AIR QUALITY VERIFICATION REPORT

DOWNER SUSTAINABLE ROAD RESOURCE CENTRE

Element Environment Pty Ltd

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Prepared by
Todoroski Air Sciences Pty Ltd
Suite 2B, 14 Glen Street
Eastwood, NSW 2122
Phone: (02) 9874 2123
Fax: (02) 9874 2125
Email: info@airsciences.com.au

Air Quality Verification Report

Downer Sustainable Road Resource Centre

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1 INTRODUCTION

Todoroski Air Sciences has prepared this report for the Downer Sustainable Road Resource Centre at Rosehill, New South Wales (NSW) (hereafter referred to as the Project).

This Air Quality Verification Report (AQVR) addresses the requirements of Condition B10 of State Significant Development Consent SSD-10459 and E3 Proof of Performance Monitoring – Air Emissions of Environment Protection Licence (EPL) 21611.

The report has been prepared with considerations of the NSW Environment Protection Authority (EPA) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2017**).

1.1 Project background

The Project involves the combined operation of an asphalt plant, reclaimed asphalt pavement (RAP) processing operation, bitumen products plant and road waste sweepings recycling facility (Reconomy) at Devon Street, Rosehill. The area surrounding the Project site is predominantly comprised of industrial and commercial operations with the nearest residential dwelling identified to be approximately 0.8 kilometres (km) to the southeast.

Todoroski Air Sciences has previously prepared the Air Quality Impact and Greenhouse Gas Assessment (AQIA) (**Todoroski Air Sciences, 2020a**), Response to Submissions (air quality) (RtS) (**Todoroski Air Sciences, 2020b**) and the DRAFT Air Quality Management Plan (AQMP) for the Project (**Todoroski Air Sciences, 2021**).

Development Consent SSD-10459 for the Project was granted on 31 January 2021.

The Reconomy plant commenced operations at the site in April 2022, the Asphalt plant operations commenced in May 2022 and the operation of the RAP facility commenced in July 2022. The bitumen emulsion plant had not commenced at the time of the site inspection (September 2022).

1.2 Statutory requirements

The conditions in SSD-10459 relevant to the AQVR is presented in **Table 1-1**.

Table 1-1: Relevant conditions in SSD-10459

SSD-10459	AQVR Section
Air Quality Verification – DSRRC	
B10. An Air Quality Verification Report (AQVR) must be submitted to the EPA and Planning Secretary within three (3) months of the commencement of operation of the DSRRC. The AQVR must:	This report
(a) be undertaken in accordance with the *Approved Methods for Modelling and Assessment of Air Pollutants in NSW*;	This report
(b) demonstrate that all reasonable and feasible mitigation measures have been incorporated into the development;	2
(c) reference manufacturer's specifications and/or performance guarantees for the asphalt plant;	2.1
(d) demonstrate compliance with the prescribed concentrations contained in the *Protection of the Environment Operations (Clean Air) Regulation 2010*;	3.4.1
(e) outline management actions to be taken to address circumstances where the concentrations specified in part d) have been exceeded; and	N/A
(f) describe the contingency measures and the timing of their implementation in the event the management actions are not effective in reducing the air emissions to an acceptable level.	3.5

The conditions in EPL 21611 relevant to the AQVR is presented in **Table 1-2**.

Table 1-2: Relevant conditions in EPL 21611

<table>
<tr><th>EPL 21611</th><th>AQVR Section</th></tr>
<tr><td>Proof of Performance Monitoring – Air Emissions</td><td></td></tr>
<tr><td>E3.1 The licensee must engage a suitably qualified person to undertake post-commissioning air emissions sampling to verify the emission performance of Licence Discharge Point 1.</td><td>3</td></tr>
<tr><td>E3.2 The post-commissioning sampling must occur within three (3) months of the commencement of all operations at the premises.</td><td>3</td></tr>
<tr><td>E3.3 Sampling must be performed for all pollutants and parameters listed in the table below, using the methods listed in column 3. All sampling and analysis must be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.

<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Sampling Method</th></tr>
<tr><td>Temperature</td><td>degrees Celsius</td><td>TM-2</td></tr>
<tr><td>Volumetric flow rate</td><td>Cubic metres per second</td><td>TM-2</td></tr>
<tr><td>Oxygen</td><td>Percent</td><td>TM-25</td></tr>
<tr><td>Moisture</td><td>Percent</td><td>TM-22</td></tr>
<tr><td>Solid Particles (Total)</td><td>Milligrams per cubic metre</td><td>TM-15</td></tr>
<tr><td>Volatile organic compounds</td><td>Milligrams per cubic metre</td><td>TM-34</td></tr>
<tr><td>Oxides of Nitrogen, as NO2 equivalent</td><td>Milligrams per cubic metre</td><td>TM-11</td></tr>
<tr><td>Type 1 and Type 2 substances (in aggregate)</td><td>Milligrams per cubic metre</td><td>TM-12. TM-13, TM-14</td></tr>
</table>
</td><td>3.2</td></tr>
<tr><td>E3.4 A minimum of two rounds of sampling must be undertaken for each pollutant contained in the above table to provide a suitable characterisation of the emissions during normal operations. The two rounds of sampling must not occur on the same day.</td><td>3</td></tr>
<tr><td>E3.5 Sampling must be conducted when plant/ process conditions are representative of normal operations.</td><td>3.3</td></tr>
<tr><td>E3.6 An air emissions verification report (the Report) must be prepared and must contain, as a minimum, the following information:
a) A description of the process operating conditions at the time of sampling, including, but not limited to:
i. a description of the process (e.g. processing rates, materials produced, products used, activities);
ii. the process flow diagram showing all inputs and outputs; and
iii. a description of all air pollution control systems.
Note: Supporting evidence must be included which confirms that the plan/ process was operating under normal, representative conditions at the time of sampling.</td><td>3.3</td></tr>
<tr><td>b) A detailed description of the sampling location. Engineering drawings, schematics or photographs should be included to support the description.</td><td>3.1</td></tr>
<tr><td>c) All information required to be reported under Section 4 of the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.</td><td>3</td></tr>
<tr><td>d) A comparison of measured emissions with prescribed concentrations contained in the Protection of the Environment Operations (Clean Air) Regulation 2021 (the Clean Air Regulation).</td><td>3.4.1</td></tr>
<tr><td>e) Where the comparison in E1.6(d) identified measured emissions greater than the Clean Air Regulation, mitigation measures to achieve compliance with the Clean Air Regulation must be identified with a timeline for implementation.</td><td>N/A</td></tr>
<tr><td>f) A comparison of measured emissions with the emissions adopted in the Air Quality Impact Assessment submitted for project approval.</td><td>3.4.2</td></tr>
<tr><td>g) Where the comparison in E1.6(f) identifies measured emissions greater than the emission adopted in the Air Quality Impact Assessment, a revised Air Quality Impact Assessment must be undertaken in accordance with the Approved Methods for Modelling and Assessment of Air Pollutants in NSW.</td><td>3.4.2</td></tr>
<tr><td>h) Where a revised Air Quality Impact Assessment required under E1.6(g) identifies exceedances of the EPA's impact assessment criteria, mitigation measures must be nominated with a timeline for implementation.</td><td>N/A</td></tr>
<tr><td>E3.7 The Report must be submitted to the EPA within three (3) months following commencement of operations at the premises. The Report can be incorporated into the Air Quality Verification Report (AQVR) required under Condition B10 of the planning consent (SSD-10459).
Note: The EPA may utilise the information contained in the report submitted to include additional conditions in this EPL. This includes, but is not limited to, emission limits and ongoing monitoring requirements.</td><td>This report</td></tr>
</table>

2 REVIEW OF AIR QUALITY MANAGEMENT

The site was inspected on 7 September 2022 to verify the air quality controls implemented at the Project.

Table 2-1 presents a checklist of the air quality control and management measures as specified in the AQMP and verified during the site walkthrough or via correspondence. Overall, the Project is fulfilling its commitments per the AQMP to install and operate equipment in line with best practice and apply all reasonable and feasible mitigation measures.

It was advised during the site inspection that no air quality incidents have been reported for the Project and that the Project has not received any air quality complaints since the operations commenced.

The Project design and operational air quality management system appear to be adequate to minimise dust and odour emissions from the site.

Table 2-1: AQMP control measure and management checklist

Activity	Control measures and management practice	Implemented	Comment
General	Training is provided to all site personnel on appropriate air quality control practices and the requirements per this plan.	✓	It was advised that air quality training is included in regular toolbox talks. It was noted that team training, which includes environmental training, for the operations team was scheduled for Saturday 10 September during a plant shut down.
	The weather forecast is checked daily, and appropriate management measures are implemented prior to adverse weather to minimise particulate emissions from the site.	✓	It was advised that the forecast is typically checked twice daily.
	If adverse weather conditions occur during operations, activities are assessed and modified as required. Cease activity where reasonable levels of dust cannot be maintained using available means.	✓	It was advised that since the commencement of operations, weather conditions have been reasonably wet and the controls/plant design have been sufficient to maintain reasonable dust levels.
	Visual monitoring of activities is undertaken to identify dust generation.	✓	It was advised that since the commencement of operations, there have been no issues of visible dust. Downer operates an online reporting system where any observations of significant visible dust will be logged. No excessive visible dust observed during site inspection.
	The site maintains an Environmental Complaints Register, which includes an odour complaint logbook.	✓	No air quality related complaints had been received at the time of the inspection.
	In the event of an odour complaint, an immediate investigation of any odour sources is undertaken, together with appropriate actions to eliminate any identified excessive odour.	✓	The complaints protocol as outlined in the AQMP will be followed in the event of an air quality related complaint.
Plant, equipment and vehicles	Where possible, all mobile non-road diesel equipment operated at the DSRRC site achieve a particulate matter emission performance commensurate with US EPA Tier 4 particulate emission standards.	✓	It was advised that all new equipment purchased meets US EPA Tier 4 particulate emission standards.
	Engines of on-site vehicles and plant are switched off when not in use.	✓	No vehicles were observed idling while not in use during the site inspection.
	Vehicles and plant are fitted with pollution reduction devices where practicable.	✓	As all new equipment purchased meets US EPA Tier 4 particulate emission standards, this is considered suitable.

Activity	Control measures and management practice	Implemented	Comment
	Vehicles are maintained and serviced according to manufacturer's specifications.	✓	It was advised that the facility has a dedicated service team for the maintenance of equipment and plant including mobile equipment.
Material handling	Drop heights from loading and handling equipment are reduced where practical.	✓	Drop heights for fixed and mobile equipment were observed to be minimised as reasonably practicable.
	Excessively dusty materials are dampened during handling.	✓	No excessive dust was observed during site inspection. Water is available should material be found to be dusty.
Exposed areas/ stockpiles	The extent of exposed surfaces and stockpiles is kept to a minimum.	✓	Materials observed to be stockpiled in the designated areas.
	Exposed areas and stockpiles are either covered or are dampened with water as far as is practicable if dust emissions are visible, or there is potential for dust emissions outside operating hours.	✓	No excessive visible dust observed during the site inspection. The Reconomy and processed RAP bunkers/bays are covered. Sprinkler systems observed around the unprocessed RAP stockpile area.
Hauling/ vehicle movements	On-site speed limits are enforced.	✓	10km/hr speed limit is signposted.
	Vehicle traffic is restricted to designated routes.	✓	Traffic routes are clearly defined.
	Driveways and hardstand areas are swept/cleaned regularly as required. A sweeper is regularly deployed to the operational site to sweep/clean internal roads periodically to prevent any tracking of fine debris.	✓	It was advised that at present a street sweeper is contracted to come to the site three times a week, however Downer is investigating options to purchase its own street sweeper which can then be used daily.
	Spills onto trafficked areas are cleaned as soon as possible.	✓	The site has a portable vacuum unit that can be used to clean up spills.
	Delivery schedules are coordinated to avoid a queue of the incoming or outgoing trucks for extended periods of time.	✓	Delivery schedule appears to have been adequately managed during site inspection. No excessive queuing observed.
	Vehicle loads are covered when travelling off-site.	✓	Truckloads of asphalt were observed to be covered in a timely manner prior to leaving the site.
	Co-locating the asphalt plant, bitumen products plant, RAP storage and processing facility and Reconomy plant act to minimise the distance heavy vehicles need to travel.	✓	The site layout appears to be well designed to minimise vehicle travel distances.
	The diesel tank for refuelling trucks and mobile plant is positioned at the front of the site thereby allowing any vehicle entering the site to fill up with fuel without travelling any further than necessary.	✓	The site layout appears to be well designed to minimise vehicle travel distances.
	The main light vehicle and visitor parking area is at the site entrance, allowing the majority of light vehicles visiting the site to enter and exit without travelling around the full perimeter of the site, reducing light vehicle travel distance and reducing exhaust emissions.	✓	The site layout appears to be well designed to minimise vehicle travel distances.
RAP	The RAP stockpiling area and access road is a sealed asphaltic concrete surface.	✓	All trafficable and processing areas appear to be sealed surfaces.
	A dedicated access road is established through the centre of the RAP stockpile area.	✓	Dedicated access road through the centre of RAP stockpile area is limited to relevant mobile equipment/vehicles.

Activity	Control measures and management practice	Implemented	Comment
			Higher silt loading observed on road surfaces in the RAP area as expected.
	Dedicated truck tipping areas are established in the RAP stockpile areas and will be kept free from RAP material.	✓	Trucks were observed unloading at the dedicated tipping area during the inspection.
	The unprocessed RAP material is dampened using a sprinkler system when visible dust is evident from the stockpiles or during handling of the RAP material.	✓	Sprinkler systems observed around the unprocessed RAP stockpile area.
	The unprocessed RAP stockpiles are restricted to the designated stockpile areas and not be allowed to encroach onto the truck access road through the centre of the stockpile area. This central unprocessed RAP stockpile area access road must be swept on a regular basis to remove spilt RAP material.	✓	Unprocessed RAP was observed to be stockpiled in the designated areas. A street sweeper is contracted to come to the site three times a week. Downer is investigating options to purchase its own street sweeper which can then be used daily.
	The volume of unprocessed RAP is regularly monitored and receival of unprocessed RAP stopped when the stockpile area reaches capacity to prevent RAP being stockpiled outside the designated stockpile area.	✓	It was advised that all volumes of unprocessed RAP coming into the site are recorded. Unprocessed RAP was observed to be stockpiled in the designated areas.
	RAP processing occurs within a shed structure. Maintenance access roller doors on the RAP processing shed remain closed at all times during RAP processing.	✓	Roller doors were observed to be closed during the site inspection.
	The granulating and separating/screening process is positioned against the clad western wall of the RAP processing shed, as far (25m) from the partly open eastern side of the RAP processing shed as possible.	✓	Granulating and screening equipment positioned away from partly open side of shed.
	The granulating process is fully enclosed inside a housing that contains hard wearing impact curtains.	✓	Granulating process was observed to be enclosed.
	The processing plant uses covered conveyors to transport materials. All conveyors include roll top type belt covers.	✓	Conveyors were observed to be covered.
	A spray mist is applied to newly crushed RAP just prior to release from the transfer conveyor into the finished product bunkers.	✓	Evidence of misting sprays was observed.
	Processed RAP is stored in concrete product bunkers.	✓	The processed RAP storage bunkers/bays are covered.
	The volume of processed RAP in the finished product bunkers is regularly monitored and processing stopped when the bunkers reach capacity to prevent RAP spilling out of the bunkers and RAP processing shed.	✓	It was advised that all volumes of processed RAP are recorded.
	The RAP processing plant receiving hopper/feeder is positioned at the southern end of the RAP processing shed, immediately adjacent to (as close as possible to) the unprocessed RAP stockpiles, minimising the distance required for the front-end loader to travel when loading unprocessed RAP into the RAP processing plant.	✓	The site layout appears to be well designed to minimise vehicle travel distances.
	The processed RAP storage bunkers are positioned immediately adjacent to (as close as possible to) the asphalt plants processed RAP cold feeders, minimising the distance required for the front-end loader to travel when loading processed RAP into the asphalt plant.	✓	The site layout appears to be well designed to minimise vehicle travel distances.

Activity	Control measures and management practice	Implemented	Comment
	All dust controls built into the design of the RAP processing facility (e.g. roll top type belt covers on conveyors and spray misters at discharge points of the radial transfer conveyors) are maintained to operate as per manufacturers specifications.	✓	It was advised that the facility has a dedicated service team for the maintenance of equipment and plant.
Asphalt plant	Air emissions generated from the asphalt mixing and drying are dispersed via a 40-metre high dryer stack. The air emissions are passed through a dust filter prior to discharge in the stack.	✓	It was advised that the stack height is approximately 42m tall. Air passes through a baghouse dust filter prior to discharge.
	The asphalt loadout area is partially enclosed and equipped with a bitumen vapour evacuation system to capture any fugitive emissions associated with the loadout process.	✓	Fumes appear to be adequately managed during asphalt loadout with vapour evacuation system operating.
	An encapsulated skip is used to reduce air emissions during the mixing prior to the loadout phase.		Mixing is enclosed.
	Aggregates are tipped into an underground receival hopper to minimise emissions.	✓	No visible dust observed during truck unloading to underground hopper.
	Aggregates are transported from the underground hopper to storage silos via a covered conveyor system.	✓	Conveyors were observed to be covered.
	Aggregates are transported from the silos to the asphalt plant via a covered conveyor system.	✓	Conveyors were observed to be covered.
	Ensure all emission controls built into the design of the asphalt plant (e.g. the stack exhaust controls and the bitumen vapour evacuation system at the loadout area) are maintained to operate as per manufacturers specifications.	✓	It was advised that the facility has a dedicated service team for the maintenance of equipment and plant.
	Clean up any aggregates that spill onto the road surface at the underground aggregate loading hopper (immediately after the spill) to prevent them being tracked onto the internal and external roads.	✓	No spills observed during site inspection. The site has a portable vacuum unit that can be used to clean up spills.
	The asphalt plant is positioned at the front of the site to minimise the overall travel distance on-site and associated asphalt truck exhaust emissions, as asphalt trucks make up the largest component of the total number of operational heavy vehicle movements to and from the site.	✓	The site layout appears to be well designed to minimise vehicle travel distances.
Bitumen emulsion plant	Bitumen is stored in individual storage silos and pumped to the asphalt plant in a closed system when required.	✓	Bitumen pumped to asphalt plant via enclosed system.
	Feedstock bitumen is supplied to the storage silos from tankers via a suction process with excess air within the storage silos vented from a breather pipe at the top and passed through a carbon filter prior to discharge to air.	✓	No filling of the bitumen storage tanks from tankers was observed during the site inspection. The housing for the carbon filter was sighted.
	Ingredients for the bitumen emulsion are pumped into sealed emulsion tanks and stored at a lower temperature compared to bitumen of approximately 80°C, which minimises air emissions.	N/A	The bitumen emulsions plant had not commenced operations at the time of the site inspection. Note that bitumen is currently imported to the site.
	Ensure all emission controls built into the design of the bitumen plant (e.g. the carbon filter on bitumen storage tanks) are maintained to operate as per manufacturers specifications.	✓	It was advised that facility has a dedicated service team for the maintenance of equipment and plant.
Reconomy plant	Organic material recovered from road sweepings in the Reconomy plant is removed from site on a regular basis to reduce the level of decomposition and associated odour.	✓	It was advised that the material from the organics bunker/bay is removed every 1 to 2 days.

Activity	Control measures and management practice	Implemented	Comment
	Recovered materials are stored in bunkers/bays.	✓	The recovered materials storage bunkers/bays are covered. It is also noted that the raw materials storage bunkers/bays and Reconomy processing equipment are covered.
	Materials storage bunkers/bays are positioned immediately adjacent to (as close as possible to) the asphalt plant, minimising the distance required for the front-end loader to travel when transferring materials to and from the storage bunkers to the asphalt plant.	✓	The site layout appears to be well designed to minimise vehicle travel distances.

2.1 Review of manufacturers specifications

Manufacturers specifications have been reviewed for the Ammann Universal HRT Stationary asphalt plant installed on the site.

The RAH100 system is utilised and operated on natural gas.

Figure 2-1 presents specifications for the plant.

Universal HRT 320/450 t/h

Plant type*	320 / 450			320 / 450	
Recycling system	RAH parallel drum system (parallel flow)			RAH100 system (counter flow)	
Max. recycling addition	60 %			80 %	
Number of recycling feeders	As desired				
Content recycling feeders	8 m³, 10 m³ or 13 m³				
Type recycling drying drum	RT 25110	RT 25140	RT 29120	RT 2790/170	
Diameter / length	2,5 m / 11 m	2,5 m / 14 m	2,9 m / 12 m	2,7 m / 9 m (Total 17 m)	
Drum drive	4 × 18,5 kW	4 × 22 kW	4 × 30 kW	4 × 22 kW	
Max. recycling capacity at 3 % moisture	150 t/h	180 t/h	240 t/h	180 t/h	
Max. recycling capacity at 5 % moisture	125 t/h	150 t/h	200 t/h	150 t/h	
Burner power output	9,7 MW	12 MW	13,9 MW	12 MW	
Fuels	Natural gas, fuel oil extra light, heavy oil, brown-coal dust, wood dust				
Filter capacity	77000 Nm³/h			106000 Nm³/h (Twinfilter)	
Filter surface	1,179 m²			1,622 m²	
Max. temperature increase	115 °C			155 °C	
Buffer silo recycling (RAH)	20 t or 35 t				
Recycling scale	RAH buffer silo with 5 t weigh scale or differential weighing system of the RAH buffer silo				

New mineral system	Combinable with both recycling systems above				
Number of cold feeders	As desired				
Content cold feeders	7,5 m³, 10 m³, 12 m³ or 15 m³				
Type drying drum	T 2590	T 25100	T 25110	T 27100	T 27110
Diameter / length	2,5 m / 9 m	2,5 m / 10 m	2,5 m / 11 m	2,7 m / 10 m	2,7 m / 11 m
Drum drive	4 × 15 kW	4 × 18,5 kW	4 × 22 kW	4 × 18,5 kW	4 × 22 kW
Max. drying capacity at 3 % moisture	270 t/h			320 t/h	
Max. drying capacity at 5 % moisture	225 t/h			275 t/h	
Burner power output	20 MW	20 MW	20 MW	24 MW	24 MW
Fuels	Natural gas, fuel oil extra light, heavy oil, brown-coal dust, wood dust				
Type screen	APS 6.2				
Screening	5- or 6-fraction				
Screen surface	56 m²				
Hot aggregate silo	120 t or 200 t, 1-row or 2-row				
Aggregate scale	4500 kg				
Filler scale	900 kg				
Bitumen scale	520 kg				
Mixer size	5 t or 6 t				
Maximum mixing capacity	400 t/h or 450 t/h				
Cold recycling addition at 3 % moisture	Up to 25 % RAC addition directly into the mixer				
Cold recycling scale	Weigh belt 1,5 t per batch				
Cold recycling silo	2 t				
Hot mix storage silo/compartments	400 t in 4 compartments Available expansions: 600 t in 6 compartments , 800 t in 8 compartments or 1000 t in 10 compartments				
Binding agent supply	E-Bit, horizontal or vertical configurations, 60 m³, 80 m³, 100 m³, also divided tanks available. Option: hot oil heated tanks				
Filler supply	According to customer's wishes: reclaimed and imported filler silos or filler towers in different desired configurations				

*Hot mix production capacity based on following conditions: 10 % bitumen and filler addition, input moisture of aggregates 3 %, aggregate temperature increase 175 K and 0/2 fraction share max. 40 % | Mixing cycles 80 per hour.

Figure 2-1: Manufacturers specifications - Ammann Universal HRT Stationary asphalt plant

3 PERFORMANCE MONITORING

Post-commission sampling of the asphalt plant exhaust stack (referred to as Licence Discharge Point 1 in EPL 21611) was undertaken per the requirements of Condition E3 of EPL 21611.

Sampling and analysis were conducted by Assured Environmental and analysis was conducted by Envirolab Services. Assured Environmental and Envriolab Services are NATA accredited organisations.

Per the requirements of Condition E3.4 of EPL 21611 two rounds of sampling were conducted. These occurred on 2/08/2022 and 19/10/2022.

The emissions monitoring reports, (**Assured Environmental, 2022a & 2022b**), have been prepared in general accordance with the *Approved Methods for the Sampling and Analysis of Pollutants in NSW* .

Note that while EPL 21611 was issued in May 2022, it appears that Condition E3.6(c) *All information required to be reported under Section 4 of the Approved Methods for the Sampling and Analysis of Pollutants in NSW*, is referring to the EPA document published in January 2007 (where Section 4 refers to analytical report requirements), and not the revised version published in January 2022 (where Section 4 refers to modifying test methods or using alternative test methods).

Table 3-1 evaluates the Assured Environmental emissions monitoring report against the analytical report requirements per the Approved Methods for the Sampling and Analysis of Pollutants in NSW (**2007**).

Table 3-1: Analytical report requirements for stationary source monitoring

Stationary source monitoring	Implemented	Comment
Name and address of reporting organisation or individual	✓	
Date of issue of the report	✓	
Date, time and place of measurements	✓	
Identification of source tested	✓	
The test method used and details of any deviation from that method	✓	
Details of source or process operating conditions during sampling and a statement about the representativeness of the sample taken	✓	
Location of sampling plane, with respect to the nearest upstream and downstream flow disturbances	✓	
Number of sampling points	✓	
Period of sampling (start and end times)	✓	
Average stack gas velocity in metres per second	✓	
Average stack gas temperature in kelvins	✓	Temperature expressed in degrees Celsius per condition E3.3 of EPL 21611.
Contaminant molecular weight or density in kilograms per cubic metre	✓	
Water content of stack gas, expressed as a percentage by volume	✓	
Stack gas volumetric flow rate on a dry basis under standard conditions, in cubic metres per second	✓	Volumetric flow rate expressed in cubic metres per minute.
Concentration of contaminant on a dry basis under standard conditions, in grams per cubic metre	✓	Concentrations expressed in mg/m^3 per condition E3.3 of EPL 21611.
Mass emission rate of contaminant on a dry basis under standard conditions, in grams per second	✓	
Details of sample preservation, if applicable	N/A	

Stationary source monitoring	Implemented	Comment
Any factors that may have affected the monitoring results	✓	
The precision of the results (using AS 2706 as a guide)	✓	
Details of the most recent calibration of each instrument used to take measurements	✓	Analyser calibration performed in laboratory prior to conducting field work and post field work in the Assured Environmental lab.

3.1 Sampling location

Table 3-2 presents the coordinates for the asphalt plant exhaust stack and **Figure 3-1** presents a photo of the sampling location. **Figure 3-2** presents the general plant PID flow diagram. Further details of the sampling location can be found in the monitoring reports (**Assured Environmental, 2022a & 2022b**).

It was noted by Assured Environment that the sample location is not compliant as per AS4323.1. Although the sampling plane is ideally located, the sampling ports are not very accessible as they are not close to the platform and due to the plant structure and an additional piece of duct work running along the edge of the stack. The temperature and velocity survey showed that the sample position complied to items (a) to (f) as per AS4323.1. Overall, while the accessibility of the sampling ports may make the sampling more challenging to undertake, the results of the sampling are valid.

Table 3-2: Source location (UTM 56 S)

Source	Eastings	Northings
Asphalt plant exhaust stack	318377.86	6255055.46

Figure 3-1: Sampling location (Source: Assured Environmental, 2022)

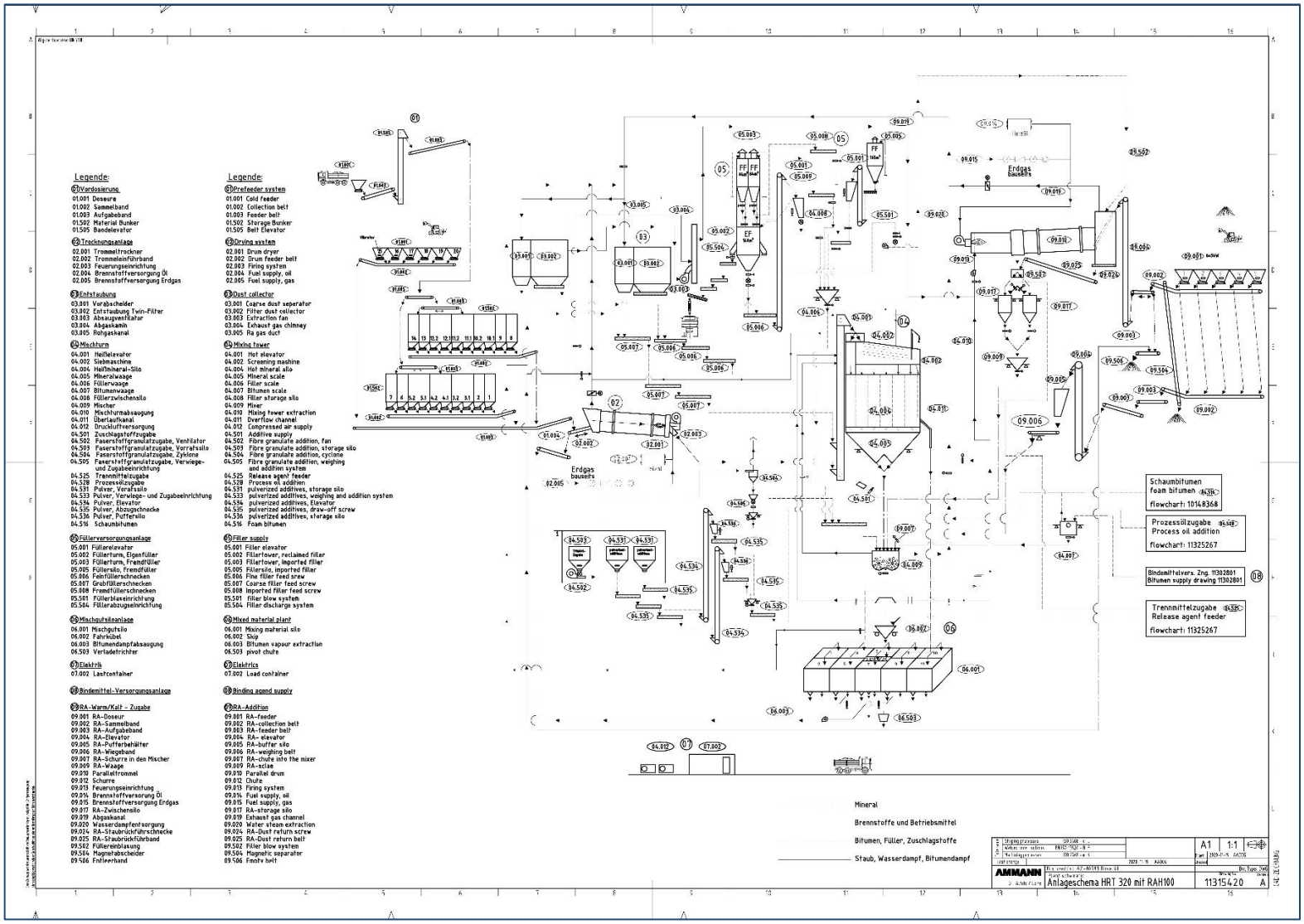


Figure 3-2: Plant PID flow (Source: Assured Environmental, 2022)

3.2 Sampling methods

Under Condition E3.3 of EPL 21611, the Project is required to monitor the following air quality pollutants and parameters set out in **Table 3-3** below, following the specified sampling method and units of measure. Results are summarised in **Table 3-5**.

Table 3-3: Sampling methodologies required under EPL 21611 Condition E3.3

Pollutant	Units of measure	Sampling method	Implemented
Temperature	Degrees Celsius	TM-2	✓
Volumetric flow rate	Cubic metres per second	TM-2	✓*
Oxygen	Percent	TM-25	✓
Moisture	Percent	TM-22	✓
Solid Particles (Total)	Milligrams per cubic metre	TM-15	✓
Volatile organic compounds	Milligrams per cubic metre	TM-34	✓
Oxides of Nitrogen, as NO_2 equivalent	Milligrams per cubic metre	TM-11	✓
Type 1 and Type 2 substances (in aggregate)	Milligrams per cubic metre	TM-12, TM-13, TM-14	✓

*Volumetric flow rate expressed in cubic metres per minute

Source: **Assured Environmental, 2022a & 2022b**

3.3 Sampling conditions

Table 3-4 summarises the production details during the sampling periods, while **Figure 3-3** presents a screenshot of the plant operational data flowchart for 2/8/2022. Downer have confirmed that these conditions are representative of typical operations.

Table 3-4: Production details during sampling

Item	2/08/2022	19/10/2022
Plant capacity	320 tonnes/hour	320 tonnes/hour
Production rate	250 tonnes/hour	180 tonnes/hour
Process mix	AC28	AC14HD
Aggregate	28mm	14mm
Mix code	428.8	230.02
Mix standard temperature	170°C to 175°C	170°C to 175°C
RAP	50%	no

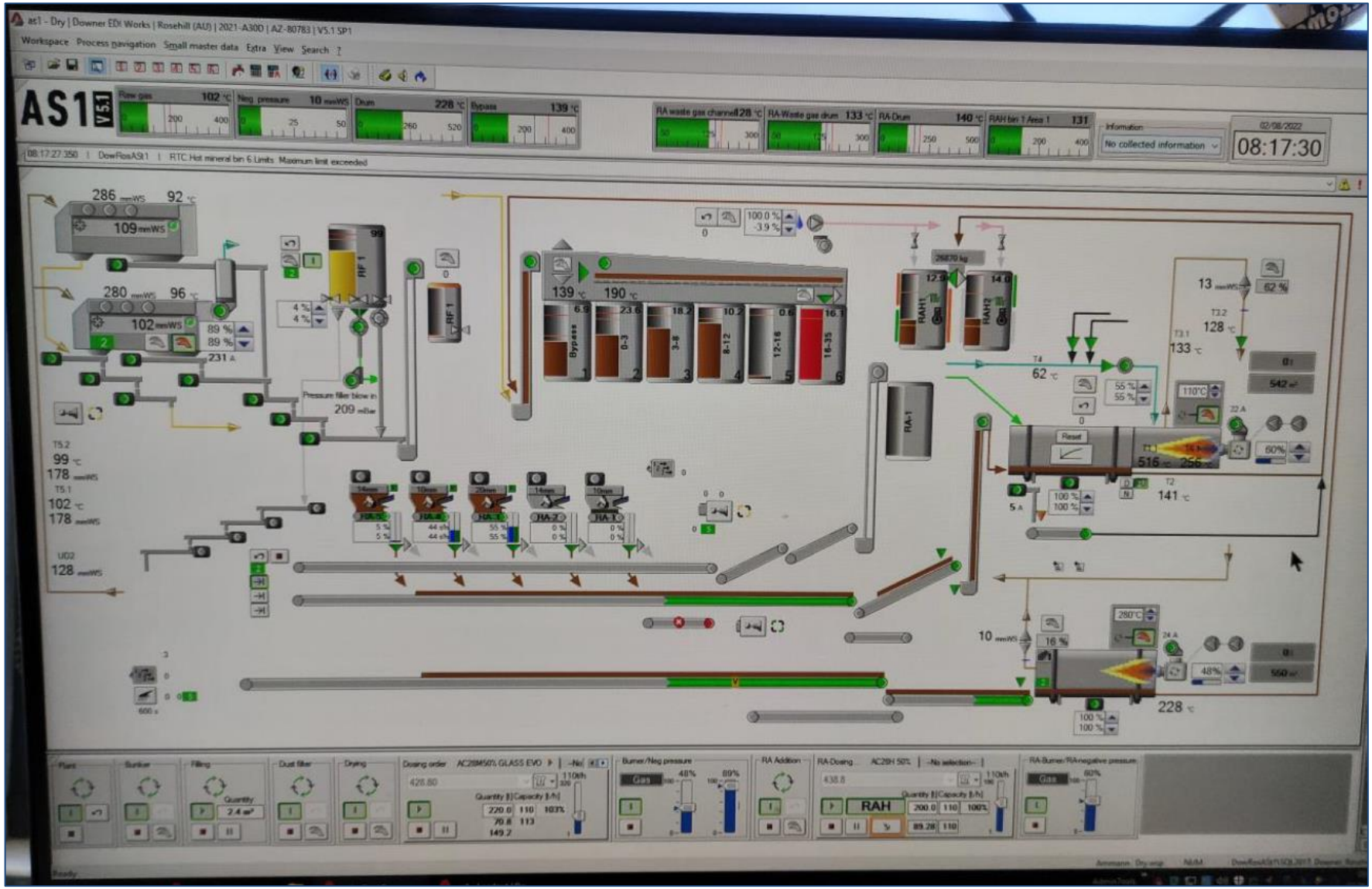


Figure 3-3: Operation details – 2/08/2022 (Source: Assured Environmental, 2022)

3.4 Results

Table 3-5 summarises the sampling results presented in the emissions monitoring reports.

Table 3-5: Summary of stack testing results

Release Point Parameter	Unit of Measure	Stack Result	Stack Result
Date of testing	dd-mm-yy	2/08/2022	19/10/2022
Average stack temperature	°C	91.6	81
Absolute stack pressure	mbar	1,014	1,014
Average stack gas water vapour content	% v/v	17.2	20.3
Average carbon dioxide content	% v/v	3.29	4.55
Average oxygen content	% v/v	15.6	13.3
Dry gas molecular weight	g/g-mole	29.2	29.3
Exhaust Velocity	m/sec	13.5	8.77
Actual stack volume flow	m^3/min	1,205	782
Wet Standard Stack Flow Rate	Nm^3/min-wet	903	604
Dry standard stack flow rate	Nm^3/min	748	481
Total solid particulates (TSP)	mg/Nm^3	2.02	3.00
TSP emission rate	g/min	1.51	1.45
Sulphur dioxide (SO_2)	mg/Nm^3	< 2.86	< 2.86
SO_2 emission rate	g/min	< 2.14	< 1.38
Nitrogen Oxides (NOx as NO_2)	mg/Nm^3	50.8	62.9
Nitrogen Oxides (NOx as NO_2) emission rate	g/min	38	30.3
TVOC (as propane)	mg/Nm^3	1.05	2.51
TVOC (as propane) emission rate	g/min	0.8	1.21
Total Heavy metals Type 1	µg/Nm^3	< 11.8	< 24.8
Total Heavy metals Type 2	µg/Nm^3	< 20.1	< 49.1

3.4.1 Comparison with POEO standards of concentration

Table 3-6 presents the applicable standards of concentration for non-scheduled activity as per the *Protection of the Environment Operations (Clean Air) Regulation 2010* (POEO) alongside the modelled (refer to the AQIA) and measured asphalt stack concentration. The comparison shows that the measured asphalt plant concentrations comply with the applicable standards and, therefore, management actions under Condition B10(e) are not required.

Table 3-6: Comparison of applicable POEO standards of concentration (mg/Nm^3)

Pollutant	Standard of concentration for non-schedule activity – Group C	Modelled asphalt plant exhaust	Measured asphalt plant exhaust	
			2/08/2022	19/10/2022
Solid particles	100	7.3	2.02	3.00

3.4.2 Comparison with predicted emissions

Table 3-7 presents a comparison of the measured emissions from the asphalt stack compared with the emissions adopted in the AQIA.

Table 3-7: Comparison of emission rates for the Project (g/s)

Pollutant	Modelled emission rate	Measured emission rate	
		2/08/2022	19/10/2022
PM_{10}	0.072	0.025 (as TSP)	0.019 (as TSP)
NO_X	0.26	0.633	0.505
Arsenic	9.59E-06	3.96E-05	3.58E-05
Beryllium	1.92E-06	2.98E-06	2.69E-06
Cadmium	3.84E-06	1.47E-05	6.34E-06
Lead	2.96E-05	4.20E-05	1.14E-04
Manganese	9.59E-05	6.31E-06	3.17E-05
Mercury	6.45E-08	1.09E-05	7.04E-06
Nickel	1.31E-04	3.85E-05	6.59E-05
Benzene	0.010	0.004	0.003
Toluene	0.0017	0.0026	0.0012
Xylene	0.0035	0.0020	0.0020

A number of pollutant emission rates measured during the post-commissioning sampling were found to be higher than those presented in the AQIA (which were estimated using emission factors from the National Pollutant Inventory Emission Estimation Technique Manuals).

Table 3-8 and **Table 3-9** present the estimated predicted impacts based on the measured emission rate for all pollutants which were measured to be above the modelled level. The pollutant impacts were scaled based on the ratio of the measured emission rates to the modelled emission rates. The data indicate that all pollutants would be still well below the relevant criteria based on the measured levels.

Table 3-8: Predicted maximum NO_2 impact at the worst affected receptor (µg/m³)

Pollutant	Averaging period	Incremental impact	Receptor ID	Background	Total impact	Criteria
2/08/2022						
NO_2	1 hour	16.1	InW2	131.2	147.3	246
	Annual	0.5	InN2	22.6	23.1	62
19/10/2022						
NO_2	1 hour	12.8	InW2	131.2	144.0	246
	Annual	0.4	InN2	22.6	23.0	62

Table 3-9: Predicted maximum pollutant impact at the boundary (µg/m³)

Pollutant	Averaging period	Incremental impact - 2/08/2022	Incremental impact - 19/10/2022	Criteria
Arsenic	1 hour	0.0008	0.0007	0.09
Beryllium	1 hour	0.00008	0.00007	0.004
Cadmium	1 hour	0.0003	0.0001	0.018
Lead	Annual	0.00003	0.00008	0.5
Mercury	1 hour	0.00027	0.00017	0.18
Toluene	1 hour	0.06	N/A	360

N/A - The measured toluene emission rate on 19/10/2022 was lower than the rate modelled in the AQIA.

3.5 Contingency plan

No contingency measures are required under Condition B10(f) as a result of this verification report as the criteria summarised in **Sections 3.4.1** and **3.4.2** have not been exceeded. Notwithstanding, the AQMP contains the following contingency plan should exceedances be detected in the future.

Per the AQMP, where air quality performance indicators are not met, such as if monitoring indicates a non-compliance with the applicable POEO standards of concentrations, Downer will implement the following contingency plan to manage any unpredicted impacts and their consequences to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible:

- Report the non-compliance or incident if required;
- Investigate and identify the cause of the non-compliance or incident;
- Consider options to manage the identified impacts; and
- Implement the appropriate course of action to ensure that the exceedance/incident ceases and does not reoccur to the satisfaction of the Planning Secretary.

4 SUMMARY AND CONCLUSIONS

This Air Quality Verification Report (AQVR) for the Downer Sustainable Road Resource Centre at Rosehill was prepared to address the requirements of Condition B10 of State Significant Development Consent SSD-10459 and E3 Proof of Performance Monitoring – Air Emissions of Environment Protection Licence (EPL) 21611.

Post-commission sampling of the asphalt plant exhaust stack and a site inspection to verify the air quality controls implemented at the Project were undertaken.

While some pollutants measured during the post-commission sampling of the asphalt plant exhaust stack were higher than those estimated in the AQIA, all impacts from the Project were well below the relevant impact assessment criteria.

No excessive visible dust or odour from the Project were observed during the site inspection and the Project has not received any air quality related complaints since the commencement of operations.

The current management practices implemented at the Project per the AQMP are generally in line with best practice and appear to operate well to ensure that the potential for air quality impacts is minimised.

5 REFERENCES

Assured Environmental (2022a)

"Source Emissions Monitoring – Downer Rosehill - 14324", on behalf of Downer Group by Assured Environmental, November 2022.

Assured Environmental (2022b)

"Source Emissions Monitoring – Downer Rosehill - 14624", on behalf of Downer Group by Assured Environmental, November 2022.

NSW Environment Protection Authority (2017)

"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales", January 2017.

Todoroski Air Sciences (2020a)

"Air Quality Impact and Greenhouse Gas assessment – Central Sydney Industrial Estate Incorporating Downer Sustainable Road Resource Centre", prepared for Element Environment on behalf of VE Property Pty Ltd and Downer Edi Works Pty Ltd by Todoroski Air Sciences, September 2020.

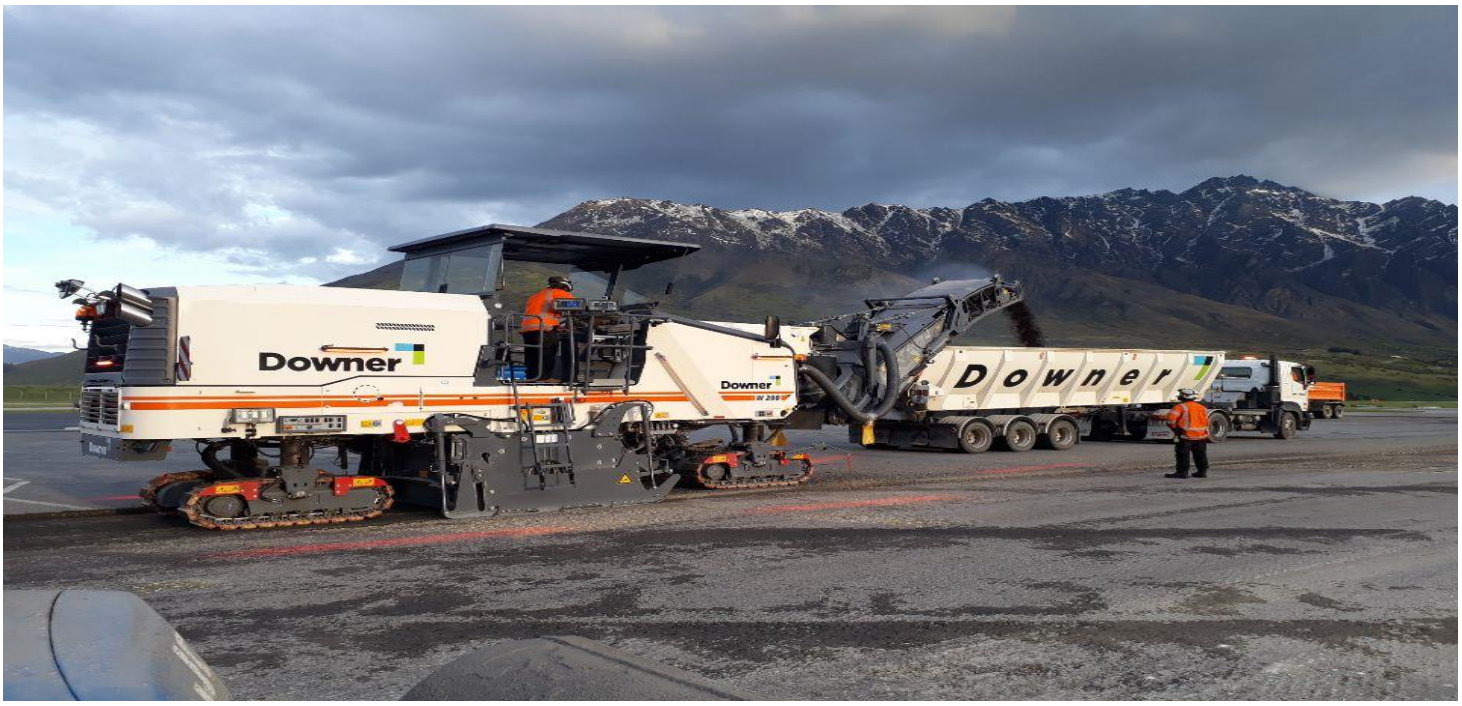
Todoroski Air Sciences (2020b)

"Response to Submissions – Central Sydney Industrial Estate Incorporating Downer Sustainable Road Resource Centre", prepared for Element Environment by Todoroski Air Sciences, November 2020.

Todoroski Air Sciences (2021)

"DRAFT Air Quality Management Plan – Downer Sustainable Road Resource Centre", prepared for Element Environment by Todoroski Air Sciences, August 2021.

Appendix A – *Asphalt plant exhaust stack emissions monitoring report – 2/08/2022*



Assured Environmental

SOURCE EMISSIONS MONITORING – DOWNER ROSEHILL

DOWNER ASPHALT NSW

Project ID. 14324

R_2.1

DATE OF RELEASE: 10/11/2022

Unit 7, 142 Tennyson Memorial Avenue, Tennyson, Queensland 4105
Unit 17, 538 Gardeners Road, Alexandria, NSW 2015

ABN: 87 604 851 078

Table 1: Document approval

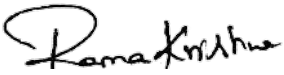
	Name	Position Title	Signature	Date
Author	Rama Tirnaty	Team Leader		19/09/2022
Reviewer	David Arbuckle	General Manager		10/11/2022
Approved	David Arbuckle	General Manager		10/11/2022

Table 2: Revision register

Revision	Date	Issuer	Recipient/s	Comment
D_0	29/08/2022	David Arbuckle	Colin Biggs	Draft results
R_0	15/09/2022	David Arbuckle	Colin Biggs	Updated report with all results
R_1	26/09/2022	David Arbuckle	Colin Biggs	Removed O2 ref. from results
R_2	10/11/2022	David Arbuckle	Colin Biggs	Updates as request by TAS
R_2.1	10/11/2022	David Arbuckle	Colin Biggs	Removed operational data not relevant to tests reported

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ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025 – TESTING

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Accreditation ID: 19703

NATA
WORLD RECOGNISED ACCREDITATION
NATA ID: 19703

1 EXECUTIVE SUMMARY

Assured Environmental (AE) conducted source emissions monitoring from the Downer Asphalt plant located at Rosehill, NSW on the 2nd of August 2022. A summary of results is presented below, for further details please refer to the body of this report.

Table 3: Summary of results

Release Point Parameter	Unit of Measure		Stack Result
Date of testing	dd-mm-yy		2/08/2022
Average stack temperature	°C		91.6
Absolute stack pressure	mbar		1,014
Average stack gas water vapour content	% v/v		17.2
Average carbon dioxide content	% v/v		3.29
Average oxygen content	% v/v		15.6
Dry gas molecular weight	g/g-mole		29.2
Exhaust Velocity	m/sec		13.5
Actual stack volume flow	m^3/min		1,205
Wet Standard Stack Flow Rate	Nm^3/min-wet		903
Dry standard stack flow rate	Nm^3/min		748
Total solid particulates (TSP)	mg/Nm^3		2.02
TSP emission rate	g/min		1.51
Nitrogen Oxides (NOx as NO_2)	mg/Nm^3		50.8
Nitrogen Oxides (NOx as NO_2) emission rate	g/min		38.0
TVOC (as propane)	mg/Nm^3		1.05
TVOC (as propane) emission rate	g/min		0.800
Total Heavy metals Type 1	mg/Nm^3	<	0.0118
Total Heavy metals Type 2	mg/Nm^3	<	0.0201

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1 INTRODUCTION

Assured Environmental (AE) was appointed by Downer Asphalt NSW to sample and analyse source emissions from the Downer asphalt production plant in Rosehill, NSW. Sampling was conducted by AE on the 2nd of August 2022 during typical site operations.

Testing was conducted as part for project approval and EPL requirements. Downer were required to conduct two rounds of stack emissions testing (not on the same day) for the pollutants as listed in the table below.

It is understood that the sampling was to be completed and results provided to Todoroski Air Sciences (TAS) within 2 months' time (starting 10th May 2022) to allow sufficient time to prepare a verification report. This time frame was blown out significantly due to substantial wet weather events.

AE was responsible for the collection and analysis of samples, unless otherwise indicated. The samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the methodologies listed below in this report.

2 METHODOLGY & EQUIPMENT

2.1 Sampling methodology

All sampling and analysis were carried out in accordance with the listed requirements in Table 4. Any deviations to these methods have been documented where required.

Table 4: Test methods & accreditation

Parameter	Reference Test Method	NSW EPA TM	NATA accreditation	Analysis by	Limit
Sample location [A]	AS4323.1	TM-1	Yes	Assured Env	n/a
Temperature, Velocity & flow rate	USEPA Method 2	TM-2	Yes	Assured Env	n/a
Stack gas density	USEPA Method 3	TM-23	Yes	Assured Env	n/a
Oxygen [B]	USEPA Method 3A	TM-25	Yes	Assured Env	n/a
Carbon dioxide [B]	USEPA Method 3A	TM-24	Yes	Assured Env	n/a
Water vapour content	USEPA Method 4	TM-22	Yes	Assured Env	n/a
Oxides of nitrogen (as NO_2) [B]	USEPA Method 7E	TM-11	Yes	Assured Env	n/a
Solid Particles (Total)	AS4323.2	TM-15	Yes	Assured Env	n/a
Volatile organic compounds (VOCs)	USEPA Method 18	TM-34	Yes	ELS	n/a
Type 1 & Type 2 substances	USEPA Method 29	TM-12, 13 & 14	Yes	ELS	n/a

Table 5: Sampling notes

Note	Comment
A	Sample location is not compliant as per AS4323.1. Sampling ports were not close to the platform. The temperature and velocity survey showed that the sample position complied to items (a) to (f) as per AS4323.1.
B	Analyser calibration performed in the laboratory prior to conducting field work and post field work in AE lab.

Table 6: Analysis notes

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental	Sampling & analysis	19703	14324
2	Envirolab services	analysis	2901	302145-[R00]

2.2 Sample Location

The figures below show the site and sample location.

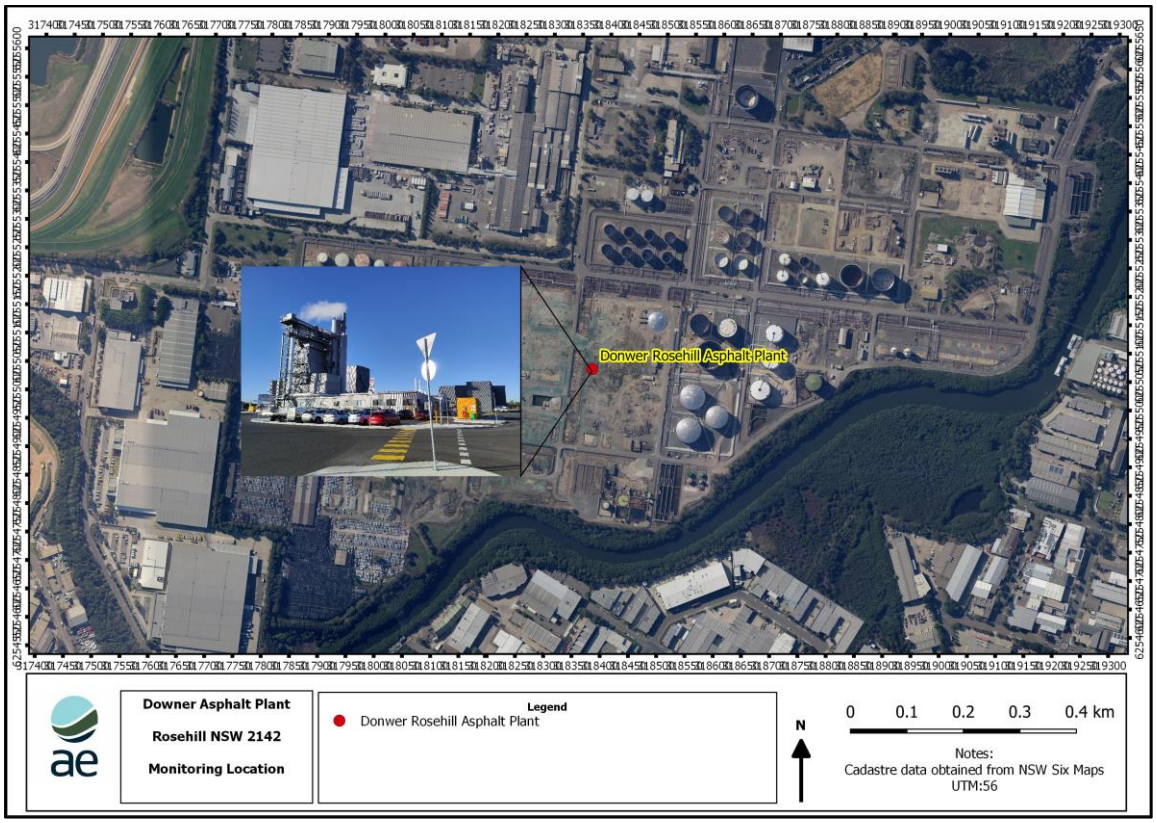


Figure 1: Downer Asphalt Rosehill site location

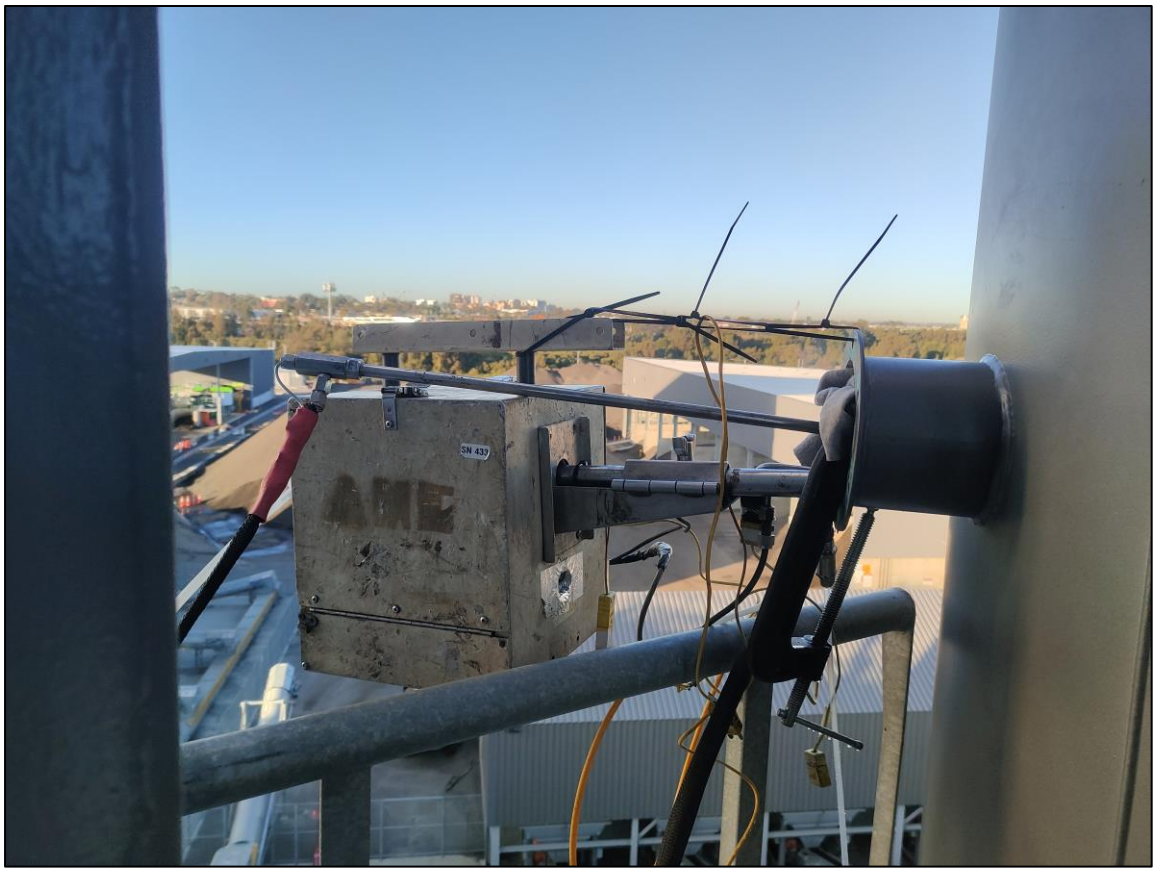


Figure 2: Downer Asphalt Rosehill sample location

Table 7: Sample location summary

AS4323.1	Sample location	Rosehill
	Description	Asphalt plant
	Stack coordinates	UTM 56s:
	Easting	318377.86 m E
	Southing	6255055.46 m S
	Stack Exit point from ground (m)	~40
	Stack Shape	CIRCULAR
	Ideal Sampling Plane Assessment	
	Stack Diameter (m)	1.38
	Stack Cross Section Area (m2)	1.49
	Distance to upstream disturbance (m) (from disturbance)	22.2
	Upstream Diameters (D)	16.2
	Distance to downstream disturbance (m) (from disturbance)	17.8
	Downstream diameters (D)	12.9
4.2.2 Table 1	Meets Requirements AS4323.1 Table 1	Yes
	Non-deal Sampling Plane Assessment	
	Assessment required?	Yes
	Total traverse point factors	1.00
	Non-conforming Sampling Plane Assessment	
4.2.2(a)	Gas flow in same direction	Yes
4.2.2(b)	Gas flow steady & evenly distributed (cyclonic or swirl <15°)	Yes
4.2.2(c)	Temperature difference between points <10%, and each point <10% of average	Yes
4.2.2(d)	Ratio of highest to lowest differential pressure & ratio highest to lowest velocity	1.67
		1.32
4.2.2(e)	Minimum differential pressure	9.00
	Gas temperature above dewpoint	Yes
	Samling Plane Type	
4.2.2, 4.2.3, 4.2.4	Samling plane type	Ideal [A]
	Alternative sampling plane available?	-
	Number of Sample Points Adopted	
	Port size (mm)	123
	Port Thread Type	Flange
	Number of traverses	1
	Number of points per traverse	4
	Total number of traverse points	4
	Flow & temperature compliance check	Yes

[A] Although the sampling plane was ideally located the sampling ports are not very accessible due to the plant structure and an additional piece of duct work running along the edge of the stack.

2.3 Test equipment

The sampling equipment was transported to site and specifically setup at the test location. Sampling was performed using one complete isokinetic sampling train with an out-of-stack heated filter.

All equipment used during the testing is sourced from Apex Instruments, an industry leader in the supply of source testing equipment.

Figure 3: Full isokinetic sampling assembly

Figure 4: Combustion gas analyser

Table 8: Combustion gas analyser specifications

Compound	Range	Lower Detection Limit	Linearity
O_2	1 to 25%	0.01%	+/- 0.8% selected range
CO_2	1 to 50%	0.01%	+/- 1.3% selected range
NO	1 to 3,000ppm	1 ppm	+/- 5% selected range
NO_2	1 to 500ppm	1 ppm	+/- 5% selected range
Lower Detection Limit	2X Noise at 60sec averaging		
Precision (% of point)	+/- 0.1%, measured with single gases at the span concentration		
Flow Rate	~ 1 litre per minute		
Accuracy	5% of span		
Span Drift	Less than 2% per week (operation time)		
Zero Noise	0.5 ppm RMS (60sec averaging time)		
Response Time	~40 seconds		

3 MEASUREMENT UNCERTAINTY

There is an inherent uncertainty associated with any scientific measurement, including stack emissions monitoring. The measurement uncertainty can be controlled with strict adherence to the reference methodology along with utilising appropriate calibration standards with corresponding acceptable uncertainty reports.

Many source sampling methods do not outline exact procedures for establishing direct measurement uncertainty. In the absence of a defined procedure, the uncertainty budgets presented are based on estimations using ISO-GUM method.

Each individual source and test may have a unique associated uncertainty, due largely to the stack sample location in relation to the positioning requirements of AS4323.1, stack temperature, water vapour content and sample analysis.

The table below outlines the estimated uncertainties associate with reports presented within this report.

Table 9: Sample specific uncertainty budgets

Parameter	Reference method	Uncertainty ± %	Coverage factor	Confidence coefficient %
Velocity	USEPA Method 2	6.6	2	95
Temperature	USEPA Method 2	3.0	2	95
Moisture content	USEPA Method 4	5.0	2	95
Oxygen	USEPA Method 3A	6.0	2	95
Particulate matter	AS 4323.2	20	2	95
Combustion gases	USEPA Method 7E	9.0	2	95
VOCs	USEPA Method 18	20	2	95

4 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

AE operates within a quality system based upon the requirements of ISO17025. Our quality system defines specific procedures and methodologies to ensure any project undertaken by AE is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

AE maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in section 2 of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same Microsoft Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures has been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 10: Sampling data QA/QC checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 11: Laboratory data QA/QC checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

5 DEFINITIONS

The following terms and abbreviations may be used in this report:

Table 12: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
°C	Degrees Celsius
CARB	California Air Resources Board methods
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
f/ml	Fibres per millilitre
g	Grams
kg	Kilograms
m	Metres
m^3	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10^{-3} grams)
min	Minute
ml	Millilitres
mmH_2O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
ng	Nanograms (10^{-9} grams)
NATO	North Atlantic Treaty Organisation
NIOSH	National institute for occupational safety and health (USA)
Nm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NMI	National Measurement Institute
NM VOC	Non methane volatile organic compound
NR	Not required on this occasion
OSHA	Occupational Safety and Health Act
ou	Odour unit
PCDD	Polychlorinated dibenzo-*p*-dioxin
PCDF	Polychlorinated dibenzofuran
PM	Particulate matter
ppb	Parts per billion
ppm	Parts per million
sec	Second
Sm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g., 15% O_2)
STP	Standard temperature and pressure (0°C and 101.3 kPa)
TO	USEPA air toxics method
TWA	Time weighted average
USEPA	United States Environmental Protection Authority

6 RESULTS

6.1 Sample run summary data

Table 13 present a summary of the isokinetic sampling and results.

Table 13: Sample results information

Source Data				Stack SDS version - 3.43
Client				Downer
Site				Bag house stack
Sample Point				Rosehill
Reference Method				USEPA M29 - ISOKINETIC
Test Parameters				PM & Metals
Process conditions				Normal
Historical Data & Hardware Information - Manual Sample				
Run Start Date		dd-mm-yyyy		2/08/2022
Project ID				14324
Run ID				-1
Run Start Time	Ti	hh:mm		7:30
Run Stop Time	Tf	hh:mm		8:42
Positioning compliance check with AS4323.1				Ideal
Flow & temperature compliance check with AS4323.1				Yes
Traverse pt factors; up, down, total & trav pts				1 , 1 , 1 , 4
Console Serial Number				SN474
Meter Calibration Factor	(Y)			1.043
Orifice Coefficient		(DH@)		42.47
Pitot Tube Coefficient	(Cp)			0.84
Actual Nozzle Diameter	(Dna)	mm		7.84
Stack Test Data				
Initial Meter Volume	(Vm)i	m3		3.1620
Final Meter Volume	(Vm)f	m3		4.9190
Actual Sampling Time	(Q)	minutes		72
Average Meter Temperature	(tm)avg	°C		10.05
Average Stack Temperature	(ts)avg	°C		91.58
Barometric Pressure	(Pb)	mb		1013
Stack Static Pressure	(Pstatic)	mm H2O		6.50
Absolute Stack Pressure	(Ps)	mb		1014
Sample Volumes				
Actual Meter Volume	(Vm)	m3		1.8326
Standard Meter Volume	(Vm)std	Nm3		1.7785
Moisture Content Data				
Water vapour concentration	(Bws(calc))	%		17.18
Stack Gas Density Analysis Data				
Carbon Dioxide Percentage	(%CO2)	%		3.29
Oxygen Percentage	(%O2)	%		15.6
Nitrogen Percentage	(%N2)	%		81.07
Dry Gas Molecular Weight	(Md)	kg/Nm3		1.30
Dry Gas Molecular Weight	(Md)	g/g-mole		29.15
Wet Stack Gas Molecular Weight	(Ms)	g/g-mole		27.24
Volumetric Flow Rate Data (at Sample Plane)				
Average Stack Gas Velocity	(vs)	m/sec		13.5
Stack Diameter	Ds	m		1.38
Stack Cross-Sectional Area	(As)	m2		1.49
Upstream distance (from disturbance)	B	m		22.2
Downstream distance (from disturbance)	A	m		17.8
Actual Stack Flow Rate	(Qaw)	m3/min		1,205
Wet Standard Stack Flow Rate	(Qsw)	Nm3/min-wet		903
Dry Standard Stack Flow Rate	(Qsd)	Nm3/min-dry		748
Percent of Isokinetic Rate	(I)	%		102
Particulate Matter (PM) Concentration				
Total Mass of Particulates	(mn)	g		0.00360
Stack PM Concentration	(cs)	mg/Nm3		2.02
Particulate Emission Rate	(E)	g/min		1.51
Average Oxides of Nitrogen (USEPA Method 7E - instrumental analyser)				
Nitrogen Oxides (NOx as NO2)	(Conc)	mg/Nm3		50.8
Nitrogen Oxides (NOx as NO2)	(E)	g/min		38.0
Heavy Metals (USEPA Method 29)	**NSW Type #**			
Antimony (Sb)	1	mg/Nm3	<	0.00318
Arsenic (As)	1	mg/Nm3	<	0.00318
Beryllium (Be)	2	mg/Nm3	<	0.000239
Cadmium (Cd)	1	mg/Nm3		0.00118
Chromium (Cr)	2	mg/Nm3		0.000900
Cobalt (Co)	2	mg/Nm3	<	0.000239
Lead (Pb)	1	mg/Nm3		0.00337
Manganese (Mn)	2	mg/Nm3		0.000506
Nickel (Ni)	2	mg/Nm3		0.00309
Selenium (Se)	2	mg/Nm3	<	0.00318
Tin (Sn)	2	mg/Nm3	<	0.00795
Vanadium (V)	2	mg/Nm3	<	0.00398
Mercury (Hg)	1	mg/Nm3		0.000872
Total Heavy metals Type 1		mg/Nm3	<	0.0118
Total Heavy metals Type 2		mg/Nm3	<	0.0201
OTHER ANALYTES (VOC's)				
TVOC (as propane)	(Conc)	mg/Nm3		1.05
TVOC (as propane) emission rate	(E)	g/min		0.800
Benzene	(Conc)	mg/Nm3		0.327
Benzene emission rate	(E)	g/min		0.250
Toluene	(Conc)	mg/Nm3		0.205
Toluene emission rate	(E)	g/min		0.156
Ethyl Benzene	(Conc)	mg/Nm3	<	0.051
Ethyl Benzene emission rate	(E)	g/min	<	0.039
m&p xylene	(Conc)	mg/Nm3	<	0.102
m&p xylene emission rate	(E)	g/min	<	0.078
o xylene	(Conc)	mg/Nm3		0.051
o xylene emission rate	(E)	g/min		0.039

6.2 Plant operational data

The table below summarises the plant operation data at the time of sampling. All process conditions were provided by the client to AE, no measurements were performed by AE.

Table 14: Production details

Item	2/8/2022
Plant Capacity	320 TPH
Production rate	250 TPH
Process Mix	AC28
Aggregate	28 mm
Mix code	428.8
Mix Standard temperature	170 dC to 175 dC
RAP	50%

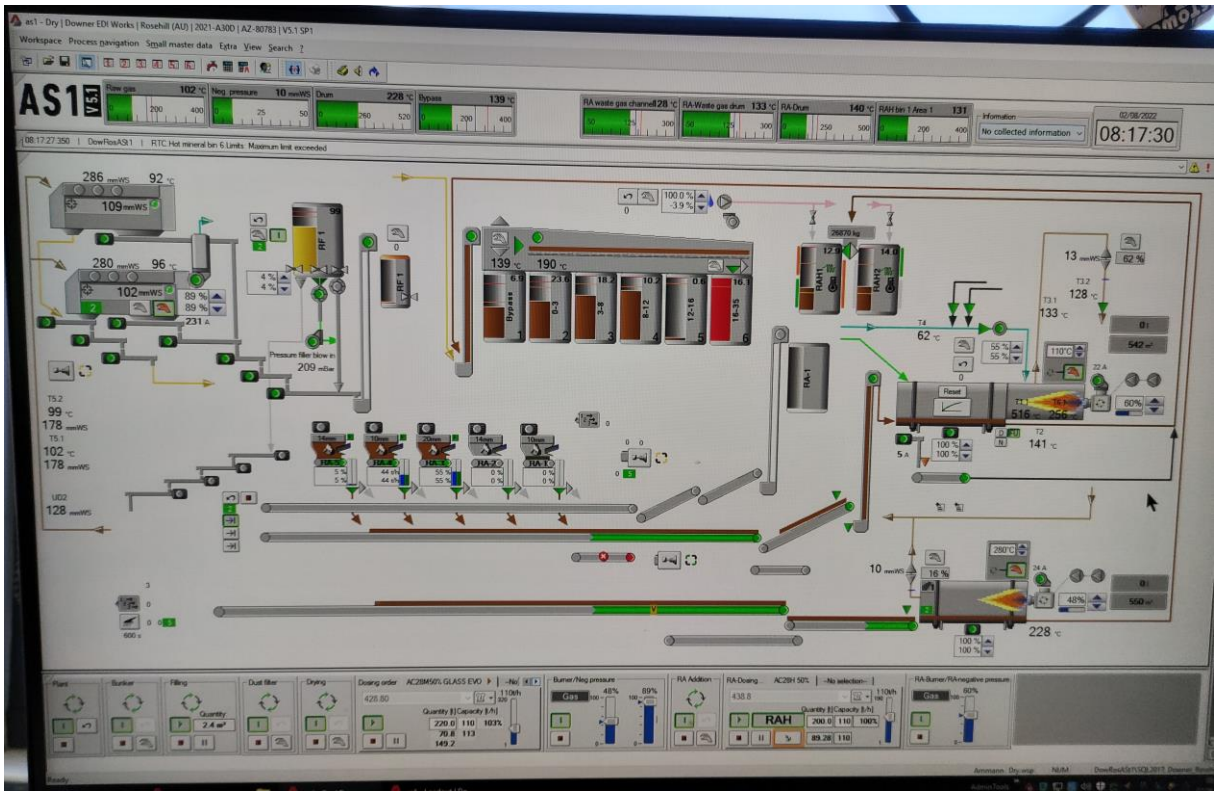


Figure 5: Operation details – 2/08/2022

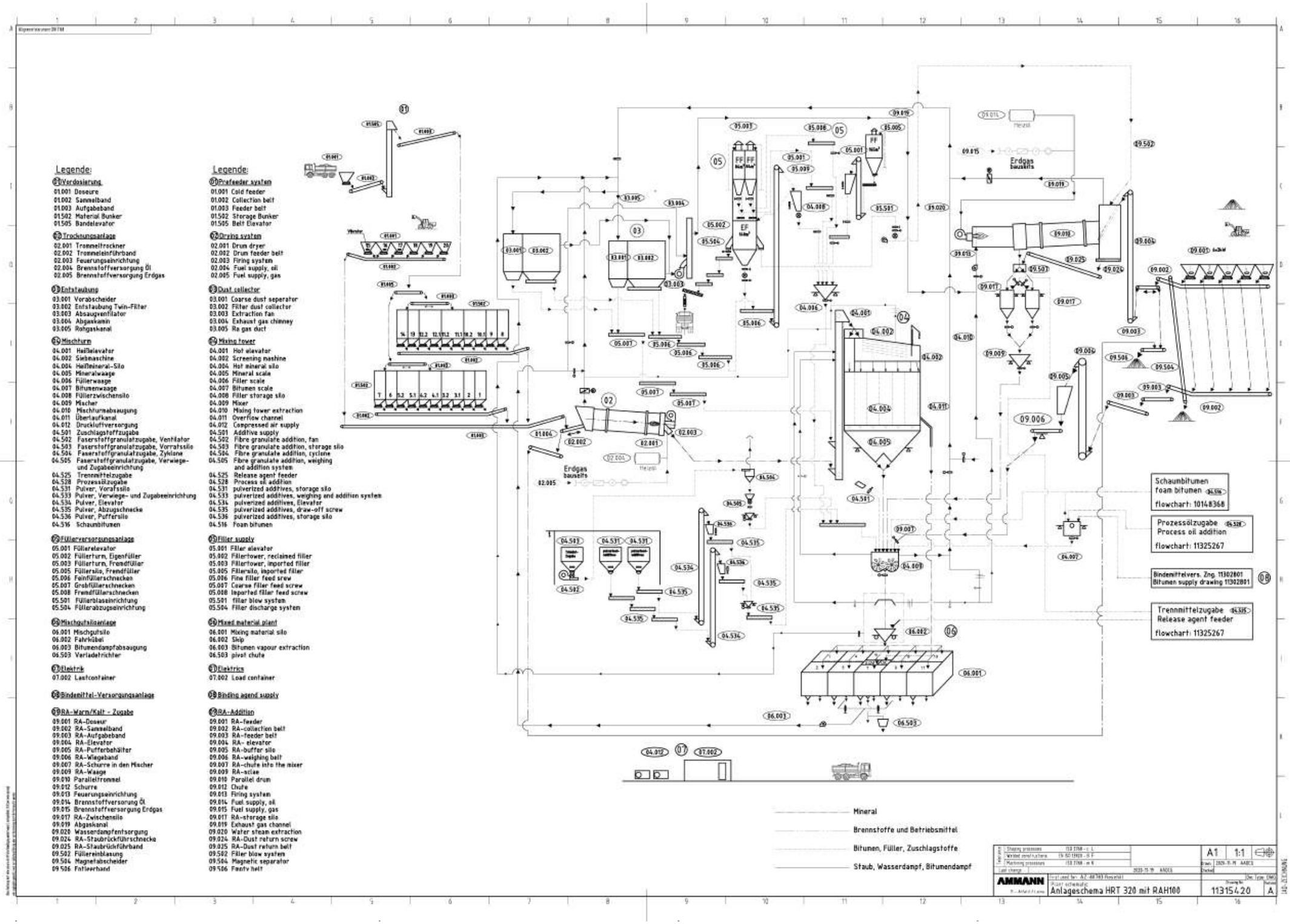
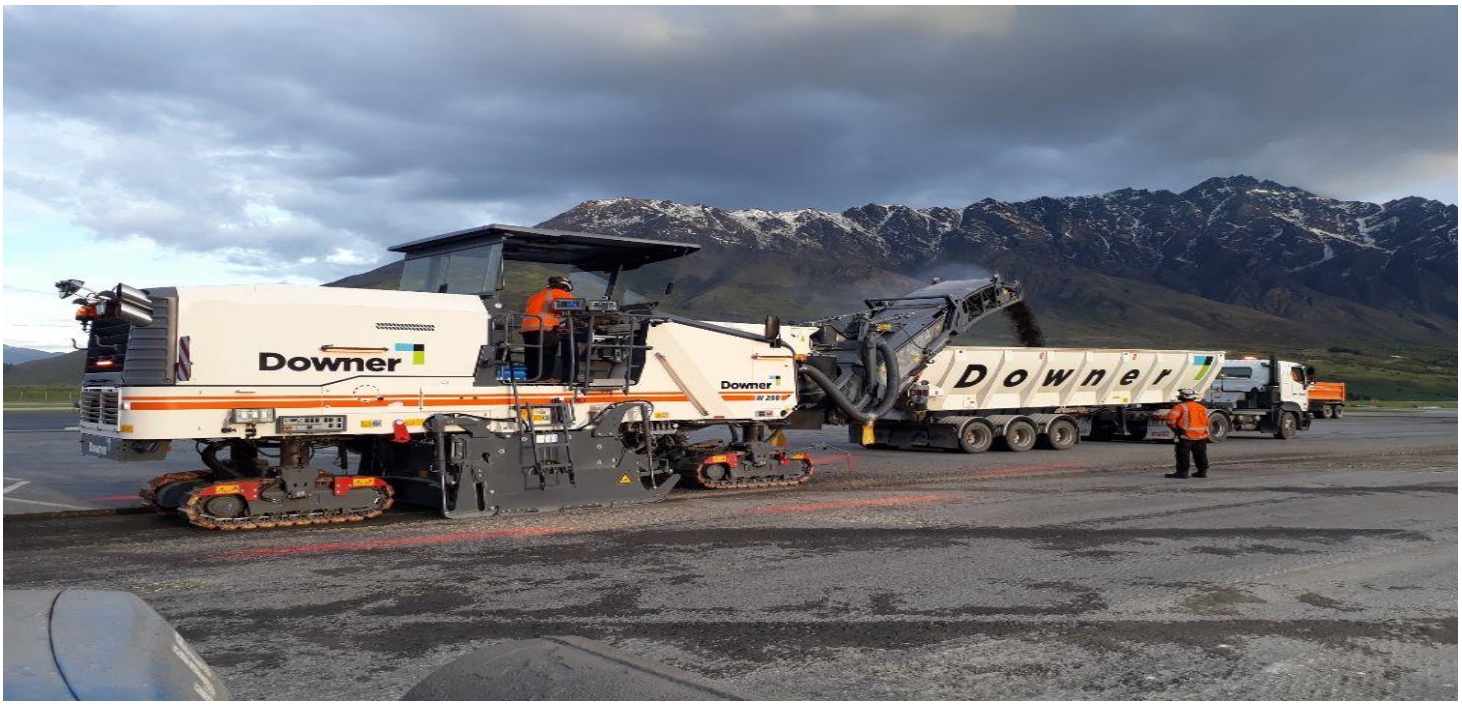


Figure 6: Plant PID flow

Appendix B– Asphalt plant exhaust stack emissions monitoring report – 19/10/2022



Assured Environmental

SOURCE EMISSIONS MONITORING – DOWNER ROSEHILL

DOWNER ASPHALT NSW

Project ID. 14624

R_1

DATE OF RELEASE: 10/11/2022

Unit 7, 142 Tennyson Memorial Avenue, Tennyson, Queensland 4105
Unit 17, 538 Gardeners Road, Alexandria, NSW 2015

ABN: 87 604 851 078

Table 1: Document approval

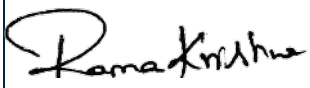
	Name	Position Title	Signature	Date
Author	Rama Tirnaty	Team Leader		7/11/2022
Reviewer	David Arbuckle	General Manager		10/11/2022
Approved	David Arbuckle	General Manager		10/11/2022

Table 2: Revision register

Revision	Date	Issuer	Recipient/s	Comment
R_0	7/11/2022	David Arbuckle	Colin Biggs	Initial Release
R_1	10/11/2022	David Arbuckle	Colin Biggs	Updates as request by TAS

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ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025 – TESTING

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Accreditation ID: 19703

NATA
WORLD RECOGNISED ACCREDITATION
NATA ID: 19703

EXECUTIVE SUMMARY

Assured Environmental (AE) conducted source emissions monitoring from the Downer Asphalt plant located at Rosehill, NSW on the 19th of October 2022. A summary of results is presented below, for further details please refer to the body of this report.

Table 3: Summary of results

Release Point Parameter	Unit of Measure		Stack Result
Date of testing	dd-mm-yy		19/10/2022
Average stack temperature	°C		81.0
Absolute stack pressure	mbar		1,014
Average stack gas water vapour content	% v/v		20.3
Average carbon dioxide content	% v/v		4.55
Average oxygen content	% v/v		13.3
Dry gas molecular weight	g/g-mole		29.3
Exhaust Velocity	m/sec		8.77
Actual stack volume flow	m^3/min		782
Wet Standard Stack Flow Rate	Nm^3/min-wet		604
Dry standard stack flow rate	Nm^3/min		481
Total solid particulates (TSP)	mg/Nm^3		3.00
TSP emission rate	g/min		1.45
Nitrogen Oxides (NOx as NO_2)	mg/Nm^3		62.9
Nitrogen Oxides (NOx as NO_2) emission rate	g/min		30.3
TVOC (as propane)	mg/Nm^3		2.51
TVOC (as propane) emission rate	g/min		1.21
Total Heavy metals Type 1	mg/Nm^3	<	0.0248
Total Heavy metals Type 2	mg/Nm^3	<	0.0491

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1 INTRODUCTION

Assured Environmental (AE) was appointed by Downer Asphalt, NSW to sample and analyse source emissions from the Downer asphalt production plant in Rosehill, NSW. Sampling was conducted by AE on the 19th of October 2022 during typical site operations.

Testing was conducted as part of an approvals process and EPL requirements. Downer were required to conduct two rounds of stack emissions testing (not on the same day) for the pollutants as listed in the table below.

It is understood that the sampling was to be completed and results provided to Todoroski Air Sciences (TAS) within 2 months' time (starting 10th May 2022) to allow sufficient time to prepare a verification report. This time frame was blown out significantly due to substantial wet weather events.

AE was responsible for the collection and analysis of samples, unless otherwise indicated. The samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the methodologies listed below in this report.

2 METHODOLGY & EQUIPMENT

2.1 Sampling methodology

All sampling and analysis were carried out in accordance with the listed requirements in Table 4. Any deviations to these methods have been documented where required.

Table 4: Test methods & accreditation

Parameter	Reference Test Method	NSW EPA TM	NATA accreditation	Analysis by	Limit
Sample location [A]	AS4323.1	TM-1	Yes	Assured Env	n/a
Temperature, Velocity & flow rate	USEPA Method 2	TM-2	Yes	Assured Env	n/a
Stack gas density	USEPA Method 3	TM-23	Yes	Assured Env	n/a
Oxygen	USEPA Method 3A	TM-25	Yes	Assured Env	n/a
Carbon dioxide [B]	USEPA Method 3A	TM-24	Yes	Assured Env	n/a
Water vapour content	USEPA Method 4	TM-22	Yes	Assured Env	n/a
Oxides of nitrogen (as NO_2) [B]	USEPA Method 7E	TM-11	Yes	Assured Env	n/a
Solid Particles (Total)	AS4323.2	TM-15	Yes	Assured Env	n/a
Volatile organic compounds (VOCs)	USEPA Method 18	TM-34	Yes	ELS	n/a
Type 1 & Type 2 substances	USEPA Method 29	TM-12, 13 & 14	Yes	ELS	n/a

Table 5: Sampling notes

Note	Comment
A	Sample location is not compliant as per AS4323.1. Sampling ports were not close to the platform. The temperature and velocity survey showed that the sample position complied to items (a) to (f) as per AS4323.1.
B	Analyser calibration performed in the laboratory prior to conducting field work and post field work in AE lab.

Table 6: Analysis notes

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental	Sampling & analysis	19703	14624
2	Envirolab services	analysis	2901	308532-[R00]

2.2 Sample Location

The figures below show the site and sample location.

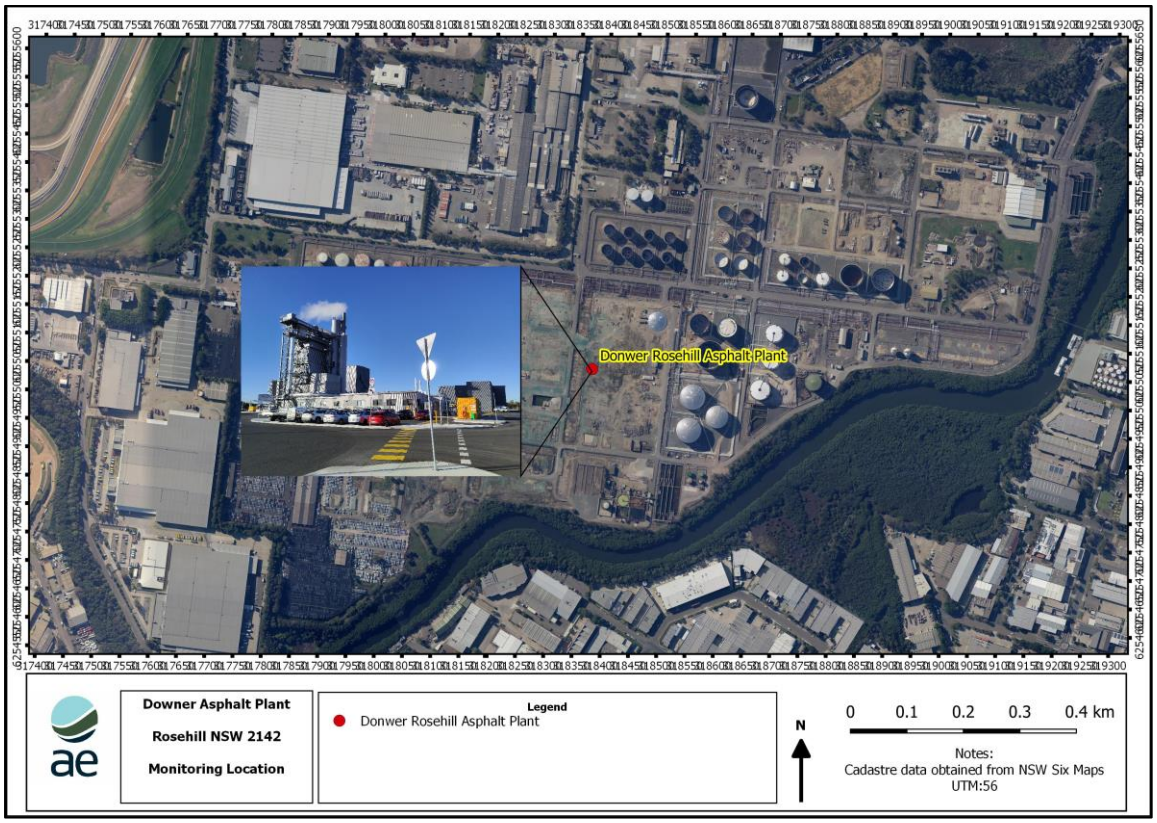

Figure 1: Downer Asphalt Rosehill site location

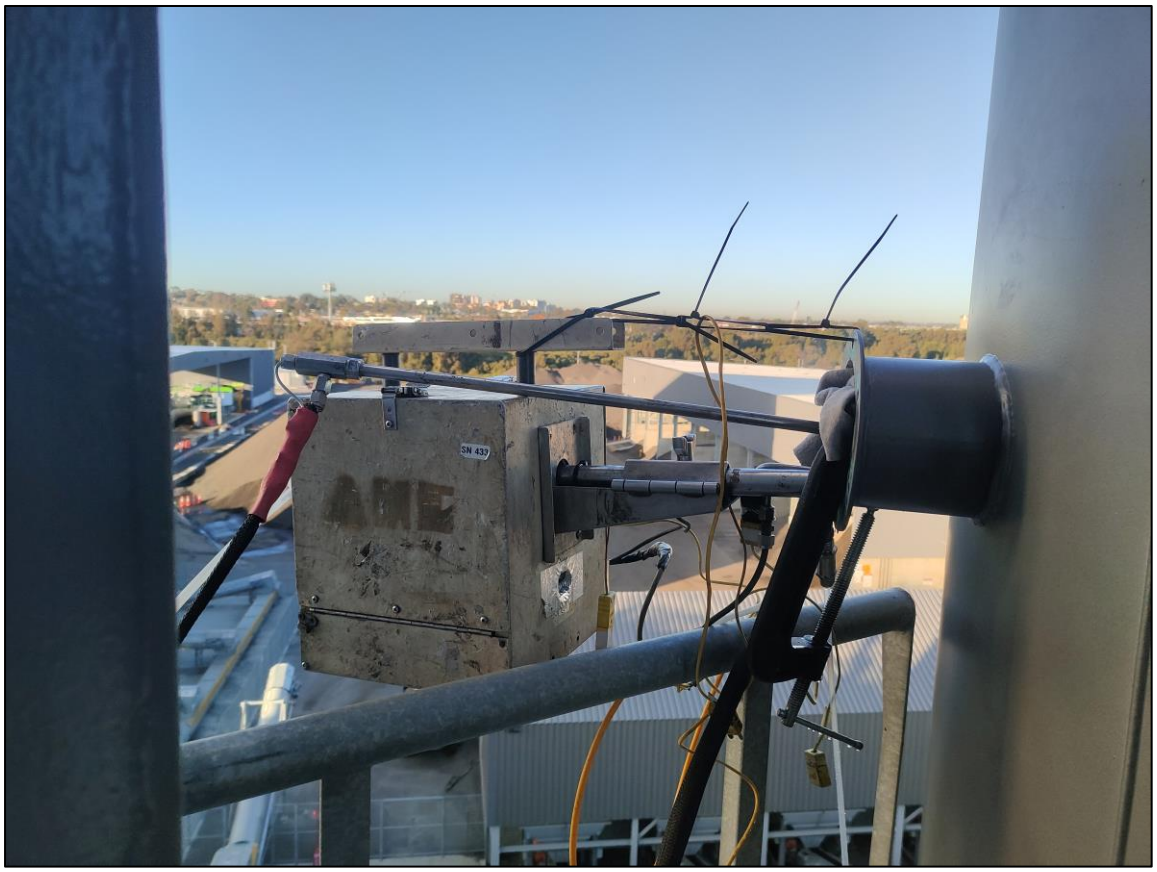

Figure 2: Downer Asphalt Rosehill sample location

Table 7: Sample location summary

AS4323.1	Sample location	Rosehill
	Description	Asphalt plant
	Stack coordinates	UTM 56s:
	Easting	318377.86 m E
	Southing	6255055.46 m S
	Stack Exit point from ground (m)	~40
	Stack Shape	CIRCULAR
	Ideal Sampling Plane Assessment	
	Stack Diameter (m)	1.38
	Stack Cross Section Area (m2)	1.49
	Distance to upstream disturbance (m) (from disturbance)	22.2
	Upstream Diameters (D)	16.2
	Distance to downstream disturbance (m) (from disturbance)	17.8
	Downstream diameters (D)	12.9
4.2.2 Table 1	Meets Requirements AS4323.1 Table 1	Yes
	Non-deal Sampling Plane Assessment	
	Assessment required?	Yes
	Total traverse point factors	1.00
	Non-conforming Sampling Plane Assessment	
4.2.2(a)	Gas flow in same direction	Yes
4.2.2(b)	Gas flow steady & evenly distributed (cyclonic or swirl <15°)	Yes
4.2.2(c)	Temperature difference between points <10%, and each point <10% of average	Yes
4.2.2(d)	Ratio of highest to lowest differential pressure & ratio highest to lowest velocity	1.67
		1.32
4.2.2(e)	Minimum differential pressure	9.00
	Gas temperature above dewpoint	Yes
	Samling Plane Type	
4.2.2, 4.2.3, 4.2.4	Samling plane type	Ideal [A]
	Alternative sampling plane available?	-
	Number of Sample Points Adopted	
	Port size (mm)	123
	Port Thread Type	Flange
	Number of traverses	1
	Number of points per traverse	4
	Total number of traverse points	4
	Flow & temperature compliance check	Yes

[A] The sampling plane is ideally located the sampling ports are not very accessible due to the plant structure and an additional piece of duct work running along the edge of the stack.

2.3 Test equipment

The sampling equipment was transported to site and specifically setup at the test location. Sampling was performed using one complete isokinetic sampling train with an out-of-stack heated filter.

All equipment used during the testing is sourced from Apex Instruments, an industry leader in the supply of source testing equipment.

Figure 3: Full isokinetic sampling assembly

Figure 4: Combustion gas analyser

Table 8: Combustion gas analyser specifications

Compound	Range	Lower Detection Limit	Linearity
O_2	1 to 25%	0.01%	+/- 0.8% selected range
CO_2	1 to 50%	0.01%	+/- 1.3% selected range
NO	1 to 3,000ppm	1 ppm	+/- 5% selected range
NO_2	1 to 500ppm	1 ppm	+/- 5% selected range
Lower Detection Limit	2X Noise at 60sec averaging		
Precision (% of point)	+/- 0.1%, measured with single gases at the span concentration		
Flow Rate	~ 1 litre per minute		
Accuracy	5% of span		
Span Drift	Less than 2% per week (operation time)		
Zero Noise	0.5 ppm RMS (60sec averaging time)		
Response Time	~40 seconds		

3 MEASUREMENT UNCERTAINTY

There is an inherent uncertainty associated with any scientific measurement, including stack emissions monitoring. The measurement uncertainty can be controlled with strict adherence to the reference methodology along with utilising appropriate calibration standards with corresponding acceptable uncertainty reports.

Many source sampling methods do not outline exact procedures for establishing direct measurement uncertainty. In the absence of a defined procedure, the uncertainty budgets presented are based on estimations using ISO-GUM method.

Each individual source and test may have a unique associated uncertainty, due largely to the stack sample location in relation to the positioning requirements of AS4323.1, stack temperature, water vapour content and sample analysis.

The table below outlines the estimated uncertainties associate with reports presented within this report.

Table 9: Sample specific uncertainty budgets

Parameter	Reference method	Uncertainty ± %	Coverage factor	Confidence coefficient %
Velocity	USEPA Method 2	6.6	2	95
Temperature	USEPA Method 2	3.0	2	95
Moisture content	USEPA Method 4	5.0	2	95
Oxygen	USEPA Method 3A	6.0	2	95
Particulate matter	AS 4323.2	20	2	95
Combustion gases	USEPA Method 7E	9.0	2	95
VOCs	USEPA Method 18	20	2	95

4 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

AE operates within a quality system based upon the requirements of ISO17025. Our quality system defines specific procedures and methodologies to ensure any project undertaken by AE is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

AE maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in section 2 of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same Microsoft Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures has been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 10: Sampling data QA/QC checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 11: Laboratory data QA/QC checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

5 DEFINITIONS

The following terms and abbreviations may be used in this report:

Table 12: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
°C	Degrees Celsius
CARB	California Air Resources Board methods
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
f/ml	Fibres per millilitre
g	Grams
kg	Kilograms
m	Metres
m^3	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10^{-3} grams)
min	Minute
ml	Millilitres
mmH_2O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
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NATO	North Atlantic Treaty Organisation
NIOSH	National institute for occupational safety and health (USA)
Nm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
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NR	Not required on this occasion
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ou	Odour unit
PCDD	Polychlorinated dibenzo-*p*-dioxin
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Sm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g., 15% O_2)
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TO	USEPA air toxics method
TWA	Time weighted average
USEPA	United States Environmental Protection Authority

6 RESULTS

6.1 Sample run summary data

Table 13 present a summary of the isokinetic sampling and results.

Table 13: Sample results information

Source Data				Stack SDS version - 3.45
Client				Downer
Site				Bag house stack
Sample Point				Rosehill
Reference Method				USEPA M29 - ISOKINETIC
Test Parameters				PM & Metals
Process conditions				Normal
Historical Data & Hardware Information - Manual Sample				
Run Start Date		dd-mm-yyyy		19/10/2022
Project ID				14624
Run ID				-1
Run Start Time	Ti	hh:mm		13:17
Run Stop Time	Tf	hh:mm		14:37
Positioning compliance check with AS4323.1				Ideal
Flow & temperature compliance check with AS4323.1				Yes
Traverse pt factors; up, down, total & trav pts				1 , 1 , 1 , 4
Console Serial Number				SN937
Meter Calibration Factor	(Y)			1.025
Orifice Coefficient		(DH@)		47.02
Pitot Tube Coefficient	(Cp)			0.84
Actual Nozzle Diameter	(Dna)	mm		7.81
Stack Test Data				
Initial Meter Volume	(Vm)i	m3		0.0000
Final Meter Volume	(Vm)f	m3		1.3920
Actual Sampling Time	(Q)	minutes		80
Average Meter Temperature	(tm)avg	oC		36.00
Average Stack Temperature	(ts)avg	oC		81.00
Barometric Pressure	(Pb)	mb		1013
Stack Static Pressure	(Pstatic)	mm H2O		6.50
Absolute Stack Pressure	(Ps)	mb		1014
Sample Volumes				
Actual Meter Volume	(Vm)	m3		1.4268
Standard Meter Volume	(Vm)std	Nm3		1.2647
Moisture Content Data				
Water vapour concentration	(Bws(calc))	%		20.29
Stack Gas Density Analysis Data				
Carbon Dioxide Percentage	(%CO2)	%		4.55
Oxygen Percentage	(%O2)	%		13.3
Nitrogen Percentage	(%N2)	%		82.16
Dry Gas Molecular Weight	(Md)	kg/Nm3		1.31
Dry Gas Molecular Weight	(Md)	g/g-mole		29.26
Wet Stack Gas Molecular Weight	(Ms)	g/g-mole		26.97
Volumetric Flow Rate Data (at Sample Plane)				
Average Stack Gas Velocity	(vs)	m/sec		8.8
Stack Diameter	Ds	m		1.38
Stack Cross-Sectional Area	(As)	m2		1.49
Upstream distance (from disturbance)	B	m		22.2
Downstream distance (from disturbance)	A	m		17.8
Actual Stack Flow Rate	(Qaw)	m3/min		782
Wet Standard Stack Flow Rate	(Qsw)	Nm3/min-wet		604
Dry Standard Stack Flow Rate	(Qsd)	Nm3/min-dry		481
Percent of Isokinetic Rate	(I)	%		102
Particulate Matter (PM) Concentration				
Total Mass of Particulates	(mn)	g		0.0038
Stack PM Concentration	(cs)	mg/Nm3		3.00
Particulate Emission Rate	(E)	g/min		1.45
Average Oxides of Nitrogen (USEPA Method 7E - instrumental analyser)				
Nitrogen Oxides (NOx as NO2)	(Conc)	mg/Nm3		62.9
Nitrogen Oxides (NOx as NO2)	(E)	g/min		30.3
Heavy Metals (USEPA Method 29)	**NSW Type #**			
Antimony (Sb)	1	mg/Nm3	<	0.00447
Arsenic (As)	1	mg/Nm3	<	0.00447
Beryllium (Be)	2	mg/Nm3	<	0.000335
Cadmium (Cd)	1	mg/Nm3		0.000791
Chromium (Cr)	2	mg/Nm3		0.00245
Cobalt (Co)	2	mg/Nm3		0.00158
Lead (Pb)	1	mg/Nm3		0.0142
Manganese (Mn)	2	mg/Nm3		0.00395
Nickel (Ni)	2	mg/Nm3		0.00822
Selenium (Se)	2	mg/Nm3		0.0158
Tin (Sn)	2	mg/Nm3	<	0.0112
Vanadium (V)	2	mg/Nm3	<	0.00559
Mercury (Hg)	1	mg/Nm3		0.000878
Total Heavy metals Type 1		mg/Nm3	<	0.0248
Total Heavy metals Type 2		mg/Nm3	<	0.0491
OTHER ANALYTES (VOC's)				
TVOC (as propane)	(Conc)	mg/Nm3		2.51
TVOC (as propane) emission rate	(E)	g/min		1.21
Benzene	(Conc)	mg/Nm3		0.344
Benzene emission rate	(E)	g/min		0.166
Toluene	(Conc)	mg/Nm3		0.147
Toluene emission rate	(E)	g/min		0.0710
Ethyl Benzene	(Conc)	mg/Nm3	<	0.0819
Ethyl Benzene emission rate	(E)	g/min	<	0.0395
m&p xylene	(Conc)	mg/Nm3	<	0.164
m&p xylene emission rate	(E)	g/min	<	0.0789
o xylene	(Conc)	mg/Nm3		0.0819
o xylene emission rate	(E)	g/min		0.0395
Acetone	(Conc)	mg/Nm3		0.459
Acetone emission rate	(E)	g/min		0.221

6.2 Plant operational data

The table below summarises the plant operation data at the time of sampling. All process conditions were provided by the client to AE, no measurements were performed by AE.

Table 14: Production details

Item	Baghouse
Address	52CP+W8, Rosehill NSW 2142
Plant Capacity	320TPH
Production rate	180 TPH
Process Mix	AC14HD
Aggregate	14 mm
Mix code	230.02
Mix Standard temperature	170dC to 175 dC
RAP	No

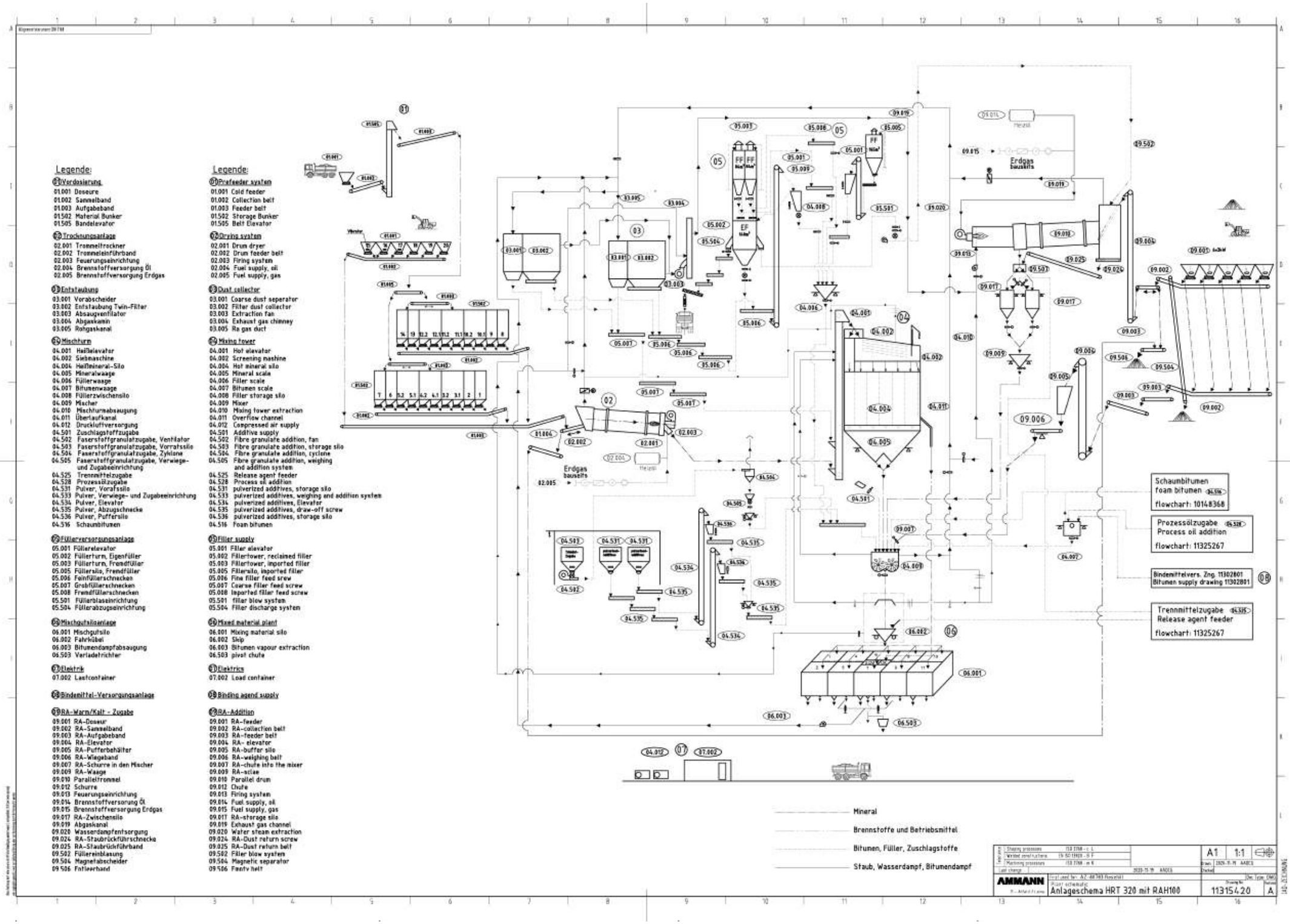

Figure 5: Plant PID flow