

# AVIATION WEATHER HAZARDS

## Moorabbin Aerodrome (YMMB)

Bureau of Meteorology › Weather Services › Aviation



Latitude: S37 58.6

Longitude: E145 06.1

Height above MSL: 50ft

This pamphlet describes hazardous weather conditions for Moorabbin Airport. It is one of a series of pamphlets focussing on hazardous weather conditions at a number of the busier General Aviation Aerodromes in Victoria. Pilots should regard this publication as information provided in support of official forecasts.



Moorabbin Airport, photo courtesy of Creative Commons

### Introduction

Moorabbin Airport is situated south-east of Melbourne about 5 km inland from the eastern shore of Port Phillip Bay. It is in a generally flat and low-lying area with the Dandenong Ranges about 20 km away to the east. Although Moorabbin is in the metropolitan area, it can experience significantly different conditions to Tullamarine and Essendon airports.

An Automatic Weather Station (AWS) with ceilometer and visibility meter is located at the airport.



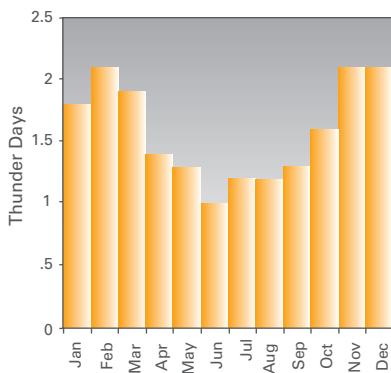
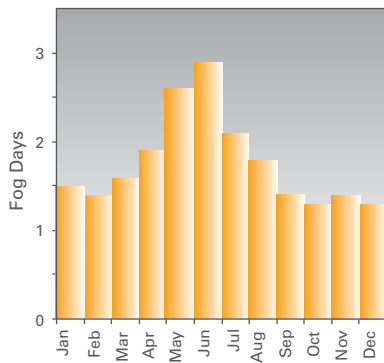
### Fog

Moorabbin is located in a low-lying area and is susceptible to fog, which occurs on about 21 days per year on average. Often this tends to be shallow fog that forms late and dissipates quite quickly after sunrise. Fogs in westerly flow are very rare with low cloud more likely if the air is moist enough. Often the air is reasonably dry in westerlies with little significant cloud. In southerly flow, low cloud is more likely to be the problem although low cloud can lower to fog on occasions, particularly if there has been prolonged precipitation.

Southeast to eastnortheast synoptic flow provides the greatest risk of fog development with most fogs occurring in late autumn and early winter. A strong high pressure system in late autumn or early winter can lead to several nights of fog, with the fog persisting until late morning then developing again soon after dark. Often in these situations smog is a problem through the day with poor visibility reported. The fog can persist all day over Port Phillip Bay, then reform over land rapidly in the evening.



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Mean number of days with fog (top) and thunder (bottom) for Moorabbin Airport from 1950–2009.

Fog can occur during or following a rain event and in any synoptic airflow. Although rare, it is more likely in flows from the south through east to northeast. Moorabbin does not experience the northerly katabatic (downslope wind) that tends to prevent fog formation at Tullamarine and Essendon, so in light northerly flow it is more susceptible to fog than the aerodromes to the north.

### Low Cloud

Moorabbin is particularly susceptible to low cloud in moist southwesterly synoptic situations. Whereas the airports to the north of the city are somewhat protected by the ranges to the west and southwest, Moorabbin is more exposed to southwesterlies. When precipitation occurs with a southwesterly air stream, periods of low cloud below 1000 ft are common. Low cloud periods will be prolonged if the precipitation is persistent, for example in cyclonic southwesterly rain events.

Northerly and northwesterly synoptic flows are quite common in winter and are generally associated with good conditions. On rare occasions with rain in northerlies, low cloud can occur. In these situations the rain tends to increase southward away from the Great Dividing Range causing low cloud to develop at Moorabbin. Tullamarine and Essendon may well be clear in these situations although, rarely, low cloud may spill over the Divide to reach the northern metropolitan area but not reach Moorabbin. Visibility can also be reduced in these situations.

When the synoptic flow is more southerly, conditions tend to be slightly better at Moorabbin than at Tullamarine and Essendon. Low cloud does occur in these situations but does not tend to be as low or to last as long as at the airports to the north.

In southeasterly flow the air tends to dry out somewhat as it moves across Gippsland and low cloud is rare. When the southeast stream is moist enough for widespread low cloud over the metropolitan area, Moorabbin is usually the first to clear.

When the stream tends more northeasterly, the surface wind tends to be light. Low cloud is unusual but can occur in rain situations. In light northeasterly flows, an eddy sometimes develops to the west of Moorabbin with southerly flow over the western areas of Port Phillip Bay and northerly flow to the east. In such events, low cloud may develop at Tullamarine and Essendon airports but may not develop at all at Moorabbin, although shallow fog may occur.

Sometimes after dawn when the eddy moves southward as the general stream tends northerly, the low cloud associated with the eddy may move over Moorabbin from the north before clearing southward.

### Thunderstorms

Thunderstorms affect Moorabbin in a similar way to Tullamarine and Essendon, but the ranges to the north are further away from Moorabbin and consequently less significant. Thunderstorms occur on about 19 days per year on average and are more common during the summer months. They seem to be more pronounced with westerly and southwesterly changes at Moorabbin. Also Moorabbin and the Mornington Peninsula are often the most affected areas in airmass thunderstorms in northwesterly flow perhaps because of the increase in low level moisture as the storms move across Port Phillip Bay.

Severe thunderstorms can occur during the warmer months with large hail and heavy rain possible. During the colder months there are usually a few occurrences each year of small hail associated with thunderstorms.

 **Wind**

With Moorabbin close to the sea, the airport is susceptible to strong westerly and southwesterly surface winds. This is particularly so with strong frontal passages. East to southeast wind also affects Moorabbin with funnelling through the Latrobe Valley producing fresh winds. As the synoptic flow tends more easterly and then northeasterly, the surface winds become lighter because of the effect of the eastern ranges, easing first at Tullamarine and Essendon and later at Moorabbin. Northerlies are quite common, particularly in winter. In northwesterly flow, the winds can be strong at Moorabbin as often the pressure gradient increases southward.

The sea breeze at Moorabbin is from the south to southwest. The sea breeze comes initially off Port Phillip Bay from the southwest but may tend more southerly during the afternoon as the breeze from the ocean takes effect. Often in summer in a light northerly situation the northerly flow will dominate at Tullamarine and Essendon Airports but a sea breeze will affect Moorabbin. This leads to considerable temperature differences. Another common scenario in summer occurs with a high pressure system passing to the south. The sea breeze will arrive at Moorabbin quite early in the day from the south/southwest. Then as the high moves further east the easterly flow through the Latrobe Valley will dominate with the wind at Moorabbin tending east to southeasterly later in the afternoon. This can lead to a quite sudden wind shift and the east to southeasterlies can be quite fresh, and also increase the surface temperature appreciably.

#### **Low-Level Turbulence & Wind Shear**

Significant turbulence occurs quite regularly at Moorabbin Airport. Strong northerly flow often produces at least moderate low level turbulence and on a number of days each year the northerlies are strong enough to produce severe low level turbulence. The northerly flow does not tend to be quite as strong as at either Tullamarine or Essendon. However, significant wind shear can occur in strengthening northerly flow after a cool night. Surface winds may be light at dawn with strong northerlies just above the surface leading to low level wind shear.

Strong westerly flow can lead to at least moderate turbulence but southerlies off the sea do not tend to be as severe.

In any significant easterly flow, eastsoutheasterlies can be quite strong at Moorabbin as a result of funnelling through the Latrobe Valley. This may lead to moderate turbulence but severe turbulence is very rare.

 **Dust/Haze/Smoke**

Dust is not common in the Melbourne area but has occurred with visibility reduced below 1000 metres. This occurs almost exclusively with strong north to northwesterlies ahead of a strong southwesterly change. The worst dust conditions generally occur with the wind change.

Smoke is principally associated with bushfires. The worst conditions develop when fires occur over the eastern ranges and a northeasterly flow develops overnight. The smoke can be trapped below a low level temperature inversion and poor visibility can last overnight and through the morning until the solar heating eventually breaks down the inversion.



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