additional
Storage Capacity		
Bale storage	0.03 ha	No additional storage

Note: Bale storage area is located external to the building but is enclosed (cf. Figure 2)

2.5. Identification of Potential Emissions to Atmosphere

Given the nature of the Project outlined above, emissions to air would be likely to be generated as described below. Note that no construction is required to facilitate the additional co-mingled recyclables processing capacity of the existing facility.

During the operation of the Project, the following activities are anticipated to result in potential emissions to air:

- Wheel-generated particulate emissions from the operation of the trucks and other site vehicles on paved road surfaces;
- Particulate emissions from the unloading and loading of materials from trucks;
- Particulate emissions from materials handling (sorting) and processing; and
- Odour from a minor quantity of contaminated materials.

To confirm the performance of the approved development with the assumptions outlined in the original AQIA (SLR, 2015), namely that impacts associated with odour were anticipated to be minimal, and manageable through the implementation of an Odour Management Plan, Condition 10 (b) and (c) of DA2015/177 required program of odour audits to be performed upon commencement of the MRF operations. SLR performed two (2) odour audits of the operating facility in July 2022 and November 2022, respectively, which concluded that:

> *"…odour emissions were being managed effectively, in accordance with the development consent conditions and the recommendations made as part of the AQIA."*

and;

> *"There have been no odour complaints since commencement on 7 July 2021, and the results of odour surveys indicate that no odours from the site were detectable at the nearest sensitive receptor locations on the day of the audit."*

Notwithstanding this, SLR made a number of recommendations to further improve the performance of the site, including the installation and operation of a de-odorising misting system at the entry doors to Building 2 (where the MRF process is located), which has since been installed.

Both odour audits included the performance of a field ambient odour assessment which identified distinct odours within the site, but no odour, or weak odour being detected beyond the boundary of the site. Weak odour was detected immediately opposite the site, at industrial receptors on Madeline Street, with no odour being detected at any residential location.

Based on the findings of those audits, it is considered that the additional 100 100 tpa of co-mingled recyclables to be received and processed at the existing facility is likely to result in no additional odour impacts than are currently experienced. However, to support this opinion, an odour modelling assessment has been performed as part of this study.

The incoming waste received at the Project site is not highly odorous in nature and would not contain putrescible waste. However, it is reasonable to assume that a fraction of incoming waste may be odorous by nature of residual materials left on recyclable material, such as residues of food present in recyclable food containers. A conservative assessment has therefore been conducted that assesses potential odour impacts that could occur should 5 % of waste from the co-mingled recyclables stream be contaminated by putrescible residues.

Given the nature of the material to be accepted at the facility, and the fact that the unloading, sorting and storage areas are all enclosed and on hardstand, leachate is not anticipated to be generated in any significant quantities, or which cannot be contained by the existing drainage system. Significant unexpected spillages of leachate presented in waste material would be cleaned immediately through the use of spill kits.

An odour complaints procedure would also be implemented as part of the Air Quality Management Plan (AQMP) and the complaint log would form part of the ongoing environmental management of the site.

Considering the above, a quantitative assessment of the potential odour impacts identified above has been performed. Calculations of potential emissions of odour and particulate matter associated with the operation of the Project are presented in Section 5.1.

3. LEGISLATION, REGULATION AND GUIDANCE

3.1. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act* 1997 (POEO Act) sets the statutory framework for managing air quality in NSW, including establishing the licensing scheme for major industrial premises and a range of air pollution offences and penalties.

The existing facility operates under an Environment Protection Licence (EPL 20576) administered by the EPA under the POEO Act. The EPL authorises the scheduled activities of 'resource recovery' and 'waste storage' to be carried out on the premises.

Part 5.4 of the POEO Act outlines a number of requirements associated with air pollution. These requirements generally relate to the appropriate maintenance of plant and equipment in an efficient condition and dealing with materials in a manner as to not cause air pollution, including odour.

The POEO Act emphasises the importance of preventing 'offensive odour'. For reference, 'offensive odour' is defined within the POEO Act as:

> *"an odour:*
>
> *(a) that, by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstances:*
>
> *(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
>
> *(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*
>
> *(b) that is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations."*

Section 129 of the POEO Act requires:

> *"...the occupier of any premises at which scheduled activities are carried on under the authority conferred by a licence must not cause or permit the emission of any offensive odour from the premises to which the licence applies."*

The requirements also relate to standards of concentration not to be exceeded from point source emissions which are prescribed within the Protection of the Environment (Clean Air) Regulation 2022 (POEO (Clean Air) Regulation).

Plant and machinery operating at the Project site will be maintained regularly. Handling of materials at the Project site will be performed with the inclusion of control measures as described in Section 5.1.3 As such, the requirements of the POEO Act would be met.

3.2. Protection of the Environment (Clean Air) Regulation 2022

The *Protection of the Environment Operations* (POEO) (Clean Air) Regulation (2022) sets requirements and standards of concentration relevant to the Project.

The Project would be operated, and equipment maintained in an appropriate manner to ensure that general standards of concentrations, and requirements associated with emissions from motor vehicles are achieved.

3.3. Ambient Air Quality Criteria

3.3.1. Criteria Air Pollutants

State air quality guidelines adopted by the NSW EPA are published in the *'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2022) which has been consulted during the preparation of this AQIA.

The Approved Methods lists the statutory methods that are to be used to model and assess emissions of criteria air pollutants from stationary sources in NSW. Section 7.1 of the Approved Methods clearly outlines the impact assessment criteria for the Project.

The criteria listed in the Approved Methods are derived from a range of sources , including National Health and Medical research Council (NHMRC), National Environment Protection Council (NEPC), Department of Environment (DoE) and World Health Organisation (WHO). Where relevant to this AQIA (coincident with the potential emissions identified in Section 2.5), the criteria specified in Section 7.1 Approved Methods have been adopted and are presented in Table 4.

Table 4 NSW EPA impact assessment criteria

Pollutant	Averaging period	Units(E)	Criterion	Notes
Particulates (as PM_{10})	24 hours	$\mu g \cdot m^{-3}$ (A)	50	Numerically equivalent to the AAQ NEPM(B) standards and goals.
	annual	$\mu g \cdot m^{-3}$	25	
Particulates (as $PM_{2.5}$)	24 hours	$\mu g \cdot m^{-3}$	25	
	annual	$\mu g \cdot m^{-3}$	8	
Particulates (as TSP)	annual	$\mu g \cdot m^{-3}$	90	
Particulates (as dust deposition)	annual(C)	$g \cdot m^{-2} \cdot month^{-1}$	2	Assessed as insoluble solids as defined by AS 3580.10.1
	annual(D)	$g \cdot m^{-2} \cdot month^{-1}$	4	

Notes: (A): micrograms per cubic metre of air (B): National Environment Protection (Ambient Air Quality) Measure
(C): Maximum increase in deposited dust level (D): Maximum total deposited dust level
(E): Gas volumes are expressed at 25°C (298 K) and at an absolute pressure of 1 atmosphere (101.325 kPa)

3.3.2. Odour Assessment Criteria

Impacts from odorous air contaminants are often nuisance-related rather than health-related. Odour performance goals guide decisions on odour management but are generally not intended to achieve "no odour".

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the odour threshold and defines one odour unit (OU). An odour goal of less than 1 OU would theoretically result in no odour impact being experienced. In practice, the character of a particular odour can only be judged by the receiver's reaction to it, and preferably only compared to another odour under similar social and regional conditions.

Based on the literature available, the level at which an odour is perceived to be a nuisance can range from 2 OU to 10 OU depending on a combination of the following factors:

- **Odour Quality**: whether an odour results from a pure compound or from a mixture of compounds. Pure compounds tend to have a higher threshold (lower offensiveness) than a mixture of compounds.
- **Population sensitivity**: any given population contains individuals with a range of sensitivities to odour. The larger a population, the greater the number of sensitive individuals it contains.
- **Background level**: whether a given odour source, because of its location, is likely to contribute to a cumulative odour impact. In areas with more closely located sources it may be necessary to apply a lower threshold to prevent offensive odour.
- **Public expectation**: whether a given community is tolerant of a particular type of odour and does not find it offensive, even at relatively high concentrations. For example, background agricultural odours may not be considered offensive until a higher threshold is reached than for odours from a landfill facility.

- **Source characteristics**: whether the odour is emitted from a stack (point source) or from an area (diffuse source). Generally, the components of point source emissions can be identified and treated more easily using control equipment than diffuse sources. Point sources tend to be in urban areas, while diffuse sources are more prevalent in rural locations.
- **Health Effects**: whether a particular odour is likely to be associated with adverse health effects. In general, odours from agricultural activities are less likely to present a health risk than emissions from industrial facilities.

Experience gained through odour assessments from proposed and existing facilities in NSW indicates that an odour performance goal of 7 OU is likely to represent the level below which "offensive" odours should not occur (for an individual with a 'standard sensitivity' to odours). Therefore, the Odour Technical Framework (NSW DEC, 2006) recommends that, as a design goal, no individual be exposed to ambient odour levels of greater than 7 OU. This is expressed as the 99^{th} percentile value, as a nose response time average (approximately one second).

Odour assessment criteria need to consider the range in sensitivities to odours within the community to provide additional protection for individuals with a heightened response to odours. This is addressed in the Technical Framework (NSW DEC, 2006) by setting a population dependent odour assessment criterion. In this way the odour assessment criterion allows for population size, cumulative impacts, anticipated odour levels during adverse meteorological conditions, and community expectations of amenity.

A summary of odour performance goals for various population densities, as referenced in the Odour Technical Notes is shown in Table 5. This table shows that in situations where the population of the affected community lies between 125 and 500 people, an odour assessment criterion of 4 OU at the nearest residence (existing or any likely future residences) is to be used. For isolated residences, an odour assessment criterion of 7 OU is appropriate.

Table 5 NSW EPA Technical Framework Odour Criteria

Population of Affected Community	Impact Assessment Criteria for Complex Mixture of Odours (OU)
Urban area (≥2000)	2.0
500 – 2000	3.0
125 – 500	4.0
30 – 125	5.0
10 – 30	6.0
Single residence (≤2)	7.0

Source: The Odour Technical Notes (NSW DEC, 2006)

The definition of an "offensive odour" is provided in the POEO Act (refer Section 3.1). Evidently, by the definition provided in the POEO Act, an offensive odour is contingent upon whether the odour '*interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises*', which directly relates to the sensitivity of the receiving environment.

Given the mixed land uses around the Project site and considering the potential population, an odour impact criterion of 2 OU has been applied. It is noted however that the nature of the land uses in closest proximity to the Project site are industrial in nature, and an odour impact criterion of anywhere between 2 OU and 7 OU might be appropriate, given the potential range of sensitivities to odour within that population. For the purposes of this assessment, the most stringent odour criterion has been applied (i.e. 2 OU) to provide comfort that any impacts from the Project can be managed appropriately.

3.4. Greenhouse Gas Legislation and Guidance

The Australian Government Clean Energy Regulator administers schemes legislated by the Australian Government for measuring, managing, reducing, or offsetting Australia's carbon emissions.

Schemes administered by the Clean Energy Regulator include:

- National Greenhouse and Energy Reporting Scheme, under the *National Greenhouse and Energy Reporting Act* (2007);
- Emissions Reduction Fund, under the *Carbon Credits (Carbon Farming Initiative) Act* (2011);
- Renewable Energy Target, under the *Renewable Energy (Electricity) Act* (2000); and
- Australian National Registry of Emissions Units, under the *Australian National Registry of Emissions Units Act* (2011).

3.4.1. National Greenhouse and Energy Reporting Scheme

The National Greenhouse and Energy Reporting (NGER) scheme, established by the *National Greenhouse and Energy Reporting Act* (2007) (NGER Act), is a national framework for reporting and disseminating company information about greenhouse gas emissions, energy production, energy consumption and other information specified under NGER legislation.

The objectives of the NGER scheme are to:

- Inform government policy;
- Inform the Australian public;
- Help meet Australia's international reporting obligations;
- Assist Commonwealth, state and territory government programmes and activities; and
- Avoid duplication of similar reporting requirements in the states and territories.

3.4.2. Relevant NSW Legislation

There is no specific GHG legislation administered within NSW. The NGER scheme (and other identified Commonwealth schemes in Section 3.4.1) forms the applicable legislation within NSW.

3.4.3. NSW Government Action on Climate Change

NSW was one of the first Australian jurisdictions to commit to net zero emissions by 2050. The Net Zero Plan Stage 1: 2020–2030 is the foundation for NSW's action to reduce emissions, reach targets of a 50 % emissions reduction on 2005 levels by 2030 and to achieve net zero emissions by 2050.

The Plan outlines the NSW Government's plan to grow the economy, create jobs and reduce the cost of living through strategic emissions reduction initiatives across the economy[1]. Major emissions reductions initiatives under the Plan include the:

- NSW Electricity Infrastructure Roadmap, which seeks to deliver a modern energy system for the State and unlock investment in renewable energy;
- NSW Net Zero Industry and Innovation Program, which aims to help reduce emissions from NSW's industrial sector and invest in new clean technologies for the future;
- NSW Electric Vehicle Strategy, which seeks to accelerate the uptake of electric vehicles;
- NSW Hydrogen Strategy, which aims to support the growth of a hydrogen industry;
- NSW Waste and Sustainable Materials Strategy, which seeks to reduce emissions through better waste and materials management; and
- NSW Primary Industries Productivity and Abatement Program, which aims to drive sustainable land management, boost productivity, and help reduce emissions.

3.4.4. Guidance

The GHG accounting and reporting principles adopted within this GHG assessment are based on the following financial accounting and reporting standards:

- Australian Government Department of the Environment, Australian National Greenhouse Accounts, National Greenhouse Accounts Factors, 2025 (DCCEEW, 2025)
- The World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) GHG Protocol: A Corporate Accounting and Report Standard (WRI, 2004);
- ISO 14064-1:2018 (Greenhouse Gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of GHG emissions and removal);
- ISO 14064-2:2019 (Greenhouse Gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of GHG emission reductions or removal enhancements); and,
- ISO 14064-3:2019 (Greenhouse Gases – Part 3: Specification with guidance for the validation and verification of GHG assertions) guidelines (internationally accepted best practice).

[1] https://www.climatechange.environment.nsw.gov.au/nsw-government-action-climate-change

4. EXISTING CONDITIONS

4.1. Surrounding Land Sensitivity

4.1.1. Land Use Zoning

The Project site and immediate surrounds is currently zoned E4 General Industrial under the Strathfield Local Environmental Plan 2012 (Strathfield LEP). Public recreation land and low-density residential zones are located further east and south of the Project site. The closest residential receptor is located 210 m to the southeast, on the corner of Excelsior Avenue and Chisholm Street.

4.1.2. Discrete Receptor Locations

Air quality assessments typically use a desk-top mapping study to identify 'discrete receptor locations', which are intended to represent a selection of locations that may be susceptible to changes in air quality. In broad terms, the identification of sensitive receptors refers to places at which humans may be present for a period representative of the averaging period for the pollutant being assessed. Typically, these locations are identified as residential properties, although other sensitive land uses may include schools, medical centres, places of employment, recreational areas or ecologically sensitive locations.

It is noted that in addition to the identified 'discrete' receptor locations, the entire modelling area is gridded with 'uniform' receptor locations (see Section 4.1.2) that are used to plot out the predicted impacts, and as such the accidental non-inclusion of a location sensitive to changes in air quality does not render the AQIA invalid, or otherwise incapable of assessing those potential risks.

To ensure that the selection of discrete receptors for the AQIA are reflective of the locations in which the population of the area surrounding the Project site reside, population density data has been examined. Population density data based on the 2021 census have been obtained from the Australian Bureau of Statistics (ABS) for a 1 square kilometre (km^2) grid, covering mainland Australia (ABS, 2022). Using a Geographical Information System (GIS), sensitive receptor locations have been confirmed with reference to their population densities.

For clarity, the ABS use the following categories to analyse population density ($persons \cdot km^{-2}$):

- Very high — Greater than 8 000
- High — 5 000 – 8 000
- Medium — 2 000 – 5 000
- Low — 500 – 2 000
- Very low — Less than500

- No population 0

Using ABS data in a GIS, the population density of the area surrounding the Project site is presented in Figure 3. The Project site is located in an area of low population density (between 500 and 2 000 persons·km^{-2}).

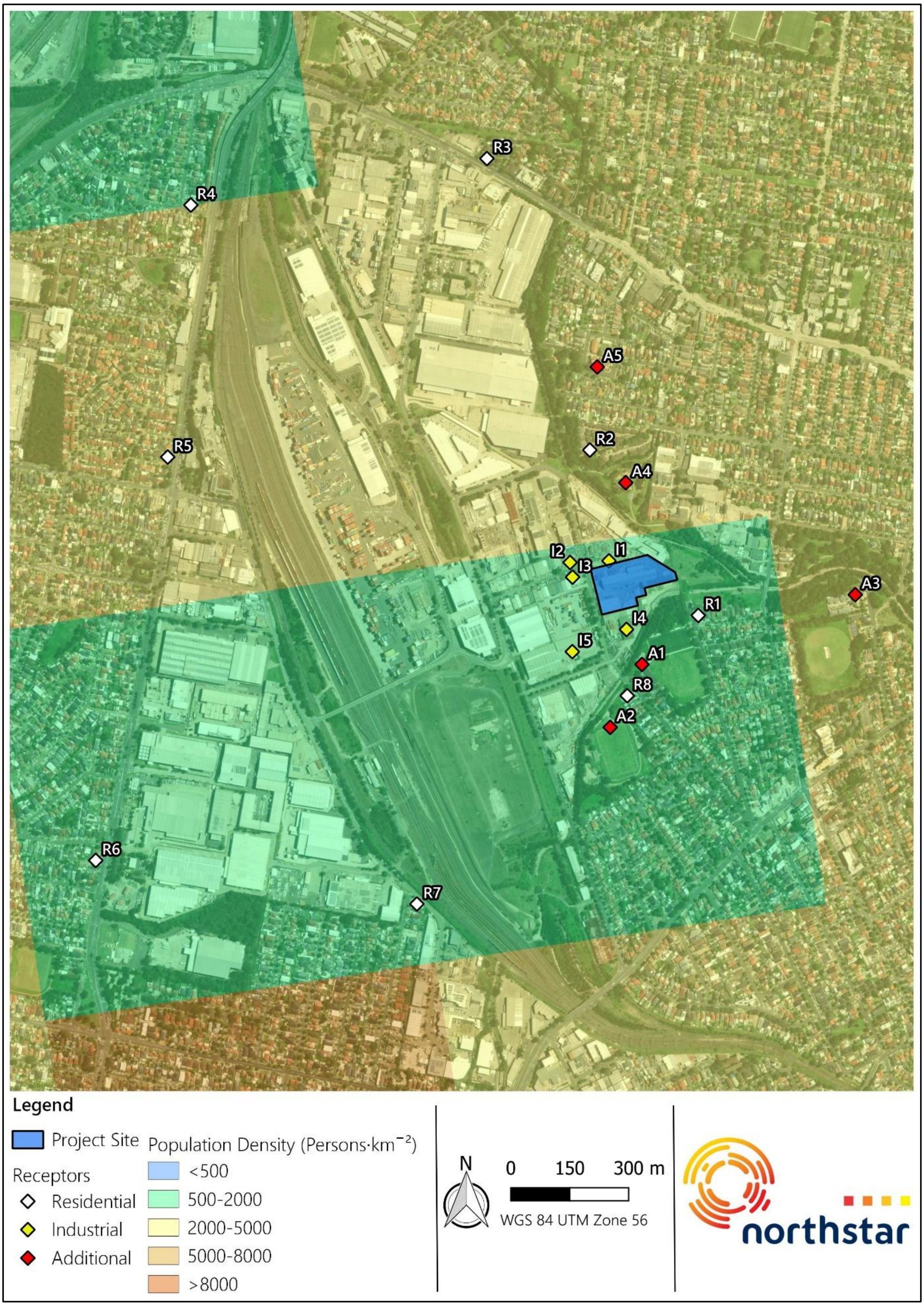
Receptors R1 to R8 and I1 to I4 have been adopted from the AQIA supporting the original development (SLR, 2015), with a number of additional receptors included to cover an additional industrial location (I5), nearby educational establishments (A3 and A5), and recreational areas (A1, A2, and A4).

Identified receptors adopted for use within this AQIA are presented in Table 6 and illustrated in Figure 3.

Table 6 Receptor locations used in the AQIA

ID	Location	Land use	Coordinates (UTM)	
			mE	mS
R1	17 Excelsior Avenue	Residential	322 530	6 247 475
R2	150 Dean Street	Residential	322 246	6 247 889
R3	569-573 Fitzgerald Crescent	Residential	321 970	6 248 623
R4	34 Jean Street	Residential	321 218	6 248 491
R5	14 Callistemon Grove	Residential	321 171	6 247 851
R6	182 Roberts Road	Residential	321 007	6 246 825
R7	2 Wentworth Street	Residential	321 827	6 246 730
R8	79 Madeline Street	Residential	322 353	6 247 268
I1	Near northern boundary (adjacent to site)	Industrial	322 300	6 247 609
I2	Near north-western boundary (across road from site)	Industrial	322 201	6 247 603
I3	Near western boundary (across road from site)	Industrial	322 208	6 247 566
I4	Near southern boundary (adjacent to site)	Industrial	322 348	6 247 436
I5	South-west of site	Industrial	322 211	6 247 377
A1	Cookes Skate Park	Recreational	322 389	6 247 348
A2	Begnell Field	Recreational	322 311	6 247 187
A3	Alphabeta Preparatory School	Educational	322 929	6 247 535
A4	Dean Reserve	Recreational	322 339	6 247 808
A5	St Anne's Primary School	Educational	322 261	6 248 100

Figure 3 Population density and receptor locations



Source: Northstar

4.2. Meteorology

The meteorology experienced within an area can govern the generation (in the case of wind-dependent emission sources), dispersion, transport and eventual fate of pollutants in the atmosphere. The meteorological conditions surrounding the Project site have been characterised using data collected by the Australian Government Bureau of Meteorology (BoM) at a number of surrounding automatic weather stations (AWS).

Four meteorological stations operated by BoM were identified within an approximate 10 km radius of the Project site. A summary of the relevant AWS is provided in Table 7 below (listed by proximity).

Table 7 Details of meteorological monitoring surrounding the Project site

Site name	Source	Approximate location		Approximate distance
		mE	mS	km
Canterbury Racecourse AWS	BoM	325 572	6 246 697	3.5
Sydney Olympic Park AWS	BoM	320 948	6 252 558	5.3
Sydney Olympic Park (Archery Centre) AWS	BoM	321 575	6 254 599	7.2
Bankstown Airport AWS	BoM	313 855	6 245 099	8.8

Data at Canterbury Racecourse AWS for the period 2018-2022 have been analysed for use in this study. The meteorological conditions measured at Canterbury Racecourse AWS are presented in Appendix B.

The wind roses presented in Appendix B indicate that from 2018 to 2022, winds at Canterbury Racecourse AWS show generally similar wind distribution patterns across the years assessed, with predominant south-easterly wind directions with north-westerly and north-easterly components evident.

The majority of wind speeds experienced at the Canterbury Racecourse AWS between 2018 and 2022 are generally in the range 1.5 meters per second ($m \cdot s^{-1}$) to 8 $m \cdot s^{-1}$ with the highest wind speeds (greater than 8 $m \cdot s^{-1}$) occurring from mostly south-easterly directions. Winds of this speed are rare and occur during 1.3 % of the observed hours during the years while calm winds (< 0.5 $m \cdot s^{-1}$) occur during 18.5 % of hours on average across the years 2018-2022.

An analysis of the correlation coefficients between each year for wind speed, wind direction and particulate matter data distribution was performed to select a representative year for the meteorological modelling (refer Appendix B). Following this analysis, the year 2020 was selected as the most representative year for further assessment.

To provide a characterisation of the meteorology which would be expected at the Project site, a meteorological modelling exercise has also been performed. A summary of the inputs and outputs of the meteorological modelling assessment, including validation of those outputs is presented in Appendix B.

4.3. Background Air Quality

The air quality experienced at any location will be a result of emissions generated by natural and anthropogenic sources on a variety of scales (local, regional and global). The relative contributions of sources at each of these scales to the air quality at a location, will vary based on a wide number of factors including the type, location, proximity and strength of the emission source(s), prevailing meteorology, land uses and other factors affecting the emission, dispersion and fate of those pollutants.

When assessing the impact of any particular source of emissions on the potential air quality at a location, the impact of all other sources of an individual pollutant, should also be assessed. These 'background' (sometimes called 'baseline') air quality conditions will vary depending on the pollutants to be assessed and can often be characterised by using representative air quality monitoring data.

Three AQMS have been identified within a 10 km radius of the Project site, operated by NSW Department of Planning and Environment (NSW DPE). These locations (listed by proximity) are summarised in Table 8.

Table 8 Closest AQMS to the Project site

AQMS location	Distance to site (km)	2020 data	Measurements		
			PM_{10}	$PM_{2.5}$	TSP
Chullora	3.1	✓	✓	✓	×
Earlwood	5.7	✓	✓	✓	×
Rozelle	8.5	✓	✓	✓	×

The closest representative AQMS with data available for the year 2020 (consistent with the meteorological modelling) is noted to be located at Chullora. Correspondingly, PM_{10} and $PM_{2.5}$ data from Chullora for the year 2020 have been adopted for use in this assessment.

Appendix C provides a detailed assessment of the background air quality monitoring data used in this AQIA.

It is noted that none of the AQMS identified in Table 8 measure concentrations of TSP. This pollutant is of relevance to the expected emissions from the Project. Other sources of data have been adopted to allow representation of the TSP environment in the area surrounding the Project site, and a full discussion is provided in Appendix C.

It is noted that a number of AQMS in NSW metropolitan and regional population centres recorded particulate matter concentrations above the national standard on a number of days towards the start of 2020. This was mainly driven by intense drought conditions and a high frequency of bushfires occurring across NSW in early 2020 (NSW DPIE, 2021).

A summary of the air quality monitoring data and assumptions used to produce this AQIA are presented in Table 9.

Table 9 Summary of background air quality used in the AQIA

Pollutant	Averaging period	Units	Measured value	Notes
Particles (as TSP)	Annual	$\mu g \cdot m^{-3}$	42.2	Estimated on a $TSP:PM_{10}$ ratio of 2.0551: 1
Particles (as PM_{10})	24-hour	$\mu g \cdot m^{-3}$	Daily varying	The 24-hour maximum PM_{10} concentration in 2020 was 167.9 $\mu g \cdot m^{-3}$
	Annual	$\mu g \cdot m^{-3}$	20.5	
Particles (as $PM_{2.5}$)	24-hour	$\mu g \cdot m^{-3}$	Daily varying	The 24-hour maximum $PM_{2.5}$ concentration in 2020 was 86.2 $\mu g \cdot m^{-3}$
	Annual	$\mu g \cdot m^{-3}$	8.8	

Note: Reference should be made to Appendix C

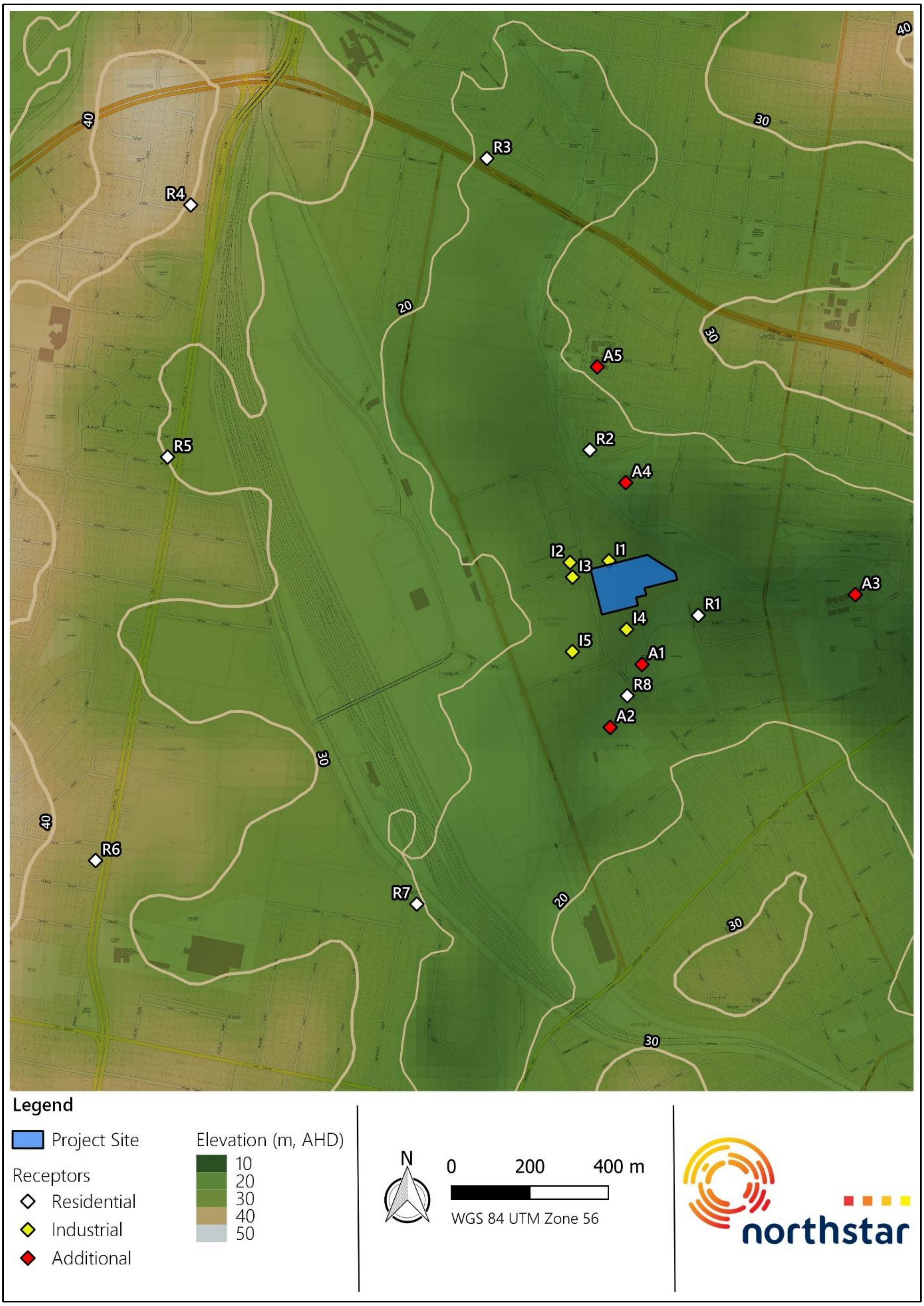
For the purposes of this assessment, existing odour concentrations have been assumed to be negligible.

4.4. Topography

The Project site is located within an area which has a relatively flat surface terrain with little height variation. The elevation of the Project site is approximately 15 m Australian Height Datum (AHD). The topography between the Project site and the nearest identified sensitive receptor locations is relatively consistent with elevation variances of less than 20 m within the surrounding locality. In dispersion modelling terms, the topography is relatively uncomplicated, and does not need to be explicitly accounted for in the dispersion modelling exercise.

The topography surrounding the Project site is presented in Figure 4.

Figure 4 Local topography surrounding Project site



Source: Northstar

4.5. Potential for Cumulative Impacts

Given the industrial nature of the area surrounding the Project site, there is the potential for emissions generated as part of the Project and other surrounding facilities to impact cumulatively on nearby sensitive receptors.

The Project site is located within an existing industrial estate, with a concrete batching plant (operated by Hanson) located approximately 170 m to the northeast, a number of smash repair facilities over 100 m to the north, and freight/logistics operations immediately to the west, and approximately 300 m to the west of Cosgrove Road, at the Enfield Intermodal Logistics Centre.

It is noted that no publicly available documentation could be found regarding potential air quality impacts on the local environment associated with the abovementioned facilities. Correspondingly, it is considered that the inclusion of background air quality data as described in Section 4.3 would appropriately account for any potential cumulative impacts associated with these surrounding land uses.

The potential for cumulative impacts to occur as a result of the Aussie Skips operation at 84 Madeline Street has been specifically requested to be addressed by Council. The AQIA performed to support a modification to DA 9899/452 (EMM, 2020) has been reviewed, which included a dispersion modelling assessment of the receipt, unloading, processing, storage and load-out of building and demolition waste.

In terms of incremental impacts (i.e. due to the operation of the Aussie Skips facility alone), the AQIA predicted maximum 24-hour PM_{10} impacts of 20.7 $\mu g \cdot m^{-3}$ at industrial receptors (representing 41 % of the criterion), and 12.7 $\mu g \cdot m^{-3}$ at residential receptors (representing 25 % of the criterion). Section 6 of this AQIA presents incremental concentrations significantly less than those predicted in (EMM, 2020), even based on conservative assumptions.

(EMM, 2020) concluded:

> *"The predicted incremental air quality impacts from facility operations with the proposed enclosure are below all applicable assessment criteria at all surrounding assessment locations for both peak day and average day operations. When background air quality conditions are accounted for, operational emissions from the facility are unlikely to result in additional cumulative exceedances of impact assessment criteria at any surrounding residential or recreational location.*
>
> *Between one and two additional exceedance days were predicted for 24-hour average PM_{10} at two neighbouring industrial assessment locations, however these predicted exceedances are not considered significant for the following reasons:*

• the background concentration on these exceedances was elevated relative to the impact assessment criterion and contributed more than 92% of the total cumulative concentration;

• the exceedances are based on the continual assumption of peak day operational emissions on every day of the calendar year modelling period; and

• the two industrial assessment locations with exceedances are an operational recycling facility and an operational automotive spray-painting facility."

The likelihood of peak day operations at both facilities coinciding is likely to be minimal, and incremental impacts associated with the Project are shown to be low. Cumulative impacts, although possible, are considered to be unlikely.

5. APPROACH TO ASSESSMENT

5.1. Air Quality Impact Assessment

5.1.1. Atmospheric Dispersion Modelling

A dispersion modelling assessment has been performed using the NSW EPA approved CALPUFF atmospheric dispersion model. The modelling has been performed in CALPUFF 2-dimensional (2-D) mode. Given the flat (uncomplicated) terrain and the proximity of the receptors to the Project site, a detailed assessment using a 3-D meteorological dataset is not warranted.

An assessment of the impacts of the operation of activities at the Project site has been performed which characterises the likely day-to-day operation, approximating average operational characteristics which are appropriate to assess against longer term (annual average) criteria for particulate matter. The likely peak activities at the Project site have also been characterised to allow comparison of potential impacts against shorter term (24-hour) criteria for particulate matter.

The modelling scenarios provide an indication of the air quality impacts of the operation of activities at the Project site. Added to these impacts are background air quality concentrations where available as discussed in Section 4.3 and Appendix C, which represent the air quality that may be expected within the area surrounding the Project site, without the impacts of the Project itself.

The following provides a description of the determination of appropriate emissions of air pollutants resulting from the operation of the Project.

5.1.2. Emission Estimation

The estimation of emissions from a process is typically performed using direct measurement or through the application of factors which appropriately represent the processes under assessment. This assessment has adopted emission factors for materials handling processes, movement of trucks on paved site roads, crushing and screening, and wind erosion contained within the US EPA AP-42 emission factor compendium (US EPA, 1995 and updates) to represent the emission of particulate matter resulting from the operations occurring at the Project site as described in Section 2.5. These factors are appropriate for adoption in Australia and are routinely adopted in the assessment of operations of this nature.

It is acknowledged that the adopted emission factors are generally associated with the mining industry, and correspondingly 'dustier' material in general than is assumed to be handled and processed as part of the Project. However, emissions estimates, and subsequent modelled impacts should be viewed with that conservatism in mind.

A full description of the particulate emissions estimation is presented in Appendix D.

In relation to odour, emissions associated with the 5 % (w/w) of contaminated material assumed to be present at the Project site have been calculated based on emission factors associated with municipal solid waste, in the absence of more specific data. It has been assumed that 72.1 t of material would be received at the Project site each hour during a peak busy day (1 154 t over a 16 hour period), and of that, 5 %(w/w), or 3.6 t, may be contaminated (see Section 2.5 for the discussion of this assumption). Applying an emission factor of 113.5 odour units per tonne of waste per second ($OU \cdot m^3 \cdot t^{-1} \cdot s^{-1}$) results in an emission rate of 408.6 $OU \cdot m^3 \cdot s^{-1}$. The emission factor has been sourced from monitoring data (TOU, 2018) and as applied in a recent co-mingled recycling SSD AQIA (Katestone, 2020).

The evaluation of odour impacts requires the estimation of short or peak concentrations on the time scale of less than one second. Dispersion model predictions are typically valid for averaging periods of one hour and longer. Dispersion models therefore need to be supplemented to accurately simulate atmospheric dispersion of odours and the instantaneous perception of odours by the human nose. The prediction of peak concentrations from estimates of ensemble means can be obtained from a ratio between extreme short-term concentration and longer-term averages. Properly defined peak-to-mean ratios depend upon the type of source, atmospheric stability and distance downwind. The NSW EPA recommended factor for estimating peak concentrations for volume source is 2.3, in all atmospheric conditions. This factor has been adopted within this assessment.

5.1.3. Emission Controls

Except for vehicle movements, all activities at the Project site are performed within an enclosed building. Roller doors are closed when possible, with doors kept open to allow the delivery of materials to the MRF receival bay during permitted delivery hours.

Two baghouses (i.e. fabric filters) are installed at the facility which capture a significant fraction of dust emissions associated with the glass beneficiation process prior to discharge. Each baghouse is rated at a volumetric throughput of 40 000 $m^3 \cdot hr^{-1}$.

The emission controls adopted at the existing MRF facility are presented in Table 10. Emissions control factors have been adopted from (NPI, 2001), (NPI, 2012), or adopted from (SLR, 2015).

For the purposes of this assessment, given the types of materials being stored, and given that all storage areas will be either partially or fully enclosed, emissions associated with wind erosion have been taken to be zero.

Table 10 Summary of emission reduction methods adopted as part of Project operation

Emission control method	Control efficiency (%)
Enclosure when loading and unloading material	70
Use of baghouses during glass beneficiation process (Crushing, screening, separation and sorting)	99.5
Storage of product material in 3-sided storage bins	75
Wind shielding (roof and side wall) when loading by conveyors to truck off-site	70
Limiting trucks speeds on site to 5 km·hr^{-1}	25

Based on the foregoing, and the information provided in Appendix D, the distribution of uncontrolled and controlled PM_{10} emissions is presented in Figure 5 (annual emissions totals). This shows the effect of the inclusion of emission controls at the Project site by emission type.

Figure 5 Calculated uncontrolled and controlled annual PM_{10} emissions – Project

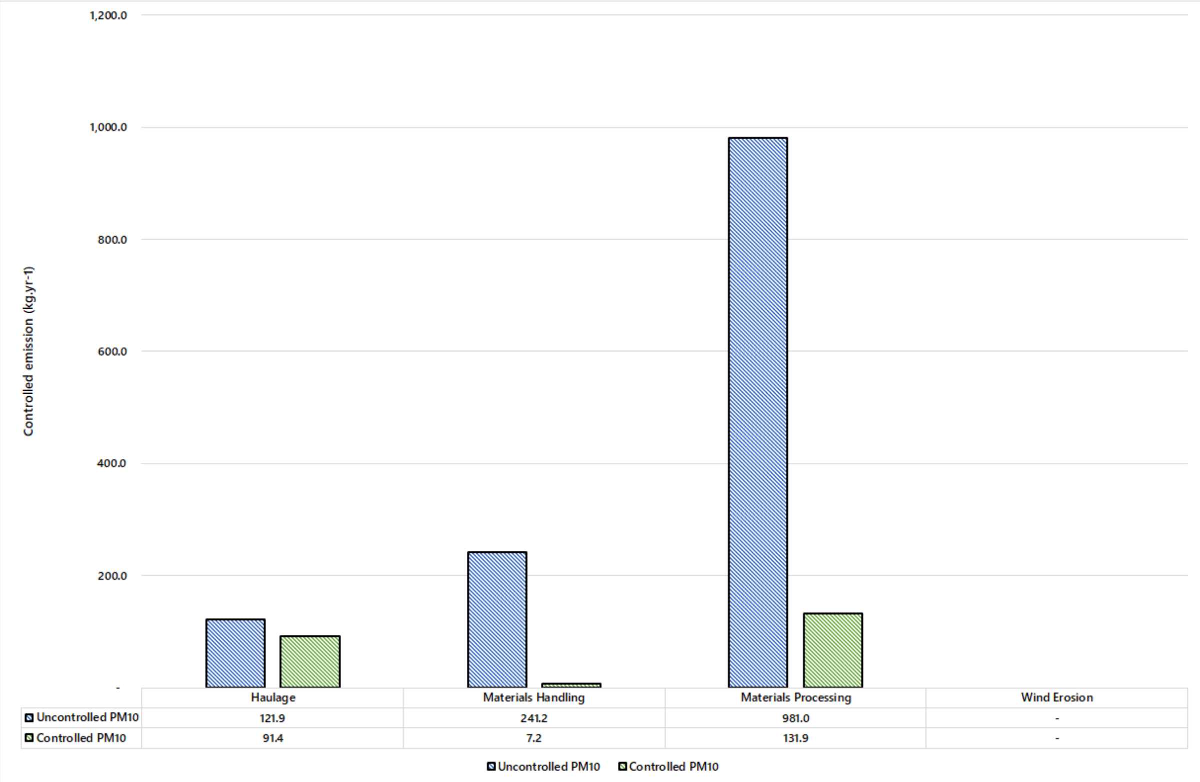
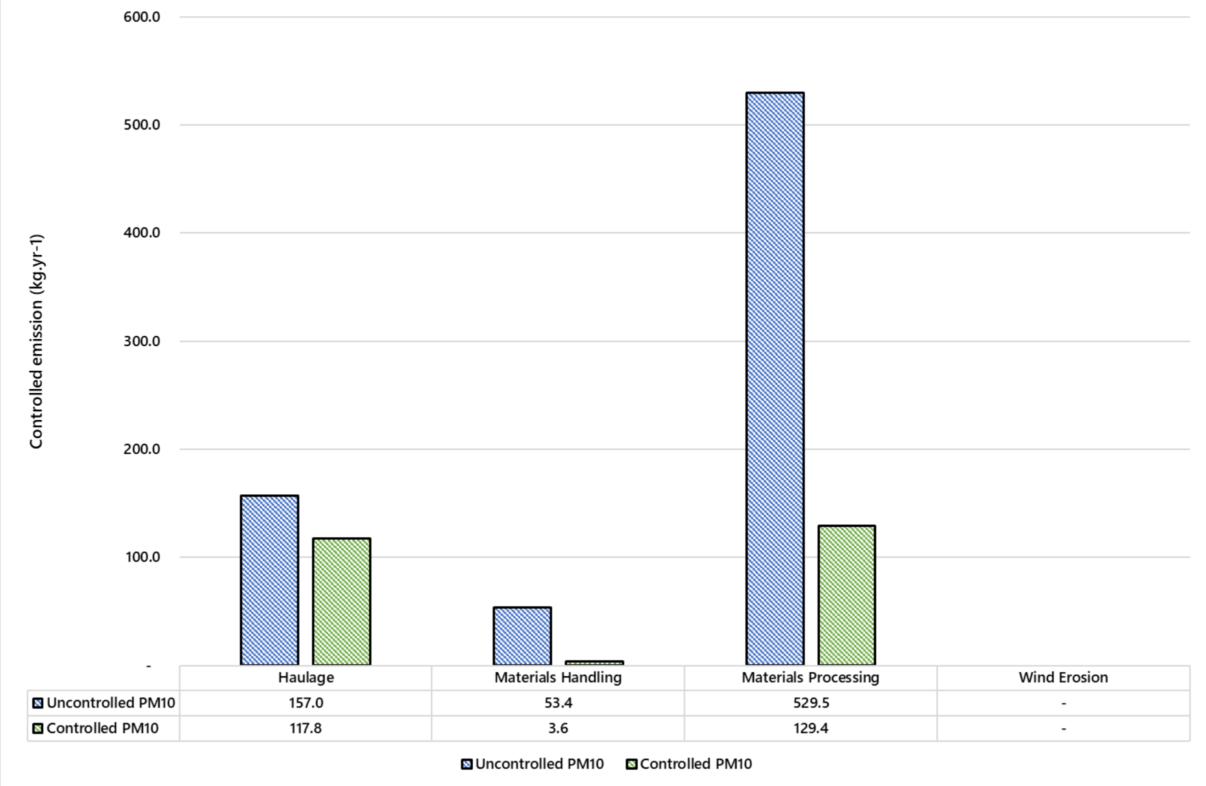


Figure 6 Calculated uncontrolled and controlled annual PM_{10} emissions – Approved development



5.2. Greenhouse Gas Assessment

The purpose of the GHG assessment is to examine the potential impacts of the operation of the Project relating to emissions of GHG. A quantitative assessment of emissions is performed with direct emissions compared against total national and NSW GHG emissions for context.

The scope of the GHG assessment is to provide a quantitative assessment of GHG emissions arising from the operation of the Project. This report does not provide a definitive quantification of GHG emissions arising from the Project operation but provides the general context of the likely quantum of emissions. Opportunities for reduction of GHG emissions are discussed.

5.2.1. Emission Types

Australian National Greenhouse Accounts Factors Workbook (DCCEEW, 2025),(the NGA Factors workbook) defines two types of GHG emissions, namely 'direct' and 'indirect' emissions (see Table 11). This assessment considers both direct emissions and indirect emissions resulting from the operation of the Project.

Table 11 Greenhouse gas emission types

Emission type	Definition
Direct	Produced from sources within the boundary of an organisation and as a result of that organisation's activities (e.g. consumption of fuel in on-site vehicles).
Indirect	Generated in the wider economy as a consequence of an organisations' activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation (e.g. consumption of purchased electricity).

5.2.2. Emission Scopes

The NGA Factors workbook identifies two 'scopes' of emissions for GHG accounting and reporting purposes as shown in Table 12.

Table 12 Greenhouse gas emission scopes

Emission scope	Definition
Scope 1	Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO_2-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal etc). These factors are used to calculate Scope 1 emissions.
Scope 2	Indirect emission factors are used to calculate Scope 2 emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO_2-e per unit of electricity consumed. Scope 2 emissions are physically produced by the burning of fuels (coal, natural gas etc.) at the power station.

Note: Adapted from the NGA Factors Workbook (DCCEEW, 2025)

A third scope of emissions, Scope 3 emissions, are also recognised in some GHG assessments. The Greenhouse Gas Protocol (WRI, 2004) defines Scope 3 emissions as "other indirect GHG emissions":

> *"Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of Scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services."*

Scope 3 emissions related to the extraction and transport of fuels, and the use of fuels in employee transport have been considered.

5.2.3. Emission Source Identification

The geographical boundary set for this GHG assessment covers the Project site and also includes the transport of material to, and from the Project site. All Scope 1, Scope 2 and Scope 3 emissions within the defined boundary have been identified and reported as far as possible.

The GHG emission sources associated with the operation of the Project have been identified through a review of the proposed broad activities, as described in Section 2.4.5. The activities/operations being performed as part of the Project, which would have the potential to result in emissions of GHG are presented in Table 13.

Table 13 Greenhouse gas emission sources

Scope	Project component	Emission source description
1	Consumption of diesel fuel in fixed and mobile plant and equipment at the Project site.	Emissions from combustion of fuel.
2	Consumption of electricity as part of Project operations.	Consumption of purchased electricity.
3	Consumption of diesel fuel/unleaded fuel for material transport purposes.	Emissions from combustion of fuel
	Consumption of diesel fuel/unleaded fuel for employee transport purposes.	Emissions associated with the extraction and transport of fuel.

5.2.4. Emission Estimation

Emissions of GHG from the sources identified in Table 13 have been calculated using activity data for the source per annum (i.e. per kilolitre (kL) of diesel) and the relevant emission factor for each source.

The assumptions used in the calculation of activity data for the emission source and emission factors, are presented in the following sections.

5.2.5. Activity Data

The assumptions relating to activity (i.e. consumption) data are outlined in Table 14.

Calculations take into account avoided GHG emissions through on-site solar electricity generation.

Table 14 Calculated activity data

Component	Assumptions	Activity	Units
Consumption of diesel fuel in fixed and mobile plant and equipment	- Includes diesel consumption for whole site, including MRF, GBP and PCR	98.5	$kL \cdot yr^{-1}$
Consumption of purchased electricity	- Information provided by Proponent	600 000	$kWh \cdot yr^{-1}$
Consumption of diesel fuel / unleaded fuel for material transport purposes (outgoing)	- Outgoing material transport of 163 vehicles per day, 49 063 vehicles per year - Assumed transport distance within wider Sydney region (50 km radius)	2 605.2	$kL \cdot yr^{-1}$

Component	Assumptions	Activity	Units
	- Fuel usage for B-double truck of 53.1 L per 100 km		
Consumption of diesel fuel / unleaded fuel for material transport purposes (incoming)	- Incoming material delivery of 163 vehicles per day, 49 063 vehicles per year - Assumed transport distance within wider Sydney region (50 km radius) - Fuel usage for B-double and articulated trucks of 53.1 L per 100 km	2 605.2	$kL{\cdot}yr^{-1}$
Consumption of diesel fuel / unleaded fuel for employee transport purposes	- 19 full time employees - Assumed average commuting distance of 25 km one way - Fuel usage based on light vehicle consumption of 18.4 L per 100 km	52.6	$kL{\cdot}yr^{-1}$

5.2.6. Emission Factors

Emission factors used for the assessment of GHG emissions associated with the operation of the Project have been sourced from the NGA Factors workbook as outlined in Table 15.

Table 15 Greenhouse gas emission factors

Emission scope	Emission source	Emission factor	Energy content factor
Scope 1	Diesel fuel for fixed and mobile plant and equipment and material transport	70.2 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}
Scope 2	Consumption of purchased electricity (NSW)	0.64kg CO_2-e kWh^{-1}	-
Scope 3	Diesel fuel for mobile plant and equipment	17.3 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}
	Unleaded fuel for employee transport	17.2 kg CO_2-e·GJ^{-1}	34.2 GJ·kL^{-1}
	Diesel fuel for material transport	17.3 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}
	Consumption of purchased electricity (NSW)	0.03 kg CO_2-e kWh^{-1}	-

6. AIR QUALITY IMPACT ASSESSMENT

This section presents the results of the dispersion modelling assessment and uses the following terminology:

- **Incremental impact** – relates to the concentrations predicted due to the operation of the Project in isolation;
- **Approved development** – relates to the impacts associated with approved operations, which may impact cumulatively with the Project; and
- **Cumulative impact** – relates to the incremental concentrations predicted due to the operation of the Project PLUS the concentrations predicted due to the Approved development PLUS background air quality concentrations discussed in Section 4.3.

The results are presented in this manner to allow examination of the likely impact of the Project in isolation and the contribution to air quality impacts in a broader sense.

In the presentation of results, the tables included shaded cells which represent the following:

Model prediction (impacts predicted as a result of the Project operation alone)	Pollutant concentration / deposition rate less than the relevant criterion	Pollutant concentration / deposition rate equal to, or greater than the relevant criterion

6.1. Odour

Presented in Table 16 are the predicted incremental 99th percentile nose response time average odour concentrations predicted to occur at the nearest sensitive receptors as a result of the operation of the MRF, both currently, and under the proposed expansion.

The predicted incremental concentrations of odour are demonstrated to be minor under both current operations and following the proposed expansion.

The dispersion modelling results for the current operation correspond with the findings of the two odour audits performed following commencement of the existing approved project (SLR, 2022a) (SLR, 2022b). Dispersion modelling predictions for the Project also indicate that the operations at the site can be performed without giving rise to offensive odour at nearby sensitive receptor locations.

Table 16 Predicted incremental 99th percentile odour concentrations

Receptor	99th percentile nose response time (OU)		
	Incr	Approved	Cumul.
Criterion	2	2	2
Max. % of criterion	19	19	39
R1	0.1	0.1	0.2
R2	< 0.1	< 0.1	0.1
R3	< 0.1	< 0.1	< 0.1
R4	< 0.1	< 0.1	< 0.1
R5	< 0.1	< 0.1	< 0.1
R6	< 0.1	< 0.1	< 0.1
R7	< 0.1	< 0.1	< 0.1
R8	< 0.1	< 0.1	0.1
I1	0.4	0.4	0.8
I2	0.1	0.1	0.3
I3	0.1	0.1	0.3
I4	0.1	0.1	0.3
I5	0.1	0.1	0.2
A1	0.1	0.1	0.1
A2	< 0.1	< 0.1	0.1
A3	< 0.1	< 0.1	< 0.1
A4	0.1	0.1	0.1
A5	< 0.1	< 0.1	< 0.1

Note: Incr. = Project, Approved = approved development at the site, Cumul. = Project + approved development

6.2. Particulate Matter

6.2.1. Annual Average TSP, PM_{10} and $PM_{2.5}$

The predicted annual average particulate matter concentrations (as TSP, PM_{10} and $PM_{2.5}$) resulting from the operations at the Project site are presented in Table 17.

An exceedance of the annual average $PM_{2.5}$ criteria is shown in Table 17, although this is dominated by the exceeding background, which is already 110% of the criterion.

No contour plots of annual average TSP, PM_{10} or $PM_{2.5}$ are presented, given the minor contribution from the Project at the nearest relevant sensitive receptors.

Table 17 Predicted annual average TSP, PM_{10} and $PM_{2.5}$ concentrations

Receptor	Annual average concentration ($\mu g \cdot m^{-3}$)											
	TSP				PM_{10}				$PM_{2.5}$			
	Incr.	Approved	Bg.	Cumul.	Incr.	Approved	Bg.	Cumul.	Incr.	Approved.	Bg.	Cumul.
Criterion	90				25				8			
Max. % of criterion	2.7	2.5	46.9	52.0	2.3	2.1	82.0	86.4	1.4	1.3	110.0	112.7
R1	0.3	0.3	42.2	42.8	<0.1	0.1	20.5	20.7	<0.1	<0.1	8.8	8.9
R2	0.1	0.1	42.2	42.4	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R3	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R4	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R5	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R6	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R7	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
R8	<0.1	0.1	42.2	42.4	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
I1	2.4	2.2	42.2	46.8	0.6	0.5	20.5	21.6	0.1	0.1	8.8	9.0
I2	0.4	0.6	42.2	43.1	0.1	0.2	20.5	20.8	<0.1	<0.1	8.8	8.9
I3	0.4	0.7	42.2	43.3	0.1	0.2	20.5	20.8	<0.1	<0.1	8.8	8.9
I4	0.4	0.7	42.2	43.3	0.1	0.2	20.5	20.8	<0.1	<0.1	8.8	8.9
I5	0.1	0.3	42.2	42.6	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
A1	0.2	0.2	42.2	42.6	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
A2	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
A3	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
A4	0.2	0.2	42.2	42.6	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9
A5	<0.1	<0.1	42.2	42.3	<0.1	<0.1	20.5	20.6	<0.1	<0.1	8.8	8.9

Note: Incr. = Project, Approved = approved development at the site, Bg. = background, Cumul. = Project + approved development +background

6.2.2. Annual Average Dust Deposition Rates

Table 18 presents the annual average dust deposition predicted as a result of the operations at the Project site (Incremental impact) and the approved development. An assumed background dust deposition of 2 $g \cdot m^{-2} \cdot month^{-1}$ is presented in Table 18, although comparison of the incremental concentration with the incremental criterion of 2 $g \cdot m^{-2} \cdot month^{-1}$ is also valid (as discussed within Section 4.3). In either case, the resulting conclusions drawn are identical. The results indicate minor incremental impacts at all surrounding receptor locations, and compliance with the relevant criterion.

No contour plot of annual average dust deposition is presented, given the minor contribution from the Project at the nearest sensitive receptors.

Table 18 Predicted annual average dust deposition

Receptor	Annual average dust deposition ($g \cdot m^{-2} \cdot month^{-1}$)			
	Project	Approved development	Regional background	Cumulative impact
Criterion	2	2	-	4
Max. % of criterion	15.4	15.6	-	65.5
R1	<0.1	<0.1	2.0	2.1
R2	<0.1	<0.1	2.0	2.1
R3	<0.1	<0.1	2.0	2.1
R4	<0.1	<0.1	2.0	2.1
R5	<0.1	<0.1	2.0	2.1
R6	<0.1	<0.1	2.0	2.1
R7	<0.1	<0.1	2.0	2.1
R8	<0.1	<0.1	2.0	2.1
I1	0.3	0.3	2.0	2.6
I2	<0.1	<0.1	2.0	2.1
I3	<0.1	<0.1	2.0	2.1
I4	<0.1	<0.1	2.0	2.1
I5	<0.1	<0.1	2.0	2.1
A1	<0.1	<0.1	2.0	2.1
A2	<0.1	<0.1	2.0	2.1
A3	<0.1	<0.1	2.0	2.1
A4	<0.1	<0.1	2.0	2.1
A5	<0.1	<0.1	2.0	2.1
Criterion		2	-	4

6.2.3. Maximum 24-hour PM_{10} and $PM_{2.5}$

Presented in Table 19 are the maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations predicted to occur at the nearest sensitive receptors as a result of the operation of the Project. No background concentrations are included within this table.

The predicted incremental concentrations of PM_{10} and $PM_{2.5}$, are demonstrated to be low.

Table 19 Predicted maximum incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations

Receptor	Maximum 24-hour average concentration ($\mu g \cdot m^{-3}$)			
	PM_{10}		$PM_{2.5}$	
	Project	Approved	Project	Approved
Criterion	50	50	25	26
Max. % of criterion	8.3	7.2	3.0	2.8
R1	1.3	1.2	0.2	0.2
R2	0.4	0.5	<0.1	<0.1
R3	0.1	0.2	<0.1	<0.1
R4	<0.1	<0.1	<0.1	<0.1
R5	0.1	0.2	<0.1	<0.1
R6	0.1	0.2	<0.1	<0.1
R7	0.2	0.2	<0.1	<0.1
R8	0.5	0.6	<0.1	<0.1
I1	4.2	3.6	0.8	0.7
I2	1.2	1.6	0.3	0.3
I3	2.0	1.8	0.4	0.4
I4	1.2	2.1	0.2	0.3
I5	1.0	1.8	0.1	0.3
A1	0.6	1.0	0.1	0.2
A2	0.4	0.5	<0.1	<0.1
A3	0.2	0.2	<0.1	<0.1
A4	0.7	0.8	0.1	0.1
A5	0.2	0.3	<0.1	<0.1

Table 20 and Table 21 present the predicted maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations resulting from the operation of the Project, with background included.

Results are presented for the receptor at which the highest incremental PM_{10} and $PM_{2.5}$ impacts have been predicted, and for the receptors at which the highest cumulative impacts (increment plus approved development plus background) have been predicted. These may be different receptors than those at which the highest incremental impacts are predicted.

The left side of the tables show the predicted concentration on days with the highest cumulative impact (principally driven by the highest background concentrations), and the right side shows the total predicted concentration on days with the highest predicted incremental concentrations with the contemporaneous background values to derive the respective cumulative predictions.

For PM_{10}, the maximum cumulative impact (the left hand side of Table 20), and the maximum incremental impact (the right hand side of Table 20) are predicted at receptor I4 and I1 respectively.

For $PM_{2.5}$, the maximum cumulative impact (the left hand side of Table 21), and the maximum incremental impact (the right hand side of Table 21) are predicted at receptor I1.

It is noted that a number of exceedances are indicated in the 'background' air quality data, and as discussed in Section 4.3, these were due to regional air quality episodes. The results show that for both PM_{10} and $PM_{2.5}$, the operation of the Project and the approved development is not predicted to result in any additional exceedances of the criteria at any other receptor location.

Table 20 Summary of contemporaneous impact and background – PM_{10}

Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$) – I4				Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$) – I1			
	Incr.	Approved	Bg.	Cumul.		Incr.	Approved	Bg.	Cumul.
23/01/2020	0.5	0.8	167.9	169.2	12/02/2020	4.2	3.0	11.1	18.3
8/01/2020	<0.1	<0.1	102.5	102.6	21/02/2020	4.1	3.3	22.1	29.6
24/01/2020	<0.1	<0.1	88.4	88.5	13/02/2020	3.8	2.9	18.4	25.2
4/01/2020	0.7	1.2	65.1	67.0	15/12/2020	3.7	2.8	15.3	21.8
5/01/2020	<0.1	<0.1	65.7	65.8	9/06/2020	3.6	3.4	14.8	21.8
12/01/2020	<0.1	<0.1	63.4	63.5	29/10/2020	3.5	3.2	7.6	14.3
25/01/2020	<0.1	<0.1	56.4	56.5	19/04/2020	3.4	3.0	17.0	23.4
11/01/2020	<0.1	<0.1	50.0	50.1	9/04/2020	3.3	2.8	14.0	20.1
1/01/2020	<0.1	<0.1	47.8	47.9	27/03/2020	3.3	2.6	19.0	24.9
2/01/2020	<0.1	<0.1	46.6	46.7	3/03/2020	3.3	2.6	24.5	30.4
These data represent the highest Cumulative Impact 24-hour PM_{10} predictions (outlined in red) as a result of the operation of the Project					These data represent the highest Incremental Impact 24-hour PM_{10} predictions (outlined in blue) as a result of the operation of the Project				

Note: Incr. = Project, Approved = approved development at the site, Bg. = background, Cumul. = Project + approved development +background

Table 21 Summary of contemporaneous impact and background – $PM_{2.5}$

Date	24-hour average $PM_{2.5}$ concentration (µg·m^{-3}) – I1				Date	24-hour average $PM_{2.5}$ concentration (µg·m^{-3}) – I1			
	Incr.	Approved	Bg.	Cumul.		Incr.	Approved	Bg.	Cumul.
8/01/2020	0.3	0.3	86.2	86.8	21/02/2020	0.8	0.6	6.4	7.8
12/01/2020	0.3	0.3	47.7	48.4	9/06/2020	0.7	0.7	5.8	7.2
24/01/2020	0.2	0.2	40.0	40.4	19/04/2020	0.7	0.6	9.5	10.8
17/01/2020	0.3	0.4	35.8	36.5	29/10/2020	0.7	0.7	3.4	4.7
5/01/2020	0.2	0.2	35.1	35.5	8/08/2020	0.7	0.7	8.0	9.4
11/01/2020	0.3	0.2	33.4	33.9	19/01/2020	0.7	0.6	7.1	8.4
4/01/2020	<0.1	<0.1	31.9	32.0	12/02/2020	0.7	0.6	3.8	5.0
2/01/2020	0.3	0.3	28.5	29.1	16/05/2020	0.6	0.7	9.3	10.6
23/01/2020	<0.1	<0.1	28.7	28.8	15/12/2020	0.6	0.5	4.5	5.6
30/08/2020	<0.1	<0.1	24.6	24.7	29/06/2020	0.6	0.6	5.9	7.1
These data represent the highest Cumulative Impact 24-hour $PM_{2.5}$ predictions (outlined in red) as a result of the operation of the Project					These data represent the highest Incremental Impact 24-hour $PM_{2.5}$ predictions (outlined in blue) as a result of the operation of the Project				

Note: Incr. = Project, Approved = approved development at the site, Bg. = background, Cumul. = Project + approved development +background

Contour plots of the predicted incremental 24-hour PM_{10} concentrations associated with the Project are presented in Figure 7 to allow examination of the distribution of particulate matter in the area surrounding the Project.

Figure 7 Predicted maximum incremental 24-hour PM_{10} impacts

Source: Northstar

7. GREENHOUSE GAS ASSESSMENT

This section presents the results of the GHG assessment, compares direct emissions totals with NSW and Australian totals, and provides a range of measures which might be considered to reduce GHG emissions.

7.1. Calculation of Emissions

Based on the activity data emission factors outlined in Section 5.2.5, Table 22 presents the calculated Scope 1, 2 and 3 GHG emissions associated with operation of the Project.

Table 22 Greenhouse gas emissions

Emission scope	Emission source	Emission factor	Energy content factor	Activity rate	Emissions (t CO_2-e $\cdot yr^{-1}$)
Scope 1	Diesel fuel for mobile plant and equipment	70.2 kg CO_2-e GJ^{-1}	38.6 $GJ \cdot kL^{-1}$	98.5 $kL \cdot yr^{-1}$	266.9
				Total Scope 1	**266.9**
Scope 2	Electricity	0.64 kg CO_2-e kWh^{-1}	-		384
				Total Scope 2	**384**
Scope 3	Diesel fuel for mobile plant and equipment	17.3 kg CO_2-e GJ^{-1}	38.6 $GJ \cdot kL^{-1}$	98.5 $kL \cdot yr^{-1}$	65.8
	Diesel fuel for outgoing materials	17.3 kg CO_2-e GJ^{-1}	38.6 $GJ \cdot kL^{-1}$	2 605 $kL \cdot yr^{-1}$	1 739.7
	Diesel fuel for incoming materials	17.3 kg CO_2-e GJ^{-1}	38.6 $GJ \cdot kL^{-1}$	2 605 $kL \cdot yr^{-1}$	1 739.7
	Unleaded fuel for employee transport	17.2 kg CO_2-e GJ^{-1}	34.2 $GJ \cdot kL^{-1}$	52.6 $kL \cdot yr^{-1}$	31.0
	Consumption of purchased electricity	0.03 kg CO_2-e kWh^{-1}	-	600 000 $kWh \cdot yr^{-1}$	18.0
				Total Scope 3	**3 594.2**

A summary of calculated emissions is presented in Table 23. Based on the production and throughput rates, the total annual GHG emissions (Scope 1, 2, and 3) are estimated to be 4 245.1 t CO_2-e.

Table 23 Summary of GHG emissions

Emission scope	Annual GHG emissions (t CO_2-e·yr^{-1})
Scope 1	266.9
Scope 2	384
Scope 3	3 594.2
Total	**4 245.1**

7.2. Comparison with National Totals

A comparison of the calculated Scope 1 GHG emissions associated with the Project and NSW and Australia total emissions is presented in Table 24.

Table 24 Greenhouse gas emissions in context

Emission scope	Project total (t CO_2-e·yr^{-1})	Emissions (Mt CO_2-e·yr^{-1})	
		Australia (2024) 466.42 Mt	NSW (2024) 106.17 Mt
Scope 1	266.9	0.00006%	0.0003%

These data indicate that the operation of the Project would contribute up to 0.0003 % of NSW total GHG emissions in 2024 and up to 0.00006 % of Australia total GHG emissions in 2024.

7.3. NSW Government Action on Climate Change

The Project will assist in the achievement of the targets under the NSW Government Waste and Sustainable Materials Strategy:

- reduce total waste generated by 10 % per person by 2030;
- have an 80 % average recovery rate from all waste streams by 2030;
- significantly increase the use of recycled content by governments and industry;
- phase out problematic and unnecessary plastics by 2025;
- halve the amount of organic waste sent to landfill by 2030;
- reduce litter by 60 % by 2030 and plastics litter by 30 % by 2025; and
- triple the plastics recycling rate by 2030.

Specifically, the Project will support the resource recovery sector's response to Australia's waste export ban and aligns with the NSW Government's targets in the NSW Waste Strategy 2041.

8. MITIGATION AND MANAGEMENT

8.1. Operational Phase Mitigation

The operational phase impact assessment indicates that the Project can achieve all relevant air quality criteria. As discussed in Section 6.2.1, the contribution of the Project to annual average $PM_{2.5}$ impacts is predicted to be minor, however, the background is noted to be already exceeding the criterion.

A number of emissions control measures are currently adopted at the Project site as outlined in Section 5.1.3 which have been considered as part of the dispersion modelling assessment. The results of the AQIA indicate that appropriate implementation of those control measures would ensure that air quality (including odour) impacts at adjacent receptor locations are minimised.

For clarity, the adopted emissions control measures comprise:

- Keeping building doors closed when possible, to reduce the egress of uncontrolled emissions;
- Ensuring the dust capture system and baghouses are operating effectively and are maintained to reduce emissions associated with the glass beneficiation process;
- Storing baled product and glass cullet in enclosed areas; and
- Limiting vehicle speeds on site to 5 $km \cdot hr^{-1}$.

8.2. Monitoring

Given the discussion presented above, taking into consideration the incremental contribution of the Project to air quality impacts in the surrounding area, no air quality monitoring is required or proposed.

8.3. Greenhouse Gas Mitigation

Emissions of GHG resulting from the Project will be minimised to the maximum extent practical by consideration of the following measures:

- The most efficient vehicle and size should be used to minimise the number of trips required and minimise greenhouse gas (and particulate) emissions per tonne of material transported.
- All vehicle/plant and machinery should be turned off when not in use and be regularly serviced to ensure efficient operation, including the optimisation of tyre pressures.
- Truck routes and loading capacity should be designed to reduce the distance and effort required by the vehicles.
- Maintenance of roads in good condition to avoid meandering of vehicles.
- Where possible, B5 fuel should be used in plant and equipment.

- Applicant should investigate opportunities to use renewable energy sources, including solar power for power generation.

9. CONCLUSION

Northstar has been commissioned by Polytrade to perform an AQIA and GHG assessment to support an EIS for the proposed expansion of a MRF located at 40 Madeline Street, Strathfield South NSW.

This AQIA identifies and examines potential air quality impacts associated with operation of the Project, in accordance with the SEARs and identifies mitigation and monitoring requirements commensurate with those anticipated impacts.

The prediction of potential impacts associated with operational activities has been performed in general accordance with the requirements of the Approved Methods, using an approved and appropriate dispersion modelling technique. The estimation of emissions has been performed using referenced emission factors.

The results of the assessment indicate that all air quality criteria are predicted to be achieved. Modelled concentrations associated with the operation of the Project and the approved development at nearby receptors are minimal, and would not result in any additional exceedances of the air quality criteria. Exceedances of the annual average $PM_{2.5}$ criterion is dominated by the already exceeding background conditions. The contribution of the Project and the approved development to that exceedance is minimal.

Further to the above, it is noted that good site management practices, such as keeping building doors closed when possible, to reduce the egress of uncontrolled emissions and operation and maintenance of the baghouses to manage emissions, should be sufficient to ensure that no exceedances are to be observed during normal Project operation.

The GHG assessment provides a summary of GHG emissions associated with the Project and compares these totals with national and state emissions. Opportunities for GHG reduction are also provided.

10. REFERENCES

ABS. (2022). *Regional Population*. Retrieved from https://www.abs.gov.au/statistics/people/population/regional-population/2021#interactive-maps

DCCEEW. (2025). *Australian National Greenhouse Accounts Factors, For individuals and organisations estimating greenhouse gas emissions, 2025.*

EMM. (2020). *Alterations and additions at 5/84-108 Madeline St, Strathfield South, Air quality impact assessment, Prepared for Aussie Skips Recycling Pty Ltd, EMM Consulting December 2020.*

Katestone. (2020). *Chullora Materials Recycling Facility, Environmental Impact Statement (SSD-10401), Appendix K Air Quality Impact Assessment.*

MRA. (2021). *Statement of Environmental Effects: Enfield MRF & PCR - s4.55 Modification, 15 November 2021.*

NPI. (2001). *Emission Estimation Technique Manual for Non-Ferrous Metals Manufacture, Version 1.1, October 2001.*

NPI. (2012). *National Pollutant Inventory Emission Estimation Technique Manual for Mining, Version 3.1.*

NSW DEC. (2006). Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW.

NSW DPIE. (2021). *New South Wales Annual Compliance Report 2020.*

NSW EPA. (2022). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.* NSW Environment Protection Authority.

SLR. (2015). *Air Quality Impact Assessment, Materials Recovery Facility, 14-82 Madeline Street, South Strathfield (610.14992-R3), dated 30/11/2015.*

SLR. (2022a). *Materials Recovery Facility, 14-82 Madeline Street, South Strathfield, Odour Quality Monitoring. 610.14992-L01-v1.0-20220720, 20 July 2022.*

SLR. (2022b). *Materials Recovery Facility, 14-82 Madeline Street, South Strathfield, Odour Quality Monitoring. 610.14992-L02-v1.0-20221129, 29 November 2022.*

TOU. (2018). *The Odour Unit, Materials Recovery Facility and Rail Freight Terminal Odour Impact Assessment.*

US EPA. (2006). *AP-42 Compilation of Air Pollutant Emission Factors, Chapter 13.2.4 Aggregate Handling and Storage Piles.*

US EPA. (2006b). *AP-42 Emission Factors Section 13.2.4 Aggregate Handling and Storage Piles.*

US EPA. (2011). *Emission Factor Documentation for AP-42, Section 13.2.1 Paved Roads.*

WRI. (2004). *A Coporate Accounting and Reporting Standard - Revised Edition. World Resources Institute/World Business Council for Sustainable World Business Council for Sustainable Development.*

APPENDIX A

Commonly used units and abbreviations

Units Used in the Report

Units presented in the report follow the International System of Units (SI) conventions, unless derived from references using non-SI units.

Commonly used SI units

The following units are commonly used in Northstar reports.

Symbol	Name	Quantity
SI base units		
K	Kelvin	thermodynamic temperature
kg	kilogram	mass
m	metre	length
mol	mole	amount of substance
s	seconds	time
Non-SI units mentioned in the SI or accepted for use		
°	degree	plane angle
d	day	time
h	hour	time
ha	hectare	area
J	joule	energy
L	litre	volume
min	minute	time
N	newton	force or weight
t	tonne	mass
V	volt	electrical potential
W	watt	power

Multiples of SI and non-SI units

The following prefixes are added to unit names to produce multiples and sub-multiples of units:

Prefix	Symbol	Factor
T	tera-	10^{12}
G	giga-	10^{9}
M	mega-	10^{6}
k	kilo-	10^{3}
h	hector-	10^{2}
da	deca-	10^{1}

Prefix	Symbol	Factor
p	pico-	10^{-12}
n	nano-	10^{-9}
μ	micro-	10^{-6}
m	milli-	10^{-3}
c	centi-	10^{-2}
d	deci-	10^{-1}

In this report, units formed by the division of SI and non-SI units are expressed as a negative exponent, and do not use the solidus (/) symbol. For example:

- 50 micrograms per cubic metre would be presented as 50 $\mu g \cdot m^{-3}$ and not 50 $\mu g/m^3$; and,

- 0.2 kilograms per hectare per hour would be presented as 0.2 $kg{\cdot}ha^{-1}{\cdot}hr^{-1}$ and not 0.2 kg/ha/hr.

Commonly used SI-derived and non-SI units

$g{\cdot}m^{-2}{\cdot}s^{-1}$	gram per square metre per second	rate of mass deposition per unit area
$g{\cdot}s^{-1}$	gram per second	rate of mass emission
$kg{\cdot}ha^{-1}{\cdot}hr^{-1}$	kilogram per hectare per hour	rate of mass deposition per unit area
$kg{\cdot}m^{-3}$	kilogram per cubic metre	density
$L{\cdot}s^{-1}$	litres per second	volumetric rate
m^2	square metre	area
m^3	cubic metre	volume
$m{\cdot}s^{-1}$	metre per second	speed and velocity
$mg{\cdot}m^{-3}$	milligram per cubic metre	mass concentration per unit volume
$mg{\cdot}Nm^{-3}$	milligram per normalised cubic metre (of air)	mass concentration per unit volume
$\mu g{\cdot}m^{-3}$	microgram per cubic metre	mass concentration per unit volume
$mg{\cdot}m^{-3}$	milligram per cubic metre	mass concentration per unit volume
Pa	pascal	pressure
ppb	parts per billion ($1x10^{-9}$)	volumetric concentration
pphm	parts per hundred million (1×10^{-5})	volumetric concentration
ppm	parts per million ($1x10^{-6}$)	volumetric concentration

Commonly used abbreviations

Abbreviation	Term
ABS	Australian Bureau of Statistics
ACT	Australian Commonwealth Territory
AGL	above ground level
AHD	Australian height datum
APC	air pollution control
AQI	air quality index
AQIA	air quality impact assessment
AQMS	air quality monitoring station
AQRA	air quality risk assessment
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AS/NZS	Australian Standard / New Zealand Standard
AWS	automatic weather station
BCA	Building Code of Australia
BGL	below ground level
BOM	Bureau of Meteorology
CEMP	construction environment management plan
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation

Abbreviation	Term
DEM	digital elevation model
EETM	emission estimation technique manual
EPA VIC	Environmental Protection Authority Victoria
EPBC	Environment Protection and Biodiversity Conservation Act
FIBC	flexible intermediate bulk container
GIS	geographical information system
IAQM	UK Institute of Air Quality Management
IBC	intermediate bulk container
ID	internal diameter
LLV	low level waste
LoM	life of mine
MSDS	Material Safety Data Sheet
NCAA	National Clean Air Agreement
NEPM	National Environment Protection Measure
NH_3	ammonia
NO	nitric oxide
NO_X	oxides of nitrogen
NO_2	nitrogen dioxide
NORM	naturally occurring radioactive material
NSW	New South Wales
NSW DPE	New South Wales Department of Planning and Environment
NSW EPA	New South Wales Environment Protection Authority
NT	Northern Territory
OEMP	operational environmental management plan
O_3	ozone
OU	odour unit
$OU \cdot m^3 \cdot s^{-1}$	odour units times metres cubed per second
$OU \cdot s^{-1}$	odour units per second
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 µm or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 µm or less
ROM	run of mine
SA	South Australia
SEPP	State Environmental Protection Policy
SO_X	oxides of sulphur
SO_2	sulphur dioxide
SRTM3	Shuttle Radar Topography Mission
SVOC	semi-volatile organic compound
TAPM	The Air Pollution Model
TAS	Tasmania

Abbreviation	Term
TEU	twenty-foot equivalent unit
TSP	total suspended particulates
TVOC	total volatile organic compounds
TWA	time weighted average
US EPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
VIC	Victoria
VLLW	very low level waste
VOC	volatile organic compound

APPENDIX B

Meteorology

As discussed in Section 4.2, a meteorological modelling exercise has been performed to characterise the meteorology of the Project site in the absence of site-specific measurements. The meteorological monitoring has been based on measurements acquired from surrounding automatic weather stations (AWS) operated by the Australian Government Bureau of Meteorology (BoM).

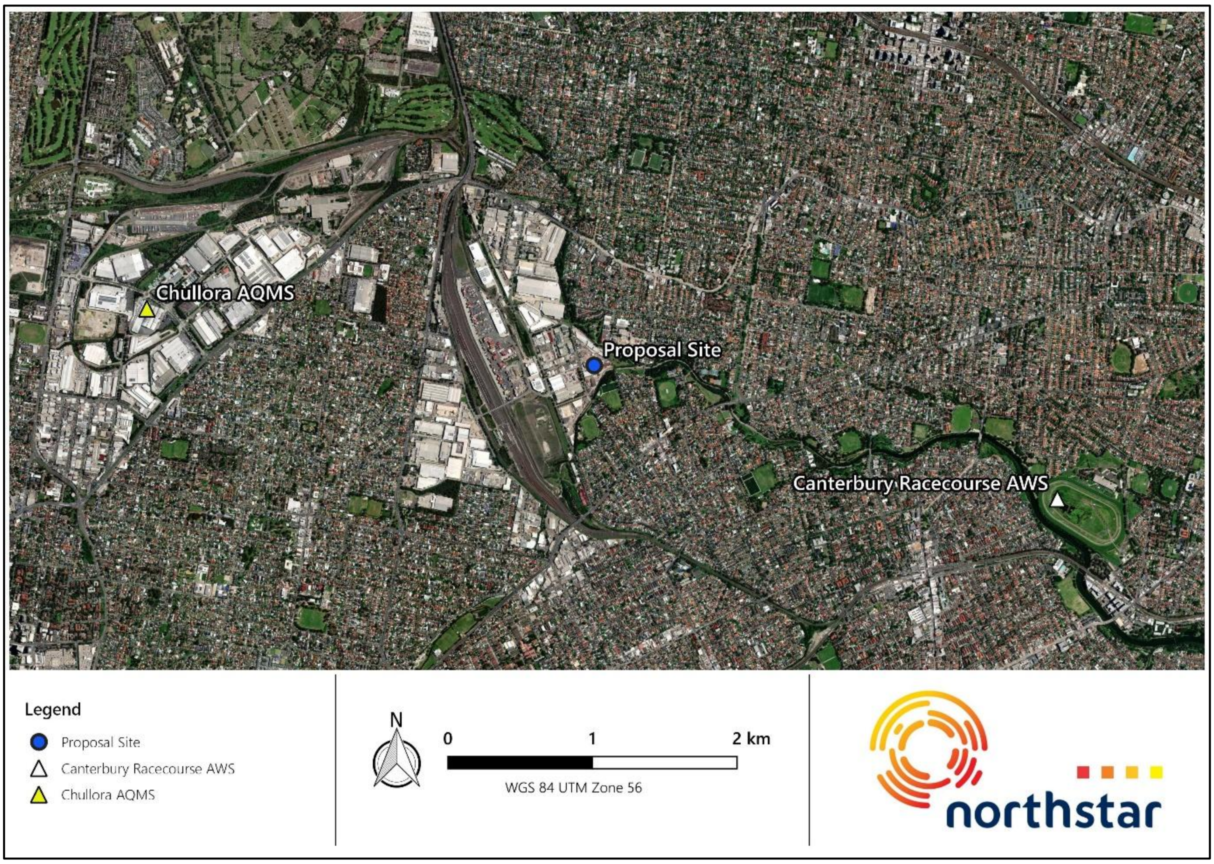
A summary of the relevant monitoring sites is provided in Table B1.

Additionally, the locations of the adopted meteorological and background air quality monitoring stations used in this study is illustrated in Figure B1.

Table B1 Details of the meteorological monitoring surrounding the Project site

Site name	Source	Approximate location		Approximate distance
		mE	mS	km
Canterbury Racecourse AWS	BoM	325 572	6 246 697	3.5
Sydney Olympic Park AWS	BoM	320 948	6 252 558	5.3
Sydney Olympic Park (Archery Centre) AWS	BoM	321 575	6 254 599	7.2
Bankstown Airport AWS	BoM	313 855	6 245 099	8.8

Figure B1 Monitoring stations adopted in this study



Source: Northstar

As discussed in Section 4.2, meteorological conditions at Canterbury Racecourse AWS have been examined to determine a 'typical' or representative dataset for use in dispersion modelling. Annual wind roses for the period 2018 to 2022 are presented in Figure B2. The annual wind speed frequency distribution for the five-year period is presented in Figure B3.

The correlation coefficient between each year and the five-year period for the distribution of wind speed, wind direction, PM_{10} and $PM_{2.5}$ are summarised in Table B2. The correlation coefficients were ranked and aggregated to select the representative year for the meteorological modelling. The rankings are also presented in Table B2.

The wind roses indicate that from 2018 to 2022, winds at Canterbury Racecourse AWS show generally similar wind distribution patterns across the years assessed, with predominant south-easterly wind directions with north-westerly and north-easterly components evident.

The majority of wind speeds experienced at the Canterbury Racecourse AWS between 2018 and 2022 are generally in the range 1.5 meters per second ($m \cdot s^{-1}$) to 5.5 $m \cdot s^{-1}$ with the highest wind speeds (greater than 8 $m \cdot s^{-1}$) occurring from mostly south-easterly directions. Winds of this speed are rare and occur during 1.3 % of the observed hours during the years while calm winds (< 0.5 $m \cdot s^{-1}$) occur during 18.5 % of hours on average across the years 2018-2022.

Figure B2 Annual wind roses – Canterbury Racecourse AWS (2018 – 2022)

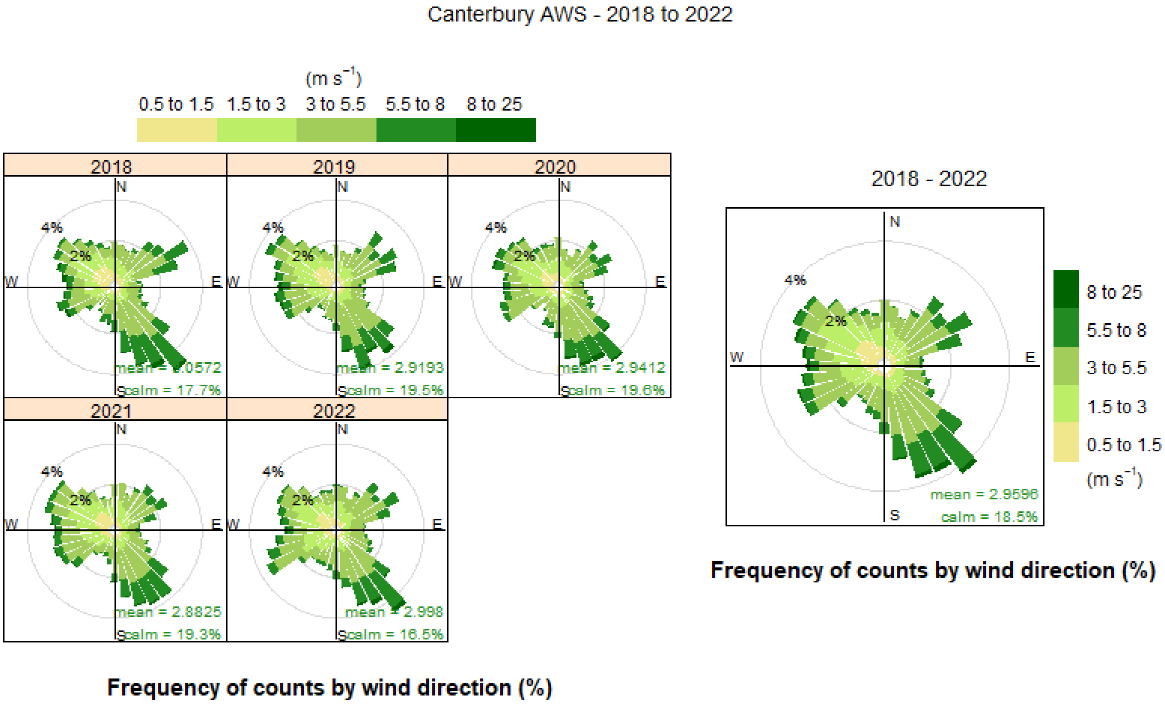


Figure B3 Annual wind speed and direction distributions – Canterbury Racecourse AWS (2018 – 2022)

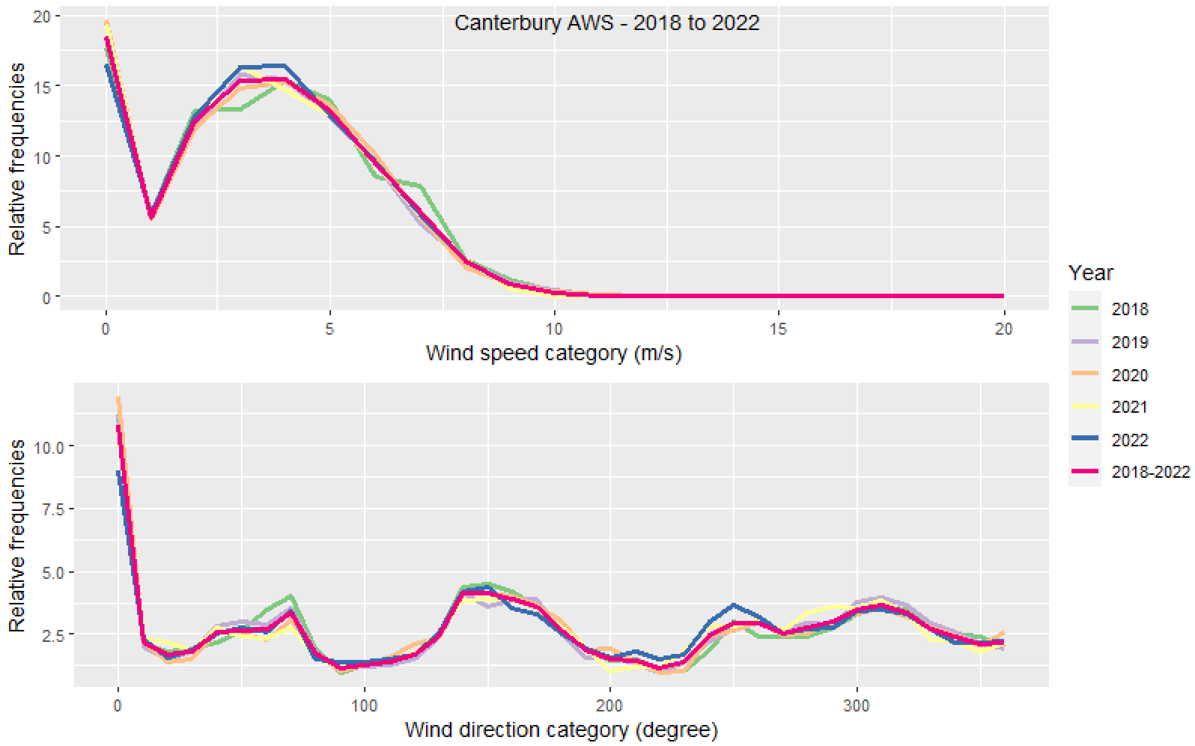


Table B2 Correlation coefficient analysis – Canterbury Racecourse AWS and Chullora AQMS (2018 – 2022)

Parameter	Wind speed		Wind direction		PM_{10}		$PM_{2.5}$		Aggregated rank
	Corr.	Rank	Corr.	Rank	Corr.	Rank	Corr.	Rank	
2018	0.9942	5	0.9872	3	0.9440	4	0.9723	3	4
2019	0.9987	1	0.9933	1	0.9570	3	0.8917	5	3
2020	0.9984	3	0.9913	2	0.9818	2	0.9951	1	1
2021	0.9986	2	0.9849	4	0.9856	1	0.9879	2	2
2022	0.9962	4	0.9840	5	0.8932	5	0.9148	4	5
2018-2022	1	-	1	-	1	-	1	-	-

Note: Corr. = correlation

Wind speed observations for each year correlated well against the wind speed over the five-year period, with each year having a correlation coefficient > 0.99. The year 2019 is the highest ranked for correlation against the wind speed over the five-year period.

Wind direction observations for each year are reasonably well correlated against the wind direction over the five-year period, with each year having a correlation coefficient > 0.98. The year 2019 is the highest ranked for correlation against the wind direction over the five-year period.

Particulate matter concentrations for each year are also well correlated against particulate matter concentrations over the five-year period. Each year resulted in having a correlation coefficient > 0.89. The year 2021 is the highest rank for PM_{10} while 2020 was the highest ranked year for $PM_{2.5}$.

The correlation coefficient analysis indicates that 2020 is the most representative year for meteorological modelling.

Meteorological Processing

The BoM data adequately covers the issues of data quality assurance; however, it is limited by its location compared to the Project site. To address these uncertainties, a multi-phased assessment of the meteorology data has been performed.

In absence of any measured onsite meteorological data, site representative meteorological data for this Project was generated using The Air Pollution Model (TAPM, v 4.0.5) meteorological model in a format suitable for using in the CALPUFF dispersion model (refer Section 5.1).

Meteorological modelling using TAPM has been performed to predict the meteorological parameters required for CALPUFF. TAPM, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is a prognostic model which may be used to predict three-dimensional meteorological data and air pollution concentrations.

TAPM predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate site-specific hourly meteorological observations at user-defined levels within the atmosphere.

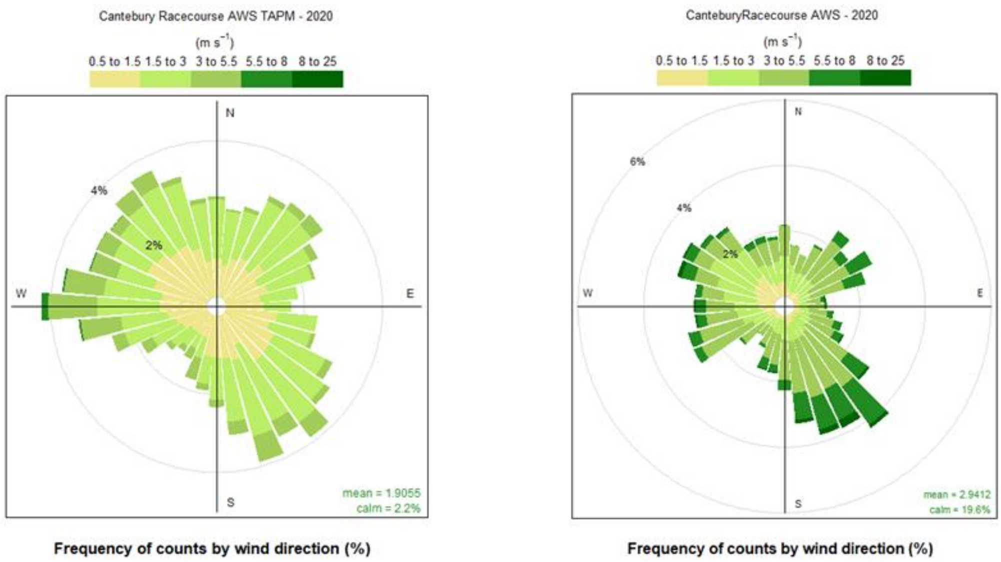
The parameters used in TAPM modelling are presented in Table B3.

Table B3 TAPM meteorological parameters

TAPM v 4.0.5	
Modelling period	1 January 2020 to 31 December 2020
Centre of analysis	323 568 mS, 6 246 368 mN (UTM Coordinates)
Number of grid points	25 x 25 x 25
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Terrain	AUSLIG 9 second DEM
Data assimilation	No data assimilation

A comparison of the TAPM generated meteorological data, and that observed at the Canterbury Racecourse AWS is presented in Figure B4. These data generally compare well which provides confidence that the meteorological conditions modelled as part of this assessment are appropriate.

Figure B4 Modelled and observed meteorological data – Canterbury Racecourse AWS (2020)

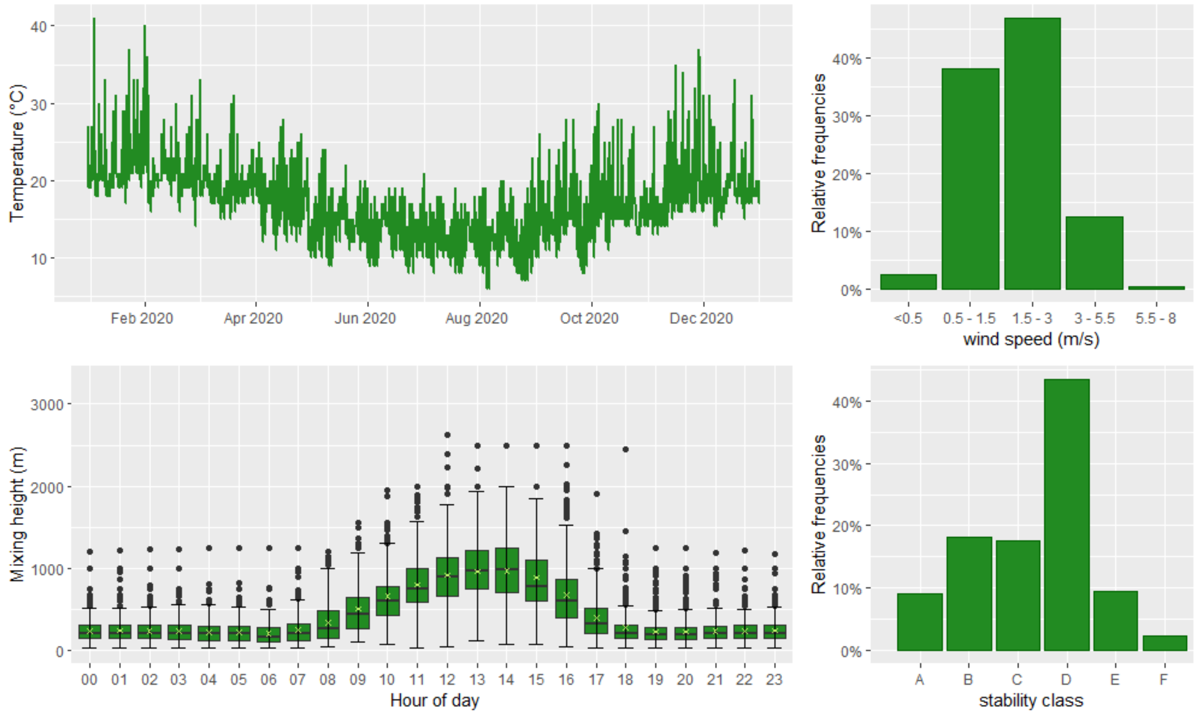


As generally required by the NSW EPA the following provides a summary of the modelled meteorological dataset. Given the nature of the pollutant emission sources at the Project site, detailed discussion of the humidity, evaporation, cloud cover, katabatic air drainage and air recirculation potential of the Project site has not been provided. Details of the predictions of wind speed and direction, mixing height and temperature at the Project site are provided below.

Diurnal variations in maximum and average mixing heights predicted by TAPM at the Project site during 2020 period are illustrated in Figure B5.

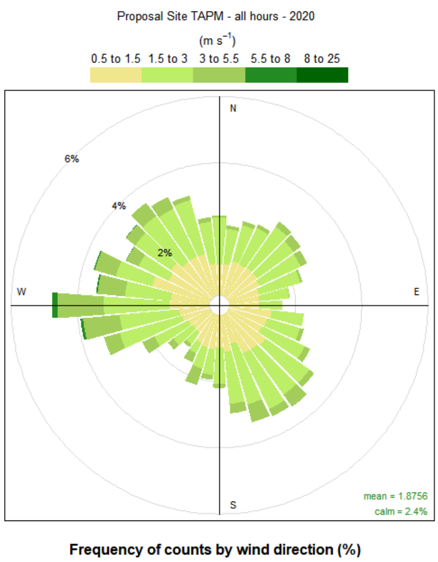
As expected, an increase in mixing height during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and growth of the convective mixing layer.

Figure B5 Predicted mixing height, wind speed and stability class frequency at the Project site (2020)



The modelled wind speed and direction at the Project site during 2020 are presented in Figure B6.

Figure B6 Predicted wind speed and direction – Project site (2020)



APPENDIX C

Background Air Quality

Air quality is not monitored at the Project site and therefore air quality monitoring data measured at a representative location has been adopted for the purposes of this assessment. Determination of data to be used as a location representative of the Project site and during a representative year can be complicated by factors which include:

- the sources of air pollutant emissions around the Project site and representative AQMS; and
- the variability of particulate matter concentrations (often impacted by natural climate variability).

Air quality monitoring is performed by the NSW Department of Planning and Environment (DPE) at two air quality monitoring stations (AQMS) proximate to the Project site. Details of the monitoring performed at these AQMS is presented in Table C1.

Table C1 Details of closest AQMS surrounding the site

AQMS location	Distance to site (km)	2020 data	Measurements		
			PM_{10}	$PM_{2.5}$	TSP
Chullora	3.1	✓	✓	✓	×
Earlwood	5.7	✓	✓	✓	×
Rozelle	8.5	✓	✓	✓	×

Given the availability of data and its proximity to the Project site, data from Chullora AQMS is considered to be the most representative air quality dataset and has correspondingly been adopted for use in this assessment. Particulate matter data for the period 2018 to 2022 has been analysed. The annual frequency distribution for the five-year period is presented in Figure C1.

The results of the correlation coefficient analysis provided in Appendix B indicates that meteorological and PM data measured in 2020 is the most appropriate dataset for use within this study.

Concentrations of TSP are not measured at any AQMS surrounding the Project site. An analysis of co-located measurements of TSP and PM_{10} in the Lower Hunter (1999 to 2011), Illawarra (2002 to 2004), and Sydney Metropolitan (1999 to 2004) regions is presented in Figure C2. The analysis concludes that, on the basis of the measurements collected in all regions between 1999 to 2011, the derivation of a broad TSP:PM_{10} ratio of 2.0551 : 1 (i.e. PM_{10} represents ~49% of TSP) from the Sydney Metropolitan location is appropriate. In the absence of any more specific information, this ratio has been adopted within this AQIA, resulting in a background annual average TSP concentration of 42.2 $\mu g{\cdot}m^{-3}$ being adopted.

Summary statistics for the selected data are presented in Table C2.

Figure C1 Annual distribution at Chullora AQMS for PM_{10} (2018 – 2022)

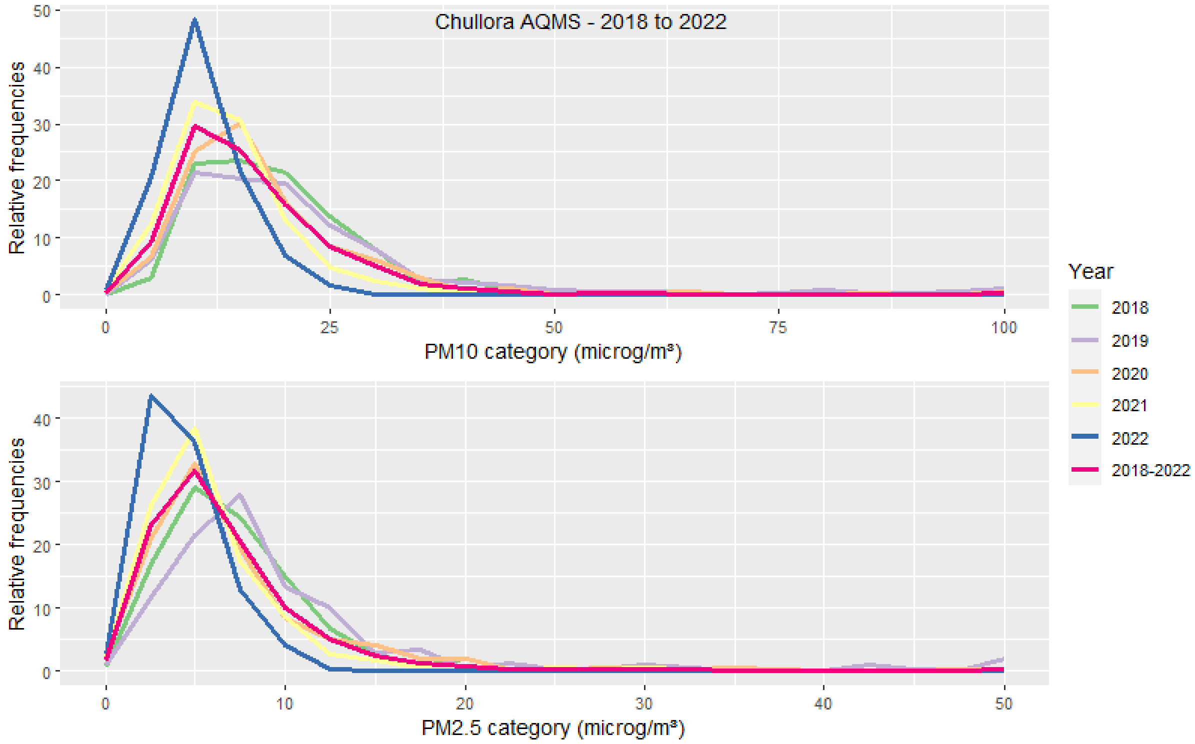
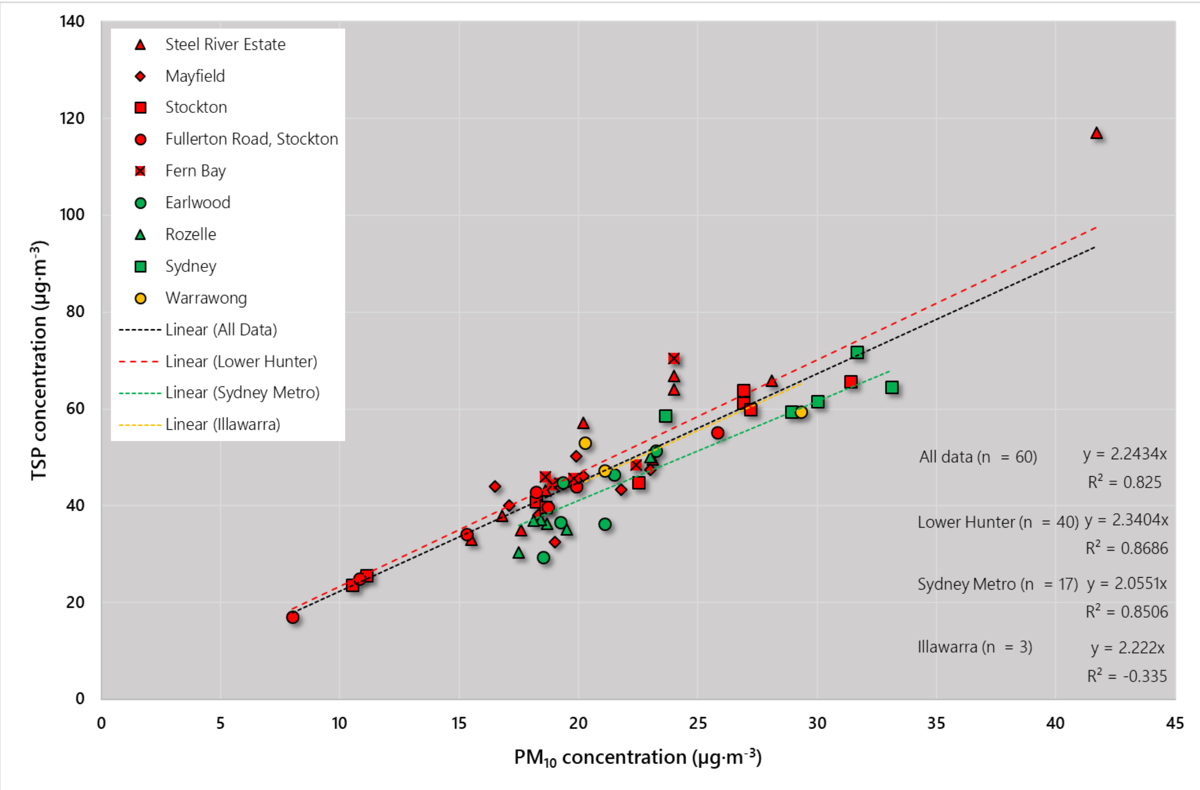


Figure C2 Co-located TSP and PM_{10} measurements – Lower Hunter, Sydney Metro and Illawarra



Graphs presenting the daily varying PM_{10} and $PM_{2.5}$ data recorded at Chullora AQMS in 2020 are presented in Figure C3 and Figure C4, respectively.

Table C2 Background air quality statistics – Prospect AQMS (2020)

Pollutant	TSP (µg·m^{-3})	PM_{10} (µg·m^{-3})	$PM_{2.5}$ (µg·m^{-3})
Averaging period	Annual	24-Hour	24-Hour
Data Points (number)	361	361	358
Mean	42.2	20.5	8.8
Standard deviation	-	13.2	7.2
Skew[1]	-	*5.4*	*5.0*
Kurtosis[2]	-	*47.9*	*41.4*
Minimum	-	4.0	1.6
Percentiles			
25th	-	13.9	5.1
50th	-	17.6	6.9
75th	-	23.9	9.9
90th	-	31.8	15.3
95t	-	37.7	19.6
97th	-	42.8	22.2
98th	-	49.6	28.7
99th	-	65.3	35.4
Maximum	-	167.9	86.2
Data Capture (%)	-	98.6	97.8

Notes: 1: Skew represents an expression of the distribution of measured values around the derived mean. Positive skew represents a distribution tending towards values higher than the mean, and negative skew represents a distribution tending towards values lower than the mean. Skew is dimensionless.

2: Kurtosis represents an expression of the value of measured values in relation to a normal distribution. Positive skew represents a more peaked distribution, and negative skew represents a distribution more flattened than a normal distribution. Kurtosis is dimensionless.

Figure C3 PM_{10} concentrations – Chullora AQMS (2020)

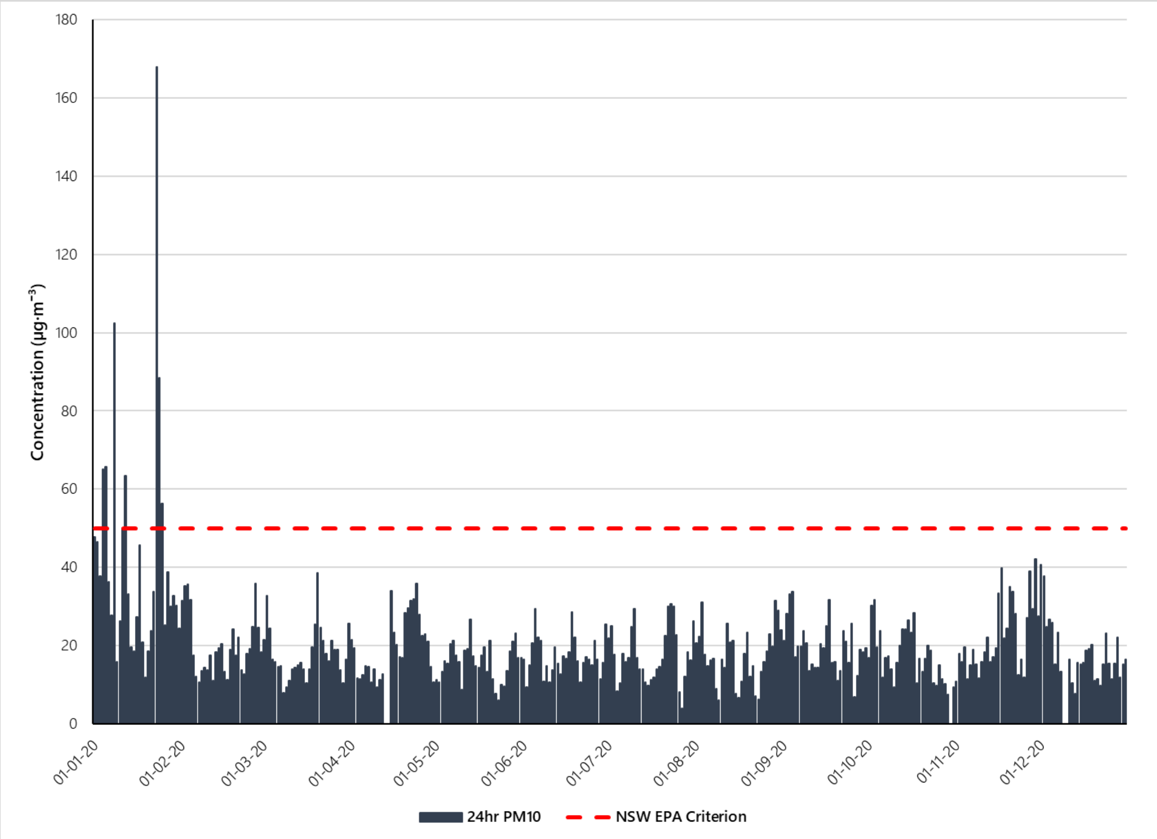
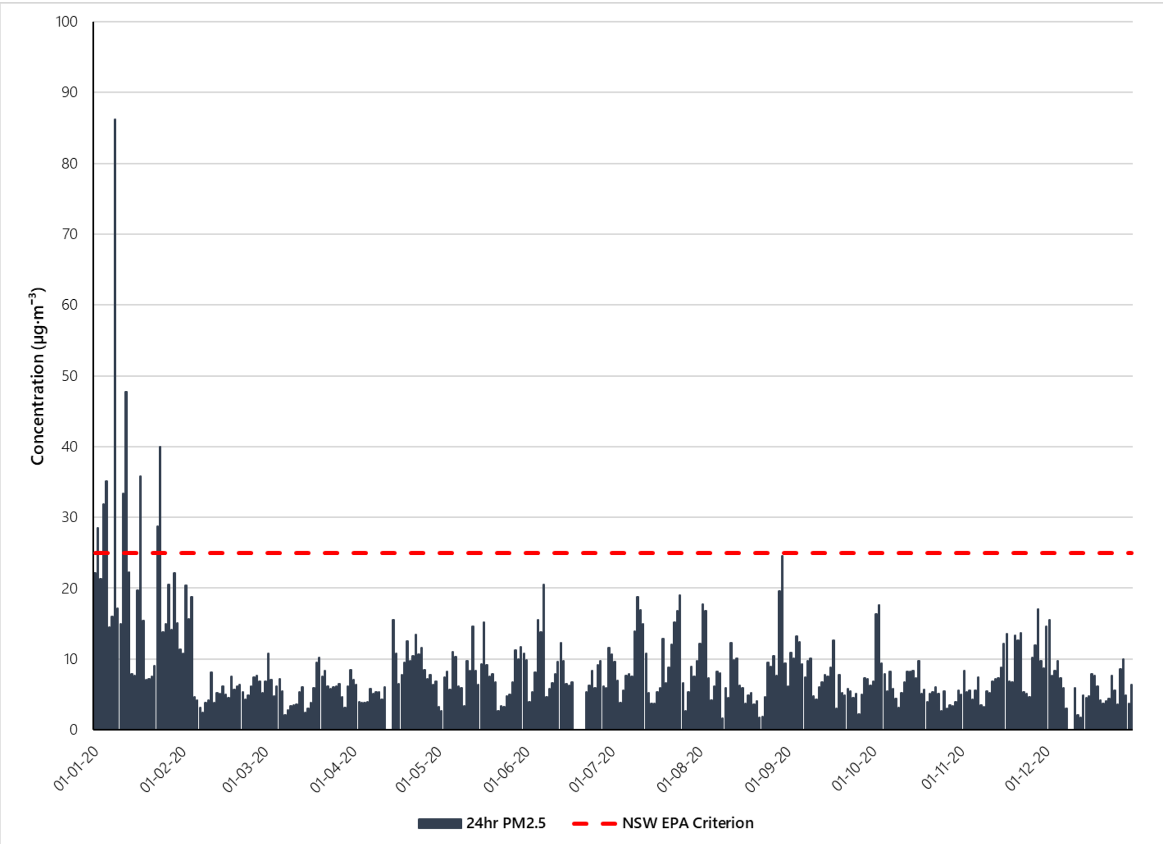


Figure C4 $PM_{2.5}$ concentrations – Chullora AQMS (2020)



APPENDIX D

Emissions Inventory

The assumptions outlined in Table D1 have been used in the development of the particulate emissions inventory for the Project. Note that the peak daily material receipt, processing and dispatch rate is assumed to be approximately 1.825 times higher than the average daily rate.

Additional information used in the construction of the emissions inventory is presented in Section 2.4.5.

Table D1 Assumptions adopted within the particulate matter assessment

Parameter	Units	Annual average	Peak daily maximum
MRF			
Material throughput	t	170 000	850
Material moisture content	%	11	11
Silt loading of paved roads	$g \cdot m^{-2}$	1.1	1.1
Haul truck- Average weight – incoming	t	13	13
Total kilometres – incoming	$VKT \cdot yr^{-1}$	14 287	26 072
Haul truck- Average weight - outgoing	t	38	38
Total kilometres – outgoing	$VKT \cdot yr^{-1}$	3 051	5 567
PCR			
Material throughput		30 000	150
Material moisture content	%	11	%
Silt loading of paved roads	$g \cdot m^{-2}$	1.1	$g \cdot m^{-2}$
Haul truck- Average weight – incoming	t	13	13
Total kilometres – incoming	$VKT \cdot yr^{-1}$	5 059	9 232
Haul truck- Average weight - outgoing	t	38	38
Total kilometres – outgoing	$VKT \cdot yr^{-1}$	767	1 400

Emissions resulting from the unloading and loading of materials, operation of the front end loader, loading of the crusher and screen, and loading materials to bins after processing, have been estimated using emission factors presented in Section 13.2.4.3 of AP-42 (Aggregate Handling and Storage Piles) (US EPA, 2006b).

This emission factor can result from several distinct source activities because the adding or removal of aggregate material from a storage pile or receiving surface results in batch drop operations and in other cases continuous drop operations. Either type of drop events emission factor can be estimated through:

$$EF\ (kg.tonne^{-1}) = k(0.0016)\frac{(\frac{U}{2.2})^{1.3}}{(\frac{M}{2})^{1.4}}$$

where:

$EF_{(kg \cdot tonne^{-1})}$ = emission factor

k = particle size multiplier, where TSP = 0.74; PM_{15} = 0.48; PM_{10} = 0.35; PM_5 = 0.20; $PM_{2.5}$ = 0.053;

U = mean wind speed, meters per second ($m.s^{-1}$)

M = material moisture content (%)

The quality rating for this application is rated A.

The average wind speed of 1.8 $m \cdot s^{-1}$ has been adopted in the above equation, based on modelling outputs as described in Appendix B.

Emissions arising from the movement of heavy vehicles on paved site roads have been estimated using the US EPA AP-42 emission factor for paved roads (US EPA, 2011) as outlined below.

$$E = k\ (sL)^{0.91} \times (W)^{1.02}$$

Where:

E = Emission factor ($g \cdot VKT^{-1}$)

k = particle size multiplier (dimensionless) for TSP = 3.23, for PM_{10} = 0.62, for $PM_{2.5}$ = 0.15

sL = road surface silt loading ($g \cdot m^{-2}$)

W = Mean vehicle weight (tonnes)

Emissions resulting from the crushing and screening of materials at the Project site have been estimated using the US EPA AP-42 emission factor for crushed stone processing (US EPA, 2006). The emission factor for uncontrolled primary crushing:

- 0.0027 $kg \cdot t^{-1}$ for TSP
- 0.0012 $kg \cdot t^{-1}$ for PM_{10} and
- 0.00022 $kg \cdot t^{-1}$ for $PM_{2.5}$

have been adopted.

For screening uncontrolled emissions rates of:

- 0.0125 $kg \cdot t^{-1}$ for TSP
- 0.0043 $kg \cdot t^{-1}$ for PM_{10} and
- 0.00043 $kg \cdot t^{-1}$ for $PM_{2.5}$

have been adopted.

Emissions from the glass processing activities have been assumed to be captured by the dust extraction system, filtered and exhausted via the two baghouses at the Project site. Adopted parameters in modelling are presented in Table D2.

Table D2 Adopted baghouse emission parameters particulate emissions

Parameter	Baghouse 1	Baghouse 2
Easting	322 351	322 390
Northing	6 247 550	6 247 593
Airflow($m^3 \cdot s^{-1}$)	11.1	11.1
Diameter (m)	2.52	2.52
Velocity ($m \cdot s^{-1}$)	2.22	2.22
Temperature (K)	293	293
Height (m)	9	9
Area (m^2)	5	5

A summary of the controlled particulate emissions calculated for annual operations (as $kg \cdot yr^{-1}$) and for peak day activities (as $kg \cdot day^{-1}$) are presented overleaf.

Table D3 Annual particulate emissions – Project

		Emission rate							Controlled emission (kg.yr-1)		
Description	Emission Factor	TSP	PM10	PM2.5	Units	Activity Rate	Units	Emission Controls	TSP	PM10	PM2.5
MRF unloading project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	100,100	t	indoor 70%	2.657	1.257	0.190
MRF loading project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	100,100	t	indoor 70%	2.657	1.257	0.190
MRF screening project	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	100,100	t	indoor 70%	375.375	129.129	9.039
Step 1 - Glass manually loaded into hopper project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	100,100	t	indoor 70%	2.657	1.257	0.190
Step 2 - Double Roll Crusher project	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	100,100	t	Baghouse 99.5%	1.351	0.601	0.108
Step 3 – Fines Screen to bunker project	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	100,100	t	Baghouse 99.5%	6.256	2.152	0.151
Step 4 – Zigzag Separator project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	100,100	t	Baghouse 99.5%	0.751	0.275	0.077
Step 5 - Sorting Stage 1 project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	100,100	t	Baghouse 99.5%	0.751	0.275	0.077
Step 6 - Sorting Stage 2 (Redwave CS) project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	100,100	t	Baghouse 99.5%	0.751	0.275	0.077
Step 7 - Sorting Stage 3 & 4 project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	100,100	t	Baghouse 99.5%	0.751	0.275	0.077
Bunker loading 1 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Bunker loading 2 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Bunker loading 3 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Bunker loading 4 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Bunker loading 5 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Bunker loading 6 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	16,683	t	3 sided bunker 75%	0.369	0.175	0.026
Step 8 - Sale: Portable conveyors or by a loader vehicle project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	100,100	t	wind shielding - roof and side wall (conveyors) 70%	2.657	1.257	0.190
MRF in project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	8,045	VKT	5 km/hr	389.0	74.7	18.1
MRF out 1 project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	901	VKT	5 km/hr	43.6	8.4	2.0
MRF out 2 project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	901	VKT	5 km/hr	43.6	8.4	2.0
								TOTAL	**874.9**	**230.4**	**32.6**

Table D4 Annual particulate emissions – Approved development

Description	Emission Factor	Emission rate						Emission Controls	Controlled emission (kg.yr-1)		
		TSP	PM10	PM2.5	Units	Activity Rate	Units		TSP	PM10	PM2.5
MRF unloading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	69,900	t	indoor 70%	1.855	0.877	0.133
MRF loading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	69,900	t	indoor 70%	1.855	0.877	0.133
MRF screening current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	69,900	t	indoor 70%	262.125	90.171	6.312
Disposal of non-recyclable waste current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	6,990	t	indoor 70%	0.186	0.088	0.013
Consolidation of Recyclables (exc. Glass) current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	44,736	t	indoor 70%	1.187	0.562	0.085
Recyclables Transportation off-site North: loading	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	22,368	t	1	-	-	-
Recyclables Transportation off-site South: loading	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	22,368	t	1	-	-	-
Step 1 - Glass manually loaded into hopper current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	18,174	t	indoor 70%	0.482	0.228	0.035
Step 2 - Double Roll Crusher current	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	18,174	t	Baghouse 99.5%	0.245	0.109	0.020
Step 3 – Fines Screen to bunker current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	18,174	t	Baghouse 99.5%	1.136	0.391	0.027
Step 4 – Zigzag Separator current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	18,174	t	Baghouse 99.5%	0.136	0.050	0.014
Step 5 - Sorting Stage 1 current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	18,174	t	Baghouse 99.5%	0.136	0.050	0.014
Step 6 - Sorting Stage 2 (Redwave CS) current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	18,174	t	Baghouse 99.5%	0.136	0.050	0.014
Step 7 - Sorting Stage 3 & 4 current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	18,174	t	Baghouse 99.5%	0.136	0.050	0.014
Bunker loading 1 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Bunker loading 2 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Bunker loading 3 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Bunker loading 4 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Bunker loading 5 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Bunker loading 6 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	3,029	t	3 sided bunker 75%	0.067	0.032	0.005
Step 8 - Sale: Portable conveyors or by a loader vehicle current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	18,174	t	wind shielding - roof and side wall (conveyors) 70%	0.482	0.228	0.035
PCR unloading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	30,000	t	indoor 70%	0.796	0.377	0.057
PCR sorting / handling current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	30,000	t	indoor 70%	112.500	38.700	2.709
MRF in current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	6,242	VKT	5 km/hr	301.8	57.9	14.0
MRF out 1 current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	624	VKT	5 km/hr	30.2	5.8	1.4
MRF out 2 current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	624	VKT	5 km/hr	30.2	5.8	1.4
PCR in	AP-42 Paved roads - Section 13.2.1	4.4E-02	8.5E-03	2.1E-03	kg·VKT-1	5,059	VKT	5 km/hr	168.6	32.4	7.8
PCR out	AP-42 Paved roads - Section 13.2.1	1.4E-01	2.8E-02	6.7E-03	kg·VKT-1	767	VKT	5 km/hr	82.8	15.9	3.8
								TOTAL	**997.3**	**250.8**	**38.1**

Table D5 Peak daily particulate emissions – Project

Description	Emission Factor	Emission rate						Emission Controls	Controlled emissions (kg.day-1)		
		TSP	PM10	PM2.5	Units	Activity Rate	Units		TSP	PM10	PM2.5
MRF unloading project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	500	t	indoor 70%	0.013	0.006	0.001
MRF loading project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	500	t	indoor 70%	0.013	0.006	0.001
MRF screening project	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	500	t	indoor 70%	1.877	0.646	0.045
Step 1 - Glass manually loaded into hopper project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	500	t	indoor 70%	0.013	0.006	0.001
Step 2 - Double Roll Crusher project	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	500	t	Baghouse 99.5%	0.007	0.003	0.001
Step 3 – Fines Screen to bunker project	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	500	t	Baghouse 99.5%	0.031	0.011	0.001
Step 4 – Zigzag Separator project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	500	t	Baghouse 99.5%	0.004	0.001	0.000
Step 5 - Sorting Stage 1 project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	500	t	Baghouse 99.5%	0.004	0.001	0.000
Step 6 - Sorting Stage 2 (Redwave CS) project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	500	t	Baghouse 99.5%	0.004	0.001	0.000
Step 7 - Sorting Stage 3 & 4 project	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	500	t	Baghouse 99.5%	0.004	0.001	0.000
Bunker loading 1 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Bunker loading 2 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Bunker loading 3 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Bunker loading 4 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Bunker loading 5 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Bunker loading 6 project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	83	t	3 sided bunker 75%	0.002	0.001	0.000
Step 8 - Sale: Portable conveyors or by a loader vehicle project	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	500	t	wind shielding - roof and side wall (conveyors) 70%	0.013	0.006	0.001
MRF in project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	40	VKT	5 km/hr	1.9	0.4	0.1
MRF out 1 project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	5	VKT	5 km/hr	0.2	0.0	0.0
MRF out 2 project	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	5	VKT	5 km/hr	0.2	0.0	0.0
								TOTAL	**4.4**	**1.2**	**0.2**

Table D6 Peak daily particulate emissions – Approved development

Description	Emission Factor	Emission rate						Emission Controls	Controlled emissions (kg.day-1)		
		TSP	PM10	PM2.5	Units	Activity Rate	Units		TSP	PM10	PM2.5
MRF unloading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	349	t	indoor 70%	0.009	0.004	0.001
MRF loading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	349	t	indoor 70%	0.009	0.004	0.001
MRF screening current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	349	t	indoor 70%	1.310	0.451	0.032
Disposal of non-recyclable waste current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	35	t	indoor 70%	0.001	0.000	0.000
Consolidation of Recyclables (exc. Glass) current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	224	t	indoor 70%	0.006	0.003	0.000
Recyclables Transportation off-site North: loading	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	112	t	1	-	-	-
Recyclables Transportation off-site South: loading	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	112	t	1	-	-	-
Step 1 - Glass manually loaded into hopper current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	91	t	indoor 70%	0.002	0.001	0.000
Step 2 - Double Roll Crusher current	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	91	t	Baghouse 99.5%	0.001	0.001	0.000
Step 3 – Fines Screen to bunker current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	91	t	Baghouse 99.5%	0.006	0.002	0.000
Step 4 – Zigzag Separator current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	91	t	Baghouse 99.5%	0.001	0.000	0.000
Step 5 - Sorting Stage 1 current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	91	t	Baghouse 99.5%	0.001	0.000	0.000
Step 6 - Sorting Stage 2 (Redwave CS) current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	91	t	Baghouse 99.5%	0.001	0.000	0.000
Step 7 - Sorting Stage 3 & 4 current	AP-42 - Conveyor transfer point - Table 11.19.2.1	1.5E-03	5.5E-04	1.5E-04	kg·t-1	91	t	Baghouse 99.5%	0.001	0.000	0.000
Bunker loading 1 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Bunker loading 2 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Bunker loading 3 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Bunker loading 4 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Bunker loading 5 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Bunker loading 6 current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	15	t	3 sided bunker 75%	0.000	0.000	0.000
Step 8 - Sale: Portable conveyors or by a loader vehicle current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	91	t	wind shielding - roof and side wall (conveyors) 70%	0.002	0.001	0.000
PCR unloading current	AP-42 - Batch drop - Section 13.2.4.3	8.8E-05	4.2E-05	6.3E-06	kg·t-1	150	t	indoor 70%	0.004	0.002	0.000
PCR sorting / handling current	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	150	t	indoor 70%	0.562	0.193	0.014
MRF in current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	31	VKT	5 km/hr	1.5	0.3	0.1
MRF out 1 current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	3	VKT	5 km/hr	0.2	0.0	0.0
MRF out 2 current	AP-42 Paved roads - Section 13.2.1	6.4E-02	1.2E-02	3.0E-03	kg·VKT-1	3	VKT	5 km/hr	0.2	0.0	0.0
PCR in	AP-42 Paved roads - Section 13.2.1	4.4E-02	8.5E-03	2.1E-03	kg·VKT-1	25	VKT	5 km/hr	0.8	0.2	0.0
PCR out	AP-42 Paved roads - Section 13.2.1	1.4E-01	2.8E-02	6.7E-03	kg·VKT-1	4	VKT	5 km/hr	0.4	0.1	0.0
								TOTAL	**5.0**	**1.3**	**0.2**