Volume 3

Melbourne Airport
M3R MDP

Chapters B6–B9

MELBOURNE AIRPORT


Jet

Chapter B6
Indigenous Cultural Heritage

Summary of key findings:

- A detailed assessment of Indigenous cultural heritage values within Melbourne Airport's Third Runway (M3R) study area has been completed. This assessment was undertaken in accordance with the requirements of the Commonwealth and Victorian governments.
- The assessment identified 33 previously recorded Aboriginal cultural heritage places within the study area. These consisted of stone artefact scatters, low density artefact distributions, and scarred trees. The results of the survey and test excavations for the project have combined a large number of these existing values. There are now 17 Aboriginal places in the study area as a result of the completed Cultural Heritage Management Plan (CHMP). However, not all of the Aboriginal places or components thereof will be impacted.
- Melbourne Airport prepared a CHMP 16792 (Biosis Pty Ltd 2020) in consultation with Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation (Wurundjeri). Wurundjeri is the Registered Aboriginal Party (RAP) for the region that includes Melbourne Airport. The CHMP details the findings of the assessment, and the specific heritage management requirements to be implemented to avoid, manage and mitigate impacts to heritage values. These measures include, cultural inductions for people working on M3R and site specific procedures to manage Aboriginal cultural heritage places during the life of M3R.
- The CHMP has been approved by Wurundjeri and follows best practice under the Victorian state heritage legislation.

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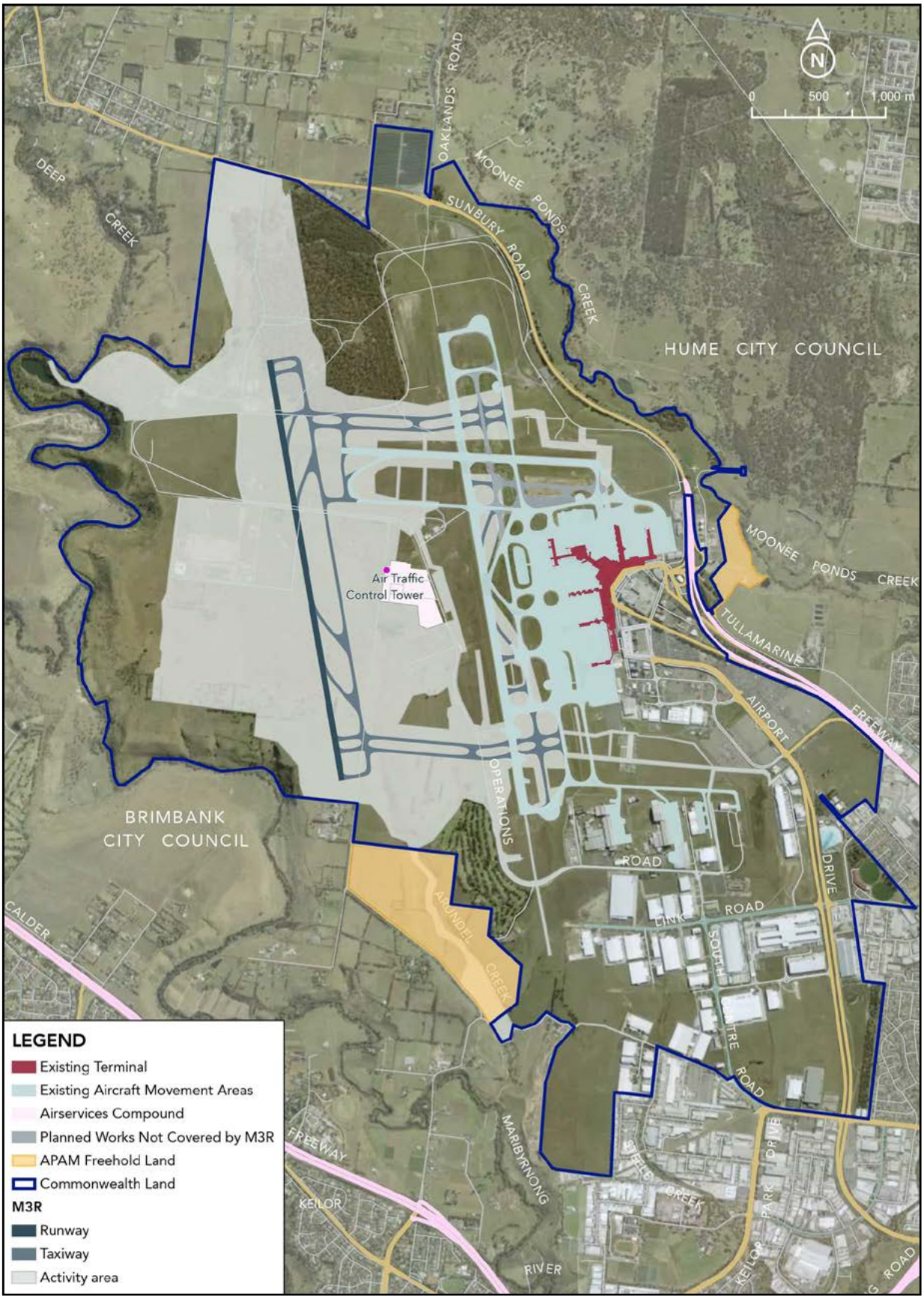
B6.1
INTRODUCTION

This chapter describes the Indigenous cultural heritage values of the project area (referred to as the study area) and the legislation and policy requirements applicable to Melbourne Airport's Third Runway (M3R). It also outlines the associated assessment methodology for identification of Indigenous cultural heritage values. In addition, it provides an assessment of the potential impacts, then identifies measures to specifically avoid, manage, mitigate and/or monitor these impacts.

For the purposes of this chapter, the study area refers to the M3R disturbance footprint (**Figure B6.1**).

Figure B6.1
Extent of the cultural heritage study area



B6.2 METHODOLOGY

B6.2.1 Methodology and assumptions

First Peoples – State Relations (FP-SR) (formerly Aboriginal Victoria) does not have jurisdiction on Commonwealth land under the *Airports Act 1996* (Airports Act) Section 112 (2), and therefore the provisions of the Victorian *Aboriginal Heritage Act 2006* do not apply on Melbourne Airport land. However, to manage potential impacts to Aboriginal cultural heritage at Melbourne Airport in a way that is comprehensive, Cultural Heritage Management Plans (CHMPs) can be completed on a voluntary basis under the Victorian Aboriginal Heritage Act 2006. They are an appropriate management methodology to ensure that Commonwealth requirements under the *Airports Act 1996* (Cth) (the Airport Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) are met. This process also ensures detailed consultation with the Wurundjeri.

A Notice of Intent to prepare a voluntary CHMP under the Aboriginal Heritage Act 2006 was submitted on behalf of Melbourne Airport to the Secretary, Department of Premier and Cabinet (DPC), and Wurundjeri which is the relevant Registered Aboriginal Party (RAP), before the commencement of the CHMP. FP-SR allocated number 16792 to this assessment.

Once approved by the evaluating authority (i.e. the Wurundjeri), the approved CHMP 16792 is made available to Melbourne Airport for use in ongoing planning and construction requirements for M3R. The CHMP was approved by the RAP on 22 July 2022.

Investigation and assessment of cultural (Indigenous) heritage values was undertaken in accordance with relevant Victorian and Commonwealth heritage guidelines and criteria. These guidelines and criteria include:

- Victorian Aboriginal Heritage Regulations 2018 (Aboriginal Heritage Regulations (Vic) 2018)
- Guide to Preparing Aboriginal Cultural Heritage Management Plans (Aboriginal Victoria 2016)
- Guidelines for Conducting and Reporting on Aboriginal Cultural Heritage Investigations (Aboriginal Victoria 2012)
- Standards for Recording Victorian Aboriginal Heritage Places and Objects (Aboriginal Affairs Victoria 2008; 2013)
- Guidelines for the Assessment of Places for the National Heritage List (Commonwealth of Australia 2009)
- Commonwealth Heritage List criteria (Commonwealth of Australia 2020).

CHMP 16792 also includes long term maintenance conditions for cultural heritage places. These will address the ongoing conservation of cultural heritage places during standard operations and land management activities at Melbourne Airport.

The investigation of cultural heritage values under CHMP 16792 includes a review of the region's history, and background research of state databases and resources (the 'Desktop Assessment'), a field survey (the 'Standard Assessment'), archaeological excavations (the 'Complex Assessment'). Following the field component, a significance and impact assessment is completed to determine cultural heritage values in the study area, their level of importance and the proposed impacts at these areas by M3R.

The complex assessment method was determined and agreed to between Biosis (on behalf of Melbourne Airport) and Wurundjeri at the post-standard assessment project meeting on 25 February 2020. Subsequently, the scope and aims of stage 1 of the complex assessment were communicated to Wurundjeri's Heritage Unit Manager and Elders via email correspondence on 22 September 2020. It was explained that the stage 1 excavations would be completed within the framework of the previously agreed method, and were required to inform this chapter of the MDP. Wurundjeri responded and indicated they had no further comments on this approach.

An interim meeting was held with Wurundjeri on 22 June 2021 before undertaking Stage 2 of Complex Assessment. Wurundjeri held no further comments on the approach and aims of this fieldwork, with remaining excavations for the CHMP completed in late 2021. Preliminary discussions were held with Wurundjeri on 16 December 2022 to determine management requirements for the CHMP and Aboriginal places in the study area. Additional meetings were subsequently held between APAM, Wurundjeri and Biosis to finalise the CHMP and begin a working cultural heritage awareness strategy for M3R; these meetings were held on 2 February 2022 and 10 March 2022. Consultations continue between Wurundjeri and APAM for M3R beyond the requirements of the CHMP's pre and post-approval actions.

Methodology for each stage of the investigation is discussed below, and the results of investigations presented in **Section B6.4**. Throughout the CHMP process, consultation in the form of formal meetings, email correspondence and Wurundjeri representative and field officer attendance during field assessment with Wurundjeri occurred. All Traditional Owner consultation was carried out following:

- Guidelines for Ethical Research in Australian Indigenous Studies (Australian Institute of Aboriginal and Torres Strait Islander Studies 2012)
- Victorian Aboriginal Heritage Act 2006 (Aboriginal Heritage Act (Vic) 2006), and Regulations 2018 (Aboriginal Heritage Regulations (Vic) 2018)

- Guidelines for Conductions and Reporting on Aboriginal Cultural Heritage Management Plans (Aboriginal Victoria 2012)
- Engage Early – Guidance for Proponents on Best Practice Indigenous Engagement for Environmental Assessments under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth of Australia 2016).

B6.2.2
Desktop assessment

A desktop assessment was undertaken to establish known and potential cultural heritage values in the study area. The assessment included consultation with Indigenous stakeholders, a review of historic aerial photography, and searches of applicable heritage registers and reports. The results were used to develop a predictive model of heritage potential in the study area, which was then used to guide the field survey.

The Australian Heritage Database and the Victorian Aboriginal Heritage Register (VAHR) were searched for information on cultural heritage values in the study area. The Australian Heritage Database includes World and National Heritage Lists. The VAHR contains all records of Indigenous cultural values and heritage places across Victoria.

B6.2.3
Standard assessment survey

The standard assessment field survey was undertaken to ground truth (through direct observation and measurement) the predictive model and predictive statement developed in the desktop assessment, identify and record Indigenous heritage places (referred to on the VAHR and in the Victorian Aboriginal Heritage Regulations 2018 as 'Aboriginal cultural heritage places' and 'Aboriginal places'), and identify areas with potential for Indigenous heritage. The field survey targeted the previously unassessed areas of the M3R footprint. The areas assessed by the previous Runway Development Plan (RDP) CHMP 12774 did not require re-survey unless a recorded Aboriginal place within M3R was located there.

The field survey was undertaken in one phase, in November and December 2019. It was conducted on foot across the M3R footprint (outside areas covered by an existing CHMP) apart from some airside locations where access was precluded. CHMP 12774 has documented that airside areas have been heavily impacted by existing airport and runway constructions. These areas were recorded as part of the 'modified basalt plains' landform within the CHMP.

The field survey produced a series of identified and potential locations for cultural heritage, which were mapped along with results of the desktop assessment to provide locations for further investigation. These were then examined on site in detail. Visible surface features were recorded using digital photography (with a Nikon AW120 camera). Location features were recorded with Trimble Differential Global Positioning System with GNSS Receiver (accurate to +/-1 metre after processing) and transferred to ArcGIS for digital mapping.

B6.2.4
Complex assessment test excavation

Excavations were completed around locations of known Aboriginal places which showed surface evidence of cultural material during the field survey, suggesting the presence of subsurface features in the area. Excavations were also undertaken where ground conditions were too obscured to show any evidence of surface material and where the predictive model indicates cultural material is likely to be present (e.g. Arundel Creek floodplain). The test excavations completed for the CHMP focused on establishing controlled stratigraphic excavations and determining spatial extents of Aboriginal cultural heritage places using a combination of hand and mechanical excavation, in order to fully determine the potential impact to these places by M3R.

The CHMP excavation methodology was endorsed by Wurundjeri Elders during the CHMP consultation process and over each stage of proposed investigations.

B6.2.5
Significance assessment

A significance assessment of each Indigenous heritage place using Commonwealth Heritage List criteria (CHL) (Commonwealth of Australia, 2020) and the CHMP significance assessment process was undertaken to understand the heritage values at each heritage place and their level of importance. These criteria are discussed in more detail in Section B6.3.3.

B6.3
STATUTORY AND POLICY REQUIREMENTS

Knowledge of cultural heritage legislation is essential when assessing sites, places or items of cultural heritage significance. Commonwealth and Victorian requirements applicable to cultural heritage values in the study area are discussed in this section.

B6.3.1
Commonwealth legislation

Melbourne Airport is located on Commonwealth land. *The Airports Act 1996* and EPBC Act are the key pieces of legislation that set the regulatory framework for M3R and this assessment, as discussed in Chapter A8: Assessment and Approvals process. However, consideration has also been given to relevant Victorian legislation (including environmental planning instruments, policies, and guidelines) where appropriate.

B6.3.1.1
Airports Act 1996

Section 112(2) of the Airports Act states that 'the land use, planning and building controls within Part 5 of the Commonwealth Act operate to the exclusion of a law of a state'. In Victoria this is applicable to land use planning legislation such as the Victorian *Planning and Environment Act 1987* and the *Aboriginal Heritage Act 2006*.

Under the Airports Act, it is understood that the intention is to 'cover the field' of heritage protection. However, the preference of Melbourne Airport when assessing heritage is to address all requirements under the Commonwealth legislation, while also considering the requirements of Victorian legislation to inform recommendations and follow best practice.

Therefore the implications for the project were assessed in relation to both Commonwealth and Victorian legislation:

- Matters listed under the EPBC Act, associated policy statements and significant impacts guidelines including:
  - Matters of National Environmental Significance (MNES) *Significant impact guidelines 1.1* of the EPBC Act (Commonwealth of Australia 2013a), and;
  - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies *Significant impact guidelines 1.2* of the EPBC Act (Commonwealth of Australia 2013b).
- Matters listed under the *Aboriginal Heritage Act 2006* and the Aboriginal Heritage Regulations.

B6.3.1.2
Environment Protection and Biodiversity Conservation Act 1999 – Significant Impact Guidelines 1.2

A significant impact on the environment is an impact that is 'important, notable, or of consequence, having regard to its context or intensity' as defined in *Actions on, or impacting upon Commonwealth land, and actions by Commonwealth agencies, Significant impact guidelines 1.2 Environment Protection and Biodiversity Conservation Act 1999 (Significant impact guidelines 1.2)* (DSEWPC, 2013). The significance of an impact is determined according to criteria outlined in the Significant impact guidelines 1.2.

A significant impact is considered likely if there is 'a real or not remote chance or possibility' of the impact occurring. There does not need to be a greater than 50 per cent chance of the significant impact happening. The likelihood of a significant impact is assessed according to the sensitivity, value and quality of the environment that is impacted and according to the intensity, duration, magnitude and geographic extent of the impacts as described in these requirements.

Under the Significant Impact Guidelines 1.2, step 4 outlines self-assessment criteria to determine if an impact is considered significant. Of relevance to this chapter are impacts on heritage, specifically whether M3R would:

- Permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place?
- Involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place?
- Involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place?
- Substantially diminish the heritage value of a heritage place for a community or group for which it is significant?
- Substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place?
- Substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site?

The assessment of potential impacts outlined in Section B6.5 adequately addresses these questions. Harm will be mitigated through avoidance and mitigation strategies as discussed in Section B6.6. Based on assessments completed, the impacts to Indigenous cultural heritage and the whole of environment are considered significant as defined by the *Significant impact guidelines 1.2*. A discussion on the acceptability of this impact is contained in Chapter E6: Summary Commitments and Conclusion.

B6.3.1.3
Australian Heritage Council Act 2003

The Australian Heritage Council Act 2003 (Cth) (AHC Act) provides for the establishment of the Australian Heritage Council (AHC) which is the principal advisory group to the Commonwealth Government on heritage issues and administers the National Heritage List (NHL). The NHL covers places with outstanding natural, Indigenous or historic heritage value to the nation. The AHC assesses whether a nominated place has heritage values against of the nine relevant criteria and makes a recommendation to the Minister for the Environment and Water on that basis. The Minister for the Environment and Water makes the final decision on listing and may take into account social and economic matters.

B6.3.2
Victorian legislation

B6.3.2.1
Aboriginal Heritage Act 2006

The Aboriginal Heritage Act 2006 is administered by First Peoples – State Relations. It is the Victorian Government's key cultural heritage legislation for Indigenous heritage. The Aboriginal Heritage Act 2006 identifies and protects Indigenous heritage places and objects in Victoria. This includes Indigenous artefacts and objects, Indigenous archaeological sites, historic buildings, story places, and cultural knowledge. The Aboriginal Heritage Act 2006 established the VAHR that records all the Indigenous heritage places and objects listed above.

FP-SR does not have jurisdiction on Commonwealth land the provisions of the Aboriginal Heritage Act 2006 do not apply to Commonwealth property. Obtaining an approved CHMP or Cultural Heritage Permit would be the normal process for obtaining statutory approval for any works that may cause harm to places listed on the VAHR. As discussed in **Section B6.2**, while FP-SR does not have jurisdiction on Commonwealth land, Melbourne Airport will meet the standards of state heritage assessment, and a voluntary CHMP under the Aboriginal Heritage Act 2006 was considered appropriate to facilitate this.

The Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation (Wurundjeri) is the RAP for the region that includes the study area. The RAP elected to evaluate the CHMP on 12 September 2019, and the CHMP was subsequently approved by the RAP on 22 July 2022.

B6.3.3
Description of significance criteria

A significance assessment of each Indigenous heritage place has been undertaken using Commonwealth and Victorian standard significance criteria and thresholds to understand heritage values and their level of importance. These criteria are applied with a 'significance threshold' to judge the level of significance of a place's heritage value by considering how important these values are.

Significance assessments of heritage on Commonwealth land use the Commonwealth Heritage List (CHL) criteria. Items of state or local significance can be listed on the CHL if they are located on Commonwealth land. To reach the threshold for the National Heritage List a place must have 'outstanding' heritage value to the nation by comparing it to other, similar types of places. To be entered in the CHL, a place must have 'significant' heritage value. Under the CHL nomination process, nominations must set out the qualities or values of the place that make it significant by indicating how the place meets one or more of the Commonwealth heritage significance criteria.

The CHL criteria (Commonwealth of Australia, 2020) are:

1. The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history
2. The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history
3. The place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history
4. The place has significant heritage value because of the place's importance in demonstrating the principal characteristics of:
    a. a class of Australia's natural or cultural places; or
    b. a class of Australia's natural or cultural environments
5. The place has significant heritage values because of the place's importance in exhibiting particular aesthetic characteristics values by a community or cultural group
6. The place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period
7. The place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
8. The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history
9. The place has significant heritage value because of the place's importance as part of Indigenous tradition.

The NHL criteria (Commonwealth of Australia, 2009) are:

a) The place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history

b) The place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history

c) The place has outstanding heritage value to the nation because of the place's potential to yield

information that will contribute to an understanding of Australia's natural or cultural history

d) The place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:

   i. A class of Australia's natural or cultural places

   ii. A class of Australia's natural or cultural environments.

e) The place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group

f) The place has outstanding heritage value to the nation because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period

g) The place has outstanding heritage value to the nation because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

h) The place has outstanding heritage value to the nation because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history

i) The place has outstanding heritage value to the nation because of the place's importance as part of Indigenous tradition.

Note: The cultural aspect of a (NHL) criterion means the Indigenous cultural aspect, the non-Indigenous cultural aspect, or both.

Cultural heritage value assessments for Indigenous heritage in Victoria are broadly defined in the Burra Charter as the 'aesthetic, historic, scientific or social values for past, present or future generations' (Marquis-Kyle and Walker, 1994). Although there are no formal guidelines for the assessment of significance of Indigenous archaeological places in Victoria, the definition of cultural heritage significance under section 4 of the Aboriginal Heritage Act 2006 includes archaeological, anthropological, contemporary, historical, scientific, social or spiritual significance and significance in accordance with Indigenous tradition. These criteria are typically condensed and assessed as cultural and scientific significance as part of the CHMP process in Victoria.

Many Indigenous heritage places have cultural significance to a specific Indigenous community. It is common practice in Victoria for the Indigenous community to determine the cultural significance of Indigenous heritage places. This determination is typically provided as a statement of cultural significance (either verbally or in written format) during CHMP consultation. The Indigenous community may not always provide a statement of cultural significance, particularly if cultural information is considered dangerous or is culturally restricted. A broad statement of cultural significance may also be provided for an area or cultural places where the traditional owner group(s) have only limited knowledge of ancestral occupation of that area.

Scientific significance is based on the capacity of Indigenous places to provide us with historical, cultural or social information. The scientific significance assessment methodology is based on scores for research potential (divided into 'place contents' and 'place condition') and for representativeness. This system is derived from Bowler (1981). Place contents refers to all tangible cultural materials and organic remains associated with human activity at a place. Place condition refers to the degree of disturbance and integrity of the place to the contents of a place at the time it was recorded. The representativeness of an Indigenous cultural heritage place is assessed by whether the place is common, occasional or rare in a given region. Assessments of representativeness are subjective and can be affected by current knowledge of the distribution and number of Indigenous places, and vary from place to place depending on the extent of archaeological research. The determination of scientific significance for a heritage place is expressed as a statement of significance.

In this instance, Indigenous heritage values have been assessed against the relevant NHL and CHL criteria, and the thresholds in **Figure B6.1** applied, to determine the level at which the place is considered significant. Note that all Indigenous heritage values are protected under the Aboriginal Heritage Act 2006, which does not provide significance thresholds to listings. The VAHR, however, does record different levels of significance which are important in determining appropriate management requirements.

Table B6.1
Significance thresholds

Definition	Threshold
High Significance – Place / element of outstanding or exceptional heritage value that embodies National and Commonwealth criteria in its own right and makes an irreplaceable contribution to the significance of the place as a whole.	National / state Significance: Likely to fulfil criteria for listing on the NHL or VAHR
Moderate Significance – Place / element of heritage value that meets Commonwealth heritage significance in its own right or contributes to the significance of the place as a whole.	State Significance: Likely to fulfil criteria for listing on the VAHR or CHL
Minor Significance – Place / element of heritage value that has some Commonwealth significance in its own right or contributes to the significance of the place as a whole.	Local Significance: Likely to fulfil criteria for listing on the VAHR or CHL.
Negligible Significance – Place / element does not meet Commonwealth or state heritage significance in its own right or is intrusive to the significance of the place as a whole.	Unlikely to fulfil criteria for any heritage listings.

B6.4
EXISTING CONDITIONS

This section details the existing conditions of the study area, and the results of the cultural heritage assessment.

B6.4.1
Desktop assessment

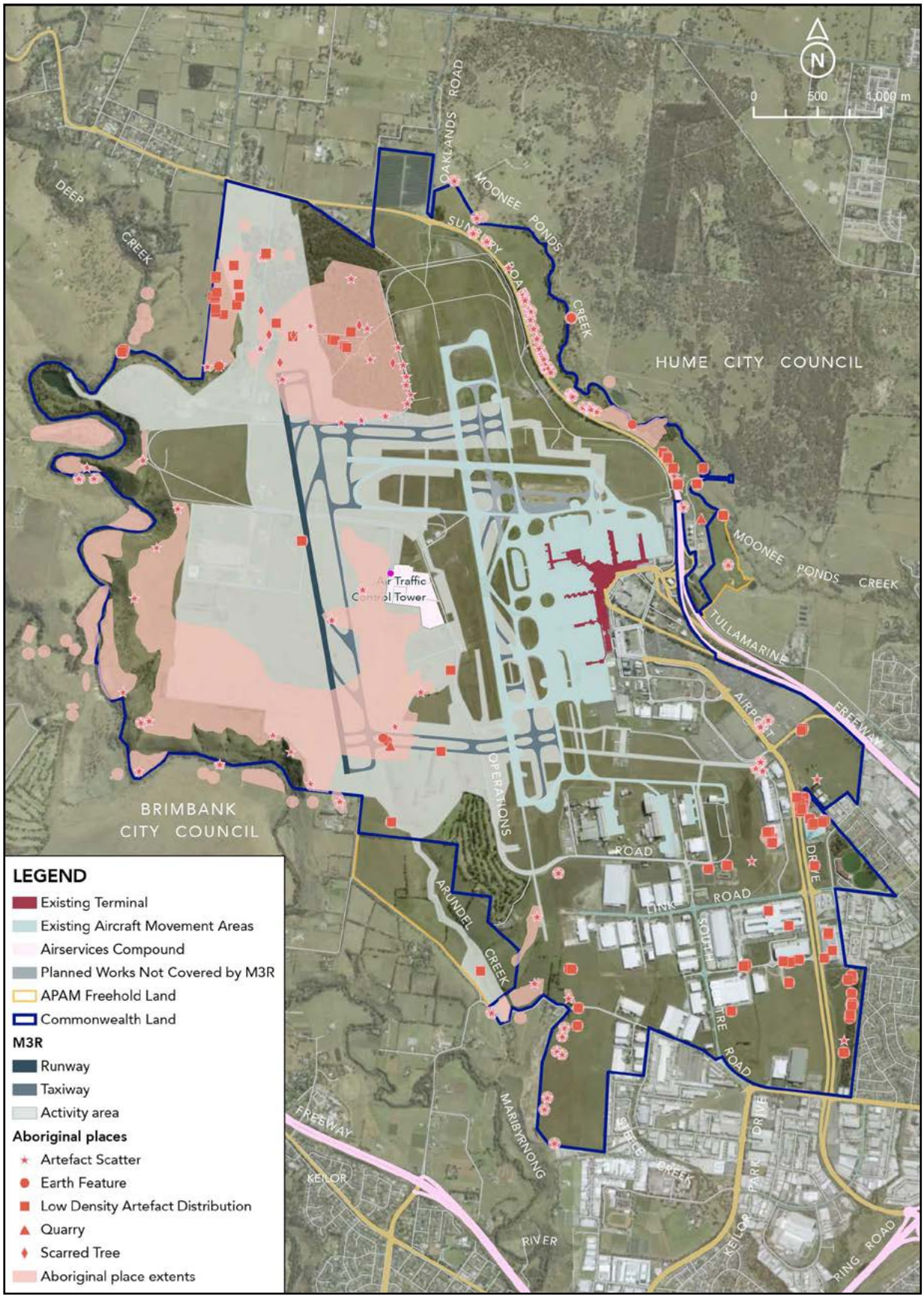
B6.4.1.1
Heritage register searches

At the commencement of M3R, there were 33 previously recorded Indigenous archaeological places within the study area registered on the VAHR (**Table B6.2** and **Figure B6.2**). The places comprise 79 individual place 'components', which include the single GPS point locations of all isolated artefacts and Low Density Artefact Distribution (LDAD) registrations. Components also include individual scarred trees and earth features, where part of a multi-component place such as VAHR 7822-3872 (Glenara Creek 1).

Table B6.2
Heritage register search results – VAHR places in the study area

Name	Register	Listing No.	Place Type
Radar Hill 1	VAHR	7822-0800	Artefact scatter
Radar Hill 2	VAHR	7822-0801	Artefact scatter
Radar Hill 3	VAHR	7822-0802	Scarred tree
Radar Hill 4	VAHR	7822-0803	Artefact scatter
Radar Hill 5	VAHR	7822-0804	Scarred tree
Radar Hill 6	VAHR	7822-0805	Artefact scatter
Radar Hill 7	VAHR	7822-0806	Scarred tree
Radar Hill 9	VAHR	7822-0808	Artefact scatter/earth feature
Radar Hill 10	VAHR	7822-0809	Artefact scatter
Radar Hill 11	VAHR	7822-0810	Artefact scatter
Radar Hill 12	VAHR	7822-0811	Artefact scatter
Radar Hill 13	VAHR	7822-0812	Artefact scatter
Radar Hill 14	VAHR	7822-0813	Artefact scatter
Radar Hill 15	VAHR	7822-0814	Scarred tree
Radar Hill 16	VAHR	7822-0815	Artefact scatter
Radar Hill 17	VAHR	7822-0816	Artefact scatter
Radar Hill 18	VAHR	7822-0817	Artefact scatter
Radar Hill 19	VAHR	7822-0818	Artefact scatter
Radar Hill 22	VAHR	7822-0821	Artefact scatter
Radar Hill 24	VAHR	7822-1116	Artefact scatter
Radar Hill 25	VAHR	7822-1117	Artefact scatter
Melbourne Airport SE 3	VAHR	7822-1335	Artefact scatter
Melbourne Airport Unigas 2	VAHR	7822-1803	Artefact scatter
Arundel Creek LDAD	VAHR	7822-3857	LDAD
Mansfield Road LDAD	VAHR	7822-3858	LDAD
Glenara Creek LDAD	VAHR	7822-3863	LDAD
Deep Creek Escarpment 1	VAHR	7822-3864	Artefact scatter
Upper Maribyrnong Escarpment	VAHR	7822-3871	Artefact scatter/Earth mound
Glenara Creek 1	VAHR	7822-3872	Artefact scatter/Scarred trees
Glenara Creek LDAD 2	VAHR	7822-4081	LDAD
APAM Grey Box Forest LDAD	VAHR	7822-4178	LDAD
Arundel Creek LDAD 2	VAHR	7822-4312	LDAD
Link Road Ridge Artefact Scatter	VAHR	7822-4287	Artefact scatter

Figure B6.2
Previously recorded Indigenous cultural heritage places in the study area



The majority of these Indigenous places are artefact distributions (including isolated artefacts and LDADs). The remainder are scarred trees, earth features and multi-component places which comprise two or more of these place types at the same location. Spatial distribution of these places indicates that artefact distributions are most commonly located along incised river valley edges and alluvial terraces, and areas where high levels of natural ground exposure have occurred. Isolated artefacts are also located throughout the landscape over the flat basalt plains landform in lower densities. Scarred trees are present in remnant vegetation and wooded areas, primarily contained in the Grey Box Woodland located within the north of the study area.

B6.4.1.2 Previous reports

The study area is in close proximity to the Keilor Archaeological Site (VAHR 7822-0010), which was the focus of some of the earliest archaeological investigations in Victoria. The name and extent of archaeological works at the place has been updated due to recent works detailed in part below. The new name attributes traditional language and is now referred to as Murrup Tamboore (VAHR 7822-4277). In addition, the Maribyrnong River, associated creek lines and surrounding volcanic plains have also been subjected to a number of large-scale archaeological survey programs. Outside Murrup Tamboore, archaeological excavation has mainly been associated with developments located on volcanic/basalt plain landforms. The previous archaeological assessment for the Melbourne Airport Runway Development Program (RDP) CHMP 12774 recorded a number of new Indigenous values and places. Many of these were recorded over large sections of land, based on their unique geomorphological context and encompassing landforms. The study area for CHMP 12774 covers approximately two-thirds of the M3R study area.

A discussion of archaeological investigations at Murrup Tamboore, CHMP 12774 and the results of archaeological surveys and excavations in areas surrounding the study area is given below. A summary of report findings is provided in Table B6.3.

Murrup Tamboore (VAHR 7822-4277), formerly known as the Keilor Archaeological Site (VAHR 7822-0010) site

An Aboriginal cranium (Aboriginal ancestral remains) was identified at Keilor (the junction of Dry Creek, now known as Arundel Creek, and the Maribyrnong River) in 1940 by James White and provoked immediate archaeological interest. The former Keilor Archaeological Site (VAHR 7822-0010) has subsequently produced a significant body of work focusing on the archaeology and geomorphology of the site. White had taken the cranium to the National Museum of Victoria, and the site was then visited by a party of museum specialists in December 1940. It was immediately identified that the relationship of the skull with complex alluvial terraces indicated a considerable age for the find. A number of publications were subsequently produced in early 1940s by museum staff in regards to the skull, its geomorphological context, and artefacts surrounding the find (Adam 1943; Mahony 1943a; Mahony 1943b; Mahony 1944; Wunderly 1943; Keble and MacPherson 1946). Ongoing work has been undertaken at the archaeological site in recent years, however the results of these investigations have yet to be published. The Keilor site holds a high amount of cultural significance for the Wurundjeri people. The place provides a direct relationship for the Wurundjeri to the Keilor region, including Maribyrnong River, Arundel Creek and their associated archaeological deposits.

While Mahony (1943a) identified the potential for age, a more detailed study of the geomorphology of the site was undertaken by Keble and Macpherson (1946). Keble and MacPherson produced a geological map of the site, initially identifying three terraces in descending age and labelling them as the Keilor, Braybrook and Maribyrnong. Keble and MacPherson did caution that the Keilor skull may have belonged to a relatively recent burial cut into older deposits. However the find still generated considerable interest in the area; and led to Mitchell subsequently surveying Aboriginal campsites at Keilor, Altona and along the Maribyrnong River in the 1940s although no archaeological excavation was undertaken (Mitchell 1948).

Edmund Gill then undertook a series of studies on the Keilor cranium and geomorphology through the 1950s to early 1970s; focusing on dating the cranium (Gill 1953; Edmund D Gill 1955; E.D. Gill 1955; Gill 1954) and investigating its stratigraphic providence (Gill 1966; Gill and Tindale 1969). Gill concluded that the cranium had been located in the river terrace as a result of secondary deposition rather than burial as raised previously by Keble and MacPherson (Edmund D Gill 1955). Gill subsequently argued that the age of the cranium would be the same as the deposit, and identified the stratigraphic context of the cranium as being located in what he termed the B horizon of the Doutta Galla Silt, sediments roughly 15,000 years old in age (Gill 1966). The Doutta Galla Silt was a reinterpretation by Gill of Keble and Macpherson's Braybrook terrace as an erosion surface cut into the Keilor terrace.

Mulvaney began an excavation of the Keilor site after being introduced to the site by Gill in 1962, adjacent to Gill's believed location for the cranium. The excavation was washed away in a flash flood in 1963, ending the work. Mulvaney did believe that he had identified a hearth feature (Brown, 1995, p. 7). Gallus had also been introduced to the site in 1953 by Gil, and he began excavations with the Archaeological Society of Victoria in 1966 through to 1974. Gallus subsequently produced a number of publications (1971, 1972 and 1983) detailing the results of these excavations and, in conjunction with the results of Koonalda Cave, to argue for a Pleistocene age for Indigenous colonisation of Australia, theorise that *Homo erectus* may have arrived in Australia before *Homo sapiens*, and that Australia may have been an area of independent biological and cultural evolution for modern humans (Gallus 1970).

Table B6.3
Previous reports summary

Report	Summary
Presland, (1983)	Presland (1983) undertook the first large scale archaeological survey of the Melbourne metropolitan area. The study area is located in Survey Unit 1, the Yarra and Maribyrnong Rivers and their associated floodplains. In discussing resource availability, Presland notes that Silurian silcrete outcrops are known to occur below surface basalt layers around Keilor and along the Maribyrnong River. In Survey Unit 1, Presland recorded 10 new Indigenous cultural heritage places, six scarred trees near Carrum Swamp and four stone artefact scatters on the Maribyrnong River, none of which are located in the study area.
Rhodes, (1989)	Rhodes (1989) undertook an archaeological survey of the upper Maribyrnong River Valley, Deep Creek and Jacksons Creek, which included eastern portions of the study area. Rhodes recorded 50 Indigenous cultural heritage places consisting of 36 artefact scatters, three isolated finds, three quarries, two scarred trees and one contact site. In assessing site distribution patterns by landform, Rhodes noted that the majority of places were located on alluvial terraces (46 per cent), hill slopes (28 per cent) and the escarpment edge (20 per cent). Only three places were located on the river channels, being predominantly scarred trees, and no places were noted on river cliffs. Rhodes also noted that the limitation of scarred trees to river channels was most likely due to the survival of remnant native vegetation in these areas. Silcrete quarries were limited to hill slope landforms where appropriate erosion actions had occurred to expose underlying Silurian deposits.
Rhodes, (1990) and du Cros, (1990)	Rhodes (1990) and du Cros (1990) conducted separate archaeological surveys for a study of Keilor and Sydenham respectively, which covered portions of Rhodes' 1989 survey. Rhodes' 1990 study included the southern half of the current study area while du Cros undertook her survey overlapping the south-west corner of the present study area along the Maribyrnong River. While both Rhodes and du Cros surveyed across large areas of volcanic plains, the vast majority of Indigenous cultural heritage places were recorded in incised river valleys (10 of the 12 places identified by Rhodes and 16 of the 19 places identified by du Cros). Sites outside of river valleys consisted of small, low density artefact scatters or isolated finds, with overall trends in river valleys conforming to those identified in Rhodes' 1989 survey.
Marshall, (1995)	Marshall (1995b) undertook a survey of an alluvial terrace on the Maribyrnong River in the south west of the present study area to inform approvals for the removal of 2 metres of topsoil from the terrace. Marshall identified the terrace as belonging to the 'Maribyrnong terrace' dated to the Holocene and first identified by Keble and MacPherson (1946) at the downstream Keilor site. An artefact scatter of 68 flaked stone artefacts was identified across the extent of terrace and Marshall recommended that test excavation be undertaken, which was performed later in 1995 (Marshall, 1995a).
Marshall, (1995)	Marshall (1995a) excavated 23 shovel probes across the terrace to depths between 25 and 57 centimetres in silty clay, recovering a total of 238 artefacts. The limited depth of excavation was due to the hardness of silty clay encountered. Despite only recovering cultural material in the first 35 centimetres of deposit, Marshall expected that more cultural material would be present at depths below the extent of excavation. The excavation results indicated that the artefacts were recovered from a disturbed context, with Indigenous cultural material being mixed with modern European material. Marshall recommended that the first 35 centimetres of top soil will subsequently be stockpiled on site to retain as much cultural material as possible.
Vines, (1995)	Vines (1995) undertook an archaeological survey of the Grey Box Woodland, which includes small northern portions of the study area, with his study area including the granite intrusion at Radar Hill. Vines identified a total of 23 Indigenous cultural heritage places, including eight isolated artefacts, five scarred trees and ten surface artefact scatters. All of the four larger artefact scatters (VAHR 7822-0800, 0808, 0819 and 0820) were located in close proximity to water (Deep Creek) while smaller scatters and isolated finds were found across the Grey Box Woodland area. No archaeological excavation was undertaken, but Vines noted that VAHR 7822-0800, 0808, 0819 and 0820 appeared to be relatively in situ and had potential for archaeological deposits.
Newby and Muir, (1998)	Newby and Muir (1998) surveyed a proposed pipeline route along the northern edge of the study area, along the boundary between the airfield and Grey Box Woodland into Deep Creek. No Indigenous cultural heritage material was identified during the survey. Although the survey area included part of the Maribyrnong River escarpment and associated slopes, Newby and Muir determined that their study area was of low archaeological potential due to disturbance and steepness of the slope.
Clark, (2002)	Clark (2002) undertook a survey (Report #2165) of south-eastern portions of Melbourne Airport to identify potential heritage constraints and inform planning for future expansion at the airport. Generally the survey was hampered by very poor ground surface visibility, with three Indigenous cultural heritage places being identified in areas of exposure or disturbance. These places were two isolated finds, VAHR 7822-1334 (Melbourne Airport 2) and VAHR 7822-1335 (Melbourne Airport SE 3), identified in places of disturbance; and one large artefact scatter VAHR 7822-1333 (MELBOURNE AIRPORT 1) identified on exposures of the Maribyrnong River escarpment.
Smith, Mialanes, Kiddell and Reeves, (2010)	Smith, Mialanes, Kiddell and Reeves, (2010) undertook a CHMP (#10901) for the Kings Road Interchange at Taylors Lakes, southwest and outside of the study area. The complex assessment included the excavation of five 1 x 1 metre test pits and ninety-three 30 x 30 centimetre shovel probes across volcanic plain landforms. All excavation locations were relatively shallow with an average depth of 30 centimetres or less in depth being achieved and the maximum excavation depth being 50 centimetres. Soil deposits were consistent across the CHMP 10901 area, being shallow deposits of softer clay, silty clay or silt over compacted clays. Only one artefact was located subsurface at VAHR 7822-2401, with surface artefacts being identified at VAHR 7822-1311, -1766, -1764 and -2400.
Albrecht, (2012)	Albrecht (2012) undertook a CHMP (#12136) for a proposed development at 77 Keilor Park Drive in Tullamarine, outside and south of the study area. A standard archaeological survey identified partial disturbance by previous building constructions; however the remaining area had been used for grazing and farming activities. A total of three 1 x 1 metre test pits and four 40 x 40 centimetres shovel probes were excavated to a maximum depth of 35 centimetres as part of the complex assessment. The test pits revealed previous soil disturbance, whilst the shovel probe transect appeared to be less disturbed. No Indigenous cultural heritage places were identified as part of archaeological investigations.

Report (cont.)	Summary (cont.)
Croker et al, (2012)	Croker et al, (2012) completed a CHMP (#12067) for portions of the Maribyrnong River riverbanks and alluvial terraces in 2012 to inform weed removal and revegetation activities. The activity area includes south west portions of the current study area. Ground surface visibility was relatively poor at 5 per cent, but three new Indigenous cultural heritage places were identified: two artefact scatters, VAHR 7822-3301 and 3302, on lower simple slopes (i.e. slopes between hill crests and foots) directly above river terraces; and a scarred tree, VAHR 7822-3303, on an alluvial terrace. None of these places are located in the study area.
Lawler, (2012)	Lawler (2012) undertook a CHMP (#11956), which overlaps slightly with the south-west boundary of the study area and borders the activity area for CHMP 10901. The CHMP was located on the volcanic plains landform. One 1 x 1 metre test pit and 35 shovel probes of 40 x 40 centimetres were excavated. As with CHMP 10901, the average excavation depth was relatively shallow at 20 centimetres or less and no excavation point went deeper than 40 centimetres. The vast majority of excavation points encountered loam and stone fill associated with a nearby road, before bottoming out on compacted clay. No Indigenous cultural material was identified during the assessment.
Minos & Noble, (2012)	Minos & Noble (2012) completed a voluntary CHMP (#12237) for a proposed 10 hectare construction worksite compound, overlapping the south-east boundary of the study area. There were two previously recorded Indigenous places within 300 metres of the activity area; VAHR 7822-1335 (Melbourne Airport SE 3) being an isolated artefact and VAHR 7822-3480 (Steele Creek North), a low density artefact scatter. Despite limited ground surface visibility, the field survey identified two artefacts on exposed ground. These artefacts were registered as VAHR 7822-3519 (Operations Road, Melbourne Airport). The test excavations consisted of 131, 400x400 millimetre shovel test pits and three 1x1 metre Test Pits. No subsurface Indigenous cultural heritage material was identified, due to past land use and erosion. The results of the complex assessment indicated this area has low sensitivity for cultural heritage material. Management conditions included a surface salvage of identified artefacts as harm could not be avoided to the material.
Noble, (2012)	Noble (2012c) completed a CHMP (#12333) for an extension of Airside Road in Tullamarine, located west of Airport Drive and south of its intersection with Mercer Drive. This CHMP overlaps the current study area in the south most-east section. Two previously recorded Indigenous places were located in the activity area, Artefact Scatters VAHR 7822-1335 (Melbourne Airport SE 3) and VAHR 7822-1803 (Melbourne Airport Unigas 2). The Desktop Assessment concluded that there is low potential for further cultural heritage material to be present in the activity area. The standard assessment was undertaken by pedestrian survey and noted poor ground surface visibility and the presence of occasional basalt floaters. A man made channel and other disturbances near Steele Creek were also were noted. During the complex assessment, three shovel probe transects were excavated across the basalt plain landform. The shovel probes showed that the topsoil had been stripped and instead silty clay was present over bedrock. The maximum excavated depth of the shovel test pits was 230 millimetres. It was concluded that the land had undergone extensive disturbance and was of low sensitivity for Indigenous cultural heritage material. No Indigenous cultural heritage places were located.
Noble and Filihia, (2013)	Noble and Filihia (2013) undertook a CHMP (#12498) for the Business Park Development at Airport Drive and Steele Creek, south of the study area. A pedestrian survey of the land was undertaken to confirm the location of previously recorded Aboriginal places and to determine the location of any previously unrecorded places. Although Indigenous new places were recorded during the survey, not all previously recorded places were relocated, particularly isolated artefacts. An extensive subsurface excavation program was undertaken, comprising 448 test holes, 12 test pits and 18 machine transects. Excavation reached to 38 centimetres onto a basal clay unit. Subsurface deposits were shallow and Indigenous places generally consisted of low density artefact scatters. Sixteen new Indigenous places were recorded as a result of the test excavations.
Wheeler, (2013)	Following on from CHMP 12067, a further Standard Assessment CHMP (#12389) was undertaken to the north following Deep Creek. The activity area is located adjacent to part of the north-west boundary of the current study area. Ground surface visibility was limited to about 5 per cent visibility with five new Indigenous cultural heritage places identified. Places included artefact scatter VAHR 7822-3572 (Deep Creek AS 1), which was recorded on an alluvial terrace; LDADs VAHR 7822-3568 (Deeper Creek LDAD) and VAHR 7822-3577 (Deep Creek LDAD 2) recorded on simple slopes; and rock shelters VAHR 7822-3578 (Deep Creek RS2) and VAHR 7822-3579 (Deep Creek RS1) recorded on granite outcrops on simple slopes above Deep Creek.
Robb, Houghton and Wood, (Biosis Pty Ltd 2014)	Robb, Houghton and Wood (2015) completed a CHMP (#13257) for the proposed Business Park at Melbourne Airport, located in two areas, one approximately 50 metres east and the other approximately 500 metres south of the current study area. No Indigenous places were identified during the standard assessment, however ground surface visibility was very poor resulting in unsatisfactory effective survey coverage. The activity areas are located on low lying plains impacted by varying degrees of disturbance and land modification, including the realignment of Steele Creek, construction of the wetlands, importation of fill, roads, agricultural and historical activities. Two 1x1 metre Test Pits and 48 shovel test probes were excavated between the two activity area locations. The stratigraphy proving to be a fairly consistent thin soil profile of silts over clay, the result of weathering basaltic lava flows. Some locations recorded different profiles, such as in proximity to the swamp, where soils contained a darker, moist clay, or other locations where evidence of extensive ground disturbance were noted; these pits contained blue metal, gravels or general fill. The testing was very shallow, with most probes extending to between 100-180 millimetres, and the deepest extending to 220-240 millimetres. No Indigenous places were recorded during the complex assessment.

Report (cont.)	Summary (cont.)
Vines and Berelov, (Biosis 2016)	Vines and Berelov (2016) undertook a CHMP (#13202) for the replacement of High Intensity Approach Light (HIAL) structures within the eastern approach to 09/27 at Melbourne Airport. The activity area is located along Sunbury Road, encompassing a section of Moonee Ponds Creek, and is predominantly within the present study area. Two LDADs, VAHR 7822-3822 (Marker Road Tullamarine LDAD) and VAHR 7822-3992 (Sunbury Road LDAD) were recorded during the standard assessment. The LDADs consisted of several artefacts located on the elevated ground at the top of the valley side near the present Sunbury Road. Other surface artefacts were found eroding out of the alluvial deposit of the creek bank. Areas of archaeological potential were identified as relatively flat ground on the elevated rises at the top of the valley sides, and the alluvial deposits of the Moonee Ponds Creek. Extensive areas of disturbance were noted across the activity area due to grading, road construction and excavation for foundations and underground services. Three 1x1 metre Test Pits were excavated during the complex assessment. Test Pit 3 was located on the elevated basalt clay on the eastern side of Sunbury Road, closest to the current study area. The Test Pit recorded a disturbed topsoil layer with grass, roots and gravel inclusions for the first 100-200 millimetres, overlying dark grey basalt clay from depths of 1000-1500 millimetres. Five 400x400 millimetre shovel test pits were also excavated to test the presence and potential extent of Indigenous cultural heritage and determine the nature of the stratigraphy of the landforms. No Indigenous cultural heritage was found during the excavations.
Oataway, (Biosis 2017)	The subsequent archaeological salvage for CHMP 13202, place VAHR 7822-3229 (Sunbury Road 3), was undertaken by Oataway (2017). The salvage method involved the stripping of topsoils to 200 millimetres within the light tower construction areas. The soils were then stockpiled, secured and left to dry out before being sieving through 5 millimetre mesh (mechanical table/hand sieves). Soils consisted of mixed fill materials within some thin grey/brown silts within the excavated sediments. Grass roots, concrete and gravel fragments, and other modern rubbish was also recorded in the stockpiled material. Two silcrete flakes were recorded during the salvage excavation. These materials were added to the existing registration and extent for Indigenous place VAHR 7822-3229 (Sunbury Road 3). The extent was not changed as a result of the salvage. While manual excavation techniques and methods have generally been employed for small to medium sized activities in the Tullamarine area, the use of mechanical stripping and sieving was determined to be appropriate to cover the proposed light tower footprint. The use of mechanical sieve table also more readily separated the natural sediment from fill material in the mixed deposit, which lead to the identification of the two silcrete artefacts.
Holzheimer, (2018)	Holzheimer (2018) completed a CHMP (#15230) for the Sunbury Road safety infrastructure upgrade works on land directly east of the current study area, crossing through at the current activity area's most northern east point at Sunbury Road. At the commencement of the CHMP, a total of 15 previously recorded Indigenous places were located within the activity area. The desktop assessment identified a number of places that had been recorded along the banks of the Moonee Ponds Creek as surface scatters. The standard assessment recorded 29 surface artefacts on the informal vehicle tracks or around the base of trees. Of the 29 identified artefacts, 20 artefacts were located within pre-existing Indigenous places VAHR 7822-3230, VAHR 7822-3231 and VAHR 7822-3228. The additional 9 artefacts were recorded as new Indigenous place VAHR 7822-4166 and the remaining 12 previously recorded places were unable to be relocated. The standard assessment found that significant changes had occurred across the activity area since the previously recorded Indigenous places had been registered, including erosion, land use, vegetation growth and die-back. The initial phase of the complex assessment included the excavation of a single 1x1 metre Test Pit, and 34, 500x500 millimetre shovel test pits positioned along the proposed cut drain and shoulder construction of Sunbury Road. Subsurface cultural material was identified in three testing locations, leading to the excavation of an additional 19 radial shovel test pits and three 1x1 metre Test Pits. All subsurface material was included within the LDAD registration of VAHR 7822-4166.
Oataway & Vines, (Biosis Pty Ltd 2018)	Oataway & Vines (Biosis Pty Ltd 2018b) completed a voluntary standard assessment CHMP (#15234) for the realignment of Marker Road, removal of existing structures, installation a number of aviation Jet Fuel storage and construction of a Shared User Path within the Sunbury Road Reserve following the tree-line. The activity area is located to the east of Tullamarine Freeway, between Marker Road and approximately 130 metres south-east of the current study area. Previous assessments undertaken for CHMP 13202 in 2016 and CHMP 14981 in 2017 directly north of the current study area had indicated that the western Moonee Ponds Creek terrace has been largely disturbed by a range of previous impacts including construction of the Tullamarine Freeway and the previous stage of runway lighting structures. The previously recorded Indigenous place VAHR 7822-3227 (Sunbury Road 1 IA) was not able to be relocated during the standard assessment. No areas of archaeological potential or natural ground surface identified during the standard assessment, as such it was decided in consultation with the RAP to complete the current CHMP at the level of standard assessment. An additional 5-10 metres of land was added to the north-eastern extent of the activity area in August 2018. This area was surveyed on 27 November 2017 under a 'GAPS study' of the Melbourne Airport estate (Oataway, White, & Fitzgerald, 2018) which identified this new section of land to be a continuation of the disturbances noted during the standard assessment. No further investigation was required.
Oataway & White, (Biosis Pty Ltd 2019)	Oataway & White (Biosis Pty Ltd 2019) completed a mandatory CHMP (#16193) for a proposed solar farm located at the corner intersection of Sunbury Road and Oaklands Road, Oaklands Junction, at the very north of the Melbourne Airport estate and approximately 75 metres north of the current study area. The desktop assessment determined that the activity area had been primarily used for pastoral activities including land clearing and stock grazing since European settlement. The activity area contained no previously recorded Indigenous places, with the closest located approximately 160 meters to the east, VAHR 7822-1248 (Oaklands 1 IA). Previous archaeological surveys completed have found there to be no ground surface visibility within the activity area. The results of previous archaeological investigations along the Moonee Ponds Creek escarpment have found that the cultural material is most likely to be identified within eroded, disturbed surface contexts or in low densities in subsurface contexts. The complex assessment involved the excavation of one 1x1 metre Test Pit, 66 shovel test pits, excavated across four linear transects orientated north-south across the activity area, and 16 radial shovel test pits. Three stone artefacts were found during the complex assessment and subsequently, a new Indigenous place was recorded VAHR 7822-4317 (Oaklands Junction LDAD). The place comprises two stone artefacts (1 silcrete; 1 quartzite) recorded in a shovel test pit between a depth of 0-100 millimetres, and one silcrete piece recorded in a different shovel test pit at a depth of 0-100 millimetres. The stone artefacts were found in shallow clayey silt deposits which appear to have been subjected to historic ploughing, stock trampling and other overground farming activities. They are therefore not considered to be found in situ.

The excavation program undertaken by Gallus excavated a trench 3.81 x 3.3 metres situated above what was termed the Keilor Terrace or Doutta Galla Silt, where Gallus excavated to a depth of 8.38 metres (Gallus, 1983, pp. 12-14). The stratigraphy identified by Gallus included a layer of Doutta Galla Silt between 1.8 and 3.73 metres above what he termed 'D' Clay, between 1.8 x 8.38 metres. The excavations by Gallus uncovered a large number of artefacts, the deepest find being at 6.87 metres (Gallus, 1983, p. 14). The total number of artefacts recovered by Gallus is difficult to determine as the artefact analysis methodology he used and his determinations of artefacts have been called into question (Witter & Simmons, 1978; Mulvaney, 1998).

Being under question, the work by Gallus prompted requirements for further investigation; and subsequently the Victorian Archaeological Survey and La Trobe University ran an excavation program from 1977 to 1982. Three 3 x 3 metre test pits were sited immediately above the alluvial terrace sediments located over the D-Clay identified by Gallus and Gill and Burke (1990). It was hoped this location would provide representative samples of early and late cultural material, and that the relationship between the D Clay and alluvial terrace deposits would be better defined (Burke, 1990, p. 10). The three pits (A, B and Z) were dug in arbitrary 10 centimetre spits (with some possible deviation), to depths of 3 metres (A), 7.2 metres (B) and 1.7 metres (Z) with Pit B being tup to a sterile layer of gravel.

A total of 1,989 artefacts were recovered with over 64.16% (n=1237) of the assemblage being located within a plough zone (spits 1-6); 23.55% (n=454) in the Doutta Galla Silt (spits 7-27); 11.15% (n=215 in the D Clay (spits 28-55); and 1.14% (n=22) in the Older Dry Creek Alluvium (spits 56-76) (Munro, 1998). The plough zone is a unit of the Doutta Galla Silt, which is suggested by Munro as Holocene in age due to the presence of a microlithic industry (Munro, 1998, p. 22). Charcoal from a 'hearth layer' in the Doutta Galla Silt below the plough zone has been carbon dated to 13,300 years BP +1000/-900 (Burke, 1990, p. 6). Dates for layers below the Doutta Galla Silt have been informed by the geomorphological investigations of the river terraces near the Keilor Site, undertaken by Bowler (1970), Joyce and Anderson (1976), Coutts and Cochrane (1977) and Tunn (1998). Investigations by Joyce and Anderson have carbon dated the D Clay, considered part of the Arundel terrace (Arundel B terrace) from 40,000 to 20,000 years BP (Joyce & Anderson, 1976),and Coutts and Cochrane (1977) have given estimates for the Older Dry Creek Alluvium (Arundel A terrace) at between 50,000 to 40,000 years BP.

Analyses of the artefacts recovered by the Victorian Archaeological Survey and La Trobe University program have been undertaken by Burke (1990) and Munro (1998). Both Burke and Munro note that finer grained raw material is used much more frequently in the plough zone (ratio of fine to course being 5:1) while coarser material becomes more common to depth (ratio of fine to course being 2:1 in hearth layer) (Burke, 1990; Munro, 1998). Munro also identifies the plough zone assemblage as being consistent with the Australian small tool tradition, with no blade technology being present in the Pleistocene hearth layer (1998, p. 31). The studies by Burke (1990) and Munro (1998) indicate that much less artefactual material is present in the D Clay than argued by Gallus, although his assemblage does not appear to have been re-examined.

Recently the place was surveyed in 2018 as part of a joint archaeological assessment conducted by Aboriginal Victoria, La Trobe University and Wurundjeri RAP. The place was subject to re-survey and test excavations across two periods in April and June 2018 through a cultural heritage permit (RAP F18/853 WTP/0015) by Dr Rebekah Kurpiel as part of the La Trobe University archaeology programme. Cultural material was identified in subsurface and surface contexts on an alluvial terrace landform in vicinity of the Maribyrnong River. As part of the joint assessment, updated plans were produced with respect to the earlier surveys and excavation carried out there, with this data submitted to the VAHR under its updated registration number VAHR 7822-4427 and including the new place name, Murrup Tamboore. Recorded materials include worked and unworked stone and charcoal, which was subsequently reburied as an object collection component within the place extent in June 2019.

A request was made by Biosis for additional contextual details of the results of these excavations to include in this report, but no information has been able to be provided by Wurundjeri at this time.

Runway Development Program: CHMP 12774

Ford, James-Lee, Houghton, Ashton and Vines (Biosis Pty Ltd 2017) completed a CHMP (12774) for the Runway Development Program (RDP) at Melbourne Airport, Tullamarine. Their activity area measures about 1184 hectares over multiple land parcels including large portions of the existing east-west runway (09/27) and north-south runway (16L/34R) at the airport. The RDP activity area comprises approximately 622 hectares, or 61 per cent of the current M3R activity area.

The activity area is bound by the airside (active runways) areas to the north and east, to the west by rural land and Deep Creek, and the Maribyrnong River to the west and south. The CHMP was prepared for the proposed third runway at Melbourne Airport and extension of 09/27: incorporating a wide variety of construction-specific activities such as access roads, compounds, land reshaping, utilities installation, foundations, topsoil stripping, runway construction and other infrastructure.

Due to the constraints of ongoing design for the activity, the authors considered that all these activities were likely to impact all buried former land surfaces, particularly across the basalt (volcanic) plains landform. The desktop assessment identified 25 previously recorded Indigenous cultural heritage places within the activity area, most comprising artefact scatters and isolated artefacts. The desktop assessment also highlighted that high levels of disturbance have already occurred over the eastern portions of the activity area.

This has been primarily associated with the existing runway construction. Agricultural practices were also considered likely to have impacted a large part of the west of the activity area to some degree, which have remained as rural properties.

Of the 25 previously recorded places in the activity area, 17 were relocated by the survey; one place was determined to actually be located outside the activity area; one was determined to be destroyed and two others could not be relocated. New artefact scatters were located along the Arundel Creek and Maribyrnong River/Deep Creek corridors.

The complex assessment involved the excavation of 49, 1x1 metre test pits across the activity area. 21 test pits were excavated over the basalt plains landform, 16 across the escarpment landforms, five across the cliffs and hillslopes, and seven across the alluvial terraces. A total of five shovel probe transects consisting of 52 400x400 millimetre shovel probes were excavated along the Sunbury Access Road in the north of the activity area. The mechanical testing program involved the excavation of 447 test trenches of 10x1.2 metres across the activity area. The mechanical program primarily tested those landforms where the majority of proposed impacts would occur: the basalt plains, escarpment and hillslope landforms. In addition, a total of 108 extent mechanical trenches were excavated to assess artefact densities occurring at densities greater than one artefact per square metre. These clusters occurred on well-defined escarpment edges along the Maribyrnong River, Deep Creek and Arundel Creek.

Ten new Indigenous cultural heritage palaces were recorded following the results of the complex assessment, including a large number of existing Indigenous places which were merged into the new registrations.

Summary of previous archaeological findings in the region

Large-scale archaeological surveys of waterways in the surrounding region of the study area (particularly the Maribyrnong River, Arundel Creek, Deep Creek and Jacksons Creek) provide relatively consistent results in terms of Indigenous heritage patterning. Stone artefacts, scarred trees, quarries and skeletal remains are identified in and on the alluvial terraces and escarpment edges of these waterways, typically wherever there is good ground surface visibility. Archaeological assessments over the past decade on the surrounding volcanic plains landform have shown that Indigenous cultural material appears much less frequently, with most cultural material being LDAD.

More intensive investigations have been undertaken on alluvial terraces, driven through excavations by Gallus, the Victorian Archaeological Survey and La Trobe University. Investigations of alluvial terraces have typically involved deep excavations in alluvial silts and clays to depths of more than seven metres, which have found cultural material dating to the Holocene and Pleistocene periods. A summary by report is provided in Table B6.3.

B6.4.1.3
Historical and ethno-historical background

This section provides background for the history of the study area. The Australian Heritage Commission developed a historic theme framework (Australian Heritage Commission 2001) for use at the national, state or local level to assist in the identification, assessment, interpretation and management of heritage places. This has subsequently been updated according to the *Guidelines for the assessment of place for the National Heritage List* (Australian Heritage Council 2009) and for the Victorian framework (Heritage Council Victoria 2010). Understanding these themes and their relevance to the study area can be important in establishing and understanding heritage significance. Australian historic themes relevant to the study area and cultural heritage are provided in Table B6.4. Predominately, these themes relate to the Indigenous life pre- and post- European contact.

Table B6.4
Australian historic themes relevant to the study area

Primary theme	Secondary theme	Tertiary theme
2 Peopling Australia	2.1 Living as Australia's earliest inhabitants	
	2.6 Fighting for land	2.6.1 Resisting the advent of Europeans and their animals
		2.6.2 Displacing Indigenous people

Ethno-history

Prior to European colonisation, the Victorian landscape was delineated by socio-dialectical groups who shared a common language, and who as a group identified as owning particular areas of land, with individually owned tracts of country. This was a system of spatial organisation based on land tenure (Clark 1990). Howitt (1996) identified a large portion of south central Victoria as holding a confederation of five language groups; together they comprised the Kulin Nation. Kulin is a common word for human being among the *Bun wurrung*, *Woi wurrung*, *Djadja wurrung*, *Wada wurrung* and *Daung wurrung*, who shared cultural and linguistic similarities as well as being economically and socially affiliated. The Kulin groups also had common religious beliefs and creation legends.

Indigenous groups mapped natural features as boundaries for their ranges, estates and economic territories. The *Woi wurrung* held land from the Werribee River to Mount Macedon and Mount William in the north, and the Dandenong Ranges and Warragul to the east. The *Woi wurrung* included the *Gunung willam baluk* and *Marin baluk* clans, who occupied territory in the vicinity of the study area. The *Gunung willam baluk* occupied a territory extending east and north of the Maribyrnong River and Jacksons Creek. Also known as the Mount Macedon tribe, they inhabited the Mount Macedon area, extending south to the Werribee River near Bacchus Marsh, and north to Lancefield and the Mount William

stone quarry of which they are custodians. The *Marin baluk* clan were located to the west and south of the Maribyrnong River as far south as Koroit Creek, with Sunbury recorded as the location for their headquarters (Barwick 1984; Vines 1995).

Land ownership and access rights or responsibilities centred on the smaller named groups that formed the broader language grouping. These groups are often called 'clans' or 'local descent groups', however as Wesson (2000) reasons, they are better described as 'named groups', as the membership structure of these groups, and their degree of division from other groups, could vary. In most instances, primary allegiance was owed to this named group, although this could vary according to context and location. Commonly, named groups were led by senior elders who exercised internal political and religious authority, as well as being recognised as their spokesperson when dealing with other groups (Atkinson and Berryman 1983). Particularly influential group leaders could also assume authority over the leaders of other culturally affiliated groups (Wesson 2000).

At the time of contact with Europeans, the clans were led by *Ngurungaeta*, or clan heads. Ningulabul (c. 1771-1847/51) was the *Ngurungaeta* of the *Gunung willam baluk* clan, and was succeeded by his son, also Ningulabul (c. 1809/12-1853). Bungarim (c. 1800-1848) was the *Ngurungaeta* of the *Marin baluk* clan, and his son was Marmbul (c. 1822-1848) (Barwick 1984; Vines 1995). Ningulabul was part of a joint custodianship with Murrum Murrumbean (*Talling willam, Gunung willam* patriline) of sacred sites near Gisborne important to many neighbouring *Woi wurrung*, *Djadja wurrung*, and *Watha wurrung* clans. Marriages with adjacent 'waa' clans like *Marin baluk* resulted in owner-manager bonds for the management of Mt William quarry. In the 1840s, Clarke (1990) records that the quarry was managed by old Ningulabul, his sons, and Murrum Murrumbean, in addition to Bungarim (the *Marin baluk Ngurangaeta*) and Billibellary (*Ngurangaeta*) and Bebejan, sons of sisters of Ningulabul and 'heiresses in quarry rights'. Ningulabul's authority as *Ngurungaeta* and marriage connections allowed his sons: Ningulabul, Winberri/Windberry and Nerrim-bin-uk/Nurmbinuck/Young Winberri to pass safely through the land of different remote tribes. In October 1840, their travels summoning the distant clans to a large-scale initiation in Melbourne were interpreted as an invitation to war by officials (Clark 1990).

Economy, resource availability and utilisation

Likely plant resources available to the region's Indigenous people would have been the tree canopies of River Red-gum *Eucalyptus camaldulensis*; Manna Gum *Eucalyptus viminalis ssp. viminalis*; Blackwood *Acacia melanoxylon*; Drooping Sheoak *Allocasuarina verticillata*; Black Wattle *Acacia mearnsii*; and Lightwood *Acacia implexa* (DELWP 2020). In addition to the tree canopy, many species available in the understory were harvested for food and material resources. The gum of the Golden Wattle *Acacia pycnantha* was eaten or else mixed with water and nectar to produce a sweet drink (Gott 1991).

Roots such as the Yam Daisy *Microserus scapigera* and Pink Bindweed *Convolvulus erubescens*, seeds and fruits were important staples in the Indigenous diet, as well as for medicine (Gott & Conran, 1991; Coutts, 1979). Roots were roasted in hot coal-fired earth ovens, or ground and mixed with water to form dough which was baked in ovens (Zola and Gott 1992). River Mint *Mentha australis* was used to treat coughs and colds (Gott 1991).

The basalt plains and its many waterways would have contained a wide range of faunal species hunted by the Indigenous people. A vast array of species are known to occur, and have been recorded, within the geographic region (Global Biodiversity Information Facility 2019). The open grassland environment would have supported various small mammals, as well as larger species such as Eastern Grey Kangaroo *Macropus giganteus*, Brushtail Possum *Trichosurus vulpecula*, Swamp Wallaby *Wallabia bicolor*, and Emu *Dromaius novaehollandiae* (Global Biodiversity Information Facility 2019). Seasonal variation is likely to have occurred, as the geographic region contains a highly seasonal water sources and flora species that are dependent on the seasonally changing water availability (Gott 1991). Overall, higher numbers of mammalian and bird species would have been available during the summer months, which would have resulted in more intensive hunting of certain species. These species were hunted by Indigenous people for their meat, and the pelts used to make clothing and other items (Gott 1991).

Given the close proximity of the geographic region to waterways (such as the Maribyrnong River, Moonee Ponds Creek, Arundel Creek, Steele Creek and Deep Creek) Indigenous occupation in this area is likely to have been focused on aquatic resources which were less susceptible to variations in seasonality (Gott 1991). These would have provided a wider range of resources for Indigenous people than the plains, with Freshwater mussels *Vesunia ambiguousa*, Shortfin eels *Anguilla australis*, waterbirds and lizards a reliable food source throughout most of the year (Global Biodiversity Information Facility 2019). Prior to European settlement, the geographic region would have provided extensive subsistence resources for Indigenous people. Species such as the Eastern Quoll *Dasyurus viverrinus*, Redbellied Pademelon *Thylogale billardierii* and Long-nosed Potoroo *Potorous tridactylus* were recorded at the time of European settlement but have largely or wholly disappeared since (Land Conservation Council, Victoria 1991:107). The introduction of the rabbit, fox, cat, house mouse and hare have greatly reduced the native fauna through predation and resource competition, and these introduced species are now widespread across the geographic region.

Post-contact history

The rapid European colonisation of the Melbourne region altered Indigenous society across the state. The increased presence of settlers on Indigenous land resulted in Indigenous dispossession from the land and diminished access to resources. These factors, combined with population decline from introduced diseases and conflict, transformed Indigenous pre-contact society to

be orientated around colonial activity, such as movement onto camps to the outskirts of towns or relying on European industry for livelihood.

John Aitken was the first European settler to move into the *Gunung willam baluk* and *Marin baluk* clan areas in 1836, taking up a 10 square mile pastoral run at Mount Aitken, roughly 30 kilometres north-west of the study area. Aitken was helped by local Indigenous people at Dromana to unload his sheep, and initially he appeared to have attempted to foster good relationships with the Mount Macedon Tribe by distributing rations of rice, sugar and flour (Sayers 1969). However, he clashed with the *Gunung willam baluk* clan on a number of occasions, particularly in 1838 when the clan made deliberate attempts against squatters on their land. Aitken recorded in April of that year that 40 Indigenous people approached his station armed with spears and three guns. Mounted on horseback, Aitken was able to outmanoeuvre the group and dispose them of two of the guns, although he narrowly avoided being struck by a tomahawk in doing so. The *Gunung willam baluk* then departed but targeted George Evans' run at Sunbury, spearing sheep and threatening a shepherd. Shepherd Samuel Fallon was killed and disembowelled shortly thereafter (Symonds 1985). By this time, Aitken's relationship with the *Gunung willam baluk* appears to have deteriorated to the point that he no longer tolerated their 'trespass' on his run.

In 1839 an Aboriginal Protectorate Scheme was established in Victoria. Appointed Protectorates provided religious instruction, rations, homes and medical care to Indigenous people whilst recording population information (Broome 2005); a pretext of encouraging Indigenous Victorians to adopt a European lifestyle. Edward Stone Parker was assigned to the Mount Macedon district in 1839 and built a hut at Jacksons Creek where he lived for a year, before moving to the Loddon River (Symonds 1985).

Official inquiries into the welfare of Indigenous people were held in 1849 and again in 1858. Although informants at the inquiries remarked on the rapid fall in the Indigenous population, it was a number of years before any action was taken. The latter inquiry led to the formation of the Aboriginal Protection Board in 1860 which encouraged Indigenous people to move onto reserves. A special 'Aborigines Act' was passed in 1869, which gave the Governor of Victoria power to dictate where Indigenous people in Victoria could reside; what activities they could undertake on and off reserves or stations; and the authority to take charge of Indigenous children (Christie, 1979). Eventually, what remained of the Kulin tribes were gathered and sent to live at Coranderrk and other mission settlements, isolated from their traditional lands (Barwick 1984; Vines 1995).

George Sinclair Brodie came to Port Phillip with John Pascoe Fawkner's party in May 1836 from Van Diemen's Land with 500 sheep and headed north to settle at Deep Creek near Bulla (Billis and Kenyon 1974; Moloney 1998:200). With his brother Richard Brodie, he took up the 9,078 acre squatting lease for the *Bulla Bulla* run (Spreadborough and Anderson 1983:259), to the north of the present activity area where he built the first slab huts. In the same year, an additional lease of three and a half square miles was acquired, which included a homestead section of 640 acres. By 1852, Brodie had 4,000 acres of freehold land in the district (Vines 1993). The majority of land in the activity area was sold by the Crown to Kaye, Chapman and Kaye, Fawkner, Grant, McNab and McNab, Thomson and Duncan, Annand, Oakden and Bonthorne in 1850 (Itellya 2013).

Although the initial violence between settlers and Indigenous people appears to have been largely restricted to the 1830s, the memories of this early conflict seem to have influenced incoming settlers long afterwards. The McNab family took up property in the study area in 1848. Their first homestead (the original Victoria Bank) is recorded as having defensive slit windows long after attacks had occurred on Aitken's run (Gibbs 1998). Gibbs (1998) also notes that John McNab recorded being chased home by Indigenous people, although details of this event are scant. The history of early conflict between settlers and *Woi wurrung* people is reflected in the naming of the locality 'Tullamarine'. The name is said to derive from a woman called Tullymarine, whose husband Bunja Logan stole potatoes from John Gardiner's farm in 1838, and who was later responsible for one of the attacks on Aitken. After Bunja Logan escaped from gaol by setting fire to the thatched roof, he disappeared into the mountains with Tullymarine and their children (Symonds 1985:73; Vines 1995).

The discovery of gold in Victoria prompted a rush of prospectors to the Bendigo and Mount Alexander goldfields. Passing through the outer districts of Melbourne, the prospectors travelled up the road which would later become the Tullamarine Freeway and crossed Moonee Ponds Creek north of the activity areas (Weaver 1993). The prosperity that followed from the gold rush resulted in much agricultural land in the wider region becoming residential and industrial, as people settled around the crossing areas in order to make a living providing goods and services to those travelling to and from Melbourne (Weaver 1993). From this original settlement, the surrounding land was auctioned to farmers who relocated to the region attracted by the plentiful grasslands which they cleared and cultivated or utilized for pastoral grazing, eventually establishing Tullamarine Village in the 1950s (Lennon 1993).

The township of Bulla, located north-west of the activity area and east of a crossing over Deep Creek, was established to service road traffic along a track between Melbourne and Bendigo. Now called Sunbury Road, the track has been previously referred to as the Mt Macedon Route, Lancefield Road, Lancefield Bulla Road and Deep Creek Road. At the junction of the Mt Macedon Route with Oaklands Road (at the north-east corner of the Grey-Box Woodland, in Section 17 A, north of the present activity area) the Oaklands Junction Village formed around the Inverness Hotel, built by Alexander Kennedy in the 1850s. After the initial gold rush and formalisation of the Colony of Victoria in 1851, a series of government Acts encouraged closer settlement of land.

Squatting licences were cancelled, and many of the large pastoral leases subdivided and sold at auction or made open for selection for farming and agricultural purposes (Serle 1963). Economic conditions favoured larger properties, and the majority of land sold in the activity area in 1850 would later be consolidated by families such as the Mansfields and McNabs, who built a number of homesteads across the study area.

The increase of farming in Victoria during the 1850s required more intensive land divisions to secure stock, mark property boundaries, manage crops, establish stock yards, and protect the home and garden from farm animals. Properties located on volcanic plains took advantage of the volcanic basalt scattered on the land as a convenient fencing material. The construction of drystone basalt walls also helped to clear the land of rocks for cropping activities. Drystone walls were mainly constructed between 1850 and 1880, after which time barbed wire and other cheaper fencing materials made drystone walls uneconomical. However, a few were still built or maintained until after WWII (Moloney 1998:66).

Typically, agricultural land use is likely to have minimal impacts on Indigenous cultural material, with intensive subsurface disturbance likely to be localised to construction areas around homesteads and outbuildings. Ploughing is likely to have disrupted the integrity of archaeological deposits for the first 300mm across much of the activity area, with deeper disruption potentially present along alluvial river flats/terraces where market gardening has taken place. Clearance of native vegetation to maximise grazing potential may have removed potential scarred trees, however it is highly likely that mature native vegetation still survives along major watercourses.

Establishment of the airport

Aircraft landed in paddocks at Tullamarine in the 1920s, and there was a satellite aerodrome of Essendon Fields Airport on the east side of Melrose Drive during World War II. Gowrie Park was also used for aviation. Aerial Transport Ltd purchased 560 acres at Tullamarine for the establishment of an airport (Vines 1995:38). In 1959, the Commonwealth Government acquired a further 5,300 hectares (13,000 acres) of grassland in Tullamarine (Lucas 2010) and construction of Melbourne's new international airport began in 1962 .Construction of the runways involved significant earthworks in subsoils and the removal of surface soils in the majority of construction areas. Runway construction preceded the construction of terminal infrastructure, which was completed in the early 1970s.

On 27 November 1962, then prime minister Robert Menzies announced a five-year plan to provide Melbourne with a $45 million 'jetport' by 1967. The first sod was turned in November 1964 and Melbourne Airport was opened to international operations on 1 July 1970 by the prime minister at the time, John Gorton. Domestic flights were transferred to Melbourne Airport on 26 June 1971. Expansion works, including extending runways, were completed in 1973, which allowed Boeing 747s to use the airport.

A review of historic aerial photos (from 1931, 1945, 1960, 1980 and 1990) indicate that the majority of active airport areas (runways, taxiways, terminals, hangers etc) have been subject to major ground disturbing works with little potential for Indigenous heritage to remain. The construction of the runways had resulted in the clearance of the Grey Box Woodland's east and southern extent, where the tree line had become more diffuse and scattered. However, a thin band of trees appears to have been retained on the opposing east side of the runway perimeter access track (the area which is today designated as the active airside perimeter security fence). The intersection at Oaklands Junction has also been cleared, although the former roadways are still clearly visible leaving behind a transected triangular shape. Outside these active airport areas, the majority of the study area has remained relatively unchanged from earlier agricultural uses. Natural soil surfaces and the potential for Indigenous heritage still remains, even if the topsoil has been disturbed by ploughing or other agricultural uses.

Land use within the Grey Box Woodland

Aerial imagery was sourced over consecutive runs to better illustrate the prior extent and impacts to the Grey Box Woodland located at the north of the activity area. Imagery was sourced from available film runs in 1946 and 1951, which cover the northern portion of the activity area, from as far as Moonee Ponds Creek in the east to Deep Creek in the west. The 1946 imagery shows that the majority of the area south of the Grey Box Woodland is cleared and used for agricultural purposes. This area has become subject to high levels of overground activity and development associated with the airport's construction. Well defined roads, and also informal tracking, are present across the pasture in this 1946 imagery, visible to the south and south-east of the Grey Box Woodland. Some of these linear tracks appear to culminate in a farming dam, suggesting repeat agricultural practices and possible stock movement towards this water source. The dam also appears in line with a shallow drainage marked by sparse vegetation, running north-south. The Grey Box Woodland's southern tree line appears to be primarily drawn against a shared parcel boundary running east-west, and can be seen in continuation in each direction across the cleared paddocks. The later 1951 imagery covers the entire northern extent of the activity area. In this imagery, the Grey Box Woodland appears to become much denser towards its northernmost extent while becoming diffuse the further south it extends. There are also wide clearings within its central portion. Linear tracks appear to be located along the northern extent, indicated by imagery highlights that contrast strongly against the tree line. The track indicates constant use of the tree line as the main navigation route, possibly also used to reach the intersection at Oaklands Junction. Notably, within the centre of Grey Box Woodland, the larger clearing has now been established for use as the airport radar installation (Radar Hill). Access roads extend from the hill to the Grey Box Woodland west boundary road, and south-west towards the former Glen Alice homestead area (which was also removed during runway construction, although some small debris appears to be left behind).

Desktop assessment conclusions

The study area comprises the basalt plains geomorphological unit that also covers the majority of the established airport facilities, wide areas of undeveloped agricultural land, and the Grey Box Woodland within the north of the activity area. basalt plains are dissected by the incised river and creek valleys of the Maribyrnong River, Deep Creek and Arundel Creek. A large portion of the plains landform has been modified by airport construction activities. The Maribyrnong River and Deep Creek corridor is located on the western and southern boundary of the study area and likely to offer complex archaeological deposits. Located centrally within the study area, Arundel Creek is likely to be heavily impacted by past airport and agricultural activities but still has potential for cultural material.

The review of state heritage databases identified 33 Indigenous places comprising 79 individual components located within the study area. These comprise 20 artefact scatters, six LDADs, four scarred trees and three multicomponent places. The multicomponent places comprise the combined registration of 7822-3871 (Upper Maribyrnong Escarpment) comprising eight artefact scatter components and two earth features within the activity area, VAHR 7822-3872 (Glenara Creek 1) comprising one artefact scatter and two scarred trees, and VAHR 7822-0808 (Radar Hill 9) which includes a scarred tree and an earth feature.

Previous archaeological assessments in the study area and wider region have found that artefact scatters are most likely to be located along incised river valley edges and alluvial terraces, with isolated artefacts potentially located throughout the landscape in lower densities. Artefact scatters located on volcanic plains are likely to have only shallow unconsolidated cultural deposits, while alluvial terraces may have the potential for deep stratified cultural deposits. Quarries may be present wherever suitable stone material is exposed, mostly along incised river and creek valley slopes. Earth mounds are likely to be present on river and creek flats. Scarred trees have the potential to be present wherever mature remnant native vegetation survives.

European settlement occurred during the first phases of European arrival in Victoria. Today, despite encroachment of residential suburban development and the construction of Melbourne Airport, the study area remains relatively rural in nature (see Chapter B7: European Heritage). As a result, outside of the Melbourne Airport construction footprint, which has been subject to significant earth work activities, cultural material has a strong potential of surviving albeit with some disturbance from agricultural activities. The presence of early homestead sites, and records of Indigenous people and European settlers, also suggest there may be some potential for post-contact (i.e. post-European settlement) archaeology.

B6.4.2 Survey

B6.4.2.1 Methodology

For the purpose of the standard assessment, the study area was divided into survey units. These areas had, to date, not been subject to prior archaeological survey at the level of a CHMP. They were initially surveyed according to their separate locations within the study area. The standard assessment was undertaken in accordance with First Peoples – State Relations' (2008; 2013) guidelines regarding the identification and recording
of Indigenous cultural heritage material.

The standard assessment was completed by traversing the study area on foot at intervals of approximately 5 metres between survey participants. During the survey of the Grey Box Woodland section, wider transect intervals were walked due to the overall low ground surface visibility within the woodland and the presence of obstructions such as vegetation and fallen branches which prohibited undertaking regular linear transects. An opportunistic survey was also conducted where feasible, to further inspect areas of increased ground surface visibility and other features in the woodland (such as mature trees) for evidence of cultural modification.

Systematic survey coverage was undertaken of the study area's previously unassessed land, and views of the study area recorded using a Nikon AW120 camera. Field notes were also taken recording the ground conditions of each survey unit, the vegetation type, landform and details of areas of archaeological potential for Indigenous cultural heritage. Data for previously recorded Indigenous places was reviewed in the field; this included the spatial display of previously recorded places on a Trimble R1 GNSS receiver DGPS and the use of original paper 'site cards' to assist in the relocation of Indigenous places which were not subject to prior assessment or were not able to be relocated under CHMP 12774.

All previously recorded Indigenous places within M3R were revisited during the survey. However, the encompassing lands previously surveyed under the previous RDP project (i.e. 09/27) CHMP 12774 were not required to be methodically re-surveyed as part of CHMP 16792. This approach was established following prior consultation and agreement with Wurundjeri during the initial project consultation meeting.

Figure B6.3
View north along watercourse channel, on east bank of upper reaches of Glenara Creek and edge of Grey Box Woodland (K.Oataway 6/11/19)

Figure B6.4
View south-west of relocated Scarred Tree VAHR 7822-3872-2 (Glenara Creek 1)

Figure B6.5
Newly recorded silcrete artefact on eroded area against north-west boundary of activity area (K.Oataway 6/11/19)

B6.4.2.2
Survey Results

The standard assessment was completed over multiple field days between 6 and 27 November 2019. The ground survey was supervised by Kym Oataway and Kim White (Heritage Advisors [HA]), Biosis Pty Ltd. Of the 33 previously identified places within the study area, 15 were unable to be relocated during the survey and 15 were relocated (some required updates to their primary GPS co-ordinates). A further three were determined to have been previously collected at their time of recording, subject to archaeological salvage or likely destroyed at their recorded location with no likelihood for any tangible remains of the place to be present. A total of 131 new surface artefacts were identified during the survey, 47 attributed to previously recorded Indigenous places (artefact scatters).

Glenara Creek

The area around Glenara Creek mostly comprises undeveloped agricultural land. Past historic occupation has been identified along here in the north-west of the study area, including former farming dams, a historic heritage 'boiling-down' works site, and a potential sheep-wash associated with early settler George Coghill. A number of previously recorded Indigenous places are located along the creek line (observed as little more than a dry, shallow drainage below the elevated hillslope on the west side). The area is still widely covered by agricultural grasses on the west side of the creek line, and scattered trees with leaf litter along the creek line and to the east where it borders the Grey Box Woodland. A small concentration of newly recorded surface artefacts were located on an eroded part of the slope directly north of Coghill's dam, and another modern farming dam further north again along the drainage.

Grey Box Woodland and Radar Hill

Within the Grey Box Woodland, the effectiveness of the survey was hindered by the covering understorey and leaf litter (Figure B6.6). Although wide areas of ground appeared to be exposed as a result of erosion and some prior disturbances, visibility was hindered by the prevailing grasses, low shrubs and abundance of trees and broken tree branches across the ground. The north extent of the woodland comprises much younger growth planted after the construction of the airport. These areas were demonstrated to be cleared in historic aerial imagery in 1945-6. It is likely that these fringes of the woodland were exploited for sources of timber following initial land clearance and settlement. It is unclear what the full extent of the woodland once comprised. Only one previously recorded place, VAHR 7822-0801 (Radar Hill 2) is located here, which may demonstrate the impact of prior clearing, leading to the possible destruction of scarred trees and displacement of any artefact distributions.

As the survey moved further south through the woodland, the topography changed from flat basalt plains to the gradual north incline of the granite hill formation, Radar Hill (Figure B6.7). There are noticeably more mature trees in this area, although some could still potentially be regrowth following initial European exploitation. There are occasional clearings and depressions indicative of prior excavation and soil movement. The former tracks and firebreaks, as initially recorded by Vines (1995) and as depicted on the Radar Hill VAHR place site cards, have mostly become overgrown. Some firebreaks are only just perceptible along linear clearings or in areas of marked young regrowth between mature species. One new standing (dead) scarred tree was identified in the south of the woodland approaching the airside perimeter fence. It is likely the tree was culturally modified in the past, but it is in only fair to poor health.

Arundel Creek

The southern part of the study area comprises undeveloped land either side of Arundel Creek (Figure B6.8). Parts of the hillslopes, particularly above the west bank, appear subject to prior disturbances and are now eroding. Most of the area is covered by agricultural grasses, although impacts of prior land modifications were noted. These included the reshaping of the creek line, possible deposition of alluvial sediments on the floodplain area, and subsequent modern infrastructure. A number of isolated surface artefacts were identified but, due to their isolated recording, are likely to represent the displacement of material in the immediate landscape rather than a dense concentration in the area of recording.

B6.4.2.3
Survey conclusions

The survey confirmed the location and nature of high-sensitivity landforms in the study area, namely hillslopes and escarpments. These landforms were anticipated to be sensitive for low to moderate densities of stone artefacts. Flat and low relief basalt plains were considered to have a much lower potential for artefacts. The survey confirmed the presence of stone artefacts in the study area but generally confined to discrete areas of erosion along the gullies above Glenara and Arundel creeks. Leaf litter, grasses and broken branches obscured large portions of the ground within the Grey Box Woodland; however, large areas of ground exposure were identified on the crest of the granite hill. A moderate density of stone artefacts was also located here. The highly eroding sediments and presence of granite floaters indicates a shallow soil profile on the hill crest and upper slope. It is likely that a proportionally higher number of stone artefacts occur on the ground's surface, with a much lower potential for subsurface artefacts to be present here. The survey allowed the predictive model from the desktop assessment to be refined through ground truthing detail for landforms, land use disturbance and new Indigenous cultural material finds. The results of the survey confirmed the presence of new cultural heritage places on known sensitive landforms. The survey also recorded new stone artefacts found in association with older, previously recorded places. The survey has thereby updated the conditions and records for the extent and nature of Indigenous places within the study area.

Figure B6.6
Young regrowth over basalt plains landform within north sections of the Grey Box Woodland, view east (C.Manning 12/11/19)

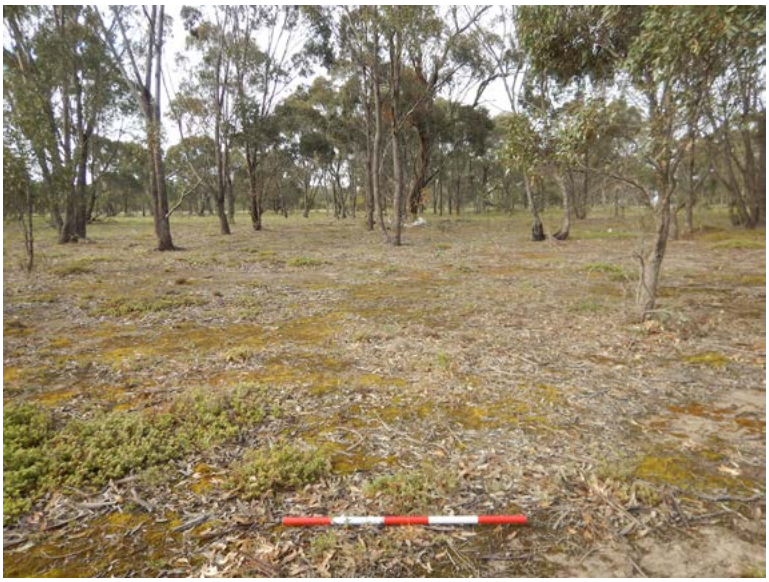


Figure B6.7
Eroded crest of the granite hill facing south-east showing sample of identified surface artefacts (pink flags) (K.White 12/11/19)

Figure B6.8
View north from southern end of activity area over hillslopes and floodplains of the Arundel Creek corridor (E.Nuridin 6/11/19)

Table B6.5
Indigenous cultural heritage places assessed during survey

VAHR place number and name	VAHR place type	Results	Condition rating
VAHR 7822-0800 (Radar Hill 1)	Artefact Scatter	Not located	Very poor
VAHR 7822-0801 (Radar Hill 2)	Artefact Scatter	Located	Very poor
VAHR 7822-0802 (Radar Hill 3)	Scarred Tree	Located	Poor
VAHR 7822-0803 (Radar Hill 4)	Artefact Scatter	Not located	-
VAHR 7822-0804 (Radar Hill 5)	Scarred Tree	Located	Good
VAHR 7822-0805 (Radar Hill 6)	Artefact Scatter	Located	Very poor
VAHR 7822-0806 (Radar Hill 7)	Scarred Tree	Not located	-
VAHR 7822-0808 (Radar Hill 9)	Earth feature/Artefact Scatter	Located	-
VAHR 7822-0809 (Radar Hill 10)	Artefact Scatter	Located	Very poor
VAHR 7822-0810 (Radar Hill 11)	Artefact Scatter	Located	Very poor
VAHR 7822-0811 (Radar Hill 12)	Artefact Scatter	Located	Poor
VAHR 7822-0812 (Radar Hill 13)	Artefact Scatter	Not located	-
VAHR 7822-0813 (Radar Hill 14)	Artefact Scatter	Not located	-
VAHR 7822-0814 (Radar Hill 15)	Scarred Tree	Located	Poor
VAHR 7822-0815 (Radar Hill 16)	Artefact Scatter	Not located	-
VAHR 7822-0816 (Radar Hill 17)	Artefact Scatter	Located	Poor
VAHR 7822-0817 (Radar Hill 18)	Artefact Scatter	Located	Poor
VAHR 7822-0818 (Radar Hill 19)	Artefact Scatter	Not located	Fair
VAHR 7822-0821 (Radar Hill 22)	Artefact Scatter	Not located	Fair
VAHR 7822-1116 (Radar Hill 24)	Artefact Scatter	Not located	-
VAHR 7822-1117 (Radar Hill 25)	Artefact Scatter	Located	Fair
VAHR 7822-3857 (Arundel Creek LDAD)	LDAD	Not located	Collected
VAHR 7822-4312 (Arundel Creek LDAD 2)	LDAD	Not located	Poor
VAHR 7822-3863 (Glenara Creek LDAD)	LDAD	Not located	Fair
VAHR 7822-4081 (Glenara Creek LDAD 2)	LDAD	Not located	Fair
VAHR 7822-3872 (Glenara Creek 1)	Artefact Scatter and Scarred Trees	Located	**Component 1** Fair **Component 2** Good **Component 3** Poor
VAHR 7822-3871 (Upper Maribyrnong Escarpment)	Multi-component place	Located	Good
VAHR 7822-4178 (APAM Grey Box Forest LDAD)	LDAD	Located	Poor
VAHR 7822-3858 (Mansfield Road LDAD)	LDAD	Not located	Fair
VAHR 7822-1803 (MELBOURNE AIRPORT UNIGAS 2)	Artefact Scatter	Not located	Destroyed
VAHR 7822-1335 (Melbourne Airport SE 3)	Artefact Scatter	Not located	Destroyed
VAHR 7822-3864 (Deep Creek Escarpment 1)	Artefact Scatter	Located	Fair
VAHR 7822-4287 (Link Road Ridge Artefact Scatter)	Artefact Scatter	Located	Good

Figure B6.9
Excavation of a trench on the basalt plains above Glenara Creek, view north towrdas Sunbury Road

Figure B6.10
View of shallow drainage line connecting to farming dam, dissecting the basalt plains landform (west edge of Grey Box Woodland in background)

Figure B6.11
Location of reinstated test pit 1 on the crest of the granite hill landform

B6.4.3
Test excavation results

Archaeological test excavations were first undertaken between September and November 2020 under the Stage 1 approach to Complex Assessment of CHMP 16792. Stage 2 of Complex Assessment was completed between August and September 2021. Targeted testing was completed in order to understand the underlying geology and geomorphology of these landforms, and how Indigenous cultural materials have been preserved within this stratigraphy.

The test excavations included:

- five, one by one metre, manually excavated test pits,
- 56 one by ten metre mechanical trenches,
- 20 one by five metre mechanical trenches,
- two, one by three metres mechanical trenches, and
- 40 one by two metre mechanical trenches.

The size of the mechanical trenches excavated depended on whether there were any ecological constraints present at each test location. The majority of the one by two metre mechanical trenches were excavated along the Arundel Creek floodplains within the south of the study area, where Growling Grass Frog habitat zones and various native grass communities are present.

These excavations resulted in the identification of 419 Indigenous stone artefacts across three different landforms; Basalt Plains (n=30), Granite Hill (n=372) and Floodplains (n=17). Combined with he results of the ground survey, A total of 537 stone artefacts were recorded and analysed during the course of the CHMP.

B6.4.3.1
Basalt plains and hillslopes landforms

The majority of testing focused on the basalt plains and hillslopes landform units, which had largely uniform soil profiles of shallow silty clays. The basalt plains extend across the low relief landscape on all sides of the granite hill landform in the north of the study area. The basalt plains also extend to the west boundary of the study area (and airport estate) beyond the shallow drainage line of Glenara Creek (**Figure B6.9** and **Figure B6.10**). The focus of the Stage 1 CHMP testing was conducted in this area and further refined during Stage 2 of testing where new stone artefacts were identified; a series of one by ten metre mechanical trenches were excavated at approximately 100 metre intervals over the landform. The testing demonstrated a very consistent profile of shallow blocky clay-silt deposits to between 150mm to 200mm overlaying a slightly plastic clay base. There is evidence of greater levels of disturbance within the topsoils from the trenches located closer to Sunbury Road. At the time of excavation, the deposits across the basalt plains and hillslopes were generally dry and blocky (attributed to prolonged soil truncation as a result of ploughing and stock trampling over the areas by Glenara Creek). This profile was also confirmed by the excavation of test pit 5 near the west boundary of the estate. The test pit recorded a blocky, indurated silty clay over a moist clay base at 150mm to 170mm. The test pit was located near to previously recorded surface artefacts from the earlier survey but no cultural material was recorded within it.

Around the margins of the Grey Box Woodland there is nearly a complete absence of topsoil accumulation. This is largely due to historic land clearance, modern land use activities and ongoing erosion. This was consistent with the observations made during the survey. There are large areas within and around the edge of the current Grey Box Woodland that have been subject to extensive erosion and sheet wash. These natural weathering processes have been compounded by historic ground disturbance works such as utilities construction, the former Radar Hill installation, perimeter security fencing, creation of firebreaks, and exposed vehicle access tracks that meander through the woodland. These cumulative impacts led to the identification of stone artefacts in generally exposed surface contexts with very little to no stratified soil profiles present. Very low densities of stone artefacts were identified around the margins of the granite hill, both on the surrounding basalt plains (MT 24) and on the edge of the granite landform itself (test pits 3 and 4 and MT 24) as discussed below. This material most likely represents displacement of cultural material over the basalt plains and granite hill landform but also less frequently traversed portions of these landforms.

B6.4.3.2
Granite Hill landform

Three 1x1 metre test pits were excavated within the granite hill landform during Stage 1 of testing, also known as Radar Hill. The excavations sought to investigate the presence and extent of a subsurface context to the cultural material recorded on the crest of the hill after a moderate density of stone artefacts were identified during the Standard Assessment survey. Test pit 1 was excavated on the crest and to the south of the concentration of exposed surface artefacts (Photograph 9). The area was selected which appeared from the surface to be less extensively eroded or exposed by past land use. Services detection was undertaken for the immediate area prior to excavations. This confirmed a number of electrical and communications services are still present on under the surface scatter. Some of these probably related to the earlier radar installation site, but some are active communications lines which run towards the runway areas.

Test pit 1 recorded a profile of course silt and highly degraded rock structure (to 50 per cent deposit) with some degraded granite throughout. This was excavated to the depth of undulating granite rock between 300mm to 320mm. Eighteen stone artefacts were recorded within the upper 200mm of the pit, thereby demonstrating some potential for artefacts to be present below ground surface. Subsequently, test pit 2 was excavated at an open area to the east, and just below the elevation of the crest. Test pit 2 is approximately 80 metres east of test pit 1 and recorded a consistent

coarse clayey silt with gravel inclusions. No cultural material was identified in test pit 2 however, indicating the scatter on the crest of the hill is a localised flaking occurrence or evidence of periodic revisitation. Evidence of displacement of surface material off the north-west side of the crest was noted during the survey, where extensive erosion has occurred and further artefacts were identified. This area coincided with existing nearby recorded artefacts as part of VAHR 7822-4178 (APAM Grey Box Woodland LDAD).

Isolated artefacts were also recorded within test pit 3 and MT 23 at the south-western edge of the hill and Grey Box Woodland. This area is located by the modelled boundary of the granite hill and basalt plains landforms. MT 23 demonstrated a profile of loosely compacted silt over moderately plastic clay base at 100mm to 200mm. The profile appears consistent with the basalt plains landform, however is starkly contrasted to the profile of nearby test pit 3 (**Figure B6.12**; located approximately 100 metres to the south-east). The test pit recorded a moist clayey silt increasing in gravel component with depth. The soil contained frequent inclusions of rounded basalt pieces (2mm to 5mm) and angular quartz pieces, and was a notably pale grey-brown in colour compared to the darker brown silt of MT 23. Test pit 3 was excavated to 390mm onto a fairly flat, damp plastic clay base.

This profile may be representative of the former profile for nearby recorded Indigenous place VAHR 7822-0805 (Radar Hill 6) located within 40 metres to the east (**Figure B6.13**). This existing place is a broad surface scatter located on a former firebreak and has been subject to a high degree of erosion and modern overgrown activity. The contrasting stratigraphy of test pit 3 and MT 23 appears to show the prevailing landform units within the topsoils. While there is a clear concentration of cultural material associated with the granite hill landform (particularly on the crest), there is a fairly consistent low density of artefacts around the lower slope of the hill, with material also distributed across the adjoining basalt plains (**Figure B6.14**).

Test pit 4 was excavated on a protruding contour band on the mid-slope of the granite hill formation, approximately 300 metres south-west of the hill crest. The profile of Test pit 4 was consistent with that of test pit 2, comprising dry, granitic silt which overlays a hard sandy clay base at 270mm. One silcrete artefact was recorded between 100 mm and 200mm.

During Stage 2 of testing, further investigation was undertaken by mechanical excavation in a clearing close to test pit 2, on the granite hill upper slope. The results identified a continued, moderate density of stone artefacts in the area that is obscured by covering vegetation (MT118). This demonstrates the variance in artefact identification and presence in the soil profile, given no artefacts were found in test pit 2. Another unexpected high density of stone artefacts was found to the south-west margin of the granite hill lower slope, at the edge of the Grey Box Woodland. 180 artefacts were found in MT61, 45 artefacts in MT80 and drastically fewer artefacts in surrounding 'extent' testing in this area.

B6.4.3.3 Arundel Creek floodplain landform

The stage 1 testing also sought to investigate the south of the study area, on the east side of Arundel Creek (based on the impact area for M3R). This area is primarily located in an open paddock used for stock management and grazing. The paddock is located adjacent to the residential driveway at 100 Annandale Road, with Annandale Road running to the immediate south where it crosses the creek (**Figure B6.15**). Testing during stage 1 of the complex assessment was limited in size to one by two metre mechanical trenches due to working within and near to multiple ecological constraints.

The testing demonstrated a clear change in geomorphological processes within this paddock. Areas that were slightly elevated and set back from the creek line recorded a silt topsoil unit of variable depth, overlying a silty-clay context. Generally, where the upper

Figure B6.12
Excavation of test pit 3 from the CHMP assessment

Figure B6.13
View towards VAHR 7822-0805 (Radar Hill 6) from location of test pit 3

Figure B6.14
Low relief area near to test pit 3 and at edge Granite Hill landform, looking west towards basalt plains landform

Figure B6.15
View south of the lower slope to floodplain landforms above Arundel Creek

silt is present, the clay component increased with depth to an excavation limit of between 500mm and 550mm. This depth is considered to be the end of the artefact-bearing deposits, due to the consistency of the clay content and absence of any further artefactual material being uncovered in these lower deposits. Cultural material was identified in only some of these trenches but generally confined to the upper 200mm to 300mm where the soil is primarily a coarse silt composition and well above the deeper clay concentrated unit, where there was an absence of any artefacts.

The mechanical trenches located closer to the creek line, at a much lower elevation, recorded almost no topsoil and excavation was unable to penetrate the highly compacted plastic clay unit encountered between 100mm and 150mm; this is a notably different very dark-brown to black composition and resulting from successive periods of waterlogging and then erosion in dry seasons. MT 28 was located at the lower slope margin on the edge of the creek floodplain unit, and recorded three silcrete artefacts in the upper 100mm. This suggests that the recorded artefacts have become displaced into the floodplain unit as a result of ongoing weathering and erosion from the slopes above.

Based on the composition of the silt and artefact bearing deposits on the lower slope, including artefact typology (mostly broken flaked pieces) it was clear that the material, soils and other inclusions (primarily observed natural siliceous cobble and stone fragments) was consistent with nearby Aboriginal place VAHR 7822-4286 (Annandale Road Ridge Exposure). VAHR 7822-4286 is not located within the M3R footprint but was recorded along with VAHR 7822-4287 (Link Road Ridge Artefact Scatter) by nearby in-progress CHMP 15771 (CHMP 15771 is being prepared by Biosis on behalf of Melbourne Airport under a separate activity and had commenced assessment prior to M3R). The CHMP 15771 activity area includes the parcel of land on the opposing north-east side of the property driveway at 100 Annandale Road. Notably, the paddock under investigation for M3R shares the same prevailing hillslope where VAHR 7822-4286 (Annandale Road Ridge Exposure) is located. The stage 1 testing for M3R along Arundel Creek sought to investigate this same landform. Mechanical testing was also completed on both sides of Arundel Creek further north within the activity area to determine if there is any extension of a similar silt and artefact bearing deposit, however none was identified. (**Figure B6.16** and **Figure B6.17**) Testing further north along the floodplain (creek side areas) demonstrated a strongly indurated clay deposit under the current pastoral grass cover. MT 41 was recorded north of the silt deposits on the same east side of Arundel Creek. The trench recorded a slightly damp and mixed silty-clay unit. Excavation of deeper deposits was completed to better understand the stratigraphic contexts and geomorphological processes. The intent of the excavation was to consider whether deeper, stratified contexts of alluvium or similar exist below the recent clay deposit. The upper dark silty-clay material increased in clay component to a depth of about 900mm, where there was a clear contact onto a sandy clay unit containing some basalt inclusions. Excavation was ceased at this point. It was determined that if further excavation of the substrata needed to be undertaken, then additional excavation, sieving and spoil controls may need to be established to investigate this deposit. A review of available geotechnical data for Melbourne Airport (detailed within the CHMP's desktop assessment) was also undertaken to determine if further machine excavation was required to assess the potential for cultural material to exist in this unit.

No further investigation was undertaken of this part of the study area during Stage 2 of the Complex Assessment, in agreement with the RAP.

B6.4.3.4 Testing from European (non-Indigenous) heritage excavations

Concurrent historical excavations were undertaken in January-February 2020 for known and potential historical heritage sites within the M3R study area. This body of work follows on from previous non-Indigenous excavations which were also undertaken between 2014 and 2015 for the preparation of the RDP.

Excavations were completed near to the current CHMP assessment's test pit 3 (TP 3), as part of the M3R European (non-Indigenous) heritage assessment. The excavations focused on the site of George Coghill's Boiling-Down Works at Glencairne. Among the demolition rubble of the boiling-down works' ruined walls and foundations, seven Indigenous stone artefacts were also identified. These stone artefacts are likely to have been deposited over the nearby clay-silt soils, which were then extracted for building materials and mortar for the boiling-down works site. The artefacts may have now also been redeposited as part of the demolition material and fill on the site. These artefacts, combined with the single artefact identified in TP 3 of the CHMP and nearby VAHR 7822-0805 (Radar Hill 6), demonstrate a low to moderate density of material across the area. There is some potential for stone artefacts to exist within secondary contexts, despite the historic and modern disturbances in this immediate area.

The artefacts may have originally been deposited on the former ground surface in association with the Glenara Creek margins and ephemeral tributaries. The area near to TP 3 and Coghill's Boiling-Down Works may have once been a low relief area where water accumulated during wet periods. The proximity of this location to the incised Glenara Creek would have provided an abundant amount of natural resources for Aboriginal people in the past. The stone artefacts identified to date appear to have been subject to ongoing weathering (erosion, sheet wash), historic landscaping (Boiling-Down Works site) and modern overground activities (Grey Box Woodland and airport firebreaks).

A second historic place was investigated in the west of the study area, on the west bank of Glenara Creek. This place is attributed as Kennedy's Hut Site. One silcrete Indigenous stone artefact was identified during

excavation of a debris layer located at the rear of the site. A short course of external brick flooring was recorded in this area, suggesting the artefacts had become dispersed within an area of refuse/dumping associated with the hut. Other modern materials recorded in this context included buttons, pins, lead pencil tips, fragments of clay pipe and porcelain/ceramic dolls/figurines. No Indigenous cultural material was identified near the Kennedy Hut site; however, the location of Indigenous place Radar Hill 19 (VAHR 7822-0818) is nearby, about 150 metres to the east on the opposite side of the Glenara drainage line. This suggests that a low distribution of stone artefacts may have been deposited along the creek line in the past, and which have become exposed over time on the surface and also displaced by the construction and subsequent demolition of the historic hut site and any of its ancillary features.

The artefacts from the historic excavations have been identified in secondary contexts and without a clear stratigraphic profile.

The results of the excavations at the two European sites where these artefacts were found is detailed further in **Chapter B7: European Heritage**. These stone artefacts were registered in an wide-ranging 'Low Density Artefact Distribution' with the VAHR, spanning multiple locations across the M3R study area, at the completion of all test excavations.

B6.4.3.5
Test excavation conclusions

The results of the standard assessment identified 33 Indigenous places within the M3R study area. The results of the test excavations resulted in a large number of

Figure B6.16
View north on east side of Arundel Creek along floodplain unit

Figure B6.17
View south on west side of Arundel Creek along floodplain unit, near drainage mains outfall infastructure

previously recorded Indigenous cultural heritage place records being merged into larger landform registrations. As a result of the test excavations there are 14 Indigenous places recorded within the M3R study area (**Figure B6.18**).

Table B6.6 presents the summary of excavations completed under stage 1 of the complex assessment according to the landforms investigated.

The approach to recording Aboriginal places on the VAHR based on landform was initially endorsed by Wurundjeri during consultation in the CHMP project meetings (Standard Assessment meeting, 25 February 2020) and during subsequent email correspondence with Wurundjeri's Cultural Heritage Unit Manager, Matthew Chamberlain (via Kim White, Biosis Pty Ltd, 9 November 2020). The Wurundjeri Elders indicated they did not have any concerns with the approach proposed. The proposed method for further investigating and confirming these predictions for defining the Aboriginal places was discussed in an additional meeting held with Wurundjeri before the commencement of Stage 2 of Complex Assessment, on the 22 June 2021.

The test excavation results confirmed a number of general observations both from the survey and about the investigated landforms:

A number of previously recorded places within the M3R footprint have been subject to disturbance in previously developed parts of the study area.

The high proportion of previously recorded places (namely artefact scatters) are in poor condition due to the impact of ongoing erosion (e.g. within the Grey Box Woodland and Granite Hill areas) in naturally shallow and erosional soil profiles.

Stone artefacts were also identified in disturbed contexts associated with two European heritage places: Kennedy's Hut Site and Coghill's Boiling-Down Works.

The Basalt Plains landform has very limited potential for surviving cultural heritage materials in subsurface contexts. The existing topsoils are very shallow and are more likely to be affected/displaced by ground disturbance. Stone artefact distributions on this landform are predominantly found in eroded or surface contexts within areas used for pastoral activities. It is noted, however, that artefacts are still able to be located within disturbed contexts.

The Granite Hill landform (also known as Radar Hill) is a focal point for past Aboriginal occupation of the area and within the M3R footprint; as demonstrated by the presence of more concentrated deposits of artefacts, particularly in surface contexts and some areas of preserved subsurface archaeological deposits.

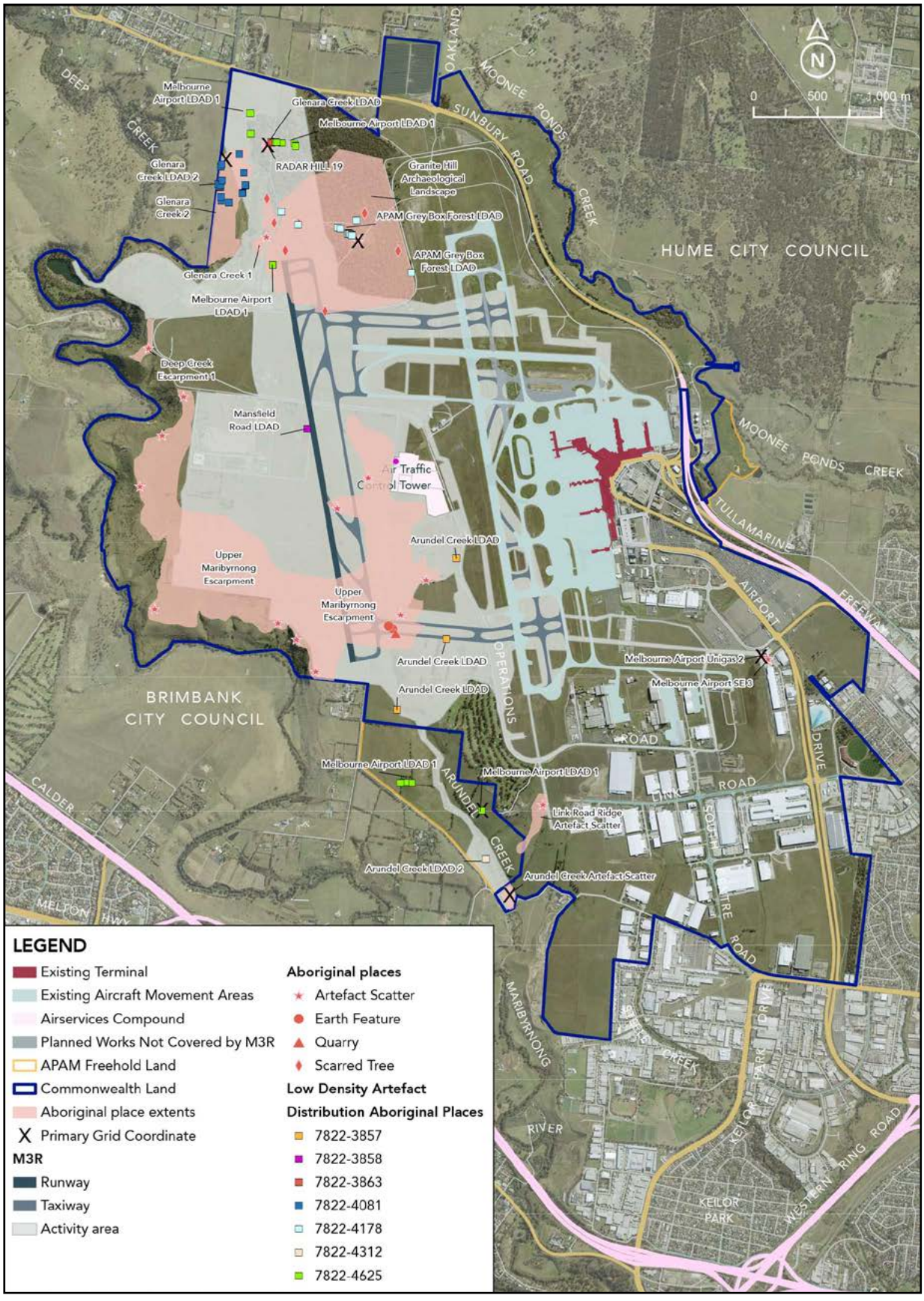
There is potential for shallow subsurface archaeological deposits on the lower hillslopes approaching Arundel Creek. There is a much lower likelihood for stone artefacts to exist on the current floodplain landform associated with Arundel Creek. Further investigation is required to investigate the potential deep alluvial deposits located adjacent and within the floodplain.

The results for the floodplain landform highlight the research potential of such waterways as Arundel Creek and its associated geomorphological process. Similar to the significance of the alluvial terrace landforms investigated by the RDP CHMP 12774, these waterway channels can present opportunities to further examine the complex geomorphology within the Melbourne

Table B6.6
Summary Results of the Test Excavations

Landform assessed	Testing type completed	Results – soil profiles	Results – artefact occurrence	Indigenous places recorded (VAHR)
Granite Hill (includes lower slopes and intersection with basalt plains)	Three, 1x1 metre test pits 37, 1x10 metre mechanical trenches 10, 1x5 metre mechanical trenches	Little to no topsoil preserved in highly eroded areas. Some silt deposits containing degraded granite over granite or clay base, to 320-390 millimetres.	TP1: 18 artefacts TP3: 1 artefact TP 4: 1 artefact MT 23: 1 artefact	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Basalt plains	One, 1x1 metre test Pit 50, 1x10 metre mechanical trenches 15, 1x5 metre mechanical trenches	Little to no preserved topsoil, silty clay and blocky clays to 100-200 millimetres in depth.	MT 1: 1 artefact MT 24: 1 artefact MT 37: 1 artefact	Part of Melbourne Airport LDAD 1 (VAHR 7822-4625); Link Road Ridge Artefact Scatter (VAHR 7822-4287)
Arundel Creek Floodplain (and lower hillslope)	16, 1x2 metre mechanical trenches	Indurated block clay on floodplain adjacent to edge of creek. Coarse clayey silts overlying silty clay to 500-550 millimetres on lower slope face.	MT 28: 2 artefacts MT 30: 6 artefacts MT 32: 1 artefact MT 33: 3 artefacts MT 35: 2 artefacts MT 36: 2 artefacts	Arundel Creek Artefact Scatter (VAHR 7822-4626)
Historic excavations	Uncovering of surface features and removal of rubbish and demolition debris	Rubbish, weed removal and demolition debris	Seven stone artefacts across two sites	Part of Melbourne Airport LDAD 1 (VAHR 7822-4625) (Kennedy's Hut and Coghill's Boiling Down Works)

Figure B6.18
Indigenous cultural heritage places in the study area



Airport estate. This helps to determine the potential for archaeological deposits in these areas; and the likelihood of cultural materials, primarily stone artefacts, to exist within different stratigraphic profiles below the present ground surface. The current extent of testing has determined the relative archaeological potential of the lower hillslope and floodplain landforms associated with Arundel Creek, limited to the south of M3R. Only limited archaeological information has been collected to inform this technical chapter. Larger test samples are required to comprehensively interpret past Aboriginal land use within these landforms, which will be determined through implementation of the complete CHMP subsurface testing methodology.

B6.4.4 Place inventory

B6.4.4.1 Aboriginal places in M3R

Additional Indigenous cultural heritage material was identified during the survey and test excavation components under CHMP 16792 across the Glenara Creek, Grey Box Woodland and Arundel Creek areas. Following the completion of all subsequent test excavations required for the Complex Assessment, a number of new Aboriginal place registrations have been determined in consultation with Wurundjeri and FP-SR (the regulator of the VAHR).

Table B6.7 to Table B6.23 provide information on the Indigenous cultural heritage places identified in the study area as a result of the survey and test excavations conducted to date. These places are also shown in Figure B6.19 to Figure B6.33. Note that not all places within the study area, or all portions of these places, will be impacted by the M3R Disturbance footprint.

Table B6.7
Place inventory for Granite Hill Archaeological Landscape (VAHR 7822-4618)

Granite Hill Archaeological Landscape (VAHR 7822-4618)	
Place type	Multi-component place (Artefact Scatter and Scarred-trees)
Description	This new place has been recorded to reflect this prominent granite hill crest as part of a 'whole of landscape' approach to determining known cultural heritage values and the potential for further unidentified values to be present in the immediate area. Additional, unidentified material will most likely include further concentrations of isolated and low density stone artefact distributions in surface and subsurface contexts. Such material may not be visible on the surface due to prevailing understorey and leaf litter cover, and likely also exists in areas not subject to test excavations given the large extent of the place. The place includes a moderate density of stone artefacts on the hill crest, which have been subject to some prior disturbances leading to their exposure. A lower density of artefacts exists in eroded area on the upper slope. A diffuse distribution of artefacts are located on the lower granite hill slope, near to the junction of this landform with the surrounding flat basalt plains. A consistent distribution of surface artefacts is present around the highly eroded external airside perimeter security fence line, at the edge of the Grey Box Woodland, to the east and south sides. This place extent includes a section of known values on the basalt plains to the north, whereas the east and southern boundaries are defined by the granite landform and its abrupt boundary with the modern airport airside and runway areas. The west boundary is defined by a combination of the granite landform and recorded values as a result of the in progress CHMP assessment. Four existing scarred trees are located within the place with one new tree determined to 'most likely' have been culturally modified identified during the survey, with one new scar tree also recorded, being in poor health (dead, standing). A total of 484 stone artefacts were recorded at the place by the CHMP across surface and subsurface contexts.
Images	**Figure B6.19** **Exposed boulder on crest of granite hill landform, view east** 

Table B6.8
Place inventory for Glenara Creek 2 (VAHR 7822-4627)

Glenara Creek 2 (VAHR 7822-4627)	
Place type	Artefact Scatter, two components, and earth feature
Description	The place is defined by the area covered by previously recorded Indigenous places VAHR 7822-4081 (Glenara Creek LDAD 2), VAHR 7822-0808 (Radar Hill 9), VAHR 7822-1116 (Radar Hill 24) and VAHR 7822-1117 (Radar Hill 25). A low density of newly recorded artefacts was also identified within this extent by the current assessment (one subsurface and 12 surface artefacts). The place is primarily defined by the low density of surface artefacts recorded across the elevated basalt plains landform within the north-west of M3R and a narrow section of escarpment landform. The place predominantly comprises a low density of surface artefacts across the extent which includes the merged locations of the VAHR 7822-0808, VAHR 7822-1116 and 7822-1117; these are highly eroding artefact distributions above the Glenara Creek gully in the south of the place. Most of the surface artefacts recorded at the basalt plains level have been subject to prior agricultural activities such as ploughing and stock trampling and grazing. Therefore, there is unlikely to be very extensive intact subsurface profiles within the place extent. Only one stone artefact was collected during Stage 1 of the CHMP Complex Assessment at a depth of between 0-100 millimetres, however an additional 29 store artefacts were recorded during Stage 2. As a result, the place was registered to include two unique artefact distribution components within the overall spatial identity of the place in agreement with the regulator, this sought to most comprehensively register the known Indigenous values and those areas where it was considered high probability additional heritage materials will still exist, but which were not identified during the targeted testing method or survey. The place also includes an existing archaeological deposit (soil feature) previously registered as VAHR 7822-0808 (RADAR HILL 9).
Images	**Figure B6.20** **View north across top of basalt plains at Glenara Creek 2** 

Table B6.9
Place inventory for Arundel Creek Artefact Scatter (VAHR 7822-4626)

Arundal Creek Artefact Scatter (VAHR 7822-4626)	
Place type	Artefact Scatter
Description	The place is a low density artefact scatter on a lower slope on the east side of Arundel Creek, in the very south of M3R. This is a newly recorded place based on the extent of testing completed in Stage 1 of the CHMP. No further testing at the place was required during Stage 3 of Complex Assessment. Testing was undertaken by mechanical trenches excavated in short transect across the lower slope and on the floodplain unit above Arundel Creek. Testing on the low elevation floodplain unit recorded almost no topsoil development and encountered a compact clay unit between 100-150 millimetres. Testing on the lower slope face recorded a clear silt topsoil deposit to between 200-300 millimetres, overlying a silty clay context to depths between 500-550 millimetres. Cultural material was identified in the majority of trenches on the lower slope above the floodplain level, with artefacts recorded in the upper 200-300 millimetre. Trench MT 28 was located at the transition between the lower slope margin and the creek floodplain. Three silcrete artefacts were identified in the upper 100 millimetres in the highly compact clay deposit. This suggests that the artefacts have become displaced over the floodplain unit as a result of ongoing weathering and erosion out of the silt profile on the slopes above. The material recorded at this place appears consistent with nearby Aboriginal place VAHR 7822-4286 (Annandale Road Ridge Exposure) further upslope on the same hillside (outside M3R footprint). The newly recorded place Arundel Creek Artefact Scatter comprises 17 subsurface artefacts across six positive test locations.
Images	**Figure B6.21** **View south of Arundel Creek Artefact Scatter, across low hillslope and floodplain** 

Table B6.10
Place inventory for VAHR 7822-4287 (Link Road Ridge Artefact Scatter)

VAHR 7822-4287 (Link Road Ridge Artefact Scatter)	
Place type	Artefact Scatter
Description	The place is a moderate density artefact scatter located across a prominent ridgeline in the south of M3R, with excellent views along the Arundel Creek valley. The place was first recorded by nearby CHMP 15771, which is currently in preparation by Biosis on behalf of APAM for other works. CHMP 15771 recorded two surface artefacts and 191 subsurface artefacts from a total of three 1x1 metre test pits, and fourteen 50x50 centimetre shovel test pits (STPs). 52 artefacts were recorded in a single STP in Transect 2 (STP 7) demonstrating the highly concentrated nature of this place along the ridge spine. In line with the 'landform' approach of this assessment, the place extent has been updated to reflect the full ridgeline crest which runs to the south. The northern extent of the place has also increased based on identification of an artefact in a test trench where the ridge approaches the basalt plains landform in the north.
Images	**Figure B6.22** **View of VAHR 7822-4287 facing south, ridge crest in distant middle-ground** 

Table B6.11
Place inventory for VAHR 7822-0818 (Radar Hill 19)

VAHR 7822-0818 (Radar Hill 19)	
Place type	Artefact Scatter
Description	The place was unable to be relocated. The area is located near to the Gate 4 access road (to the east). The ground is covered with leaf litter which obscured vision of the ground's surface and any cultural material present. The place comprises a single silcrete artefact, which may have become displaced or obscured from vision.
Images	**Figure B6.23** **Location of previously recorded place VAHR 7822-0818 (Radar Hill 19) looking south-west towards Glenara Creek gully** 

Table B6.12
Place inventory for VAHR 7822-1335 (Melbourne Airport SE 3)

VAHR 7822-1335 (Melbourne Airport SE 3)	
Place type	Artefact Scatter
Description	26 artefacts collected in surface salvage associated with CHMP 10442 in 2012 and place was consequently destroyed. The place location has since been subject to disturbance as part of internal roads and infrastructure near the roundabout connecting Airport Drive and Mercer Drive. No further investigation was determined to be required as part of the current assessment.

Table B6.13
Place inventory for VAHR 7822-1803 (Melbourne Airport UNIGAS 2)

VAHR 7822-1803 (MELBOURNE AIRPORT UNIGAS 2)	
Place type	Artefact Scatter
Description	The place was subject to the most recent reassessment under CHMP 12333. Due to the importation of fill, the cultural material present was determined to have no provenance, The current survey observed the place to have been subject to disturbance as part of internal roads and infrastructure near the roundabout connecting Airport Drive and Mercer Drive. No further investigation was determined to be required as part of the current assessment.

Table B6.14
Place inventory for VAHR 7822-3857 (Arundel Creek LDAD)

VAHR 7822-3857 (Arundel Creek LDAD)	
Place type	Low Density Artefact Distribution
Description	The place was collected at the time of recording during CHMP 12774. The components of this place comprise two stone artefacts located on the west bank of Arundel Creek, and two within the undeveloped land west of Operations Road, identified during concurrent historical heritage investigations.

Table B6.15
Place inventory for VAHR 7822-3858 (Mansfield Road LDAD)

VAHR 7822-3858 (Mansfield Road LDAD)	
Place type	Low Density Artefact Distribution
Description	Two artefacts were found during subsurface excavations as part of CHMP 12774. It is likely the place primarily existed as a low density subsurface distribution on the basalt plain landform. No further investigation was determined to be required as part of the current assessment.

Table B6.16
Place inventory for VAHR 7822-3863 (Glenara Creek LDAD)

VAHR 7822-3863 (Glenara Creek LDAD)	
Place type	Low Density Artefact Distribution
Description	The place location was revisited during the survey but no cultural heritage material was able to be identified at the original component locations, primarily due to prevailing grass and leaf litter cover. Additional isolated surface artefacts identified during the survey across the northern assessment area (basalt plains and outer margins of the Grey Box Woodland) will be added to this registration under a VAHR 'Record Edit' process.
Images	**Figure B6.24** **Location of previously recorded place VAHR 7822-3863 (Glenara Creek LDAD) adjacent to access road looking south** 

Table B6.17
Place inventory for VAHR 7822-3864 (Deep Creek Escarpment 1)

VAHR 7822-3864 (Deep Creek Escarpment 1)	
Place type	Artefact Scatter
Description	VAHR 7822-3864 is a large Artefact Scatter located on the eastern escarpment of Deep Creek. The place is located on a crest and is bounded by cliffs and steep slopes to the west and south and by disturbance associated with runway construction to the east and north. CHMP 12774 merged previously recorded places VAHR 7822-0365 into this place. The place was revisited during the current survey but no new artefacts were recorded.

Table B6.18
Place inventory for VAHR 7822-3871 (Upper Maribyrnong Escarpment)

VAHR 7822-3871 (Upper Maribyrnong Escarpment)	
Place type	Artefact Scatters
Description	VAHR 7822-3871 is a wide covering multi-component place comprising a diffuse 'background scatter' of stone artefacts, and a number of higher density 'artefact clusters'. The escarpment was revisited and views of the place were recorded with digital camera. At the time of survey, the majority of the place extent is under medium grass growth which has dried after the change to the summer period. The place appears to be in good conditions, following the prior assessment by CHMP 12774. Some parts of the middle and lower hillslopes above Arundel Creek (e.g. component -13; cluster) are exposed and are likely subject to ongoing erosion, where no vegetation matter is present to stabilise the area.
Images	**Figure B6.25** **Location of VAHR 7822-3871 (Upper Maribyrnong Escarpment) looking north along Arundel Creek valley (eastern extent of place)** 
	Figure B6.26 **Location of VAHR 7822-3871 (Upper Maribyrnong Escarpment) looking northwest along Arundel Creek valley (northern extent of place)** 

Table B6.19
Place inventory for VAHR 7822-3872 (Glenara Creek 1)

VAHR 7822-3872 (Glenara Creek 1)	
Place type	Artefact Scatter and Scarred Trees
Description	Three surface artefacts were identified within the existing place extent (VAHR 7822-3872-1), in eroding areas of ground. Two were located near the artefact scatter PGC, and one near to the Component 3 scarred tree. The two scarred tree components were re-inspected, with component 2 (VAHR 7822-3872-2) appearing to be in good health, although component 3 (VAHR 7822-3872-3) appeared to be in poor health.
Images	**Figure B6.27** **View eroded ground near new artefacts within previously recorded place VAHR 7822-3872-1 (Glenara Creek 1)** 
	Figure B6.28 **View south-west of relocated Scarred Tree VAHR 7822-3872-2 (Glenara Creek 1)** 
	Figure B6.29 **View north of relocated Scarred Tree VAHR 7822-3872-3 (Glenara Creek 1)** 

Table B6.20
Place inventory for VAHR 7822-4312 (Arundel Creek LDAD 2)

VAHR 7822-4312 (Arundel Creek LDAD 2)	
Place type	Low Density Artefact Distribution
Description	The specific components of the place were unable to be located during the current survey. The place location appears to be subject to significant flood damage at the creek line. This may have displaced the material remains from the area, or the artefact has been obscured by grass cover. A number of new surface artefacts were identified along the hillslopes above Arundel Creek during the survey portion of the current assessment. Due to their proximity to the existing VAHR components, these will be added under a 'Record Edit' process for this place. The place now comprises a total of five surface artefacts (four newly recorded and one existing), however only the existing component is located within the M3R footprint.
Images	**Figure B6.30** **Location of previously recorded place VAHR 7822-4312 (Arundel Creek LDAD 2) looking south-east across creek floodplain** 

Table B6.21
Place inventory for Melbourne Airport LDAD 1 (VAHR 7822-4625)

Melbourne Airport LDAD 1 (VAHR 7822-4625)	
Place type	Low Density Artefact Distribution
Description	A total of 21 artefacts are included in this place registration. The registration covers areas within the north and south parts of the Melbourne Airport estate. The registration could only be processed after the larger, landform based registrations had been approved for CHMP 16792. Thereby, these artefact locations are remaining isolated artefact occurrences identified by the CHMP. Eight of the artefacts include isolated finds in areas north of the Grey Box Woodland, in the northern most parts of the basalt plain which make up the Activity Area. One additional artefact was recovered from positive MT 24 from Stage 1 of the Complex Assessment. Four artefacts were recorded across the hillslopes above Arundel Creek in the very south of the former extent to the Activity Area, before this area was subsequently revised to activity's disturbance footprint along the creek corridor. Seven artefacts were recorded amongst rubble in-fill from the historical investigation conducted at the newly attributed site of George Coghill's Boiling Down Works at Glencarine, to the immediate south-west of the Grey Box Woodland. One artefact was identified within a refuse deposit at the rear (western) side of a historic residential hut, attributed to 'Kennedy's Hut Site' further to the north of the Boiling Down Works.
Images	**Figure B6.31** **Photograph 19 Microlith artefact identified in area of exosure by farming dam at Glenara Creek drainage line (VAHR 7822-4625-2)** 

Table B6.22
Place inventory for VAHR 7822-4081 (Glenara Creek LDAD 2)

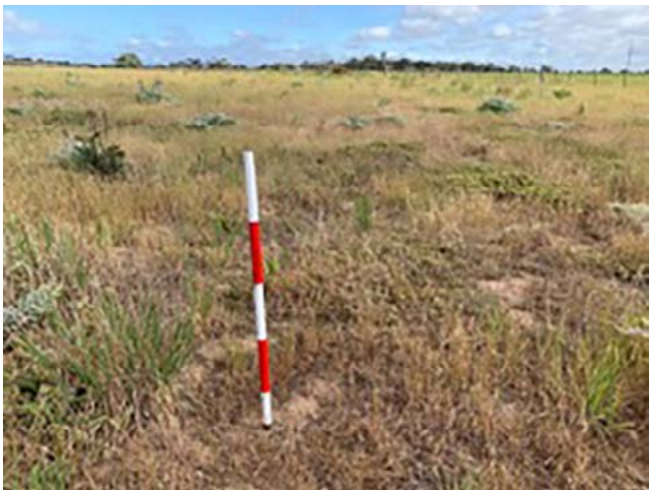
VAHR 7822-4081 (Glenara Creek LDAD 2)	
Place type	Low Density Artefact Distribution
Merged with	Glenara Creek 2 (VAHR TBD)
Description	Although the specific components of the place could not be relocated, three new artefacts were identified in the area.
Images	**Figure B6.32** **Photograph 28** **Location of previously recorded place VAHR 7822-4081 (Glenara Creek LDAD 2) looking north-west** 

Table B6.23
Place inventory for VAHR 7822-4178 (APAM Grey Box Forest LDAD)

VAHR 7822-4178 (APAM Grey Box Forest LDAD)	
Place type	Low Density Artefact Distribution
Merged / Retired with	The place has been merged in its entirety with the Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place comprises a number of surface artefacts recorded within the Grey Box Woodland and along the landside perimeter security fence line by a previous non-CHMP survey. Not all components were able to be relocated, however additional cultural material was recorded in the vicinity of a concentration on the west slope of Radar Hill. Eleven artefacts were located along an area that appears to be a former track or firebreak for the now removed radar installation. The exposure is highly eroded along its extent, with sheet wash cutting into the underlying sediment. Grass and vegetation obscures ground visibility on either side. Only a low density of material was identified around the middle to upper slope of Radar Hill, despite further wide areas of ground exposure.
Images	**Figure B6.33** **View of highly eroded area at location of previously recorded components of place VAHR 7822-4178 (APAM Grey Box Forest LDAD) looking east** 

B6.4.4.2
Previously recorded and retired/merged Aboriginal places

Table B6.24 to Table B6.43 presented below detail those Indigenous places previously recorded within the study area and which have now been merged within one of the new places. The place locations were subject to survey during the CHMP Standard Assessment. The information is provided below as a recorded of each the site contents for each new place.

Table B6.24
Place inventory for VAHR 7822-0800 (Radar Hill 1)

VAHR 7822-0800 (Radar Hill 1)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place GPS location was revisited. The area is in a deteriorated state with few spatial references to identify the location of the previously registered scatter. One isolated artefact was identified on part of the same unformed/exposed track. The track is now disused and is largely covered by leaf litter. It is unclear if the artefact is related to the place and may be indicative of displacement of materials over time, or a low density continuation of material in the vicinity.
Images	**Figure B6.34 Previously recorded location of VAHR 7822-0800 (Radar Hill 1) showing existing ground conditions looking north** 

Table B6.25
Place inventory for VAHR 7822-0801 (Radar Hill 2)

VAHR 7822-0801 (Radar Hill 2)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place GPS location was revisited. No cultural material was able to be identified. The line of a prior firebreak or informal track appears to run across the location east-west. The original site card indicates the place on a firebreak abutting a fence line. It seems more likely that on this basis, the place is more accurately located on the exposed access track further to the north of the current ACHRIS entry. Cultural material was recorded in this latter assessed area.
Images	**Figure B6.35 Register location of previously recorded place VAHR 7822-0801 (Radar Hill 2)** 

Table B6.26
Place inventory for VAHR 7822-0802 (Radar Hill 3)

VAHR 7822-0802 (Radar Hill 3)	
Place type	Scarred Tree
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place GPS position was revisited. No potential standing scarred tree representing the original place card was noted here. A fallen, dead tree was recorded within 50 metres of this area which displayed a scar mark. The scar face is partially laid against the ground but it was not thought to be the result of cultural modification. Subsequently, the mud map on the place card was used to relocate the place much further north-west, roughly central in the existing GBW extent. The scarred tree is in poor health with the base of the tree extensively burrowed by animal activity. The scar is angled as depicted in the place card and follows the main trunk orientation.
Images	**Figure B6.36 Relocated scarred tree VAHR 7822-0802 (Radar Hill 3) view of scar side looking south** 

Table B6.27
Place inventory for VAHR 7822-0803 (Radar Hill 4)

VAHR 7822-0803 (Radar Hill 4)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place GPS position was revisited. No cultural material was able to be identified here. The area is covered by medium thick grass, but is located on the edge of wider eroded areas. The place is located downslope of a much larger concentration of cultural material and exposed granite on the crest of Radar Hill. It is probable that the existing ground conditions obscure the extent of the place and its prior identifying features.
Images	**Figure B6.37** **Location of previously recorded place VAHR 7822-0803 (Radar Hill 4) looking north-east** 

Table B6.28
Place inventory for VAHR 7822-0804 (Radar Hill 5)

VAHR 7822-0804 (Radar Hill 5)	
Place type	Scarred Tree
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was relocated near to its existing ACHRIS record. The tree is in good health and the main south-facing scar is well preserved. The tree base is surrounded by boxthorn. A second smaller scar is located on the north side of the tree and is hollowed with a great amount of regrowth present.
Images	**Figure B6.38** **Relocated scarred tree VAHR 7822-0804 (Radar Hill 5) view of scar side looking north** 

Table B6.29
Place inventory for VAHR 7822-0805 (Radar Hill 6)

VAHR 7822-0805 (Radar Hill 6)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was relocated at its existing ACHRIS record. The scatter covers a wide area along a heavily eroded prior firebreak. The area has most likely been subject to prior vehicle activity as well. The distribution of artefacts becomes diffuse at the northern extent, where the current level of exposure narrows. The ground exposure continues to the south and west in small area of new vegetation growth and also to the east below more establish young growth. Further material was unable to be located here however, in part due to accumulated leaf litter over this surface.
Images	**Figure B6.39 Relocated area of VAHR 7822-0805 (Radar Hill 6) view south-east** 

Table B6.30
Place inventory for VAHR 7822-0806 (Radar Hill 7)

VAHR 7822-0806 (Radar Hill 7)	
Place type	Scarred Tree
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place GPS position was revisited. No mature trees bearing cultural modification could be located in this immediate area. One tree was recorded further north of the place, however. The visible scar is elevated much higher above the ground, and faces approximately south-east. The dimensions of the scar do not appear to match those of the original place card however, unless the scar has deteriorated since initial recording.
Images	**Figure B6.40 Probable relocated scarred tree VAHR 7822-0806 (Radar Hill 7) view of scar side looking north-west** 

Table B6.31
Place inventory for VAHR 7822-0808 (Radar Hill 9)

VAHR 7822-0808 (Radar Hill 9)	
Place type	Earth feature/Artefact Scatter
Merged with	Glenara Creek 2 (VAHR 7822-4627)
Description	The place was unable to be relocated during the initial CHMP survey. Low GSV hindered the ability to relocate the place. Subsequently, one silcrete artefact was located on the eroding embankment above the creek line during visitation of the area for a separate historic heritage survey.
Images	**Figure B6.41 View of previously recorded place VAHR 7822-0808 (Radar Hill 9) over shallow gully on north side of Glenara Creek** 

Table B6.32
Place inventory for VAHR 7822-0809 (Radar Hill 10)

VAHR 7822-0809 (Radar Hill 10)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was revisited with two surface artefacts recorded within 10 metres of the GPS location. Further isolated artefacts were also noted north and south within 100 metres of the place. The place is located on the landside (west of the perimeter security fence). The area is highly eroded on the prior firebreak; now the airside perimeter security fence. Sheet wash is continuing to cut into the underlying sediments approaching the fence line. Large ant colonies are also located across the area, obscuring vision of the obscured ground in some parts.
Images	**Figure B6.42 Location of relocated place VAHR 7822-0809 (Radar Hill 10) looking south along perimeter security fence line** 

Table B6.33
Place inventory for VAHR 7822-0810 (Radar Hill 11)

VAHR 7822-0810 (Radar Hill 11)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	Similar to above place VAHR 7822-0809, this place is located along the west side to the perimeter security fence, along the south-east of the Grey Box Woodland. One silcrete artefact was located near to the place GPS location. The area is highly eroded which a variety of imported materials also present in the area contributing to disturbance and obscuring the natural sediments of the area.
Images	**Figure B6.43 Location of previously recorded place VAHR 7822-0810 (Radar Hill 11) looking south along perimeter security fence line** 

Table B6.34
Place inventory for VAHR 7822-0811 (Radar Hill 12)

VAHR 7822-0811 (Radar Hill 12)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was located along the west side of the perimeter security fence. Five artefacts were identified in the vicinity of the place GPS location. The area is in poor condition and subject to erosion.
Images	**Figure B6.44 View of relocated place VAHR 7822-0811 (Radar Hill 12) looking south along perimeter security fence line** 

Table B6.35
Place inventory for VAHR 7822-0812 (Radar Hill 13)

VAHR 7822-0812 (Radar Hill 13)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was unable to be relocated. It is likely the continued erosion of the area has lead to displacement of material, and also the obscuring of artefacts by sediment and other rubbish material along the fence line. The area is slightly narrower between the fence line and also sparse vegetation extending from the GBW, which limited visibility of the ground surface.
Images	**Figure B6.45** **View of previously recorded place VAHR 7822-0812 (Radar Hill 13) looking north along perimeter security fence line** 

Table B6.36
Place inventory for VAHR 7822-0813 (Radar Hill 14)

VAHR 7822-0813 (Radar Hill 14)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was unable to be relocated. It is likely the continued erosion of the area has led to displacement of material, and also the obscuring of artefacts by sediment and other rubbish material along the fence line.
Images	**Figure B6.46** **View of relocated place VAHR 7822-0813 (Radar Hill 14) looking south along perimeter security fence line** 

Table B6.37
Place inventory for VAHR 7822-0814 (Radar Hill 15)

VAHR 7822-0814 (Radar Hill 15)	
Place type	Scarred Tree
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was relocated near the original place recording. The tree is in poor to good health and appears to be decaying. One branch is still alive with leaves still attached, although the main trunk limb appears dead at the canopy end. A number of large branches have fallen around the base of the tree. The south-facing scar appears to be well preserved.
Images	**Figure B6.47** **Relocated scarred tree VAHR 7822-0814 (Radar Hill 15) showing scar side looking north** 

Table B6.38
Place inventory for VAHR 7822-0815 (Radar Hill 16)

VAHR 7822-0815 (Radar Hill 16)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was unable to be located. Material may have become displaced due to prolonged erosion along the perimeter security fence line, or by vegetation regrowth along the edge of the Grey Box Woodland understorey.
Images	**Figure B6.48** **View of surveyed area at recorded location of VAHR 7822-0815 (Radar Hill 16) looking east along perimeter security fence line** 

Table B6.39
Place inventory for VAHR 7822-0816 (Radar Hill 17)

VAHR 7822-0816 (Radar Hill 17)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was relocated. Four surface artefacts were identified in the vicinity of the place. The fence-line is eroding along the GBW side, with a gentle slope proceeding southwards from the Granite Hill formation to the north (Radar Hill).

Images

Figure B6.49
View of surveyed area at recorded location of VAHR 7822-0816 (Radar Hill 17) looking east along perimeter security fence line

Table B6.40
Place inventory for VAHR 7822-0817 (Radar Hill 18)

VAHR 7822-0817 (Radar Hill 18)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place was relocated by the perimeter security fence line. Two artefacts were identified by the place co-ordinate.

Images

Figure B6.50
View of surveyed area at recorded location of VAHR 7822-0817 (Radar Hill 18) looking east along perimeter security fence line

Table B6.41
Place inventory for VAHR 7822-0821 (Radar Hill 22)

VAHR 7822-0821 (Radar Hill 22)	
Place type	Artefact Scatter
Merged with	Granite Hill Archaeological Landscape (VAHR 7822-4618)
Description	The place location was revisited, following the relocation of nearby scarred tree VAHR 7822-0802 (RADAR HILL 3). The area appears to be stable and located on flat ground. Prior access tracks are present in the area as well as discrete areas of disturbance, including underground cabling and an area of rock pilling. Leaf litter and boxthorn obscures a large area, making it difficult to reference the original place card. No cultural material was identified in the vicinity of the place.
Images	**Figure B6.51 Approximate location of VAHR 7822-0821 (Radar Hill 22) based on original site recording information, looking north** 

Table B6.42
Place inventory for VAHR 7822-1116 (Radar Hill 24)

VAHR 7822-1116 (Radar Hill 24)	
Place type	Artefact Scatter
Merged with	Glenara Creek 2 (VAHR 7822-4627)
Description	The place was unable to be relocated during the survey,
Images	**Figure B6.52 View over location of previously recorded place VAHR 7822-1116 (Radar Hill 24) looking west over shallow gully** 

Table B6.43
Place inventory for VAHR 7822-1117 (Radar Hill 25)

VAHR 7822-1117 (Radar Hill 25)	
Place type	Artefact Scatter
Merged with	Glenara Creek 2 (VAHR 7822-4627)
Description	The place could not be located at the existing GPS position but six additional artefacts were recorded in close vicinity, in an area of exposed sands eroded from the mid-slope near to Glenara Creek.
Images	**Figure B6.53** **Area of high erosion where artefacts were identified near to previously recorded place VAHR 7822-1117 (Radar Hill 25)**

B6.4.5
Significance assessment

A significance assessment of each Indigenous cultural heritage place is summarised in Table B6.44. The RAP field representatives who participated in the CHMP were not aware of any specific traditional information about the Indigenous cultural heritage within the study area. The representatives commented that cultural heritage places are considered to have high cultural significance as they represent their ancestors' use of the land. A number of Wurundjeri representatives commonly comment on the Grey Box Woodland as a significant area for cultural heritage, particularly owing to the scarred trees located there. For some representatives, this is also informed by previous cultural heritage survey work they have participated in at Melbourne Airport. This has given them an opportunity to survey and locate existing places, and in some instances assist in identifying new material such as stone artefacts.

Additional Indigenous cultural heritage material was identified during the survey under CHMP 16792 across the Glenara Creek, Grey Box Woodland and Arundel Creek survey areas. Stage 1 of the complex assessment has been completed and serves to determine the extent, nature and significance of those new places listed in Section B6.4.4.1. The spatial extent (boundaries) of these new places are primarily defined by the key landforms discussed in Section B6.4.3 and informed by the extent of test excavation completed to date.

Table B6.44
Significance assessment for Aboriginal cultrual heritage places in the study area

VAHR place number and name	Commonwealth Heritage List criteria	Significance threshold	Statement of significance
Granite Hill Archaeological Landscape (VAHR 7822-4618)	Criterion 1. Criterion 9	Moderate – the site is of state significance.	Place Granite Hill Archaeological Landscape is a large multi-component place within the north of the M3R study area. The place comprises a large portion of the current extant Grey Box Woodland, located over the granite hill geological landform, also known as 'Radar Hill'. The place comprises a moderate density of stone artefacts on the hill crest, a low density artefact distribution on the lower slope margins of the hill and in areas subject to erosion. This new place also combines four existing Scarred Tree components, which are in various conditions of health, some in good health and others in a deteriorating state. The individual components (predominantly surface artefact distributions) are common place types in the local region, however the connection of these components is tightly bound to the granite hill formation as a focus of past Indigenous occupation. The place provides information about the exploitation of multiple resources and site patterning across the regional landscape. The scarred tree components are also limited in occurrence for the region. For these reasons, proposed place Granite Hill Archaeological Landscape is considered to be of moderate significance.
Glenara Creek 2 (VAHR 7822-4627)	Criterion 9	Minor – the site is of local significance.	Proposed place Glenara Creek 2 is a low density artefact scatter primarily located over the basalt plains landform in the north-west of the M3R study area. It is a common place type in the local region and has limited stratigraphic integrity. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density and history of impacts by pastoral activities. The place has combined a number of earlier place registrations and include additional surface material identified by the current CHMP 16792 survey. For these reasons, proposed place Glenara Creek 2 is considered to be of minor significance.
Arundel Creek Artefact Scatter (VAHR 7822-4626)	Criterion 9	Minor – the site is of local significance.	Proposed place Arundel Creek Artefact Scatter is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density and common representativeness of its contents. It is representative of an extension to a nearby artefact scatter which shares the same hillslope. For these reasons, proposed place Arundel Creek Artefact Scatter is considered to be of minor significance.
VAHR 7822-0818 (Radar Hill 19)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-0818 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-0818 is considered to be of minor significance.
VAHR 7822-3857 (Arundel Creek LDAD)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-3857 is a low density artefact scatter and a common site in the local region. Artefacts are located in a disturbed context. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low density of artefacts. For these reasons, VAHR 7825-3857 is considered to be of minor significance.
VAHR 7822-4312 (Arundel Creek LDAD 2)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-4312 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-4312 is considered to be of minor significance.
VAHR 7822-3863 (Glenara Creek LDAD)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-3863 is a low density artefact scatter and is a common site in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7825-3863 is considered to be of minor significance.
VAHR 7822-3872 (Glenara Creek 1)	Criterion 1 Criterion 9	Moderate – the site is of state significance.	VAHR 7822-3872 is a low density artefact scatter with surface and subsurface components as well as two scarred trees. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape, but is in good condition and displays a range of components. For these reasons, VAHR 7825-3866 is considered to be of moderate significance.

VAHR place number and name (cont.)	Commonwealth Heritage List criteria (cont.)	Significance threshold (cont.)	Statement of significance (cont.)
VAHR 7822-3871 (Upper Maribyrnong escarpment)	Criterion 1 Criterion 9	Moderate – the site is of state significance.	VAHR 7825-3871 is a large low density artefact scatter with surface and subsurface components as well as a silcrete quarry identified within a gully leading into the Arundel Creek. The place has only shallow archaeological deposits with no stratigraphic features. As a large place with multiple interrelated components, VAHR 7825-3871 has high potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape. For these reasons, VAHR 7825-3871 is considered to be of moderate significance.
VAHR 7822-3858 (Mansfield Road LDAD)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-3858 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-3858 is considered to be of minor significance.
VAHR 7822-1803 (Melbourne Airport Unigas 2)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-1803 is an isolated artefact occurrence and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. The place has been previously assessed under CHMP 12333 which could not relocate the place and it was considered to have been destroyed. Therefore, it is determined that no physical remains are left at the place. For these reasons, VAHR 7822-1803 is considered to be of minor significance.
VAHR 7822-1335 (Melbourne Airport SE 3)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-1335 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. The place has been previously assessed and subject to archaeological salvage under CHMP 10442. Therefore, it is determined that no physical remains are left at the place. For these reasons, VAHR 7822-1335 is considered to be of minor significance.
VAHR 7822-3864 (Deep Creek Escarpment 1)	Criterion 1 Criterion 9	Moderate – the site is of state significance.	VAHR 7825-3864 is a low density artefact scatter and is a common site in the local region. Artefacts are located in a disturbed context. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low density of artefacts. The potential for further investigation of the relationship between Indigenous cultural material and the Bellno homestead does provide limited opportunities for further research. For these reasons, VAHR 7825-3864 is considered to be of moderate significance.
VAHR 7822-4287 (Link Road Ridge Artefact Scatter)	Criterion 1 Criterion 9	Moderate – the site is of state significance.	VAHR 7822-4287 is a large artefact scatter with a primarily high density subsurface component as well as low density surface component. The place directly overlooks the Arundel Creek valley and its drainages with excellent vantage over a wide landscape. The place has relatively shallow but very intact subsurface archaeological deposits. The location of the place also demonstrates more complex stratigraphic and geomorphological processes unique to the landscape it is situated in. As a relatively large and moderate-density place, but with artefacts that are fairly common in form and representativeness, VAHR 7825-4287 has moderate potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape. For these reasons, VAHR 7825-4287 is considered to be of moderate significance.
VAHR 7822-4625 (Melbourne Airport LDAD 1)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-4625 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-4625 is considered to be of minor significance.
VAHR 7822-4081 (Glenara Creek LDAD 2)	Criterion 9	Minor – the site is of local significance.	VAHR 7822-4081 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-4081 is considered to be of minor significance.
VAHR 7822-4178 (APAM Grey Box Forest LDAD	Criterion 9	Minor – the site is of local significance.	VAHR 7822-4178 is a low density artefact scatter and is a common place type in the local region. The place has limited potential to provide new information about the exploitation of raw stone materials and site patterning across the regional landscape due to the low artefact density. For these reasons, VAHR 7822-4178 is considered to be of minor significance.

B6.5
ASSESSMENT OF POTENTIAL IMPACTS

The assessment of potential impacts uses the project-specific severity criteria developed for the cultural heritage assessment (described in **Table B6.45** as well as the significance ratings for cultural heritage sites in **Table B6.44**). Duration of impact and likelihood of impact are as described in *Chapter A8: Assessment and Approvals Process* of the *M3R content development guide*. A number of cultural heritage places will be impacted by the M3R development. Impacts will result from excavation and filling to prepare runways, airside areas, access roads, service facilities and other infrastructure.

The significance assessment criteria for assessing impacts to cultural heritage have been developed in accordance with the significant assessment framework for M3R described in *Section A8.3 of Chapter A8: Assessment and Approvals Process*. This follows an approach that requires an initial assessment of the baseline condition of the heritage place and anticipated impacts of the development as proposed, incorporating standard mitigation, followed by a determination of the residual impacts once additional measures are taken into consideration to lower the severity or likelihood of an impact occurring. The significance assessment criteria for assessing impacts to Indigenous heritage have been developed in accordance with the significant assessment framework for M3R (refer to **Section B6.4.5** Significance assessment).

The method for implementation of these avoidance and mitigation measures must be approved within the CHMP by Wurundjeri, and determined through consultation to be appropriate to best minimise impacts to Indigenous cultural heritage throughout the construction of M3R.

However, because of the complexity of M3R it may not be possible to avoid direct impacts to a given Indigenous place and certain mitigation measures will be required as stipulated by the CHMP as approved by the RAP. Mitigation actions are generally developed with respect to the nature, extent and significance of each place. Nominally, such mitigation requirements are achieved through a program of methodical archaeological salvage excavation and detailed site recording, which will record and preserve information of cultural heritage values. This information is also utilised in the production of an archaeological salvage report for all Indigenous places investigated. The report further details the nature of the cultural material collected. It provides a resource detailing the archaeological importance of each place, its nature and site formation processes within the broader landscape, and which seeks to answer additional research questions posed at the completion of the CHMP assessment.

Cultural heritage values not directly impacted by the M3R (where applicable) may be managed through providing temporary exclusion fencing and established no-go zones and other non-invasive protection measures to ensure works do not impact upon preserved parts of places. It is noted that under the requirements of the Regulations, harm avoidance should be explored by the CHMP Sponsor for each Indigenous place in the first instance. Harm avoidance is also the preferred option of the RAP where this is feasible.

Table B6.45
Severity criteria

Impact severity	Description
Major	Adverse non reversible impacts to heritage places / objects of national significance. Meets NHL Criteria.
High	Adverse non reversible impacts to heritage places / objects of state significance. Meets VAHR criteria for high significance.
Moderate	Adverse non reversible impacts to heritage places / objects of regional significance. Meets VAHR criteria for moderate significance.
Minor	Adverse non reversible impacts to heritage places / objects of local significance. Meets VAHR criteria for low significance.
Negligible	Minor works without adverse impacts.

B6.6
AVOIDANCE, MANAGEMENT AND MITIGATION MEASURES

Works will be undertaken in compliance with the specific requirements of approved CHMP 16792. The consultation process with the RAP has established precise methods for harm mitigation and/or minimisation for each Indigenous place to be directly impacted by the proposed works. It is expected that, should further design be able to minimise impacts to Indigenous places, these places will then be avoided and protected following a methodology reached in agreement with the RAP.

The specific requirements of CHMP 16792 include conditions for:

- Cross cultural inductions with site contractors involved in ground disturbance activities
- Compliance inspections staged at key ground disturbance and construction works completion
- Repatriation and/or reburial of cultural material
- Encouraging cultural awareness through interpretative signage or other educational platforms
- Avoidance actions per cultural heritage place where practical
- Other mitigation actions prior to the proposed works such as archaeological salvage.

Most of these measures for harm avoidance, management and mitigation will involve the expertise of a heritage adviser, suitably qualified in archaeology, to oversee the implementation of these requirements (including works required on site). Heritage officers

and field representatives for the RAP will be invited to participate in a number of these measures such as salvage and cultural awareness sessions. The timing and function of RAP's involvement, where appropriate, will be determined during the CHMP consultation process and post-approval consultation where further detailed construction staging and timing is known.

The CHMP also lists specific contingency plans to be followed during M3R. The contingency plans assist the CHMP Sponsor (i.e. Australia Pacific Airports (Melbourne)) to monitor and ensure compliance with the management requirements within the plan. The contingency plans also include a step-by–step set of actions to take in the event that unexpected additional cultural heritage material (including suspected human remains) is uncovered during works, including recording, custody and future management requirements.

The contingency plans are outlined in Section 2 of the approved CHMP.

Following approval by the evaluating authority (the RAP/Wurundjeri) the approved CHMP 16792 has been made available to Melbourne Airport for use in ongoing planning and construction requirements for M3R.

B6.7
CONCLUSIONS

B6.7.1
Cultural heritage values

B6.7.1.1
Previously recorded Indigenous places

The start of the cultural heritage assessment identified 33 existing Indigenous cultural heritage places within M3R. These predominately consisted of artefact scatters and low density artefact distributions, with some scarred trees also present in the Grey Box Woodland. The list of previously recorded places is presented for easy reference in Table B6.46

The location of a number of the individual places in the table has been updated based on the survey and test excavations as part of CHMP 16792. As a result, a large number of smaller individual locations have been merged into spatially larger landform places. This was primarily conducted across the granite hill and Grey Box Woodland areas, as the previously recorded places share this same prominent landform.

There are now 17 Indigenous places within the M3R study area. These recorded Indigenous places in M3R are listed in Table B6.47 with the indication of the places that have now been merged into larger recordings.

The types of Indigenous places in the study area range from smaller distributed and isolated artefact occurrences with low local significance, to large extensive places of high state significance. These have been listed below according to their updated conditions: new registrations, updated registrations and existing (unchanged) registrations based on the assessment conducted under CHMP 16792.

B6.7.1.2
Current Indigenous places

New Indigenous places are presented first in the following table. Places that have been updated as a result of the survey and excavations are then presented, and lastly, places which did not require any changes are listed.

Table B6.46
Previously recorded VAHR places in M3R

Name	Listing No.	Place Type
Radar Hill 1	7822-0800	Artefact scatter
Radar Hill 2	7822-0801	Artefact scatter
Radar Hill 3	7822-0802	Scarred tree
Radar Hill 4	7822-0803	Artefact scatter
Radar Hill 5	7822-0804	Scarred tree
Radar Hill 6	7822-0805	Artefact scatter
Radar Hill 7	7822-0806	Scarred tree
Radar Hill 9	7822-0808	Artefact scatter/earth feature
Radar Hill 10	7822-0809	Artefact scatter
Radar Hill 11	7822-0810	Artefact scatter
Radar Hill 12	7822-0811	Artefact scatter
Radar Hill 13	7822-0812	Artefact scatter
Radar Hill 14	7822-0813	Artefact scatter
Radar Hill 15	7822-0814	Scarred tree
Radar Hill 16	7822-0815	Artefact scatter
Radar Hill 17	7822-0816	Artefact scatter
Radar Hill 18	7822-0817	Artefact scatter
Radar Hill 19	7822-0818	Artefact scatter
Radar Hill 22	7822-0821	Artefact scatter
Radar Hill 24	7822-1116	Artefact scatter
Radar Hill 25	7822-1117	Artefact scatter
Melbourne Airport SE 3	7822-1335	Artefact scatter
Melbourne Airport Unigas 2	7822-1803	Artefact scatter
Arundel Creek LDAD	7822-3857	LDAD
Mansfield Road LDAD	7822-3858	LDAD
Glenara Creek LDAD	7822-3863	LDAD
Deep Creek Escarpment 1	7822-3864	Artefact scatter
Upper Maribyrnong Escarpment	7822-3871	Artefact scatter/ Earth mound
Glenara Creek 1	7822-3872	Artefact scatter/ Scarred trees
Glenara Creek LDAD 2	7822-4081	LDAD
APAM Grey Box Forest LDAD	7822-4178	LDAD
Arundel Creek LDAD 2	7822-4312	LDAD
Link Road Ridge Artefact Scatter	7822-4287	Artefact scatter

Table B6.47
Current Indigenous places within M3R showing merged places

Place name		VAHR number	Place Type
Granite Hill Archaeological Landscape (VAHR 7822-4618)			
Merged places	Radar Hill 1	VAHR 7822-0800	Artefact Scatter
	Radar Hill 2	VAHR 7822-0801	Artefact scatter
	Radar Hill 3	VAHR 7822-0802	Scarred tree
	Radar Hill 4	VAHR 7822-0803	Artefact scatter
	Radar Hill 5	VAHR 7822-0804	Scarred tree
	Radar Hill 6	VAHR 7822-0805	Artefact scatter
	Radar Hill 7	VAHR 7822-0806	Scarred tree
	Radar Hill 10	VAHR 7822-0809	Artefact scatter
	Radar Hill 11	VAHR 7822-0810	Artefact scatter
	Radar Hill 12	VAHR 7822-0811	Artefact scatter
	Radar Hill 13	VAHR 7822-0812	Artefact scatter
	Radar Hill 14	VAHR 7822-0813	Artefact scatter
	Radar Hill 15	VAHR 7822-0814	Scarred tree
	Radar Hill 16	VAHR 7822-0815	Artefact scatter
	Radar Hill 17	VAHR 7822-0816	Artefact scatter
	Radar Hill 18	VAHR 7822-0817	Artefact scatter
Glenara Creek 2 (VAHR 7822-4627)			
Merged places	Radar Hill 9	VAHR 7822-0808	Artefact scatter/Earth feature
	Radar Hill 24	VAHR 7822-1116	Artefact scatter
	Radar Hill 25	VAHR 7822-1117	Artefact scatter
New and updated places			
Arundel Creek Artefact Scatter		TBD	Artefact scatter
Link Road Ridge Artefact Scatter		VAHR 7822-4287	Artefact scatter
Melbourne Airport LDAD 1		VAHR 7822-4625	Low Density Artefact Distribution
Unchanged places			
Radar Hill 19		VAHR 7822-0818	Artefact scatter
Arundel Creek LDAD		VAHR 7822-3857	Low Density Artefact Distribution
Glenara Creek 1		VAHR 7822-3872	Artefact scatter/Scarred-trees
Glenara Creek LDAD		VAHR 7822-3863	Low Density Artefact Distribution
Upper Maribyrnong Escarpment		VAHR 7822-3871	Artefact scatter
Mansfield Road LDAD		VAHR 7822-3858	Low Density Artefact Distribution
MELBOURNE AIRPORT UNIGAS 2		VAHR 7822-1803	Artefact scatter
Melbourne Airport SE 3		VAHR 7822-1335	Artefact scatter
Deep Creek Escarpment 1		VAHR 7822-3864	Artefact scatter
Arundel Creek LDAD 2		VAHR 7822-4312	Low Density Artefact Distribution
APAM Grey Box Forest LDAD		VAHR 7822-4178	Low Density Artefact Distribution
Glenara Creek LDAD 2		VAHR 7822-4081	Low Density Artefact Distribution

B6.7.2
Potential impacts

Large portions of Indigenous cultural heritage places within the study area will most probably be removed by construction of compounds, haul road or proposed infrastructure. Threats to cultural heritage within the study area include:

- Removal and/or modification of topsoils, impacting surface artefacts and shallow archaeological deposits on the basalt plains and granite hill landforms.
- Removal and/or modification of subsoils with archaeological deposits, impacting archaeological deposits on the floodplain, lower hillslopes associated with waterways and alluvial terraces.
- Removal of vegetation, including scarred trees.
- Modification of natural landscape values impacting intangible attributes.
- Of the 17 cultural heritage places located in the study area, it is likely that a majortiy will be impacted by the proposed development to some extent.

In addition, a number of long-term maintenance actions within the study area will be considered under CHMP 16792 including:

- Removing general rubbish
- Slashing or removal of vegetation by hand or machine when required
- Spraying with herbicide to eradicate weeds
- Grading or ploughing to establish and maintain firebreaks
- Establishment of drainage channels
- Establishment and maintenance of all-weather access tracks
- Temporary stockpiling of soils, rubbish or vegetation
- Removal or cleaning of topsoil to deal with contaminated soils issues.

Table B6.48
Impact assessment summary

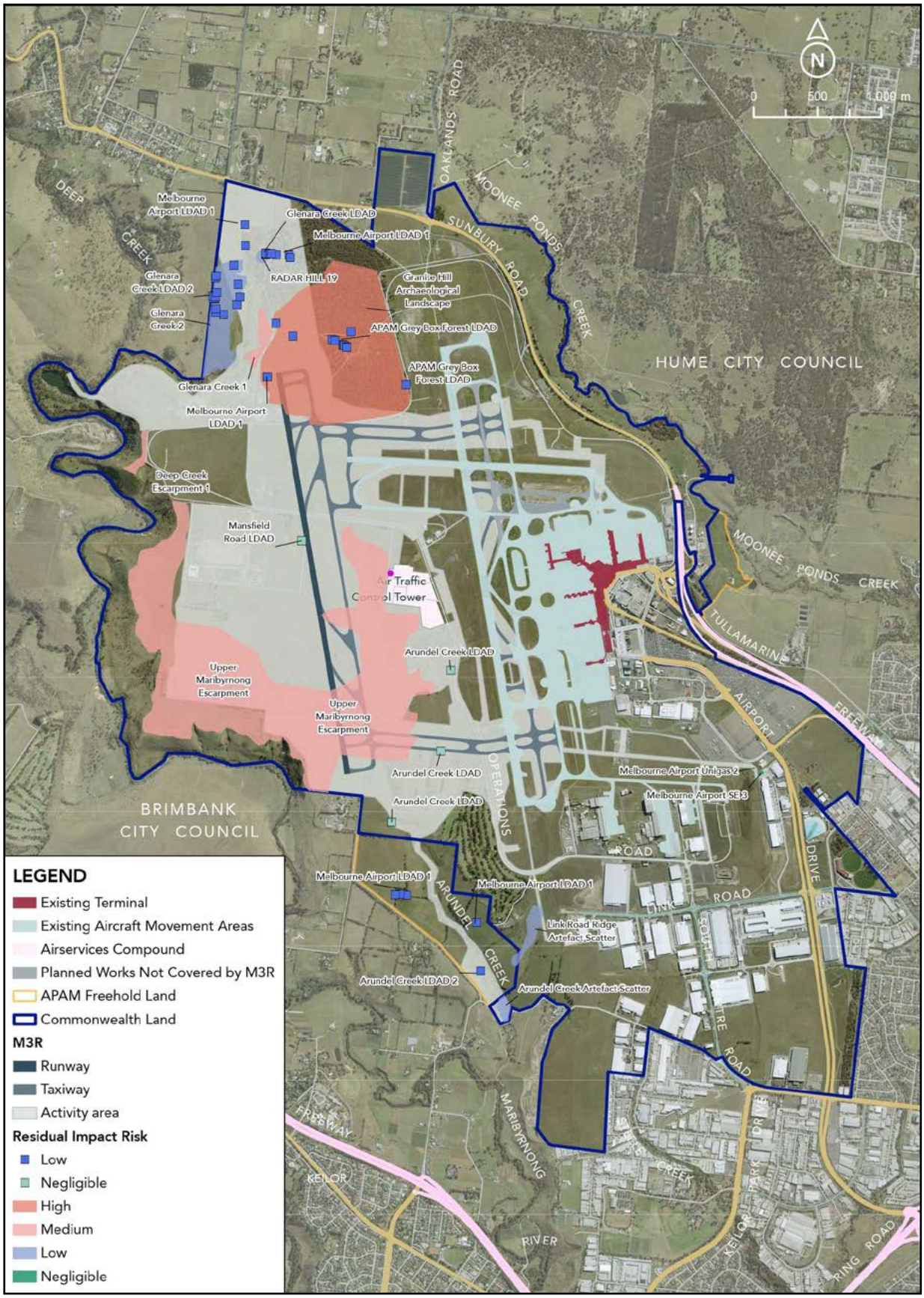
Aspect of the Environment	Baseline Condition	Description and characterisation of potential impact					
		Potential Impact	Mitigation inherent in design / practice	Significance Assessment			
				Temporal	Severity	Likelihood	Impact Risk
Construction / Operations							
Granite Hill Archaeological Landscape VAHR 7822-4618	Moderate local significance	Direct impacts from runway footprint	Minimal options to reduce impacts due to topographic locations.	Permanent	High	Almost Certain	High
Glenara Creek 2 (VAHR 7822-4627)	Low local significance	Direct impacts from runway footprint and access roads	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
Arundel Creek Artefact Scatter (VAHR 7822-4626)	Low local significance	Direct impacts from water treatment measures	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
VAHR 7822-0818 (Radar Hill 19)	Low local significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
VAHR 7822-3857 (Arundel Creek LDAD)	Low local significance	Direct impacts from runway footprint	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Low
VAHR 7822-4312 (Arundel Creek LDAD 2)	Low local significance	To be determined – artefacts may be avoided	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Low
VAHR 7822-3863 (Glenara Creek LDAD 1)	Low local significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
VAHR 7822-3872 (Glenara Creek 1)	Moderate regional significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium

Mitigation of management measures	Description of Residual Impact					
				Significance Assessment		
	Impact	Temporal	Severity	Likelihood	Impact Risk
Construction / Operations (cont.)					
To be determined – archaeological salvage likely	Removal of surface artefacts, archaeological deposits and scarred trees from footprint	Permanent	High	Almost Certain	High
To be determined – archaeological surface collection likely	Removal of surface artefacts from footprint and earthworks	Permanent	Minor	Almost Certain	Low
To be determined – archaeological salvage likely	Removal of archaeological deposits from footprint and earthworks	Permanent	Minor	Almost Certain	Low
To be determined – archaeological surface collection likely	Removal of surface artefacts from footprint and earthworks	Permanent	Minor	Almost Certain	Low
None - Impacted artefacts have already been salvaged	None	Temporary	Negligible	Almost Certain	Negligible
To be determined – artefacts may be avoided	Removal of surface artefacts from footprint and earthworks	Temporary	Minor	Almost Certain	Low
To de determined – archaeological surface collection likely for surface artefacts	Removal of surface artefacts from footprint and earthworks	Permanent	Minor	Almost Certain	Low
To de determined – archaeological salvage likely	Removal of surface artefacts, scarred trees from footprint and earthworks	Permanent	Moderate	Almost Certain	Medium

Aspect of the Environment (cont.)	Baseline Condition (cont.)	Description and characterisation of potential impact (cont.)					
		Potential Impact	Mitigation inherent in design / practice	Significance Assessment			
				Temporal	Severity	Likelihood	Impact Risk
Construction / Operations (cont.)							
VAHR 7822-3858 (Mansfield Road LDAD)	Low local significance	Direct impacts from runway footprint	Minimal options to reduce impacts due to topographic locations.	Permanent	Negligible	Almost Certain	Negligible
VAHR 7822-1803 (Melbourne Airport UNIGAS 2)	Low local significance	Direct impacts from roads and infrastructure	Minimal options to reduce impacts due to topographic locations.	Permanent	Negligible (place subject to prior harm)	Almost Certain	Negligible
VAHR 7822-1335 (Melbourne Airport SE 3)	Low local significance	Direct impacts from roads and infrastructure	Minimal options to reduce impacts due to topographic locations.	Permanent	Negligible (place subject to prior harm)	Almost Certain	Negligible
VAHR 7822-3864 (Deep Creek Escarpment 1)	Moderate local significance	Potential impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Moderate	Almost Certain.	High
VAHR 7822-4287 (Link Road Ridge Artefact Scatter)	Moderate local significance	Direct impacts from runway footprint- extension of 16R/34L.	Minimal options to reduce impacts due to topographic locations.	Permanent	Moderate	Almost Certain	Medium
VAHR 7822-3871 (Upper Maribyrnong escarpment)	High regional significance	Direct impacts from runway footprint	Minimal options to reduce impacts due to topographic locations.	Permanent	High	Almost Certain	Extreme
APAM Grey Box Forest LDAD (VAHR 7822-4312)	Low local significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
Glenara Creek LDAD 2 (VAHR 7822-4081)	Low local significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium
Melbourne Airport LDAD 1 (VAHR 7822-4625)	Low local significance	Direct impacts from runway footprint and earthworks	Minimal options to reduce impacts due to topographic locations.	Permanent	Minor	Almost Certain	Medium

Mitigation of management measures (cont.)	Description of Residual Impact (cont.)				
			Significance Assessment		
	Impact	Temporal	Severity	Likelihood	Impact Risk
Construction / Operations (cont.)					
None - Impacted artefacts have already been salvaged	None	Temporary	Negligible	Rare	Negligible
None – place has already been impacted.	None	Temporary	Negligible	Rare	Negligible
None – place has already been impacted.	None	Temporary	Negligible	Rare	Negligible
To de determined – archaeological salvage likely if impacted	Removal of surface artefacts, archaeological deposits from footprint and earthworks	Permanent	Moderate	Almost Certain	Medium
To de determined – archaeological salvage likely	Removal of archaeological deposits from footprint and earthworks	Permanent	Low	Almost Certain	Low
To de determined – archaeological salvage likely	Removal of surface artefacts, archaeological deposits from footprint and earthworks	Permanent	Moderate	Almost Certain	Medium
To de determined – archaeological surface collection likely for surface artefacts	Removal of surface artefacts from footprint and earthworks	Permanent	Low	Almost Certain	Low
To de determined – archaeological surface collection likely for surface artefacts	Removal of surface artefacts from footprint and earthworks	Permanent	Low	Almost Certain	Low
To de determined – archaeological surface collection likely for surface artefacts	Removal of surface artefacts from footprint and earthworks	Permanent	Low	Almost Certain	Low

Figure B6.54
Assessment of residual risk for Aboriginal cultural heritage places in the study area



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Chapter B7
European Heritage

Summary of key findings:

- A detailed assessment of European heritage has been completed to ascertain the heritage values of the development area and immediate surrounds of Melbourne Airport's Third Runway (M3R).
- Research was carried out to identify existing and previously unassessed heritage sites. This was facilitated through consultation with historical societies, experts and Heritage Victoria (HV), field surveys and excavation. The sites' historical significance was assessed using Commonwealth Heritage Criteria, and HV criteria and thresholds.
- The study identified 16 existing and potential historical sites of heritage value. Of these, 10 required further assessment in the form of targeted excavations. The sites mainly relate to early European settlement in the Tullamarine area in the mid to late-19th century and consist of early residential homesteads, farms and early industrial development. Only one homestead, Aucholzie, was found to have surviving built structures. The other sites were either ruins, building foundations with remnant occupational and demolition deposits, or more modern and ephemeral archaeological deposits.
- Of the sites identified, two were determined to have no remaining significant archaeological deposits or features. In the case of the Glen Alice Outbuildings, this was due to construction of the existing east-west runway (09/27). In the case of Glenara Sheep Dam, this was due to reconstruction of the dam on Glenara Creek. Four sites are located nearby but outside M3R's development footprint. They are: Barbiston Farm Complex, Bellno Farmstead and Quarry, Oaklands Junction, and Radar Hill Track.
- The remaining 10 sites will be directly impacted by M3R. They are: Aucholzie Homestead, Coghill's Sheepwash and Dam, Coghill's Boiling-Down Works, Fawkner Land Co Settlement, Grants Bluestone Culvert, Kennedy's Hut Site, Oakbank Farm Homestead, Roseleigh Homestead, Seafield Farm and Victoria Bank Homestead.
- The proposed impacts before mitigation are assessed as minor, moderate or high due to sites being of either local or regional significance. The exception is Coghill's Boiling-Down Works, assessed as extreme. Salvage and recording of all sites will be done before any impact so that their heritage value can be documented and retained. This means any harm will be mitigated and the potential impact reduced. Coghill's Boiling-Down Works is considered a unique surviving example of early Victorian industry and assessed as being of state significance. Even after the salvage, recording and documenting of this site, the residual impact is considered to be high because of its significance.

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B7.1
INTRODUCTION

This chapter describes the European heritage values of the project area (i.e. the study area), applicable legislation and policy requirements, the potential impacts of Melbourne Airport's Third Runway (M3R) and associated assessment methodology. Where required, measures to specifically avoid, manage, mitigate and/or monitor impacts are described. This work was undertaken for Melbourne Airport by ecological and heritage consulting firm Biosis.

For the purposes of this chapter, 'study area' refers to the M3R development footprint and immediate surrounds (**Figure B7.1**) that may be impacted by M3R. The historical places identified are:

- Aucholzie Homestead
- Barbiston Farm Complex
- Bellno Quarry and Homestead
- Coghill's Sheepwash and Dam
- Coghill's Boiling-Down Works at Glencairne (previously Glencairne Homestead)
- Grants Road Bluestone Culvert
- Kennedy's Hut Site
- Oakbank Farm Homestead
- Oaklands Junction
- Seafield Farm
- Roseleigh Homestead
- Victoria Bank Homestead
- Fawkner Land Co Settlement
- Radar Hill Track

All sites identified in the study area have been listed in **Table B7.1**. Note that names of some sites have changed as a result of the additional investigations outlined in this report (the table lists the old and new names). Note that the Airport Construction Site (previously Glen Alice Homestead) and Glenara Sheep Dam are not listed above because they are determined to have no remaining significant archeological deposits or features.

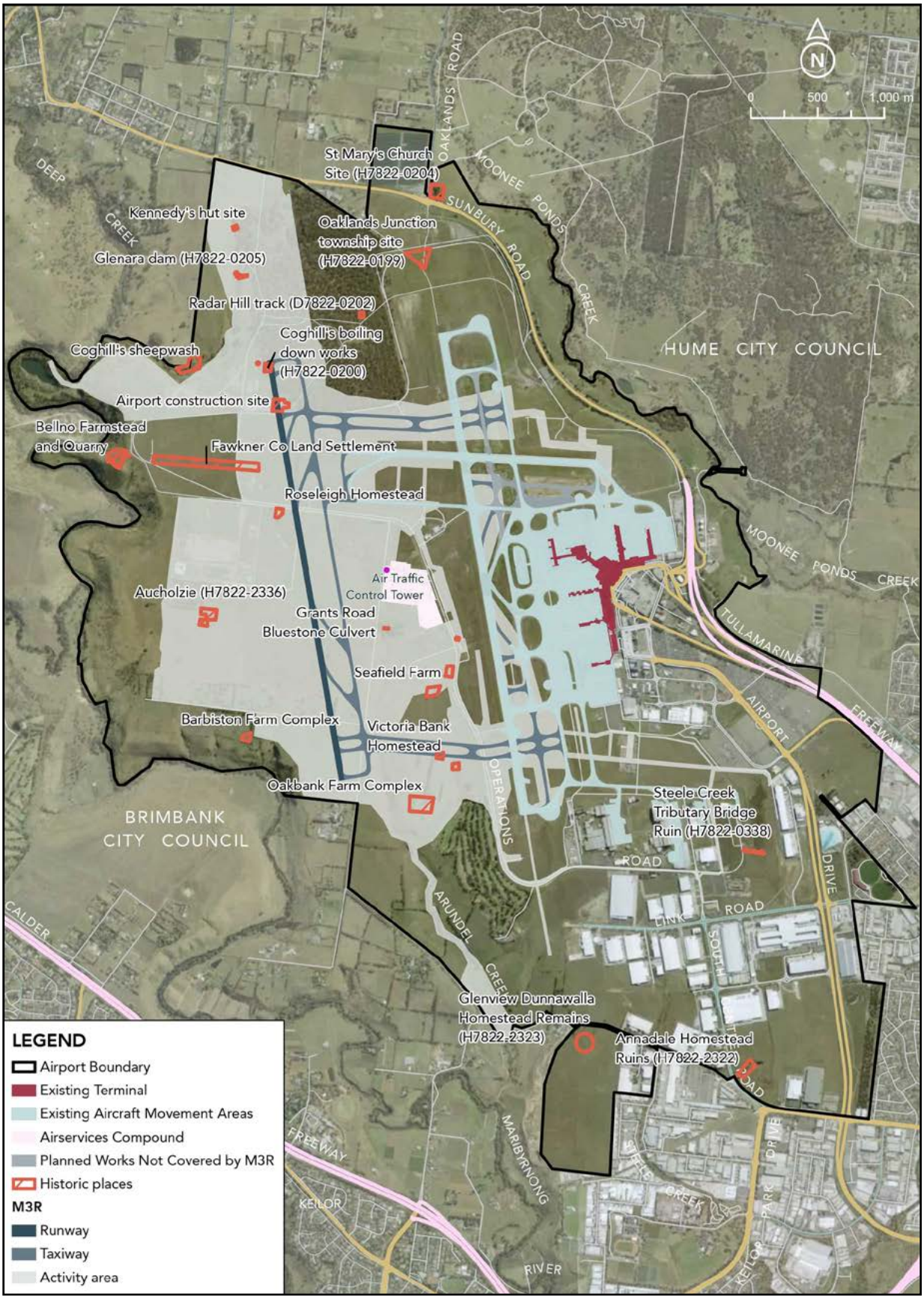
NB New names are used hereafter unless referring to their former Victorian Heritage Inventory (VHI) designations.

Table B7.1
All European heritage sites identified in the study with current and former names

Current name	Previous name (2016)	Register	Listing No.	Description
Airport construction site (delisted)	Glen Alice Homestead	VHI	D7822-0201	The Glen Alice Homestead site has been removed from the inventory. The farm buildings were located near the western end of the 09L/27R but were destroyed during the construction of the runway and service road. Other concrete footings and slabs near Perimeter Rd appear to relate to post WWII sheds and construction of the airport.
Aucholzie Homestead		VHI	H7822-2336	Remains of homestead complex
Barbiston Farm Complex		Unlisted		Remains of homestead complex
Bellno Farmstead and Quarry		Unlisted		Remains of homestead complex
Coghill's Sheepwash and Dam (delisted)	Coghill's Dam	VHI	D7822-0203	Coghill's Dam was removed from the VHI. It was originally registered from historical sources as a bluestone spillway. Further research and test excavations confirmed the site's identification.
Coghill's Boiling-Down Works	Glencairne Homestead Site	VHI	H7822-0200	This site was mistakenly identified as Coghill's Homestead but further research and test excavations confirmed the identification of this site as Coghill's Boiling-Down Works, on the Glencairne estate. The actual location of the Glencairne homestead and stables is the adjacent property to the west of the airport land.
Glenara Sheep Dam		VHI	H7822-0205	Remains of sheep wash and dam along "Glenara" creek drainable line. Modern reconstruction of the dam has removed evidence of any 19th century features.
Grants Rd Bluestone Culvert		Unlisted		Bluestone culvert
Kennedy's hut site	Coghill's Hut	Unlisted		Remains of early hut.
Oakbank Farm Homestead		Unlisted		Remains of homestead complex.
Oaklands Junction	Oaklands Junction Township Site	VHI	H7822-0199	Oaklands Junction is the remains of several structures including a bluestone culvert and building foundations associated with the small 19th century settlement.
Radar Hill Track (delisted)	Radar Hill Track	VHI	D7822-0202	Earth and gravel track through grey box woodland, possibly connecting Glencairne to Oaklands Junction.
Roseleigh Homestead		Unlisted		Remains of homestead complex.
Seafield Farm (school not identified)	Seafield Farm and Seafield National School	Unlisted		Remains of homestead complex, following excavation and further survey it was determined that the school site was probably destroyed by road and taxiway.
Victoria Bank Homestead		Unlisted		Remains of homestead complex.
Fawkner Land Co Settlement		Unlisted		Remains of early settlement, may retain archaeological remains and some elements such as building footings, drains and former roadways.

Source: Biosis Pty Ltd 2020

Figure B7.1
Map of the study area showing historical places



Source: Biosis Pty Ltd

B7.2 METHODOLOGY AND ASSUMPTIONS

The European heritage assessment study area included only Commonwealth-owned and controlled land. The study area is therefore exempt from the requirements of the Victorian Heritage Act 2017 (the Heritage Act). It is noted however, that some heritage sites in the study area were, at the time of assessment, listed on Victorian heritage databases including the VHI.

Although the study area is exempt from the requirements of the Heritage Act, consultation has been undertaken with HV for the heritage places assessed as part of M3R development and planning. This included providing HV with an indicative survey and excavation method for each site believed to require further assessment in order to determine their significance. HV had no objections to the proposed methodologies.

Investigation and assessment of European (non-Indigenous) heritage values was undertaken in accordance with Commonwealth and Victorian heritage guidelines and criteria. These guidelines and criteria include the:

- Guidelines for the Assessment of Places for the National Heritage List (Australian Heritage Council 2009)
- Guidelines for Investigating Historical Archaeological Artefacts and Sites (Heritage Victoria 2015)
- Charter for the Conservation of Places of Cultural Significance (Burra Charter) (Australia ICOMOS 2013)
- Guidelines for Conducting Historical Archaeological Surveys (Heritage Council of Victoria (Heritage Victoria) 2008)
- The Victorian Heritage Register Criteria and Threshold Guidelines (Heritage Victoria 2019).

The investigation of European heritage values included desktop assessment, field survey, test excavations, and significance assessment. These were to better understand the European heritage values in the study area and their importance. Methodology for each stage of investigation is discussed below and the results presented in Section B7.4.

B7.2.1 Desktop assessment

A desktop assessment was undertaken to establish known and potential European heritage values in the study area. It included consultation with stakeholders, a review of historic aerial photography, and searches of applicable heritage registers and reports. The results were used to develop a predictive model of heritage potential to guide the field survey.

To identify relevant local bodies that potentially hold historical documentation of sites associated with the study area, contact was made with the Hume District Library Service and the Broadmeadows Historical Society and Museum including the Hume Global Learning Centres, Hume Libraries, Keilor Historical Society, Broadmeadows Historical Society and Hume City Council were all subsequently contacted and consulted for information on the study area.

Commonwealth and Victorian heritage databases and registers were also searched for information on European heritage values in the study area. These included VHI, Victorian Heritage Register (VHR), HERMES heritage online database (managed by Heritage Victoria), VICPlan, City of Hume Planning Scheme heritage overlay (HO), National Trust Register and the Australian heritage database. The Australian heritage database includes world, national and Commonwealth heritage lists as well as the Australian national shipwreck database and the register of the National Estate.

Additional historical research was undertaken by historian and architect Graeme Butler.

B7.2.2 Consultation

The current M3R assessment follows previous investigations conducted for the earlier Runway Development Program (RDP) at Melbourne Airport and incorporates the previous results. The following organisations were consulted for the RDP report and the current assessment:

- Broadmeadows Historical Society and Museum
- Hume District Library
- Tullamarine Library
- Keilor Historical Society
- Hume City Council
- Ray Gibb (local historian).

Discussions were also held with the principal archaeologist at HV, Jeremy Smith, to provide an indicative methodology for the assessment of sites within the study area. A meeting was held at HV's office on 16 January 2020. It was noted that, because the archaeological sites do not come under the jurisdiction of the Heritage Act, there was no requirement for meeting specifications of state legislation or guidelines. Upon review, HV provided a written statement (dated 20 January 2020) confirming that the proposed heritage investigations and methodology accorded with those of HV (Heritage Victoria 2015). HV advised any European heritage sites that will not be directly impacted by M3R should not be investigated or disturbed. Heritage Victoria also advised that, as sites within Commonwealth land could not be included under Victorian legislation, the existing VHI sites within the airport property would be removed from the VHI.

B7.2.3
Survey

The field survey was undertaken to 'ground truth' (through direct observation and measurement) the predictive model developed in the desktop assessment, and to identify and record European heritage values. The survey also sought to confirm the conditions of known heritage sites and identify those areas with the potential for new and previously unassessed European heritage sites.

The field survey was undertaken in several stages. Initial surveys and assessments were completed between 2013 and 2016 for the RDP historical technical report. A subsequent survey for the expanded M3R footprint was undertaken in January 2020. It was conducted by vehicle and on foot for sites determined to need further assessment. The sites identified as either previously recorded or with new historic features are listed in Table B7.2.

This field survey produced a series of potential locations for European heritage. These were then mapped, along with desktop assessment results, to provide locations for further investigation which were then surveyed on foot to record their features. Visible surface features were recorded using digital photography (with a Nikon AW120 camera). Locations of visible features were recorded with a Samsung Toughpad tablet using the Trimble Differential Global Positioning System (DGPS) with GNSS R1 receiver (accurate to +/- one metre after processing) and transferred to ArcGIS for digital mapping. Detailed site plans were prepared using tape and compass transect over graphical drawing and trace paper. These were subsequently redrafted using Adobe Illustrator with reference to field notes, aerial imagery and site photographs.

Table B7.2
European heritage sites identified in surveys

Current Name	Description	Register	Listing No.
Airport Construction Site	Initially identified as Glen Alice homestead outbuildings, but requiring further survey and testing to confirm.	VHI	D7822-0201
Aucholzie Homestead	Substantial but dilapidated brick homestead and extensive outbuildings (assessed but requires further investigation).	VHI	H7822-2336
Barbiston Farm Complex	Remains of former timber house and outbuildings.	Unlisted	
Bellno Farmstead and Quarry	Remains of small stone cottage.	Unlisted	
Coghill's Sheepwash and Dam	Earth dam with stone spillway, timber structure and glass, metal and ceramic artefacts, delisted by HV (possibly in error).	VHI	D7822-0203
Coghill's Boiling-Down Works	Stone and brick rubble, initially recorded as Glencairne Homestead, redefined following further research.	VHI	H7822-0200
Glenara Sheep Dam	Little evidence of 19th century earth dam and sheepwash, probably destroyed by 20th century reconstruction.	VHI	H7822-0205
Grants Road Bluestone Culvert	Four cell bluestone culverts on former public road within dense Elm coppice from naturalised avenue.	Unlisted	
Kennedy's Hut Site	Ephemeral hut site with stone footings and glass and ceramic artefact scatter (unassessed requiring further investigation).	Unlisted	
Oakbank Farm Homestead	Footings and paving from homestead and farm buildings.	Unlisted	
Oaklands Junction	Footings visible as crop marks of Inverness Hotel, store, culvert and other structures.	VHI	H7822-0199
Radar Hill Track	Earth and gravel track through Grey Box Woodland, possibly connecting Glencairne to Oaklands Junction.	VHI	D7822-0202
Roseleigh Homestead	Former timber farmhouse and outbuildings (assessed as destroyed by recent demolition and site clearing).	Unlisted	
Seafield Farm (school not identified)	Footings of bluestone homestead, cistern, outbuildings and other structures.	Unlisted	
Victoria Bank Homestead	Extensive stone ruins including cellar and cistern.	Unlisted	
Fawkner Land Co Settlement	Remains of early settlement, may retain archaeological remains and some elements such as building footings, drains and former roadways.	Unlisted	

B7.2.4
Test excavation

Selective hand-test excavations were carried out at three heritage sites to determine the presence and integrity of any archaeological deposits. The initial manual testing was completed at Kennedy's Hut, Coghill's Boiling-Down works and Coghill's Sheepwash Dam. Background research determined the Glen Alice and Aucholzie homestead sites would not benefit from this selective process and require larger stripping by use of machine excavator later in the test program. Background research and a site survey determined there was no further archaeological value to the Glenara sheepwash and dam site so no further investigation was considered necessary.

Hand excavation began in test pits measuring approximately 1 x 1 metre or 50 x 50 centimetres in locations determined from matching plans and aerial photographs. These locations were confirmed on site and located on or adjacent to visible features such as exposed structural stone work or areas of noticeable flat ground where structural components may be present. These were followed by more extensive excavations using both mechanical and hand methods to further expose identified archaeological features and deposits. Specific methods used for each heritage place are further described in **Section B7.4.3.1**. However, in general, mechanical excavation was used where little evidence of in-situ occupation deposits or intact structure could be found; and where large amounts of overburden and demolition rubble had to be removed to access the occupation layers.

B7.2.5
Significance assessment

A significance assessment of each European heritage place was done using Commonwealth Heritage List criteria (CHL) (Commonwealth of Australia 2020) and Heritage Victoria criteria and thresholds (Australian Heritage Council 2009; Heritage Victoria 2015). This was in order to understand the heritage values at each heritage place and their level of importance. The criteria are discussed in more detail in **Section B7.3.2.3** of this chapter.

B7.3
STATUTORY AND POLICY REQUIREMENTS

Knowledge of cultural heritage legislation is essential when assessing sites, places or items of cultural heritage significance. The Commonwealth and Victorian requirements applicable to cultural heritage values in the study area are discussed in this section.

B7.3.1
Commonwealth legislation

Melbourne Airport is located on Commonwealth land. The *Airports Act 1996* (Airports Act) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (the EPBC Act) are the key pieces of legislation that set the regulatory framework for the M3R development and this assessment (as discussed in **Chapter A8: Assessment and Approvals Process**). However, consideration has also been given to relevant Victorian legislation (including environmental planning instruments, policies and guidelines) where appropriate.

B7.3.1.1
Airports Act 1996

Section 112(2) of the Airports Act states 'the land use, planning and building controls within Part 5 of the Commonwealth Act operate to the exclusion of a law of a state'. In Victoria this applies to land use planning legislation such as the Victorian *Planning and Environment Act 1987* and the *Heritage Act 2017*.

Under the Airports Act, it is understood that the intention is to 'cover the field' of heritage protection. However, Melbourne Airports' preference for assessing heritage is to address all requirements under the Commonwealth legislation while also considering the requirements of Victorian legislation to inform recommendations and follow best practice. Therefore, the implications for the project were assessed in relation to both Commonwealth and Victorian legislation:

- Matters listed under the EPBC Act, associated policy statements and significant impact guidelines
- Matters listed under the Victorian Heritage Act.

B7.3.1.2
Environment Protection and Biodiversity Act 1999 – Significant Impact Guidelines 1.2

The *Actions on, or impacting upon Commonwealth land, and actions by Commonwealth agencies, Significant Impact Guidelines 1.2 Environment Protection and Biodiversity Conservation Act 1999* (Significant Impact Guidelines 1.2) (DSEWPC 2013) defines a significant impact as an impact which is 'important, notable, or of consequence, having regard to its context or intensity'

A significant impact is considered likely if there is 'a real or not remote chance or possibility' of the impact occurring (there does not need to be a greater than 50 per cent chance of the significant impact happening). The likelihood is assessed according to the sensitivity, value and quality of the environment impacted; and according to the intensity, duration, magnitude and geographic extent of the impacts as described in these requirements.

Under the Significant Impact Guidelines 1.2, Step 4 outlines the self-assessment criteria used to determine if an impact is considered significant. Of relevance to this MDP chapter are the impacts on heritage, specifically whether M3R will:

- Permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place

- Involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place
- Involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place
- Substantially diminish the heritage value of a heritage place for a community or group for which it is significant
- Substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place
- Substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site.

The assessment of potential impacts in **Section B7.5** is considered to adequately address these concerns. While harm will be mitigated through various mitigation strategies (as discussed in **Section B7.6**) the impacts to European heritage sites and the whole of the environment are considered significant as defined by the Significant Impact Guidelines 1.2. A discussion on the acceptability of this impact is contained in **Chapter E6: Summary Commitments and Conclusion**.

B7.3.1.3
Australian Heritage Council Act 2003

The *Australian Heritage Council Act 2003* (Cth) (the AHC Act) provides for the establishment of the Australian Heritage Council. This is the principal advisory group to the Commonwealth Government on heritage issues and administers the National Heritage List (NHL). The NHL covers places with outstanding natural, Indigenous or historic heritage value to the nation. The Australian Heritage Council assesses if a nominated place has heritage values according to nine criteria then makes a recommendation to the Minister for the Environment and Water on that basis. The Minister for the Environment and Water makes the final decision on listing and may take into account social and economic matters. There are no sites located within the study area listed on the NHL.

B7.3.2
Victorian legislation

B7.3.2.1
Planning and Environment Act 1987

The Victorian Planning and Environment Act 1987 as amended in 2000 provides for land use planning controls in all municipalities in Victoria that are prepared and administered by state and local government authorities. Heritage Overlays (HOs) are one of these planning controls. They include places of local heritage significance as well as heritage precincts. There are no HOs in the study area.

B7.3.2.2
Heritage Act 2017

The Heritage Act administered by Heritage Victoria (HV) and is the Victorian Government's key cultural heritage legislation. It identifies and protects heritage places and objects of significance to Victoria. These include historical archaeological sites and artefacts, historical buildings, structures and precincts, gardens, trees, cemeteries, cultural landscapes, shipwrecks, relics and significant objects. The Heritage Act established the VHR for sites of state significance and the VHI for sites with historical archaeological values. It also established the Heritage Council of Victoria as the overarching body responsible for implementing heritage protection in the state. At the time of assessment, the following VHI sites were located within the study area:

- Glenara Sheep Dam (H7822-0205)
- Oaklands Junction (H7822-0199)
- Glencairne Homestead (H7822-0200) (new name: Coghill's Boiling-Down Works)
- Aucholzie Homestead (H7822-2336).

It should be noted HV does not have jurisdiction on Commonwealth land and therefore the provisions of the Heritage Act do not apply to Commonwealth property that is part of the present study area. Following this application, the assessment results provided in this chapter will avoid using former VHI place designations and labels. These listings are included only in **Table B7.1** and **Table B7.2**, in order to clearly demonstrate the current heritage place names against those within prior assessments; particularly in instances where the place name has been completely updated such as Coghill's Boiling-Down Works.

Obtaining a 'consent to damage' would be the normal process for obtaining statutory approval for any works that may cause harm to sites listed on the VHI. Although HV has no jurisdiction on Commonwealth land, Melbourne Airport wishes to meet standards of state heritage assessment and management. As such, discussions were held with the principal archaeologist at Heritage Victoria, Jeremy Smith, to give an indicative methodology for the heritage assessment of sites within the study area. A meeting was held at HV's office on the 16 January 2020. It was noted that because the archaeological sites (including those listed on the VHI) are not under jurisdiction of the Heritage Act there was no requirement for meeting specifications of neither Victorian legislation nor guidelines. Upon review, HV provided a written statement (dated 20 January 2020) confirming that the proposed heritage investigations and methodology accorded with those of HV (Heritage Victoria 2015). HV advised that any European heritage sites that will not be directly impacted by M3R should not be investigated or disturbed. HV also recommended a professional conservator be engaged to manage conservation and curation of artefacts collected during the investigations.

B7.3.2.3
Description of significance criteria

A significance assessment of each European heritage place has been undertaken using Commonwealth and Victorian standard significance criteria and thresholds to understand heritage values and their level of importance.

Significance assessments of heritage on Commonwealth land use Commonwealth Heritage List (CHL) criteria. Items of state or local significance can be listed on the CHL if they are located on Commonwealth land. To reach the threshold for the NHL, a place must have 'outstanding' heritage value to the nation by comparing it to similar types of places; to be entered in the CHL a place must have 'significant' heritage value. Under the CHL nomination process nominations must set out the qualities or values of a place that make it significant by indicating how it meets one or more Commonwealth heritage significance criteria.

The CHL 'significance' criteria (Commonwealth of Australia 2020) are:

1. The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history
2. The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history
3. The place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history
4. The place has significant heritage value because of the place's importance in demonstrating the principal characteristics of:
    a. a class of Australia's natural or cultural places; or
    b. a class of Australia's natural or cultural environments
5. The place has significant heritage values because of the place's importance in exhibiting particular aesthetic characteristics values by a community or cultural group
6. The place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period
7. The place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
8. The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history
9. The place has significant heritage value because of the place's importance as part of Indigenous tradition.

The NHL 'outstanding' criteria (Commonwealth of Australia 2009) are:

a) The place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history

b) The place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history

c) The place has outstanding heritage value to the nation because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history

d) The place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:
    I. A class of Australia's natural or cultural places
    II. A class of Australia's natural or cultural environments.

e) The place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group

f) The place has outstanding heritage value to the nation because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period

g) The place has outstanding heritage value to the nation because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

h) The place has outstanding heritage value to the nation because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history

i) The place has outstanding heritage value to the nation because of the place's importance as part of Indigenous tradition.

Note: The cultural aspect of a NHL criterion means the Indigenous cultural aspect, the non-Indigenous cultural aspect, or both.

Significance assessments of heritage in Victoria typically use the HV criteria, which encompass Burra Charter categories of aesthetic, historic, scientific and social significance. The HV criteria are applied with a threshold that allocates places of state significance to the VHR and places that have historical archaeological values of local significance to the VHI. Heritage places of local significance with no archaeological values are typically allocated to Heritage Overlays on local planning schemes, protected under the Planning and Environment Act 1987.

The Heritage Victoria Criteria (Heritage Victoria 2019) are:

a) Importance to the course, or pattern, of Victoria's cultural history

b) Possession of uncommon, rare or endangered aspects of Victoria's cultural history

c) Potential to yield information that will contribute to an understanding of Victoria's cultural history

d) Importance in demonstrating the principal characteristics of a class of cultural places and objects

e) Importance in exhibiting particular aesthetic characteristics

f) Importance in demonstrating a high degree of creative or technical achievement at a particular period.

g) Strong or special association with a particular present-day community or cultural group for social, cultural or spiritual reasons

h) Special association with the life or works of a person, or group of persons, of importance in Victoria's history.

Once a place has been assessed against the Heritage Victoria criteria and CHL criteria, the thresholds in Table B7.3 are applied to determine the level at which the place is considered significant.

Table B7.3
Significance thresholds

Significance	Definition	Threshold
High	Place / element of outstanding or exceptional heritage value that embodies Commonwealth criteria in its own right and makes an irreplaceable contribution to the significance of the place as a whole.	National / state Significance: Likely to fulfil criteria for listing on the NHL or VHR
Moderate	Place / element of heritage value that meets Commonwealth heritage significance in its own right or contributes to the significance of the place as a whole.	State Significance: Likely to fulfil criteria for listing on the VHR, VHI or CHL
Minor	Place / element of heritage value that has some Commonwealth significance in its own right or contributes to the significance of the place as a whole.	Local Significance: Likely to fulfil criteria for listing on the, VHI, CHL or HO.
Negligible	Place / element does not meet Commonwealth or state heritage significance in its own right or is intrusive to the significance of the place as a whole.	Unlikely to fulfil criteria for any heritage listings

B7.4
EXISTING CONDITIONS

This section details the existing conditions of the study area and the results of the European heritage assessment.

B7.4.1
Desktop assessment

B7.4.1.1
Heritage register searches and existing assessments

There were 14 European heritage sites in the study area (Table B7.4). The majority had been identified and assessed during previous investigations for RDP.

Among previously-assessed sites, the Glen Alice Homestead (current name: Airport Construction Site) was originally mapped within the footprint of runway 09/27 but is believed to have been destroyed during runway construction and was delisted from the VHI. There was determined to be potential for archaeological remains associated with the homestead's dairying works to be present, and ancillary structures located further north beyond the runway construction area.

Coghill's Sheepwash and Dam was subsequently delisted as part of Heritage Victoria's reassessment of sites. There are no statutory obligations for delisted sites, however they remain on the VHI as a historical record.

There are additional European heritage values previously recorded in close proximity to the study area. The vast majority relate to early European settlement in the mid to late- 19th century and are either homestead sites, agricultural or road infrastructure.

Table B7.4
Heritage register search results

Current Name
Aucholzie Homestead
Barbiston Farm Complex
Bellno Farmstead and Quarry
Coghill's dam (Coghill's Sheepwash and Dam)
Glenara Sheep Dam
Glencairne Homestead (Coghill's Boiling-Down Works)
Glen Alice Homestead (Airport Construction Site)
Grants Road Bluestone Culvert
Oakbank Farm Homestead
Oaklands Junction
Radar Hill Track
Roseleigh Homestead
Seafield Farm
Victoria Bank Homestead

B7.4.1.2
Previous reports

Historic archaeological studies associated with specific developments and broad regional studies have been carried out within two kilometres of M3R (Table B7.5). They largely identified farming complexes; including homesteads, drystone walls and sheep dips associated with 19th century settlement. Many of these heritage sites have been built from bluestone. This was a readily-available stone that was commonly used, particularly in the early and mid-19th century until other building materials such as brick and concrete became more common.

B7.4.1.3
Historical and ethno-historical background

This section provides background for the history of the study area. The Australian Heritage Commission developed a historic theme framework for Australia (Australian Heritage Commission 2001) to be used at the national, state or local level to help with the identification, assessment, interpretation and management of heritage sites (Sayers 1969:50).

These Australian historic themes predominantly relate to the early settlement and agricultural history of Tullamarine and are used to help understand the significance of heritage values in a larger national context. The framework has been more recently refined to fit the Victorian context under the Heritage Council Victoria (2010). Themes relevant to the study area and European heritage are shown in Table B7.6 and Table B7.7.

Early squatters and conflict with Indigenous people

When the Tullamarine area was sparsely settled during the squatting period (1835 to c. 1850) the open grassland along the Maribyrnong River and Deep and Jacksons creeks was among the first to be grazed by the new settlers. They initially occupied the area in a manner inconsistent with prevailing Indigenous laws and land uses at the time. From 1844 (under a system of de-pasturing licences at £10 per run) these settlers were legalised and from 1847 required to lodge applications for annual leases. In 1836, John Aitken was the first European settler to move into the region, taking up a 10-square mile pastoral run at Mount Aitken (roughly 30 kilometres north-west of the M3R development footprint). Both this region and the M3R footprint are within the country of the Woi wurrung (associated with the Gunung willam baluk and Marin baluk clans (Clark 1990) and often referred to by early settlers as the Mount Macedon Tribe).

Table B7.5
Previous reports summary

Report	Summary
Weaver. (1991)	Weaver (1991) conducted a broad scale survey of the Moonee Ponds area, recording four historic sites along Moonee Ponds Creek. These included: Moonee Ponds Creek 12 and 13 (bluestone lined ford and drystone walls, respectively) thought to date to the period 1834-1851; Moonee Ponds Creek 10, an open cut quarry, was not able to be dated earlier than 1960; and Moonee Ponds Creek 11, which was not discussed. Weaver noted the stretch of the creek north of Mickleham Road was relatively undeveloped compared to that of the rest of the survey area, and there was potential for further sites associated with 19th century settlement to be encountered in the Moonee Ponds region.
Vines. (1995)	Vines (1995) was commissioned to prepare a cultural heritage study and management proposal for the Grey Box Woodland, located directly north of the M3R development footprint. Vines identified seven historic archaeological sites including Oaklands Junction, Glencairne Homestead, Glen Alice Homestead, Disused Road, Coghill's Dam, St Mary's Church Site and the Glenara Sheep Wash (H7822-0199 to -0205). Vines (1995, p. 67) stated that: "…the historic archaeological sites which survive in the study area attest to a range of European occupation from the first travellers who crossed the Keilor-Werribee Plains, when the area was only sparsely settled by pioneering squatters, to the development of a [sic] distinct communities in the mid nineteenth century, and the gradual decline of the original settlements in favour of the main towns". Vines noted that the Oaklands Junction, Glencairne Homestead, Glenara Sheep Wash and Coghill's Dam had potential for highly significant historic archaeological evidence, and should be protected from any damage or destruction from future construction.
Marshall. (1995)	Marshall (1995) undertook a survey of Barbiston Road, within the present M3R development footprint, but did not record any historic archaeological sites.
Weaver. (1998)	Weaver (1998) recorded Whittenbury Homestead 1 (H7822-0251) during the field survey of a property at Moonee Ponds Creek, Attwood. The site is located between the quarry and Mickleham Road, east of the development footprint. A farm complex, covering an area of approximately 100 x 100 metres, features a brick-lined sheep dip, a concrete exit ramp, timber fence posts and a possible shearing shed. Weaver suggested that the complex may be associated with Chandos, a property located on former section 6.
Hill et al. (1999)	Hill (1999) assessed the Mickleham Road duplication project at Attwood. One previously recorded historic archaeological site was present in Hills study area and a further fifteen sites associated with 19th century settlement were recorded nearby.
Clark. (2002)	Clark (2002) covered much of the M3R development footprint and areas further east. One previously unrecorded historic archaeological site, Steele Creek Tributary Bridge Ruin (H7822-0388), was recorded and consisted of the remains of a bluestone bridge or culvert over a tributary of Steele Creek. This site is located east of the development footprint.
Clark and Anderson. (2006)	Clark and Anderson (2006) examined land south of Annandale Road, south of the present M3R development footprint. There were no previously recorded historic archaeological sites and no previously unrecorded sites were identified during the survey.
Vines et al. (2017)	The RDP Technical report was prepared for a proposed east-west runway development. This identified and assessed many of the sites in the current report during field survey and test excavation.

Prepared by Australian section, Imperial General Staff: 1938 Victoria, Sunbury [Cartographic Material]. Melbourne: Great Britain War Office: By authority H.J. Green, Govt. Printer. http://handle.slv.vic.gov.au/10381/149198.

Table B7.6
Heritage register search results

Primary theme	Secondary theme	Tertiary theme
2 Peopling Australia	2.4 Migrating 2.6 Fighting for land	2.4.2 Migrating to seek opportunity 2.6.1 Resisting the advent of Europeans and their animals 2.6.2 Displacing Indigenous people
3 Developing Local, Regional and National Economies	3.5 Developing primary production 3.8 Moving goods and people	3.5.1 Breeding animals 3.8.5 Moving goods and people on land 3.8.9 Moving goods and people by air
6 Educating	6.2 Establishing schools	-
8 Developing Australia's Cultural Life	8.14 Living in the country and rural settlements	-

Prepared by Australian section, Imperial General Staff: 1938 Victoria, Sunbury [Cartographic Material]. Melbourne: Great Britain War Office: By authority H.J. Green, Govt. Printer. http://handle.slv.vic.gov.au/10381/149198.

Table B7.7
Victorian historic themes relevant to the study area

Primary theme	Secondary theme
2 Peopling Victoria's places and landscapes	2.2 Exploring, surveying and mapping 2.3 Adapting to diverse environments 2.4 Arriving in a new land 2.5 Migrating and making a home 2.6 Maintaining distinctive cultures 2.7 Promoting settlement
3 Connecting Victorians by transport and communications	3.4 Linking Victorians by road in the twentieth century 3.6 Linking Victorians by air 3.7 Establishing and maintaining communications
4 Transforming and managing land and natural resources	4.1 Living off the land 4.3 Grazing and raising livestock 4.4 Farming
5 Building Victoria's industries and workforce	5.1 Developing a manufacturing capacity
6 Building towns, cities and the garden state	6.6 Marking significant phases in development of Victoria's settlements, towns and cities
8 Developing Australia's Cultural Life	8.14 Living in the country and rural settlements

On his arrival in Victoria, Aitken was helped by local Indigenous people at Dromana to unload his sheep. He initially appears to have attempted to foster good relations with the Mount Macedon Tribe by distributing rations of rice, sugar and flour (Sayers 1969:50). However, he clashed with the Gunung willam baluk clan on a number of occasions particularly in 1838 when the clan made deliberate attempts against squatters on their land. Aitken recorded in April of that year that 40 Indigenous people approached his station armed with spears and three guns. Mounted on horseback, Aitkens was able to outmanoeuvre the group and dispossess them of two of the guns, although he narrowly avoided being struck by a tomahawk in doing so. The Gunung willam baluk then left but targeted George Evans's run at Sunbury, spearing sheep and threatening a shepherd. Shepherd Samuel Fallon was killed and disembowelled shortly after (Symonds 1985). By this time, Aitken's relationship with the Gunung willam baluk appears to have deteriorated to the point that he no longer tolerated their 'trespass' on his run.

Although the initial violence between settlers and Indigenous people appears to have been largely constrained to the 1830s, the memories of this early conflict seem to have influenced incoming settlers long afterwards. The McNab family took up property in the study area in 1848 and their first homestead (the first Victoria Bank) is recorded as having defensive slit windows long after attacks had occurred on Aitkens run (Itellya 2013). Gibbs also notes John McNab recorded being chased home by Aborigines although details are scant.

The history of early conflict between settlers and Woi wurrung people is also reflected in the naming of the locality 'Tullamarine'. It is said to derive from a woman

Figure B7.2
Map of early allotments and squatters runs in the vicinity of Tullamarine

Source: Spreadborough and Anderson 1983

called Tullymarine, whose husband Bunja Logan stole potatoes from John Gardiner's farm in 1838 and was later responsible for one of the attacks on Aitken. After Bunja Logan escaped from gaol by setting fire to the thatched roof, he disappeared into the mountains with Tullymarine and their children (Symonds 1985:73; Vines 1995).

More information on the Indigenous history of the study area can be found in **Chapter B6: Indigenous Cultural Heritage**.

Early landholders and the speculators of Tullamarine

Land surveying was undertaken in the Tullamarine Parish in 1842, with most of the parish divided into 640 acre sections and some smaller blocks near creeks (Geelong Advertiser, 22 August 1842). The Tullamarine Parish was the last to be sold from the Moonee Chain of Ponds survey (only one or two sections of the Tullamarine Parish were sold in the first Crown land sales for the parish in 1842). The large size of the lots may have been beyond the means of most new immigrants; and also many of the sections were likely withheld from sale due to the depressed economic conditions of the time. There was however a demand for small farms, and some of the 640 acre sections were bought, subdivided and re-sold by speculators such as John Pascoe Fawkner in the 1840s. Other new owners subdivided their sections and leased them to tenant farmers. Much of the Tullamarine parish was not granted until about 1850 (Itellya 2013).

Most of the current study area is within land originally acquired by a small number of mainly Scottish settlers in the late 1840s and early 1850s (see **Figure B7.2**).

Alexander Kennedy bought section 17 Lot A (485 acres) on 11 May 1849. Traversed by the Mt Alexander Road, it was a suitable location on which to erect an inn to serve travellers. This was the Inverness Hotel managed by Alexander's son Henry. The lot south of Kennedy's was 17B, purchased by George Coghill, the son of William Coghill, who acquired land to the east of the study area as well as other squatting holdings around Victoria. Coghill also partnered with Fawkner to acquire Lot 13A as part of their Co-operative Freehold and Land Investment Society venture. Coghill erected a bluestone homestead and stables and named the property Glencairne, establishing a boiling-down works as early as 1849. He applied for a slaughtering licence from the police bench 'for his melting establishment on the

Salt Water River', indicating he may already have been operating at this date (The Argus, 27 February 1849:4).

With the onset of the Victorian gold rushes, service towns grew on the Mount Macedon Road to the north-east (later known as Mount Alexander Road) as they formed some of the primary routes to the Bendigo and Castlemaine goldfields. Tullamarine, Keilor, Bulla and Sunbury and the small community at Oaklands Junction, immediately north of M3R, served both travellers and the local community. This was one of the earliest recorded tracks within the Port Phillip District and also used from 1837 as an alternative route to Sydney Road by travellers from the Murray River. Oaklands Junction Village was at the corner of Mount Macedon and Oaklands roads, and comprised a blacksmith, shop, post office and the Inverness Hotel (Moloney 1998).

Scottish squatters and settlers were particularly prominent in the Tullamarine area. Many had migrated in the 1830s and 1840s during the turmoil of the highland clearances and the lowland agrarian revolution in Scotland, where improvers switched from tenanting subsistence farmers or 'cotters', to more productive sheep grazing in enclosed fields (Prentis 2008). As a result, there was both a shortage of work for dispossessed farmworkers and a shortage of land for the better-off farmers (known as tacksmen) who had their own leases and aspired to improve their circumstances (Devine 2011). The generally high level of education, strong Presbyterian values (highlighting hard work and improvement, application of scientific principles to improvements in agriculture, animal husbandry and breeding) and the integration and adoption of capitalism into these values, made the Scots particularly well adapted to colonial conditions. An example of this was the introduction and improvement of the Ayrshire cattle breed. Some of the most prominent breeders included McNab, Grant, Ritchie and Gibson (Prentis 2008).

The Tullamarine families were closely acquainted through various social connections. For example, their children attended the Seafield School on land donated by John Grant of Seafield Farm; and under the supervision of the Board of Advice for the School District of Keilor, of which Grant and Ritchie were members. They were also acquainted through worship at the Bulla Presbyterian Church (established in 1858 on land donated by Ann Greene) and through marriages over several generations. For example, John Grant, later of Seafield, who married Mary McNab in 1846; Malcolm Ritchie, of Aucholzie, Keilor, who married Jane Gray, daughter of Donald Gray, in 1856; and Angus Francis Grant, of Yarrawonga, son of John Grant of Seafield, who married Elizabeth Ritchie, eldest daughter of Malcolm Ritchie, of Aucholzie, in 1880.

Community was also established through other institutions. Members of the Grant, McNab and Ritchie families took roles on the roads' board and later in shire councils. Opposition to the Melbourne establishment (and in particular the Melbourne Hunt Club stationed at Oaklands Junction) provided a cause for collaboration when a number of farmers established the Field, Fence and Chattel Preservation League to protect their crops and livestock from damage by the hunt (The Australasian, 19 June 1869:20). The Inverness Hotel at Oaklands Junction was perhaps the interface between the two groups and, while it typically served a more egalitarian social function, this sometimes came with unexpected interactions such as when Edward Hagenay was charged with hitting Malcolm Ritchie over the head with a shovel during an altercation over roads' board matters (Hagenay 1864).

Victoria Co-operative Freehold and Land Investment Society

John Pascoe Fawkner was prominent in Melbourne's early history and played an important role in the development of Tullamarine. He opposed the dominance of the squatters and attempted to weaken their grip by encouraging more people onto the land. To this end, he established the Victoria Co-operative Freehold and Land Investment Society to purchase large Crown allotments funded by weekly contributions from society members (Moloney and Johnson 1998). The land was then subdivided into small blocks and allocated to members in proportion to their contributions. Although the scheme was generally a success in the late 1840s and early 1850s, the Tullamarine subdivisions mostly failed. A subdivision of 45 allotments was attempted at section 10, west of M3R (**Figure B7.2**), and although many allotments had water frontage most were very small (approximately 6 to 10 acres) on stony and steep land. Remnant drystone walls are indicative of the small subdivision parcels (Moloney and Johnson 1998).

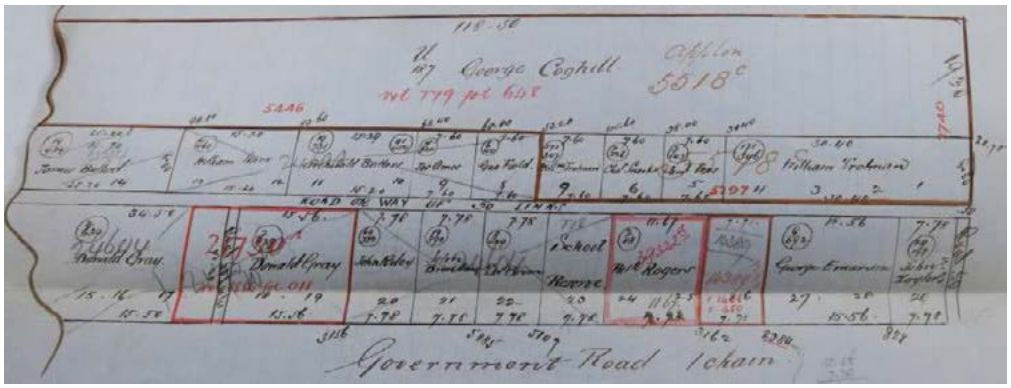
Sections 13A and 13B, on the east side of Deep Creek (**Figure B7.2**) along the alignment of Mansfield Road (near the centre of the present development footprint) were purchased in Fawkner's name by the Victoria Cooperative Freehold and Land Investment Society in December 1850. Section 13B of 415 acres was purchased solely in his name, while section 13A of 246 acres was purchased by Fawkner and George Coghill. The subdivision of section 13A took place in September 1852: Coghill took the northern 133 acres and added them to his Glencairne estate, while Fawkner took the southern 113 acres of section 13A for the Co-operative subdivision. In November 1850, a grant of lots 1, 2 and 3 (of 18 acres each) had been contracted by Fawkner to William Trotman for a total of £39.

Fawkner undertook the sale of his village allotments through a share issue, with each lot or share sold for 10 shillings. Purchasers included Joseph Amos, Patrick Rogers, Charles Snooks, Donald Gray, Samuel Lees, William Warr, Thomas Brown, John Taylor, John Riley, Archibald Butters and William Trotman. Some were resold for much greater sums in the late 1850s, and by 1867 Walter Clark had purchased Trotman's lot in the north-east corner of village.

A share certificate from the society (**Figure B7.3**) depicts a small village against the backdrop of Mount Macedon dotted with gabled cottages resembling prefabricated iron houses set along both sides of a roadway. These appear to correspond with the plan of subdivision for

Figure B7.3
Fawkner's subdivision of part of A/CP13, Tullamarine Parish Plan, RGO application 5518C, 1875 JP Fawkner

Figure B7.4
Part of a share certificate issued to William Trotman by Fawkner to buyers, appears to depict the proposed village with Mount Macedon in the rear



Source: Public Records Office of Victoria 5518

the estate showing the settlers' names (Figure B7.4). The alignment of the road through the village can still be discerned on aerial photographs of the airport. The footing or at least one cottage, Donald Gray's Bellno, was found during the survey which suggests the possibility of other remains within the airport.

The subdivision of section 13 seems to have been even less successful than that of section 10, as little documentation remains. Surviving remnants of the subdivision plan for section 13B indicate 35 parcels (Moloney and Johnson 1998). Blocks varied in size from 6 to 18 acres, and the road alignment comprised two unformed crossroads (most likely Bassett Rad and Panton Drive). Apart from the Mansfield family (who went on to buy most of the estate) it is unclear whether many original purchasers of the subdivided parcels attempted to live on their land, the area being described as a dismal plain and steep valley. In 1856, George Coghill mortgaged his property Glencairne (northern half of section 13A, 17B and part of section 16) to Henry Miller.

Coghill's half of section of 13A and Fawkner's section 13A lots 1-14 later became Glen Alice, which was

bought by David Mansfield who built the homestead in bichrome brick in about 1900. It was sold in 1939 for a poor price and thought to be demolished around 1965. William Trotman purchased three lots of the section 13 subdivision but soon moved to Springvale. By 1867, Mrs Trotman was widowed and she sold seven lots (another four had since been purchased, making a total of 42 acres) to Walter Clark of Glenara (Moloney and Johnson 1998). The Roseleigh homestead owned by Ernest Mansfield (Walter's brother) was situated on the south side of Mansfield Road in section 13B. Section 7 was also subdivided under Fawkner's Co-op, located partly in the south-east corner of the present development footprint (Itellya 2013).

Some landowners took advantage of the speculators' subdivisions to enlarge their own properties. Kennedy sold his section to Clark in the 1850s and Coghill's heirs sold section 17B in 1864, also to Clark. George Coghill died in early 1864 and it appears none of his family wished to operate the farm or boiling-down works. The sale indicated substantial improvements including:

> *800 ACRES. Valuable Farming and Grazing Property.*
>
> *GLENCAIRN.*
>
> *With Substantial Bluestone Dwelling house, Boiling Down Establishment, Plant, etc.*
>
> *Situate on the Deep Creek, within 12 Miles of Melbourne.*
>
> *The Property of the late George Coghill, Esq.*
>
> *To Farmers, Graziers, Speculators, and others. GEMMELL, M'CAUL, and Co. have received instructions from the executors of the late George Coghill, Esq., to SELL by AUCTION, at their rooms, 36 Collins street west, in September, That valuable property, situate on the Deep Creek, known as GLENCAIRN, and comprising 800 acres fine AGRICULTURAL AND GRAZING LAND, Securely fenced, and subdivided into paddocks.*
>
> *The property has a frontage of 64 chains 80 links to the Main Government Road, and also a frontage to the DEEP CREEK, from which there is a never-failing supply of water. The Dwelling house is built of bluestone, and contains six rooms, kitchen, servants'-room, men's hut. Also,*
>
> *Very commodious bluestone stables, cart sheds, storehouse, and salting-room.*
>
> *The Garden is well stocked with choice fruit-trees, and securely fenced by a stone wall. There is also erected on the property a boiling-down house and stock-yard, within one mile of the dwelling house.*
>
> *The Boiling-down Plant In complete working order, consisting of steam boilers, iron steam vats, force pump, coolers, wooden vats, weights, and scales.*
>
> *The auctioneers is calling attention to this valuable property, would remind intending purchasers that as grazing-paddock for stock such an opportunity as the present Is seldom met with. The distance from town is only 12 miles, and the property is well timbered, and has a never falling supply of water. There is also abundance of splendid bluestone and granite, and valuable deposits of kaolin. (The Argus 16 July 1864:2)*

In the late 1850s and early 1860s Walter Clark owned properties that he leased to a number of people. These included Gilbert Alstone `Blacksmith's forge, house, + land £40 GAV, £32 NAV; James Dewar `Store, dwelling, garden and land' £32/10/- GAV, £26 NAV; and Thomas Chadwick `Inverness Hotel + Agl land £140 GAV, £100 NAV. This indicates his holdings included the hotel and a number of other buildings on Section 17A (Bulla District Road Board rate book A/CP17 parts, November 1863: 201-203 (Shire of Bulla 1863)).

By 1892, Clark's Glenara estate encompassed approximately 1300 acres south of the Bulla Township between Oaklands Junction and the Maribyrnong River. By the time of his death in 1873, the Glenara estate was 4079 acres. In 1887, the homestead block of about 830 acres was purchased by his son Alistair Clark, one of Australia's best-known horticulturalists and rosarians. The garden became the site for the breeding of many plant species for more than 60 years.

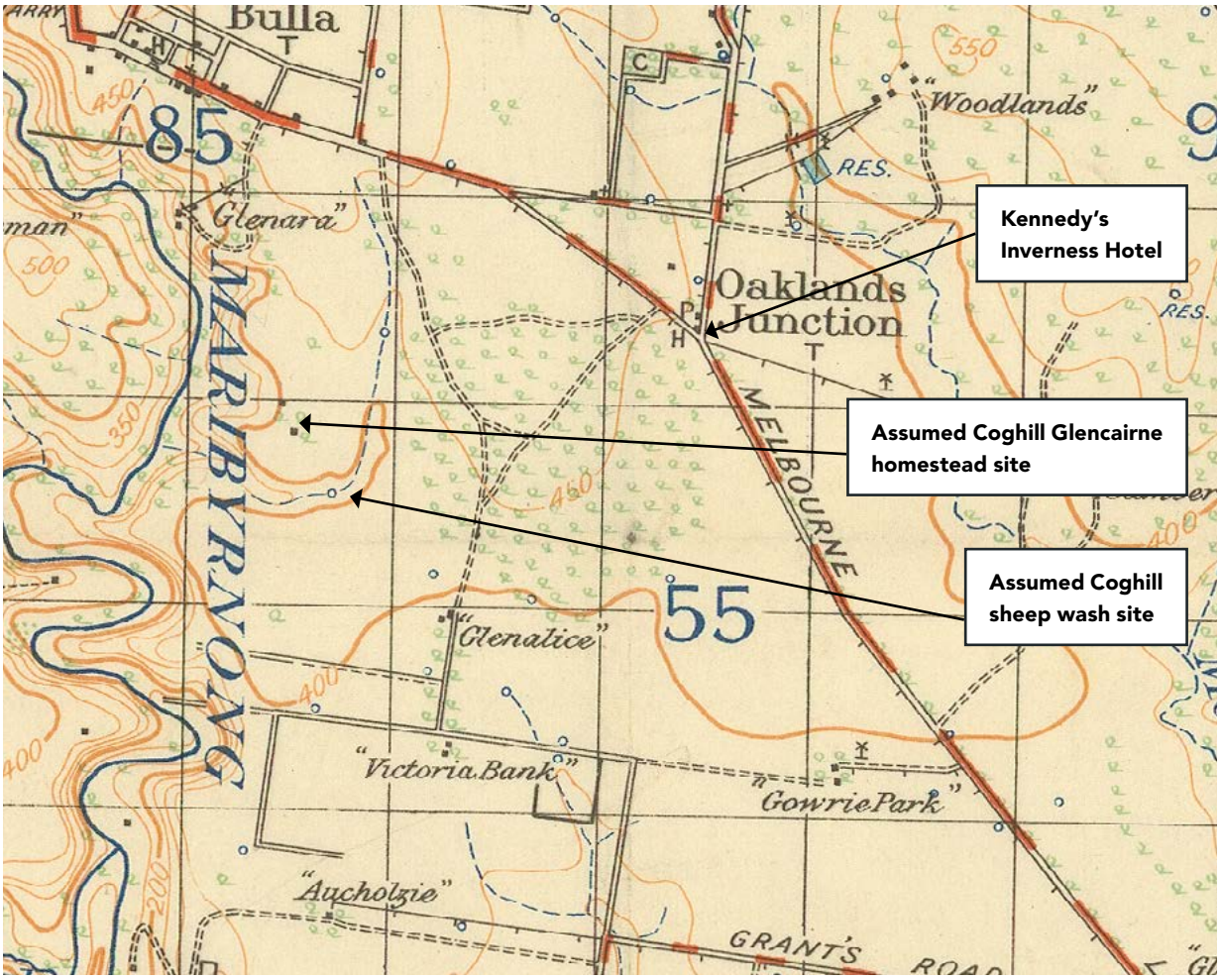
Although the boiling-down works appears not to have operated after Clark's purchase of the property, it was still referred to as 'the boiling-down works on Glenara' many years later (The Sunbury News, 4 June 1910:2).

The Mansfield Family

The Mansfield family arrived in Australia in 1849. They were miners and labourers who, despite being unsuccessful in the gold rush, still made enough money to buy a few of Fawkner's Tullamarine parcels. In 1850, John, Samuel and Isaac Mansfield bought land in Fawkner's section 13B subdivision. Eventually, John Mansfield bought 36 acres and the family purchased most of the blocks either side of Mansfield Road. Roseleigh cottage (on the south side of Mansfield Road) was the main farm and probably built around 1865. By 1888, the Mansfield estate was owned by David, Samuel and John Mansfield.

The Mansfield's grew hay and bred draught horses. The youngest of the three brothers, David reportedly acquired his father's property upon his father's death in 1867, and apparently became wealthy by supplying hay for horses during the Boer War (Mansfield 2007). David built the polychrome Italianate villa Glen Alice on the north side of Mansfield Road (section 13A) which was later demolished to make way for Melbourne Airport's east-west runway (09/27). In 1998, Roseleigh cottage in section 13B was also scheduled for demolition to enable construction of a new runway (Moloney and Johnson 1998).

Figure B7.5
Oaklands Junction in the early 20th century showing locations of Kennedy's Inverness Hotel and Coghill's properties (prepared by Australian Section, Imperial General Staff 1938)



Prepared by Australian section, Imperial General Staff: 1938 Victoria, Sunbury [Cartographic Material]. Melbourne: Great Britain War Office: By authority H.J. Green, Govt. Printer. http://handle.slv.vic.gov.au/10381/149198.

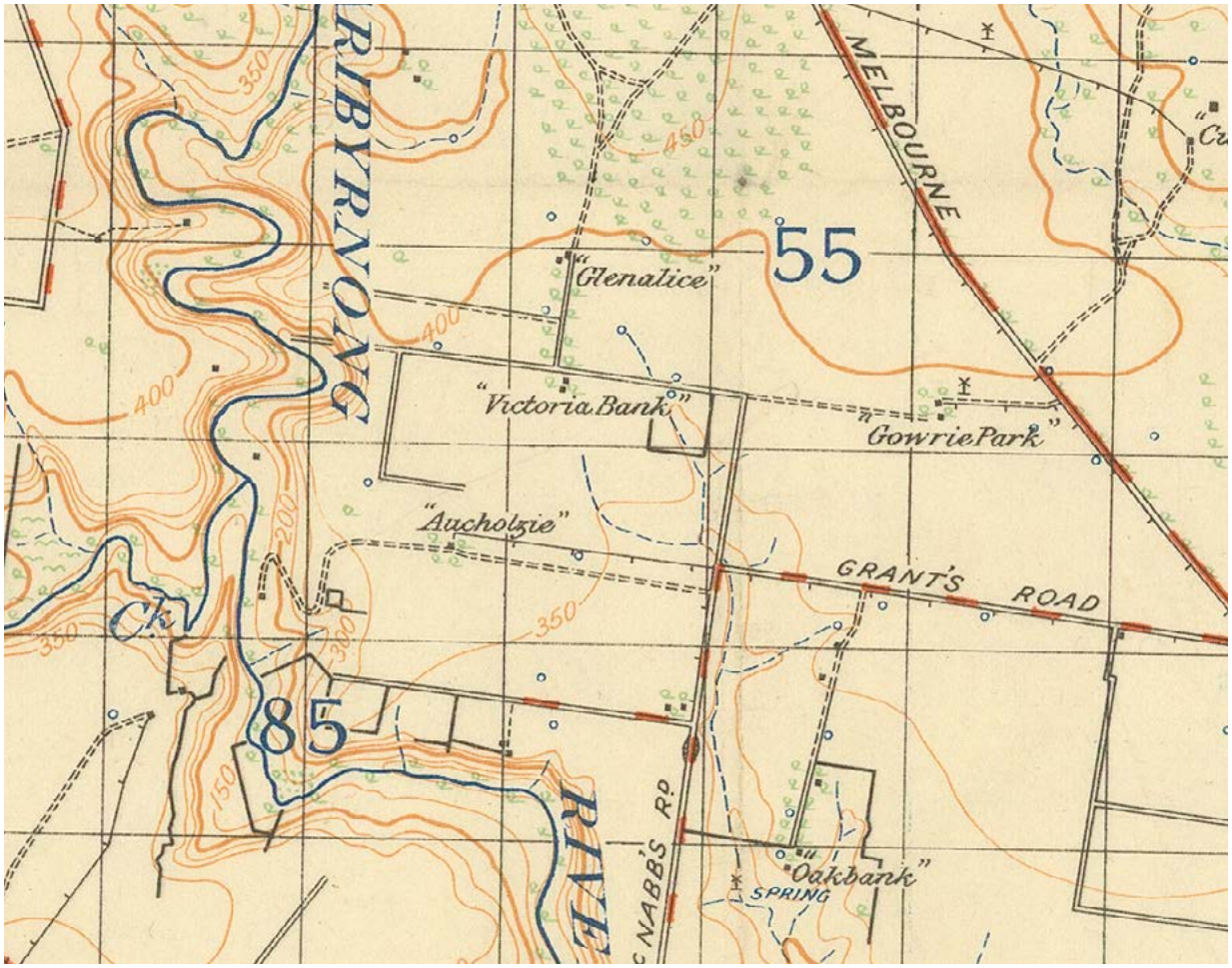
Ritchie brothers

John, James and Malcolm Ritchie came from a small village called Aucholzie in Aberdeenshire, Scotland. By December 1852, they were described as 'farmers of Merri Creek' when they purchased section 12B from Kaye, Chapman and Kaye, (the original purchasers of Crown sections 11, 12 & 13). Section 12B is bound by Deep Creek to the east and Jacksons Creek to the south, on the eastern boundary of the M3R development footprint. The Ritchies went on to purchase part of section 11B, all of 12B and, east of Deep Creek, parts of section 13A and 13B. They called this land Aucholzie. Malcolm Ritchie also held the Overpostle farm on Tullamarine Island and by 1883 had amassed over 1005 acres. The property was put up for sale when James Ritchie died in 1886. However, the sale did not go ahead and instead Malcolm Ritchie undertook further improvements. Advertisements were placed by the Scottish architect AE Duguid for tenders to construct a new brick house on Aucholzie (**Figure B7.6**) in 1889 (Moloney and Johnson 1998).

McNab brothers and John Grant

The McNab family arrived in Port Phillip on the David Clarke, landing in 1839. They initially bought land in Collins Street but within a couple of seasons sold up and moved to Campbellfield, where they leased land for nearly a decade. Angus McNab was the youngest of the five well-known McNab brothers, whose families appropriately celebrated their centenary in October 1939 with about 100 descendants. Like the Grants, the McNabs were Presbyterians and probably worshipped at the church at Oaklands. John and Duncan McNab purchased land in Tullamarine in 1850 in partnership with John Grant (see below) who had settled there in 1848. They subsequently divided Crown allotment 8 between them.

Figure B7.6
Early homesteads in the development footprint (prepared by Australian Section, Imperial General Staff 1938)



Prepared by Australian section, Imperial General Staff: 1938 Victoria, Sunbury [Cartographic Material]. Melbourne: Great Britain War Office: By authority H.J. Green, Govt. Printer. http://handle.slv.vic.gov.au/10381/149198.

Duncan McNab bought the middle 160-acre section of section 8, called it Victoria Bank, and lived there until 1869. In 1880, his sons Angus and John McNab returned and a second Victoria Bank was established. This was either on 95 acres between the north side of Barbiston Road and Aucholzie (section 9A), previously owned by the widow Ritchie, or on the south side of Mansfield Road (section 13B) (**Figure B7.6**).

John McNab (who married Mary Grant in 1846) owned the southern 160 acres of section 8 and called it Oakbank (**Figure B7.6**). Oakbank later absorbed the original Victoria Bank to the north, as well as part of the Upper Keilor Estate and properties owned by Love and Turner. Oakbank had a reputation for the finest herd of Ayrshire cows in Australia and was later known for its Shropshire sheep stud flock (**Figure B7.7**).

John Grant of Renewan Farm in Inverness-shire on Scotland's River Spey arrived in Sydney in 1838. He occupied a farm on Merri Creek in Campbellfield from 1839 for 11 years until he could buy land himself.

He acquired the northern 320 acres of section 8, which he named Seafield. When he died in 1904 at the age of 93 it was noted that:

> *"…[along] with his brother-in-law, Duncan McNab, he laid the foundation of the famous herds of Ayrshire cattle, the breeding of which was still being continued on the neighbouring farms by the descendants of these two old pioneers. Mr. Grant was for many years a member of the Keilor Shire Council, and was the last of the original trustees of the old established Presbyterian Church at Bulla." (The Argus, 8 November 1904:6)*

Grant also purchased part of section 9A at the south corner of Barbiston and McNabs roads, and later donated land for the Seafield National School (1859-1884). The school was located where the existing north-south runway (16L/34R) would meet Incinerator Road should the runway continue that far. He was also a shire councillor in Bulla and a founder of the Bulla Presbyterian Church.

Figure B7.7
Oakbank's Shropshire stud flock, with homestead behind

Source: The Sydney Mail and New South Wales Advertiser 1904

Establishment of the Airport

Aircraft first landed in paddocks at Tullamarine in the 1920s then during World War II there was a satellite aerodrome of Essendon Fields Airport on the east side of Melrose Drive. Gowrie Park was also used for aviation. Aerial Transport Ltd purchased 560 acres at Tullamarine, for the establishment of an airport (Vines 1995:38).

In 1959, the Commonwealth Government acquired a further 5,300 hectares (13,000 acres) of grassland in Tullamarine (Lucas 2010) and in 1962 construction of Melbourne's new international airport began. Runway construction involved significant earthworks in subsoils and the removal of surface soils in the majority of construction areas. This preceded construction of the terminal infrastructure, not finished until the early 1970s.

On 27 November 1962, then Prime Minister Robert Menzies announced a five-year plan to provide Melbourne with a $45 million 'jetport' by 1967. The first sod was turned in November 1964 and Melbourne Airport was opened to international operations on 1 July 1970 by the then Prime Minister John Gorton. Domestic flights were transferred to Melbourne Airport on 26 June 1971. Expansion works, including extending runways, were completed in 1973, allowing Boeing 747s to use the airport.

A review of aerial photography from 1931, 1945, 1960, 1980 and 1990 indicates the majority of active airport areas (runways, taxiways, terminals, hangers, etc) have been subject to major ground disturbing works. There was therefore little potential for European heritage to survive among the main constructed concrete and bitumen surfaces. However, grassed areas adjacent to the runways and taxiways appear to have been only cleared level with the surface, so archaeological features may survive on the airside (as attested by features evident at Oaklands Junction and along the Fawkner Land Co Settlement laneway). The construction of the runways had resulted in the clearance of the Grey Box Woodland's east and southern perimeter, where the tree line had become more diffuse and scattered. Here, two historic homesteads sites were located in Glencairne and Glen Alice (including ancillary buildings and potential dairying works). The intersection at Oaklands Junction has also been cleared (although the former roadways are still clearly visible) leaving behind a triangular shape and surface evidence of the building foundations. Similarly, the laneway running through the Fawkner Land Co Settlement can also be discerned as crop marks in grass on the airside. Outside these active airport areas, the majority of the study area remains relatively unchanged from earlier agricultural uses. Natural soil surfaces and the potential for European heritage sites in the form of structural foundations and occupational deposits remain, even though topsoil has been disturbed by ploughing or other agricultural uses.

B7.4.2
Field survey results

The survey undertaken for the M3R investigations identified 16 sites of historical interest within the study area as listed in **Table B7.8**. These are also displayed in **Figure B7.1**. These sites predominately relate to former homestead complexes, many of which have been demolished but archaeological deposits and foundations remain.

Aucholzie is the only homestead complex with surviving structures, the remaining homestead sites are limited to ruins and building foundations.

Glenara Sheep Dam was revisited but appeared to have been substantially altered by modern reconstruction. Some areas of flattened ground above the creek line and apparently constructed timber beams were identified at the edge of the creek gully. Further investigation was deemed necessary to determine if any structural remains could be present in these areas.

Observation of demolished building materials and large bluestone blocks indicated the potential for structural footings at Kennedy's Hut Site and Coghill's Boiling-Down Works. Vegetation overgrowth, and demolition and other stockpiled materials, prevented visibility of true extent of archaeological remains at these places.

Field survey of two areas of archaeological potential was not possible due to restricted access to airside sites (Oaklands Junction and the Fawkner Land Co Settlement). Both areas are considered likely to retain archaeological remains and some elements such as building footings, drains and former roadways can be identified from crop marks seen in aerial photographs.

Crop marks occur when grass or other vegetation either dries off early where above solid structures such as foundations, or stays green longer where it grows over artificial depressions such as drains and other backfilled excavations. Features can therefore be readily identified if aerial photographs are taken at the right time of year.

Parts of the Oaklands Junction site including footings of the Inverness Hotel were visible in the 1990s when the site was first recorded (Nearmap aerial photos show the footings of several buildings at this site).

The Fawkner Land Co Settlement can be traced by crop marks along the former village lane that divided the allotments. Comparison of the linear feature located just south of, and extending west from the western end of the east-west runway (09/27), with the settlement's subdivision plan (**Figure B7.3**) show that this feature corresponds closely with the width of the road reservation left between the allotments. As at least one building site from this settlement has been identified (Donald Gray's Bellno) there are potentially other

Table B7.8
European heritage sites identified during the survey within M3R

Current Name	Description
Aucholzie Homestead	Remains of homestead complex
Barbiston Farm Complex	Remains of homestead complex
Bellno Farmstead and Quarry	Remains of homestead and quarry
Coghill's Sheepwash and dam	Coghill's Dam has been removed from the inventory. It was originally registered from historical sources as a bluestone spillway. Further research and test excavations confirmed the identification of this site.
Coghill's Boiling Down Works (previously Glencairne Homestead)	This site was mistakenly identified as Coghill's Homestead but further research and test excavations confirmed the identification of this site, while the actual location of the Glencairne homestead and stables have been identified on the adjacent property to the west of the airport land.
Glenara Sheep Dam	Remains of sheep wash and dam along 'Glenara' creek drainage line. Reconstruction has removed nineteenth century remains.
Airport construction site (previously Glen Alice Homestead)	The Glen Alice Homestead site has been removed from the inventory. It was located near the present Perimeter Rd and on the north side of 09/27. Concrete footings and slabs of outbuildings related to the Glen Alice Homestead appear to relate to post WWII sheds. The homestead site was destroyed during the construction of the runway and service road.
Grants Road Bluestone Culvert	Bluestone culvert
Kennedy's hut site	Remains of early hut
Oakbank Farm Homestead	Remains of homestead complex
Oaklands Junction (unable to be directly surveyed)	Oaklands Junction is the remains of several structures including a bluestone culvert and building foundations associated with the small 19th century settlement.
Seafield Farm (school not identified)	Remains of homestead complex, following excavation and further survey it was determined that the school site was probably destroyed by road and taxiway construction
Roseleigh Homestead	Remains of homestead complex
Victoria Bank Homestead	Remains of homestead complex
Fawkner Land Co Settlement (Unable to be directly surveyed)	Remains of early settlement, may retain archaeological remains and some elements such as building footings, drains and former roadways.
Radar Hill Track	Historic crushed stone and gravel trackway running through Grey Box Woodland towards Glencairne Homestead.

buildings or structures (some of which may be shown on the share-certificate illustration) that may still survive as archaeological remains (Figure B7.4).

Following the background research desktop assessment, the field survey did not identify any built heritage values or other features requiring further assessment. As noted above, Aucholzie is the only homestead complex with surviving structures. It stands in a heavily deteriorated state (partial wall collapses, stripped interior, roof tiles removed etc). Grants Road Bluestone Culvert is the only other partially-standing site. All other sites exist as archaeological deposits, remains or parts of other historic infrastructure (e.g. the Coghill and Glenara sheepwash and dams).

B7.4.3
Test excavations

B7.4.3.1
Excavation methodology

Consultation was undertaken with HV for the above heritage sites assessed as part of M3R development and planning (refer to Section B7.2). The consultation process included providing HV with an indicative survey and excavation method for each site that Melbourne Airport believed required further assessment in order to determine its significance (a summary of the proposed excavation methodology for each site, as provided to HV, is detailed in Table B7.9). Where significant features such as large structural/foundation stones were uncovered, further excavation was undertaken to determine their extent in order to uncover a more complete 'site extent' of the structural remains. Excavations were predominantly limited to removing surface litter, vegetation and demolition layers to determine the site orientation and nature. The test excavations sought to preserve the level of any remnant and intact occupational deposits. The results provided additional context to both existing background information and new research undertaken concurrently to the field program.

B7.4.3.2
Excavation results

Previous excavations of the Victoria Bank and Bellno homesteads, and Barbiston, Oakbank and Seafield farms revealed a series of nineteenth century small farm buildings of various forms. Additional excavation was undertaken at the Coghill's Boiling-Down Works (previously Glencairne Homestead) revealing well preserved foundation stonework. The excavations recorded sufficient structural remains to provide a fairly complete site plan. This included the number of potential rooms, orientation of buildings, divisions of internal and external areas, and separation of the demolition layer and potential occupational layer.

Excavations at the Kenney's Hut site demonstrated this was an early occupation of a small domestic building dating from the mid-nineteenth century; while excavations at Coghill's Sheepwash and Dam were less conclusive, revealing various structures and mid-nineteenth century artefacts.

The potential archaeological deposits associated with the Airport Construction Site (previously Glen Alice Homestead) outbuildings and Glenara Sheep Dam were investigated but no significant features identified. The site was determined to have little archaeological value. Following excavation, it was determined that the Airport Construction Site (previously Glen Alice Homestead) represented mid to late-twentieth century structures probably associated with construction of the Melbourne Airport runways. Select mechanical stripping was conducted at the Aucholzie Homestead, which helped to reveal additional external features and sample of depositional finds. Results from these sites are discussed among those previously assessed sites in the place inventory (Section B7.4.4).

Based on the test excavations and contextual information from the background assessment, updates were made to more accurately name each place and assess its condition. The revised names and descriptions have been included in the various tables to this report.

Test excavations could not be undertaken of the Oaklands Junction and Fawkner Land Co Settlement sites due to restrictions on works on the airside. However, assessments from historical sources and aerial photographs can be used to assess the potential archaeological values of these sites.

B7.4.4
Place inventory

The following place inventory tables (Table B7.10 to Table B7.25) provide information on all European historical sites identified in the M3R development footprint or which may be impacted. The sites are closely associated with the Tullamarine region's 19th century settlement, farming and road infrastructure. Due to the largely rural nature of the study area and lack of development since the 1960s (except Melbourne Airport) the study area largely retains these remains of early settlement (see Figure B7.1).

Table B7.9
Excavation methodlogy

Archaeological site	Description	Proposed investigation
Kennedy's Hut site	A small earth and stone levelled platform with brick, glass and ceramic fragments is believed to be from a mid-19th century hut	Hand excavation of a trench across the site, and test pits in vicinity of potential artefact dumps, expanded to determine nature and extent of deposits and features.
Coghill's Sheepwash and Dam	Breached earth dam wall with timber and stone structural remains and level building platforms nearby.	Hand excavation to expose structural remains and other feature with one to three trenches, plus test pits at building platform sites.
Coghill's Boiling-Down Works (previously Glencairne Homestead)	Coghill's 1840-50s bluestone and brick Boiling-Down Works site.	Scrape back recent disturbed fill layer with backhoe, hand excavation of trench across site plus test pits at exposed structural features.
Airport Construction Site (previously Glen Alice Homestead)	Concrete slabs thought to relate to farm buildings.	Scrape area near former structures by mechanical excavator – at least two transects to determine if artefacts are present.
Aucholzie Homestead	C1889 brick homestead and outbuildings with possible earlier bluestone structure in rear.	Scrape area of rubble behind existing building with m echanical excavator to determine if evidence of earlier structure is present – hand excavate to determine structural form and stratigraphy if any structure found.
Barbiston Farm Complex	Extensive surface scatter of artefacts stone paving and timber structures among boxthorn hedges and other garden plants.	Test pit along north edge of building (hand). Open area excavation of eastern part of building (machine and hand).
Bellno Homestead	Bluestone foundations of two room cottage with fireplace and extensive artefact scatter Fragmentary remains of bluestone footings, post holes, fire place foundations and extensive disturbed artefact scatter.	Test pit in north west corner of building (hand). Test pit near middle of south wall at presumed entrance (hand). Test pit in south east corner of building (hand). Open area excavation at western end of building (hand). Open area excavation at south east of building (hand).
Oakbank Farm Homestead	Traces of former homestead, paved area near south entrance, driveway and garage, circular brick tank within larger square bluestone lined in-ground tank and scattered artefacts.	Trench (machine). Asbestos material scattered through the soil in many areas, so it is determined that hand excavation and sieving is not appropriate.
Seafield Farm	Base layer of wall footings, stone lined tank with occupation and demolition rubble fill	Test pits along north and south walls (hand). Test pit near north west corner (outside building line) (hand). Test pit west of northern end of building (hand). Open area excavation of northern part of building (machine and hand).
Victoria Bank Homestead	Foundations and partly standing walls of three-room bluestone cottage with deep cellar, stone lined circular underground tank, traces of timber extension and stone paved veranda	Test pit in north east corner of building (hand). Test pit in north west of paved veranda (hand). Test pit on western entrance to building (hand). Open area excavation in north and middle room (hand). Open area excavation around cellar room (hand, with clearance of cellar fill and collapsed wall rubble by machine.

Table B7.10
Place inventory for Aucholzie Homestead

Aucholzie	
Type	Remains of homestead complex
History	The Ritchie brothers, John, James and Malcolm, acquired extensive landholdings in the Tullamarine district in the 1850s and 1860s. By 1883 they had about 1005 acres, which was known as Aucholzie and encompassed part of section 11B, all of 12B, and parts of section 13A and 13B. The original Aucholzie is a locality on the River Dee in Aberdeenshire, Scotland, and appears to have been the ancestral home of the Ritchies. James Ritchie died in August 1883. The following year, John and Charles Ritchie were living at Cobaw near Lancefield. It appears that Malcolm then became the principal owner of the land that the brothers had jointly acquired. In 1889, architect A E Duguid advertised for tenders for the erection of a residence at 'Aucholzie'. This homestead was built for Malcolm Ritchie, probably because his relatively wealthy status and family were not suited to the original, nearly 50-year-old, bluestone and mud mortared house on the site. Duguid accepted the tender to erect a substantial brick villa in June 1889.
Description	The existing brick house is clearly the 1889 home built by Malcolm Ritchie when he took over the farm. Surrounding sheds are from the early to mid-twentieth century, as indicated by most of them being evident on 1940s aerial photographs. A collection of cut bluestone to the west of the farm yard, and a possible group of foundations with slate immediately behind the house, are potentially remains of the original 1850s homestead. There may be a cellar under this, but not within the later house. The area to the north and west of the house is also likely to contain the domestic refuse from the household, which would have been deposited.
Condition	Standing structures remaining and also potential for archaeological deposits.
Images	**Figure B7.8** **Looking north-east at Aucholzie residence during stripping works outside of structure**  **Figure B7.9** **Brickwork exposed during stripping works at Aucholzie residence** 

Table B7.11
Place inventory for Barbiston Farm Complex

Barbiston Farm Complex	
Type	Remains of homestead complex
History	Barbiston Farm was one of several properties established in the late 1840s and early 1850s in the Tullamarine area. It initially comprised a small bluestone homestead and several outbuildings, with the homestead paddock well defined by windbreaks of peppercorns and cypress trees and later sugar gums. The role of the farm in Victoria's cattle breeding was described much later in the Australasian in 1933 as follows: *"The Barbiston Ayrshire stud was established by the late Mr. Richard Gibson in the Tullamarine district. Near Melbourne, in "the early days" has played an important part in the progress of the brood throughout Australia, although not to the same extent as the famous Oakbank stud of Messrs. McNab Bros. It was founded on several cows bred in New Zealand and stock purchased from the late Mr. J. E. Pennell, a New South Wales breeder, who imported cattle from the Drumlanrig stud of the Duke of Breeleuch (Scotland), which are at the of some of the best Ayrshires in Australia today."* Although absorbed into larger adjacent properties, it appears to have continued in use as a dwelling until demolished for the airport in the 1960s. Aerial photos show a series of buildings within several farm yards edged by windbreaks and hedges. The trees remain, but most areas within the yards have been demolished. Remaining stone, brick, timber and metal from buildings, and glass, ceramic and metal domestic refuse are widely scattered. A particular concentration of ceramic and glass appears to be a dump site just beyond the garden gate facing out to the escarpment edge.
Description	A scatter of late nineteenth and early twentieth century domestic artefacts, tree rows, remnant fencing, dry stone walls and cut bluestone indicate the former homestead and farm complex. The fences from the property indicate small pens adjacent to a large stable and not far from the homestead, typical of stud farms.
Condition	There are no standing structures remaining, but potential for archaeological deposits remain.
Images	**Figure B7.10** **Barbiston Farm, constructed in the 1870s**  *Collins, J. T. 1966. Keilor. "Barbiston Farm." Photography. http://search.slv.vic.gov.au/MAIN:Everything:SLV_VOYAGER1674223* **Figure B7.11** **Barbiston Farm foundations following excavation** 

Table B7.12
Place inventory for Bellno Farmhouse and Quarry

Bellno Farmhouse and Quarry	
Type	Remains of homestead complex
History	It is possible that the hut site relates to either the very first occupation as part of Coghill's Glencairne pastoral property or the first occupant leasing or buying from Fawkner's land society. Lots 15-19 in John Pascoe Fawkner's co-operative subdivision of section 13A, Parish of Tullamarine, were conveyed to Donald Gray, who named the property 'Bellno'. Donald Gray was Malcolm Ritchie's father in law and Malcolm owned property on both sides of Deep Creek. Located on the north side of Mansfields Road, the eastern boundary was 540 metres up what was called Grays Hill. A ford on Deep Creek was in line with Loemans and Mansfield Road. A 'slate freestone' quarry was described in this location in 1862, "running along the steep cliffs beneath Mr Gray's house" and while the existing quarry workings appear to be basalt, the lower strata comprise mudstone and other measures, which may have been considered usable as slate.
Description	The site comprises the footings and base course of a two-room bluestone cottage, measuring about 6 x 11 metres. Superimposition of one wall against another indicates the western room was constructed separately and the eastern room added later – although this might only be weeks or months after the original structure was completed. To the west are a series of stone walled stock pens, partly formed from massive boulders, and partly from well-made dry stone walling. These extend for about 70 metres, and are about 12 metres wide. A four-metre-wide roadway runs beside the yards, with a second boulder wall opposite (north side). The structures are all on a narrow tongue of land projecting out over the Deep Creek valley. Steep slopes are about 30 metres to the north and 40 metres to the south. The southern escarpment has been quarried. No specific history has been found for the quarry. At present it can only be speculated that it was an early exploitation, possibly by the landowner as a supplement to their farming income. The size of the quarry means it is unlikely to have been a stand-alone commercial venture, but may have been opportunistic or related to a specific stone construction contract in the immediate area. This might have been for one of the many local bluestone homesteads and public buildings, or for road projects, such as the Grants Road culvert.
Condition	There are no standing structures remaining, but further potential for archaeological deposits remain.
Images	**Figure B7.12** **Bellno wall foundations obscured by thistles looking north, 2014**

Figure B7.13
West end of Bellno showing fireplace and flagstone floor

Table B7.13
Place inventory for Kennedy's Hut

Kennedy's Hut	
Type	Early settler's residence
History	Crown Allotment 17A was purchased in 1849 by Alexander Kennedy, who left his son Henry to run the Inverness Hotel on property at Oaklands Junction. It can be assumed that the remainder of the property was grazed and that this hut site was a cottage leased either to a tenant farmer or used by a farm manager. It is possibly mentioned in the estate listings for Walter Clarke's Glenara property and later sales notices suggests that there were a number of cottages on the larger property, but the location of these is uncertain. The hut site appears to have only been occupied for a short time.
Description	Bluestone foundations of buildings and external paving present, with some later brick course work present. Limited occupational deposits present. A level platform has been formed of rounded boulders and clay behind a cut stone wall on the east side, and partly benched into the slightly rising slope to the west. Small round stones have been used to create a cobbled veranda pavement with large flagstones in the midpoint suggesting the entrance doorway. Window glass fragments were found in localised areas on either side. The total area is about 10 x 6 metres. A brick paved area near the north west may be associated with an out building. Extensive scatters of glass and ceramics occur for up to 50 metres from the cottage.
Condition	Fair – some intact occupation deposit and demolition layers.
Images	**Figure B7.14** **Kennedy's Hut site during initial excavation looking over threshold and exterior paving, facing south-west, 2020**  **Figure B7.15** **Detail of brick paving at rear of Kennedy's Hut site, 2020** 

Table B7.14
Place inventory for Coghill's Boiling-Down Works at Glencairne

Coghill's Boiling-Down Works at Glencairne	
Type	Early industrial complex for processing of animal material and tallow production
History	George Coghill acquired crown allotment 17 B in 1850 and established his Glencairne homestead shortly after. He is likely to have occupied the area earlier as his father was located to the east on the Cumberland property and had grazing licence over the area. In 1849, Coghill applied for a slaughtering licence for his 'Melting establishment' so it appears to have constructed this works by that time. Confirmation of the boiling down works is found in the estate sale notice after his death in 1864 when the property and boiling down works were sold to Walter Clarke of Glenara.
Description	Substantial bluestone foundations for walls, internal and yard paving with brick course work, including for a boiler setting and furnaces for melting vats. A substantial bluestone masonry wall runs around the large site evidently enclosing an area of about 15 x 20 metres. There are two openings for cart entrances, one on the north side, and another on the east which has intentionally formed cart ruts in the bluestone cobble paving. A large area of stone paving is located in the south east part of this enclosed yard, however, much of the yard appears to have been earth. A stone paved drain also runs along the north side outside the wall. A large quantity of butchered sheep and cattle bone was found in this drain. Bones were also found both inside and outside the yard wall near the eastern entrance adjacent to the supposed melting vat furnace. Potential for further occupational deposits to be present.
Condition	Fair – large areas of disturbed material from both the airport construction and more recent bulldozing, but there are still intact occupation deposits and structural remains.
Images	**Figure B7.16** **Excavated boiler setting at Coghill's Boiling-Down Works site facing west, 2020**  **Figure B7.17** **Stone paving and cart track in yard at Coghill's Boiling-Down Works site facing east, 2020** 

Figure B7.18
Plan of boiling down works after preliminary excavations 2020

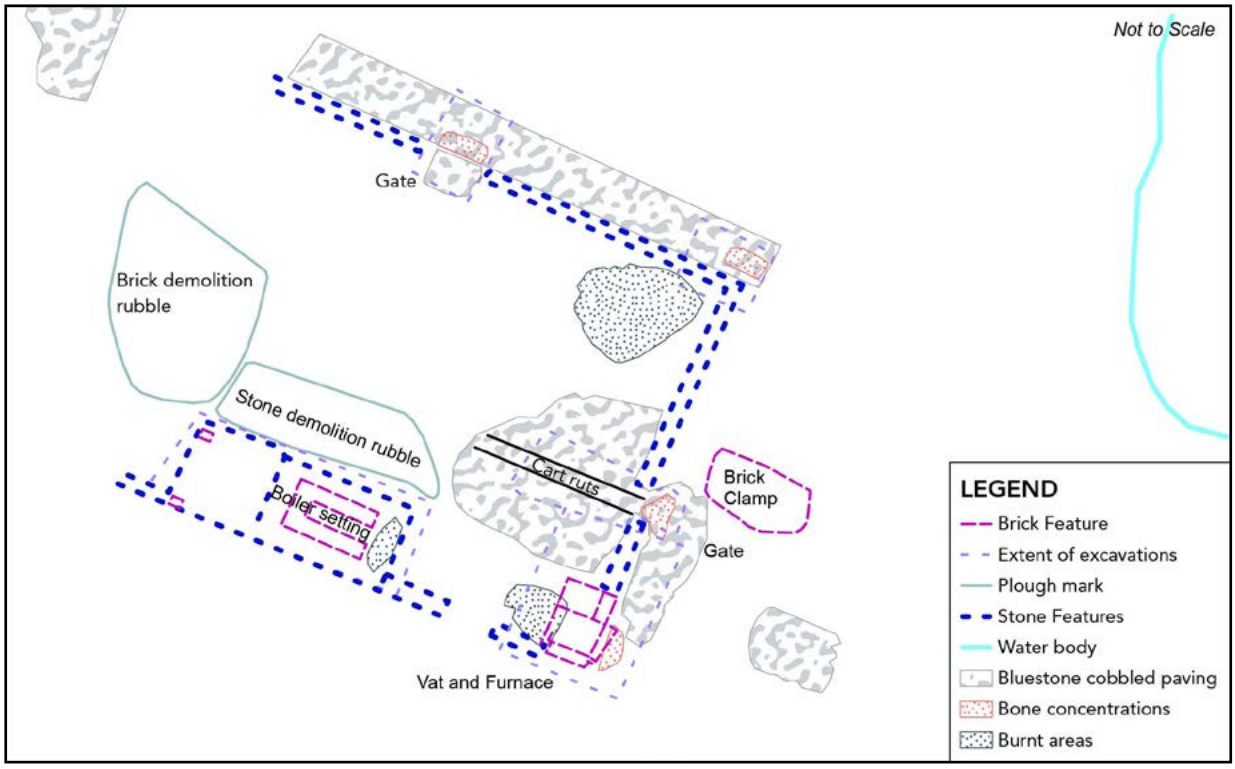


Table B7.15
Place inventory for Oakbank Farm Homestead

Oakbank Farm Homestead	
Type	Remains of homestead complex
History	John and Duncan McNab and John Grant jointly purchased section 8, Parish of Tullamarine, in 1850, possibly having squatted briefly in the area prior. They created three farms between them: Oakbank in the south; Victoria Bank in the middle; and Seafield in the north. The McNabs were renowned for improving the Ayrshire cattle breed, with their bloodstock sold at auction at high prices, and winning prizes at agricultural shows. John McNab built and ran the Oakbank property, later absorbing Victoria Bank. John married Mary Grant in 1857, while Mary's brother John Grant had married John McNab's sister Mary McNab in 1846. John McNab died in 1884, but his wife and sons continued to run the farm. In 1913, William McNab is recorded as running the farm with his brothers. John and Mary McNab's son Angus Duncan McNab married Elizabeth Meikle, from Queensland, and their only son was John Alexander Grant McNab, who, with his sons, Ian, Alex and Keith, farmed Oakbank until it was compulsorily acquired for the airport circa 1960.
Description	As the Oakbank farm appears to have been the main property and longest lived of the McNab/Grant undertakings, the archaeological remains might also be extensive. Located at the southern end of a long avenue of sugar gums, which formed the main driveway between the three farms known as Oakbank Lane, the site comprises a series of building and shed foundations, cobbled areas from pens and tracks, and remains of various footings from equipment and other structures. The main house site is within a tree lined yard, where a mound of cut stone, mortar, plaster and some timber has been heaped. This has evidently been pushed up following removal of the bulk of the building stone, some of which would appear to have been pushed into the large stone lined dam to the south west. Several large stones, probably from lintels or window sills, are also evident. A large stone-lined cistern with brick dome remnants is located near the south east corner of the house. Other features on the site include stone paving from the stables and sheds, stone paving along the driveway west of the house, a larger livestock shed to the south, concrete floor, probably from a dairy, north east of the house, and two in-ground, brick-lined tanks, one near the larger shed and another further south.
Condition	There are no standing structures remaining, but potential for archaeological deposits remain.

Oakbank Farm Homestead (cont.)	
Images	**Figure B7.19** **Mound of cut stone on Oakbank homestead site, looking north, 2013**  **Figure B7.20** **Edge of brick cistern at Oakbank homestead site, 2016** 

Table B7.16
Place inventory for Glenara Sheep Dam

Glenara Sheep Dam	
Type	Sheepwash and dam
History	A dam is marked on several early plans of the Glenara property, and may have pre-dated Walter Clarke's ownership, as it is the only water source on Allotment 17A originally purchased in 1849 by Alexander Kennedy. The dam may have been utilised for watering stock by the Melbourne Airport which has managed the Grey Box Woodland using sheep grazing to keep grass down since the 1960s. It appears the dam was reconstructed in the last 20 years.
Description	When first recorded in the 1990s, features including a stone lined sheep dip were described at this site. The dam appears to have been reconstructed in recent decades with a modified earth bank wall, excavated spillway and concrete diffusion structure in the water channel upstream.
Condition	Poor - no archaeological features remain

Table B7.17
Place inventory for Oaklands Junction

Oaklands Junction	
Type	Former settlement
History	The earliest European occupation of the airport and its surrounds was by squatters in the late 1830s, but it was not until the gold rush period of the 1860s that permanent residences were constructed near the M3R development footprint. This was the township of Oaklands Junction which was originally developed as a stopover for people heading from Melbourne to the goldfields. During the previous assessment, an arched, bluestone culvert associated with Oaklands Junction was noted. The culvert was assessed as being relatively intact and it was determined that there is potential for additional historic features or objects associated with the historic place to be identified.
Description	Foundations of buildings and bluestone culvert evident. Various fragments of ceramics and bottle glass observed. Likely additional material currently obscured by vegetation. Footings of several buildings are visible as crop marks in aerial photographs.
Condition	Fair
Images	**Figure B7.21** **Bluestone culvert, looking south, 2016**

Figure B7.22
Oaklands Junction building footings visible as crop marks in Nearmap aerial image Jan 2020

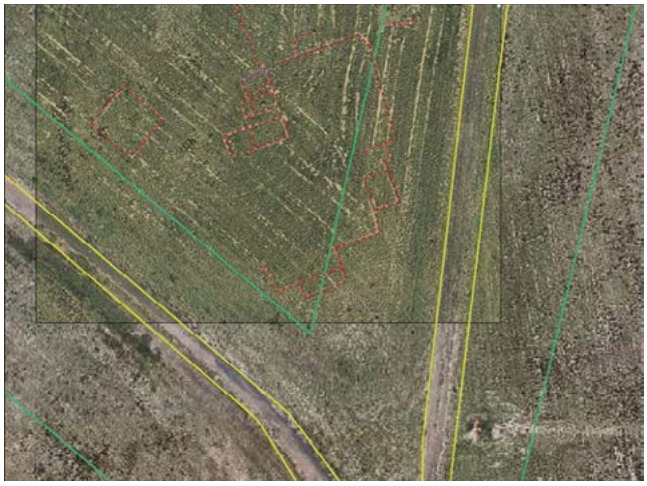


Table B7.18
Place inventory for Airport Construction Site

Airport Construction Site	
Type	Airport construction site (previously identified as Glen Alice outbuildings)
History	Glen Alice Homestead was constructed in about 1900 by the David Mansfield. In the mid-20th century a dairy and other outbuildings were added to the north of the homestead, however, these now appear to have been within the airside and were demolished for the east west runway and taxiway, along with the homestead, around 1965. Foundations of other buildings just north of the airside perimeter fence now are considered to be related to airport construction activities in the 1960s, possibly including a concrete batching plant, elevated fuel storage tank and material storage buildings or shelters. By the 1980s these buildings themselves had been demolished.
Description	Several concrete slabs with holding down bolts set into the perimeter are evident with crushed rock screenings spread around them. These are in a wide levelled area, excavated about one metre into natural ground on the north side. Separate footings for an elevated tank were found on the south side of the slabs. No significant archaeological deposits were identified.
Condition	No significant archaeology
Images	**Figure B7.23** **Example of ground stripping below modern concrete slab construction during investigations 2020** 

Table B7.19
Place inventory for Radar Hill Track

Radar Hill Track	
Type	Earth and gravel vehicle track
History	Several tracks are noted from historical maps passing either side of, and running through the middle of, the Grey Box Woodland. Tracks shown on early Tullamarine and Bulla Parish Plans indicate distinct routes to Mt Alexander passed to the north-east and south-west of the woodland. Later plans including the 1918 Ordnance Survey indicate tracks connecting Oaklands Junction with Glencairne and Glen Alice Homesteads. Prior to 1864, Coghill's Glencairne property only had road access at the Mt Alexander Road, so it is likely any track to his homestead went through the woodland, passed his Boiling-Down Works and Dam and across the gully to his homestead at the western end of the block.
Description	A number of tracks are evident within the Grey Box Woodland, some clearly associated with operation of the airport (for example, giving access to the former radar installation). Others appear to be earlier tracks pre-dating the establishment of the airport. These are sometimes deeply rutted and eroded due to the scouring of the loose granitic soils.
Condition	No significant archaeology evident – potential for isolated historic artefacts
Images	**Figure B7.24** **Existing track across Radar Hill 2020** 

Table B7.20
Place inventory for Coghill's Sheepwash and Dam

Coghill's Sheepwash and Dam	
Type	Sheepwash and Dam
History	Historical references note a bluestone lined spillway and timber dam constructed on Coghill's property in the 1840s. The dam is on what was George Coghill's Glencairne, purchased in 1850, but possibly occupied earlier. Glencairne Homestead ruin is located about 300 metres north west and Coghill's Boiling-Down Works is 400 metres east. A dam with "a never failing water supply" is mentioned in the 1864 Estate sale, and maps identify this location as the Glenara sheepwash later, after Walter Clarke had added Section 17A to his Glenara Estate.
Description	A breached earth dam wall crosses Glenara Creek about 800 metres from its junction with Deep Creek. A small cut bluestone paved spillway is near the north side of the dam and two timber posts with tenon cuts on their tops, stand near the base of the dam. Remnants of a riveted wrought iron ship's tank are in a small gully to the north, and areas of artificially terraced flats extend to the west of this gully and a cart track runs along the hillside from the flat to the west. A dense deposit of mid-19th century glass and ceramic was located on the edge of this flat. The features suggest that wool scouring may have occurred here as well as washing the fleece on the sheep.
Condition	Fair – scattered 19th century artefacts and some features evident.
Images	**Figure B7.25** **Femnant timber uprights within gully at Coghill's Sheepwash and Dam, looking west along Glenara Creek gully**

Figure B7.26
Stone spillway on the dam wall, looking south 2020

Table B7.21
Place inventory for Grants Road Bluestone Culvert

Grants Road Bluestone Culvert	
Type	Bluestone culvert
History	Grants Road was established in the original survey of the Parish of Tullamarine between sections 14 and 15 to the north and sections 7 and 8 to the south. It initially extended across the middle of the parish to the Mount Alexander Road (now Melrose Drive). The first government land sales in the parish were in 1842, when eighteen large allotments were put up for sale. The allotments were between 300 and 900 acres, but mostly square mile blocks of about 640 acres. Among these was Portion 8, which was on the south side of Grants Road. However, it appears that much of this land went unsold. The next and more successful sales were in 1849. The first evidence of road construction is in 1868, when tenders were called for "…160 cubic yards of 2 inch bluestone metal to be laid on [sic] Grant's-road, In the parish of Tullamarine". The Shire of Bulla recorded £36/10/8 paid to the Keilor Roads Board for road works on Grants Road. These early works were evidently insufficient as complaints about the condition of the road re-occurred over the years. For example, in 1901, the Shire of Bulla received evidence from Duncan McNab that the steepness of the water tables (drains) and condition of the surface was so bad that vehicles were in danger of overturning. Planting was also undertaken (along the Tullamarine boundary) as part of these improvements. This is probably the date of the original elm trees and the sugar gums further to the east. More substantial works, including drainage and metaling, were also carried out in 1914.
Description	The Grants Road culvert is a four-cell box culvert constructed entirely of bluestone with long stone lintels over dwarf walls and a stone paved base. Angled cutwaters extend on the upstream side with wing walls either end. Stone-lined drains direct water from two separate channels. The downstream face of the culvert has failed with wing walls, piers and lintels having fallen into the waterway. The surrounding land is covered in a dense copse of elm trees, which appear to have spread from a small number of now dead or senescent trees planted as an avenue either side of the crossing.
Condition	Although the culvert has failed in some sections, the culvert is still in use.
Images	**Figure B7.27** **North side of culvert showing cutwaters, 2013** 

Table B7.22
Place inventory for Roseleigh Homestead

Roseleigh Homestead	
Type	Remains of homestead complex
History	The Roseleigh homestead was built in the mid to late 1860s as part of the settlement scheme established by J P Fawkner as the Victoria Co-operative Freehold and Land Investment society. Among the purchasers were Isaac Mansfield and his sons John, George and Samuel. Another son, David, later also acquired property here. By 1888 the Mansfield estate encompassed much of the eland in Section 13 B on either side of Mansfield Road, owned jointly by the brothers. Roseleigh cottage, on the south side of Mansfield Road, may have been Isaac's original homestead, although it has also been suggested it was built as a wedding present for David Mansfield, the youngest of the three brothers. David is also said to have inherited Roseleigh on his father's death in 1867. The Mansfields grew hay and bred draught horses with David apparently becoming wealthy during the Boer War supplying hay for horses. By the 20th century Roseleigh was home to David's son Ernest and his family while David had built and occupied Glen Alice opposite.
Description	The Roseleigh homestead site has been demolished, with only tree plantings and stock yards remaining. The vast majority of building materials have been removed from site. However, there may be some potential for archaeological deposits to remain, albeit in a heavily disturbed context.
Condition	Poor – there are no standing structures remaining, and only limited potential for archaeological deposits.
Images	**Figure B7.28** **The former Roseleigh homestead (prior to demolition)** 

Table B7.23
Place inventory for Seafield Farm

Seafield Farm	
Type	Remains of school and homestead complex
History	John Grant established the Seafield Farm, on the northern part of Section 8, Parish of Tullamarine, in 1850. He married John McNab's sister Mary McNab in 1846. The property was run by the 'Misses Grant' in the 1900s, presumably daughters or sisters of John Grant. John Grant is said to have given the land for the Seafield National School (No. 546) which operated from 1859 and was located "where the runway crosses the line of Grants Lane" according to some accounts. In 1856, the Commissioners of National Education received a preliminary application for the establishment of the Seafield School. The school closed in 1884 when the Conders Lane School (SS 2613) opened in Tullamarine.
Description	The site of the Seafield Farm is marked by several mature trees and stone paved areas. Shallow concrete and brick spoon drains run across the site from east to west, with stone foundations of a probably four-room cottage immediately north with a square bluestone-lined cistern (or possibly cellar) on the west side. A possible haystack base formed from basalt slabs and other stone paved areas are to the south and west of these features. A concrete lined cistern formed from corrugated iron lies to the north east. Four trees mark the former stock yards with some sections of intact stone paving. No evidence of the Seafield School has been found.
Condition	There are no standing structures, but potential for archaeological deposits remain.
Images	**Figure B7.29** **Cut stone from Seafield Homestead, 2013**  **Figure B7.30** **Foundations of Seafield Homestead following mechanical excavation, 2014** 

Table B7.24
Place inventory for Victoria Bank Homestead

Victoria Bank Homestead	
Type	Remains of homestead complex
History	Duncan McNab established Victoria Bank on about 180 acres in the middle part of section 8, Parish of Tullamarine, in 1850. In 1869, Duncan moved to Lilydale, but his son Angus McNab continued running the farm until at least 1913 (although it is unclear if this was the first or second Victoria Bank). The first Victoria Bank was later absorbed as part of the Oakbank farm. The second Victoria Bank was later established by one of the McNab sons on the west side of McNabs Road. John McNab evidently had some contact with the Aboriginal population of the district. In later life, he accounted how, as a boy, he was chased by Aborigines while on his way home. It has also been reported that the Victoria Bank homestead had "slit windows which allowed rifle fire at hostile aborigines but were too narrow to permit entry for the attackers". Incidents leading to such defensive measures have been recorded, such as when Tullamarine led an attack on John Aitken's Mount Aitken station near Sunbury.
Description	The Victoria Bank site comprises a modest bluestone ruin of three to four rooms with a deep cellar at the south end and a large stone lined cistern to the east. The house block is ringed by peppercorn trees and some evidence of cobbled yards and other timber outbuildings can be seen. There are extensive surface scatters of domestic artefacts including ceramics, glass, metal and some timber. Fragments of square terracotta tile marked 'GLEW' are from a former dairy or laundry floor. Such paving tiles were made by a handful of manufacturers in Victoria from the 1850s, with Glew's product being among the better quality. The cellar is about 1.5 metres deep and measures 3 x 5 metres. Stairs enter from the south, possibly from an external cellar door. The house overall measures six metres by 13 metres with at least three rooms evident from stone foundations measuring 60 centimetres thick. Stone paving to the south of the stone footings suggest a garden and possibly a former timber structure. The 1930s and 1940s aerial photographs only show a small single building roughly central among the tree rows while later images show it was demolished by 1970.
Condition	Good – substantial structural remains and occupation deposits were found intact, and there is further potential from the cistern fill and unexcavated parts of the interior of the building and surrounds.
Images	**Figure B7.31** **Cistern/in-ground tank in foreground, cellar and house ruins behind, looking west, 2013**  **Figure B7.32** **Victoria Bank cellar following excavation 2014** 

Table B7.25
Place inventory for Fawkner Land Co Settlement

Fawkner Land Co Settlement	
Type	Former settlement
History	The Victoria Co-operative Freehold and Land Investment Society was established in the late 1840s by John Pascoe Fawkner to provide small landholdings for settlers and break the power of the squatters. A number of allotments were subdivided on either side of Mansfield Road, and shares allocated to the society members. Several people took up these farms, but eventually most moved away and the land was absorbed into a few larger holdings. The footings of one house from the settlement (Donald Gray's Bellno) remain as evidence while David Mansfield's Roseleigh homestead was a late survivor of this settlement.
Description	Linear features corresponding to the lane running between the individual allotments are visible on aerial photographs indicating the form of the roadway, table drains and fenceline embankments survive beneath the mown grass on the airside. The survival of one building site (Bellno) suggests there is potential for archaeological remains of other structures relating to the settlement to be present.
Condition	Fair – the extent of surviving archaeology is unknown.
Images	**Figure B7.33** **Aerial photograph 2016, showing laneway and position of Bellno and Roseleigh**

B7.4.4.1
Significance assessment

A significance assessment of each European heritage place is summarised in and uses the criteria outlined in Section B7.3.2.3:

Table B7.26
Significance assessment for European heritage sites in M3R

Site	Applicable Heritage Victoria criteria	Applicable Commonwealth Heritage List criteria	Significance threshold	Statement of significance
Aucholzie Homestead	Criterion (a) Importance to the course, or pattern, of Victoria's cultural history. Criterion (c) Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Criterion 1. The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.	Moderate-the site is of regional significance. Meets VHI criteria. Meets CHL criteria.	Aucholzie is of historical significance as an early farm settlement marking the initial phase of occupation and improvement in the Tullamarine area under the Ritchie family, a notable family of livestock improvers and part of the Melbourne establishment. The site has considerable archaeological evidence for the arrangement of the farm and material culture related to its occupation and operation in the period 1850 to 1960. The potential for intact archaeological deposits related to the 1850s house and cellar and underfloor areas from both periods is very high. While it was determined there may be potential for Indigenous contact associated with this site, no Indigenous cultural material was identified during the current historic assessment. The 1889 house was once an attractive and substantial villa with considerable aesthetic interest in the architectural elements – white moulded brick string course and brackets, Flemish bond with bands of tuck-pointing and elaborate bay windows, etc. However, its ruinous condition has substantially impacted on this. The surrounding landscape is evocative of 19th century plantings with sugar gums, peppercorns, a Moreton Bay fig and conifers. The Ritchie family descendants and local historians have an association with the site, but due to its isolation from public access, this has been substantially diminished.
Barbiston Farm Complex	Criterion (a) Importance to the course, or pattern, of Victoria's cultural history. Criterion (c) Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: Criterion 1. The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.	Low – the site is of local significance. Meets VHI criteria. Meets CHL criteria.	Barbiston Farm is of historical significance as one of the local 19th century properties that reflect early settlement patterns along the Maribyrnong River. It is of importance for its association with the prosperous stock and station agent and Ayrshire cattle breeder Richard Gibson, and as the centre of the subsequent prominent Fox family's large farm and extensive landholding.

Site (cont.)	Applicable Heritage Victoria criteria (cont.)	Applicable Commonwealth Heritage List criteria (cont.)	Significance threshold (cont.)	Statement of significance (cont.)
Bellno Farmhouse and Quarry	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.	Moderate – the site is of regional significance. Meets VHI criteria. Meets CHL criteria.	The stone hut foundations and associated dry stone walled stock pens are potentially of high archaeological and historical significance for their possible association with the earliest phase of European settlement in the district, either relating to the first squatter occupancy, or more probably Donald Gray, one of the few to take up land under John Fawkner's Victoria Co-operative Freehold and Land Investment Society. As such, the site provides information regarding material cultural and settlement behaviour in the 1840s and 1850s. Although little is known about the quarry, it may be of both historical and archaeological significance for evidence of early exploitation of local stone and potentially in association with the adjacent stone hut site. Excavations have indicated that archaeological components to the site survive.
Coghill's Sheepwash and Dam	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.	Moderate – the site is of regional significance. Meets VHI criteria. Meets CHL criteria.	The site is significant for evidence of early pastoral activity in the region and association with George Coghill. Mid-19th century artefact deposits and structural remains provide insight into methods of animal husbandry and the behaviours of the estate workers.
Kennedy's Hut	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history. **Criterion (h)** Special association with the life or works of a person, or group of persons, of importance in Victoria's history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history. **Criterion 8.** The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.	Moderate – the site is of regional significance. Meets VHI criteria. Meets CHL criteria.	Kennedy's hut site is of historic significance as an early residence in the Tullamarine region. It is possible that, like nearby Oaklands Junction site, the hut acted as a stopover for people heading from Melbourne to the goldfields. The site has archaeological evidence for the early settlement and occupation of the encompassing pastoral estate from the mid-19th century, and its association to other early residences including Glencairne and Glenara. The site is also significant for its association with Alexander and Henry Kennedy who built and ran the Inverness hotel at Oaklands Junction. This association provides further context to the chronology of settlement and management of early farming practices at Tullamarine.
Coghill's Boiling-Down Works at Glencairne	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history. **Criterion (f)** Importance in demonstrating a high degree of creative or technical achievement at a particular period. **Criterion (h)** Special association with the life or works of a person, or group of persons, of importance in Victoria's history.	Meets CHL criteria: **Criterion 2.** The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history. **Criterion 8.** The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.	High - the site is of state significance: Meets VHI criteria. Likely to fulfil criteria for listing on the CHL or VHR.	Coghill's Boiling-Down Works is of historic significance as one of the earliest examples of industrial development in Victoria, and a very rare example of an early boiling down works with archaeological remains. This association provides further context to the chronology of Coghill's estate and management of early farming practices at Tullamarine. This includes the documented down-turn in the production of wool and adaption to new farming practices as a result. Excavations have indicated that well preserved archaeological remains survive.

Site (cont.)	Applicable Heritage Victoria criteria (cont.)	Applicable Commonwealth Heritage List criteria (cont.)	Significance threshold (cont.)	Statement of significance (cont.)
Airport Construction Site	Does not meet criteria	Does not meet criteria	No significance	This site has little significance because of its recent date and lack of substantial archaeological remains.
Glenara Sheep Dam	Does not meet criteria	Does not meet criteria	No significance	This site has little significance because modern impacts have removed any potential archaeological remains.
Grants Road Bluestone Culvert	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history. **Criterion (f)** The importance of the place or object in demonstrating or being associated with scientific or technical innovations or achievements	Does not meet criteria	Low-the site is of local significance. Meets HO criteria.	The Grants Road culvert is a locally rare type of early road structure, which reflects the first efforts made by local roads boards to improve communication and access in the then- thinly populated communities. The stonework reflects the locally available materials and traditional skills in roadmaking. This particular culvert is unusual for the very large spanning lintels used to cover the box culvert cells.
Oakbank Farm Homestead	Criterion (a) Importance to the course, or pattern, of Victoria's cultural history. Criterion (c) Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history. **Criterion 8.** The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.	Moderate-the site of regional significance. Meets VHI criteria. Meets CHL criteria.	Oakbank is of historical significance as an early farm settlement marking the initial phase of occupation and improvement in the Tullamarine area under a notable family of livestock improvers, famous for introducing Ayrshire cattle in Victoria, and having the finest breeding herd in the country. The site has considerable archaeological evidence for the arrangement of the farm and material culture related to its occupation and operation in the period 1850 to 1960.
Oaklands Junction	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Does not meet criteria	Low-site is of local significance. Meets VHI criteria	Oaklands Junction is of historic significance as an early stopover for people heading from Melbourne to the goldfields. The site has archaeological evidence for the arrangement and development of the site, including its role as a local gathering place for social events such as hunting.
Radar Hill Track	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Does not meet criteria	Low-the site is of local significance. Meets VHI criteria.	The former track through the Grey Box Woodland is of historic and archeologically significance for its potential to reveal evidence of early occupation and use of the area by graziers and travellers.

Site (cont.)	Applicable Heritage Victoria criteria (cont.)	Applicable Commonwealth Heritage List criteria (cont.)	Significance threshold (cont.)	Statement of significance (cont.)
Roseleigh Homestead	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Does not meet criteria	Low-the site is of local significance. Meets VHI criteria.	The former Roseleigh, property, comprising cottage and associated outbuildings, is of local historical impacts due to its associations with the 1851 John Pascoe Fawkner land co-operative estate on sections 13A and 13B Parish of Tullamarine; and the Mansfield family. The structures have been removed and while there is some potential for archaeological deposits they will have been heavily disturbed by the demolition process.
Seafield Farm and Seafield National School	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.	Low-the site is of local significance. Meets VHI criteria. Meets CHL criteria.	The Seafield homestead is historically significant as part of the initial phase of occupation of the region. The site however, has limited archaeological potential due to clearance for the airport. The Seafield School was a short-lived but locally important example of pioneering communities undertaking civic improvements as part of the establishment of settlements. However, the site of the school has not been found and was probably destroyed during construction of the north-south runway.
Victoria Bank Homestead	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history. **Criterion 8.** The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.	Moderate – the site is of regional significance. Meets VHI criteria. Meets CHL criteria	Victoria Bank is a historically significant early farm settlement marking the initial phase of occupation and improvement in the Tullamarine area under a notable family of livestock improvers, famous for introducing Ayrshire cattle in Victoria, and having the finest breeding herd in the country. The site has considerable archaeological evidence for the arrangement of the farm and material culture related to its occupation and operation in the period 1850 to 1900. In particular, the site has potential for sealed deposits in the bottom of the cellar and underfloor deposits capped by the collapsed bluestone walls.
Fawkner Land Co Settlement	**Criterion (a)** Importance to the course, or pattern, of Victoria's cultural history. **Criterion (c)** Potential to yield information that will contribute to an understanding of Victoria's cultural history.	Meets CHL criteria: **Criterion 1.** The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history. **Criterion 8.** The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.	Moderate possibly state or regional significance. Meets VHI criteria. Meets CHL criteria	Fawkner's 'Victoria Co-operative Freehold and Land Investment Society' settlement represents a unique attempt at establishing a privately sponsored 'yeoman farmer' community through a cooperative share system and allocation of small holdings to farmers. While the scheme ultimately failed it is historically important for demonstrating the role of John Pascoe Fawkner as a reformer and radical, and for its role in attempts to break the power of the squatters both politically and in the way they locked up land preventing closer settlement. The potential survival of archaeological remains associated with any of the occupants would be of great significance.

Table B7.27
Severity criteria

Impact severity	Criteria against heritage discipline
Major	Adverse, permanent, irreversible impacts, to heritage sites / places generally but not exclusively of national importance. Heritage place / feature meet NHL Criteria.
High	Generally adverse, permanent, irreversible impacts to heritage sites / places of state significance. Heritage place / feature meet VHI criteria for high significance.
Moderate	Generally adverse, irreversible impacts to heritage sites / places of regional significance. Consider cumulative impact of multiple instances. Heritage place / feature meets VHI criteria for moderate significance.
Minor	May be adverse or beneficial impacts to heritage sites / places of local significance. Heritage place / feature meets VHI criteria for low significance.
Negligible	Minor works without foreseeable adverse impacts.
Beneficial	N/A

B7.5
ASSESSMENT OF POTENTIAL IMPACTS

The assessment of potential impacts uses the project-specific severity criteria developed for the assessment of European heritage (described in **Table B7.27**) as well as the significance ratings for European heritage sites in **Table B7.26**. The duration of impact and likelihood of impact are as described in **Chapter A8: Assessment and Approvals Process**.

Impacts by the proposed M3R development will result from excavation and filling to prepare runways, airside areas, access roads, service facilities and other infrastructure. Permanent impacts are anticipated to occur to all sites listed within the place inventory (**Section B7.4.4**).

Avoidance, management and mitigation measures are discussed further in **Section B7.6**.

The proposed impacts to the European heritage sites may include:

- Land reshaping to facilitate the development (including a combination of cut and fill)
- Underground utilities will be extended throughout development area (including water, stormwater, electricity, telecommunications and fibre optics)
- General site logistics (including provision for access, laydown, plant compounds and vehicle haulage areas)
- General site establishment works (including concrete building foundations, and construction of other associated structures).

The works include the following impacts to the ground surface and have the potential to impact on surface and subsurface archaeological deposits, features and objects:

- Stripping of topsoil over some works areas
- The construction of drains, underground services, concrete foundations, associated landscaping and earthworks
- Underground services (such as water, sewer, stormwater, electricity, gas, telecommunications and fibre optics) will be excavated to standard depths generally not exceeding one metre
- Construction of M3R will involve temporary and permanent excavation to various depths (depending on size, style, construction materials, building methods and function) - much of which will be in excess of one metre.

B7.6
AVOIDANCE, MANAGEMENT AND MITIGATION MEASURES

Proposed avoidance, management and mitigation measures are outlined in this section and in **Chapter E2: Environmental Management Framework**. They entail undertaking salvage excavations and archaeological watching briefs (monitoring) on the sites impacted by M3R. Sites where impacts can be avoided or minimised will be protected during works by temporary exclusion fencing and the inclusion of appropriate instructions in works and environmental management plans.

It is proposed that the following mitigation measures will only be undertaken if M3R's design is unable to avoid impacts to these sites. Options for specific harm minimisation may be determined on a case-by-case basis once further detailed construction impacts are known. Due to this level of uncertainty, specific harm mitigation measures will be undertaken for all places located within the study area before ground works and construction activities take place.

B7.6.1.1
Archaeological excavation – mitigation measures

Impacts from M3R are predicted to occur at the majority of sites listed in the place inventory. Based on the disturbance footprint, four of these places are located nearby but outside the disturbance footprint extent. They are:

- Bellno
- Barbiston Farm Complex (considered already salvaged)
- Oaklands Junction
- Radar Hill Track

Harm mitigation actions are provided below in consideration of the level of assessment and investigations already conducted to date for M3R. Should M3R not impact these locations, the harm avoidance measures in **Section B7.6.1.3** will apply instead. No mitigation actions have been outlined for the Airport Construction Site or Glenara Sheep Dam as these are determined to have no remaining significant archeological deposits or features.

It is noted that HV does not have jurisdiction on Commonwealth land and therefore a 'consent to disturb' is not required under the Victorian Heritage Act. An archaeological salvage program will therefore be designed for each European site of significance that accords to 'best practice' approach, and HV's guidelines to conducting archaeological salvage of historic heritage places and objects. This includes development of a research design, salvage methodology and artefact conservation policy for all sites that are to be impacted. A professional conservator is proposed to be engaged to manage conservation and curation of artefacts. The process for artefact collection, management (including conservation, where required) and storage is further detailed in **Section B7.6.1.6**.

The proposed salvage measures are shown in **Table B7.28**.

The following excavation methods will be utilised where required across the European heritage sites to be impacted by the proposed M3R works:

- Any excavation will be undertaken by a qualified archaeologist, and the works are to be monitored by a suitably qualified heritage advisor or archaeologist.
- Mechanical excavation will be used where there is a low likelihood of significant intact archaeological deposits. Areas will be scraped progressively in 10 centimetre layers, and the excavated surface and spoil examined for artefacts and features.
- Utilising hand excavation (shovels and trowels), sections of the sites will be cleared. The topsoil will be excavated and transported to an established culturally sterile area.
- The topsoil will be examined for contemporary artefacts corresponding to each excavation area.
- Hand excavation (trowels) will be utilised to expose features for recording and also ensure any contextual artefacts are preserved in situ. Portable artefacts will be bagged for post-excavation analysis.
- Onsite recording will follow archaeological best practice. All exposed structures, features and contextual artefacts will be plotted in plan and cross section, and photographed in situ. A Trimble Geo Xh 3000 will ensure sub-metre accuracy for site location within the wider landscape context. Features considered to be well preserved or contributing to the significance of the site will also be recorded utilising photogrammetry.
- At the completion of the excavation, the site can be backfilled.

The proposed areas for salvage are shown in **Table B7.29**.

Following excavation, artefacts will be bagged by provenance and entered into an onsite catalogue before removal from the site, following the process outlined in **Section B7.6.1.6**. If the assemblage is deemed to be of high significance (assessed on a place-by-place basis) it will be recommended for lodgement with HV's Artefact Repository. If the assemblage is of low significance it will be offered to APAM for interpretative or display purposes or otherwise discarded. The disposal method will be supplied to HV for record keeping.

Table B7.28
Archaeological excavation requirements for European heritage sites

Site name	Methodology	Area of salvage
Aucholzie	Archival recording of standing structures and monitoring of demolition and clearance of area around homestead and near yard.	30m radius mechanical
Bellno (if not avoided)	Completion of hand excavation of building footprint and three metres surrounding, Monitoring mechanical excavation within 10 metres of building footprint and clearance of well.	4 x 8 metre hand excavation 10 metre radius mechanical
Coghill's Boiling-Down Works at Glencairne	Hand excavation of remaining structures and artefact deposits around boiler setting, vat and stone paving, monitoring mechanical excavation in area within 50 metres of site.	15 x 15 metre hand excavation 50 metre radius mechanical excavation
Coghill's Sheepwash and Dam	Mechanical clearance of features with selective hand excavation if significant archaeological deposits exposed.	20 x 30 metre machine Up to four areas 2 x 4 metre hand excavation
Fawkner Land Co Settlement	Monitoring of stripping of topsoil in area of former laneway and selectively along frontages (according to impacts from construction) to determine if any evidence of former cottages or archaeological deposits remain. Mechanical salvage excavation and detailed hand excavation if significant intact archaeological deposits or features are uncovered.	Monitoring area about 20 metres either side of laneway for about 500 metres, with a provision for at least five areas hand excavations of at least 4 x 4 metres if required to investigate significant features and deposits dependant on area to be impacted.
Grants Bluestone Culvert	Detailed measured drawings and photography to be prepared prior to demolition and monitoring of stripping of surface to expose underlying bluestone structure and removal of the structure using a mechanical excavator to foundation level so that internal structure and footings can be recorded.	Monitor extent of bluestone structure up to two metres up and downstream and a section excavated through the roadway at the embankment and abutment.
Kennedy's Hut site	Hand excavation of remaining building footprint and test trenches along front of veranda and select areas adjacent to building, surface collection of artefacts within 50 metres of building footprint.	12 x 8 metre open area excavation Three 1 x 10 metre trenches 50 metre radius surface collection
Oakbank Farm Homestead	Monitoring of mechanical excavation of site once asbestos contamination has been managed, including exposure of footings and clearance of cistern.	20 x 20 metre mechanical Two 5x5 metre hand excavation if significant deposits found
Oaklands Junction (if not avoided)	Machine clearance of vegetation over footings and building footprint followed by hand excavation of features and artefacts exposed at hotel and store, plus selective testing along linear features (e.g. drains and walls).	20 x 10 metre, 10 x 10 metre, 8 x 8 metre building footprints 40 metres of linear features
Roseleigh	Monitoring of mechanical excavation in area of house and outbuilding, hand excavation if any intact archaeological deposits exposed.	15 x 20 metre machine Up to 2 x 4 metre area for selective hand excavation
Seafield Farm	Monitoring of mechanical excavation of remainder of site including completion of clearance of cistern.	15 metre radius mechanical
Victoria Bank	Completion of hand excavation of building footprint and three metres surrounding, Monitoring mechanical excavation within 20 metres of building footprint, including clearance of cistern.	12 x 6 metre hand excavation 20 metre radius mechanical
Radar Hill Track (if not avoided)	Monitoring of stripping of topsoil in area of former track. Mechanical salvage excavation and detailed hand excavation if significant intact archaeological deposits or features are uncovered.	Monitoring area of track and five metres either side for about 500 metres Up to two 2 x 2 metre hand excavations if required

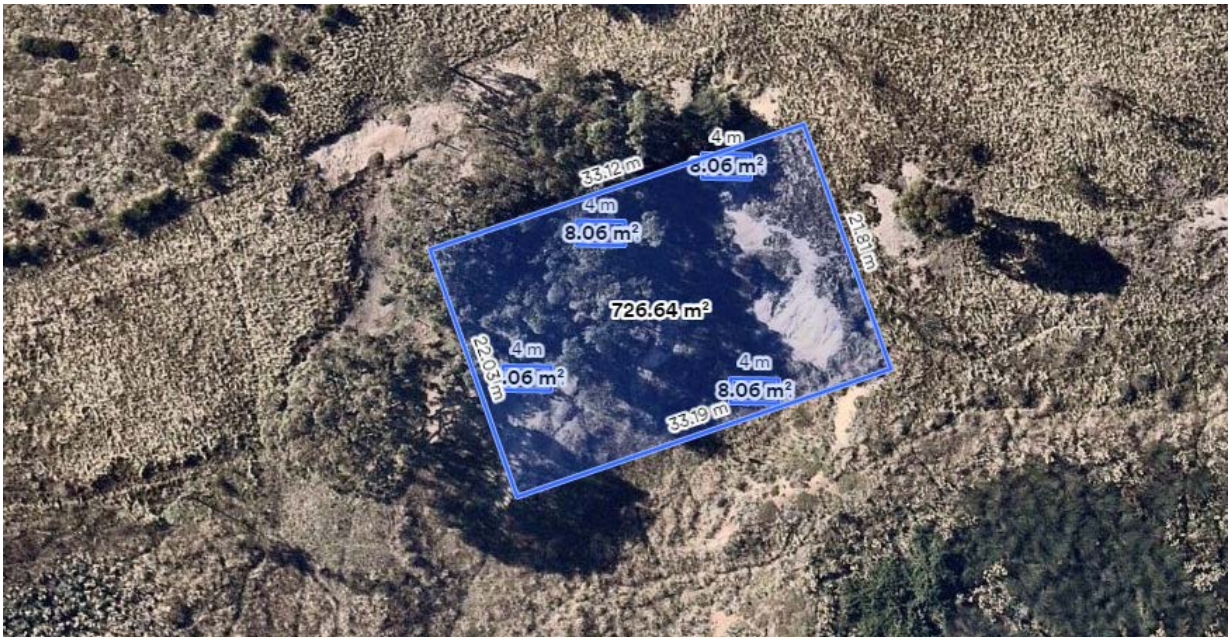
Table B7.29
Archaeological excavation areas for European heritage sites

Site name	Area of salvage
Aucholzie	30 metre radius mechanical
Bellno (if not avoided)	4 x 8 metre hand excavation 10 metre radius mechanical

Imagery

Coghill's Boiling-Down Works at Glencairne	15 x 15 metre hand excavation 50 metre radius mechanical excavation
Coghill's Sheepwash and Dam	20 x 30 metre machine Up to four areas 2 x 4 metre hand excavation
Fawkner Land Co Settlement	Monitoring area about 20 metres either side of laneway for about 500 metres, with a provision for at least five areas hand excavations of at least 4 x 4 metres if required to investigate significant features and deposits dependant on area to be impacted.


2827.35 m²
30 m


4 m
33.12 m
4 m
8.06 m²
726.64 m²
4 m
8.06 m²
33.19 m


16 m²
516.12 m
21917.54 m²
16 m²
16 m²

Grants Bluestone Road Culvert	Monitor extent of bluestone structure up to two metres up and downstream and a section excavated through the roadway at the embankment and abutment.
Kennedy's Hut site	12 x 8 metre open area excavation Three 1 x 10 metre trenches 50 metre radius surface collection
Oakbank Farm Homestead	20 x 20 metre mechanical Two 5x5 metre hand excavation if significant deposits found


22.58 m
11.6 m
256.74 m²
22.15 m


7853.98 m²
r 50 m


20.27 m
15.09 m
14.69 m
306.07 m²
24.47 m
20.58 m

Oaklands Junction (if not avoided)	20 x 10 metre, 10 x 10 metre, 8 x 8 metre building footprints 40 metres of linear features
Roseleigh Homestead	15 x 20 metre machine Up to 2 x 4 metre area for selective hand excavation

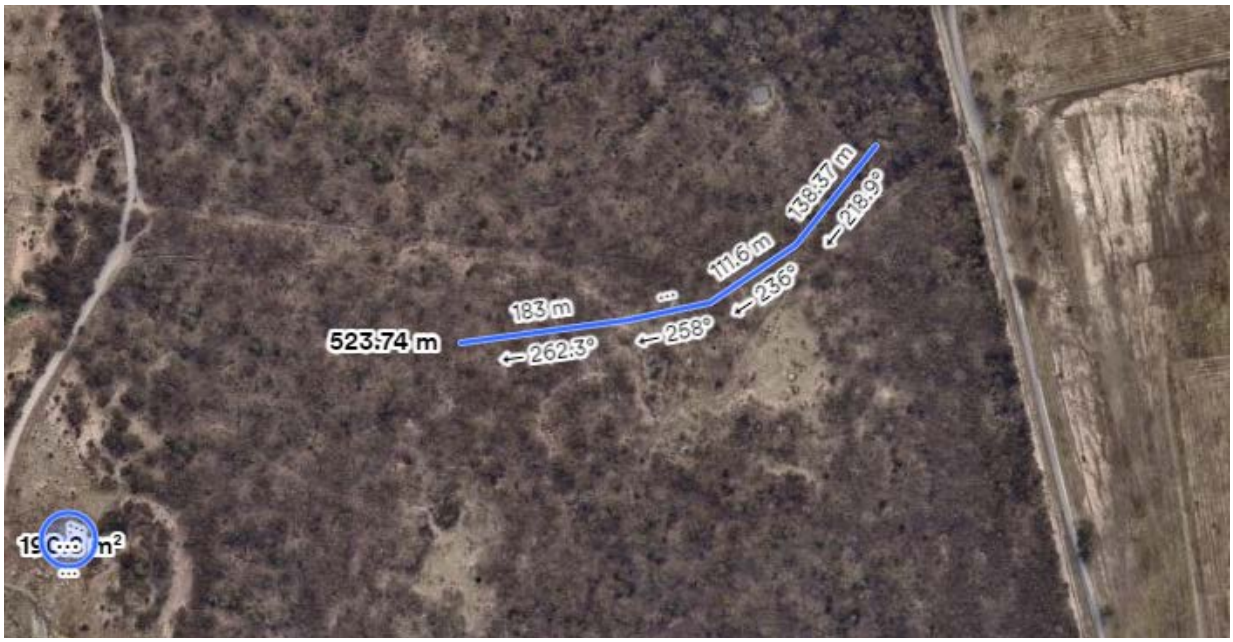

10.16 m
19.88 m
202.13 m²
10.13 m
8.1 m
8.19 m
66.19 m²
8.1 m
27.03 m²
10.97 m
10.4 m
109.55 m²
10.89 m
14.55 m²
6.97 m²
7.75 m²


20.15 m
15.7 m
316.04 m²
8 m²
15.7 m
20.15 m

Seafield Farm	15 metre radius mechanical
Victoria Bank	12 x 6 metre hand excavation (or two areas of 9 x 4 and 9 x 6) 20 metre radius mechanical
Radar Hill Track (if not avoided)	Monitoring area of track and five metres either side for about 500 metres Up to two 2 x 2 metre hand excavations if required


706.84 m²
r 15 m


8.74 m
43.73 m²
6.5 m
16.02 m²
r 20 m
8.62 m
52.32 m²
8.62 m
6.12 m


523.74 m
183 m
262.3°
258°
111.6 m
236°
138.37 m
218.9°

B7.6.1.2
Archival recording – mitigation measures

Measured drawings and archival photographic recording of the standing structures at Aucholzie will be undertaken prior to the salvage works and watching brief described in Table B7.28. Archival recording will be undertaken in accordance with the following guidelines: *Photographic Recording of Heritage Items Using Film or Digital Capture* (NSW Heritage Office 2006) and *Technical Note: Photographic Recording for Heritage Places and Objects* (Heritage Victoria 2006).

B7.6.1.3
Temporary fencing – avoidance measures

The majority of European heritage sites identified in the place inventory (Section B7.4.4) are proposed to be destroyed following completion of mitigation measures.

Four places are nearby but located outside the disturbance footprint. These are:

- Bellno
- Barbiston Farm Complex (which is considered already salvaged)
- Oaklands Junction
- Radar Hill Track

Prior to M3R works commencing, it is recommended that temporary protective fencing is established around the extent of these places to protect them from incidental harm.

It is also recommended that the extent of all historic heritage places within, and those located immediately near to the study area (as listed above), are displayed on site and with construction plans for the life of all ground disturbance activities.

Should further significant features be uncovered during the salvage excavations outlined above or during the proposed works, temporary fencing should be established around the feature until completion of the salvage works or until an initial assessment can be made of the significance of the material. The process for managing unexpected finds is further detailed in Section B7.6.1.5.

B7.6.1.4
No actions

No further actions are required for the Airport construction site (previously Glen Alice Homestead) and Glenara Sheep Dam as they are considered destroyed and have no heritage value. No further assessment at Barbiston homestead is required, as previous excavations have demonstrated only minor archaeological materials and this site can be considered already salvaged.

B7.6.1.5
Unexpected finds process

Significant historic archaeological artefacts more than 75 years old are nominally protected under the Victorian Heritage Act 2017. As noted throughout this chapter, HV does not have jurisdiction on Commonwealth land and therefore the provisions of the Heritage Act do not apply. The *Airports (Environmental Protection) Regulations 1997* outline the duty of care that must be taken in relation to environment and heritage site attributes.

In some instances, historic artefacts may be found in locations and at times when no archaeological supervision is present. In these cases, the following unexpected finds process will be followed to identify and assess unexpected finds.

Induction and information

In the first instance, the foreman of works on site or other responsible project manager will have taken part in an induction demonstrating the nature of the archaeological materials that could be found during works and the procedures to follow. A copy of the historical excavation report that has informed this chapter, and relevant supporting documentation that describes the heritage values of the heritage places and this protocol, will be kept on site and be made familiar to workers on site.

Procedure

If significant archaeological deposits, structures or other features are identified during the course of works (especially in areas not subject to the above mitigation actions or monitoring requirements) works in the area must stop immediately and the work area made safe. The following process can then be followed:

1. Discovery
    a. If suspected historic cultural heritage is identified, all activity must stop within the extent of the finds. The historic cultural heritage must be left in place, and protected from harm or damage.
2. Notification
    a. The person in charge of the activity must notify the relevant Melbourne Airport Program Manager and the Melbourne Airport Environment and Sustainability Team immediately.
    b. Melbourne Airport must notify the Archaeologist or Heritage Advisor of the identification of historic cultural heritage as soon as practical.
    c. Following consultation with the Archaeologist or Heritage Advisor, Melbourne Airport will advise the Commonwealth Airport Environment Officer and may also request the Archaeologist or Heritage Advisor notify Heritage Victoria following site assessment.

3. Assessment
    a. A site assessment will determine if the artefacts are:
        i. In-situ and part of a significant deposit based on determining their age, extent, formation and other factors as appropriate.
    b. The location, extent, depth and other site formation data will be recorded.
    c. If the artefacts or deposit constitute a new previously unrecorded historic archaeological place or feature:
        i. If works cannot proceed without harming the archaeological deposit and it is not considered to be covered by an existing place assessment, a new assessment of significance must be undertaken by the Archaeologist/Heritage Advisor.
4. Artefact management
    a. Artefacts or deposits determined to be significant will be managed in accordance with the artefact management and conservation procedure outlined in **Section B7.6.1.6**.
5. Impact mitigation or salvage
    a. An appropriate impact mitigation or salvage strategy will be determined by the Archaeologist or Heritage Advisor in consultation with Melbourne Airport.
6. Curation and further analysis
    a. The treatment of salvaged historic cultural heritage must be in accordance with the artefact management and conservation process developed in **Section B7.6.1.6.**

B7.6.1.6 Artefact management and conservation

Artefact management in the field

It is not anticipated that large quantities of significant archaeological artefacts will be recovered from the salvage and mitigation measures. This is partly due to the deteriorated/partly demolished nature of the historic heritage places investigated within the study area. Based on initial test excavations to date, the primary archaeological remains comprise robust, large structural building remains (walls, foundation, flooring, etc). A large quantity of animal bone has been recorded at Coghill's Boiling-Down Works, associated with this place's historic function. The test excavation results indicate more bone will likely be uncovered during salvage.

Artefacts found during the test excavations, salvage and/or monitoring will be processed and catalogued using the Heritage Victoria catalogue template; and cataloguing and artefact packaging will be carried out to meet the requirements specified in Heritage Victoria's *Guidelines for Investigating Historical Archaeological Artefacts and Sites 2015*.

Included below is an artefact collection and discard policy, developed to guide the collection, curation, conservation and retention or discarding of artefacts (Praetzellis & Costello, 2002).

Artefact retention in the field

If fragile artefact material is uncovered that cannot be safely excavated without specialist advice, the remains will be protected in-situ (as recommended by the conservator) until removal can be safely carried out.

If fragile artefacts are excavated that cannot be safely processed within the archaeology team's skill and experience, the nominated project conservator will be consulted to provide conservation advice (remotely, on-call or on-site as appropriate).

Field conservation carried out by Biosis will be limited to the artefact cleaning processes outlined below.

Artefact storage and transport

Initially, all artefacts will be bagged by provenance (context) and entered into an onsite catalogue. Following fieldwork/site investigation works, artefacts will be stored on site in a secure, enclosed and locked vehicle and/or site office. The artefacts will be packed and transported to the Biosis office (38 Bertie Street, Port Melbourne) at the completion of every field day.

Artefacts will be sorted into material type as soon as possible, and stored in class type.

Robust and stable artefacts will be cleaned at the Biosis office under the supervision and guidance of experienced personnel.

For fragile and at-risk artefacts, cleaning will not be undertaken before consulting the nominated project conservator. Artefacts will be stored as per conservator advice until cleaning can be carried out safely. Cleaning of these artefacts will be undertaken according to the methodology outlined by the conservator.

Significance assessment

A significance-based assessment of the artefact assemblage will be carried out. If the assemblage is deemed to be of high significance (assessed on a place-by-place basis) it will be recommended for lodgement with Heritage Victoria's Artefact Repository. If the assemblage is of low significance it will be offered to APAM for interpretative or display purposes, or otherwise discarded.

Sampling and discard policy

Based on the outcomes of the significance assessment, further sampling and discard may be appropriate. The disposal method for any discard will be supplied to Heritage Victoria for record keeping.

Artefact conservation

A professional conservator will be engaged to evaluate conservation requirements, advise on basic conservation actions and undertake specialist conservation works if required. The nominated conservator is:

Kristine Allinson
BA (Hons) Archaeology and Ancient History
MA Cultural Material Conservation (Objects)
Objects Conservator
International Conservation Services
4 Harper Street, Abbotsford, VIC 3067
+61 (3) 7013 2892
0415 738 216
k.allinson@icsconservation.com

Kristine is ICS' Melbourne-based Objects Conservator, specialising in the conservation of archaeological artefacts. She applies a practical approach to her understanding of a broad range of cultural materials and their deterioration processes, including ceramics, metals, glass, wood, leather and composite objects. She maintains up-to-date knowledge about the statutory requirements for archaeological conservation in Victoria. Kristine has a special interest in historical and ancient archaeology, and the conservation of archaeological materials. In her current role, she provides conservation advice and treatment, and assists with the onsite analysis of artefacts during archaeological excavations. Kristine is a current member of both the Australian Institute for the Conservation of Cultural Material (AICCM) and Australasian Society of Historical Archaeology (ASHA).

Conservation assessment

Based on the outcomes of the significance assessment, a conservation assessment of the assemblage will be undertaken by a professional conservator. In circumstances where the entire assemblage is deemed of low significance, a conservation assessment will not be carried out.

The conservation assessment will detail the condition and conservation needs of the assemblage based on the significance assessment.

Conservation

Conservation decisions will depend on both the condition of the object and its archaeological significance.

Conservation of artefacts will be undertaken with the objective of slowing deterioration, arresting organic decay and stabilising corrosion.

B7.7 CONCLUSIONS

B7.7.1 European heritage values

Within and immediately next to the M3R development footprint, the European heritage assessment identified 14 European heritage sites that possess values in alignment with Heritage Victoria and Commonwealth Heritage criteria. Of these, 10 are anticipated to be directly impacted by M3R. These sites consist predominately of homesteads and residential/farming amenities, with Coghill's Boiling-Down Works a unique site relating to early farming industry. Two additional sites were investigated (Glenara sheep dam and Glen Alice outbuildings) but no evidence for archaeological deposits or features were found.

The following 10 European heritage sites have been identified in the development footprint:

- Aucholzie Homestead
- Coghill's Sheepwash and Dam
- Coghill's Boiling-Down Works at Glencairne (previously Glencairne Homestead)
- Grants Road Bluestone Culvert
- Kennedy's Hut Site
- Oakbank Farm Homestead
- Seafield Farm
- Roseleigh Homestead
- Victoria Bank Homestead
- Fawkner Land Co Settlement

B7.7.2 Potential impacts

Within M3R, it is assumed that large portions of European heritage sites will be removed by construction of compounds, haul roads or proposed infrastructure. Potential impacts to European heritage within the development footprint may result from the removal and/or modification of topsoils and subsoils thereby impacting surface artefacts, features and archaeological deposits. A summary of the impact assessment is provided in Table B7.30.

The following is a brief discussion of the high and medium impacts, and their management or mitigation strategies. Archaeological salvage will occur at the following sites:

- Aucholzie Homestead
- Coghill's Sheepwash and Dam
- Coghill's Boiling-Down Works at Glencairne (previously Glencairne Homestead)
- Grants Road Bluestone Culvert
- Kennedy's Hut Site

- Oakbank Farm Homestead
- Seafield Farm
- Roseleigh Homestead
- Victoria Bank Homestead
- Fawkner Land Co Settlement

Archaeological salvage and watching briefs will occur at each site listed in Table B7.28 prior to works proceeding. This is designed to best manage the existing heritage values already identified and to record and recover select artefacts and features before they are permanently destroyed. This method will provide further data relating to each site and add to the knowledge about European settlement in the Tullamarine area. This strategy will assist in reducing the original impacts from 'High' or 'Medium' to 'Low' for a number of these sites.

Coghill's Boiling-Down Works at Glencairne is considered of high state significance. The cumulative impact for the complete removal of this unique and early site of colonial industry in Victoria is considered within the residual impact assessment rating.

B7.7.2.1
Avoid, minimise and offset potential impacts

Works within M3R will impact 10 European heritage sites that cannot be avoided by the proposed works. Prior to M3R works commencing, mitigation measures in the form of archaeological salvage of these 10 sites will be undertaken in compliance with the best practice methods for archaeological salvage in Victoria (in accordance with Heritage Victoria standards). It is noted that the Barbiston Farm Complex has already been assessed and it was determined no further salvage was required for the site. The works will avoid four places and provision has been made for specific mitigation actions due to their proximity to the development footprint.

A summary of the potential impact assessment is provided in Table B7.30.

Table B7.30
Impact assessment summary

Environment aspect & baseline condition	Assessment of original impact					
	Original Impact	Mitigation inherent in design/practice	Significance			
			Duration	Severity	Likelihood	Impact
Construction (and Operation)						
Aucholzie Homestead Low local significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Medium
Barbiston Farm Complex Low local significance	Design avoids impact	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Medium
Bellno Farmstead and Quarry Moderate regional significance	Design avoids impact	Minimal options to reduce impacts due to topographic locations	Permanent	Moderate	Almost Certain	High
Kennedy's Hut Site Moderate regional significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Moderate	Almost Certain	High
Coghill's Boiling-Down Works High state significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	High	Almost Certain	Extreme
Coghill's Sheepwash and Dam Low local significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Medium
Fawkner Land Co Settlement Unknown (potential moderate significance depending on monitoring results)	Direct impacts to part of place from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Unknown	Almost Certain	Unknown

Mitigation and/or management measures	Assessment of residual impact				
	Residual Impact	Significance			
		Duration	Severity	Likelihood	Impact
Construction (and Operation) (cont.)					
Archival recording and archaeological salvage	None	Permanent	Negligible	Almost Certain	Low
None required. Salvage completed.	None	Permanent	Negligible	Almost Certain	Low
Provision for archaeological salvage if harm cannot be avoided.	None	Short-Term	Negligible	Almost Certain	Low
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.	None	Permanent	Moderate	Almost Certain	High
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low

Environment aspect & baseline condition	Assessment of original impact					
	Original Impact	Mitigation inherent in design/practice	Significance			
			Duration	Severity	Likelihood	Impact
Construction (and Operation)						
Grants Road Bluestone Culvert Low local significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Low
Oakbank Farm Homestead Moderate regional significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Moderate	Almost Certain	Medium
Oaklands Junction Low local significance	Design avoids impact	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Low
Radar Hill Track Low local significance	Design avoids impact	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Low
Roseleigh Homestead Low local significance	Direct impacts from construction	Minimal options to reduce impacts due to existing infrastructure	Permanent	Minor	Almost Certain	Medium
Seafield Farm Low local significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Minor	Almost Certain	Medium
Victoria Bank Homestead Moderate regional significance	Direct impacts from construction	Minimal options to reduce impacts due to topographic locations	Permanent	Moderate	Almost Certain	High

Mitigation and/or management measures	Assessment of residual impact					
	Residual Impact	Significance				
		Duration	Severity	Likelihood	Impact
Construction (and Operation) (cont.)					
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.	None	Short Term	Negligible	Almost Certain	Low
Provision for archaeological salvage if harm cannot be avoided	None	Permanent	Negligible	Almost Certain	Low
Provision for archaeological salvage if harm cannot be avoided.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.	None	Permanent	Negligible	Almost Certain	Low
Archaeological salvage.		Permanent	Negligible	Almost Certain	Low

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Chapter B8
Surface Transport

Summary of key findings:

- An assessment has been completed to understand the impact that increased transport activity will have on the performance of the internal and external road networks that serve Melbourne Airport. This assessment considers both the construction and operational phases of Melbourne Airport's Third Runway (M3R).
- The assessment found that the overall difference between the Build and No Build scenarios is generally moderate (i.e. reduced road network performance of between 5 per cent and 20 per cent), with conditions becoming increasingly congested as years progress – although this varies depending on location and mode. Without mitigation, the impact of the Build scenario on some elements of the transport network may be greater, with demands exceeding capacities more regularly than under the No Build scenario.
- A range of mitigation measures were identified and assessed, including a need to support further development of the proposed Melbourne Airport Rail link (to be undertaken independently of this Major Development Plan) and its potential to alleviate operational challenges.


B1

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B8.1
INTRODUCTION

This chapter describes the baseline surface-transport conditions of the study area; applicable legislation and policy requirements; potential impacts of Melbourne Airport's Third Runway (M3R) on future transport-network conditions under both Build (i.e. with a new runway in a north-south alignment) and No Build (i.e. no new runway) scenarios; and specific measures to avoid, manage, mitigate and/or monitor these impacts. Strategic modelling and associated analysis were undertaken for Melbourne Airport by technical professional-services consulting firm Jacobs.

For the purpose of this chapter, the study area refers to the airport and surrounding transport infrastructure within approximately five kilometres of the terminals.

B8.2
METHODOLOGY AND ASSUMPTIONS

B8.2.1
Purpose

The objectives of the surface-transport impact assessment are to:

- Determine the local and regional transport network impacts associated with the implementation of M3R, based on comparison of Build versus No Build scenarios
- Determine the transport network requirements to accommodate future surface transport demands associated with M3R
- Identify mitigation measures to address adverse impacts on surface transport
- Provide surface transport demand data from the transport models to inform other runway environmental impact assessment studies.

B8.2.2
Methodology

The surface transport impact assessment was split into three phases: baseline assessment, construction impact assessment and operational impact assessment.

The baseline assessment reviewed the existing transport network conditions (see **Chapter A2: Need for the Project**).

The construction impact assessment considered the temporary demands on the external transport network generated by traffic associated with construction of the new north-south runway (16R/34L). Mitigation measures were identified to manage these impacts.

The operational impact assessment considered the future operating conditions incorporating M3R (Build scenario) in comparison to the No Build scenario (i.e. no third runway) on external and internal road networks. Mitigation measures were identified to manage these impacts.

This assessment used strategic modelling as the foundation for its methodology, using the Victorian Integrated Transport Model (VITM). VITM is a traditional four-stage strategic transport model used extensively by the Victorian Government's Department of Transport and Planning (DTP). It is a comprehensive multi-modal analytical tool which forecasts Average Annual Weekday

Travel (AAWT) for metropolitan Melbourne and its surrounding areas and can be used to estimate future-year private vehicle, public transport and freight travel demand in response to various transport infrastructure and land use planning scenarios. VITM includes a dedicated sub-model for Melbourne Airport, which separately models trip generation, distribution and mode choice for airport-related travel.

Detailed modelling using VITM (including full four-step model runs) was previously undertaken as part of the east-west aligned Runway Development Plan (RDP) proposal. This work was carried out in 2017–18 and included assessment of the above scenarios (albeit for different years).

As part of the planning assessment for the new north-south runway, the same detailed modelling using VITM was unable to be undertaken by APAM (as directed by DTP). Instead of using VITM directly to undertake full model runs (as was undertaken for the RDP assessment), the project team adopted a different methodology to complete the surface transport assessment requirements promulgated in the *Airports Act 1996* (Cth).

The methodology for this assessment used the same VITM outputs as in the RDP assessment, specifically the trip volume matrices. These outputs were used to inform an assessment of the future operating conditions for M3R. The previous modelling outputs were factored-up to account for the change in assessment years and revised passenger/employee numbers (i.e. comparing differences between M3R instead of RDP). Overall, this methodology enables a good understanding of changes in traffic flows between the Build and No Build scenarios.

Where this chapter discusses any comparison in assumptions/inputs etc. between the previous modelling (for RDP) and the current analysis for M3R, the details from the former are hereafter referred to as the 'reference assessment'. It is noted that the assumptions applied for the previous modelling may not all still apply, and as such a review of these assumptions has been undertaken and is discussed in **Section B8.2.4**.

For this assessment, the key M3R planning assessment years apply: 2026 (opening year), 2031 (opening plus five years) and 2046 (opening plus 20 years). Traffic conditions for each of these years were determined by interpolating the VITM future-year forecasts (2021, 2031 and 2046) and reference assessment results, while also taking into account step-changes in traffic demand that are predicted to occur with changes to the transport network (described in more detail in **Section B8.2.4.3**).

Due to no VITM models being re-run for this assessment, the implications have been considered and potential impacts on key findings are discussed in **Section B8.2.5**.

The assessment of the internal road network performance was undertaken using microsimulation modelling. A microsimulation model of the airport's landside road network has been developed, used for internal planning and to inform design on a range of projects. The microsimulation modelling used for this assessment was based on 2018 traffic conditions, and was calibrated and validated to DTP standards and a calibration report was approved by DTP. The model area includes the Tullamarine Freeway, to the Mickleham Road north-facing ramps; it does not include the Business Park road network. This microsimulation model (for M3R assessment) was not reviewed and agreed to by the Victorian Government.

B8.2.3 Consultation

Prior to undertaking the technical work for this assessment, the project team consulted with DTP on the project's evaluation requirements and obtained broad agreement on the approach, in terms of a strategic modelling foundation based on VITM. The importance of this was noted, as having the assessment underpinned by VITM ensures that the assumptions adopted were consistent with the Victorian Government's long-term plans.

As noted above, the microsimulation model (for M3R assessment) was not reviewed and agreed to by the Victorian Government; and that some of the assumptions applied for the previous modelling may no longer be current, as such a review of these assumptions has been undertaken and is discussed in **Section B8.2.4**.

B8.2.4 Assumptions

Assumptions used to inform the modelling analysis include:

- Future year airport passenger data
- Future year airport employment data
- Future year transport networks.

Other demographic forecasts (e.g. population, non-airport employment) were unchanged.

B8.2.4.1 Future year airport passenger data

Passenger forecasts were based on the detailed hourly airline movement forecasts (outlined in **Chapter A2: Need for the Project**). For the purposes of this assessment, the number of passengers on a 'representative busy day' in each forecast year has been adopted as the 'design day' for the transport assessment. The selected representative busy day is Thursday's flight schedule from the 'design week' developed by APAM (2019) for each forecast year.

The forecast design-day passenger demands for AM peak, PM peak and daily, for the Build and No Build scenarios, are shown in **Table B8.1** and **Table B8.2** respectively. (Note that interpolation calculations between the reference and current passenger forecasts were done for this assessment.)

Several assumptions were made in determining how passenger forecasts were input into the AM peak (7am–9am) and PM peak (3pm–6pm) periods which are analysed in the transport assessment:

Table B8.1
Design day passenger forecasts (Build scenario)

Year	AM peak				PM peak				Daily				Total
	Domestic		International		Domestic		International		Domestic		International		
	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	
2019	3,092	6,705	2,875	3,055	8,550	9,444	1,851	2,535	41,116	40,969	16,550	16,960	**115,595**
2026	4,131	8,427	4,413	4,596	10,140	11,424	2,718	3,676	49,435	49,488	24,398	24,769	**148,090**
2031	4,885	10,038	5,378	5,432	12,042	12,811	3,448	4,267	58,305	58,351	29,923	30,275	**176,854**
2046	7,534	13,636	9,579	8,973	16,989	17,395	5,811	6,987	81,392	81,423	47,722	48,130	**258,667**

Table B8.2
Design day passenger forecasts (No Build scenario)

Year	AM peak				PM peak				Daily				Total
	Domestic		International		Domestic		International		Domestic		International		
	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	
2019	3,092	6,705	2,875	3,055	8,550	9,444	1,851	2,535	41,116	40,969	16,550	16,960	**115,595**
2026	4,131	8,427	4,413	4,596	10,140	11,424	2,718	3,676	49,435	49,488	24,398	24,769	**148,090**
2031	3,849	8,085	5,618	5,005	11,553	12,073	3,074	3,981	54,171	53,990	29,951	30,339	**168,451**
2046	4,150	8,743	5,840	5,203	12,328	12,878	3,267	4,199	57,953	57,737	31,404	31,807	**178,901**

- AM peak passenger forecasts include the total number of passengers with:
  - Domestic flight departures 8am–10am
  - Domestic flight arrivals 6:30am–8:30am
  - International flight departures 9am–11am
  - International flight arrivals 6am–8am
- PM peak passenger forecasts include the total number of passengers with:
  - Domestic flight departures 4pm–7 pm
  - Domestic flight arrivals 2:30pm–5:30pm
  - International flight departures 5pm–8pm
  - International flight arrivals 2pm–5pm

The above AM and PM peak flight departure and arrival time periods were chosen in order to account for typical lag times in arrivals/departures before and after flights.

B8.2.4.2
Future year airport employment data

Employment forecasts for Melbourne Airport (comprising full-time and part-time combined jobs) are for the SA2 zone ('Statistical Area Level 2', which refers to a medium-sized geographical area representing a community) representing Melbourne Airport, shown in Table B8.3.

Table B8.3
Employment forecasts

Year	No Build Scenario	Build Scenario
2019	18,567	18,567
2026	22,164	22,161
2031	23,674	24,145
2046	27,616	30,837

B8.2.4.3
Future year transport network

A review of key changes to the transport network in future years was undertaken on a project-by-project basis, given the absence of a publicly accessible Victorian Transport Plan. For this assessment, expected changes to the transport network were sourced from the *2018 Melbourne Airport Master Plan* (for changes to the transport network within the airport estate), and VITM and Victorian Government announcements (for changes to the external network).

VITM reference-case models include a comprehensive listing of all future transport projects and their timing in relation to the standard VITM forecast years of 2021, 2031 and 2046. Some of these projects are expected to influence the distribution of traffic travelling to

and from Melbourne Airport. Where required, assumptions were made on the timing of these projects (including comparison to the timing adopted in the reference assessment).

These projects, and the assumptions made to inform the analysis, are described in more detail below.

Internal Airport Road Network

As detailed in the *2022 Melbourne Airport Master Plan* (MP22), a number of enhancements to the airport's internal road network are proposed in order to increase capacity and improve performance.

The highest priority is the Elevated Roads Project, which is the subject of two separate MDPs (Stages 1 and 2). It includes a new airport exit from the Tullamarine Freeway and a continuous grade-separated road link into the Terminal 4 and Terminal 1/2/3 multi-storey car parks (i.e. it will be elevated above the surface roads). It also includes expanded drop-off and pick-up facilities for Terminals 1/2/3 (and several other features not particularly relevant to this assessment). It is scheduled for construction in the short-term (i.e. it has a less than five-year timeframe).

Further road enhancements include two new north-facing ramp connections with the Tullamarine Freeway (i.e. a northbound on-ramp and an off-ramp for southbound freeway traffic). These connections are longer term (with a five to 15 year timeframe) and scheduled to coincide with major changes to the external road network (notably Bulla Bypass, outlined below).

In addition, Airport Drive is proposed to be widened to six lanes between Sharps Road and Mercer Drive (i.e. from two lanes in each direction to three lanes each direction). This is proposed to be implemented in the 2030s.

The airport road network plan is further outlined in Section B8.3.4.1.

For this assessment, the Elevated Roads Project was assumed to be operational in 2026 and the other road enhancements in 2031. It is noted that the airport road projects included in the VITM reference model are based on an older road network plan and differ slightly from the current plan described above. However, this is not expected to have a significant impact on the results, given the core connections are still provided and the directional distributions are based more on the wider network than on the airport roads.

Bulla Bypass and Melbourne Airport Link

Bulla Bypass is a proposed four-kilometre road corridor connecting Sunbury Road to Somerton Road (including a 1.5 kilometre duplication of Somerton Road's western end). It would provide an alternate crossing of Deep Creek and bypass of the Bulla township, which are bottlenecks to the Sunbury Road corridor's operational capacity. Its efficacy is largely dependent on the parallel opening of Melbourne Airport Link (MAL).

MAL is a proposed five-kilometre road corridor to connect the southern segment of Sunbury Road to Bulla Bypass/Somerton Road, and with the future Outer Metropolitan Ring (OMR, outlined below). It is further understood that construction of MAL would also involve a 2.5 kilometre duplication of the southernmost segment of Sunbury Road, essentially integrating with the Tullamarine Freeway. Combined with Bulla Bypass, MAL would provide a significant improvement to the capacity of the main connecting road corridor north of Melbourne Airport, which is currently a two-lane road (one-lane each direction) with several bottlenecks. While some airport-generated traffic would benefit, the main beneficiaries of these road projects would be residents of Sunbury and the Sunbury/Northern growth corridors.

For this assessment, Bulla Bypass and MAL were assumed to be operational in 2031 as four-lane roads (based on the VITM reference model), with MAL widened to six lanes in 2046. However, guidance from DTP indicates it is likely that this entire infrastructure package will open at the same time in 2046, rather than be staged. This would have relatively minor impacts on traffic volumes in the Melbourne Airport locality due to the Bulla Bypass and the four-lane MAL serving only the Sunbury area and some of the northern growth area.

Outer Metropolitan Ring

The Outer Metropolitan Ring (the OMR) is a proposed 100-kilometre high-speed orbital transport corridor aligned through Melbourne's outer north and outer west. Planning for OMR includes options for an ultimate freeway-standard road with four to six lanes in each direction. The OMR (combined with MAL) is expected to have a significant impact on the distribution of airport-generated traffic to and from the northern and western suburbs. A significant amount of traffic from the M80 Western Ring Road will be redistributed to the OMR, resulting in more traffic approaching the airport from the north rather than the Tullamarine Freeway. The timing of the OMR will be subject to future planning and funding although, in line with the VITM reference model, it was assumed to be operational in 2046 for this assessment.

Melbourne Airport Rail

The Melbourne Airport Rail (MAR) link is a proposed new rail connection between the terminals and Melbourne CBD. MAR is a project jointly funded by the Commonwealth Government and Victorian Government and Rail Projects Victoria is responsible for its delivery. MAR is a major infrastructure project with a target opening date of 2029, subject to relevant Victorian and Commonwealth planning, environment and other approvals. As outlined in MP22, land has been reserved for a rail alignment and station within the airport, consistent with the Victorian Government's preferred 'Sunshine Route' announced in 2018.

However, at the time this assessment was undertaken, there was some uncertainty about the timing of MAR and as such the project team adopted a conservative approach of undertaking the traffic analysis assuming that MAR is not operational. For clarity, this is hereafter referred to as 'without MAR' assumptions. This was applied to both the Build and No Build scenarios, in 2031 and 2046.

Note that the proposed Suburban Rail Loop (SRL) project was not incorporated in the analysis (consistent with current VITM reference models that do not include SRL). This is not expected to impact the findings of the 2026 or 2031 analysis and, given the uncertainty around SRL, it's unclear if it would have any impact on the findings of the 2046 analysis.

All other future year public transport enhancements detailed in the VITM reference models were left unchanged.

Other transport projects

In addition to the projects listed above, two other major transport projects are worth noting. The first is the West Gate Tunnel, included in all future-year models; the second is North East Link, included only in the 2046 VITM model. This has become a limitation given that North East Link is now anticipated to open in 2028. Notwithstanding, this is anticipated to have limited impacts on the overall traffic volume forecasts between 2027 and 2046 due to its distance from the airport. The West Gate Tunnel Project will provide access to Melbourne Airport for people living in the city's west, whereas the North East Link will improve access for people living in the city's north. (Although North East Link will potentially change travel routings to the airport, its impact upon the local network will be limited as vehicles will continue to use the same principal airport-access points.)

Finally, it is noted that all other future year transport network assumptions employed for the reference assessment (not discussed above) also apply to the current assessment. The works completed recently as part of the CityLink Tulla Widening (CTW) project were modelled as being operational in all assessment years.

No additional future year transport network projects were assumed.

Summary

Maps of the major external (i.e. non-airport) transport projects described above are shown in **Figure B8.1** (for the broader metropolitan area) and **Figure B8.2** (for the vicinity of Melbourne Airport). A summary of the major transport-project assumptions used in this assessment is shown in **Table B8.4**.

B8.2.5 Limitations

The analysis undertaken for this MDP has accepted the modelling structure and process inherent within the VITM modelling suite used for the reference assessment. The base year for the VITM model, for which the model was calibrated and validated against observed data, is 2011. No further work was undertaken, as part of this project, in updating, rerunning, validating or calibrating the model.

While the base year is not particularly recent, and no further model work was undertaken, the analysis still incorporates the fundamental network details that influence regional travel patterns, such as MAR and OMR. As such, this limitation, while acknowledged, is not expected to have any significant implications on the analysis outcomes.

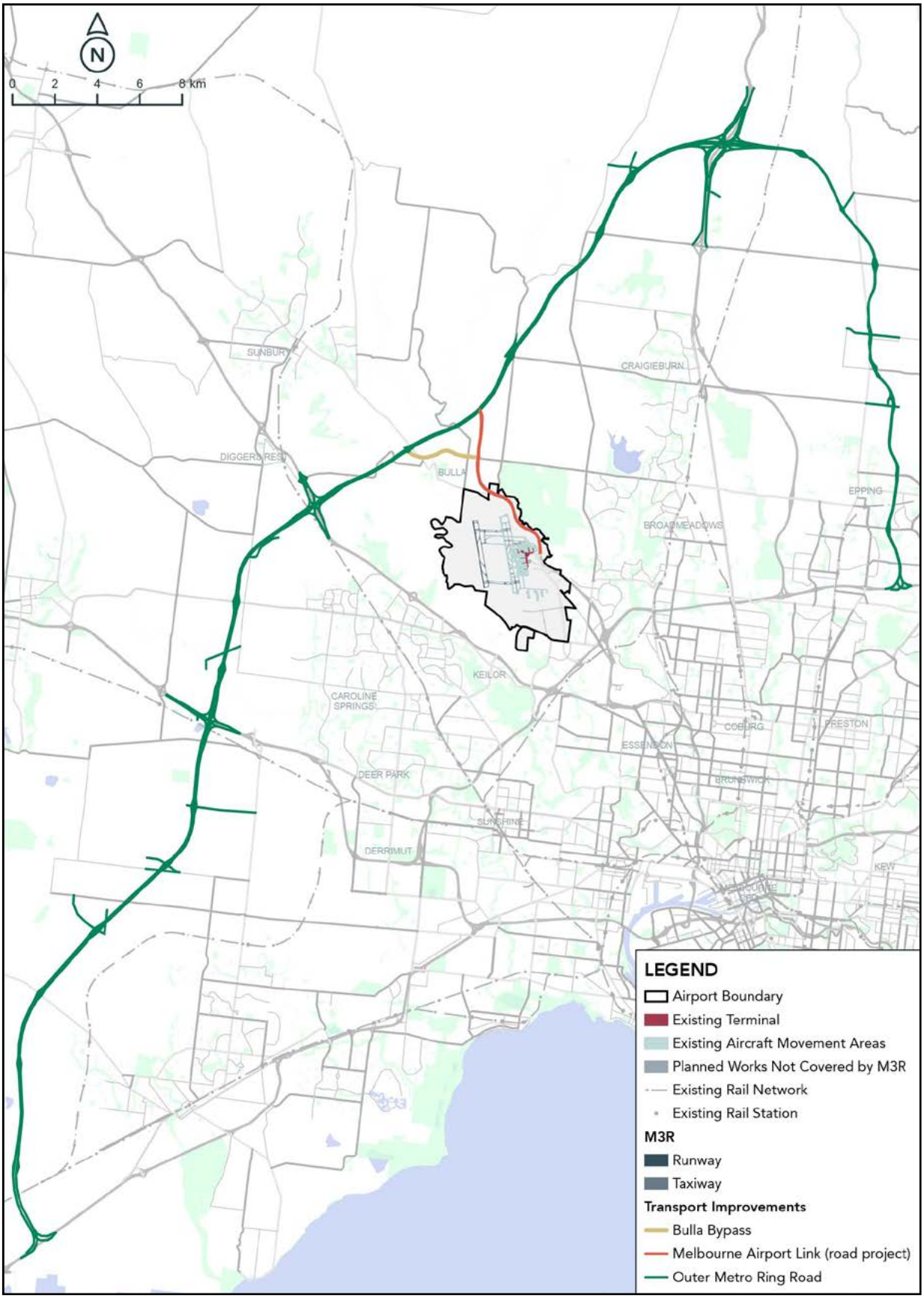
As mentioned in **Section B8.2.4.1**, this assessment adopted a 'representative busy day' as the basis for the transport modelling. As the representative busy day corresponds to a greater number of passenger movements than an average weekday, the number of forecast car trips on the road network in the vicinity of the airport was typically higher than would be generated from the VITM reference-case models. This should be taken into account when interpreting the modelling outputs reported in **Section B8.6.2**.

Table B8.4
Summary of major transport project assumptions

Year	Runway scenario	Internal projects		External projects			
		Elevated Roads Stages 1 & 2	North-facing ramps connecting to the freeway	CTW	OMR	MAL / Bulla Bypass	MAR
2026	Build	✓	×	✓	×	×	×
	No Build	✓	×	✓	×	×	×
2031	Build	✓	✓	✓	×	✓	×
	No Build	✓	✓	✓	×	✓	×
2046	Build	✓	✓	✓	✓	✓	×
	No Build	✓	✓	✓	✓	✓	×

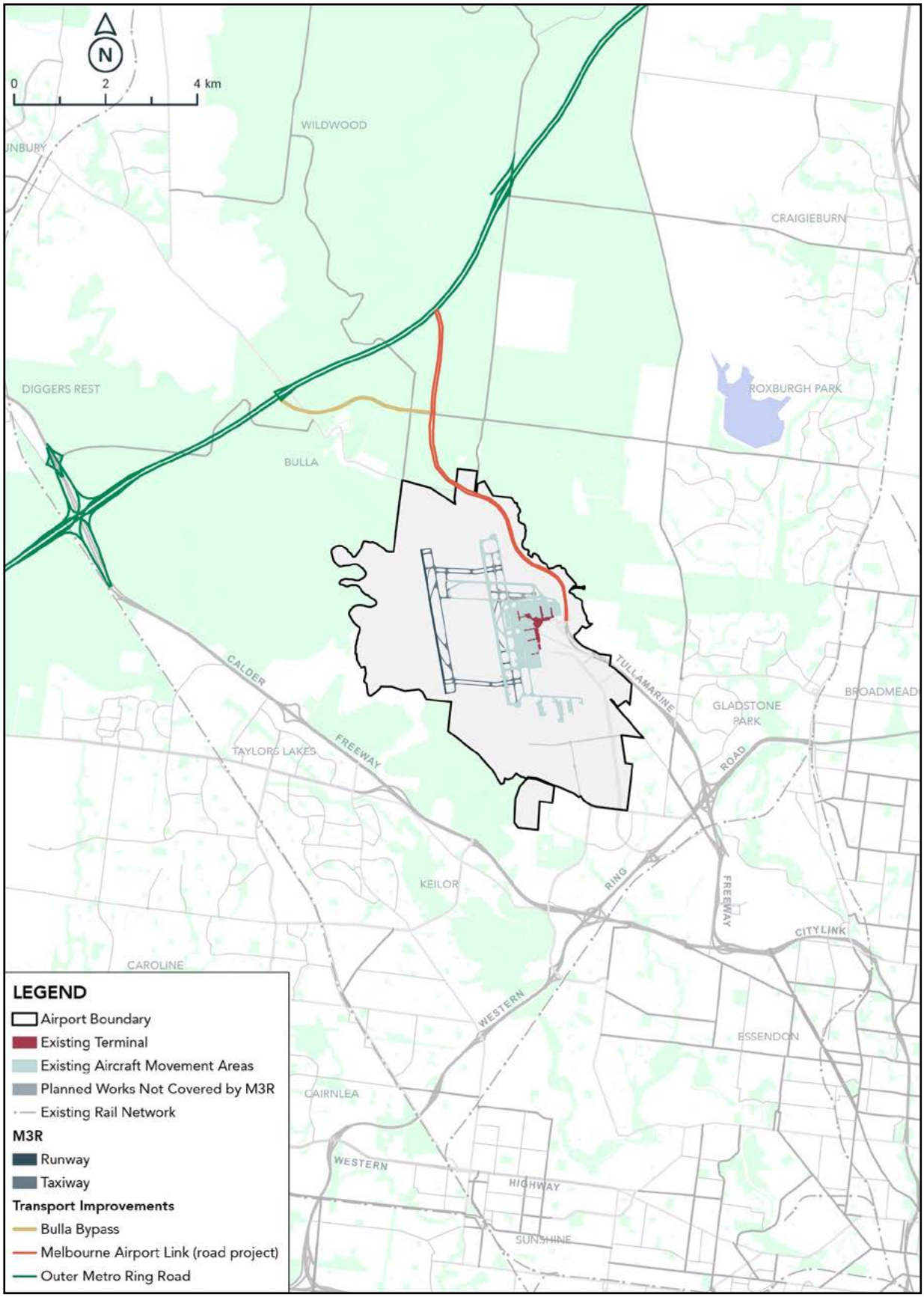
✓ *Project included in this assessment*
× *Project excluded from this assessment*

Figure B8.1
Major transport network improvement projects relevant to M3R (broader metropolitan area)



Note: Based on 'without MAR' assumptions

Figure B8.2
Major transport network improvement projects relevant to M3R (in vicinity of airport)



Note: Based on 'without MAR' assumptions

B8.3
STATUTORY AND POLICY REQUIREMENTS

B8.3.1
Commonwealth Government

B8.3.1.1
Airports Act 1996

Sub-section (1) of Section 91 states that an MDP, or a draft of such a plan, must set out:

(ga) the likely effect of the proposed developments that is set out in the major development plan, or the draft of the major development plan, on:

(i) traffic flows at the airport and surrounding the airport;

B8.3.1.2
Infrastructure Priority List

Infrastructure Australia (IA) is an independent statutory body providing advice to government and industry regarding Australia's infrastructure needs. IA prepares the *Infrastructure Priority List* of nationally-significant infrastructure projects and initiatives. Projects included in this document of relevance to this assessment, in addition to M3R, are the MAR and OMR projects outlined in Section B8.2.4.3.

B8.3.2
Victorian Government

B8.3.2.1
Transport Integration Act 2010

The *Transport Integration Act 2010* enables transport decisions to be made, powers exercised, or functions performed in line with broadly-stated principles. The Act:

- Aims to ensure that transport agencies work together towards the common goal of an integrated and sustainable transport system
- Makes it clear that the transport system needs to be sustainable on a triple-bottom-line basis (in terms of economic, environmental social analysis)
- Provides a framework – vision, objectives and principles; along with coordinated institutional arrangements for integrated transport policy and operations
- Recognises that the transport system should be conceived and planned as a single system performing multiple tasks
- Integrates land use and transport planning and decision making by extending the policy framework to agencies that significantly impact on the transport system
- Establishes transport bodies with consistent charters to deliver outcomes aligned to the overall vision and objectives.

This means that external network transport projects can be implemented, providing they can be supported through a triple-bottom-line assessment.

B8.3.2.2
Plan Melbourne 2017–2050

Plan Melbourne 2017–2050, released in 2017 by Department of Transport and Planning (DTP), previously known as the Department of Environment, Land, Water and Planning (DELWP) is the Victorian Government's metropolitan planning strategy. It provides a guide on how growth in the city and suburbs will be managed through to 2050. The strategy seeks to integrate long-term land use, infrastructure and transport planning in order to meet the city's future environmental, population, housing and employment needs.

Plan Melbourne 2017–2050 specifies Melbourne Airport as a designated Transport Gateway and Place of State Significance.

Plan Melbourne 2017–2050 identifies a suite of proposed transport initiatives. Those of relevance to M3R over the assessment period include the OMR and the proposed MAR (noting that the CTW project identified in the document has already been delivered).

B8.3.2.3
Victoria's 30-year infrastructure strategy

Infrastructure Victoria (IV) is an independent statutory authority which provides expert advice and guides decision-making on Victoria's infrastructure needs and priorities. IV released its 30-year infrastructure strategy for Victoria in 2016. The strategy presents a summary of IV's analysis of Victoria's infrastructure needs and priorities over the next 30 years and covers all forms of infrastructure including transport.

The strategy includes a recommendation to 'upgrade and, over time, construct high-capacity public transport links between Melbourne Airport and the CBD to create strong interstate and global links with the central city' (Recommendation 10.9). In particular, IV recommends the delivery of on-road priority to bus services linking Melbourne Airport to central Melbourne within 10 years (Recommendation 10.9.1); with delivery of a rail line to Melbourne Airport within 15–30 years once the additional capacity of the airport bus is close to being exceeded (Recommendation 10.9.1).

B8.3.3
Local Government

B8.3.3.1
Hume Integrated Land Use and Transport Strategy (HILATS)

The *Hume Integrated Land Use and Transport Strategy* (HILATS) (Hume City Council, 2011) outlines land use and transport initiatives aimed at improving transport options for Hume residents, workers and visitors. HILATS aims to create more accessible, liveable and sustainable communities within the Hume municipality, giving residents improved access to jobs, education, shopping and community facilities by expanding the range of transport choices and modes.

Although major transport projects are the responsibility of the Victorian and Commonwealth Governments, the Hume City Council supports a number of key road and freight projects relevant to this MDP including:

- Bulla Bypass
- Upgrades to Sunbury Road, Somerton Road and Mickleham Road
- Support for improved public transport services to the airport, including the MAR.

B8.3.4
Melbourne Airport

B8.3.4.1
2022 Melbourne Airport Master Plan: Ground Transport Plan

The *2022 Melbourne Airport Master Plan* includes a Ground Transport Plan that outlines how Melbourne Airport's vision for an interconnected ground transport system will be achieved. The five strategic objectives of the 2022 Ground Transport Plan are:

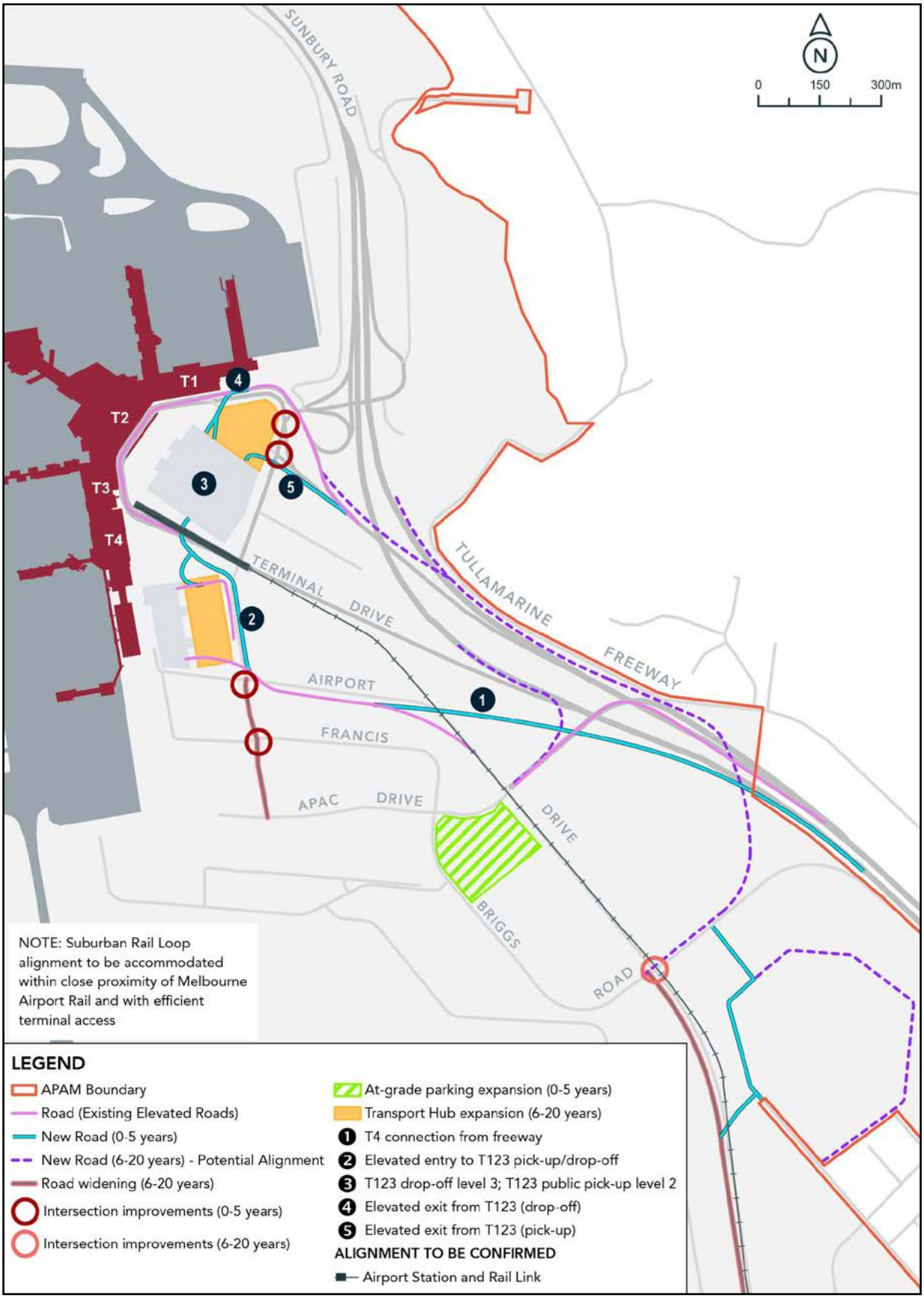
- Increase road capacity to address existing congestion issues, accommodate future growth, and ensure network resilience
- Reconfigure ground transport facilities serving Terminal 1,2,3 to increase drop-off/pick-up capacity and enable more space for people at the building frontages
- Facilitate expansions to bus service levels and network coverage in order to encourage public transport use
- Guide the development of a passenger rail service to the airport
- Enable safe bicycle riding access to the airport.

The key elements of the Ground Transport Plan are described in Section 12 of the *2022 Melbourne Airport Master Plan* and shown in **Figure B8.3**. The Elevated Roads Project directly responds to the first three objectives noted above, and is of most relevance to this transport assessment (as summarised earlier in **Section B8.2.4.3**).

Table B8.5
Severity criteria – surface transport assessment

Severity	Description
Major	• Major adverse impact on flow of external roads and key intersections during peak periods • Reduced performance by >50 per cent when compared to the No Build scenario • Transport users experience highly significant disruptions to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)
High	• High adverse impact on flow of external roads and key intersections during peak periods • Reduced performance of 20-50 per cent when compared to the No Build scenario • Transport users experience reasonably significant disruptions to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)
Moderate	• Moderate adverse impact on flow of external roads and key intersections during peak periods • Reduced performance of 5-20 per cent when compared to the No Build scenario • Transport users would experience some disruptions to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)
Minor	• Minor adverse impact on flow of external roads and key intersections during peak periods • Reduced performance of 1-5 per cent when compared to the No Build scenario • Transport users may perceive some minor disruptions to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)
Negligible	• Negligible impact on flow of external roads and key intersections during peak periods • Reduced performance of less than one per cent when compared to the No Build scenario • Transport users are unlikely to perceive any impact to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)
Beneficial	• Reduced traffic flows on external roads and key intersections during peak periods • Improved performance when compared to the No Build scenario • Transport users would experience improvements to the accessibility and amenity of transport infrastructure as a result of the Build scenario (or construction phase works)

Figure B8.3
Melbourne Airport ground transport plan 2022



B8.4
DESCRIPTION OF SIGNIFICANCE CRITERIA

The assessment of significance has applied the framework described in **Chapter A8: Assessment and Approvals Process**.

Project-specific criteria for severity have been developed for the surface transport assessment. These are described in **Table B8.5**.

The significance assessment framework has been developed to apply to both the construction and operational phases, and assess the level of impact in relation to each of these criteria. It is consistent with assessments undertaken on other major transport infrastructure projects. Where quantitative data is not available for the assessment, qualitative assessments are necessary.

The key areas identified that need to be considered include differences in:

- Traffic volumes on external roads and key intersections during peak periods (or changes in public transport demands for the public transport assessment)
- Performance of the network compared to the scenario without the scheme using the Volume to Capacity Ratio (VCR) as the main measure
- The accessibility and/or amenity of transport infrastructure (qualitative assessment).

B8.5
EXISTING CONDITIONS

B8.5.1
Road network

B8.5.1.1
External road network

The road network in the area is strongly influenced by the convergence of three motorway corridors (Tullamarine Freeway, M80 Ring Road and Calder Freeway) that intersect south of the airport. The arterial road network in the area largely functions to feed to and from these motorway corridors. The airport itself is also a strong influence on the network, with several road corridors aligned directly to the terminals.

The external road network in the vicinity of Melbourne Airport is shown in **Figure B8.4**.

For this assessment, in order to understand the traffic changes that could be expected as a result of M3R, the analysis examines 10 road corridors in the area. They include the three motorway corridors (at multiple points) and selected points in the arterial network. Combined, these points form a cordon around the airport; understanding the traffic changes at these points will provide a strategic understanding of the key changes to the surrounding road network as a result of M3R.

Table B8.6 lists the 10 road corridors reported on throughout this chapter. Existing traffic volumes on these roads, as determined from 2019 traffic count surveys, are shown in **Table B8.7**, which correspond with the locations shown in **Figure B8.4**.

For this assessment, the Airport Drive corridor south of Mercer Drive has been included in the external road network, not the internal road network; only the corridor's segments north of Mercer Drive are included in the assessment of the internal road network, where traffic activity is heavily influenced by the terminal precincts (i.e. Airport Drive south of Mercer Drive is not as heavily influenced by the terminal precincts).

Table B8.6
Roads assessed in study area

Road	Function	Number of lanes	Speed limit
Calder Freeway	Freeway	2–4 lanes each direction (varies)	80–100 km/h (varies)
Western Ring Road	Freeway	4 lanes each direction	100 km/h
Tullamarine Freeway	Freeway	3–4 lanes each direction (varies)	100 km/h
Keilor Park Drive	Arterial Road	2 lanes each direction	80 km/h
Sharps Road	Arterial Road	2 lanes each direction	70 km/h
Mickleham Road	Arterial Road	2–3 lanes each direction (varies)	70 km/h
Broadmeadows Road / Johnstone Street	Arterial Road	1–2 lanes each direction (varies)	70 km/h
Melrose Drive	Arterial Road / Collector Road	1–2 lanes each direction (varies)	60 km/h
Airport Drive	Arterial Road	2 lanes each direction	60–80 km/h (varies)
Sunbury Road	Arterial Road	1 lane each direction	80 km/h

Table B8.7
2019 traffic volumes on selected roads

Location	Direction	Current traffic volumes		
		AM peak	PM peak	Daily
1. Calder Freeway west of Keilor Park Drive	Westbound	2,300	4,100	42,400
	Eastbound	4,700	3,600	53,300
2. Calder Freeway east of Western Ring Road	Westbound	2,800	5,100	51,700
	Eastbound	4,600	3,500	52,500
3. Western Ring Road east of Tullamarine Freeway	Eastbound	3,800	4,300	55,300
	Westbound	5,300	5,300	71,300
4. Western Ring Road west of Tullamarine Freeway	Southbound	4,100	4,300	54,600
	Northbound	4,100	4,000	54,900
5. Western Ring Road south of Keilor Park Drive	Northbound	4,500	4,500	60,600
	Southbound	5,300	5,600	72,200
6. Tullamarine Freeway north of Mickleham Road	Northbound	2,900	3,500	47,800
	Southbound	4,400	3,200	53,900
7. Keilor Park Drive south of Tullamarine Park Road	Southbound	700	1,700	16,600
	Northbound	1,900	1,000	18,200
8. Sharps Road west of Melrose Drive	Eastbound	600	1,000	10,300
	Westbound	1,000	600	10,000
9. Mickleham Road north of Broadmeadows Road	Northbound	800	1,700	18,000
	Southbound	1,900	1,100	18,500
10. Broadmeadows Road east of Mickleham Road	Westbound	No data	No data	No data
	Eastbound	No data	No data	No data
11. Melrose Drive south of Mickleham Road	Northbound	1,000	1,700	17,500
	Southbound	1,700	1,200	18,500
12. Airport Drive north of Sharps Road	Southbound	400	800	9,300
	Northbound	700	500	11,700
13. Sunbury Road north of Airport	Northbound	500	1,300	11,800
	Southbound	1,400	700	12,400

Source: DoT, 2019 and APAM, 2019; traffic volumes shown above represent rounded numbers

In terms of traffic activity, the terminals can be described as high-traffic-generating areas, active from early morning to late evening, with peak activities that generally correspond to commuter peak periods.

There are also employment areas located throughout the airport, as well as large employment areas located in the adjacent suburbs of Tullamarine and Keilor Park. They include light industrial, warehouse and logistics land-uses, resulting in high amounts of commercial traffic (including heavy vehicles).

Around the airport, traffic on the Tullamarine Freeway is strongly influenced by terminal activity. In recent years, residential growth in Sunbury has resulted in increased commuter traffic travelling through the Sunbury Road/Tullamarine Freeway corridor. For example, on the Tullamarine Freeway (west of Mickleham Road), outbound traffic comprises 94 per cent airport-generated traffic during the AM peak period, however this proportion is only 57 per cent during the PM peak, when there is a much larger proportion of non-airport traffic using this segment of the freeway.

Figure B8.4
External road network in the vicinity of Melbourne Airport

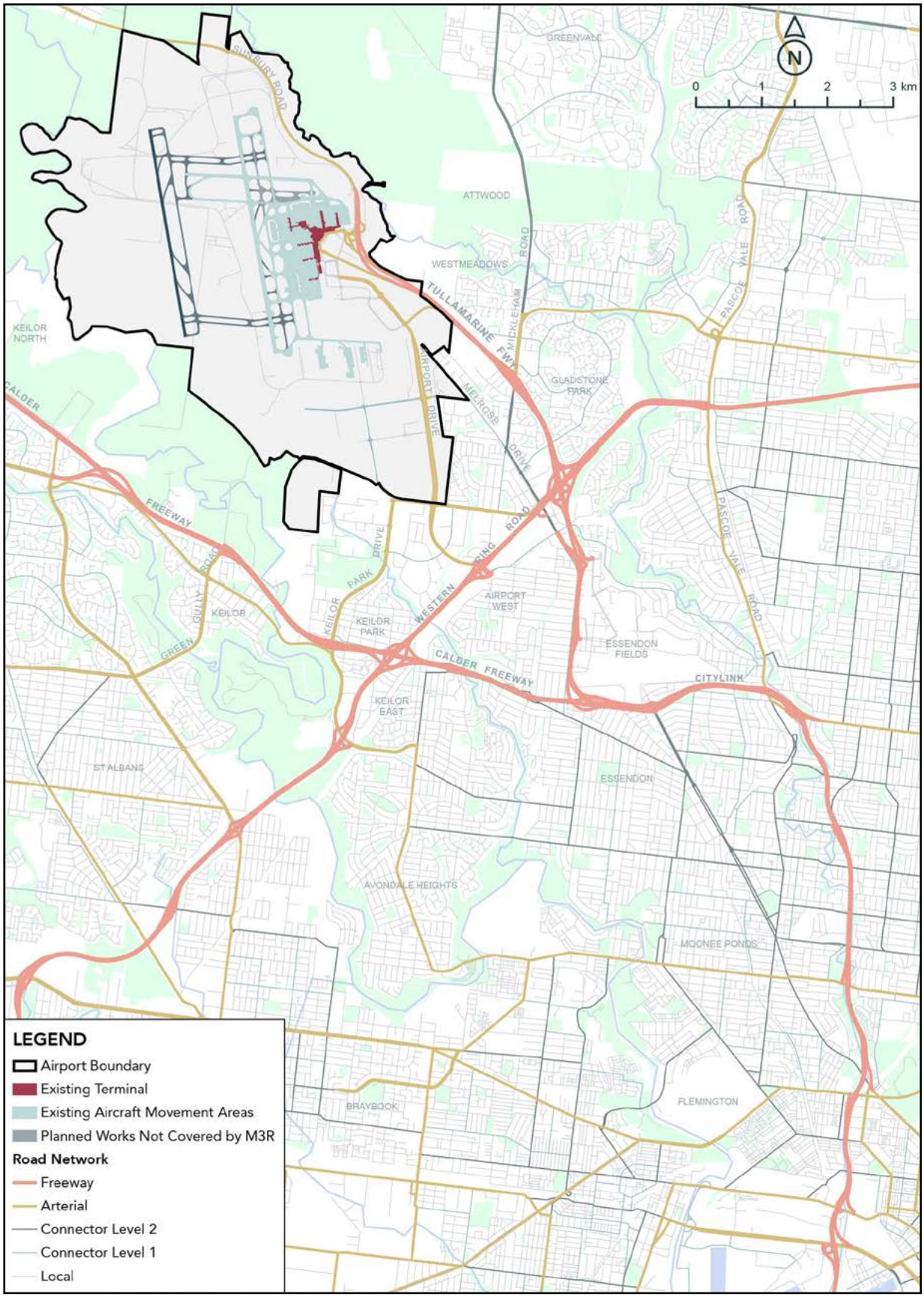


Figure B8.5
Traffic reporting sites in the vicinity of Melbourne Airport

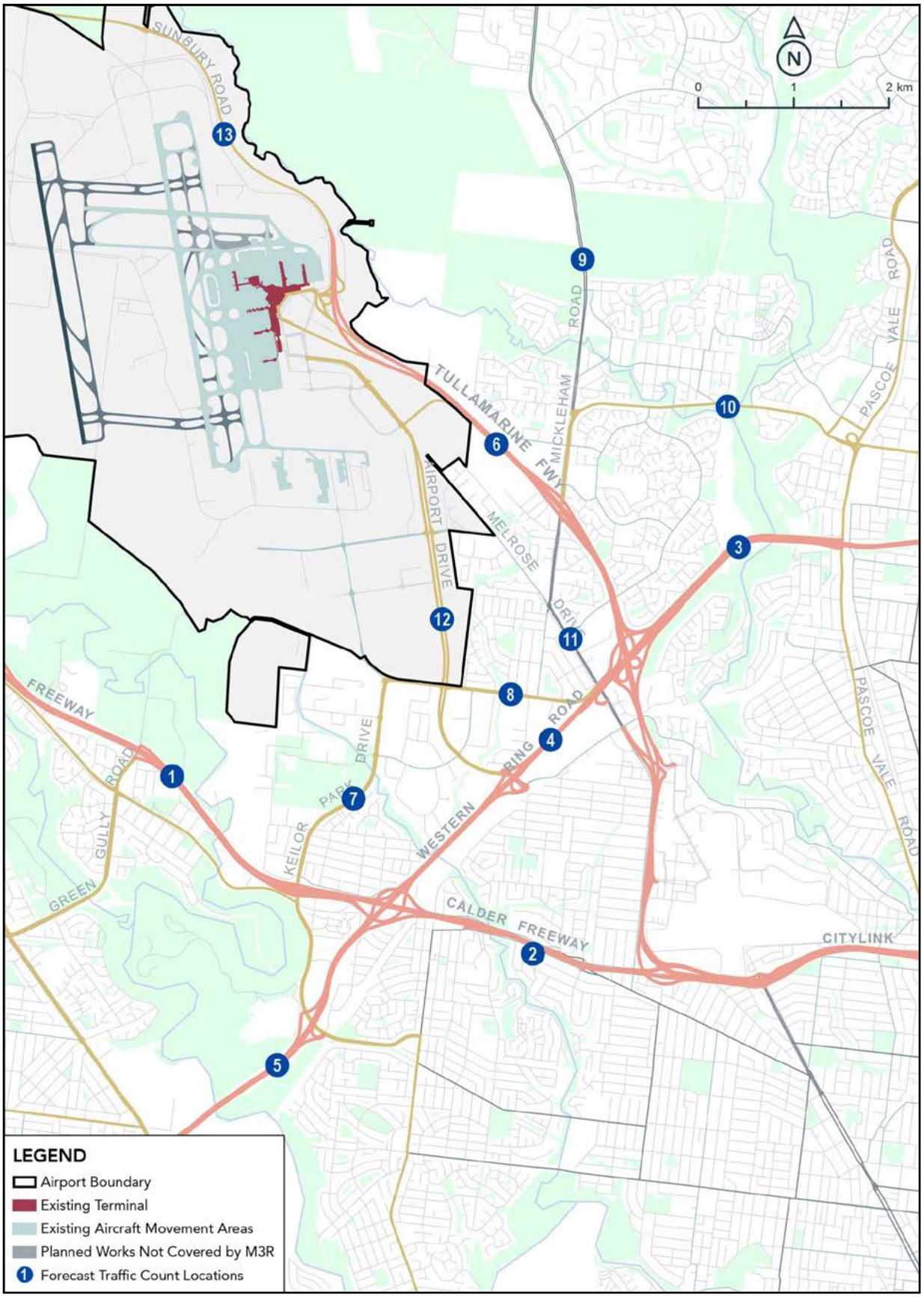
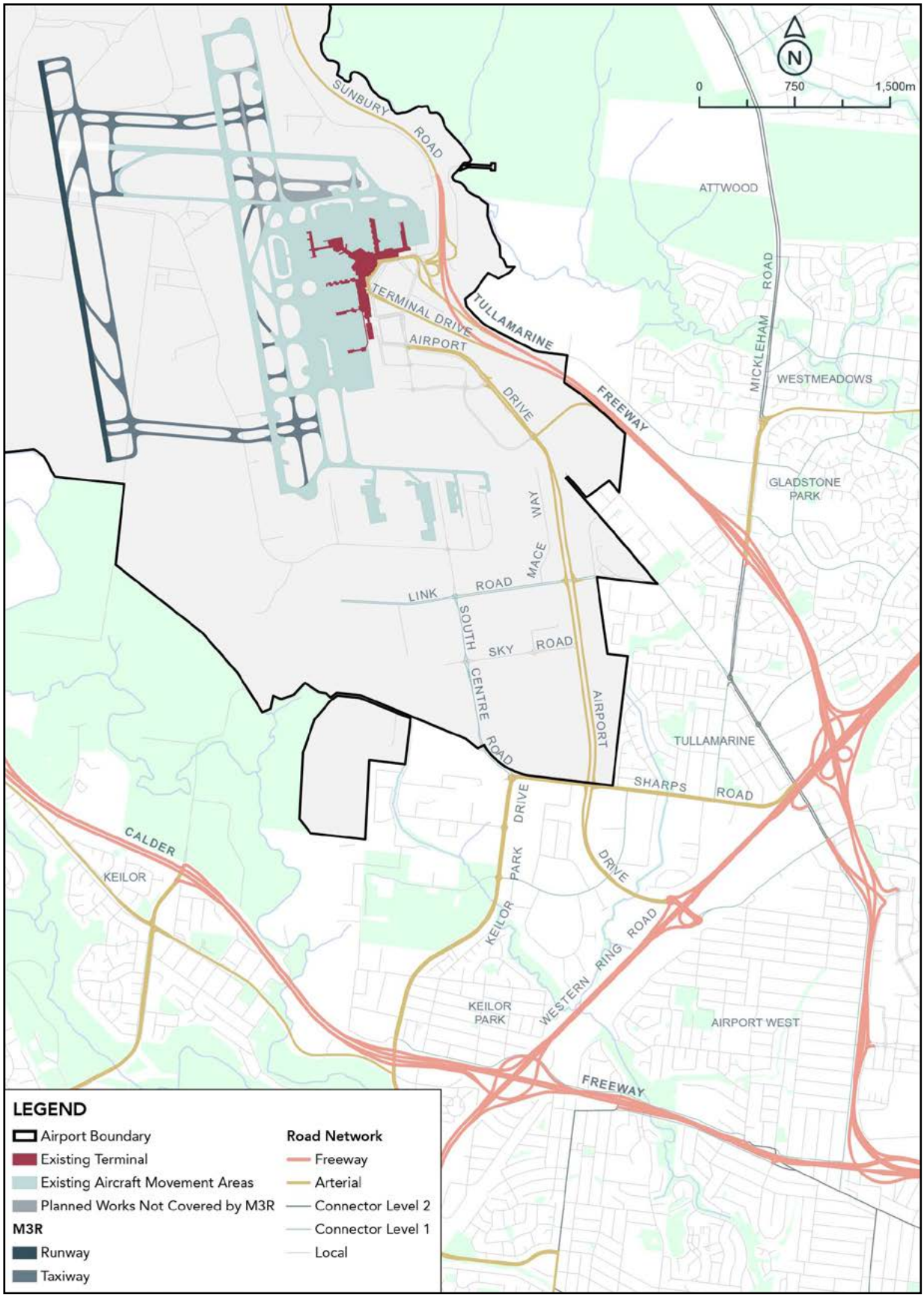


Figure B8.6
Melbourne Airport internal road network



B8.5.1.2
Internal road network

Within the airport boundary, APAM manages approximately 40 kilometres of roads. The internal road network serves a number of functions – most importantly, it provides passenger access to the terminal precincts (e.g. for drop-off/pick-up, car parking etc.). The network also allows for access and circulation between the various aviation-support businesses (including for associated employees). Finally, it supports activity in the Business Park (which includes some non-aviation businesses). The internal airport road network is shown in **Figure B8.6**.

Key roads in the internal network relevant to this assessment are described below:

- Terminal Drive is the main exit from the Tullamarine Freeway to reach the terminals (the ground forecourt that is the frontage for Terminals 1, 2 and 3), and is also used by several key bus routes (e.g. SkyBus and SmartBus)
- Airport Drive provides access to the terminals from the suburbs south of the airport, and links the Business Park to the rest of the airport; it interfaces with Sharps Road in the south and broadly aligns with Keilor Park Drive
- Centre Road provides an important circulation function adjacent to the terminal precincts by linking Airport Drive to the T1/2/3 ground forecourt (from the southern segments), and also linking traffic approaching from north of the airport (i.e. Sunbury Road) to the terminal precincts.

The Tullamarine Freeway is considered the primary access point to the airport and is used by 68 per cent of all vehicles entering and exiting the airport (average weekday). Airport Drive, South Centre Road and Watson Drive combined carry 26 per cent of all airport traffic, while Sunbury Road carries around six per cent of all airport traffic.

Current demand for passenger drop-off and pick-up regularly exceeds the capacity of the ground forecourt. On particularly busy days, during peak demand periods, traffic queues from the ground forecourt along Terminal Drive can extend onto the Tullamarine Freeway mainline (which represents a traffic queue of over 1,100 metres).

For this assessment, the internal road network has been assessed as a combined network, not on a road-by-road basis. This is considered appropriate given that future impacts to the internal road network are practically unrelated to M3R, and more profoundly related to the Elevated Roads Project (outlined in **Section B8.2.4.3**) which will result in fundamental changes in layout, capacity and operations of the internal road network. The impacts of the Elevated Roads Project have been investigated in detail as part of a separate MDP.

B8.5.2
Public transport network

Public transport connectivity to Melbourne Airport is provided via a range of bus services. These include SkyBus express bus services, Public Transport Victoria (PTV) bus routes, and privately-operated shuttle buses. A summary of the various bus services servicing the airport is provided in **Table B8.8**.

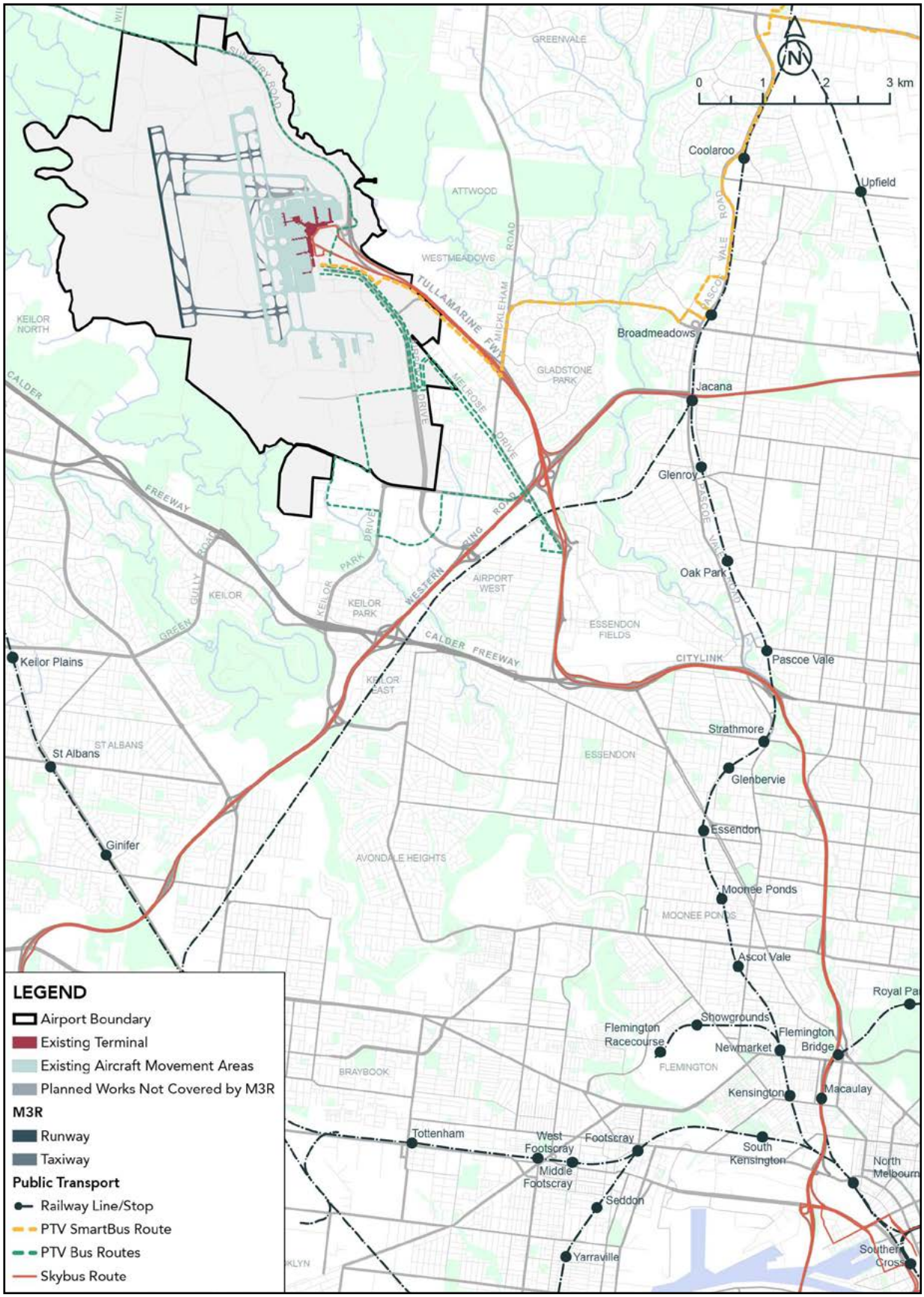
Table B8.8 shows that the VITM reference model includes the SkyBus 'Melbourne City Express' and PTV metropolitan bus routes. These are important, as this SkyBus service has the highest ridership out of all the above services (around 11 per cent of non-transfer passengers), while the SmartBus route provides a regular connection to nearby Broadmeadows train station (around 15-minutes travel time) thereby linking to the rail network.

Table B8.8
Summary of bus services connecting to Melbourne Airport

Bus service	Description	Service features	Included in VITM
SkyBus Melbourne City Express	Airport transfer to Melbourne CBD (Southern Cross Station)	High service frequency	✓
SkyBus – other services (six routes)	Airport transfer to Docklands, Southbank, St Kilda, Bayside/ Mornington Peninsula, Wyndham and Eastern suburb centres	Hourly service frequencies	×
PTV – SmartBus Route 901 Frankston to Melbourne Airport	Orbital bus route aligned through several major activity centres in northern, eastern and south-eastern suburbs	Regular service frequency	✓
PTV – local bus routes Routes 478, 479 and 482	Local bus services connecting to surrounding suburbs (Sunbury, Bulla, Tullamarine and Airport West)	Low service frequencies	✓
PTV – V/Line coach Barham to Melbourne via Heathcote	Long distance coach to designated towns in central Victoria via north-south alignment (Echuca/Heathcote/Lancefield)	Daily service	×
Privately operated shuttle buses (various bus operators)	Various operators providing airport transfers, including to regional centres (including Geelong, Ballarat and Bendigo)	Varies between operators	×

Source: SkyBus, PTV

Figure B8.7
Public Transport access to Melbourne Airport



The other bus services are not included in VITM, which may have a small effect on the results in this analysis. However, given this is a relatively small portion of airport users, this is not expected to result in any changes to the overall outcomes.

The route alignments of the SkyBus 'Melbourne City Express' and PTV bus routes servicing the airport are shown in **Figure B8.7**. These represent the bus services which are in VITM and captured in the analysis reported in this chapter.

B8.5.3
Active transport network

Melbourne Airport is located reasonably close to two strategic bicycle-riding routes in the surrounding area: the Western Ring Road Trail and the Moonee Ponds Creek Trail. These routes are designated as a 'Primary Route' (C1) and 'Main Route' (C2), respectively, in the Department of Transport and Planning's Strategic Cycling Corridors (SCC) network. These shared-use paths connect across northern and western metropolitan areas, and link with other strategic bicycle-riding routes in Melbourne. Currently, there are gaps in the external and internal network infrastructure to connect these paths to the airport, resulting in bicycle riders having to ride on the road, sharing with traffic (thereby limiting the appeal for some riders). The existing bicycle-riding network in the vicinity of the airport is shown in **Figure B8.8**.

Footpaths are provided on most roads within the airport to enable walking within precincts, with pedestrian-crossing facilities provided appropriate to the various road environments. Roads in the terminal precincts have the highest walking activity, and so these locations have additional facilities to enhance walking, such as wayfinding signage and a posted speed limit of 40 kilometres per hour in all roads in these areas.

B8.5.4
Existing ground transport demand

In 2019, Melbourne Airport generated an average weekday volume of around 124,000 vehicle trips to and from the airport. Traffic volumes during typical 'busy day' activities are up to eight per cent higher, most of which is attributable to passengers.

B8.5.4.1
Traffic demand by user type

Airport-generated traffic comprises several user groups, including passengers, employees, freight and other commercial traffic:

- Passenger-generated traffic comprise the majority of all traffic entering the airport precinct, estimated at around two-thirds of all airport-generated traffic.
- Workers at Melbourne Airport form a substantial component of the total transport demand, although they have different travel patterns to passengers and drive to different parts of the airport. The vast majority of the airport workforce travels by car (as shown in census data), which is not unusual for an outer suburban employment area with a relatively high proportion of shift-workers.
- Commercial trips associated with freight and logistics support the significant number of airport-related and non-airport related businesses located within the airport boundary. Commercial vehicles are estimated to represent at least 10 per cent of total airport traffic.

In addition to the above external trips, there are internal trips made by aviation support vehicles, emergency services, taxis (circulating from drop-off and pick-up) and rental vehicles (repositioning from storage yards to public rental area at the ground level of the Terminal 1/2/3 multi-storey car park).

B8.5.4.2
Mode share – passenger travel

Table B8.9 shows a breakdown of existing passenger travel modes from 2016-17 estimates. These mode shares are considered representative of existing (as in 2019) conditions.

Table B8.9
Passenger travel modes (2016/2017 estimates)

Passenger travel modes	Mode share
Public drop-off and pick-up (including rideshare)	37%
Taxi	19%
On-airport car parking	14%
SkyBus	10%
Other bus (including regional shuttles and charters)	9%
Off-airport car parking (shuttle transfer)	4%
VHA	4%
Rental car	3%

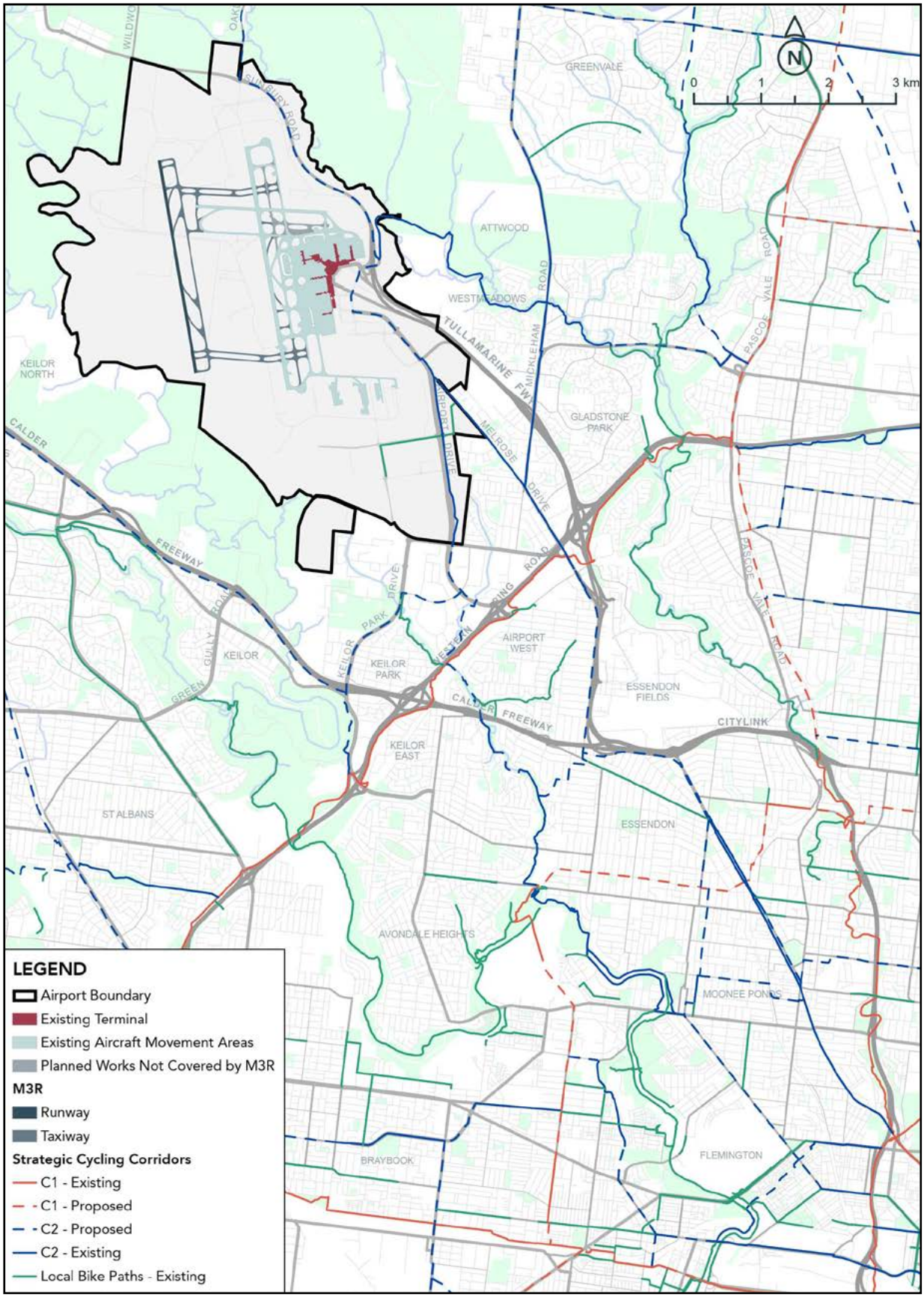
As shown above, around half of all passengers access the airport by private vehicle (rideshare breakdown unknown), either dropped-off/picked-up by friends/family or parking in an on-airport car park. Around a quarter of passengers arrive at the airport by bus, coach or other shuttle service (including off-airport parking). SkyBus is the dominant public transport service, its express service between the CBD and airport carrying around 10 per cent of all passengers.

B8.6
ASSESSMENT OF POTENTIAL IMPACTS

B8.6.1
Construction impact assessment

The construction impact assessment provides a high-level overview of the construction traffic activity associated with M3R, and describes the general impacts on the surrounding road network that could be expected

Figure B8.8
Existing bicycle riding network in the vicinity of Melbourne Airport



during construction works. (Note that details relating to fill requirements and construction routes have been broadly developed, and will be subject to further development as part of later design phases.)

This section does not include the full details normally associated with a Construction Traffic Management Plan (CTMP). A CTMP will be developed once the MDP has been approved, for submission to DTP and subject to separate approval. An overview of the details expected to be covered in the CTMP are described in Section B8.7.1.

B8.6.1.1 Construction zone

A construction zone will be established west of the existing north-south runway (16L/34R). It will be the designated area for plant and equipment laydown and storage during construction.

B8.6.1.2 Construction activity

Construction vehicle access routes

Two access points to the construction zone are proposed:

- From the north: utilising an access road connecting off Sunbury Road. Options are being considered for access to and from Sunbury Road, and the final arrangement will be subject to agreement with DTP. Melbourne Airport is currently working closely with DTP to undertake an approvals process for a new roundabout on the Sunbury Road corridor that would offer access from the north of the airport site.
- From the south: via Operations Road (or McNabs Road under special circumstances). This would involve travel through the local/collector road network (managed by Melbourne Airport and Hume City Council respectively) to the arterial network at Sharps Road, Keilor Park Drive and/or the Calder Freeway.

Proposed construction access routes would be confirmed as part of the CTMP.

Construction hours and timeframes

The construction of M3R is expected to take place over a four to five year timeframe.

It is expected that construction operations will be continuous through the period, and in some phases will operate 24 hours a day, seven days a week. Where possible, construction traffic will avoid unnecessary travel during peak periods. Where required, any potential effects on peak period traffic will be managed through the use of on-site stockpile areas that will provide sufficient flexibility in the operation of truck movements to and from the site.

Allowing for downtime periods, it is assumed that construction activity will occur over approximately 312 days a year.

Construction workforce

It is expected that there will be up to 600 workers typically on the site at peak construction periods (with additional staff located off-site in supervision and project management related functions). The majority are assumed to drive to the site (i.e. vehicle occupancy of one person per car). As a result, there will be up to 600 arrivals and 600 departures a day to the construction site. Much of this traffic activity will occur at shift changeover times which are typically outside conventional commuter peak periods (although some overlap may occur).

It is expected that access for the construction workforce will be principally from Sunbury Road. The CTMP will identify access arrangements and shift times, and confirm that capacity is available to accommodate the expected workforce traffic throughout the duration of construction activity.

Construction vehicle activity levels

It is expected that the contractor will establish on-site asphalt and concrete batching plants to facilitate ease of material supply. Materials that will be hauled on public roads on a regular basis will include imported fill (although some fill will be sourced on-site), stone aggregate, sand, cement, ready-mix concrete and possibly precast culverts and precast tunnel items. The types of construction vehicles that can be expected to use public roads for delivering these materials and other construction equipment will include:

- On-road truck and trailer tippers – delivering imported fill, stone aggregate, sand and cement
- Ready-mix concrete trucks – delivering five cubic metres of concrete per trip, typically operating from 6am to 6pm Monday to Saturday (noting there will be some periods that require additional concrete trucks to deliver concrete for taxiway and runway tie-ins, so these works can occur when air traffic is low)
- Manufacturer's trucks – delivering precast concrete culverts and/or tunnel sections (unless in-situ options are adopted, which would require delivery of concrete materials) typically between 8am and 6pm
- Low loaders – to deliver construction equipment (this will be infrequent and occur mainly at the start and end of the construction period).

For the purposes of this assessment, it is assumed that the materials will be supplied to the works site as per the summary estimate shown in Table B8.10.

Table B8.10
Estimated likely supply routes for construction activity

Material supply	Access direction	Comments
Imported fill	North/South	Assume 70/30 split distribution in both scenarios
Stone aggregate, sand, cement	North/South	Assume 70/30 split distribution in both scenarios
Ready mix concrete	North/South	Assume 50/50 split distribution in both scenarios
AC	North/South	Assume 70/30 split distribution in both scenarios
Precast concrete culvert	North/South	Assume 50/50 split distribution in both scenarios
Culvert base materials	North/South	Assume 70/30 split distribution in both scenarios
Tunnel units	North/South	Assume 50/50 split distribution in both scenarios

B8.6.1.3 Road network assessment

Construction truck traffic generation

The main traffic impact of the construction activity will be from construction truck movements travelling to and from the site for delivery of materials and equipment. The impact of these truck movements on daily traffic operations is moderated by virtue of a four-year construction period and a 12-hour period each day.

Adopting the likely supply routes shown above in Table B8.10, the number of truck trips to and from the south (Operations Road) and the north (Sunbury Road) can be estimated as shown in Table B8.11.

Based on the quantities of materials calculated above, it is expected M3R could require around 270,000 heavy-vehicle trip deliveries. Each heavy-vehicle delivery trip would also result in the same number of empty vehicles exiting the site.

Given the deliveries will be spread across four to five years and spread throughout a workday, average hourly trips are expected to be up to around 18 trips per hour per direction. These trips will be further distributed north or south, depending on supply routes.

Construction-truck volumes, and their split between north/south routes, will be further detailed in the CTMP.

Construction traffic impact on northern access routes

The estimates above show that construction traffic generated from the project site to the northern access routes would be in the order of 296 truck trips per day. Hourly volumes would be up to 12 truck trips per hour per direction. These trips would all be distributed from the project site to Sunbury Road (interface point to be determined) before travelling on the surrounding network.

The extent of impacts this would have on the Sunbury Road corridor's operations would be largely dependent on how the construction access would interface with the corridor. Melbourne Airport is working closely with DTP to undertake an approvals process for a new roundabout on Sunbury Road, which would offer access from the north of the airport site. This includes identifying the nature and extent of any mitigation or remediation measures that might be needed (subject to DTP approval).

To understand the indicative feasibility of a construction access from either roundabout, a preliminary review of the intersection performance was undertaken (analysed with existing and construction-traffic volumes). The review indicated that the increase in hourly traffic is not expected to significantly impact the peak-period operations, with the expected increase being consistent with typical day-to-day fluctuations in traffic flows.

Should access from either roundabout be unavailable, construction access could be proposed via Old Bulla Road or Gate 4. This may require modification to these intersections to allow for safe turning movements (the extent of such modifications is not known at this stage).

In terms of other impacts, a review of existing (as in early 2020) Sunbury Road traffic volumes indicate the road carries around 11,000 to 12,000 vehicles per day per direction, with heavy vehicles comprising between six and eight per cent. The estimates of truck volumes indicate M3R construction could result in an increase of up to two per cent additional truck volume proportions during the construction period. As such, further understanding from the CTMP (once the construction program has been developed) will be needed to confirm any potential impacts this additional heavy-vehicle proportion could have on the Sunbury Road corridor's surface, with potential mitigation measures identified in collaboration with DTP.

It is noted that the nearby Oaklands quarry is a potential source of construction material. If used, this could potentially reduce the number of truck movements on Sunbury Road and the wider road network by a substantial amount, thereby reducing impact on other traffic.

Based on the above, it is expected that M3R construction activity would have 'negligible' to 'minor' impacts on roads to the north of the construction site.

Construction traffic impact on southern access routes

The estimates in Table B8.11 show that construction traffic generated from the project site to the southern access routes would be in the order of 135 truck trips per day. Hourly volumes would be up to 10 truck trips per hour per direction. These trips would be distributed from the project site through the interfacing local/collector road network, which could be through one of the following routes:

Table B8.11
Estimated truck trips by direction by access route

Material supply	Quantity and units	Volume per load	Total trips	North	South
Imported fill	2,054,000.00 m^3	12 m^3	171,167	119,817	51,350
Stone aggregate, sand, cement	1,992,455.76 T	28 T	71,159	49,811	21,348
AC	209,147.36 T	28 T	7,470	5,229	2,241
Ready mix concrete	57,481.00 m^3	5 m^3	11,496	120	5,748
Precast culvert	480.00 units	2 units	240	980	120
Culvert base materials	7,000.00 m^3	5 m^3	1,400	3,420	420
Tunnel	30,465.20 m^3	5 m^3	6,093	3,047	3,047
One-way deliveries (over 4 years)			269,025	184,751	84,274
Two-way trips (over 4 years)			538,049	369,503	168,546
Per year (4 years)			134,512	92,376	42,137
Per day (312 days per year)			431	296	135
Average per hour over 12-hour day			36 trips per hour (18 trips each direction)	25 trips per hour (13 trips each direction)	11 trips per hour (6 trips each direction)

- Operations Road/South Centre Road (managed by Melbourne Airport)
- McNabs Road/Arundel Road/Annandale Road under special circumstances (managed by Hume City Council).

From either route, the subsequent interface with the arterial road network is through Sharps Road, Keilor Park Drive, Calder Freeway and/or Western Ring Road.

The addition of construction traffic to the above local/collector roads could represent notable increases in terms of their daily proportions; however the actual volumes are considered to be relatively low, and as such not expected to have any significant impacts to the roads' operation. Notwithstanding, should these routes be needed for construction trucks, this may necessitate localised road improvements such as widening, pavement strengthening and/or bridge strengthening (and potentially rehabilitation works post-construction). Further site investigation will be required to determine the extent of any such works, which will need to be documented in the CTMP (and, if required, submitted to Hume City Council).

Regarding impacts to the arterial-road network, the additional truck traffic, when spread across multiple access routes and throughout the workday, would represent less than a one per cent increase in the current volumes. This should not impact network operations, with the expected increases being not inconsistent with typical day-to-day fluctuations in traffic flows.

It is noted that the Arundel Road route could connect to the Calder Freeway at Green Gully Road. While the interchange is suitable for truck access, the westbound freeway off-ramp is currently uncontrolled and its configuration is not well-suited to accommodating larger heavy-vehicle traffic movements. As such, if this route is chosen, this location will need to be reviewed as part of the CTMP. However, as there are multiple access routes available, it is considered that there is opportunity to suitably manage heavy-vehicle movements.

Based on the above, it is expected that M3R construction activity would have 'negligible' to 'minor' adverse impacts on roads to the south of the construction site.

Summary – construction traffic impacts

Overall, it is expected that M3R construction activity would have 'negligible' to 'minor' adverse impacts on roads surrounding the construction site.

B8.6.1.4 Public transport assessment

As the construction truck access routes to the site are largely located away from bus routes, there will be little or no interface between the construction activity and public transport. The only potential interface may be between buses and trucks on the arterial and motorway network. However, these interfaces are likely to be negligible and not inconsistent with daily traffic conditions on such networks.

On this basis it is expected that there will be a negligible impact on public transport from the M3R construction activity.

B8.6.1.5
Active transport assessment

There is expected to be little or no interface between the construction activity and the active transport modes as the access routes to the site are away from any of the active transport corridors. Any potential interfaces between bicycle routes or footpaths and proposed truck routes will need to be reviewed as part of the CTMP, to ensure the paths remain safe for cyclists and pedestrians.

On this basis it is expected that there will be a negligible impact on active transport from the M3R construction activity.

B8.6.2
Operational impact assessment

B8.6.2.1
Approach to operational assessment

This assessment has adopted several key parameters to enable a comparison of the overall impact of M3R on road network operations. The severity criteria set out in Table B8.5 focuses on differences in traffic flow and performance. Traffic flow differences are most relevant at a daily level, and performance differences are most relevant in peak periods. As noted in Section B8.2.4.1, traffic volumes (for both the Build and No Build scenarios) were determined based on the design day at the airport. Therefore, the reported traffic flow and performance differences reflect the conditions likely to exist on that particular day in the M3R planning assessment year rather than an average day (or average weekday) in that year.

The operational impact assessment includes consideration of the following impacts:

- Traffic flow assessment – changes that M3R would have on traffic flows on the road network was assessed by determining the AM-peak, PM-peak and daily traffic volumes for both the Build and No Build scenarios
- Performance assessment – the associated impacts on the performance of the external road network were assessed by measuring changes to the Volume to Capacity Ratio (VCR), which are based on the traffic flow differences and derived from strategic model outputs; the performance of the internal road network was assessed by measuring changes in average travel speed and queue lengths (outputs from separate modelling analysis)
- Public transport assessment – changes in public transport mode share were assessed by applying changes in the demands on the public transport systems between the Build and the No Build scenarios. This was based on car trip and public transport trip numbers from the reference assessment
- Active transport assessment – a qualitative assessment was undertaken to understand any impacts M3R could have on active transport infrastructure and trips patterns.

B8.6.2.2
Traffic flow assessment

External roads

Estimated traffic flows have been determined for all assessment scenarios, corresponding with the locations reported in the baseline assessment (i.e. locations per Figure B8.4).

Summary tables showing the one-hour AM and PM peak traffic flow volumes, as well as daily traffic volumes, for 2026, 2031 and 2046, Build versus No Build, are shown in Table B8.12, Table B8.13 and Table B8.14 respectively. The 'difference' columns show the actual change and the percentage change in traffic volume that would result from the Build scenario in comparison to the No Build scenario.

Generally, the traffic flow assessment shows some increases in traffic flows under the Build scenario (compared to the No Build scenario), depending on the location in the road network. The traffic volume differences are relatively small in the early years, with only very marginal changes (likely due to differences in employment). In later years, the differences are greater as the Build scenario results in more passenger growth.

Based on the 2026 analysis of the Build versus No Build scenarios (shown in Table B8.12), the following observations are made:

- Most roads surrounding the airport experience little changes under the Build scenario, with differences around one per cent
- There is an increase in daily traffic flows on Airport Drive by around 25 per cent, although the actual numbers during the peak periods were low, less than 200 vehicles per hour

Based on the 2031 analysis of the Build versus No Build scenarios (shown in Table B8.13), the following observations are made:

- Most roads surrounding the airport experience low increases, of around one per cent, under the Build scenario
- Modest increases in traffic (though not exceeding 10 per cent) are observed on the Tullamarine Freeway, Sharps Road and Keilor Park Drive under the Build scenario
- The largest percentage increase in traffic volume under the Build scenario is observed on Airport Drive (around a 28 per cent increase in daily volumes in both directions).

Observations of the 2046 analysis of the Build versus No Build scenarios (shown in Table B8.14) are as follows:

- The traffic volume differentials are more widespread, with more roads experiencing increases up to around 10 per cent under the Build scenario
- There are clearer increases in daily traffic flows on the Tullamarine Freeway, Sharps Road and Keilor Park Drive under the Build scenario (around 15 to 20 per cent)

Table B8.12
Design day traffic volume and percentage differences Build vs No Build – 2026

2026		Traffic volumes – No Build			Traffic volumes – Build			Differences in traffic volumes – Build compared to No Build		
Location	Direction	AM peak	PM peak	Daily	AM peak	PM peak	Daily	AM peak	PM peak	Daily
1. Calder Freeway west of Keilor Park Drive	Westbound	3,600	6,723	64,512	3,608	6,757	65,099	8 (+1%)	34 (+1%)	587 (+1%)
	Eastbound	6,577	4,550	69,725	6,565	4,589	70,523	-12 (-1%)	39 (+1%)	798 (+1%)
2. Calder Freeway east of Western Ring Road	Westbound	2,965	5,095	50,543	2,999	5,107	50,600	34 (+1%)	12 (+1%)	57 (+1%)
	Eastbound	5,518	3,663	55,565	5,528	3,664	55,715	10 (+1%)	1 (+1%)	150 (+1%)
3. Western Ring Road east of Tullamarine Freeway	Eastbound	5,609	6,629	79,453	5,558	6,675	80,015	-51 (-1%)	46 (+1%)	562 (+1%)
	Westbound	8,002	7,932	103,875	7,856	7,945	104,402	-146 (-2%)	13 (+1%)	527 (+1%)
4. Western Ring Road west of Tullamarine Freeway	Southbound	5,023	6,135	73,250	5,073	6,153	72,426	50 (+1%)	18 (+1%)	-824 (-1%)
	Northbound	5,642	5,871	76,018	5,589	5,905	76,049	-53 (-1%)	34 (+1%)	31 (+1%)
5. Western Ring Road south of Keilor Park Drive	Northbound	7,099	6,166	82,642	7,079	6,212	83,401	-20 (-1%)	46 (+1%)	759 (+1%)
	Southbound	5,401	6,576	79,859	5,366	6,646	80,452	-35 (-1%)	70 (+1%)	593 (+1%)
6. Tullamarine Freeway north of Mickleham Road	Northbound	6,630	6,412	81,788	6,044	6,482	83,108	-586 (-9%)	70 (+1%)	1,320 (+2%)
	Southbound	5,889	4,772	77,760	5,574	4,934	77,835	-315 (-5%)	162 (+3%)	75 (+1%)
7. Keilor Park Drive south of Tullamarine Park Rd	Southbound	928	1,475	17,168	926	1,520	17,944	-2 (-1%)	45 (+3%)	776 (+5%)
	Northbound	1,606	1,172	17,086	1,613	1,239	18,021	7 (+1%)	67 (+6%)	935 (+5%)
8. Sharps Road west of Melrose Drive	Eastbound	491	937	10,653	495	983	11,588	4 (+1%)	46 (+5%)	935 (+9%)
	Westbound	675	414	9,006	686	421	9,630	11 (+2%)	7 (+2%)	624 (+7%)
9. Mickleham Road north of Broadmeadows Rd	Northbound	814	1,392	17,109	801	1,386	17,137	-13 (-2%)	-6 (-1%)	28 (+1%)
	Southbound	1,288	1,058	17,385	1,316	1,056	17,570	28 (+2%)	-2 (-1%)	185 (+1%)
10. Broadmeadows Road east of Mickleham Road	Westbound	1,021	916	12,218	1,027	915	12,416	6 (+1%)	-1 (-1%)	198 (+2%)
	Eastbound	715	1,153	11,654	724	1,164	11,837	9 (+1%)	11 (+1%)	183 (+2%)
11. Melrose Drive south of Mickleham Road	Northbound	382	553	6,559	387	558	6,592	5 (+1%)	5 (+1%)	33 (+1%)
	Southbound	462	483	6,942	464	501	7,083	2 (+1%)	18 (+4%)	141 (+2%)
12. Airport Drive north of Sharps Road	Southbound	792	718	10,714	722	878	13,363	-70 (-9%)	160 (+22%)	2,649 (+25%)
	Northbound	1,054	744	9,531	1,153	864	11,815	99 (+9%)	120 (+16%)	2,284 (+24%)
13. Sunbury Road north of Airport	Northbound	734	3,240	23,368	688	3,214	23,416	-46 (-6%)	-26 (-1%)	48 (+1%)
	Southbound	3,122	857	21,653	3,067	865	21,472	-55 (-2%)	8 (+1%)	-181 (-1%)

The above AM and PM peaks represent one-hour periods. Forecasts based on 'without MAR' assumptions.

Table B8.13
Design day traffic volume and percentage differences Build vs No Build – 2031

2031		Traffic volumes – No Build			Traffic volumes – Build			Differences in traffic volumes – Build compared to No Build		
Location	Direction	AM peak	PM peak	Daily	AM peak	PM peak	Daily	AM peak	PM peak	Daily
1. Calder Freeway west of Keilor Park Drive	Westbound	3,613	6,756	65,008	3,655	6,809	65,846	42 (+1%)	53 (+1%)	838 (+1%)
	Eastbound	6,600	4,583	70,281	6,633	4,643	71,346	33 (+1%)	60 (+1%)	1,065 (+2%)
2. Calder Freeway east of Western Ring Road	Westbound	2,969	5,099	50,611	3,008	5,115	50,707	39 (+1%)	16 (+1%)	96 (+1%)
	Eastbound	5,518	3,666	55,614	5,528	3,667	55,780	10 (+1%)	1 (0%)	166 (+1%)
3. Western Ring Road east of Tullamarine Freeway	Eastbound	5,631	6,673	80,428	5,631	6,748	81,447	0 (0%)	75 (+1%)	1,019 (+1%)
	Westbound	8,043	7,976	104,931	7,985	8,016	105,989	-58 (-1%)	40 (+1%)	1,058 (+1%)
4. Western Ring Road west of Tullamarine Freeway	Southbound	5,028	6,179	74,128	5,084	6,220	73,425	56 (+1%)	41 (+1%)	-703 (-1%)
	Northbound	5,650	5,876	76,813	5,605	5,913	77,144	-45 (-1%)	37 (+1%)	331 (+1%)
5. Western Ring Road south of Keilor Park Drive	Northbound	7,143	6,223	83,854	7,230	6,309	85,221	87 (+1%)	86 (+1%)	1,367 (+2%)
	Southbound	5,426	6,633	81,051	5,456	6,741	82,211	30 (+1%)	108 (+2%)	1,160 (+1%)
6. Tullamarine Freeway north of Mickleham Road	Northbound	6,916	6,766	89,984	7,095	7,072	94,960	179 (+3%)	306 (+5%)	4,976 (+6%)
	Southbound	6,052	5,198	85,990	6,197	5,628	89,558	145 (+2%)	430 (+8%)	3,568 (+4%)
7. Keilor Park Drive south of Tullamarine Park Rd	Southbound	947	1,515	17,821	985	1,582	18,921	38 (+4%)	67 (+4%)	1,100 (+6%)
	Northbound	1,640	1,211	17,721	1,706	1,303	18,963	66 (+4%)	92 (+8%)	1,242 (+7%)
8. Sharps Road west of Melrose Drive	Eastbound	496	954	10,938	501	1,008	12,034	5 (+1%)	54 (+6%)	1,096 (+10%)
	Westbound	685	421	9,247	698	430	9,997	13 (+2%)	9 (+2%)	750 (+8%)
9. Mickleham Road north of Broadmeadows Rd	Northbound	815	1,396	17,208	805	1,391	17,280	-10 (-1%)	-5 (-1%)	72 (+1%)
	Southbound	1,290	1,060	17,466	1,319	1,060	17,694	29 (+2%)	0 (0%)	228 (+1%)
10. Broadmeadows Road east of Mickleham Road	Westbound	1,025	921	12,346	1,037	924	12,623	12 (+1%)	3 (+1%)	277 (+2%)
	Eastbound	717	1,161	11,772	730	1,175	12,014	13 (+2%)	14 (+1%)	242 (+2%)
11. Melrose Drive south of Mickleham Road	Northbound	383	554	6,579	390	560	6,623	7 (+2%)	6 (+1%)	44 (+1%)
	Southbound	463	484	6,963	467	503	7,115	4 (+1%)	19 (+4%)	152 (+2%)
12. Airport Drive north of Sharps Road	Southbound	825	771	11,608	849	973	14,963	24 (+3%)	202 (+26%)	3,355 (+29%)
	Northbound	1,105	815	10,462	1,343	988	13,357	238 (+22%)	173 (+21%)	2,895 (+28%)
13. Sunbury Road north of Airport	Northbound	746	3,279	24,050	735	3,283	24,460	-11 (-1%)	4 (+1%)	410 (+2%)
	Southbound	3,159	889	22,446	3,189	917	22,639	30 (+1%)	28 (+3%)	193 (+1%)

The above AM and PM peaks represent one-hour periods. Forecasts based on 'without MAR' assumptions.

Table B8.14
Design day traffic volume and percentage differences Build vs No Build – 2046

2046		Traffic volumes – No Build			Traffic volumes – Build			Differences in traffic volumes – Build compared to No Build		
Location	Direction	AM peak	PM peak	Daily	AM peak	PM peak	Daily	AM peak	PM peak	Daily
1. Calder Freeway west of Keilor Park Drive	Westbound	3,492	6,954	66,176	3,676	7,029	68,772	184 (+5%)	75 (+1%)	2,596 (+4%)
	Eastbound	6,786	4,382	72,149	6,871	4,467	74,587	85 (+1%)	85 (+2%)	2,438 (+3%)
2. Calder Freeway east of Western Ring Road	Westbound	3,306	5,375	54,683	3,745	5,489	56,543	439 (+13%)	114 (+2%)	1,860 (+3%)
	Eastbound	6,128	3,937	61,317	6,188	4,028	62,892	60 (+1%)	91 (+2%)	1,575 (+3%)
3. Western Ring Road east of Tullamarine Freeway	Eastbound	5,118	6,277	73,240	5,544	6,574	79,252	426 (+8%)	297 (+5%)	6,012 (+8%)
	Westbound	7,690	7,173	96,667	8,130	7,596	102,985	440 (+6%)	423 (+6%)	6,318 (+7%)
4. Western Ring Road west of Tullamarine Freeway	Southbound	4,293	5,495	58,811	4,478	5,521	58,690	185 (+4%)	26 (+1%)	-121 (-01%)
	Northbound	4,834	4,809	62,886	5,280	4,922	63,102	446 (+9%)	113 (+2%)	216 (+1%)
5. Western Ring Road south of Keilor Park Drive	Northbound	7,564	5,638	78,313	8,083	6,101	83,676	519 (+7%)	463 (+8%)	5,363 (+7%)
	Southbound	4,820	6,810	72,986	5,053	7,102	76,697	233 (+5%)	292 (+4%)	3,711 (+5%)
6. Tullamarine Freeway north of Mickleham Road	Northbound	7,047	7,304	102,385	9,080	8,559	124,169	2,033 (+29%)	1,255 (+17%)	21,784 (+21%)
	Southbound	6,453	5,892	96,739	7,735	7,670	118,222	1,282 (+20%)	1,778 (+30%)	21,483 (+22%)
7. Keilor Park Drive south of Tullamarine Park Rd	Southbound	741	1,412	17,402	868	1,604	20,104	127 (+17%)	192 (+14%)	2,702 (+16%)
	Northbound	1,528	1,075	17,939	1,815	1,337	20,876	287 (+19%)	262 (+24%)	2,937 (+16%)
8. Sharps Road west of Melrose Drive	Eastbound	600	967	12,262	594	1,033	13,696	-6 (-1%)	66 (+7%)	1,434 (+12%)
	Westbound	601	414	9,164	871	468	10,559	270 (+45%)	54 (+13%)	1,395 (+15%)
9. Mickleham Road north of Broadmeadows Rd	Northbound	737	1,453	16,635	695	1,439	16,665	-42 (-6%)	-14 (-1%)	30 (+1%)
	Southbound	1,251	947	16,442	1,264	946	16,789	13 (+1%)	-1 (-1%)	347 (+2%)
10. Broadmeadows Road east of Mickleham Road	Westbound	1,267	1,085	15,088	1,342	1,121	16,070	75 (+6%)	36 (+3%)	982 (+7%)
	Eastbound	821	1,311	14,740	781	1,337	14,929	-40 (-5%)	26 (+2%)	189 (+1%)
11. Melrose Drive south of Mickleham Road	Northbound	433	632	7,687	672	672	8,361	239 (+55%)	40 (+6%)	674 (+9%)
	Southbound	490	575	8,211	590	627	9,236	100 (+20%)	52 (+9%)	1,025 (+12%)
12. Airport Drive north of Sharps Road	Southbound	596	916	13,977	1,002	1,616	24,441	406 (+68%)	700 (+77%)	10,464 (+75%)
	Northbound	1,334	834	12,340	2,332	1,661	23,326	998 (+75%)	827 (+99%)	10,986 (+89%)
13. Sunbury Road north of Airport	Northbound	1,427	4,113	44,637	1,464	4,268	47,798	37 (+3%)	155 (+4%)	3,161 (+7%)
	Southbound	3,866	1,961	42,848	4,308	2,176	45,665	442 (+11%)	215 (+11%)	2,817 (+7%)

The above AM and PM peaks represent one-hour periods. Forecasts based on 'without MAR' assumptions.

- The most significant increase in traffic volume under the Build scenario is on Airport Drive – around 10,000 additional vehicles per day per direction, which represents an 80 per cent increase compared to the No Build scenario.

Internal roads

Table B8.15 presents a summary of the total forecast internal-road traffic flows for the Build and No Build scenarios.

Traffic flows are expected to increase under the M3R Build scenario by up to around 11 per cent during the five years post-opening. By 2046, daily traffic flows are substantially increased, with an additional 40 per cent daily traffic flows compared to the No Build scenario. It is noted that traffic flows will increase over time even under the No Build scenario.

The forecast traffic flows on the internal network appear to increase by a higher degree than some roads on the external network. This is expected, given the convergence of traffic to the airport, particularly the high-traffic-generating terminal precincts.

Summary of project impacts on traffic flows

The overall impact of traffic flows from M3R will vary between roads. The traffic flows impact assessment has been combined with the performance assessment for the external and internal road networks (summarised in Section B8.6.2.3 and Section B8.6.2.4 respectively).

B8.6.2.3
Performance assessment – external road network

The performance of the external road network incorporating M3R has been determined based on measuring the VCR throughout the road network for all scenarios. VCRs are a standard metric in strategic transport modelling, used to understand future road performance conditions by measuring the level of congestion (given forecast traffic volumes and road capacity thresholds).

For this road performance assessment, the project team adopted the VCR colour-coded bands illustrated and described in Table B8.16 (Austroads, 2013).

Figure B8.9, Figure B8.10 and Figure B8.11 show the estimated road performance levels of the external

Table B8.15
Daily airport trip forecasts – internal roads

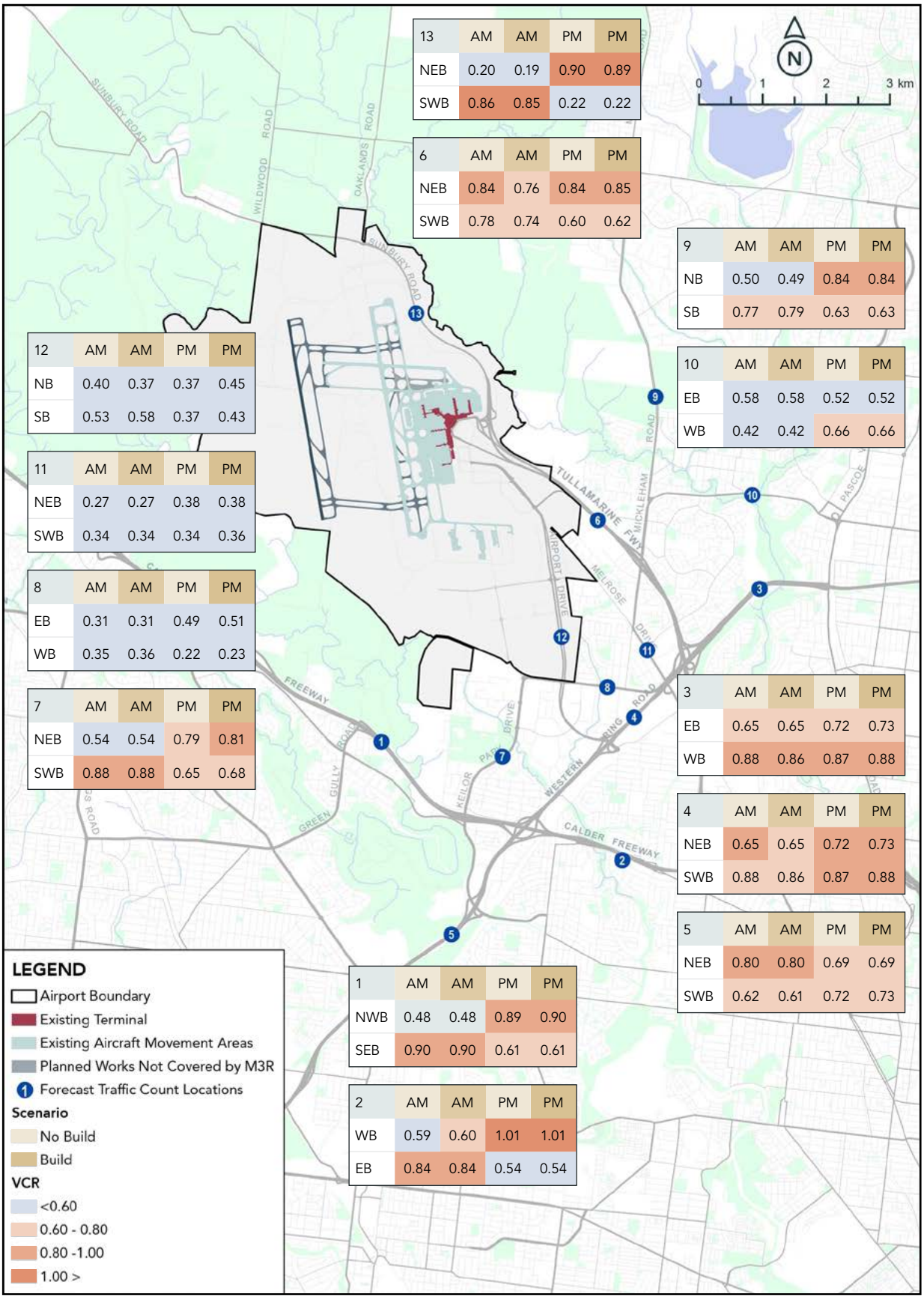
Year	Scenario	No. of car trips to airport	Increase in car trips (Build compared to No Build)
2026	No Build	151,296	+7.2%
	Build	162,257	
2031	No Build	164,933	+11.6%
	Build	184,139	
2046	No Build	185,749	+40.0%
	Build	260,115	

Forecasts based on 'without MAR' assumptions

Table B8.16
Volume to Capacity Ratio (VCR) categories of road performance levels

Colour code in Figures B8.9 to B8.11	VCR	Description of road performance conditions
	≤0.60	Free flow
	>0.60 – 0.80	Stable flow (acceptable/ satisfactory performance)
	>0.80 – 0.90	Approaching unstable to unstable flow (tolerable to intolerable)
	>1.00	Forced flow (congested)

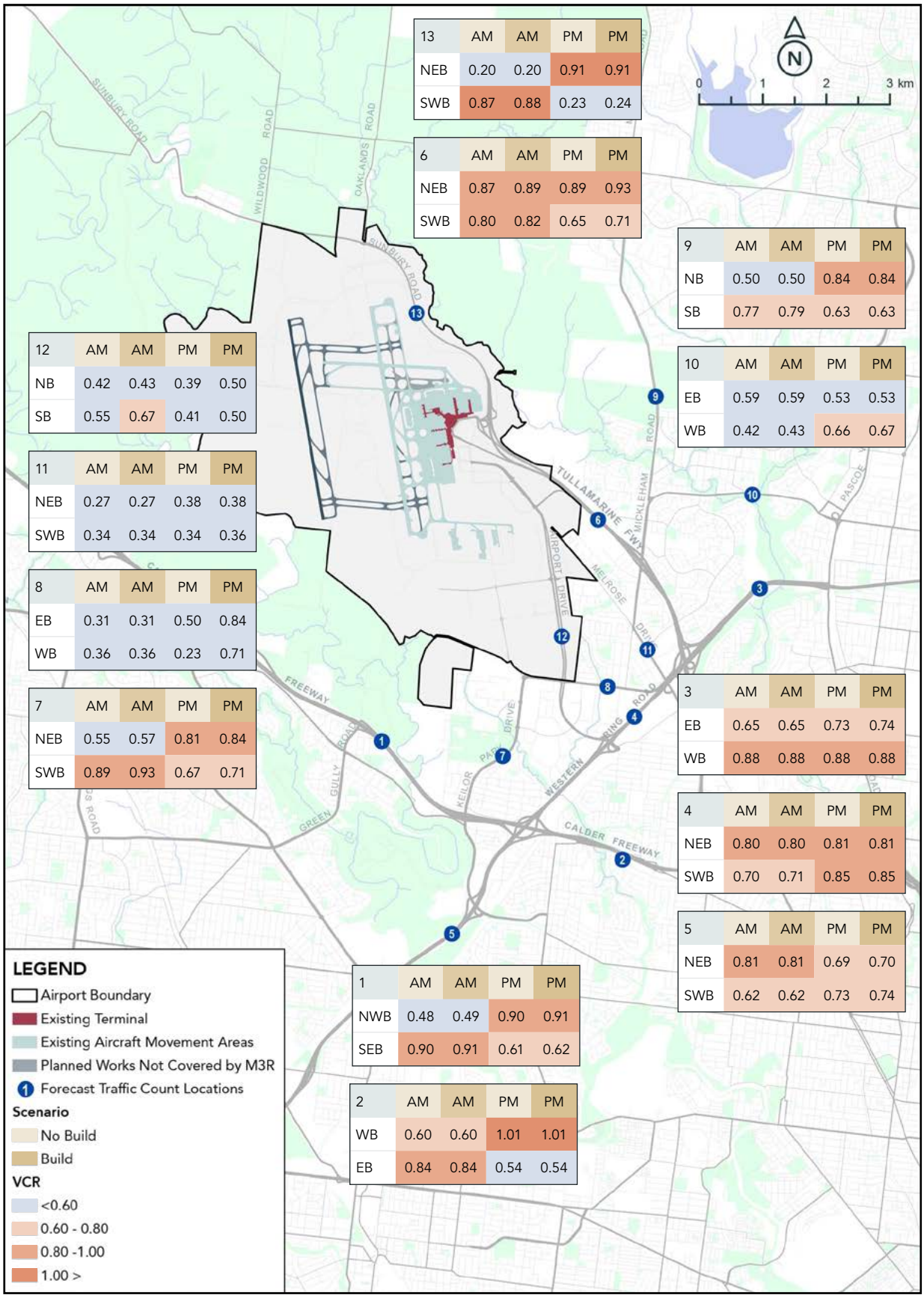
Figure B8.9
Difference in design day VCR between 2026 Build versus No Build



Each road is reported for each direction of traffic flow; abbreviations as follows:

NB North-bound EB East-bound NEB Northeast-bound NWB Northwest-bound
SB South-bound WB West-bound SEB Southeast-bound SWB Southwest-bound

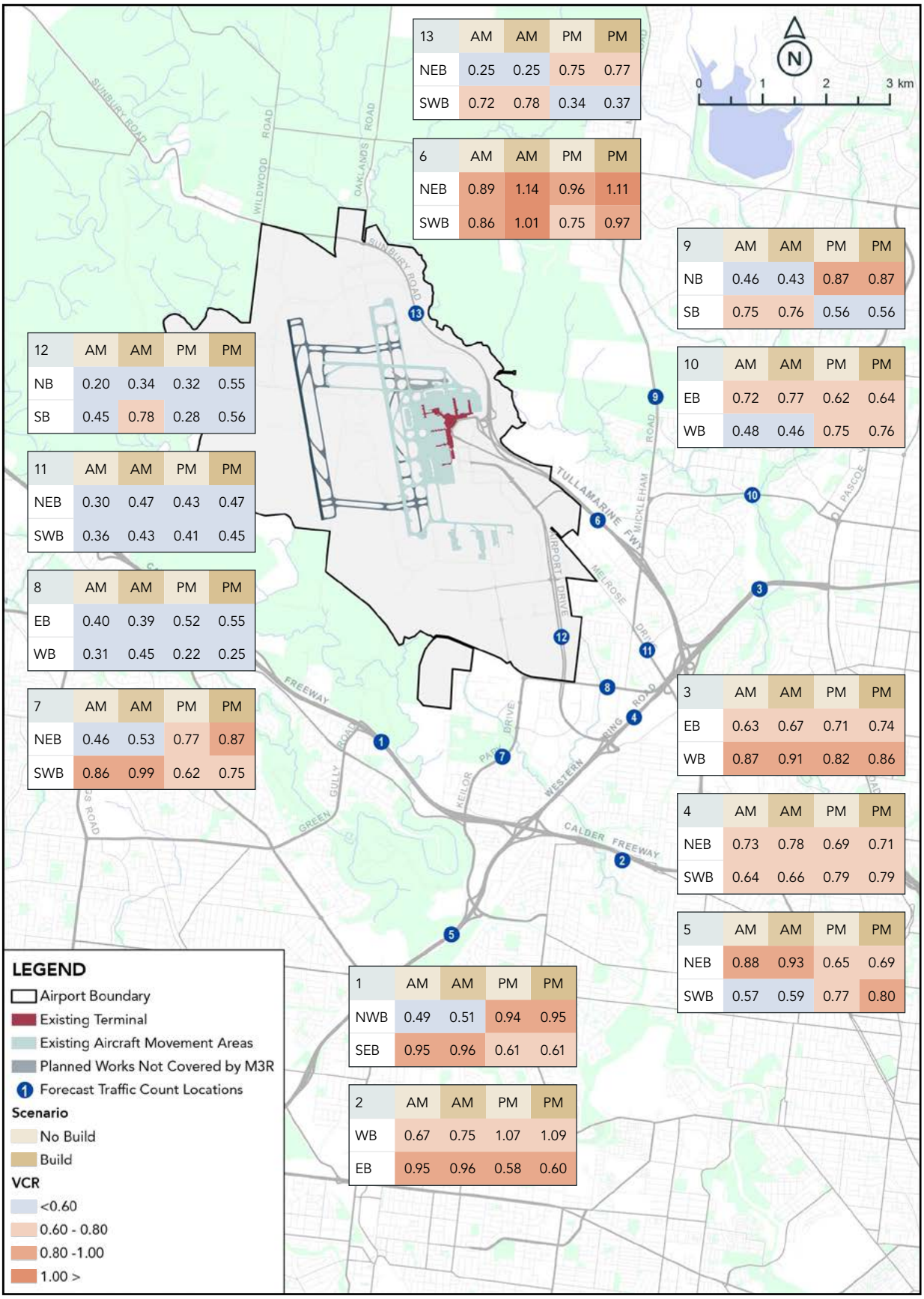
Figure B8.10
Difference in design day VCR between 2031 Build versus No Build



Each road is reported for each direction of traffic flow; abbreviations as follows:

NB North-bound EB East-bound NEB Northeast-bound NWB Northwest-bound
SB South-bound WB West-bound SEB Southeast-bound SWB Southwest-bound

Figure B8.11
Difference in design day VCR between 2046 Build versus No Build



Each road is reported for each direction of traffic flow; abbreviations as follows:

NB North-bound EB East-bound NEB Northeast-bound NWB Northwest-bound
SB South-bound WB West-bound SEB Southeast-bound SWB Southwest-bound

road network (using the same locations reported in the baseline assessment and traffic flow assessment). Each compares performance (as VCRs) between Build and No Build scenarios. It is noted that the only roads where there is additional capacity programmed to be provided between 2026 and 2046 are Sunbury Road and Airport Drive.

2026 performance

As shown in Figure B8.9, the 2026 analysis illustrates there is generally no difference in performance between Build and No Build scenarios. This corresponds with the very minor changes in traffic flow volumes between scenarios for this year.

The 2026 results show that several roads surrounding the airport would experience heavy congestion in the peak direction of travel (i.e. VCR between 0.8 and 1.0). These include several freeway segments, Mickleham Road (north of Broadmeadows Road) and Keilor Park Drive. Results are shown for both Build and No Build scenarios.

2031 performance

Based on the 2031 analysis of road performance levels shown in Figure B8.10, it is demonstrated that the Build scenario would not result in any major impact to performance levels on any roads, compared to the No Build scenario. No major increases in VCR were observed between Build and No Build scenarios. Slight increases in VCR (around +0.1) were observed on Airport Drive, however flow conditions would remain free-flow or stable.

Similar to the opening year results, the 2031 results continue to show several roads experiencing heavy congestion in the peak direction of travel (i.e. VCR between 0.8 and 1.0) on the same roads. These results are shown for both Build and No Build scenarios.

2046 performance

Based on the 2046 analysis of road performance levels shown in Figure B8.11, it is shown that the Build scenario would result in some deterioration in performance levels, compared to the No Build scenario. This is observed on road corridors closest to the airport, particularly those closest to Airport Drive:

- Slight increases in VCR (i.e. +0.1 to +0.2), resulting from the Build scenario, were observed on the following roads:
  - Tullamarine Freeway, north of Mickleham Road – although in the No Build scenario this corridor is already at unstable flow levels
  - Keilor Park Drive, south of Tullamarine Park Drive – the impacts to flows were noted only in the AM southbound and PM northbound directions
  - Sharps Road, west of Melrose Drive – however the increased VCR would not impact the road's performance, which would remain at stable levels
  - Melrose Drive, south of Mickleham Road – however the increased VCR would not impact the road's performance, which would remain at stable levels
- Airport Drive, north of Sharps Road, is estimated to experience larger increases in VCR, of around +0.2 to +0.3, as a result of the Build scenario – however the results show this would not impact the road's performance, which would remain at stable levels (likely due to the corridor's capacity increasing by 2046, i.e. additional lane each direction).

The implications of these impacts are that M3R would lead to some increases in travel time and delay on roads closest to the airport. The impacts to users on the arterial roads noted above would be generally low, given that the conditions generally stay in the same performance levels (with just slightly worse conditions). Finally, impacts to Tullamarine Freeway users are considered to be somewhat overestimated in this analysis, given that practically the corridor operations would be managed using VicRoads' Managed Motorways technology to manage traffic flows (such as through variable speed limit signage) which would minimise unstable flow conditions. Nevertheless, a modest increase in travel time to and from the airport could be expected for Tullamarine Freeway users, as a result of M3R.

Summary of project impacts on external road network

Table B8.17 presents a summary of the impact of the Build versus No Build scenario on road traffic

Table B8.17
Impact assessment summary (without mitigation) – external road traffic conditions

Assessment factor	2026	2031	2046
AM peak traffic volume	Negligible	Minor	Minor to High
PM peak traffic volume	Negligible	Minor	Minor to High
Daily traffic volume	Negligible	Minor	Minor to High
AM and PM peak performance	Negligible	Negligible	Minor to Moderate
Overall assessment	**Negligible**	**Minor**	**Minor to High**

operating conditions for the broader network, based on the parameters outlined in this assessment. The data indicates the impacts of the Build scenario are negligible in 2026, worsening slightly by 2031, and then progressively showing more significant impacts by 2046 – although this is dependent on location, with Airport Drive shown to experience disproportionate impacts compared to other surrounding roads.

Overall, on a representative busy day it is expected that, without mitigation measures, the impact on the broader road network operating conditions due to implementation of M3R will be:

- Negligible impact in 2026
- Minor adverse impact in 2031
- Up to high adverse impact in 2046 (depending on location/road).

B8.6.2.4 Performance assessment – internal road network

The performance of the airport internal road network was determined using results from microsimulation modelling (noting that strategic modelling is unsuitable for measuring road performance of a small area). Analysis was undertaken for the entire forecourt and landside area (excluding the Business Park). The model area also includes the Tullamarine Freeway (around two kilometres either side of the terminal precinct). It includes the Elevated Roads Project Stages 1 and 2, although it does not include the north-facing ramps (as outlined in Section B8.2.4.3). As such microsimulation was unable to be completed for 2046 (as there is no design) – impacts for this year are broad estimates only. The reported metrics include average speed for travelling throughout the model network, and queue lengths on key access roads. These outputs are considered sufficient to understand future performance of the internal road network. Results are for AM and PM two-hour peak periods, covering short-to-medium term scenarios.

Average speed of traffic through the internal network

For context, under existing conditions (measured at 2018 for the microsimulation modelling) the analysis outputs showed an average speed of 45 kilometres per hour during the AM-peak period and 44 kilometres per hour during the PM-peak period.

At M3R opening year, for the Build scenario the outputs showed an average speed of 41 kilometres per hour during the AM peak period, and 40 kilometres per hour during the PM peak period. For the No Build scenario, similar outcomes could be expected (given the limited change in traffic flows for this year).

Five years after M3R opening, for the Build scenario the outputs showed an average speed of 37 kilometres per hour during the AM-peak period, and 39 kilometres per hour during the PM-peak period. For the No Build scenario, the average speed is expected to slightly improve, given the lower passenger demand for this year – in the order of five to ten per cent higher average speed.

By 2046, average speeds for the Build scenario are estimated to deteriorate to a noticeably lower speed (25–30 kilometres per hour). For the No Build scenario, the average speed is expected to be moderately better (35–40 kilometres per hour).

These findings indicate that M3R could result in slower average speeds (at around five to eight kilometres per hour slower) when compared to existing conditions. The Build scenario results in slightly slower average speeds compared to the No Build scenario. However, with traffic volumes increasing by around 30 per cent during this time, the comparatively low reduction in average speed is considered a good reflection of the additional road capacity in the internal road network resulting from the Elevated Roads Project (i.e. without this project the network performance would be even slower). The implication of these slower speeds is slightly longer travel times for traffic travelling through the airport roads.

Traffic queue lengths on key access roads

For context, under existing conditions (as in 2018) the most significant traffic queue is airport-bound traffic on Terminal Drive, with queues of 1,100 metres extending from the ground forecourt. This queue length generally matches the storage capacity of the Terminal Drive freeway exit ramp (meaning that further increases to this queue would have the undesirable result of traffic queues extending onto the Tullamarine Freeway).

At M3R opening year, for the Build scenario the outputs showed queue lengths on Terminal Drive extending only 200 metres. For the No Build scenario, similar outcomes could be expected (given the limited change in traffic flows for this year). The substantial reduction in traffic queues is attributed to the additional road infrastructure and increased capacity from the Elevated Roads Project.

Five years after M3R opening, for the Build scenario the outputs showed queue lengths on Terminal Drive extending around 350 metres. For the No Build scenario, the queue lengths could be expected to be slightly shorter (in the order of 30 per cent), given the lower passenger demand for this year.

Although traffic flows increase as a result of M3R, impacts to the airport internal road network are effectively mitigated as a result of the Elevated Roads Project (which redistributes traffic from the surface road network onto the elevated road links). While some queues are expected on the elevated road links (for traffic travelling to the new drop-off/pick-up facilities), the analysis outputs show these would be generally less than around 300 metres, which is within the road link's storage capacity of approximately 450 metres.

By 2046, queue lengths are broadly estimated to remain within storage capacity limits for both Build and No Build scenarios.

Summary of internal road network performance impacts

Overall, the principal finding of this performance assessment is that M3R is not expected to result in negative impacts to the internal road network which would then impact the external road network (i.e. traffic queues extending from Terminal Drive onto the Tullamarine Freeway).

In addition, it should be noted that, while increased traffic flows from passenger growth may result in slightly slower travel times, there are other benefits, mainly result from the Elevated Roads Project. For example, the redistribution of traffic away from the surface road network and forecourt will enable smooth travel for buses, which will remain in the forecourt.

Therefore, on a representative busy day it is expected that, without mitigation measures, the impact on internal road network operating conditions from the implementation of M3R will be:

- Negligible impact in 2026
- Minor adverse impact in 2031
- Moderate adverse impact in 2046.

B8.6.2.5 Public transport assessment

Public transport impacts were assessed by considering the changes in public transport trip demands between the Build and the No Build scenarios for the M3R planning assessment years (2026, 2031 and 2046).

As noted earlier, the analysis is based on the current SkyBus and PTV bus service levels (i.e. they are assumed to remain unchanged in all future years) and default public transport network changes in VITM. A summary of the changes in public transport trips as a result of M3R is set out in Table B8.18.

The results show that additional patronage is attracted to public transport when comparing the Build to the No Build scenarios, particularly in later years where the number of public transport trips increases by more than one-third under the Build scenario. Notwithstanding this increase in absolute trip numbers, it is noted that the overall share of travel by public transport increases only marginally over time. It is also noted that the results are broadly consistent with existing public transport mode share (outlined in Section B8.5.4); although, as stated earlier, modelled public transport does not include all existing bus services, such as privately-operated regional shuttles.

Nevertheless, the results represent a considerable increase in ridership levels. Existing public transport services (including SkyBus) are unlikely to be able to accommodate this increased demand without a significant increase in service capacity and/or service frequency. The implications of the increased public-transport trips (without mitigation) could be expected to include issues such as increased crowding at bus stops and on-board buses, resulting in longer dwell times (during boarding and alighting) which could impact travel time and reliability. Overall, no delays are expected when travelling via the airport road network – this is largely attributable to the outcomes of the Elevated Roads Project, which provides substantial improvements to bus travel time and reliability by removing drop-off/pick-up traffic from the surface road network (resulting in less traffic congestion in the forecourt).

Some caution should be exercised in the interpretation of these results, as VITM has some limitations in the way airport trips' mode choice is calculated. The most significant limitation is that the relative attractiveness of a public transport trip to and from the airport is based on the average daily time and cost relative to a car trip, rather than the time and cost during the different time periods. This has the effect of making the modelled mode share less sensitive to increasing traffic congestion in future years, when increasing car travel times are likely to increase the diversion of car trips to public transport, particularly during peak periods. This suggests that the number of public transport trips and the public transport mode share may be higher than estimated by the modelling.

Table B8.18
Daily public transport trips to airport – Build vs No Build

Year	Scenario	No. of PT trips	PT mode share	Increase in PT trips (Build compared to No Build)
2026	No Build	29,751	16.4%	+2.7%
	Build	30,990	16.0%	
2031	No Build	33,783	17.0%	+8.4%
	Build	37,099	16.8%	
2046	No Build	39,499	17.5%	+34.7%
	Build	55,247	17.5%	

Forecasts based on 'without MAR' assumptions

Overall, on a representative busy day it is expected that, without mitigation measures, the impact on public transport operating conditions from the implementation of M3R will be:

- Negligible impact in 2026
- Minor adverse impact in 2031
- Moderate adverse impact in 2046.

B8.6.2.6
Active transport assessment

The VITM assessment does not include any specific analysis of pedestrian or bicycle riding demands, as such a quantitative assessment cannot be made of the impacts of M3R on active transport.

In general, it could be expected that M3R will result in an increase in demand for bicycle-riding trips to the airport. As this increase is coming from a very low base, it should not result in any crowding issues. However, it may result in increased demand for bicycle parking and end-of-trip facilities – particularly for employees. Where such facilities are limited, the increased demand and limited facilities could risk discouraging bicycle-riding travel.

In later years, the increased number of people accessing the forecourt and ground-transport facilities could result in increased crowding during peak demand periods. Any high-demand locations could experience delays for users, without further management or additional facilities.

Overall, on a representative busy day it is expected that, without mitigation measures, the impact on active transport from the implementation of M3R will be:

- Negligible impact in 2026
- Negligible impact in 2031
- Minor adverse impact in 2046.

B8.7
AVOIDANCE, MANAGEMENT AND MITIGATION MEASURES

The transport impact assessment indicates M3R will result in some construction impacts, followed by ongoing operational impacts, which need to be planned for.

B8.7.1
Construction management and mitigation measures

A CTMP will be prepared in advance of the construction works, to provide greater clarity on the form and scale of the construction traffic, including the truck fleet that will bring plant and materials to and from the M3R works site. The CTMP will confirm access arrangements, timeframes, truck route haulage plans, and traffic analysis of the access points to the main roads adjacent to the airport site and any other relevant intersections. The CTMP will also include management/mitigation measures to minimise the impact of any truck movements to and from the construction site that occur during peak periods.

On this basis it is expected that the scale of the construction activity will be able to be managed and mitigated to the extent that it can be largely accommodated within the capacity of the existing networks with 'minor' adverse impact (see also Chapter A5: Project Construction).

B8.7.2
Operations management and mitigation measures

B8.7.2.1
Road network

The operational impact analysis has indicated that the growth associated with the Build scenario, in comparison to the No Build scenario, will have negligible impact in the early years of the assessment period. By 2031, some elements of the road network could be approaching capacity limits (under both Build and No Build scenarios), potentially resulting in some operational challenges (e.g. Tullamarine Freeway northbound traffic flows during peak periods). As M3R allows passenger growth to continue the additional traffic flows could exacerbate these operational challenges and result in 'minor' to 'high' adverse impacts (depending on location) if not addressed.

An important road link between the external network and the airport is the Tullamarine Freeway. The transport modelling shows that, under both the Build and No Build scenarios, the Tullamarine Freeway peak-hour volumes are forecast to be approaching or exceeding the corridor capacity limits. While these network conditions are partly attributable to passenger growth (with or without M3R), they are also attributable to population and employment growth in the northern and north-western suburbs of Melbourne. As such, any need for further freeway expansions would not be solely attributable to M3R. Nevertheless, Melbourne Airport will monitor the traffic growth over the forecast period and engage with DTP (and other Victorian Government agencies) to support infrastructure benefiting airport growth and nearby development zones. In the longer term, new road projects such as OMR and MAL will reduce the reliance on the Tullamarine Freeway as the critical access route to the terminals.

Any impacts of the M3R on the external road network will to some extent be managed through coordinated network of Intelligent Transport Systems (ITS) infrastructure, particularly within the airport internal network. The Victorian Government has committed to the use of ITS to optimise network performance, and to continuing work with APAM in establishing this infrastructure on site.

Melbourne Airport proposes to work with DTP to establish such ITS infrastructure as part of the Elevated Roads Project, and have it directly connected to DTP traffic-management centres. This could be used to integrate with DTP's Managed Motorways system to assist in demand management of traffic flows on the freeway network during peak demands periods.

Regarding the airport internal road network, the delivery of the Elevated Roads Project will mitigate the impacts of increased traffic volumes, particularly under the Build scenario. This additional road infrastructure will ensure traffic queues do not extend onto the Tullamarine Freeway, and provides capacity to accommodate increased drop-off and pick-up activity which will occur under the Build scenario. It also avoids any delays to bus travel time through the internal road network. As stated earlier, Stages 1 and 2 of the Elevated Roads Project is the subject of separate MDPs. In the longer term, the proposed north-facing ramps will functionally integrate with the enhanced infrastructure from OMR and MAL, forming complementary links.

B8.7.2.2
Public transport

The transport modelling shows that by 2046 the Build scenario will result in 35 per cent more public transport trips to and from the airport (under 'without MAR' assumptions) compared to the No Build scenario. To mitigate the impacts of M3R on the public transport network, Melbourne Airport will work with DTP and bus operators to improve network coverage, service frequencies and operating spans to meet the expected future demand.

While the need for the MAR is not attributable to M3R, Melbourne Airport strongly supports a rail link to the airport to facilitate the airport's growth and reduce reliance on the road network. Melbourne Airport is currently working with the Victorian and Commonwealth Governments to ensure the needs of all airport users are appropriately considered.

B8.7.2.3
Summary

The implementation of these proposed improvements can be expected to mitigate many of the impacts of M3R. In summary the operational mitigation works will include:

- Work with DTP in the establishment of a coordinated network of ITS infrastructure within the airport internal network, which is directly connected to DTP traffic management centres including the Managed Motorways system (this will be stablished as part of the Elevated Roads Project)
- Coordinate the delivery of future internal road network infrastructure projects, to ensure they functionally integrate with external road network enhancements, particularly the proposed north-facing ramps and OMR/MAL projects
- Work with DTP and bus operators to improve on-road public transport in line with increased passenger growth.

To accommodate the overall expected growth of the airport (under both the Build and No Build scenarios) Melbourne Airport will also:

- Work with DTP to monitor and review traffic growth on the Tullamarine Freeway over the forecast period, so that infrastructure to support aviation growth and residential development can be delivered in a timely manner
- Work with the Victorian and Commonwealth Governments to develop the MAR proposal to ensure a viable and attractive rail solution is delivered that can reduce congestion levels on the road network.

More details on Melbourne Airport's ground transport proposals are provided in the *2022 Melbourne Airport Master Plan*.

B8.7.3
Management

The ongoing management of airport operations involves regular liaison with DTP and other relevant authorities in relation to surface access arrangements and improvements. It is relevant and appropriate that these arrangements continue through the process for implementation and operation of M3R.

The detailed CTMP will require engagement with DTP to confirm the location and format of the construction access arrangements on Sunbury Road. Discussions will also be required with DTP, Hume City Council and Brimbank City Council in relation to southern access route options through the road network.

Management of construction traffic will focus on minimising the impacts of the truck traffic operations. The CTMP will include operating plans and management measures to minimise any potential impact on the external road network.

B8.7.4
Monitoring

The modelling tools used in this impact assessment are based on a series of assumptions and projections of growth that are expected to be achieved in the future.

Growth projections will be monitored against actual outcomes and adjustments made to the planning of the airport as necessary. As APAM is required to review its Master Plan every five years, this is a suitable mechanism to review and update the surface transport networks to accommodate future demands and changes in travel trends.

Construction truck traffic will be monitored during the construction of M3R to ensure truck activity is not resulting in any unforeseen impacts on the surrounding road network. For example, it could be expected that contractors would monitor construction traffic volumes at access points to the works site.

Following the completion of M3R, APAM will continue to monitor traffic operations in and around the airport. In this way, changing trends will be identified and addressed efficiently and effectively.

B8.7.5
Significance assessment

The identified mitigation measures, together with the management and monitoring arrangements outlined above, will result in an effective strategy to manage the impacts of M3R-generated traffic and potentially improve the level of impact identified in this assessment.

Overall, the assessment of the construction of M3R indicates construction traffic will have a 'negligible' to 'minor' adverse impact on the transport network. The CTMP will be developed to detail the construction activity and management/mitigation measures to minimise potential impacts. These include identifying any upgrades to the road network that may be required such as widening, pavement strengthening or rehabilitation works.

The assessment of the future operating conditions with M3R and the implementation of suitable mitigation measures indicate that overall there will be 'minor' to 'moderate' adverse impacts on the transport network. The progressive upgrades to the internal road network will increase capacity and optimise traffic flows within the airport. These works can be expected to manage the increased demand anticipated by M3R, and mitigate negative impacts.

A summary of the pre-mitigation and post-mitigation assessment of ground transport impacts is shown in Table B8.19.

Table B8.19
Impact assessment and mitigation measures summary

Environment aspect & baseline condition	Assessment of original impact					
	Original Impact	Mitigation inherent in design/practice	Significance			
			Duration	Severity	Likelihood	Impact
Construction						
Construction activity impact on the northern access routes Sunbury Road traffic volumes are around 23,000 vehicles per day (two-way), with heavy vehicles comprising 6–8%. Corridor has several roundabouts, with varying demands and turning movements.	Addition of 296 daily two way truck trips, which will increase Sunbury Road heavy vehicle volumes by up to 2% additional. Also construction workforce traffic, which should occur outside typical commuter peak periods.	Development of a CTMP to outline construction routes, traffic analysis and management measures.	Short Term	Minor	Almost Certain	Medium
Construction activity impact on the southern access routes Arterial roads south of the construction site include Sharps Road and Keilor Park Drive (20,000–35,000 vehicles/day). Freeways include Calder Freeway and Western Ring Road (~100,000 vehicles/day). Area also includes local and collector roads.	Addition of 135 daily two-way truck trips. Spread across multiple access routes, this represents less than 1% increase in the current volumes on the arterial and freeway roads. Localised impacts to local/collector road network.	Development of a CTMP to outline construction routes, traffic analysis and management measures.	Short term	Minor	Almost certain	Medium
Construction activity impact on public transport Buses travel along Sunbury Road and through arterial network, but have limited exposure to the proposed construction access routes.	The only potential interface may be between buses and trucks on the arterial and motorway network.	Development of a CTMP to outline construction routes, and management measures.	Short term	Negligible	Possible	Negligible
Construction activity impacts on active transport Bicycle and pedestrian activity may occur on the local/collector road network, but there is limited exposure to the proposed construction access routes.	There will be little or no interface between the construction activity and active transport modes.	Development of a CTMP to outline construction routes, and management measures.	Short term	Negligible	Unlikely	Negligible
Operation						
External road network operations – 2031 Tullamarine Freeway 2031 daily traffic volumes (No Build): 90,000 northbound 86,000 southbound Heavy congestion in peak direction of travel. Airport Drive 2031 daily traffic volumes (No Build): 10,500 northbound 11,600 southbound Free-flow/stable conditions.	Build is forecast to increase daily traffic flows on the Tullamarine Freeway by around 5%, but performance analysis indicates this will not change congestion levels (VCR increases < 0.05). Daily traffic flows on Airport Drive to increase by around 28%, however flow conditions would remain free-flow or stable.	In practice, Tullamarine Freeway operations are managed using DTP's 'Managed Motorways' technology. ITS infrastructure to be delivered as part of the Elevated Roads Project will enable a coordinated ITS network, connected to DTP traffic management centres, to assist in managing peak traffic conditions.	Medium term	Minor	Likely	Medium
External road network operations – 2046 By 2046, new road projects are expected to be complete (OMR, MAL and Bulla Bypass). Tullamarine Freeway 2046 daily traffic volumes (No Build): 102,000 northbound 97,000 southbound Heavy congestion in both directions. Airport Drive 2046 daily traffic volumes (No Build): 12,300 northbound 14,000 southbound Free-flow/stable conditions.	Build is forecast to increase daily traffic flows on the Tullamarine Freeway by around 20%, exceeding capacity limits. Airport Drive traffic flows to increase by around 80%, deteriorating performance (VCRs increases of 0.2 to 0.5). Other roads to also experience traffic flow increases of around 10–15% (Sharps Road, Keilor Park Drive, Melrose Drive) although resulting performance is not as concerning.	The OMR and MAL are likely to redistribute travel patterns, reducing reliance on the Tullamarine Freeway for travel to the airport. In practice, Tullamarine Freeway operations are managed using DTP's 'Managed Motorways' technology. Also, DTP has plans for further widening of the Tullamarine Freeway to 4-lanes each way, although there is no commitment to the timing.	Medium term	High	Likely	High

Mitigation and/or management measures	Assessment of residual impact				
	Residual Impact	Duration	Significance		
			Severity	Likelihood	Impact
Construction (cont.)					
Refinement and application of CTMP, detailed to include management measures to minimise the impact of truck traffic on the road network. Analysis of the access to Sunbury Road to determine optimal intersection configuration. Collaboration with DTP to achieve optimal outcomes.	The impact will be reduced by optimising the construction's northern access location, and effective measures to minimise impacts of truck traffic on the road network.	Short Term	Minor	Almost Certain	Medium
Refinement and application of CTMP, detailed to include management measures to minimise the impact of truck traffic on the external road network. Review of the need for localised improvements to local/collector roads to accommodate the increased truck flows. Collaboration with DTP and Local Government to achieve optimal outcomes.	Any adverse impacts should be reduced through the implementation of a CTMP that is focussed on the specific needs of the project.	Short-term	Minor	Almost certain	Medium
Refinement and application of CTMP, detailed to outline interface between construction traffic and bus routes. Collaboration with DTP and Local Government to achieve optimal outcomes.	Any adverse impacts should be reduced through the implementation of a CTMP that is focussed on the specific needs of the project.	Short-term	Negligible	Possible	Negligible
Refinement and application of CTMP, detailed to outline any interfaces with existing bicycle and pedestrian activity.	Any adverse impacts should be reduced through the implementation of a CTMP that is focussed on the specific needs of the project.	Short-term	Negligible	Unlikely	Negligible
Operation (cont.)					
Work with DTP in the establishment of a coordinated network of ITS infrastructure within the airport, connected to DTP traffic management centres. Work with the Victorian and Commonwealth Governments to develop the MAR proposal to ensure a viable and attractive rail solution is delivered that can reduce congestion levels on the road network.	The impact will be reduced through engagement with DTP regarding management of traffic flows on the freeway network. Implementation of MAR has potential to reduce reliance on car travel to the airport.	Medium term	Minor	Likely	Medium
Work with DTP to monitor and review traffic growth on the Tullamarine Freeway over the forecast period, so that infrastructure to support aviation growth and residential development can be delivered in a timely manner Work with the Victorian and Commonwealth Governments to develop the MAR proposal to ensure a viable and attractive rail solution is delivered that can reduce congestion levels on the road network.	The impact will be reduced through close management and engagement with DTP and the Victorian Government in relation to further enhancements to the freeway network. Implementation of MAR has potential to reduce reliance on car travel to the airport.	Medium term	Moderate	Likely	Medium

Environment aspect & baseline condition (cont.)	Assessment of original impact (cont.)					
	Original Impact (cont.)	Mitigation inherent in design/practice (cont.)	Significance			
			Duration	Severity	Likelihood	Impact
Operation (cont.)						
Internal road network operations – 2031 Completion of Elevated Roads Project stages 1 & 2. 2031 daily traffic flows to and from airport (No Build) is total 165,000 trips.	Build is forecast to result in an increase in daily traffic flows to the airport by 12%. Travel through the network will be slightly slower, however there is no concern of traffic queues extending outside of lane storage lengths.	Additional infrastructure from Elevated Roads Project provides capacity, resilience and flexibility to manage peak demands.	Medium term	Minor	Likely	Medium
Internal road network operations – 2046 Completion of additional network enhancements in accordance with Master Plans. 2046 daily traffic flows to and from airport (No Build) is total 185,000 trips.	Build is forecast to result in an increase in daily traffic flows to the airport by 40%. Travel through the network could be moderately slower, although traffic queues should remain within lane storage lengths.	Ongoing planning of ground transport facilities and operations to optimise delivery of new infrastructure, management measures and initiatives.	Medium term	Moderate	Likely	Medium
Public transport operations Completion of Elevated Roads Project stages 1 & 2 will redistribute dropoff/pick-up traffic away from the ground forecourt, enabling improved bus movements. Public transport daily trips increase from 30,000 to 40,000 under No Build.	Public transport demand to increase under Build, slightly in 2031 (8 per cent) but a more significant 35% increase in 2046 due to passenger growth. This could result in increased crowding at bus stops and on-board buses, increasing dwell times which could impact travel time and reliability.	Ongoing planning and monitoring of public transport operations and implementation of improvement measures to address issues.	Medium term	Moderate	Likely	Medium
Active transport operations and safety Network and safety improvements for pedestrians and cyclists, in accordance with Master Plans.	Minimal impacts to pedestrian and cyclist activities, no impacts on pedestrian or cyclist facilities.	Ongoing planning of ground transport facilities to identify and optimise new infrastructure and management measures.	Medium term	Minor	Possible	Low

B8.8 CONCLUSION

B8.8.1 Construction phase assessment

The implementation of construction management mitigation measures, including the development of a CTMP, are considered to be effective in managing the construction traffic impacts.

The assessment of the construction of M3R indicates that construction traffic will have an overall negligible to minor adverse impact on the transport network.

B8.8.2 Operational phase assessment

The implementation of mitigation measures including ITS infrastructure and connectivity, and the delivery of internal airport road network projects, are considered to be effective in managing the adverse impacts of M3R. Ongoing monitoring of traffic growth on the Tullamarine Freeway will identify the need for further freeway enhancements to manage external network operations. On this basis, the impact of the operational phase is considered to be effectively mitigated and result in wider improvements.

Based on the expected implementation of the identified mitigation works, M3R will have an overall moderate to minor adverse impact on the surrounding transport network.

Mitigation and/or management measures (cont.)	Assessment of residual impact (cont.)					
	Residual Impact (cont.)	Significance				
		Duration	Severity	Likelihood	Impact
Operation (cont.)						
Ongoing monitoring and management of ground transport operations to optimise throughputs.	Any adverse operational impact is predicted to be reduced through management of the network and planning of future expansions.	Medium term	Negligible	Likely	Negligible
Coordinate the delivery of future internal road network infrastructure projects, to ensure they functionally integrate with external road network enhancements, particularly the proposed north-facing ramps and OMR/MAL projects.	The impact will be reduced through management of the network and delivery of future expansions.	Medium term	Minor	Likely	Medium
Work with DTP and bus operators to improve on-road public transport in line with increased passenger growth. Work with the Victorian and Commonwealth Governments to develop the MAR proposal to ensure a viable and attractive rail solution is delivered that can reduce congestion levels on the road network.	The impact will be reduced through enhancements and expansions of public transport services to meet demand and improve travel time reliability.	Medium term	Minor	Likely	Medium
Ongoing monitoring and management of ground transport operations to identify pedestrian and cyclist needs, including any safety measures.	Any adverse operational impact is predicted to be reduced through planning for pedestrians and cyclists as part of road network upgrades.	Medium term	Negligible	Possible	Negligible

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E1

Chapter B9
Ground-Based Noise and Vibration

Summary of key findings:

- The construction and operation of Melbourne Airport's Third Runway (M3R) will create different ground-based noise emissions during each phase.
- A detailed assessment has predicted the likely impacts of a worst-case scenario.
- Construction-noise impacts will be minimised by incorporating mitigation measures in the Construction Environmental Management Plan (CEMP).
- A small exceedance of operational noise objectives is predicted post opening of M3R with similar noise levels predicted in future scenarios.
- Vibration generated by construction activities is unlikely to exceed relevant criteria promulgated by contemporary guidelines. This is owing to the relatively large distances between vibration-generating activities and offsite receivers.


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B9.1
INTRODUCTION

This chapter addresses:

- Current ground-noise and vibration effects on the study area*
- Applicable legislation and policy requirements
- Potential impacts of M3R and associated assessment methodology and, where required, the measures to avoid, manage, mitigate and/or monitor these impacts.

**The study area is defined as an eight-kilometre radius from the airport that includes the closest "noise receivers" to M3R. It includes the full extent of predicted noise contours and is shown in* Figure B9.1.

B9.2
METHODOLOGY AND ASSUMPTIONS

This assessment has considered the following types and sources of noise and vibration during the construction and operation of M3R:

- Construction activities associated with the earthworks, pavement construction and associated infrastructure phases of M3R
- Existing ambient noise within the study area
- Surface access noise from road traffic associated with the airport, both now and in the future
- Ground-based aircraft movements: including aircraft on stand, aircraft taxiing to and from the runways, and routine engine testing in the designated areas.

Aircraft noise associated with aircraft operations from start of the take-off, to when the aircraft lands, is reported separately in **Chapter C4: Aircraft Noise and Vibration**.

The assessment of ground noise considers local circumstances and relevant guidance. This includes statutory and policy guidance issued by the Commonwealth and Victorian governments, and supporting guidance offered by national and international technical institutes (**Section B9.3**). The combined effects from ground noise and aircraft noise associated with the airport (i.e. the totality of ground-based noise and aircraft noise) are described in **Chapter C4: Aircraft Noise and Vibration**.

B9.2.1
Human response to noise

Excessive noise can interfere with speech communication, interrupt a wide range of different types of work (particularly activities requiring sustained concentration), disturb rest and relaxation, and (depending on the hours of operations) disrupt normal patterns of sleep. Continuous high noise levels for extended periods can also contribute to noise-induced hearing loss. Persistent lower noise levels outside residences can result in varying degrees of annoyance and "a feeling of displeasure" (Bergland et al, 1999).

Annoyance caused by noise is known to be affected by:

- Noise level and nature of noise: including whether the sound is constant, fluctuating, impulsive (causing a startle response), has low-frequency components (e.g. rumble/boom) or is high pitched (e.g. whine/whoosh)
- Occurrence of exposure: frequency of events and whether they are anticipated or randomly occur
- Time of day: can be influenced by acoustic factors (the relative level of background noise) and non-acoustic factors (the activities being disturbed and people's expectations of noise levels at different times).

While the 'loudness' of a noise is a purely subjective parameter, it is commonly accepted that a change in noise level of three decibels (dB(A)) is barely perceptible and that an increase or decrease of 10 dB(A) corresponds to a doubling or halving in perceived loudness respectively.

(These thresholds are derived from psychoacoustic testing.) A range of noise metrics (**Table B9.1**) is used to describe environmental noise. Some of these metrics have associated thresholds above which significant community effects are likely (WHO, 1999). These are generally associated with noise annoyance, although in recent years the health effects (other than sleep disturbance) of environmental noise are also a consideration and are considered in **Chapter D3: Health Impact**.

Table B9.1
Noise metrics

Symbol	Name	Description
$L_{Aeq(24h)}$	24-hour time average level	Average noise level across the entire day
$L_{A10(18h)}$	Daily noise level	Average of $L_{A10(h)}$ measurements between 0600-2200h – used to calculate road traffic noise
$L_{Aeq(15h)}$	Daytime noise level (also known as Ld)	Time average noise level across the day (0700-2200h)
$L_{Aeq(9h)}$	Night-time noise level (also known as Ln)	Time average noise level across the night (2200-0700h)
L_{AFmax}	Maximum noise level	Maximum instantaneous noise level in a given time interval
$L_{Aeq(15\ min)}$	15-minute average noise level	Time average noise level often used to describe construction and other forms of noise

At locations remote from the airport, noise generated by ground-based activities is typically much lower than airspace noise. The specific consideration of the health impacts, aside from annoyance, of ground-based sources is therefore excluded from the scope of this chapter.

B9.2.2
Human and structural response to vibration

Vibration is described as either 'transient' or 'continuous'. Transient vibration is temporarily sustained vibration that may be frequently repeated (e.g. impact piling). Continuous vibration is maintained for an indefinite period (e.g. drilling or tunnelling). Low and medium levels of vibration can be felt and may cause annoyance, particularly at night. Building fittings may also rattle and sensitive equipment may be affected. Higher levels of vibration may cause damage to buildings. Damage may be cosmetic, such as cracked plaster, but in rare cases structural damage may occur, such as the cracking of floor slabs or foundations.

Although the perception of vibration often leads to concerns of building damage, levels that can be felt are often an order of magnitude below the minimum threshold to cause damage to properties.

The impact of vibration depends on whether the vibration is continuous or transient. And because local geology has a significant effect on the transmission of vibration through the ground, the same activity at different locations may produce different levels of vibration. Furthermore, the type of building construction (including its foundations) affects the resulting internal vibration.

Vibration can be measured in several ways: as displacement, velocity or acceleration. For construction vibration, levels are typically presented in terms of the Peak Particle Velocity (PPV) in units of millimetres per second (mm/s).

B9.2.3
Methodology overview

The study area is defined as an eight-kilometre area from the boundary of the airport. It encompasses the closest noise receivers to M3R (**Section B9.4.1**) and captures the extent of the project's noise objectives. Outside the study area, noise is predicted to be below the noise objectives.

While it is expected that ground-based noise and vibration effects will be localised within three kilometres of the airport boundary, the extended area includes the principal surface access roads that extend beyond the immediate area surrounding the airport.

B9.2.3.1
Assessment scenarios

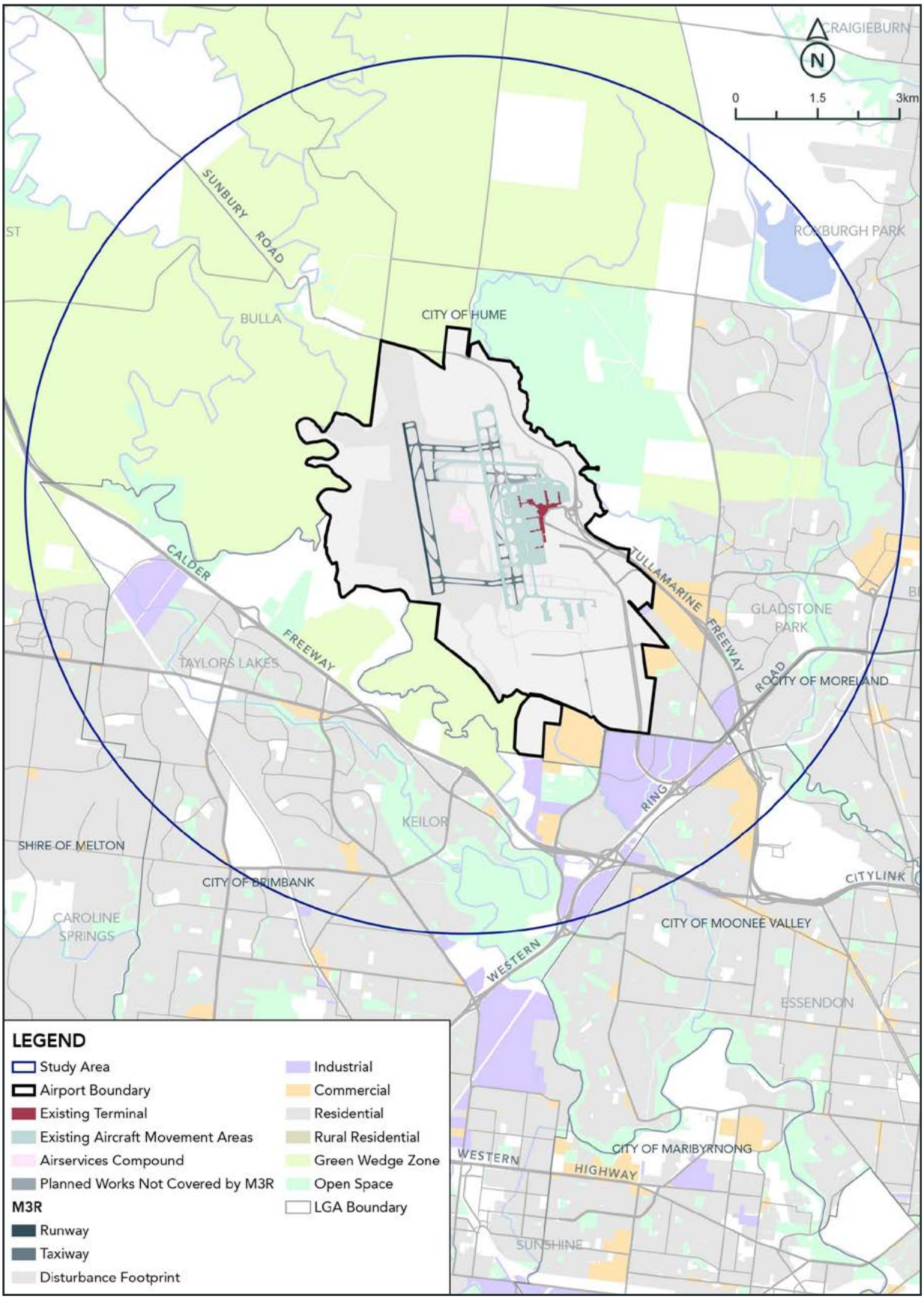
M3R has several defined assessment years which represent opening year and five and 20-years post-opening (**Table B9.2**) (**Chapter A8: Assessment and Approvals Process**).

The principal assessment scenario is a comparison of the forecast noise and vibration exposure before and shortly after opening the new infrastructure.

Table B9.2
M3R assessment years

Timeframe	Description	Year
Current	Existing runway configuration	2019
Opening year	Existing configuration with the M3R operational	2026
Five years	Five years from operational date	2031
20 years	Twenty years from operational date	2046

Figure B9.1
Ground-based noise study area



B9.3
STATUTORY AND POLICY REQUIREMENTS

Melbourne Airport is located on Commonwealth land. The Commonwealth Airports Act 1996 (Cth) (Airports Act) and Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) are the key pieces of legislation setting the regulatory framework for M3R and this assessment (see **Chapter A8: Assessment and Approvals Process** for details).

This assessment also takes guidance from Victorian environmental-planning instruments, policies and guidelines in developing appropriate noise and vibration objectives.

B9.3.1
Commonwealth

This section discusses Commonwealth requirements relevant to the assessment of ground-based noise and vibration from Melbourne Airport.

B9.3.1.1
Airports Act 1996

The preparation of a MDP as required by the Airports Act is the main approval document for M3R.

B9.3.1.2
Airports (Environment Protection) Regulations 1997

Supporting the Act are the Airports (Environment Protection) Regulations 1997 (Cth) (AEP Regulations). The latter provide a system of regulation and accountability for activities at airports that generate excessive noise and other environmental factors, and to promote improving environmental management practices.

Part 2 of Schedule 4 (Excessive Noise – Guidelines) of the AEP Regulations identifies the following sources of noise to be considered:

- Construction, maintenance or demolition of a building or other structure
- Road traffic on the site of an operator of an undertaking at an airport
- Rail traffic
- Ground-based engine testing of aircraft (including use of Auxiliary Power Units)
- Other sources: including aircraft refuelling and any activity not requiring an engine to be running (e.g. maintenance), operation of plant/machinery, passenger/freight movements to and from aircraft, and operation of fixed audible alarm or warning systems.

The Regulations explicitly do not apply to "noise generated by an aircraft in flight or when landing, taking off or taxiing at an airport".

The Regulations require that the operator of an undertaking at an airport take all reasonable and practicable measures:

- To prevent the generation of offensive noise from the undertaking; or
- If prevention is not reasonable or practicable – to minimise the generation of offensive noise from the undertaking.

In forming an opinion as to whether a noise is offensive, regard must be given to:

- The volume, tonality and impulsive character (if any) of the noise
- The time of day, and duration, of the noise
- Background noise levels at the time the noise is generated.

Schedule 4 (Excessive noise – Guidelines) of the Regulations provides guidance on what is considered excessive noise.

B9.3.2
Victorian Guidelines

The new Victorian environment protection legislation the Environment Protection Act 2017 as amended by the Environment Protection Amendment Act 2018 commenced on 1 July 2021. The new legislation is given effect by the Environment Protection Regulations 2021 (the new Regulations). The new Regulations replace the following legislative instruments:

- State Environment Protection Policy (Control of noise from Commerce, Industry and Trade), SEPP N-1
- State Environment Protection Policy (Control of Music Noise from Public Premises), SEPP N-2
- Environment Protection (Residential noise) Regulations 2018
- Environment Protection (Vehicle emissions) Regulations 2013.

The new Regulations set out a noise framework for residential, commercial, industrial and trade premises, as well as entertainment venues and events. The framework defines unreasonable noise, aggravated noise and other related concepts in relation to activities at these types of premises.

The new regulatory framework introduces a new reference document Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (the Noise Protocol). The Noise Protocol outlines EPA's approach to the determination of noise limits and to the measurement, prediction and analysis of noise.

Noise limits established under the Noise Protocol take into account a range of factors including the existing noise levels and land zoning of noise sensitive receivers and their immediate surrounds. Establishing operational noise limits at noise sensitive receivers close to the airport boundary is difficult since the Noise Protocol does not account for Commonwealth land.

Similar to previous legislation, the new Regulations exclude noise from aircraft operations except for ground maintenance activities (i.e. engine testing). The new Regulations do not identify aircraft ground noise as a separate source of noise, nor do they include any guidance on noise limits for ground noise from aircraft; rather the new Regulations only discuss the noise from aircraft in flight. In this regard, the distinction between aircraft operations to which quantitative objectives of the Noise Protocol would be intended to apply, and those activities that would be exempt, is expected to mirror the AEP Regulations (i.e. objectives would not apply to noise generated by an aircraft in flight or when landing, taking off or taxiing at an airport). As such, "operational noise" is herein used to describe the airport's operations excluding these explicit aircraft operations.

B9.3.3 Guidance

This section sets out the relevant noise standards and guidance which are considered in assessing the impacts of M3R regarding ground noise and vibration.

The following guidelines and standards are applicable as they help to inform the approach to assessing ground-based noise and vibration. They are considered best practice:

- Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, Publication 1826.4 (May 2021)
- Civil construction, building and demolition guide, EPA Publication 1834, EPA Victoria (November 2020)
- World Health Organisation 'Guidelines for community noise' (1999)
- Australian/New Zealand Standard AS/NZS 2107:2016, Acoustics – Recommended design sound levels and reverberation times for building interiors
- Australian Standard AS 2021:2015, Acoustics – Aircraft noise intrusion – Building siting and construction
- Australian Standard AS 2436-2010, Guide to noise and vibration control on construction, demolition and maintenance sites
- British Standard BS 5228.1-2009, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
- British Standard BS 5228.2-2009, Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration
- German Standard DIN 4150-3:2016-12 Vibration in buildings – Part 3: Effects on structures
- Department of Transport (Welsh Office), Calculation of road traffic noise, HMSO, 1988.

B9.4 EXISTING CONDITIONS

The existing airport has two runways with four general approach/departure directions.

The airport terminals are to the east of the existing north-south runway (16L/34R).

Operational airport ground noise is generated by aircraft movements from and to the runways, for both scheduled passenger and freight traffic from the various terminals and freight areas.

A description of the existing airport is included in **Chapter A1: Introduction**.

B9.4.1 Sensitive receivers

Melbourne Airport is surrounded by sparse settlements made up of single dwellings, and the majority are a significant distance from the airport. The main residential areas are:

- Keilor Lodge, which is approximately 2.7 kilometres to the south-west of the airport
- Greenvale, which is approximately 2.7 kilometres to the north-east of the airport
- Westmeadows, which is approximately two kilometres to the east of the airport terminals.

Within each of these residential areas there is a number of schools, including early learning facilities, primary schools and colleges. There are several non-residential areas which would also be considered noise-sensitive, including two golf courses and the adjacent Woodlands Historic Park. While these open spaces have been rated against the relevant construction and operational criteria, the significance of the impacts has considered the transient usage of these spaces. While there are other non-residential locations (e.g. Organ Pipes National Park) their distance from the airport means noise levels are not significant. The assessment of potential impacts is reported in Section B9.6 (Construction) and Section B9.7 (Operation).

Table B9.3 summarises the main noise-sensitive receivers close to the airport (within a radius of 2.5 kilometres of the airport – see **Figure B9.2**). These receivers are indicative of single-receptor locations, and multiple locations representative of groups of receivers. Where road names are provided within the table, they indicate a cluster of dwellings.

Figure B9.2
Receiver locations

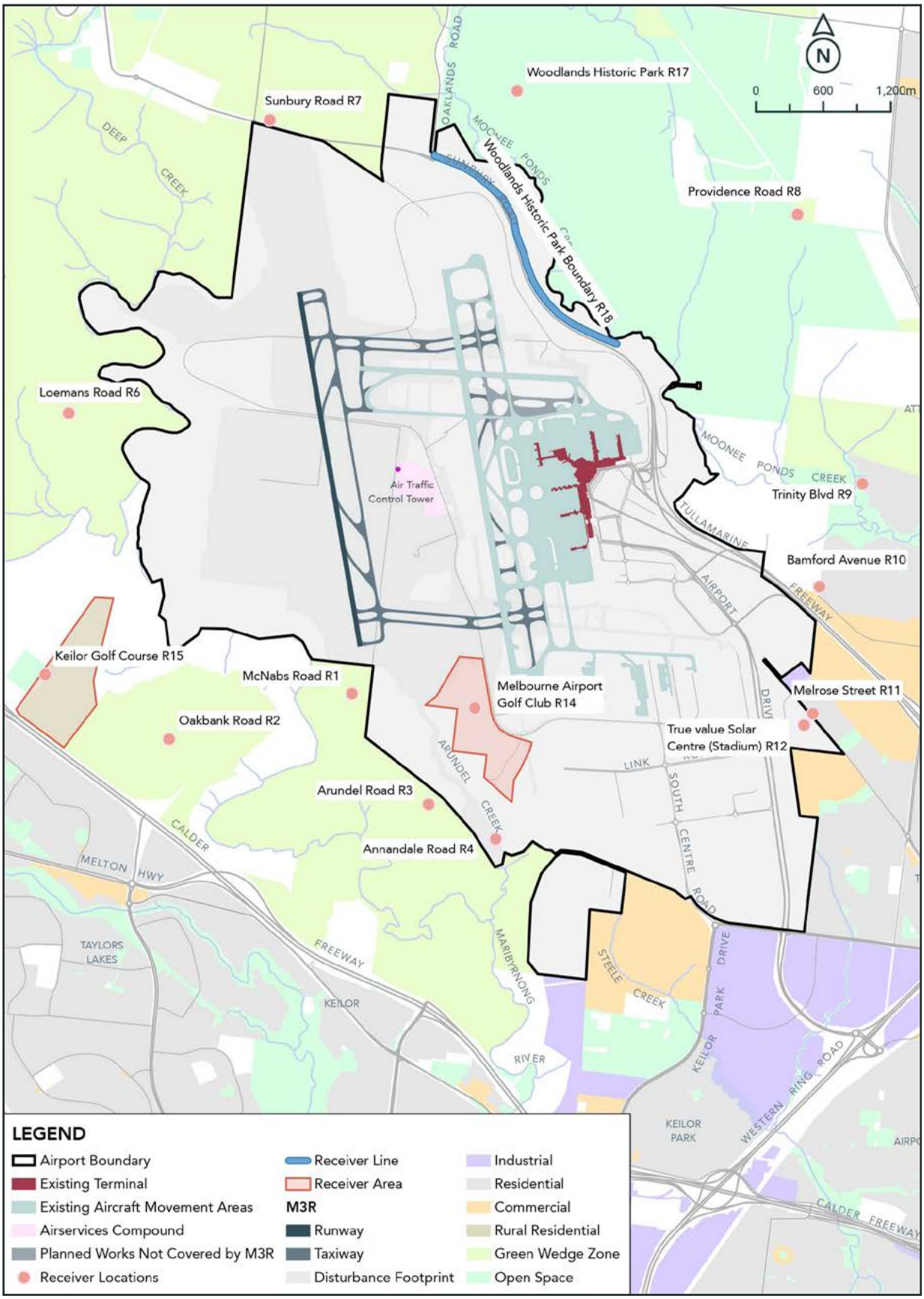


Table B9.3
Main receivers within 2.5 kilometres of airport boundary

Receiver	Address	Receiver type	Approximate distance to boundary of construction work site (m)
R1	McNabs Road	Residential	450[1]
R2	Oakbank Road	Residential	1,900
R3	Arundel Road	Residential	1,400
R4	Annandale Road	Residential	2,000
R5	Old Calder Highway	Residential	3,000
R6	Loemans Road	Residential	3,100
R7	Sunbury Road	Residential	1,000
R8	Providence Road	Residential	3,300
R9	Trinity Boulevard	Residential	3,600
R10	Bamford Avenue	Residential	3,100
R11	Melrose Drive	Residential	2,500
R12	True Value Solar Centre (stadium)	Recreational	2,500
R13	Melbourne Airport Golf Club (green)	Recreational	900
R14	Melbourne Airport Golf Club (clubhouse)	Recreational	1,400
R15	Keilor Golf Course (green)	Recreational	2,200
R16	Keilor Golf Course (clubhouse)	Recreational	2,400
R17	Woodlands Historic Park – main building	Recreational	2,400

1.An additional dwelling has recently been erected at 95-105 McNabs Road that is approximately 40 metres from the construction site. This building has occurred despite opposition by Melbourne Airport on the grounds of obstacle and noise impacts for its occupier. Without requisite planning approval it is therefore not explicitly considered in this impact assessment.

Table B9.4 provides an indication of the estimated noise environment for 2019 across the daytime and night-time periods respectively. Noise levels during the busy night-time hour are typically one to five dB(A) lower than during the day. The data only consider aircraft noise sources.

Table B9.4
Typical busy hour existing receiver noise levels 2019

Receiver	Address	L_{Aeq} dB(A)	
		Day (0700-2200)1	Night (2200-0700)2
R1	McNabs Road	50	47
R2	Oakbank Road	43	42
R3	Arundel Road	47	45
R4	Annandale Road	45	44
R5	Old Calder Highway	39	38
R6	Loemans Road	45	42
R7	Sunbury Road	48	45
R8	Providence Road	45	45
R9	Trinity Blvd	47	46
R10	Bamford Avenue	48	47
R11	Melrose Street	47	46
R12	True value Solar Centre (Stadium)	30	45
R13	Melbourne Airport Golf Club (green)	49	52
R14	Melbourne Airport Golf Club (club house)	46	47
R15	Keilor Golf Course (green)	47	40
R16	Keilor Golf Course (Club House)	48	42
R17	Woodlands Historic Park - main building	47	44

1. Typical busy hour daytime operations have been derived from historical data 0800-0900
2. Typical busy hour night-time operations have been derived from historical data 2300-0000

B9.4.2
Existing noise environment

Baseline noise levels vary across the study area, with those closest to the airport and main road infrastructure experiencing the highest noise levels. Long-term noise data covering several years, and shorter-term data over a few months, was acquired from Airservices Australia. The information provides an indication of the variation of noise levels across rural and urban locations, some of which are located near local roads. The Environmental Monitoring Unit (EMU) locations and primary noise sources are detailed in Table B9.5 together with the monitoring periods. A plan showing their location is included in Figure B9.3.

The existing noise environment data presented in this section was collected at the commencement of third-runway assessments in 2015. Ambient and background noise levels are unlikely to change significantly over time, except where a major development such as a new motorway or railway occurs. As such, the data remains relevant for the current assessment.

Project-specific existing noise data has also been measured for M3R and is discussed later in this section.

Table B9.5
ASA Environmental Monitoring Unit (EMU) locations

Environmental Monitoring Unit	Monitoring details	Noise environment
EMU 3 Keilor East (long-term)	Two-year period from 2013 until 2015	Road traffic and overflying aircraft
EMU 60 Keilor Bonfield (long-term)	Two-year period from 2013 until 2015	Calder Freeway and overflying aircraft
EMU 50 319 Keilor (short-term data available from mid-October 2014 only)	20 Oct 2014 until 1 Jan 2015	Road traffic, air handling equipment and aircraft
EMU 6 Coolaroo (long-term)	Two-year period from 2013 until 2015	
EMU 61 Thomastown (long-term)	Two-year period from 2013 until 2015	Road traffic and overflying aircraft
EMU 52 321 Diggers Rest (short-term – data available mid-October 2014 only)	20 Oct 2014 until 1 Jan 2015	Occasional road traffic and overflying traffic
EMU 64 Diggers Rest (long-term) – monitor decommissioned 20 May 2013	20 Oct 2014 until 1 Jan 2015	Road traffic and overflying aircraft

Airservices noise-monitoring information helps to illustrate the noise levels around the airport, covering several years' data. From this information, the study is able to observe the effects of variations in noise levels due to those factors that affect noise transmission such as weather.

Based on the entire dataset, background noise levels vary from around 25-40 dB(A) during the night-time up to 55-60 dB(A) during the daytime. Background noise levels during the evening are within the range 40-45 dB(A).

Analysis of EMU3 and EMU6 showed an elevation of background and ambient noise levels during the winter months, which is believed to be due to a combination of increased wind speeds (wind-induced noise) and potential elevation in noise levels from road traffic during wet road conditions. The data also showed aircraft (air noise) events as short-term elevations in the prevailing background noise levels.

Apart from M3R and the proposed Melbourne Airport Rail, there are no other known developments in the study area which would significantly alter the existing noise environment. The Melbourne Airport Rail link is likely to increase ambient noise levels in areas near to the railway, however background noise levels are unlikely to be affected. By omitting these increases in ambient noise, the current assessment may be considered slightly conservative. Changes in road traffic due to natural growth would also not result in any significant increase in the ambient and background noise environment as it would take at least a doubling in traffic volume to result in a perceptible change in the road traffic noise environment. Therefore, the data presented in this section can be assumed to be representative of the future noise environment.

The detailed noise data at each Airservices EMU site was analysed. It was found that EMU 3 – Keilor East displayed a typical seasonal and diurnal profile of the background noise data ($L_{A90,}$1hr). The data set was analysed in more detail to compute L_{A90} for each day, evening and night-time period. The data was analysed using a 25th percentile calculation of the $L_{A90,1hr}$ (i.e. the lowest 25 per cent of $L_{A90,1hr}$ measurements for each period, on each day). The approach is considered to be a conservative means of defining typical residential background noise levels. In summary, the background noise level during the day (0700-1800h) is approximately 45 dB(A), evening (1800-2200h) approximately 41 dB(A) and at night (2200-0700 h) approximately 39 dB(A).

Away from flight paths, selective noise monitoring was undertaken at key locations to establish the ambient noise levels during the day, evening and night periods. To enable a reliable assessment, monitoring was undertaken at eight locations to identify the source of noise and to enable a representative dataset for rating the existing noise environment and consequently M3R.

For each of the locations, monitoring was conducted when noise metrics had stabilised and during lulls in aircraft activity. Typically, this occurred within 30 minutes of arriving at the site and commencing observations. Monitoring was undertaken for at least 15 minutes; in most situations monitoring continued for longer periods.

Monitoring was conducted between 13 and 16 September 2015 at the locations detailed in **Table B9.6**. Noise monitoring was undertaken using a logging noise meter (Brüel & Kjær Type 2250) and the results are presented in **Table B9.7**. During the surveys the weather conditions were favourable for noise monitoring (albeit wind speeds were marginally higher than five metres per second during the day and evening periods).

Figure B9.3
Monitoring location plan – Airservices Environmental Monitoring Units

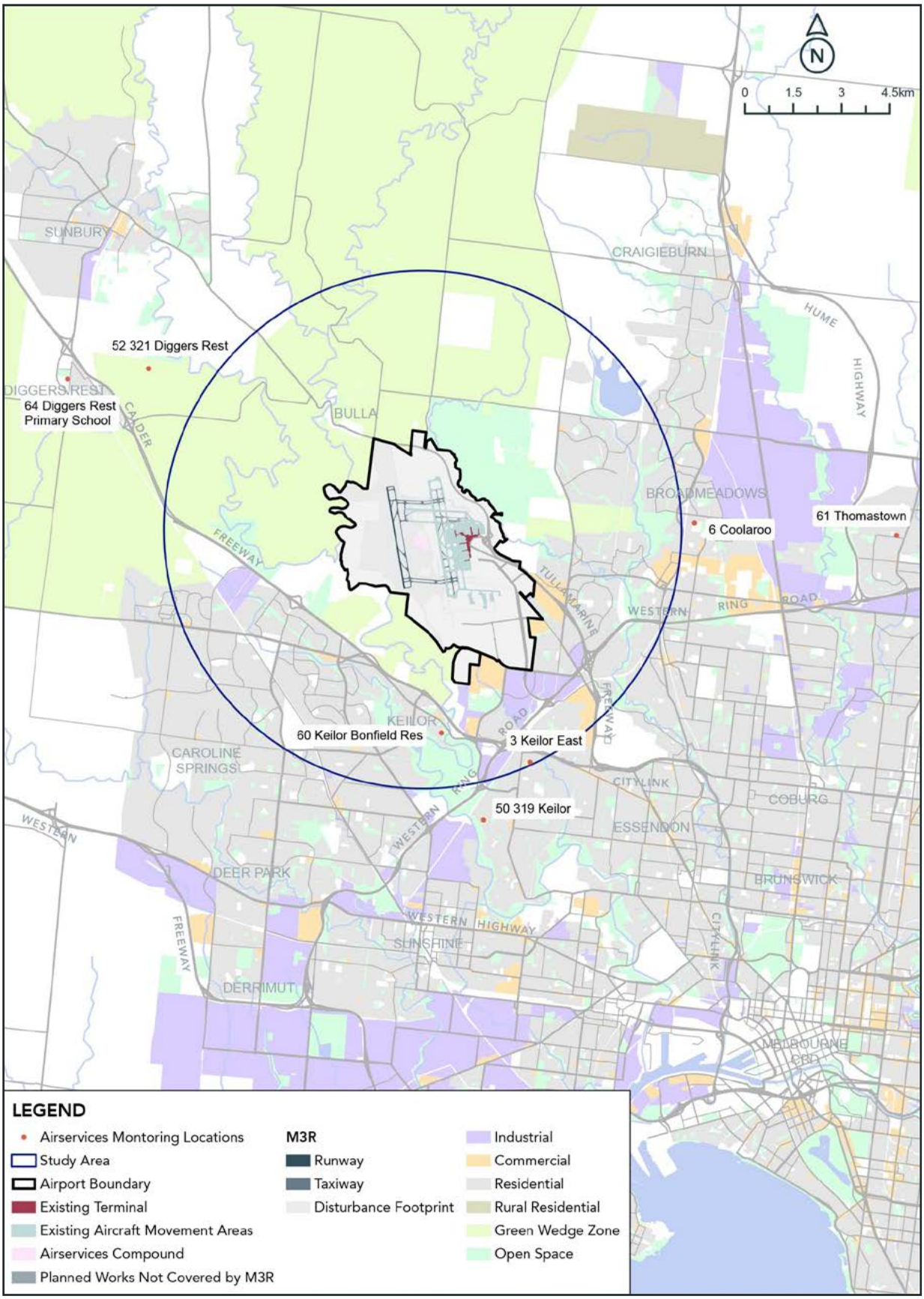


Table B9.6
Ambient noise monitoring locations

Location	Address	Description of noise environment
1	Woodlands Historic Park car park	Road traffic, airport operations
2	Sunbury Road, adjacent to emergency access gate 4	Road traffic, bird song, distant aircraft activity
3	Bulla, Coghill Street (bottom of)	Road traffic from Sunbury Road, neighbourhood noise (dog barking), bird song
4	295 Loemans Road (entrance)	Local road traffic, airport operations
5	Kings Road (Keilor Gold Course)	Local road traffic, airport operations, bird song
6	51 Overnewton Road	Local road traffic and road traffic from Calder Freeway, distant airport operations, bird song
7	95 McNabs Road (on road side)	Local road traffic, airport operations, bird song
8	True Value Solar Stadium (car park)	Local road traffic and road traffic from Calder Freeway, airport operations, bird song

Table B9.7
Summary of ambient noise data

Location	L_{A90}/dB			L_{Aeq}/dB		
	0700-1800	1800-2200	Post-2200	0700-1800	1800-2200	Post-2200
1	43	40	39	59	51	45
2	48	45	41	62	59	47
3	49	46	39	60	58	46
4	42	41	37	58	53	49
5	48	45	38	59	54	50
6	48	44	39	57	55	51
7	42	39	36	55	48	46
8	48	47	40	63	54	53
Average	**46**	**43**	**38**	**59**	**54**	**48**

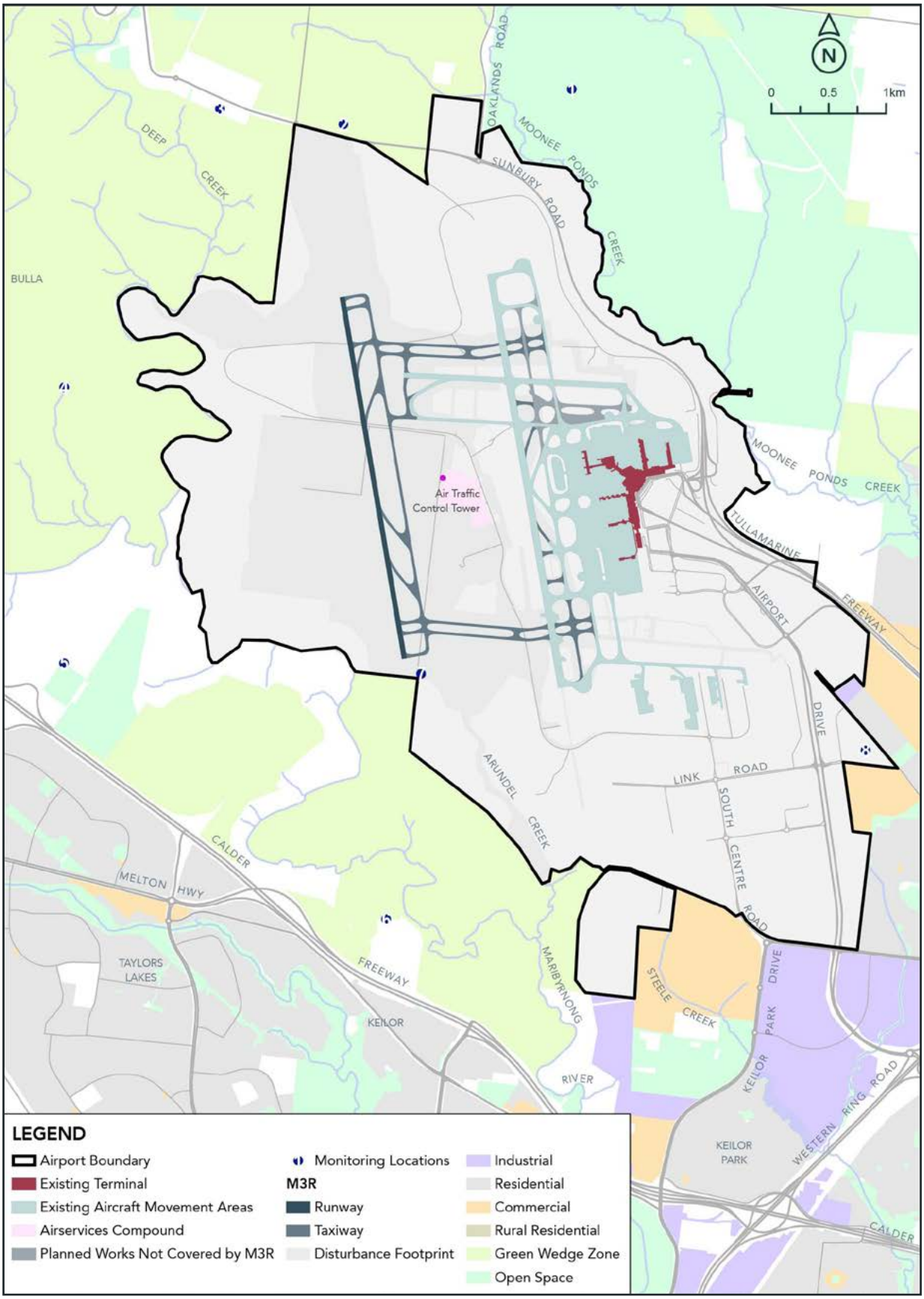
The data above shows a variance in the noise levels during the day, evening and night when measured at each location.

Having regard to the noise levels presented in **Table B9.7**, and based on a conservative assessment, the following background noise levels have been used to represent the three time periods:

- Day (0700-1800h) – $L_{A90,t}$ 45 dB(A)
- Evening (1800-2200h) – $L_{A90,t}$ 40 dB(A)
- Night (2200-0700h) – $L_{A90,t}$ 38 dB(A).

During periods without arrivals or departures, general airport noise is audible at some locations as described above. However, the presence of local road-traffic noise and noise from the main freeways comparatively generates higher levels of environmental noise, such that airport noise is masked for most of the time.

Figure B9.4
Temporary noise monitoring locations



B9.4.3
Existing operational noise

Existing operational ground noise contours have been established as part of this assessment. They are described as follows and shown in **Figure B9.5** to **Figure B9.8**. The contours have been derived from 2019 baseline movement data and reflect the typical-busy-hour L_{Aeq} for the day (0800-0900) and night (2300-0000) periods respectively.

A single scenario representing all operating modes (i.e. runways being used for arrivals and departures) has been used for each time period, noting that taxiway operations are largely reciprocal - carrying outbound traffic in one mode and inbound in another. Terminal-related sources are independent of the operating mode.

Wind speed and direction will affect the propagation of noise from the source to the receiver. As stated in **Section B9.7.1**, the ISO 9613 algorithm used in the noise modelling includes a downwind component. Attenuation of noise due to foliage has not been included in the ground noise modelling. Research regarding the potential for noise attenuation due to scattering and signal interference from foliage indicates that it may reduce noise impacts. A conservative approach, not including any attenuation of noise due to foliage in the modelling, has been taken.

These noise contours (which reflect the four runway directions) show that aircraft ground noise is apparent along the length of each taxiway. Noise from aircraft at stand is also apparent from:

- Running of Auxiliary Power Units (APUs) for those aircraft not connected to power on the stand using Fixed Electrical Ground Power (FEGP)
- Starting of engines after push back (i.e. once the aircraft has left the stand but is not yet under power)
- When parking at stand under power.

Noise at stand is not a large component of aircraft ground noise during the day. However, at night, when movements are fewer, noise from aircraft at stand can be audible at locations around the airport due to generally lower background and ambient noise levels.

Figure B9.5 and **Figure B9.6** present the modelled ground noise contours for busy day- and night-time hours respectively. These calculations include noise generated by aircraft at the stand (APUs) but exclude taxiing and other mobile aircraft sources.

Figure B9.7 and **Figure B9.8** present the same busy-hour scenarios including taxiing.

The noise contours accord with the receiver noise levels presented in **Table B9.4** and also the ambient noise measurements discussed in **Section B9.4.2** (in particular **Table B9.7**).

Figure B9.5
Typical busy hour daytime operations 2019 ground noise contours (excluding taxiing)

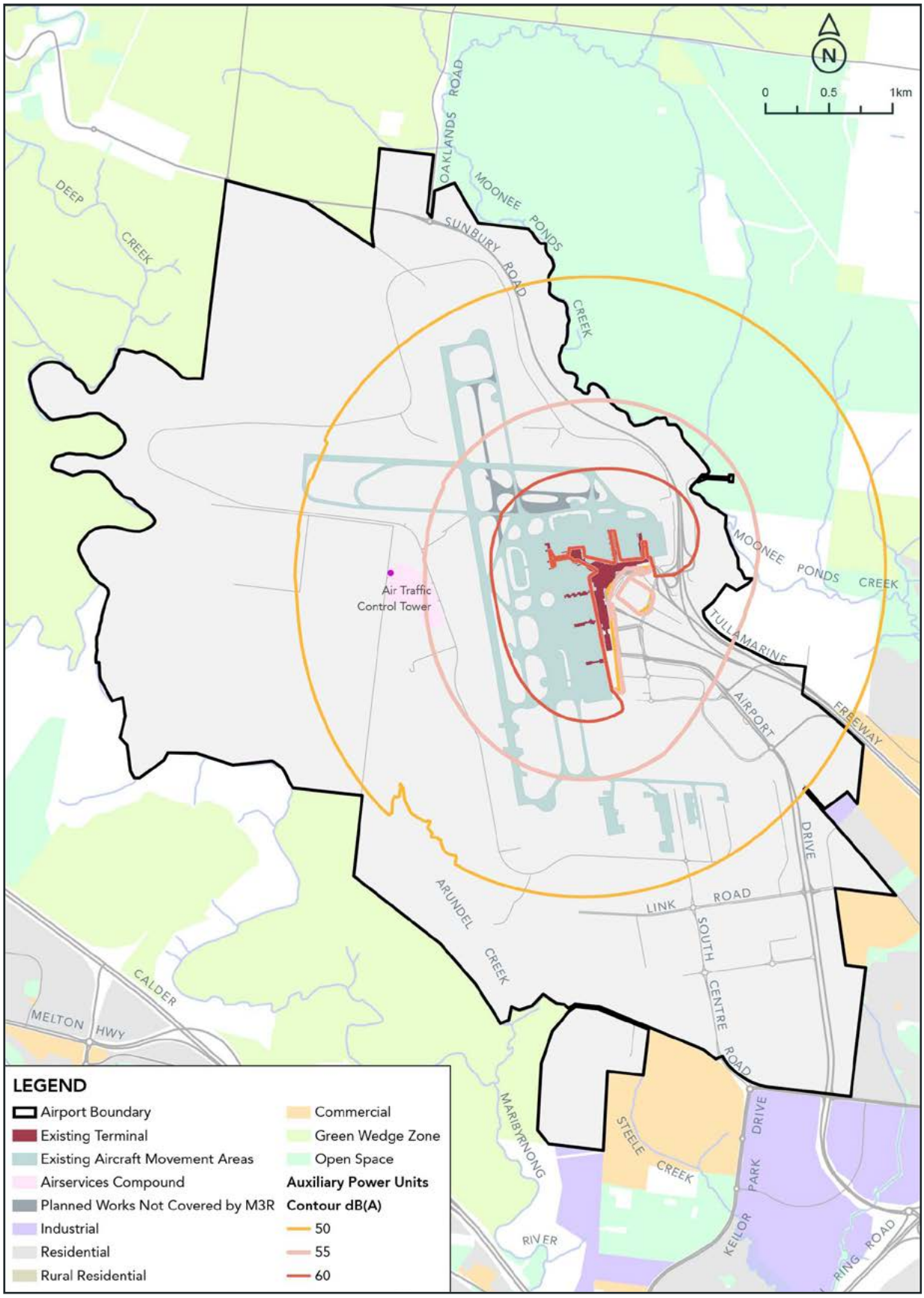


Figure B9.6
Typical busy hour night-time operations 2019 ground noise contours (excluding taxiing)

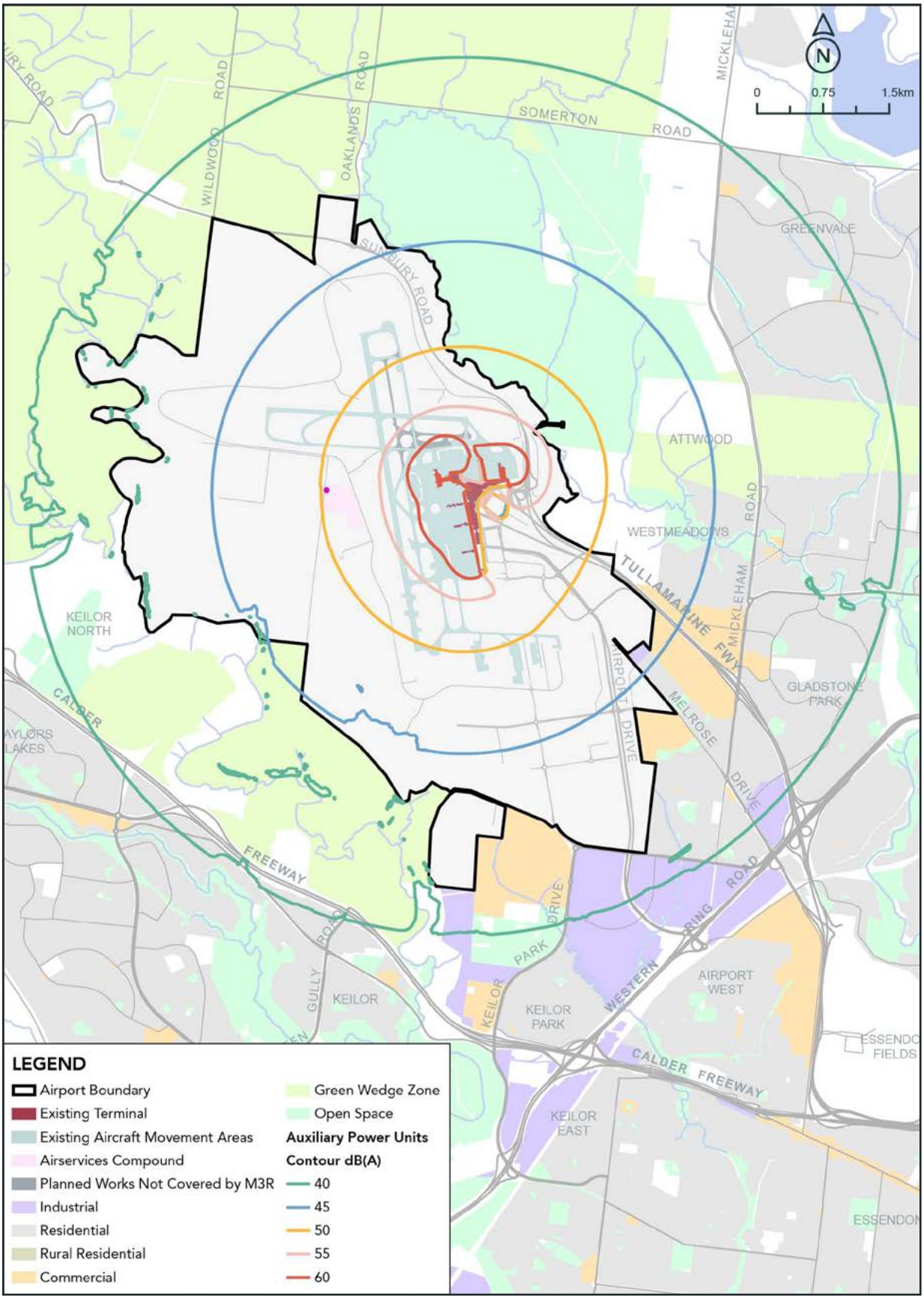


Figure B9.7
Typical busy hour daytime operations 2019 ground noise contours (including taxiing)

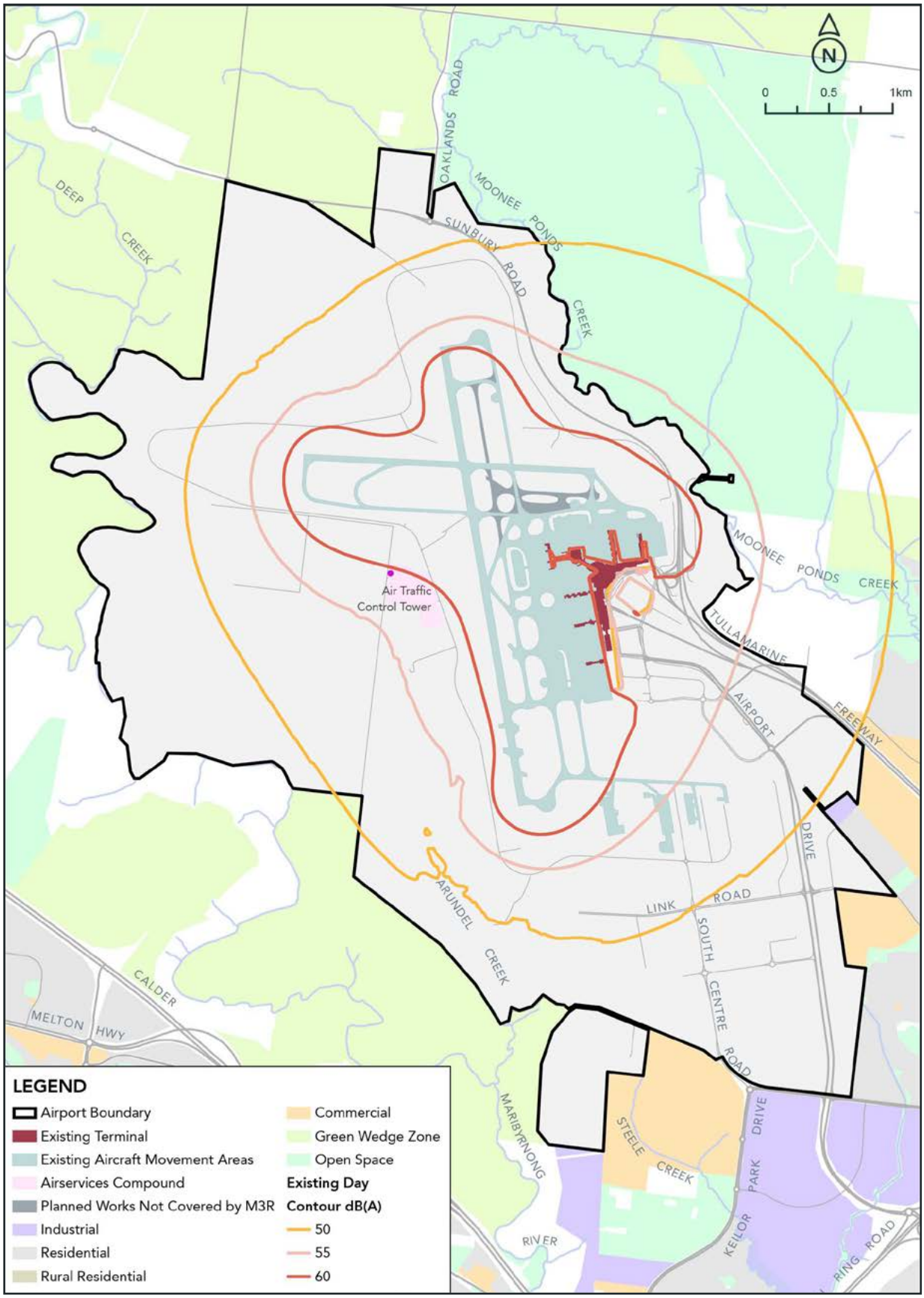
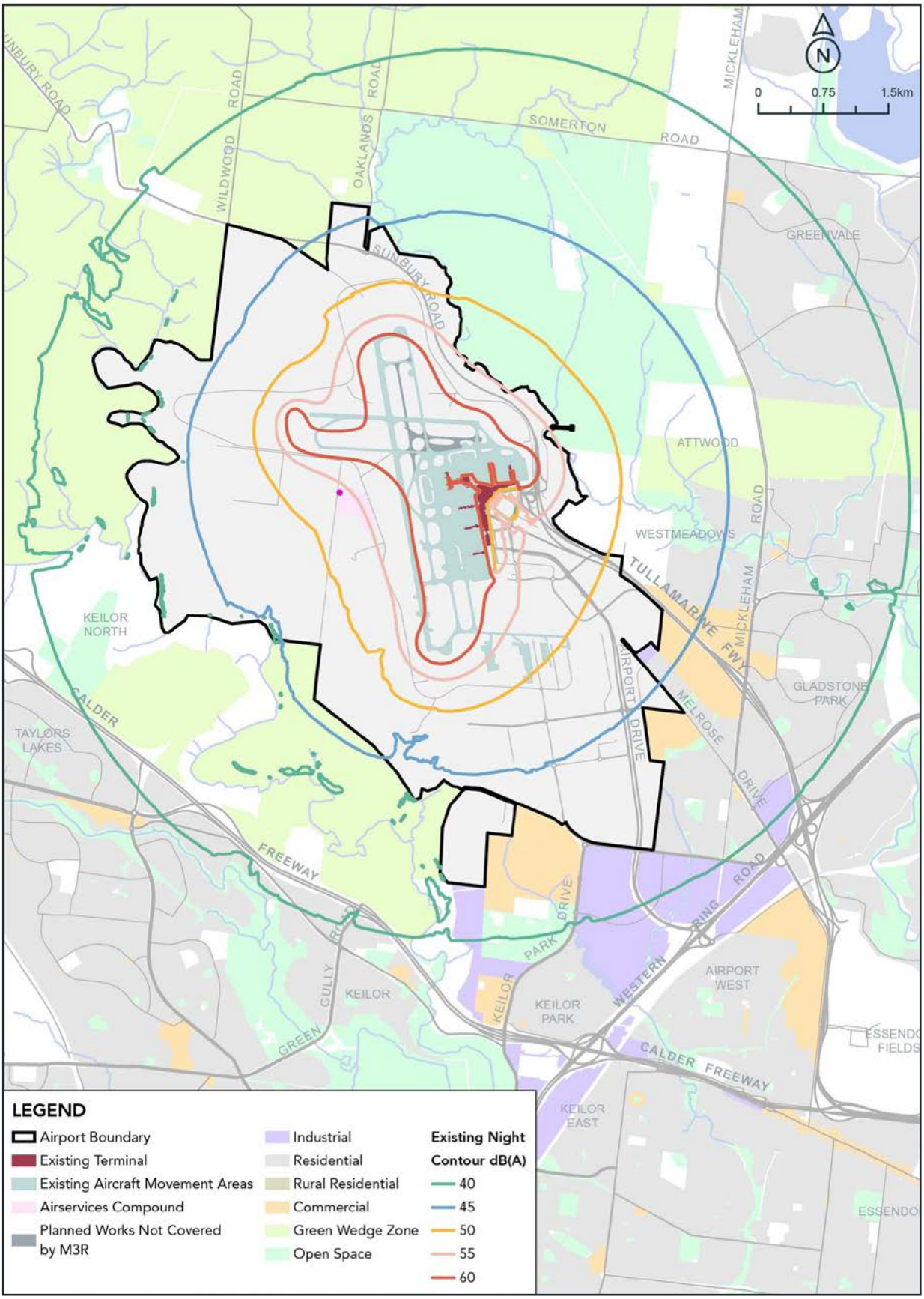


Figure B9.8
Typical busy hour night-time operations 2019 ground noise contours (including taxiing)



B9.5
DESCRIPTION OF SIGNIFICANCE CRITERIA

This section establishes the relevant construction and operational noise and vibration criteria that will be used to assess the impacts of M3R. In addition, a rating of significance has been developed by reference to these criteria and from experience of similar airport-development projects.

B9.5.1
Construction controls

The AEP Regulations provide a target level of 75 dB(A) at the site of a sensitive receptor. This represents a noise level likely to cause significant annoyance if sustained for long periods. Given the anticipated duration of construction activities, it is therefore appropriate to consider further noise objectives to control construction noise.

The EPA *Civil construction, building and demolition guide*, Publication 1834 (EPA, 2020) provides guideline noise levels for construction noise, including long-term construction noise. These guidelines are detailed in Table B9.8 below.

The AEP Regulations reference $L_{A10(15\ min)}$ whereas EPA guidelines reference $L_{Aeq(15\ min)}$. In practice, the two noise descriptors are very similar for construction noise, although small differences may be observed (up to three dB(A)). For simplicity, the EPA's L_{Aeq} descriptor has been adopted in this assessment.

EPA 1834 does not provide guidance on suitable daytime construction guideline noise levels. Therefore, in preparing this MDP, Melbourne Airport has reviewed the impact of daytime construction taking into consideration the approach most often adopted in similar situations (i.e. to reduce the target noise level by five to 10 dB(A)) and has adopted it as the M3R daytime construction noise goal. Accordingly, to provide a pragmatic approach to assessing long-term construction activities, the construction noise objective during the day (0700-1800h) has been set at 65 dB(A) $L_{Aeq(15min),}$ to be achieved at residential dwellings and other noise-sensitive receptors (excluding parks and other open spaces).

Table B9.8
EPA 1834 guideline noise levels

Time period	Applicable hours	Guideline noise levels, $L_{Aeq(15\ min)}$	
		Up to 18 months after project commencement	18 months or more after project commencement
Normal working hours	0700-1800h Monday to Friday 0700-1300h Saturday	No specific guideline noise levels measures apply	
Weekend/evening work	1800-2200h Monday to Friday 1300-2200h Saturday 0700-2200h Sunday and public holidays	Noise level at any residential premises not to exceed background noise (L_{A90}) by 10 dB(A) or more	Noise level at any residential premises not to exceed background noise (L_{A90}) by 5 dB(A) or more
Night	2200-0700h Monday to Sunday	Noise is to be inaudible within a habitable room of any residential premises	

Table B9.9
Construction noise objectives

Time period	Applicable hours	Construction noise objectives $L_{Aeq(15\ min)}$	Comment
Normal working hours	0700-1800h Monday to Friday 0700-1300h Saturday	65	Reduction of 75 dB L_{A10} by 10 dB(A) to achieve a project-defined noise goal
Weekend/evening work	1800-2200h Monday to Friday	50	Based on 45 dB L_{A90} – note 1
	1300-2200h Saturday	50	Based on 45 dB L_{A90} – note 2
	0700-2200h Sunday and public holidays	45	Based on 40 dB L_{A90} – note 3
Night	2200-0700h Monday to Sunday	40	Based on sleep disturbance effects

1. Derived from measured weekday data 1800-2200h
2. Derived from Airservices data – typical long-term average level on Saturdays (see section B9.5.2)
3. Derived from Airservices data – typical long-term average level on Sundays (excludes public holidays as it is unlikely that works would take place during these periods) (see section B9.5.2)

For all other time periods, EPA 1834 establishes construction noise objectives based on indicative background noise levels. Background noise data has been recorded within the eight-kilometre study area and the data has been used to determine airport-wide construction noise criteria for M3R. **Table B9.9** details M3R's construction noise criteria and objectives. With respect to the night-time objective, EPA 1834's noise guideline promulgates noise to be inaudible within habitable rooms.

(Inaudibility is a subjective descriptor of noise and will vary according to the prevailing background noise environment and the sound reduction performance of a building.)

The fundamental aim of controlling noise at night is to prevent sleep-disturbance effects. The WHO considers adverse effects on sleep occur with outdoor L_{Aeq} values of 40 dB(A) (WHO, 1999). Taking into account the sound reduction of an open window, this will result in internal noise levels of 30 dB(A) within bedrooms (based upon a 10 dB reduction for a partially open window). This design level accords with AS NZS 2107:2016 for sleeping areas at night in suburban areas influenced by transportation noise.

Table B9.10 provides guideline values for perception of vibration.

For the assessment of human comfort from vibration, industry best practice is to use Vibration Dose Value (VDV). It considers vibration level, frequency and duration; and is complex in its prediction and measurement. NSW DEC "Assessing Vibration: A technical guideline" presents recommended vibration limits for continuous vibration in different units, including PPV. Higher vibration levels are likely to be acceptable for transient vibration.

Suitable vibration and airblast criteria (derived from BS 5228-2:2009, AS 2187-2:2006 and DIN 4150-3:2016-12) for human comfort are provided in **Table B9.11**. Construction impacts will be managed to comply with the criteria stipulated in these standards. If either measured or predicted vibration and airblast levels exceed the criteria, a suitably qualified expert will assess and manage construction vibration and airblast to comply with the criteria as far as practicable.

In Australia, British Standard BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings" and the German Standard DIN 4150-3: 1999 "Structural vibration Part 3: Effects of vibration on structures" are most often used to assess the potential for building damage due to vibration. DIN 4150-3 provides more stringent levels and is adopted herein. Guideline values are frequency dependent but, in the absence of knowledge about the dominant frequency of vibration, the lowest and most conservative values are normally adopted. These are shown in **Table B9.12**.

During blasting, vibration is generated in the ground. This vibration may propagate to the surrounding area and cause effects upon buildings and building occupants. Ground vibration has the potential to shake buildings and cause disturbance to occupants and, at higher levels, has the potential to damage buildings.

Table B9.10
Vibration guide values for perception

Vibration level (component PPV)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for vibration frequencies associated with construction and maintenance. At lower frequencies people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Table B9.11
Vibration (continuous) criteria for human comfort

Receiver	Time	Preferred	Maximum
Critical working areas (e.g. hospital operating theatres, precision laboratories)	Day- or night-time	0.14 mm/s PPV	0.28 mm/s PPV
Residences	Night-time 2200-0700h	0.2 mm/s PPV	0.4 mm/s PPV
	Daytime 0700-2200h	0.28 mm/s PPV	0.56 mm/s PPV
Offices	Day- or night-time	0.56 mm/s PPV	1.1 mm/s PPV
Workshops	Day- or night-time	1.1 mm/s PPV	2.2 mm/s PPV

Table B9.12
Vibration Damage Guideline Values (DIN 4150-3)

Construction equipment	Guideline Value, PCPV (mm/s)
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20
Dwellings and buildings of similar design	5
Vibration-sensitive buildings including heritage structures	3

Airblast is the air pressure wave (sometimes called overpressure) which is generated as the energy of a blast is released into the atmosphere. Airblast can propagate through the air to the surrounding area and can cause effects at nearby buildings. The pressure wave may shake the building and cause disturbance to occupants. At higher levels, it can cause damage to the building, including breaking windows at very high levels.

The Australian and New Zealand Environment and Conservation Council (ANZECC) guideline, Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC, 1990) (R13), recommends residential criteria for the assessment of vibration and airblast from blasting. **Table B9.13** summarises the criteria recommended by the ANZECC guidelines. It should be noted that the vibration criteria are higher than those for other construction vibrations because of the very short duration of blast vibration.

These criteria accord with the Department of Jobs, Precincts and Regions "Guidelines for Ground Vibration and Airblast Limits for Blasting in Mines and Quarries", although these guidelines are not strictly applicable to the project.

Table B9.13
ANZECC Recommended Vibration & Airblast Criteria

Issue	Units	Criterion for 95% of Blasts	Criterion for 100% of Blasts
Vibration	mm/s PPV	5 mm/s	10 mm/s
Airblast	dBL	115 dBL	120 dBL

B9.5.2
Operational controls

The AEP Regulations provide noise criteria for ground-based operational noise at Melbourne Airport (this excludes aircraft take-off, landing and taxiing operations). The Victoria EPAL Noise Protocol also provides guidance when developing noise objectives for non-aircraft noise sources.

For Melbourne Airport, which is on Commonwealth land not controlled by the Victorian planning scheme, noise objectives have been established for M3R. These objectives acknowledge that most of the receiving environment is within the Green Wedge Zone. The objectives are summarised in **Table B9.14**.

The AEP Regulations require that operational noise not exceed the background noise level at noise-sensitive receptors by more than five dB(A) or three dB(A) respectively during the day (0700-2200h) and night (2200-0700h). It is recognised that noise during the evening period is often a concern for communities and, therefore, in line with EPA guidance, the 24-hour period has been divided into three time periods; day, evening and night.

Background and ambient noise around the airport vary depending upon proximity to the airport and local roads. However, a generic set of noise objectives has been developed based upon the representative background noise data as reported in **Section B9.4.2**. The derived objectives are expected to be appropriate for most of the surrounding receiving environment.

In summary, measured background noise levels vary from around low-30 dB L_{A90} at night to mid-50 dB L_{A90} during the day and around 40-45 dB during the evening period (**Table B9.7**). Operational noise limits established using the Noise Protocol, without modification to account for land zoning, would be within 1-2 dB of those listed in **Table B9.14**.

Table B9.14
Operational noise objectives

Period	Noise objectives / $L_{Aeq,\,t}$ dB	Comments
Day (0700-1800h)	50	Based on representative daytime background noise levels of 45 dB – note 1
Evening (1800-2200h)	45	Based on representative evening background noise levels of 40 dB – note 2
Night (2200-0700h)	40	Based on sleep disturbance effects criteria – note 3

1. Derived from measured data 0700-1800h and analysis of Airservices data see Section B9.5.2.
2. Derived from measured data for period 1800-2200h and analysis of Airservices data.
3. Identical outdoor level as used for construction criteria: the aim is to protect against sleep disturbance based on a bedroom window being open. This objective accords approximately with the AEP Regulation level of background plus three dB(A) at night.

In addition to the above, a noise-change assessment has been undertaken to compare the noise levels between the period shortly preceding construction of the M3R, and upon opening of the new infrastructure. This scenario represents the change in noise that receivers would experience, in a relatively short period of time.

Notwithstanding any audible characteristics a noise source may have, a three dB(A) change in the overall noise level is just perceptible. A 10 dB(A) increase is considered a subjective doubling of the loudness of the sound. Anywhere between three and five dB(A) would be considered a minor change and between five and 10 dB(A) a moderate change. Greater than 10 dB(A) would be considered a major change. For the purposes of this assessment, these noise changes have only been used to compare the modelled operational scenarios and not for comparing with measured levels of noise derived from the baseline surveys.

With respect to vibration, as stated in **Section B9.7**, there are no significant sources of operational vibration. Therefore, the assessment of vibration impacts only considers ground-borne vibration from construction activities.

B9.5.3
Significance rating

The severity of the construction and operational impacts will be assessed in accordance with the *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies, Significant impact guidelines 1.2 (Department of Sustainability, Environment, Water, Population and Communities, 2013).*

The scale, intensity and duration of the potential impacts will be assessed according to the severity criteria described in Table B9.15. If absolute levels of noise exceed the relevant construction or operational noise criteria, then the impact would be at least minor. The subsequent scaling of the impact will also depend upon the degree of exceedance. The duration of the noise exposure can also affect the rating of the noise. Community response surveys typically show that short-term noise effects will occur following a change in noise. These effects will generally reduce once communities habituate to the change. For the M3R, the duration of both the construction program and future operation has been considered when developing the severity criteria.

For vibration, the absolute limits have been used. For exceedances of preferred human comfort levels but below maximum levels, the magnitude would be negligible to minor, depending on the duration. For exceedances of building damage criteria, the impacts would be negligible to moderate; potentially requiring additional, more detailed assessment and monitoring, or possibly, in the most extreme circumstances, rectification works to structures.

B9.6
CONSTRUCTION NOISE AND VIBRATION

This section of the chapter details the assessment of noise and vibration from construction. The scenarios and prediction methodology are outlined first, followed by an assessment of impacts using the noise and vibration criteria and objectives detailed in Section B9.5.

B9.6.1
Construction noise

B9.6.1.1
Construction noise predictions

Construction duration and timing

The approach to construction of M3R is described in Chapter A5: Project Construction. Construction noise and vibration impacts will occur during the significant earthwork phases and subsequent phases of infrastructure construction. Due to operational constraints, some of these works will occur at night to minimise disruption to the operation of the existing runways. To enable a worst-case approach, all phases of the development have been considered to potentially occur at any time of day. This will ensure that all available combinations of daytime/night-time activities have been considered and that a worst-case assessment has been undertaken.

The proposed construction equipment and activities were assessed on a risk management basis: any activities or noise sources that are expected to generate high levels of noise, approximately greater than 70 dB(A) at

Table B9.15
Severity criteria

Impact severity	Absolute rating	Noise change rating	Comment
Major	Exceedance of construction/ operational noise criteria by more than 15 dB(A)	Significantly greater than 10 dB(A) increase in noise level due to the introduction of the development at identified noise-sensitive receivers	Applies to permanent noise from airport operations – i.e. long-term effects which will negatively affect health and wellbeing.
High	Exceedance of construction/ operational noise criteria by no more than 10 dB(A)	Approximate 10 dB(A) increase in noise levels such that noise affected receivers have to alter their living/working conditions, such as closing windows, etc.	Potential for health effects to occur such as sleep disturbance from construction and operational noise sources.
Moderate	Exceedance of construction/ operational noise criteria by no more than 8 dB(A)	Noise change of between 5-8 dB(A) is predicted to occur at residential receivers which may lead to short term disturbance	A noticeable increase in noise – likely to trigger additional mitigation.
Minor	Exceedance of construction/ operational noise criteria by no more than 5 dB(A)	Noise change of between 3-5 dB(A), i.e. a perceptible change in noise level but not considered sufficient to warrant further mitigation	Typically occurs from small changes in the noise environment, e.g. intensification of road traffic. May be considered where mitigation will occur.
Negligible	Construction/operational noise levels below relevant criteria	Minimal change to the existing noise environment, e.g. overall noise change would result in no perceptible change in the noise environment	Would typically also occur from natural growth in road traffic flows and the consequent effects of noise.

a distance of 10 metres (and/or perceptible levels of vibration off-site >1 mm/s), have been assessed against the relevant construction criteria. Where appropriate, construction-noise-management measures are proposed to offset any adverse effects.

It is estimated that delivery of M3R will take four to five years. During this time, different techniques would be used to construct the new airport facilities (runway, runway extensions, taxiways and supporting infrastructure).

Source data

Construction noise will be generated by construction plant and machinery. Haulage noise will also be generated due to heavy vehicles delivering construction materials to the site and during the removal/redistribution of excess construction waste (spoil). It is generally not possible to assess construction noise quantitatively until a project is relatively close to the construction phase, when more certainty about construction methodology and equipment is available and a contractor has been appointed.

However, for environmental assessments, an indicative noise assessment can be conducted based upon assumptions regarding the duration of works, their location, times of occurrence and the activities to be undertaken.

Typical plant likely to be used during construction includes (but will not be limited to):

- Tipper trucks and trailers
- Long-arm excavators
- Piling rigs
- Compaction plant (to be used for ground improvements within the site)
- Bulldozers
- Loaders and forklifts
- Mobile ('crawler') cranes
- Dump trucks
- Paving equipment.

Table B9.16 provides details of the major items of construction plant likely to be used, including the sound level of the plant (expressed as a sound pressure level at a specified distance) and the likely operating duty of the plant during a typical construction day. The presented data is likely to be a reasonable estimate of the source sound-level data of the various items, and will enable the main effects of the proposed construction activities to be assessed.

Construction noise calculations

Construction noise calculations generally consider the characteristics of the noise source (i.e. sound level, frequency content and number of plant, the time of day that the plant is being used and the operating duration of the plant, location, and whether the plant is stationary or moving). Sound propagation effects will also influence the received noise level because of atmospheric and ground absorption, and the shielding effects of natural and man-made features.

The site and surrounds have been modelled using SoundPLAN software considering the following factors:

- Equipment source noise levels
- Distance to receivers
- Topography/buildings
- Atmospheric absorption
- Ground effects.

Calculations utilised ISO 9613 Acoustics – Attenuation of sound during propagation outdoors parts 1 and 2 which is implemented within the SoundPLAN noise modelling software. The ISO 9613 algorithm includes a downwind propagation component and thereby represents a scenario with adverse propagation from the source to the receiver.

B9.6.1.2 Construction noise assessment

Construction noise levels have been calculated for the receivers listed in Table B9.3 and the results are detailed below in Table B9.17. A range of noise levels is presented, to reflect construction operations with northern and southern work zones.

A comparison with the project's construction-noise objectives has been conducted and a 'comply/fail' assessment has been made.

It is noted that the highest noise levels from equipment will occur during stage 2 and 3 earthworks. Therefore compliance with noise management levels during these stages will mean compliance at all other stages.

The closest receivers (R1-R11) have been highlighted, as the construction noise guidelines are relevant to residential receivers. Lower noise levels can be expected at locations farther from the airport than those presented.

A review of the results indicates that compliance is predicted for all surrounding receivers for all construction stages, except for the closest receiver (R1: 95-105 McNabs Road).

There is a minor to moderate non-compliance predicted at the closest receiver (R1: 95-105 McNabs Road) when works are toward the southern end of the site (i.e. the upper level of the presented range). When works are more distant, compliance is predicted.

Table B9.16
Construction equipment (indicative)

Construction equipment	Description	Quantity	L_{Aeq} (dB at 10m)	Expected duty (%)
Stage 1 – site compound				
Truck (delivering materials)	Idle	6	80	75
Mobile crane	Operating	2	70	75
Excavator – tracked	30t	2	80	90
Wheeled loader	Loading/moving	2	84	75
Dozer	20t	2	86	75
Vibrator roller	12t	2	82	80
Roller	22t	2	79	80
Stage 2 – earthworks (prep)				
Truck & trailers	Idle	10	80	75
Mobile crane	Operating	2	70	50
Excavator – tracked	32t	4	80	90
Wheeled loader	Loading/moving	3	84	90
Dozer	20t	2	86	75
Dumper	9t	2	84	70
Roller	22t	2	79	80
Stage 3 – earthworks (bulk)				
Truck & trailer	Idle	4	80	75
Excavator – tracked	32t	4	80	90
Wheeled loader	Loading/moving	2	84	90
Dozer	20t	2	86	75
Dumper	9t	1	84	75
Roller	22t	2	79	80
Stage 4 – paving				
Truck (delivering materials)	Idle	4	80	75
Asphalt plant	Permanent	1	86	100
Lighting rig + genset	Night works	4	60	75
Dozer	20t	2	86	75
Vibrator roller	12t	2	82	75
Asphalt paver (+ tipper)	18t	2	81	100
Roller	22t	4	79	75
Stage 5 – buildings				
Truck (delivering materials)	Idle	4	75	75
Hand tools	Misc. work	4	75	90
Mobile crane	Operating	1	70	50
Generators	Operating	2	67	90

Table B9.17
Predicted construction noise levels

Task	Receiver	Predicted noise level (L_{Aeq}/dB)	Comparison with criteria					
			Weekday 0700-1800	Weekday 1800-2200	Saturday 0700-1300	Sunday 1300-2200	Sunday & public holidays 0700-2200	Night 2200-0700
Stage 2-earthworks (prep)	R1	28-48[1]	Complies	Complies	Complies	Complies	Minor non-compliance	Moderate non-compliance
	R2	27-33	Complies	Complies	Complies	Complies	Complies	Complies
	R3	24-34	Complies	Complies	Complies	Complies	Complies	Complies
	R4	20-28	Complies	Complies	Complies	Complies	Complies	Complies
	R5	11-24	Complies	Complies	Complies	Complies	Complies	Complies
	R6	15-23	Complies	Complies	Complies	Complies	Complies	Complies
	R7	23-34	Complies	Complies	Complies	Complies	Complies	Complies
	R8	17-22	Complies	Complies	Complies	Complies	Complies	Complies
	R9	19-20	Complies	Complies	Complies	Complies	Complies	Complies
	R10	23-23	Complies	Complies	Complies	Complies	Complies	Complies
	R11	20-24	Complies	Complies	Complies	Complies	Complies	Complies
	R12	19-23	Complies	Complies	Complies	Complies	Complies	Complies
	R13	26-38	Complies	Complies	Complies	Complies	Complies	Complies
	R14	24-33	Complies	Complies	Complies	Complies	Complies	Complies
	R15	24-30	Complies	Complies	Complies	Complies	Complies	Complies
	R16	30-33	Complies	Complies	Complies	Complies	Complies	Complies
	R17	21-28	Complies	Complies	Complies	Complies	Complies	Complies
Stage 3 – earthworks bulk	R1	29-47	Complies	Complies	Complies	Complies	Minor non-compliance	Moderate non-compliance
	R2	28-34	Complies	Complies	Complies	Complies	Complies	Complies
	R3	25-35	Complies	Complies	Complies	Complies	Complies	Complies
	R4	21-29	Complies	Complies	Complies	Complies	Complies	Complies
	R5	12-25	Complies	Complies	Complies	Complies	Complies	Complies
	R6	16-24	Complies	Complies	Complies	Complies	Complies	Complies
	R7	24-35	Complies	Complies	Complies	Complies	Complies	Complies
	R8	18-23	Complies	Complies	Complies	Complies	Complies	Complies
	R9	20-21	Complies	Complies	Complies	Complies	Complies	Complies
	R10	24-24	Complies	Complies	Complies	Complies	Complies	Complies
	R11	21-25	Complies	Complies	Complies	Complies	Complies	Complies
	R12	20-24	Complies	Complies	Complies	Complies	Complies	Complies
	R13	27-39	Complies	Complies	Complies	Complies	Complies	Complies
	R14	25-34	Complies	Complies	Complies	Complies	Complies	Complies
	R15	25-31	Complies	Complies	Complies	Complies	Complies	Complies
	R16	31-34	Complies	Complies	Complies	Complies	Complies	Complies
	R17	22-29	Complies	Complies	Complies	Complies	Complies	Complies

1. The property boundary of 95-105 McNabs Road is close to the construction extents. Whilst large earthmoving equipment operate near the property boundary, elevated noise levels can be expected (up to approximately 80 dB(A)) at the adjoining property boundary. This is likely to occur intermittently, for limited durations, at particular stages of the construction. The presented range is representative of noise at the main dwelling, from typical construction activity, which will occur across the site extending several kilometres of runway and taxiways.

The noise level from construction is predicted to be lower than the existing operational noise from the airport for the respective time periods (Table B9.4). The impacts from construction are therefore expected to be negligible.

Noise from construction is expected to be significantly less than the noise from aircraft operations such as take-off, landing and overflight.

Notwithstanding that compliance with the project construction noise objectives is generally predicted, best-practice construction-noise mitigation measures will be implemented to control adverse noise effects arising from construction activity at all locations. Further detail is provided in Section B9.8.

B9.6.2
Construction vibration assessment

Vibration levels from construction have been predicted using empirical methods and compared against industry-standard vibration assessment criteria. AS 2670.2-1990 and BS 5228-2:2009 have been used to assess human annoyance response to vibration in buildings. Building damage from construction sites has been assessed using a combination of accepted industry standards BS 5228.2-2009 and German DIN 4150.3:2016-12 (standards and guidance used in the assessment are also listed in Section B9.4).

Vibration from construction activities will typically occur from high-energy works which will generate a combination of ground-borne vibration and airborne noise which can, in some cases, generate vibration effects within buildings by vibrationally exciting the building structure.

Vibration assessment has been carried out for piling, dynamic compaction and blasting. Other sources will not generate significant magnitudes of ground-borne vibration due to the distance between the work sites and vibration-sensitive properties/structures.

Table B9.18 shows the variability in vibration levels as measured at 10 metres for a range of typical construction plant. The variability arises from make and model of the plant, the ground conditions (type of soil on which they are working), and how the plant is operated. The data emphasises the wide variation in vibration levels. Accordingly, estimates of vibration have been calculated based on broad assumptions (plant type and ground conditions) using conservative data.

Table B9.19 sets out the typical ground vibration levels at various distances for safe working distances as advised by the Transport for NSW Construction Noise and Vibration Strategy, a useful guide for assessment of vibration impact. This document provides a useful reference for assessment of potential vibration impact.

A review of sensitive receivers indicates the nearest residences are at least 450 metres from the construction site. In addition, the Airservices building is 200 metres from the construction site. These distances, when reviewed with respect to the safe working distances of Table B9.19, indicate that vibration from construction activities is predicted to comply with vibration criteria.

The criteria for vibration or airblast are only likely to be exceeded in the following cases:

- Piling/dynamic compaction: high energy impact and vibratory piling may cause exceedances if works are conducted within 68 metres of a vibration sensitive building or structure. In this situation, more detailed assessment would be undertaken prior to any such work
- Blasting: vibration criteria may be exceeded if charge weights approaching 100 kilograms are used, and any vibration sensitive buildings or structures are within 200-300 metres from the blast site.

As there are no known vibration-sensitive buildings or structures within the above distances, the severity of vibration impacts is considered negligible. There are no other vibration-sensitive activities (e.g. airfield navigational aids/equipment) in the area that would be affected. In accordance with best practice, there will be specific measures implemented (including communication and engagement with affected parties) if blasting is to occur on-site during operations.

Table B9.18
Vibration levels for typical construction plant

Construction equipment	Description	PPV at 10 metres (mm/s)
Dozer	Operating	3-12
Excavator – tracked	30t	2-6
Grader	Loading and moving	1-3
Roller	20t	0.5-7
Vibratory roller	12t	2-13
Dynamic compaction	15t tamping weight	12-20
Percussive breaker on tracked excavator	Rock breaking	5-12

Table B9.19
Recommended safe working distances for vibration intensive plant

Item	Description	Safe working distance	
		Cosmetic damage (DIN 4150)	Human response
Vibratory Roller	< 50 Kn (Typically 1-2 Tonnes)	14m	15 to 20m
	< 100 Kn (Typically 2-4 Tonnes)	16m	20m
	< 200 Kn (Typically 4-6 Tonnes)	33m	40m
	< 300 Kn (Typically 7-13 Tonnes)	41m	100m
	< 300 Kn (Typically 13-18 Tonnes)	54m	100m
	< 300 Kn (Typically > 18 Tonnes)	68m	100m
Small Hydraulic Hammer	(300kg – 5 to 12t Excavator)	5m	7m
Medium Hydraulic Hammer	(900kg – 12 to 18t Excavator)	19m	23m
Large Hydraulic Hammer	(1600kg – 18 to 34t Excavator)	60m	73m
Vibratory Pile Driver	Sheet piles	50m	20m
Pile Boring	≤ 800mm	5m	7m
Jackhammer	Handheld	2m	3m

Source: Construction Noise & Vibration Strategy (V4.1), 2019, TfNSW.

B9.6.3
Construction traffic noise assessment

Construction of M3R will require substantial earthworks and it is estimated that over the life of the project, up to 125,000 truck trips carrying fill and 80,000 truck trips carrying pavement materials, may be required (with the same number of empty trips away from the site). A proportion of the fill materials will be sourced from the general site during the earthworks phases of the development. However, there will be a need to import both fill and pavement materials. This means there may be up to 38 two-way trips per hour, with approximately 25 per cent arriving from the south and the remainder from the north.

Heavy construction vehicles (trucks) will use designated traffic routes to facilitate efficient access to the project worksite. Haul trucks on the site have been assessed in **Section B9.6.1.2**, along with other mobile plant. This section addresses noise from construction traffic on public roads.

Once construction vehicles depart from the haul road and use local roads (Sunbury Road, etc), the noise from construction traffic will combine with the noise generated by existing traffic using these roads. A perceptible (three dB(A)) increase in noise would occur if construction traffic were to double existing traffic flows (neglecting the additional noise contribution of heavy vehicles) on the proposed haul roads.

Sunbury Road currently carries around 32,000 vehicles per day with around 9 to 12 per cent heavy vehicles. The overall increase in road traffic noise would be less than one dB(A) even if all construction vehicles were to use this route. This is a negligible increase.

In comparison, there are approximately 1,500 existing vehicle movements using the McNabs Road/Arundel Road route per day (see **Chapter B8: Surface Transport**). The addition of 120 construction trucks would result in a noise increase of approximately two dB(A). This would be considered a minor change in noise.

Driver behaviour can influence the noise associated with truck movements. Heavy acceleration and deceleration, especially using engine braking, can increase noise levels. In addition, driving over poorly maintained road surfaces can induce additional noise from shaking and rattling of truck and trailer bodies. As part of the traffic management plan for the project, road surfaces will be well maintained with no adverse irregularities to negate the generation of additional vehicle noise and, in some cases, vibration where receivers are in close proximity to the carriageway (typically closer than 15 metres). At most, the impact of construction traffic will be minor.

B9.7
OPERATIONAL NOISE

Ground noise from airport operations comes from a variety of sources. These are typically landside road traffic (surface access); and airside activities, principally from static and manoeuvring aircraft. Operational noise levels have therefore been predicted for both landside and airside sources.

Unlike construction activities, there are no airport-operational sources that will generate significant levels of vibration.

Ground-running aircraft undertaking routine engine checks post-maintenance have the potential to produce high magnitudes of noise, including some low frequency noise at the source. Accordingly, low frequency has been considered for Engine Ground Running (EGR).

B9.7.1 Operational noise modelling

Aircraft-movement data for Melbourne Airport for the baseline year of 2019 has been reviewed. It includes the following information:

- Time of occurrence, broken down into day (0700-2200) and night (2200-0700)
- Runway direction
- Operation type (arrival/departure)
- Aircraft category.

The above day and night-time periods have been selected to align with the assessment periods in both the AEP Regulations and the *Environment Protection Regulations 2021*.

Assessment of runway and airport operation has been conducted based on busy-hour operations of the airport for the day and night periods respectively. (Forecasts of the busy hours were determined from airspace noise modelling, which included forecasts of operations by aircraft type and runway.)

Noise modelling of aircraft on taxiways considered the forecasts applying to groups of taxiways (i.e. the apron area and taxiway from the terminal to the northern and southern ends of the airfield; and the proposed taxiways that connect to the new runway at the northern and southern ends of the airfield).

Table B9.20 presents the operations scenarios modelled for the existing airfield compared with the proposed new infrastructure in 2026 and 2046.

Noise modelling was conducted based on the following typical sound-power levels:

- Aircraft Taxing 131 dB(A)
- APU 118 dB(A)

These are typical of current jet aircraft using the airport, and have been measured at other Australian airports.

An even breakdown of aircraft per terminal was applied to each stand. APUs were assumed for a proportion of these aircraft on stand. Fixed Electrical Ground Power (FEGP) is available and its use is likely to increase. FEGP has a negligible noise contribution.

Table B9.20
Taxiway hourly aircraft operations

Operating scenario	Taxi direction (to/from runway)	Taxiway Operations (# of aircraft movements per typical hour)	
Current (actual)		**West of existing runway 16/34 (to/from east-west runway)**	**East of existing runway 16/34 (to/from terminal)**
Existing Day	North	-	8
	South	-	14
	East	-	17
	West	7	-
Existing Night	North	-	5
	South	-	8
	East	-	3
	West	2	-
Reference years (modelled)		**West of existing runway 16/34 (to/from new runway)**	**East of existing runway 16/34 (to/from terminal)**
2026 Day	North	16	36
	South	16	36
2026 Night	North	9	19
	South	9	19
2046 Day	North	27	53
	South	27	53
2046 Night	North	15	26
	South	15	26

Taxiing aircraft were assumed to travel at an average speed of 20 kilometres per hour (km/h). SoundPLAN software was used to model the aircraft ground noise. This took into account the sound power of aircraft; operating times; the geographical distribution of those sources in relation to receiver locations; and the attenuation of sound with distance from each source to each receiver location (**Figure B9.2**).

Noise-contour maps and spot-receiver noise levels were calculated. Aircraft ground noise has been predicted using the sound-level propagation procedures of ISO 9613, which is implemented in the SoundPLAN noise modelling software.

Based on the movement forecasts, 17 APUs were assumed to be operational at any one time in a busy daytime hour and nine in the busy night period. These were distributed in the model around each of the terminals, representing several actual stand locations. These APU assumptions remained for future operating scenarios with the anticipation that there will be a greater proportion of FEGP use in the future.

Directivity patterns of ground-running aircraft are available from Boeing and Airbus. They represent the noise footprint at typically 10-degree increments around each aircraft measured, with constant operating conditions throughout each measurement. Conservatively, reductions in noise emissions due to directivity of mobile aircraft operations (i.e. whilst taxiing) have been ignored. Quoted source noise levels are for the loudest direction (i.e. an equivalent sound-power level producing the measured sound pressure level in the loudest direction).

It is likely that future aircraft types will have reduced noise emissions compared to current-generation aircraft. In this regard, the assumptions in this assessment are considered conservative.

B9.7.2
Operational noise assessment

Operational noise levels for the airport are reported in **Table B9.21** and **Table B9.22**. The change in noise levels from operations (excluding aircraft taxiing operations) is expected be negligible with M3R. These predictions are therefore not repeated across the various future operating scenarios.

Operational noise levels (including aircraft taxiing) are included for reference. Note that the noise objectives do not apply to taxiing noise. However, it is useful to consider overall noise emissions (excluding take-off and landing noise).

Ground-based operational noise (excluding taxiing) associated with the airport is predicted to comply with the noise objectives at all surrounding receivers during the daytime.

During night, noise levels at the nearest receivers are predicted to exceed the project noise objectives. However, these predictions represent existing operations and the resultant noise levels are consistent with measured noise levels presented in **Section B9.4.2**.

Ground-based operational noise levels (which excludes aircraft taxiing, take-off and landing) are not predicted to change appreciably with M3R. On this basis, impacts associated with these sources are considered minor.

With the inclusion of taxiing noise (excluded by AEP regulations from being subject to noise criteria) noise emissions from the airport are predicted to be similar to the noise objectives. The results demonstrate that an increase of up to three dB(A) is expected for many of the nearest receivers due to the reconfigured geometry of the taxiway network and increased taxi times as a result of M3R.

Regardless of the future scenario, at all but the nearest residential receiver (R1: 95-105 McNabs Road) noise levels across the busy-hour assessment period (assessed externally) are below the WHO daytime guidance criteria of 50-55 dB(A) to prevent moderate to high annoyance.

The overall significance of these noise levels is negligible.

Figure B9.9 to **Figure B9.12** display the modelled noise contours for the airport in 2026 and 2046, with M3R, for both the day and night-time periods. They include taxiing noise. The results demonstrate that airport ground noise is localised around the airport.

In summary:

- The change in terminal-related sources due to M3R is expected to be negligible
- Ground-based noise is predicted to comply with the noise objectives for the daytime period
- Existing ground-based noise levels during the night are expected to exceed noise objectives; however, minimal changes are expected as a result of M3R. Hence impacts are considered minor
- Although aircraft taxiing noise is exempt from AEP Regulations it has been considered because the change in the airfield's infrastructure and capacity will affect taxiway flows and resulting noise emissions
- Increases in noise emissions from all ground-based sources (including taxiing) are predicted to range from negligible (one dB(A)) to moderate (five dB(A)) at surrounding receivers. Increases of up to three dB(A) are typically predicted
- There is a trend of increasing noise to the west of the airport for sensitive noise receptors. This is associated with the change in operations to the new runway (16R/34L).For non-residential receivers (such as public open spaces, schools and community resources) the predicted levels of noise are within the recommended limits for those locations. For public open spaces used as recreational areas, the WHO recommendation (WHO 1999) that noise levels will not increase the 'signal to noise ratio' will be achieved. This would mean that existing ambient levels (the 'noise') will not noticeably increase by the introduction of the new noise (the 'signal'). (In the context of this assessment, a noticeable increase would equate to a three dB(A) increase in ambient noise levels.)

Table B9.21
Busy Day Hour L_{Aeq} Ground Operation noise levels at Receivers – dBA

Receiver	Address	Excluding taxiing	Including taxiing		
			Existing	2026 M3R	2046 M3R
R1	McNabs Road	49	50	57	59
R2	Oakbank Road	45	43	46	47
R3	Arundel Road	48	47	50	51
R4	Annandale Road	47	45	48	49
R5	Old Calder Highway	44	39	44	45
R6	Loemans Road	41	45	46	47
R7	Sunbury Road	47	48	50	51
R8	Providence Road	48	45	48	49
R9	Trinity Blvd	49	47	50	50
R10	Bamford Avenue	50	48	50	50
R11	Melrose Street	49	47	50	51
R12	True value Solar Centre (Stadium)	48	48	50	49
R13	Melbourne Airport Golf Club (green)	51	49	58	60
R14	Melbourne Airport Golf Club (club house)	49	46	52	53
R15	Keilor Golf Course (green)	44	47	44	45
R16	Keilor Golf Course (Club House)	45	48	46	46
R17	Woodlands Historic Park - main building	47	47	48	49

Table B9.22
Busy Night Hour L_{Aeq} Ground Operation noise levels at Receivers – dBA

Receiver	Address	Excluding taxiing	Including taxiing		
			Existing	2026 M3R	2046 M3R
R1	McNabs Road	46	47	55	56
R2	Oakbank Road	41	42	43	43
R3	Arundel Road	44	45	47	48
R4	Annandale Road	44	44	45	45
R5	Old Calder Highway	40	40	41	41
R6	Loemans Road	38	42	43	40
R7	Sunbury Road	43	45	47	48
R8	Providence Road	44	45	45	45
R9	Trinity Blvd	46	46	46	47
R10	Bamford Avenue	47	47	47	48
R11	Melrose Street	45	46	46	47
R12	True value Solar Centre (Stadium)	45	45	46	46
R13	Melbourne Airport Golf Club (green)	48	52	56	57
R14	Melbourne Airport Golf Club (club house)	46	47	48	49
R15	Keilor Golf Course (green)	40	40	41	42
R16	Keilor Golf Course (Club House)	41	42	43	43
R17	Woodlands Historic Park - main building	43	44	45	45

Figure B9.9
2026 Build day (0700-2200) typical busy hour ground noise contours (including taxiing)

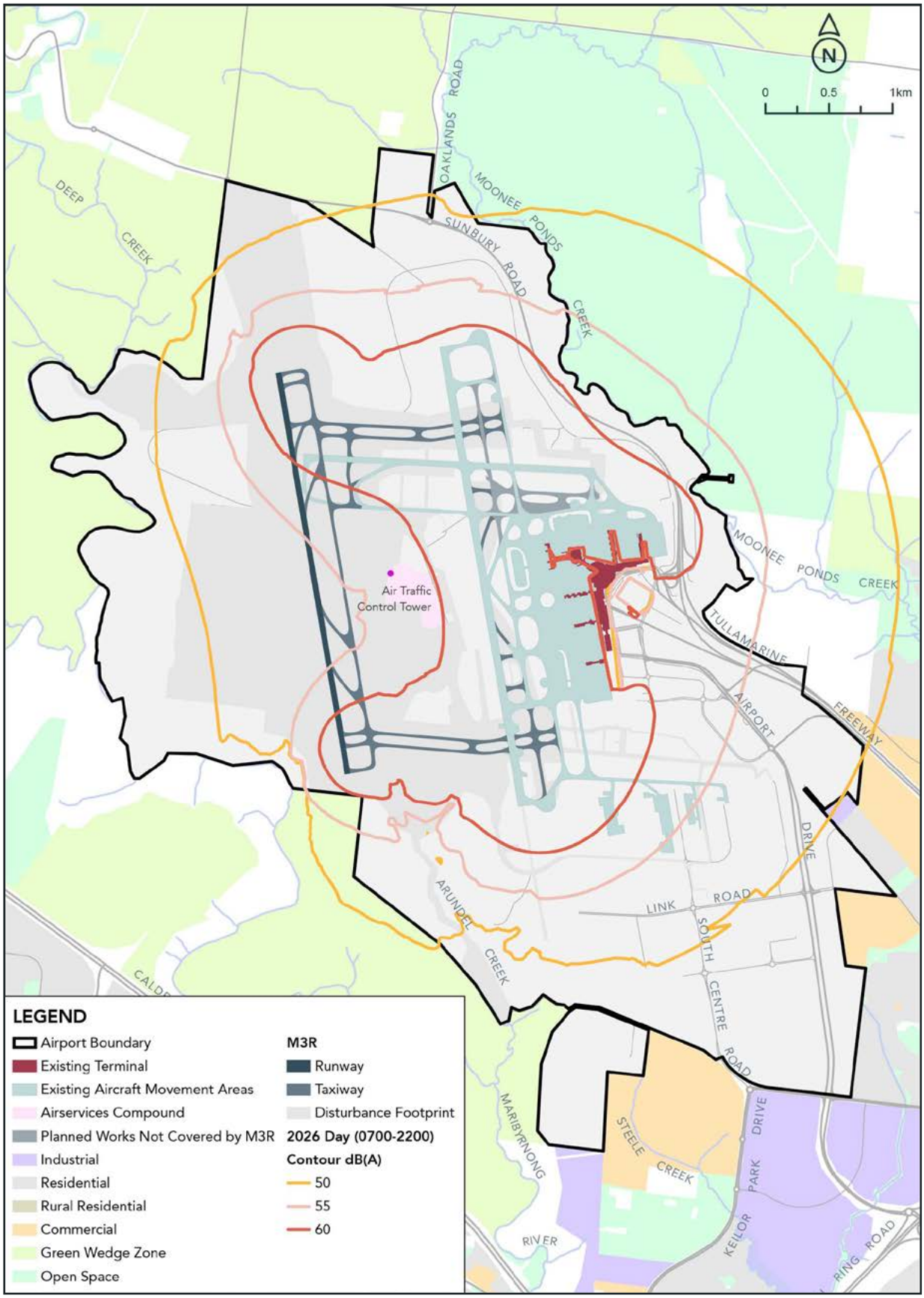


Figure B9.10
2046 Build day (0700-2200) typical busy hour ground noise contours (including taxiing)

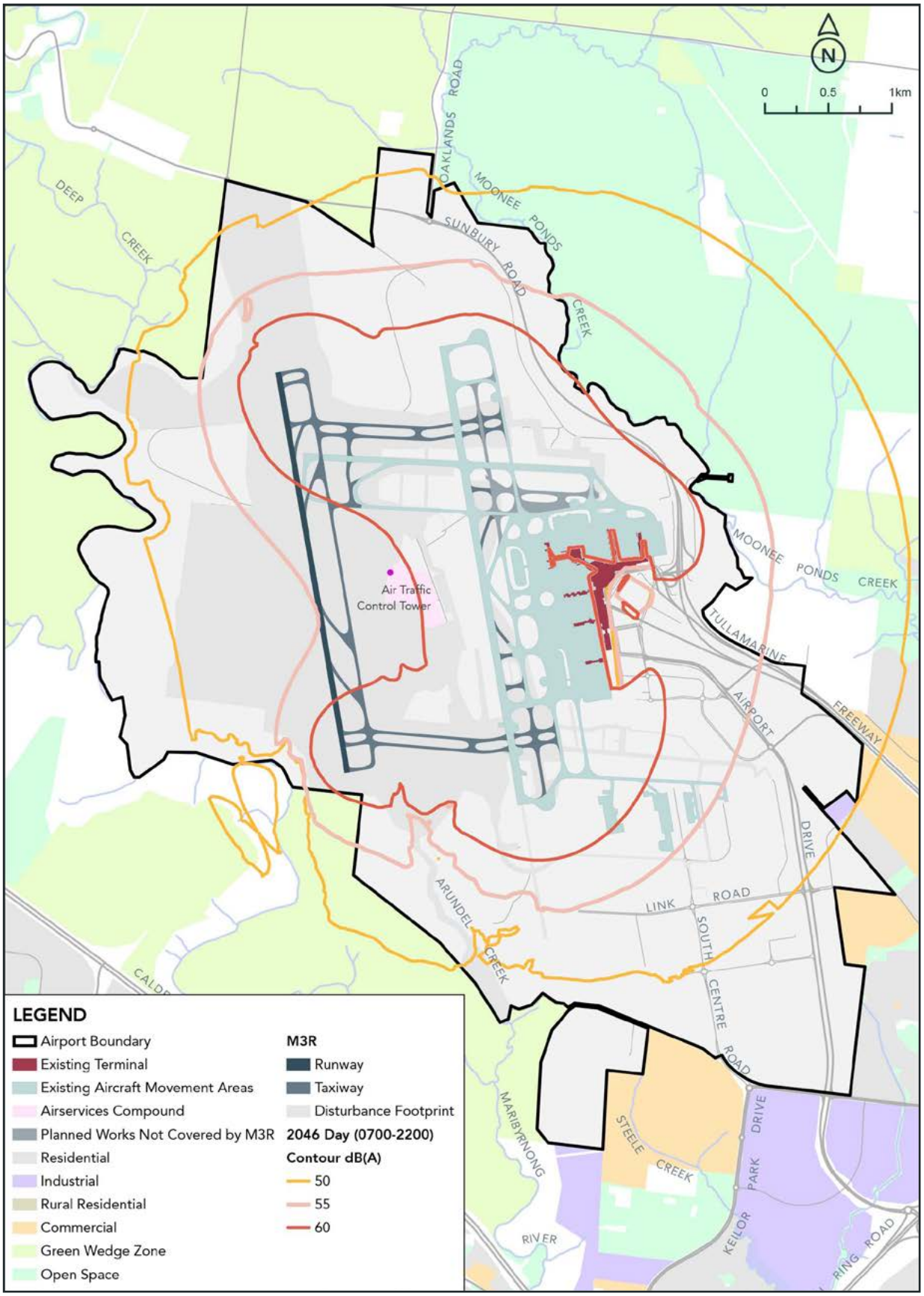


Figure B9.11
2026 Build night (2200-0700) typical busy hour ground noise contours (including taxiing)

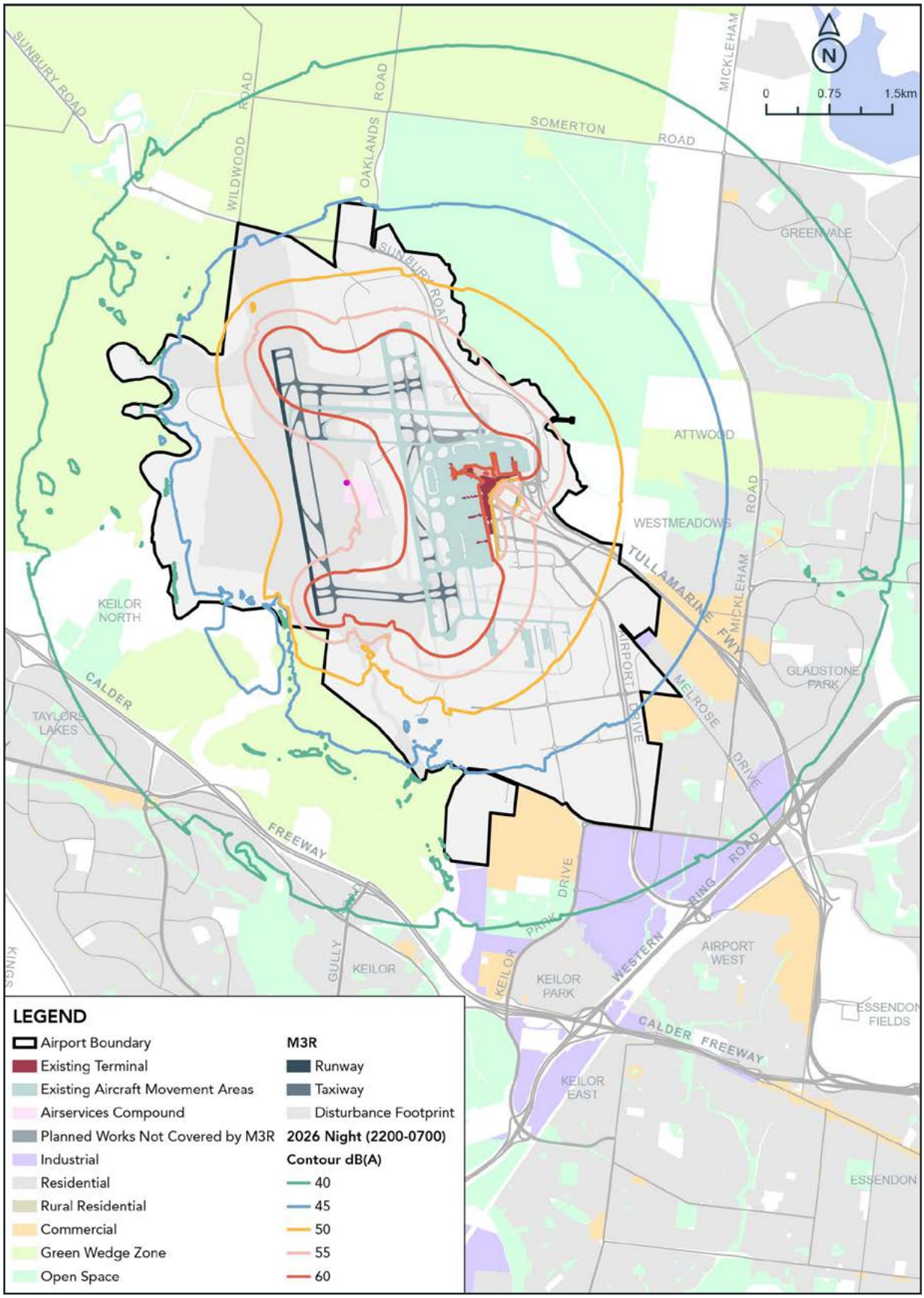
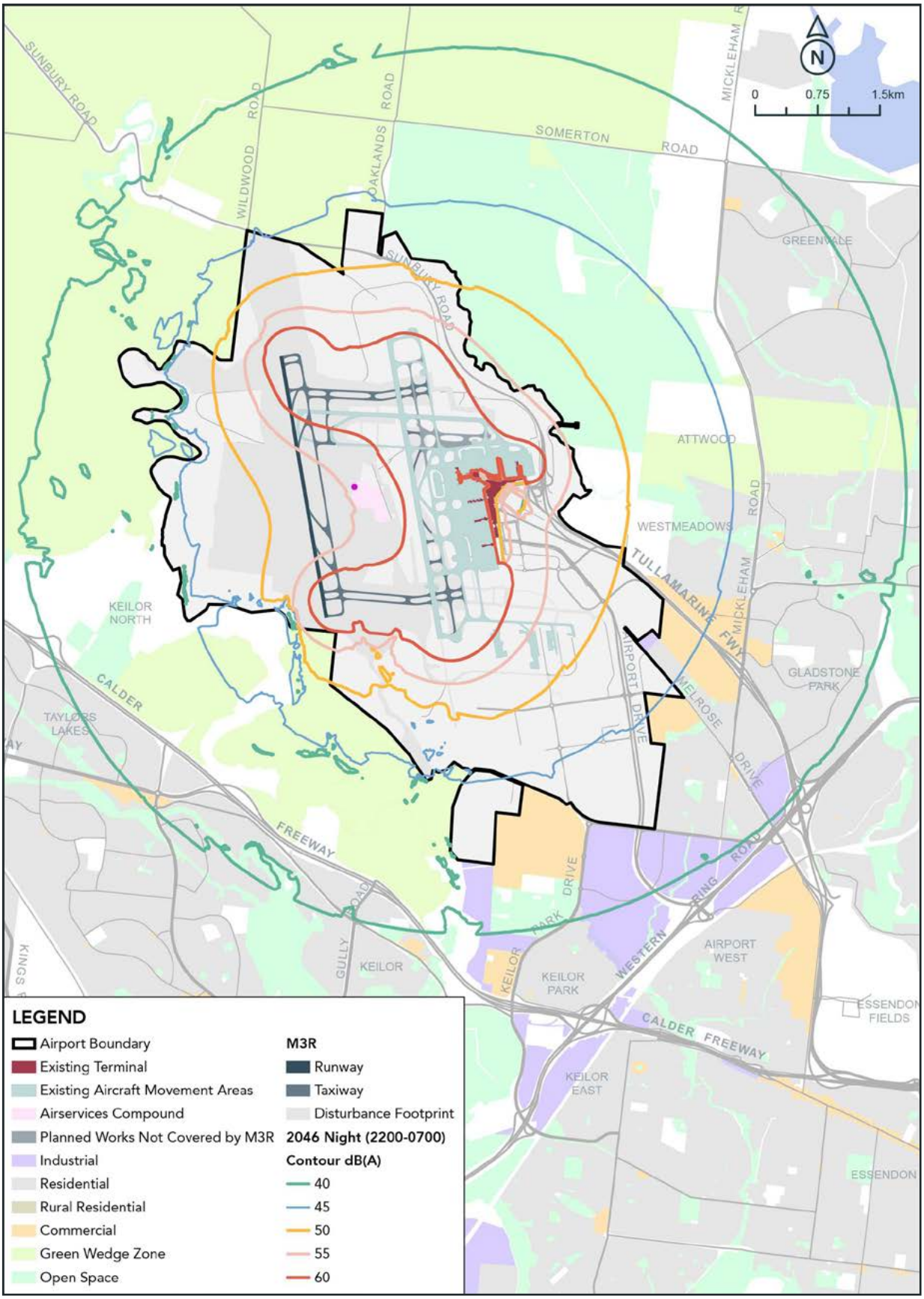


Figure B9.12
2046 Build night (2200-0700) typical busy hour ground noise contours (including taxiing)



B9.7.3
Engine ground running (EGR)

Aircraft maintenance operations are carried out at Melbourne Airport by several operators, who contract their work directly with the airlines. Post-maintenance engine ground running (EGR) is often required to ensure aircraft reliability and safe aircraft operations. EGR will typically occur during planned routine maintenance and scheduled during aircraft layover between operational days. Typically, downtime for essential aircraft maintenance occurs at night for domestic flights. Non-routine maintenance sometimes requires an EGR due to unforeseen circumstances (such as a blade change following a bird strike). These types of events can occur at any time. A typical EGR will involve running all engines at idle with intermittent use of high power on one engine at a time. The duration of an EGR will vary depending upon the maintenance requirement. However, on average a run-up will be between 10 and 25 minutes, with combined use of high power for just five minutes in total. Routine engine washing of aircraft will, in comparison, last a few minutes.

EGR of jet engines is sensitive to wind direction so aircraft will generally be faced into the oncoming wind direction. This also applies to EGR of turbo-prop aircraft (although these are not as sensitive to wind direction). EGR in the open requires an area large enough to position the aircraft facing the wind, and where it does not interfere with other aerodrome operations or navigation aids.

Melbourne Airport has an Operational Safety Policy (Melbourne Airport, 2015) for EGR. The policy is replicated in part within Melbourne Airport's aerodrome specific Aeronautical Information Publication (AIP). The Policy requires details of all EGRs to be recorded.

Four sites (see **Figure B9.13**) are available for ground running activities:

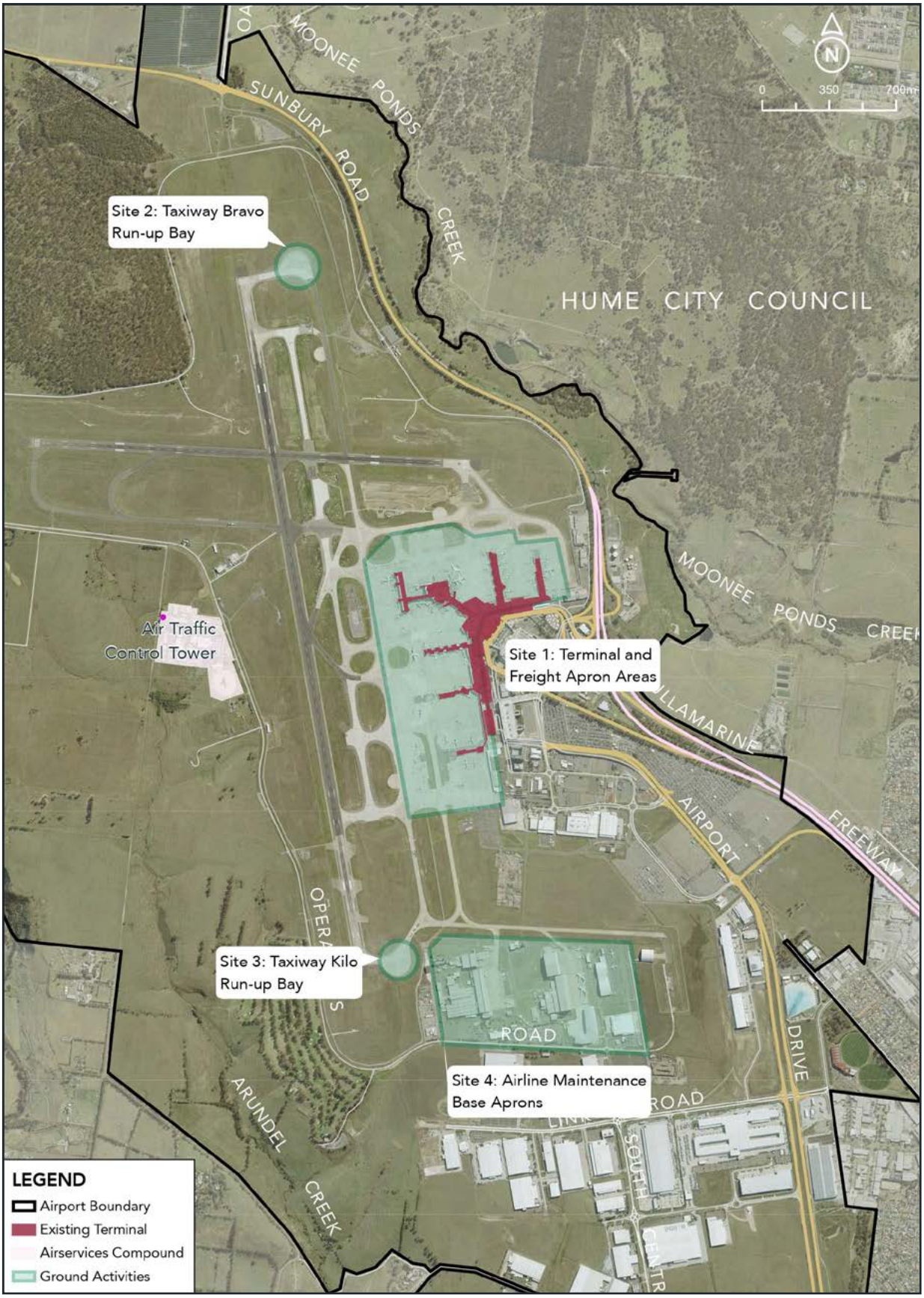
- Site 1: Terminal and Freight Apron Areas – power settings not to exceed ground idle, no more than two engines are to run at a time, duration not to exceed 30 minutes for any one event, and prior approval will have been sought.
- Site 2: Taxiway Bravo Run-up Bay – all runs at the discretion of Air Traffic Control (ATC). If facing north, aircraft is to be positioned as far north as possible; likewise if facing south then aircraft to be as far south as possible. Prior approval must be sought.
- Site 3: Taxiway Kilo Run-up Bay – all runs at the discretion of ATC, aircraft can only be positioned north or south and as far north/south as possible. (If east or west required, Bravo Run-up Bay must be used.) Restricted to between 2300 and 0500h, duration to not exceed 20 minutes and power not to exceed ground idle. Prior approval must be sought.
- Site 4: Airline Maintenance Base Aprons – power settings not to exceed ground idle, no more than one engine to be run at a time. Restricted to between 2300 and 0500h, duration to not exceed 20 minutes and prior approval must be sought.

Only site 2 can be used for high-power runs. The concrete Ground Run-up Enclosure (GRE) pad is near the threshold of runway 16, approximately 300 metres from Sunbury Road, 1.5 kilometres from Woodlands Historic Park (park buildings and car park) and over one kilometre to the nearest residential dwelling.

As part of M3R, there will be no change to Melbourne Airport's Operational Safety Policy. The run-up locations remain unchanged, although there will be a consequential increase in routine maintenance operations due to the increased aircraft fleet numbers. Currently a typical busy week will have approximately 25 engine runs. The number of future EGRs has been estimated on a pro-rata basis in comparison to the number of current EGRs versus the total number of 2019 air transport movements. It has been estimated that in 2046 there would be an additional 10 engine runs per week for the No Build scenario and 23 EGRs with M3R, which would equate to a total of four to six and six to seven engine runs per day respectively for the No Build and Build scenarios.

High-power EGRs can generate high levels of low frequency sound, which can lead to vibration within buildings. At site 2, sound levels in the region of 55-65 dB(A) would be experienced at the closest residential locations. At these decibel levels, high levels of low frequency sound are not sufficient to cause any adverse vibration. Accordingly, the impact of vibration from operational sources is negligible.

Figure B9.13
Current ground running activity locations at the airport



B9.7.4
Road traffic noise

Road traffic projections for major roads near the airport have been provided by traffic planners for the years 2026 and 2046; both with and without M3R (Build and No Build scenarios).

Noise levels at typical receiver setback distances from these roads have been calculated using the Calculation of Road Traffic Noise (CoRTN) procedure, based on projected traffic flows as detailed in Table B9.23 and Table B9.24.

Results of relative increases are detailed in Table B9.25.

With the project, the expected noise-level increase is less than two dB(A) compared to the No Build scenario for the majority of roads (with the exceptions of Airport Drive north of Sharps Road and Melrose Drive north of Mickleham Road). These increases are predicted to be 2.9 and 2.1 dB(A) in 2046. Noise levels in 2026 are not predicted to increase by more than 1.1 dB(A). Accordingly, it is unlikely that the increase in traffic noise associated with the project would be perceptible. This outcome reflects the relative small proportion of airport-induced traffic as a component of the total regional traffic forecast to use these roads.

Table B9.23
18 hr Traffic volumes

Road	Direction	No Build 2026	Build 2026	No Build 2046	Build 2046
Airport Drive north of Sharps Road	SB	7725	9642	11196	19578
	NB	7075	8584	9886	18685
Calder Freeway west of Keilor Park Drive	NWB	40679	41117	53009	55087
	SEB	43793	44427	57792	59744
Keilor Park Drive south of Tullamarine Park Road	SB	10578	11179	13940	16105
	NB	10628	11198	14371	16722
Melrose Drive north of Mickleham Road (on-airport)	NB	4932	5578	7280	11439
	SB	4744	5876	6665	9454
Melrose Drive south of Mickleham Road	NB	4565	4605	6157	6698
	SB	4794	4925	6578	7398
Mickleham Road north of Broadmeadows Road	NB	10628	10624	13325	13349
	SB	10726	10855	13172	13449
Mickleham Road 'south'	NB	9074	9137	13254	14993
	SB	8323	8491	13189	13376
Sharps Road west of Melrose Drive	EB	7076	7580	9822	10971
	WB	6046	6376	7340	8458
Sunbury Road north of Airport (2025 data & estimates)	NB	16698	16777	35753	38285
	SB	15745	15607	34321	36577
Tullamarine Freeway north of Mickleham Road	NB	52426	53994	82011	99460
	SB	50144	50697	77489	94696

Table B9.24
18 hr Percentage heavy vehicles

Road	Direction	No Build 2026	Build 2026	No Build 2046	Build 2046
Airport Drive north of Sharps Road	SB	2.7	3.2	2.4	4
	NB	0.8	0.9	1.2	1.8
Calder Freeway west of Keilor Park Drive	NWB	8.9	9	10.5	10.9
	SEB	11	11.2	12	12.3
Keilor Park Drive south of Tullamarine Park Road	SB	11.5	12.2	12.9	14.8
	NB	11.4	12.1	13.2	15.7
Melrose Drive north of Mickleham Road (on-airport)	NB	0.8	0.9	1.2	1.8
	SB	2.7	3.2	2.4	4
Melrose Drive south of Mickleham Road	NB	3.8	3.7	5	4.6
	SB	8.6	8.6	8.6	9.4
Mickleham Road north of Broadmeadows Road	NB	3.4	3.4	3.5	3.6
	SB	1.1	1.1	1.4	1.4
Mickleham Road 'south'	NB	3.8	3.7	5	4.6
	SB	8.6	8.6	8.6	9.4
Sharps Road west of Melrose Drive	EB	10.8	11.6	15.2	17.4
	WB	6.8	7.5	8	10.1
Sunbury Road north of Airport (2025 data & estimates)	NB	12.1	12.3	8.2	10.1
	SB	9.6	9.6	7.2	8.7
Tullamarine Freeway north of Mickleham Road	NB	3.3	3.5	3.1	4.4
	SB	2.6	2.6	2.7	3.8

Table B9.25
Traffic noise relative increases – build / no build

Road	2026	2046
Airport Drive north of Sharps Road	1.1	2.9
Calder Freeway west of Keilor Park Drive	0.1	0.2
Keilor Park Drive south of Tullamarine Park Road	0.3	1.0
Melrose Drive north of Mickleham Road (on-airport)	0.9	2.1
Melrose Drive south of Mickleham Road	0.7	0.5
Mickleham Road north of Broadmeadows Road	0.0	0.1
Mickleham Road 'south'	0.0	0.3
Sharps Road west of Melrose Drive	0.3	0.9
Sunbury Road north of Airport (2025 data & estimates)	0.0	0.7
Tullamarine Freeway north of Mickleham Road	0.1	1.0

B9.8
AVOIDANCE, MANAGEMENT AND MITIGATION MEASURES

B9.8.1
Incorporated mitigation

The following sections include a brief description of the incorporated mitigation measures that have been adopted as part of the construction and operational ground noise and vibration assessments.

M3R will include mitigation measures inherent in design and management. These incorporated mitigation measures do not include mitigation required to offset any adverse effects that have not been predicted, were not envisaged prior to undertaking this assessment, or which are unforeseen and arise during M3R construction or subsequent operation.

B9.8.1.1
Construction management

As part of best practice, M3R construction activities will be managed in accordance with the requirements of EPA's Civil construction, building and demolition guide (EPA 1834) which requires the appointed contractor to develop and implement a construction noise and vibration management plan.

Construction management details are available in EPA's Environmental Guidelines for major construction sites. These set out best-practice measures to eliminate health risks and nuisance to residents near major construction sites.

The EPA recommendations adopted for M3R and the range of measures will include:

- A principal contact person will be established for all community queries
- Informing potentially noise-affected neighbours about the nature of construction stages and noise reduction measures
- Notice will be given as early as possible for periods of noisier works such as blasting. The notice will include a description of the activities and their expected duration. Affected neighbours will be regularly informed of progress via social media, emails and one-to-one meetings, if required
- 24-hour contact details will be provided through letters and site signage. Any complaints received by members of the community/stakeholders will be recorded in a central database and a complaint-response procedure will be actioned suitable to the scale of works
- Within normal working hours (typically 0730-1800h) where it is reasonable to do so:
    - Noisy activities will be scheduled during the least sensitive times (for example, delaying a rock-breaking task to the later morning or afternoon)
    - Provide periods of respite from noisier works as often as practicable
    - The weekend/evening work hours in the schedule (including Saturday afternoon or Sunday) are more sensitive times and so have noise requirements consistent with quieter work. Respite periods will be provided during these days.

In addition to the above general measures, the following specific requirements will also be incorporated:

- Where work is conducted near a residential area or other noise-sensitive location, the lowest-noise work practices and equipment will be selected where possible
- Site buildings, access roads and plant will be positioned such that the minimum disturbance occurs to the locality
- The site will be planned to minimise the need for reversing of vehicles, especially when delivering materials
- All mechanical plant will be silenced by the best practical means using current technology, if safe to do so
- Mechanical plant, including noise-suppression devices, will be maintained to the manufacturer's specifications
- Internal combustion engines will be fitted with a suitable muffler in good repair
- All pneumatic tools operated near a residential area will be fitted with an effective silencer
- Vehicles speeds of large trucks will be restricted in sensitive areas
- Less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems will be followed. Use of broadband (white noise) alarms will be considered
- Drivers will be instructed to drive considerately (e.g. no aggressive braking or accelerating)
- All vehicular movements to and from the site will occur in accordance with the approved Traffic Management Plan
- Noise and vibration from the site will seek to comply with the requirements of **Table B9.14** and **Table B9.16** (showing construction noise and vibration criteria/thresholds).

Melbourne Airport has an established track record of delivering infrastructure works to the runways and terminal facilities. It also has an established annual maintenance program which includes works to the airfield pavements (some of which includes periods of night working). Melbourne Airport has a policy of adopting best practice when planning and undertaking construction works and these measures will be adopted through all the stages of M3R. As part of this best practice, Melbourne Airport will be consistent with the guidance of the EPA's 'Environmental guidelines for major construction sites'.

B9.8.1.2
Operational noise management

The Air Navigation (Aircraft Engine Emissions) Regulations 1998 conform with the Air Navigation Act 1920. They stipulate that an aircraft (excluding state aircraft or foreign aircraft) is not to fly in Australian airspace unless it complies with Annex 16 to the Chicago Convention. Annex 16 contains specific standards and recommended practices regarding aircraft noise and aircraft engine emissions. While Annex 16 is intended to limit noise when aircraft are in flight, it also has the ability to control engine ground noise at an airport. Other than this requirement, there is limited scope for Melbourne Airport to control the noise from aircraft operations except when aircraft are undertaking engine testing or using FEGP rather than APUs when on stand.

It is noted that the design of M3R has been developed through an iterative process, and noise minimisation has been prioritised wherever possible, including noise associated with ground operations

B9.8.2
Additional mitigation

B9.8.2.1
Construction management

The scale of M3R will require additional construction noise and vibration management above and beyond the comprehensive measures which Melbourne Airport already adopts when managing both construction and day-to-day operations.

It will be the responsibility of the contractor to minimise the potential noise and vibration disturbance from construction activities. The goal will be to implement best practice at all stages of M3R and to recognise that works at night will have the potential to generate adverse effects. An important control measure will be to ensure that there is appropriate communication with affected parties such that they are made aware of future works ahead of their occurrence and that the correct information is provided in a timely manner.

A Construction Noise Management Plan (CNMP) will be prepared prior commencing the construction works and will be regularly updated following any amendment to the project that may result in a change in noise and vibration levels. For high-risk work, such as blasting or prolonged night-time works, specific noise and vibration schedules will be developed to address specific periods of M3R. The aim of the schedules will be to minimise the resulting impacts and provide a notification list of potentially affected properties to assist with community engagement.

B9.8.2.2
Operational noise management

Regarding operational noise from aircraft, established procedures are successfully being adhered to and will be maintained once M3R is operational e.g. the engine ground-running (EGR) procedure.

While the assessments outlined in this chapter have shown that additional or enhanced mitigation is not required, additional procedures will be developed, which will assist in going above and beyond "good practice" at the airport, including:

- Airport collaborative decision-making – operating efficiency of the airport will be maintained by ensuring that any delays which may result in aircraft being held on the ground are minimised as far as is practicable, which will help to reduce noise and other emissions from ground operations. An example would be to hold aircraft at stand rather than at a taxiway intersection or runway hold point
- Several specific restrictions are imposed on taxiing and APU operation (i.e. use of FEGP in preference to APU running) and on EGR maintenance procedures, all of which limit the amount of ground noise which might otherwise occur, particularly at night.

B9.9
CONCLUSION

This chapter has identified likely construction and operational activities that may result in adverse ground-based noise and vibration effects associated with M3R at Melbourne Airport. A summary of the assessment against the significance assessment framework is contained in Table B9.26.

Many activities during construction and operation will produce noise of similar levels to existing airport noise during operational hours.

Construction vibration has been assessed as negligible even if blasting were to occur.

The construction contractor will be required to prepare a Construction Noise Management Plan.

Airport ground noise is localised around the airport. The distribution of noise around the airport depends upon runway usage and the corresponding number of aircraft movements and fleet-mix assumptions.

Operational ground noise is not expected to increase substantially with the operation of M3R. During the daytime, ground noise levels are predicted to remain within the noise objectives. Existing ground-based noise levels during the night-time are expected to exceed noise objectives, however, minimal changes are expected as a result of M3R. Hence impacts are considered minor.

Table B9.26
Impact assessment summary

Environment aspect & baseline condition	Assessment of original impact					
	Original Impact	Mitigation inherent in design/practice	Significance			
			Duration	Severity	Likelihood	Impact
Construction						
Noise Existing noise environment made up of existing airport noise and noise from road traffic	On-site noise from construction activities affecting off-site noise sensitive receivers	Implementation of a project-wide construction noise management plan which includes measures for noise management – including where necessary use of barriers and enclosures for noisy works at night	Short-Term	Minor to moderate impact (night)	Likely	Medium
Vibration Negligible vibration from existing sources	On-site vibration from dynamic compaction and potential blasting affecting off-site noise sensitive receivers. Potential to be felt, and in extreme cases, cause cosmetic damage of buildings	Implementation of a project-wide construction noise management plan which includes measures for management of vibration affects off-site – spatial separation is such that risk of damage/ nuisance is unlikely	Short-Term	Negligible	Possible	Negligible
Construction traffic Existing noise environment made up of existing airport noise and noise from road traffic	Heavy construction trucks on-site and off-site may cause increased noise	Implementation of a project-wide construction noise management plan which includes measures for management of construction traffic – e.g. timing, routes, road surfaces, etc.	Short-Term	Minor	Likely	Negligible
Operation						
Aircraft movements Existing noise environment made up of existing airport noise and noise from road traffic	Increased airport ground noise from taxiing and engine ground running aircraft once M3R operational	Continuation of standard operating procedures including Operational Safety Policy for ground running of aircraft	Permanent	Minor	Almost certain	Medium
Road traffic Existing noise environment made up of existing airport noise and noise from road traffic – at greater distances from the airport and away from flight paths – road traffic will be the primary source of noise	Increased noise from surface access transport using the airport as a result of the M3R	Use of primary routes to and from the airport	Permanent	Negligible	Almost certain	Low

Mitigation and/or management measures	Assessment of residual impact				
	Residual Impact	Significance			
		Duration	Severity	Likelihood	Impact
Construction (cont.)					
Enhanced noise management especially at night and during other noise sensitive time periods, increased communication and engagement with noise-affected individuals	Potential for occasional audible noise at night	Short-Term	Minor	Possible	Low
None required	-				
None required in addition to inherent practice	Increased noise from traffic on low usage local roads	Short-Term	Minor	Possible	Negligible
Operation (cont.)					
None required in addition to inherent practice	Noise from airport ground activity	Permanent	Minor	Almost certain	Medium
None required	Increased noise from surface access transport using the airport as a result of the M3R	Permanent	Negligible	Almost certain	Low

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