

# AIR QUALITY ASSESSMENT

TRG Bushfire Response Operation Base and Training Centre Block 45 Section 3 Hume ACT.



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# 1.0 Introduction

## 1.1 Overview

This report is an assessment of air quality of the proposed TRG Bushfire Response and Training Centre which includes a helicopter landing site (helicopter hard stand area).

The Environment, Planning and Sustainable Development Directorate (EPSDD) provided a Scoping Document (EIS Scoping Document 202000027 @ March 24, 2021) for the EIS that specifically outlines the specialist study requirements for the EIS.

## 1.2 Purpose of this report and background

The purpose of the report is to assist with the development assessment of the potential air quality impacts of the proposed development and prepare this qualitative Air Quality Assessment as part of an Environmental Impact Statement (EIS) in support of a Development Application (DA) on block 45 section 3 Hume ACT.

The purpose of this report is to address the requirements associated with air quality. Table 1 below outlines the specific requirements and where in the report these aspects are addressed in this report.

**Table 1:** Scoping Document requirements – Air Quality

Scoping Document Requirement	Requirement Detail	Section where requirement is addressed.
8.1.8 Climate Change and Air Quality	Describe the potential impact the proposal will have on existing air quality during operation, including dust, emissions, and fumes from helicopter exhaust whilst on the ground, taking off and landing. Include an assessment of the effect the proposal may have on climate change and how the proposal is consistent with associated ACT and national policies. Describe the proposals contribution to urban heat, noting the CSIRO study (Mapping Surface Urban Heat in Canberra, 2017) identifying the area as one of the city's hot spots. Include a microclimate assessment addressing urban	This report.  See separate report on climate change assessment.  See separate report on microclimate assessments.

heat in the area and  
recommendations of the report.

## 1.2 Project Objective

The objective of this assessment is to qualitatively determine the potential for air emissions from the proposed development to impact upon adjacent commercial - residential receptors during construction and operation of the facility.

## 1.3 Scope of this report

To address the scoping document requirements detailed in Table 1 pertaining to air quality emissions and the project objective. The following scope of work was performed:

- Identify the potential air emissions for construction and operation.
- Review of applicable air quality legislation.
- Characterisation of the meteorology and air quality data for the local area.
- Identification of the nearest sensitive receptors.
- Evaluation of the baseline air quality environment using available ambient air quality monitoring data.
- Qualitative review of emissions to air from construction and operation of the proposed facility with target pollutants limited to exhaust emissions and particulate matter (Total Suspended Particulates [TSP] and PM10).
- Assessment of particulate matter emissions based on emission factors as described within the National Pollution Inventory emissions estimation manuals. Assessment was limited to consideration of emissions from on-site activities only.

## 1.4 Documents Consulted

- ❖ Scoping Document Under Division 8.2.2 of the *Planning and Development ACT 2007*, for an Emergency Services, Maintenance and Training Facility, Application number 202000027.
- ❖ NEPC (1998). National Environmental Protection Measure for Ambient Air Quality. National Environmental Protection Council.
- ❖ NEPC (2003). National Environmental Protection Measure (Ambient Air Quality) Measure, as amended, made under the National Environment Protection Act 1994. National Environmental Protection Council, 7 July 2003.
- ❖ NEPC (2015). Variation to the National Environment Protection (Ambient Air Quality) Measure. National Environment Protection Act 1994. National Environmental Protection Council, 15 December 2015.
- ❖ South Australia EPA (SA EPA) Environment Protection (Air Quality) Policy 2016 (Air EPP).
- ❖ SA EPA Ambient Air Quality Assessment, 2016.
- ❖ ACT Separation Distance Guidelines for Air Emissions (2018).

## 2.0 Project Background

### 2.1 Project Description

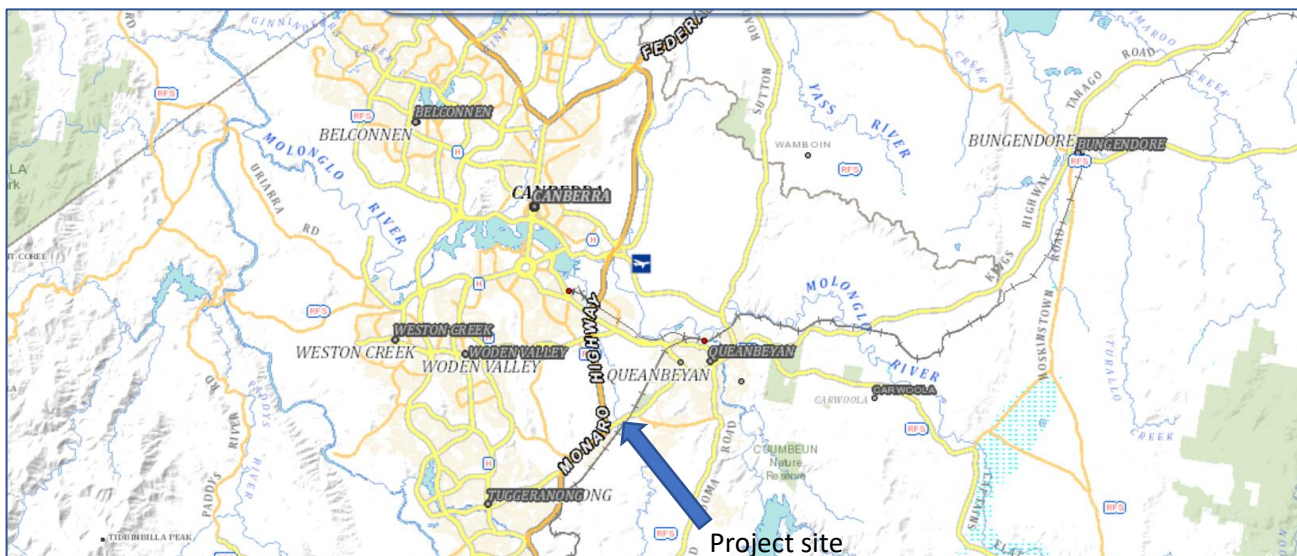
The site is identified as Block 45 Section 3 Hume and is located at the southwestern corner of Sheppard Street and Lanyon Drive (Figure 1) and Figure 2 regional map.

Block 45 Section 3 Hume is zoned NUZ1 Broadacre and is subject to the Main Avenues and Approach Routes overlay in the ACT Territory Plan.

The proposed development and use of the site, as described below, are permissible uses in this zone under the Zone Development Table; Emergency Services Facility and Educational Establishment, as well as ancillary use, uses definitions in the Territory Plan.



**Figure 1** Development site showing nearest ACT residence - Block 45 Section 3 Hume Source Sixmaps.



**Figure 2** Project Site Regional Map

Source Sixmaps.

Intended use for Block 45 involves an application to purchase and develop the land for the purposes of developing infrastructure (Figure 3) to support emergency services for bush fire response activities, training, forestry and related services, including a helicopter landing site and with ancillary uses supporting these functions which comprise of repairs and maintenance of plant and equipment.

Based on a preliminary concept plan for the site (Figure 3), the proposed development would involve the following features (including preliminary estimates of the development footprint for each element): - approx. 3030 m<sup>2</sup> of buildings for offices, training and associated uses, - approx. 3600m<sup>2</sup> hardstand, for vehicle parking and manoeuvring, - 3,000m<sup>2</sup> storage yard for Forestrack, - 2,000m<sup>2</sup> (or thereabouts) Emergency Services Training Area, - 7,600m<sup>2</sup> identified for future possible development (longer term planning to ensure site remains viable in a changing city, regional and global context).

Some of the trees located in the north-eastern portion of the site will require removal to facilitate safe take-off and landing of the helicopter, however it is expected that many of the existing trees could be retained as detailed in the landscape Plan (refer to DA Plans).

The proposed helicopter landing / departure point shown in figure 3 is located approx. 30m from the north and east site boundaries, allowing for a managed safety zone in accordance with guidelines for the establishment of helicopter hard stand area.

The flying of helicopters in an out of the site for the foreseeable future will primarily be to fly machines in and out for maintenance and refurbishment associated with bush fire response/surveillance. This is expected to be at a maximum of 30-35 flights per month or an average 2 in-and-out flights per day on average.

Normal operating hours of the facility would be 7am – 5.30 pm Mon – Friday.

Proposed TRG Bushfire Response and Training

Block 45 Section 3  
Hume, ACT



Figure 3 Site Plan

## 2.2 Pollutants of Interest

### 2.2.1 Construction

The main air pollutants likely to be generated during construction works include the following:

- Total Suspended Particulate (TSP) matter.
- Particle matter with an aerodynamic diameter of less than 10 microns (PM10).
- Particle matter with an aerodynamic diameter of less than 2.5 microns (PM2.5).

Low levels of pollutants from fuel combustion during construction of the Facility are also likely to be emitted such as oxides of nitrogen (NOx), carbon monoxide (CO), sulphur dioxide (SO2), volatile organic compounds (VOCs) and PAHs. However, it is understood that plant and equipment associated with construction would be operated in accordance with the manufacturer’s maintenance specifications and therefore, these pollutants have not been considered any further within this assessment. This technical report addresses emissions of TSP, PM<sub>10</sub>, PM<sub>2.5</sub>.

## 2.2.2 Operation

Following a review of the project, the main unmitigated pollutants likely to be emitted during operation are considered to be:

– TSP – PM<sub>10</sub> and Low levels of pollutants from fuel combustion from trucks / plant and machinery and helicopter operations<sup>1</sup>(aircraft have the potential to impact on air quality through the emission of pollutants associated with the combustion of fuel. The most important air pollutants are carbon monoxide (CO), oxides of nitrogen (NOX), sulphur dioxide (SO<sub>2</sub>) particulate matter (PM)<sup>2</sup> and to a lesser extent, volatile organic compounds (VOCs)), likely to be emitted such as oxides of nitrogen (NOx), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs) and PAHs.

Minor emissions from plant and machinery maintenance activities such as welding will generate particulate matter and particulate- phase hazardous air pollutants listed in the NPI.

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<sup>1</sup> The helicopter in question is a Bell 206 L4, with a range of 615 km on 419 litres of aviation turbine fuel (Jet A). 419 l per 615 km equates to 1.47 km/l. This aircraft can carry four people, with luggage.

Over .4 km distance the helicopter will burn about .64 litres of fuel. Compared to a service van the helicopter will use more than 3x more fuel than the van at .2 litres.

The GHG emissions from Jet A are similar to gasoline, at around 3 kg per litre (, so 419 litres would result in 1,257 kg of GHGs.

<sup>2</sup> Emission rates of PM<sub>10</sub> and PM<sub>2.5</sub> were assumed to be equivalent to total particulates. Particulate matter emitted from aircraft can be classified into a number of groups, depending on the size of the particles. PM10 is defined as all particulate matter with an aerodynamic diameter of 10 µm or less. PM2.5 is similarly defined as all particulate matter with an aerodynamic diameter of 2.5 µm or less and is a subset of PM10. Combustion particles, such as those emitted by aircraft, are generally made up predominantly of particles falling into the PM2.5 category. This assessment has assumed that all emitted particulate matter is both PM<sub>2.5</sub> and PM<sub>10</sub> and, hence, will overestimate the potential impacts associated with emissions of particulate matter.

## 3.0 Legislative Context

This section overviews the legislative context for the Project and the setting of criteria for assessing air quality impacts of pollutants during construction and operation.

### 3.1 Commonwealth Regulation – National Environment Protection Measure

The National Environment Protection (Ambient Air Quality) Measure (Air NEPM) contains standards and goals for key pollutants that are required to be achieved nationwide, with due regard to population exposure. Table 2 identifies NEPM standards that are relevant for pollutants (PM) during construction of the Project. Air NEPM standards are intended to be applied at performance monitoring locations that represent air quality within a region or subregion of 25,000 people or more. Noting that these standards are not relevant to air emissions from individual sources, specific industries or roadside locations.

**Table 2** - NEPM standards that are relevant for pollutants PM.

Pollutant	Average Period	Air Quality Standard	Max allowable exceedance
PM <sub>10</sub>	24-hours	50 µg/m <sup>3</sup>	None
	Annual	20 µg/m <sup>3</sup>	
PM <sub>2.5</sub>	24-hours	25 µg/m <sup>3</sup>	None
		20 µg/m <sup>3</sup> (2025*)	
	Annual	8 µg/m <sup>3</sup> 7 µg/m <sup>3</sup>	

\*Commonwealth, State and Territory Environment Ministers have flagged an objective to move to PM<sub>2.5</sub> standards of 20 µg/m<sup>3</sup> (1 day average) and 7 µg/m<sup>3</sup> (1 year average) by 2025.

### 3.2 Australian Capital Territory

There is no current Australian Capital Territory (ACT) legislation or policies that specifically govern air quality standards during construction. The Environment Protection Guidelines for Construction and Land Development in the ACT, Environment Protection Authority, March 2011 would be applicable for construction of the Project.

The Australian Capital Territory (ACT) is currently in the process of formalising its policy position regarding air emissions in the ACT. This includes the scheduled review of the '*Air - Environment Protection Policy*' pursuant to the *Environment Protection Act 1997*. In the interim, the ACT Environment Protection Authority (EPA) has adopted the South Australia EPA (SA EPA) Environment Protection (Air Quality) Policy 2016 (Air EPP) and the SA EPA Ambient Air Quality Assessment, 2016 guidance for assessing air emissions in the ACT.

### 3.2.1 ACT Separation Distance Guidelines for Air Emissions (2018)

These guidelines provide recommended separation distances between various emitters and sensitive land uses. They ensure incompatible land uses are located in a way that minimises the impacts of odour and polluting air emissions when applied to the assessment of new development applications. While the guidelines assist in the siting of new developments, they may also be used to ensure industrial activities in appropriate zones are protected from encroachment by residential and other sensitive land uses that would have a negative effect on the viability of industry.

The proposed development is located in NUZ1 Broadacre zone at the edge of an industrial zone with no immediate sensitive land use. The nearest residence is approximately 1000m from the site. The guidelines do not include the proposed use of the land. However, examination of emissions from proposed activities is considered relevant to assess compatibility with surrounding land use.

### 3.2.2 South Australian Environment Protection (Air Quality) Policy 2016

The Air EPP was developed to reduce the harmful impacts of smoke and other air pollutants on communities and the environment. Schedule 3 of the Air EPP prescribes the maximum PM<sub>10</sub> criterion (Table 3) that must not be exceeded at the nearest sensitive receiver.

**Table 3** – South Aust Schedule 3 of the Air EPP prescribes the maximum PM<sub>10</sub> criterion.

Pollutant	Averaging time	Criterion (µg/m <sup>3</sup> )
PM <sub>10</sub>	24-hours	50

A previously mentioned the proposed development is to be located on the border of an industrial area with one nearby residence.

## 4.0 Existing Environment

### 4.1 Sensitive Receptors

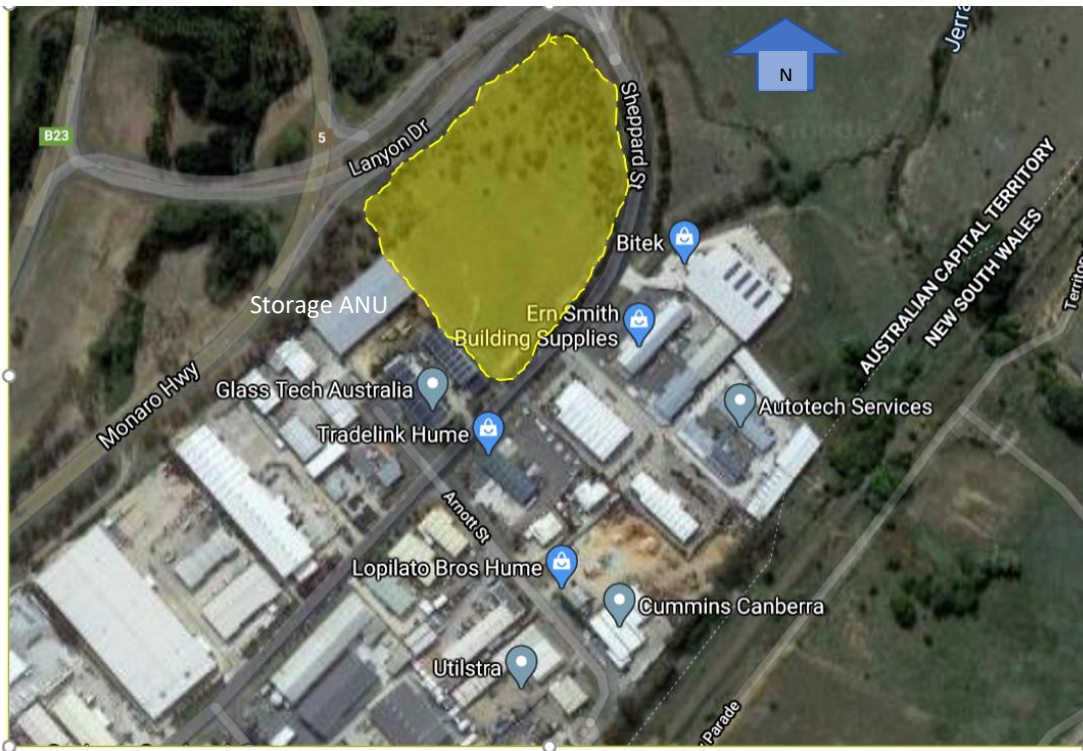
The SA EPA ‘Ambient Air Quality Assessment’, guideline document describes a sensitive receptor as a:

*‘Fixed location such as a house, building, other premises or open area where health, property or amenity is affected’*

As described in the scoping document, the purpose of this assessment is to *describe the potential impact the proposal will have on existing air quality during operation, including dust, emissions and fumes from helicopter exhaust whilst on the ground, taking off and landing.* Accordingly, background air quality data is present in this section the report together with climatic information in order to understand possible impacts on surrounding receptors - immediate and sensitive.

Immediate receptors:

**Figure 4** shows adjacent businesses which comprise storage buildings and light industry and construction retail outlet.



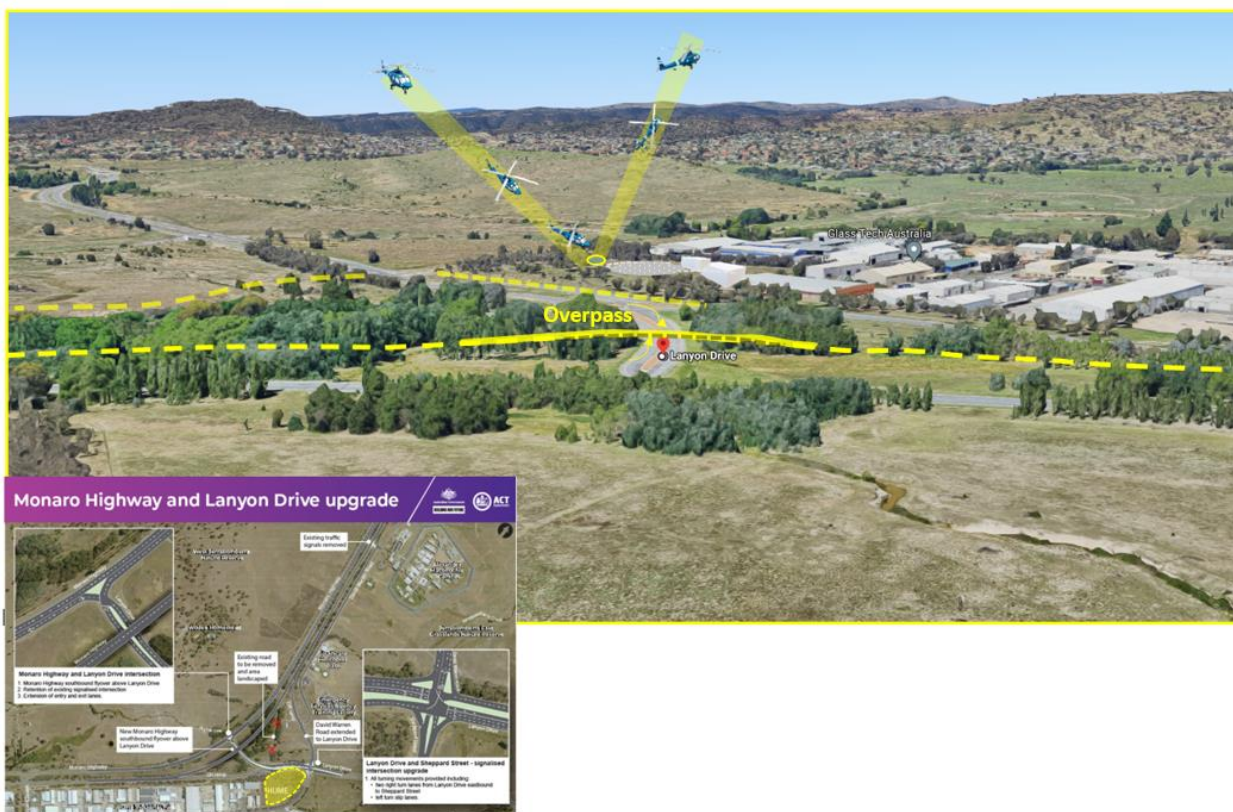


Figure 5 illustrate the project site and helicopter movement (preferred flight paths) in relation to proposed Lanyon Drive Upgrade.



Figure 6 Shows nearest residence in relation to the project site.

Figures 7 -8 illustrates sensitive receptors and distance from the project site (Helicopter landing area).



Figure 7 Project site and sensitive receptors

RECEPTOR Id	RECEPTOR	DISTANCE FROM SITE m Approx
1	Alexander Maconochie Centre	1400
2	Jerrabomberra	1900
3	Jerrabomberra Sports Centre	400
4	South Jerrabomberra Development	2400
5	Residence	855



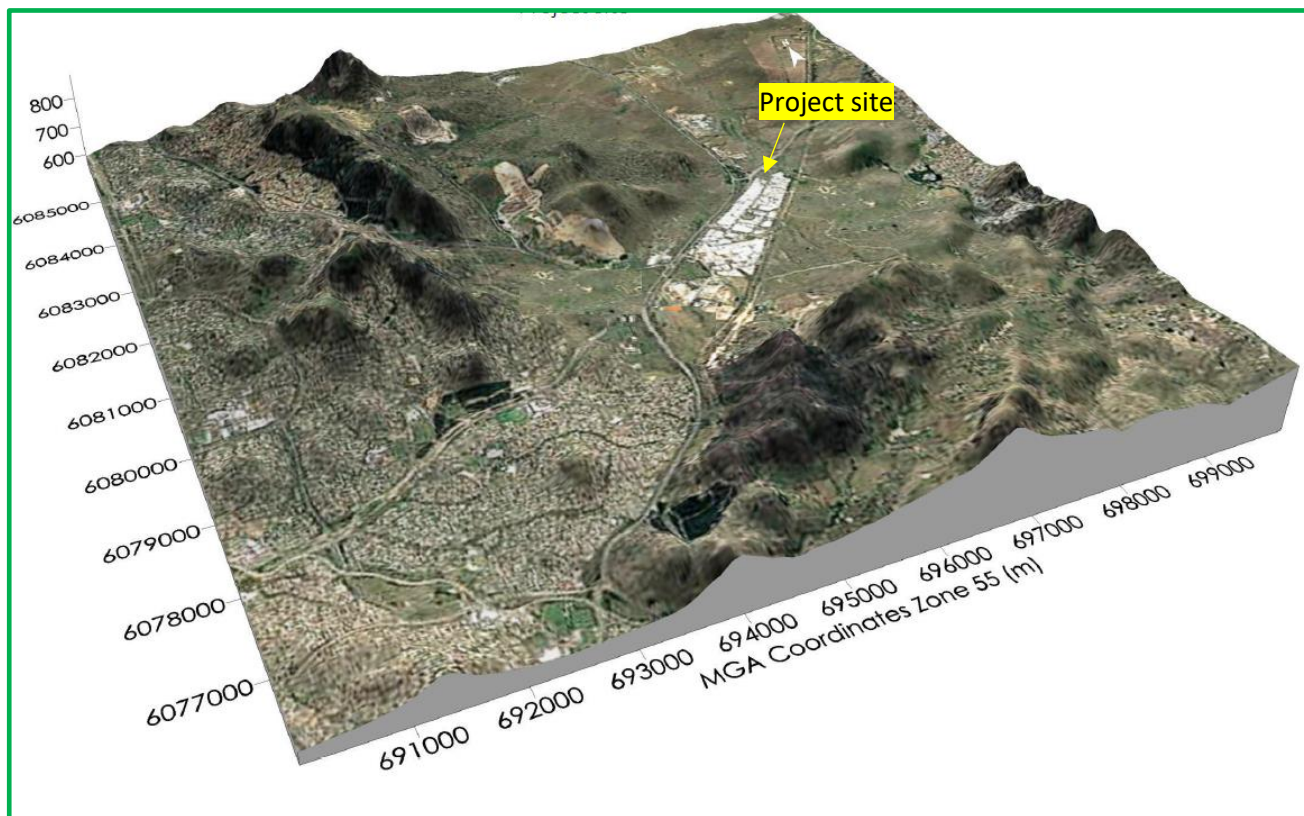
Figure 8 Looking north from South Jerrabomberra. Source – Village Building Company



Figure 9 Location map showing the project site in relation to South Jerrabomberra Development. Source Village Building Company

## 4.2 Topography

Figure 10 presents a pseudo three-dimensional visualisation of the topography in the general vicinity of the Project area. The Project area is relatively flat with elevated terrain to the northwest and southeast.



**Figure 10** Pseudo three-dimensional visualisation of the topography.

## 4.3 Local Climate

Meteorological conditions are important for determining the direction and rate at which emissions from a source would disperse. The key meteorological requirements for air assessments are typically hourly records of wind speed, wind direction, temperature, rainfall and relative humidity. This section discusses meteorological conditions in the vicinity the Project study area.

The nearest AWS to the Project study area that characterises the climate of the local area is Tuggeranong AWS (Site Number: 070339). The station is located at an elevation of 587 m, approximately 6 km west southwest of the Facility study area. The following sections provide information based on historical meteorological data for Tuggeranong AWS, including wind speed and direction, temperature, rainfall and relative humidity.

Table 4 provides a data summary from the Tuggeranong station collected over an approximate 14 to 21-year period for the various meteorological parameters.

The data indicates that January is the hottest month with a mean maximum temperature of 29.3 degrees Celsius (°C) and July as the coldest month with a mean minimum temperature of 0.1°C. Rainfall exhibits variability across the year. The data indicates that February is the wettest month with an average rainfall of 74.5 millimetres (mm) over 6.0 days and May is the driest month with an average rainfall of 22.3mm over 3.5 days.

Humidity levels peak during winter and decline thereafter. Mean 9am humidity levels range from 59 per cent (%) in December to 83% in June. Mean 3pm humidity levels range from 34% in January and December to 57% in June. Mean 9am wind speeds range from 6.5 kilometres per hour (km/h) in May to 11.3km/h in October. Mean 3pm wind speeds range from 13.2km/h in May to 18.7km/h in October.

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
<b>Temperature</b>													
Mean max. temperature (°C)	29.7	28.1	25.3	21.1	16.6	13.1	12.3	14.1	17.6	21.0	24.3	27.2	20.9
Mean min. temperature (°C)	14.5	14.2	11.4	6.9	2.5	1.3	-0.1	0.9	3.7	6.4	9.9	12.4	7.0
<b>Rainfall</b>													
Rainfall (mm)	53.9	69.6	52.5	32.4	24.8	52.8	39.4	47.1	59.4	50.4	76.5	70.2	620.0
Mean No. of rainfall days (≥ 1mm)	5.3	5.6	4.8	3.7	3.6	5.7	5.6	5.8	6.0	6.2	7.5	6.0	65.8
<b>9am conditions</b>													
Mean temperature (°C)	19.6	18.6	15.7	13.1	8.3	5.9	4.8	6.9	10.9	13.9	15.8	18.2	12.6
Mean relative humidity (%)	61	68	70	69	78	83	82	73	65	60	62	59	69
Mean wind speed (km/h)	8.4	7.7	6.5	8.0	6.5	7.1	7.1	8.9	10.8	11.3	10.1	9.6	8.5
<b>3pm conditions</b>													
Mean temperature (°C)	27.8	26.6	24.3	20.1	15.6	12.1	11.3	12.8	16.2	19.2	22.5	25.5	19.5
Mean relative humidity (%)	34	39	38	42	50	57	56	50	46	41	39	34	44
Mean wind speed (km/h)	16.2	15.4	14.7	13.8	13.2	13.5	14.3	16.5	18.5	18.7	17.3	17.7	15.8

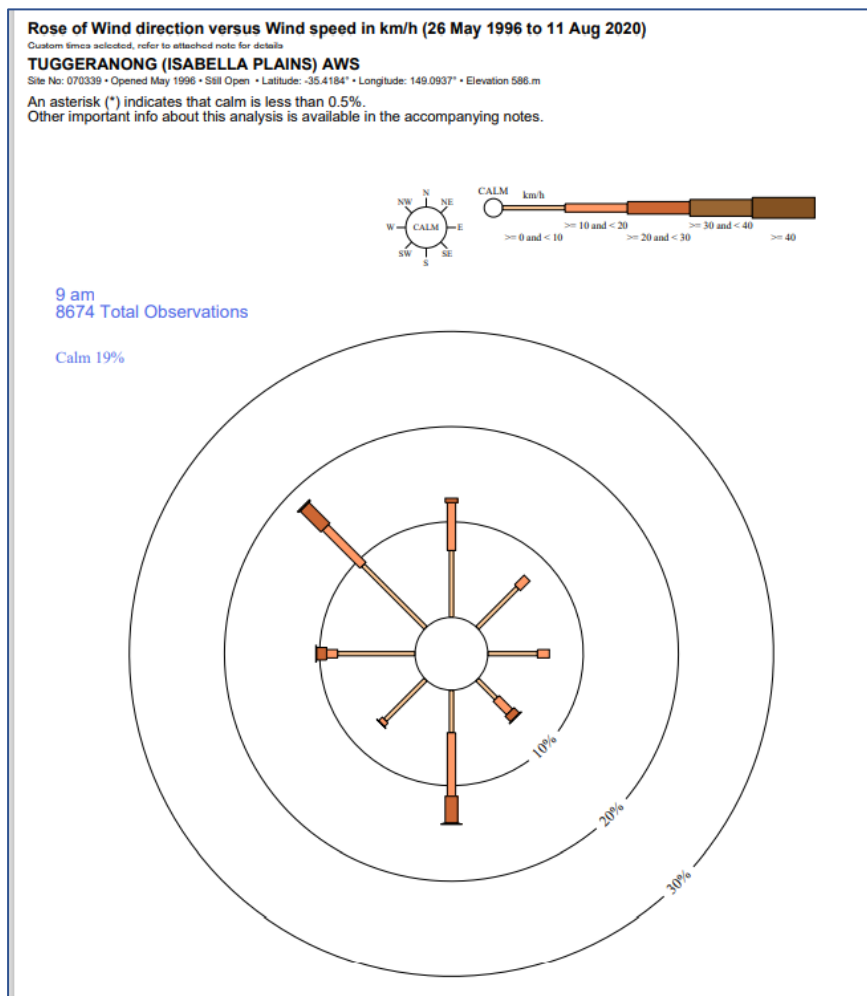
Source: Bureau of Meteorology, 2019 (accessed July 2019)

**Table 4** Monthly climate statistics summary – Tuggeranong AWS

Annual and seasonal wind roses prepared from data collected from 1996 - 2020 are presented in Figure 11-12.

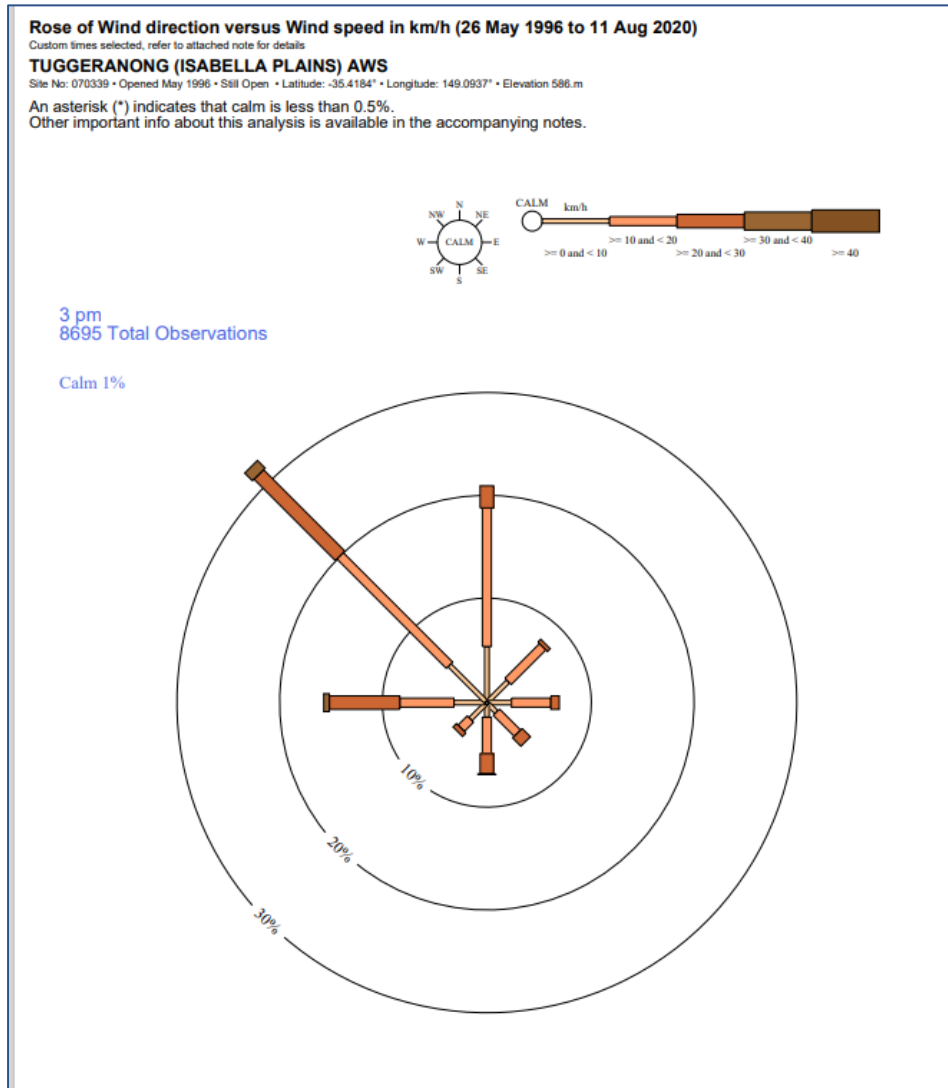
Analysis of the wind roses show that on an annual basis, winds are typically from the northwest quadrant and winds from the north and east dominate the distribution. Seasonal distributions are similar to the annual distribution at varying degrees. During summer, winds are typically from the east with few winds from all other directions. In autumn, winds from the north and north-northwest dominate the distribution followed by winds from the northwest, south, and lighter winds from the east. In winter, winds from the north, northwest dominate followed by winds from the northwest quadrant and from the south. In spring winds are typically from the northwest quadrant.

The wind roses show a wind distribution pattern that is typical of the expected patterns for this area considering the location of the station in relation to local terrain features.



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Figure 11 Rose of wind direction AWS 9am



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**Figure 12** Rose of wind direction AWS 3pm.

#### 4.4 Background Air Quality

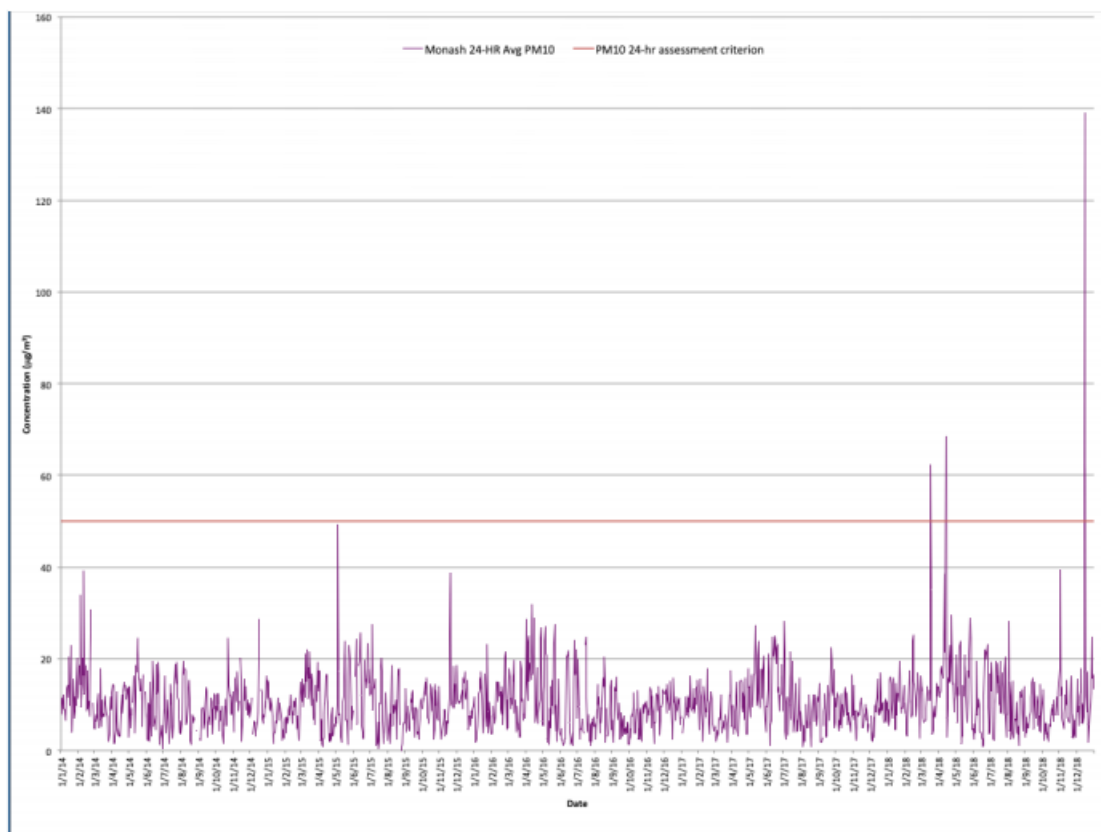
The main sources of air pollutants in the area surrounding the site include emissions from local human activities (such as motor vehicle exhaust and domestic wood heaters), agricultural activities and various other commercial or industrial activities within Hume and the surrounding area.

Ambient air quality monitoring for the relevant target pollutants at the Project site are not available (the site is currently undeveloped). Therefore particulate (PM<sub>10</sub> and PM<sub>2.5</sub>) data from the nearest available air quality monitor operated by the ACT government was used to quantify the existing background level for assessed pollutants. The ACT air quality monitor at Monash is approximately 7

km from the site and collects data that is considered representative of the potential background air quality levels at the Project site. The data from the Monash monitor has been used to quantify the existing ambient levels of air pollutants in this study.

#### 4.4.1 PM10 Monitoring

Historic data (2014 – 2018) for Monash 24-hr average PM10 is illustrated in Figure 13.



**Figure 13** Monash ACT 24-hour average PM10 (2014-2018)

Figure 13 illustrates that between 2014 and 2018, the assessment criterion for PM10 was exceeded on three (3) occasions. Based on a review of other monitoring sites within the ACT these exceedances were likely caused by a regional event, and were not isolated to Monash.

Table 5 summarises the Monash PM<sub>10</sub> data, excluding the three regional events.

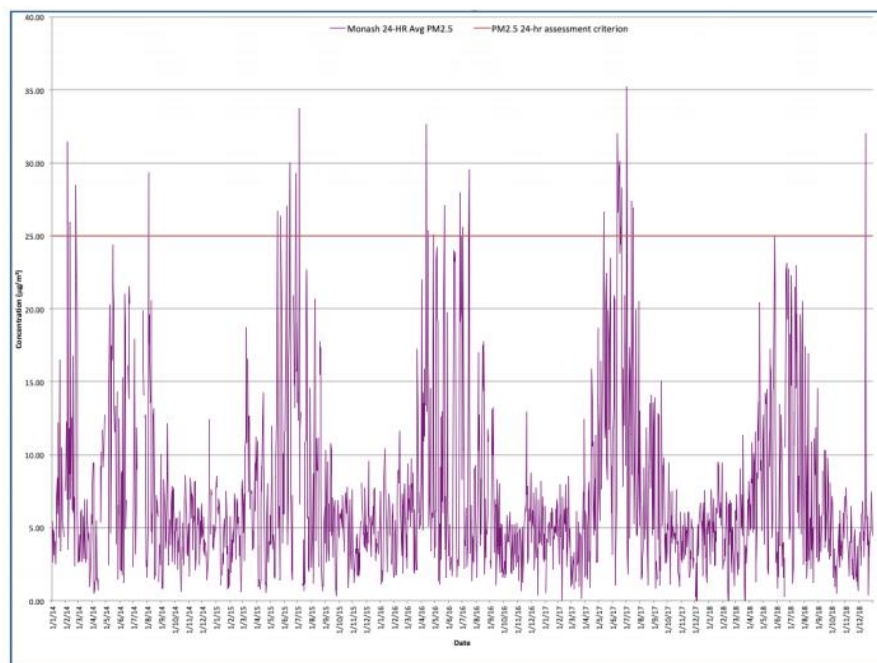
Statistical Parameter	PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )
Maximum 24-hour average	49.40
99 <sup>th</sup> percentile 24-hour average	28.27
90 <sup>th</sup> percentile 24-hour average	17.51
70 <sup>th</sup> percentile 24-hour average	12.24

**Table 5** Monash 24-hour average PM10 historical statistics (2014 – 2018).

Table 5 indicates that 24-hour average PM<sub>10</sub> concentrations at Monash are generally well below the assessment criterion.

#### 4.4.2 PM<sub>2.5</sub> Monitoring

Historic data (2014 – 2018) for Monash 24-hr average PM<sub>2.5</sub> is illustrated in Figure 14



**Figure 14** Monash ACT 24-hour average PM<sub>2.5</sub> (2014-2018)

It is evident from the data presented in Figure 10 that there is a clear seasonal pattern for PM<sub>2.5</sub>. There are numerous exceedances of the NEPM criterion each winter, which is likely caused by wood burning smoke from household heating. The historical PM<sub>2.5</sub> data for Monash is summarised in Table 6

Statistical Parameter	PM <sub>2.5</sub> Concentration (µg/m <sup>3</sup> )
Maximum 24-hour average	35.22
99 <sup>th</sup> percentile 24-hour average	27.91
95 <sup>th</sup> percentile 24-hour average	19.97
90 <sup>th</sup> percentile 24-hour average	15.07
70 <sup>th</sup> percentile 24-hour average	7.57

**Table 6** Monash 24-hour average PM<sub>2.5</sub> historical statistics (2014 – 2018)

Table 6 indicates that 24-hour average PM<sub>2.5</sub> concentrations at Monash are generally well below the assessment criterion.

## 5.0 Qualitative Air Quality Assessment

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### 5.1 Construction Impacts

#### 5.1.1 Emission Sources

Air emissions from particulate matter of varying size fractions (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) are likely to be generated during the following construction activities:

- site establishment and mobilisation.
- earthworks and civil construction work including excavation and benching/retaining walls.
- disposal of surplus material.

#### 5.1.2 Impacts during Construction.

Direct potential impacts to the local air quality would typically be limited to particulate matter and emissions from vehicles, plant and equipment generated during site establishment works and in particular bulk earthworks.

Exhaust emissions from the use of vehicles, and other machinery on site are likely to include nitrogen oxides, carbon monoxide, sulphur oxides, hydrocarbons, and particulate matter of varying size fractions in small quantities which would be typical for construction sites.

Activities that may generate particulate matter (i.e., dust) include wind erosion of exposed surfaces, movement of topsoil during excavations, disturbance of stockpiles, movement of vehicles and general site preparation works. Dust generation would primarily result from site clearing and benching activities/bulk earthworks. Impacts from these construction activities can be readily managed with a high level of control via water spray and dust suppression (refer to Section 6).

The dispersion of particulate matter would also depend on the meteorological conditions experienced during the works, but it is expected that these particulate levels would drop significantly with distance. During dry and windy meteorological conditions particulate emissions may be higher requiring additional specific corrective measures. The CEMP would identify triggers and procedures for dealing with these conditions (refer to Section 6.1).

### 5.2 Operational Impacts

#### 5.2.1 Assessment approach

Due to the limited scale of the proposal, a qualitative approach was considered appropriate to assess the potential for emissions to air from the operation of the facility.

The following was undertaken: – Review of the operational characteristics of the proposed development including helicopter operation from the site – Consider the facility together with the ACT separation distance guidelines for air emissions (2018) – Review the potential emission sources and estimated emission quantities from the proposed development – Review the mitigation proposed – Provide a qualitative conclusion on the potential for emissions to significantly impact upon the surrounding sensitive receivers.

### 5.2.2 Operational characteristics

The key processes that have the potential for emissions to air are considered to include:

- Heavy vehicle movements around the site – particulate matter and VOCs.
- Helicopter movement – VOCs from helicopter approval and departure
- Repairs and maintenance of plant and machinery

### 5.2.3 Separation Distance Assessment

The ACT Separation Distance Guidelines for Air Emissions (2018) details appropriate separation distance for selected activities that may impact on sensitive land use. The proposed land use is not one of the listed activities in the guideline, however the guidelines assist in the siting of new developments and as a consequence it is considered that adjustment for the vegetation/surface roughness between the source and the nearest receptor (residence) and the terrain effects around the site was not applicable. The proposed development is located in NUZ1 Broadacre zone at the edge of an industrial zone with no immediate sensitive land use. The nearest residence is approx. 1000m from the site. The guidelines do not include the proposed use of the land. However, examination of emissions from proposed activities is considered relevant to assess impacts/compatibility with surrounding land use.

### 5.2.4 Emission Assessment

Emissions to air from the operation of the base are estimated below.

It is noted that emissions to air from the proposed development following incorporation of emission controls described in section 6.2 (aircraft operation /helicopter location, other activities occur within an enclosed building and vehicle movements take place on hard stand areas) are anticipated to be low. Based on these emission assumptions, a quantitative air quality investigation is not considered necessary, as it would not provide any further useful information

#### 5.2.4.1 Operation Base Component - Aircraft Operation /Helicopter

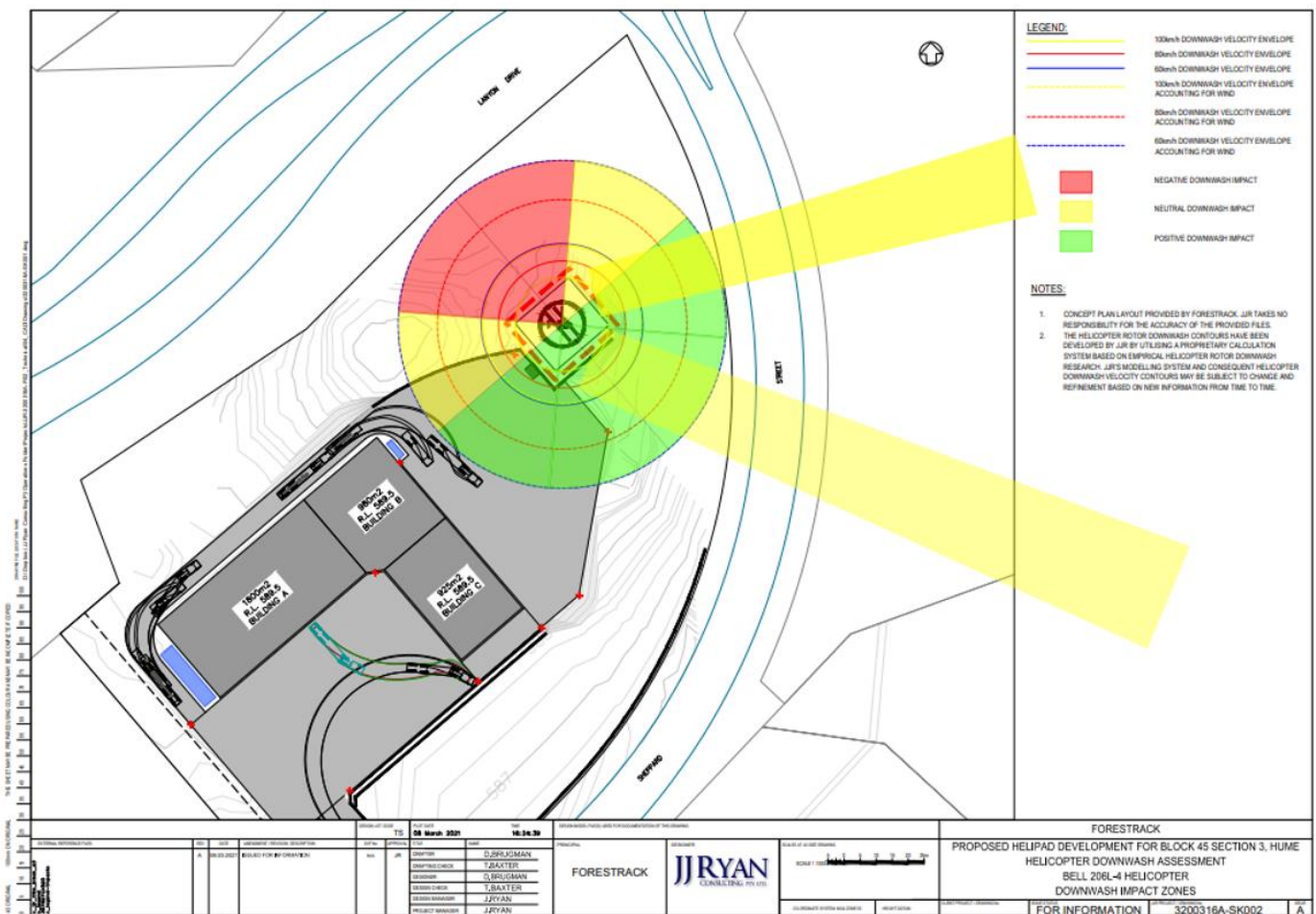
The flying of helicopters in and out of the base will primarily be to fly machines in and out for Airborne surveillance and airborne operations management support and maintenance and refurbishment. This is expected to be at a maximum of 30-35 flights per month or an average 2 in-and-out flights per day on average.

Flight directions into and out of the site will generally be to/from a northeastern direction (prevailing wind being considered) as shown in the following figure 15 photomontage.



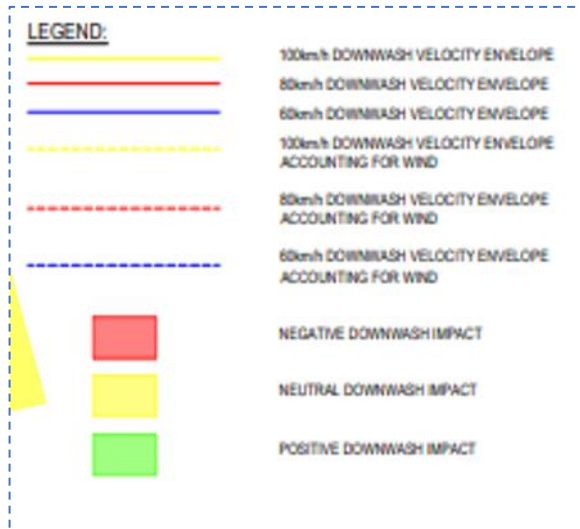
Figure 15 Photomontage illustrating preferred flight paths and location of the helicopter landing site.

Figure 16 illustrates the location of the helicopter landing site, preferred flight paths and helicopter downwash impact zones.

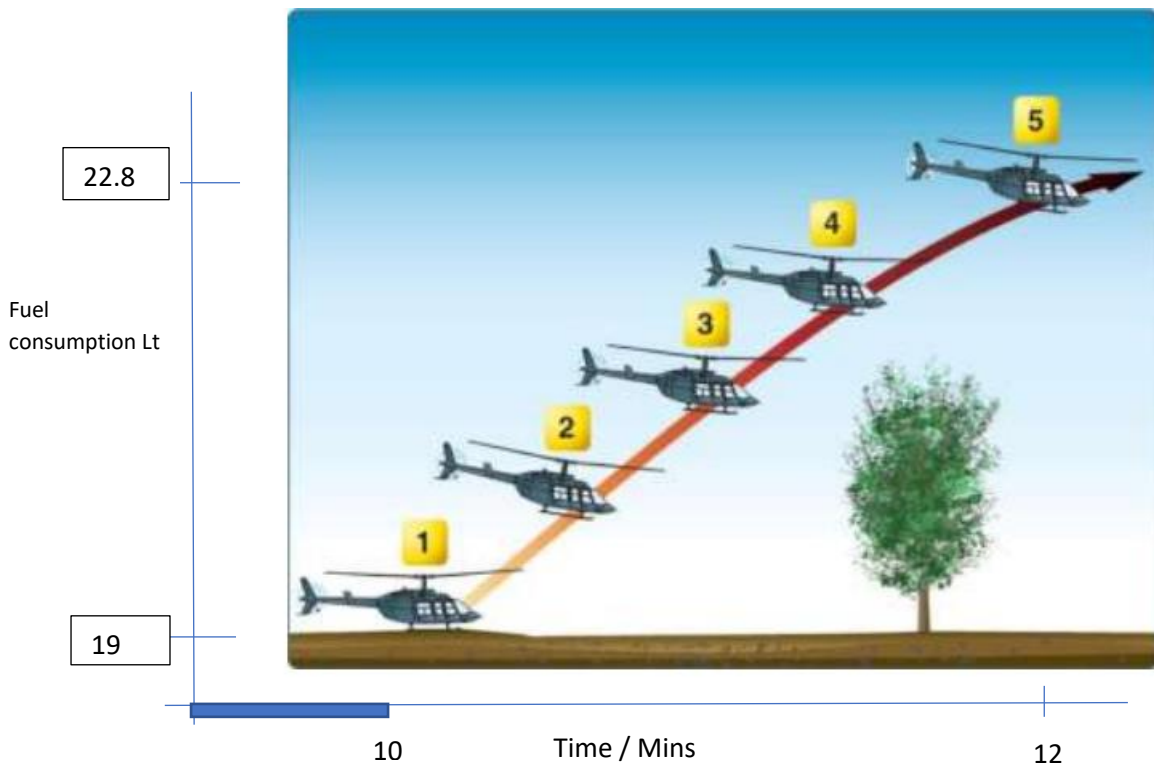


**Figure 16** Helicopter landing site, preferred flight paths and helicopter downwash impact zones Source; JJ Ryan 2021.

Apart from volatile emissions from helicopter departures/arrivals discussed below, particulate emissions may be generated from disturbed surfaces due to helicopter downwash across the impact zone.



**Figure 17** illustrates helicopter take off mode according to maximum performance take off and fuel consumption.



The purpose of a maximum performance take-offs is to transition from the helipad surface to a maximum performance climb to clear barriers in the flightpath. This mode is selected to demonstrate fuel consumption in litres versus time of ascent.

There is a variation to the maximum performance take-off manoeuvre is to complete a vertical take-off. This technique allows the pilot to descend vertically back into the confined area if the helicopter does not have the performance to clear the surrounding obstacles. During this manoeuvre, the helicopter must climb vertically and not be allowed to accelerate forward until the surrounding obstacles have been cleared.

Mode of operation versus Fuel Consumption / emissions.

**Engine start up** – Precheck / engine warm up – approximately 10min. During this period approximately 19 litres of fuel will be used.

**Position 1:** Begin take-off by getting the helicopter light on the skids. Pause and neutralise all aircraft movement. Slowly increase the collective and position the cyclic to lift off in a 40kt altitude. Continue to increase the collective slowly until the maximum power available is reached (take-off power is normally 10% above power required for hover).

**Position 2:** The large collective movement in Position 1 requires a substantial increase in pedal pressure to maintain heading. Use the cyclic as necessary to control movement toward the desired flightpath.

**Position 3:** Continue using cyclic to maintain desired climb angle. Maintain rotor rpm at its maximum and do not allow it to decrease.

**Position 4:** Maintain these inputs until the helicopter clears the obstacle or until reaching 50ft.

**Position 5:** Establish a normal climb altitude and power setting.

Between position 1 – 5 approximately 2 litres of fuel will be used over about 2 mins of operation.

In the vicinity of the site a total of 22.8 litres of fuel will be used to operate the helicopter to perform a complete mode of ascent. This will result in emissions of carbon monoxide (CO), oxides of nitrogen (NOX), sulphur dioxide (SO<sup>2</sup>) particulate matter (PM)<sup>3</sup> and to a lesser extent, volatile

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<sup>3</sup> Emission rates of PM<sub>10</sub> and PM<sub>2.5</sub> were assumed to be equivalent to total particulates. Particulate matter emitted from aircraft can be classified into a number of groups, depending on the size of the particles. PM<sub>10</sub> is defined as all particulate matter with an aerodynamic diameter of 10 µm or less. PM<sub>2.5</sub> is similarly defined as all particulate matter with an aerodynamic diameter of 2.5 µm or less and is a subset of PM<sub>10</sub>. Combustion particles, such as those emitted by aircraft, are generally made up predominantly of particles falling into the PM<sub>2.5</sub> category. This assessment has assumed that all emitted particulate matter is both PM<sub>2.5</sub> and PM<sub>10</sub> and, hence, will overestimate the potential impacts associated with emissions of particulate matter.

organic compounds (VOCs)), likely to be emitted such as oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs) and PAHs.

The GHG emissions from Jet A are similar to gasoline, at around 3 kg per litre ( ), therefore, 22.8 litres would result in 68.40 kg of GHGs which may take place twice per day, therefore 136.80 kg/d GHG emission. This emission quantity is contrasted with an airport transport van which would consume approximately 3 times less than the Bell 206L.

Management measures for controlling emissions from helicopter operations are related to design elements described in section 6.2 below.

#### 5.2.4.2 Operation Base Component – Repairs and Maintenance / welding process

The proposed operation base supports activities involve repair and maintenance of vehicles and plant and machinery and periodically involves the need for welding to repair / modify plant. Electric welding is used which has the greatest potential for emissions of NPI listed substances. Particulate matter and particulate-phase hazardous air pollutants are the major concerns in welding processes. The elemental composition of welding fume varies with the electrode and gas phase pollutants are also generated, but little information is available on these pollutants.

PM<sub>10</sub> emission factors from arc weld electrodes depend on not only the process and the electrode type, but also on the base metal , voltage, current, arc length, shielding gas, travel speed and welding electrode angel.

National Pollution Inventory Emission Estimation Techniques – fugitive emissions from welding are not covered under the NPI.

Management measures for controlling emissions form welding operations are described below in section 6.2.

#### 5.2.4.3 Operation Base Component – Plant and Machinery Repairs and Maintenance / wash bay

General plant and machinery maintenance will also involve the cleaning of plant/machinery. Residues from this process may be a source of particulate matter (PM<sub>10</sub>) which if exposed to wind may be dispersed in the immediate area as fugitive emissions. These emissions may also contain trace amounts of Category 1 and Category 2 NPI – listed metals and hydrocarbons,

Management measures for controlling emissions from plant and machinery washing is described below in section 6.2.

#### 5.2.4.4 Operation Base Component – Training facility

Fugitive emissions may be generated from vehicle traffic by people attending training sessions if travelling on disturbed surfaces.

Management measures for controlling emissions from site traffic is largely controlled by engineering elements described below in section 6.2.

#### 5.2.4.5 Operation Base Component – Transport of plant and machinery into and from the facility.

The general movement of vehicles around the site are a source of fugitive emissions from wheel generated dust if surfaces are disturbed.

Management measures for controlling emissions from site traffic is largely controlled by engineering elements described below in section 6.2.

## 6.0 Management Measures

### 6.1 Construction

Best practice management measures would be implemented as described in the Construction Environmental Management Plan (CEMP) for the Project. Management measures would incorporate the following types of controls:

- Engineering controls such as suppressing dust by using water sprays on stockpiles and roads.
- planning controls e.g. scheduling known dust generating activities during favourable meteorological conditions;
- operational controls such as wetting of unsealed roads. Potential air quality impacts would be localised and occur over a defined period. The implementation of appropriate management practices would ensure that impacts on nearby sensitive receptors and the receiving environment are minimised.

The management measures are presented in Table 7 below.

**Table 7 Proposed management measures to control emissions during construction.**

Emissions Source	Management Measure
Heavy Commercial Vehicles	Diesel fuelled vehicles would be fitted with diesel particulate filters and serviced in accordance with manufacturer's instructions to ensure compliance with the requirements prescribed in the Diesel Vehicle Emissions NEPM. – Speed limits e.g., 20 km/hr would be imposed on vehicles travelling within the construction site.
Vehicle movements All vehicle movements would be strictly limited to designated	All vehicle movements would be strictly limited to designated entry and exit areas, and parking locations.
Adverse meteorological conditions	Construction's activities would be reduced under adverse meteorological conditions e.g., high winds and extended periods of low rainfall
Earthmoving and excavation	All excavated spoil would be wetted to minimise PM emissions.

### 6.2 Operational

Apart from ongoing mitigation measures to control emissions, a number of design elements have been included in the operation base to address potential air emissions with respect to particulate matter and volatile emissions.

### 6.2.1 Particulates

The following table details proposed particulate mitigation measures included in design of the operation base and operational measures to be implemented to minimise potential impacts on the surrounding environment.

**Table 8 Particulate sources and management measures**

Source of Particulate	Management Measure
Aircraft operation/helicopter	<ul style="list-style-type: none"> <li>- Provision of hard stand for helicopter landing in a location appropriate for dispersion of emissions.</li> <li>- Landscaping of surrounding areas.</li> <li>- Location of helicopter landing site away from drainage lines to avoid erosion.</li> <li>- Refuelling of aircraft from mobile fuel tank to take place in the designated area according to site safety plan.</li> </ul>
Plant and equipment washing	<ul style="list-style-type: none"> <li>- Provision of dedicated wash bay contained in an enclosed building drainage to sumps for collection of sediment.</li> <li>- Off site disposal of sediment from wash bays.</li> </ul>
Traffic movements	<ul style="list-style-type: none"> <li>- Provision of sealed surfaces for all internal site traffic</li> <li>- Maintenance of all hard stand surfaces/access by regular sweeping.</li> </ul>
Repairs and Maintenance / welding operations	<ul style="list-style-type: none"> <li>- All welding processes to take place in appropriated located enclosed building with air ventilation/extraction/dispersal</li> </ul>

**Table 9 Volatile emission sources and management measures.**

Source of Particulate	Management Measure
Aircraft operation/helicopter	<ul style="list-style-type: none"> <li>- Appropriate location of helicopter landing site which has been subjected to downwash assessment to determine/model air emission dispersion and flight paths – arrival/departure.</li> <li>- Flight path assessment to determine appropriate location of landing site.</li> <li>- Compliance with aircraft mode of operation / safety management plan.</li> </ul>
Repairs and Maintenance / welding operations	<ul style="list-style-type: none"> <li>- All welding processes to take place in appropriated located enclosed building with air ventilation/extraction/dispersal</li> </ul>
Traffic movements	<ul style="list-style-type: none"> <li>- Diesel fuelled vehicles would be fitted with diesel particulate filters and serviced in accordance with</li> </ul>

- manufacturer's instructions to ensure compliance with the requirements prescribed in the Diesel Vehicle Emissions NEPM.
- Company vehicles to be serviced to ensure emission control equipment is maintained in accordance with manufactures requirements.

## 7.0 Conclusion

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Emissions of particulate matter associated with construction of the proposed development/ operations and the proposed helicopter landing site were quantified using publicly available emission estimation data. Atmospheric dispersion modelling predictions of air pollution emissions for proposed activities were not undertaken as it is considered that this would not provide any further useful information.

Construction works are likely to generate particulate matter of varying size fractions (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>). Best management practices (refer section 6.1) would be implemented to ensure potential impacts on the receiving environment and nearest sensitive receptors are minimised.

The potential impacts on air quality due to minor helicopter operations related to the Project were considered for air traffic levels. Given the limited number of aircraft movements, pollutants were found to have negligible potential for impact in an industrial estate setting.

The management measures outlined in section 6.2, if implemented should provide appropriate mitigation against adverse air quality emissions.

Based on outcomes of this assessment, it is concluded that the operational base would present a low risk of exceeding the adopted assessment criteria in the immediate area and at identified sensitive receptors during construction works and operation of the base.

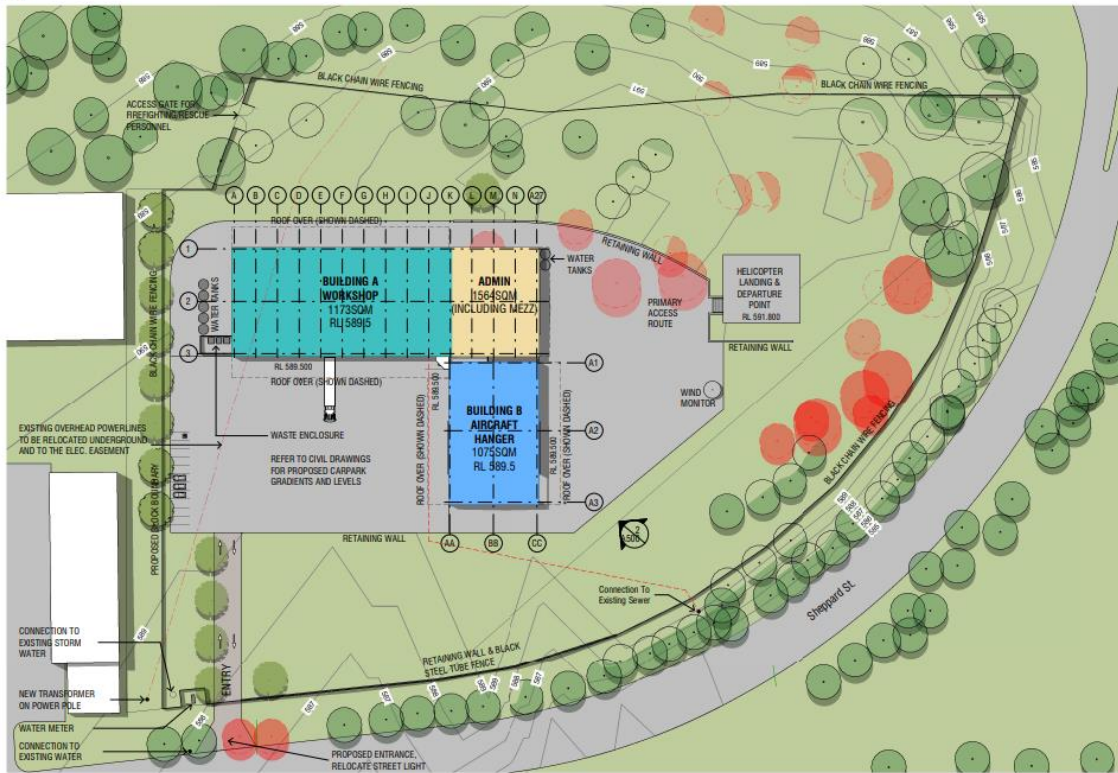
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Appendix A

Proposed development plans.

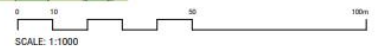
**Proposed TRG Bushfire Response and Training**

Block 45 Section 3  
Hume, ACT

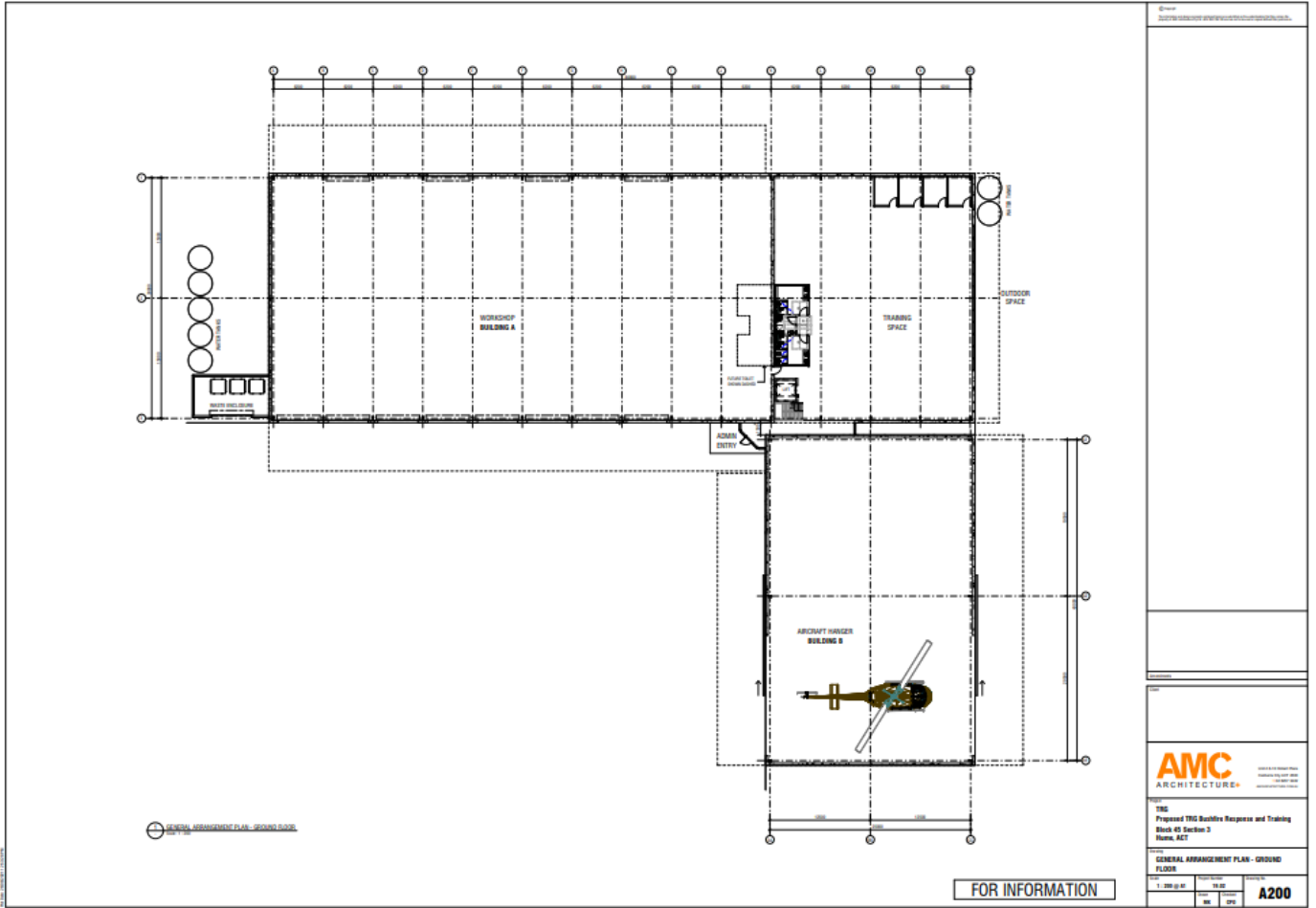


- LEGEND**
- Administration
  - Workshop
  - Aircraft Hanger
  - Hard Surface / Carparking
  - Existing Tree
  - Tree to be removed
  - Proposed Tree

**SITE LOCATION PLAN**  
Scale: 1 : 1000



DRAWING	REV	DATE	SCALE	TITLE	Site 1.01, Level 1, 10 Hobart Place, Canberra City   02 6257 3222   02 6257 4190 ACT 2600   AMCARCHITECTURE.COM.AU
+	SK01		1 : 1000	SITE PLAN	



**AMC**  
ARCHITECTURE

TBC  
Proposed TBC Building Response and Training  
Block 40 Section 3  
Hume, ACT

GENERAL ARRANGEMENT PLAN - GROUND FLOOR

DATE	SCALE	PROJECT NO.
11/20/2018	1:100	A200

