## *A.3 Climate*

The dominant climatic trend throughout the study area is a gradual increase in annual rainfall and a reduction in daily maximum and minimum temperatures moving from north to south. In the south-east, precipitation increases rapidly, with a doubling of the annual rainfall in the short distance from Guildford to Newbury. (Newbury is just outside the study area.) Superimposed on this trend is the effect of relief and position in landscape. Local increases in rainfall from increased elevation – for example, at Mount Alexander – and conversely slight rain-shadows occur in larger valleys, such as the Loddon River valley north of Cairn Curran Reservoir. Position in the landscape can influence daily temperatures, with lower daily minimum temperatures often experienced in valleys, and lower daily on higher-relief situations.

### Temperature

Warmer conditions prevail in the north of the study area. January and February are the warmest months throughout. Average maximum daily temperatures for these months range from about 30°C in the north to about 25°C in the south. The average daily minima are also highest fro these months, ranging from 15°C in the north to 11°C in the south. Temperatures are lowest during July, with the average daily maxima ranging from 12-14°C in the north to 8-10°C in the south, and average daily minima ranging from 4°C in the north of 2-3°C in the south. The graphs show the average daily maximum and minimum temperatures throughout the year at selected stations.

### Frost

The occurrence of frost depends on a number of factors, mainly the air temperature and humidity, wind speed and cloudiness, and also site factors such as the density and type of vegetation cover, the slope and the position of the site on the slope. While general statements can be made about the distribution of frosts, the susceptibility of a particular site to frost is peculiar to that site. A severe frost occurs when the screen temperature drops to 0°C and 2.2°C. The table shows the average annual occurrence of light and severe frosts in and near the study area.

***Yearly frequency of frosts***

| | Ballarat | Bendigo | Boort | C'maine | Clunes | Maldon | M'brgh |
|---|---|---|---|---|---|---|---|
| Light | 34.4 | 25.1 | 19.4 | 40.7 | 43.2 | 26.5 | 26.0 |
| Severe | 11.9 | 8.7 | 4.7 | 26.8 | 25.8 | 8.5 | 8.2 |

Sources: Central Planning Authority (1952 &1956)

Frosts throughout the study area are most common in the winter months, with a peak in July, although in the south frosts are more likely to occur earlier in the season and extend into the spring. Individual site conditions largely dictate frost frequency and it is nor practical to extrapolate frost data very far from the recording station.

### Rainfall

Most precipitation occurs as rain, with occasional snowfalls recorded in the south, especially in the south-east. The average annual rainfall ranges between about 400 mm in the north to about 110 mm in the south-east. The histograms show average monthly rainfall at selected locations, and map C shows average annual rainfall isohyets. Winter is the wettest season in most areas, and in the south the higher rainfall levels extend into spring. An interesting phenomenon experienced by most area, particularly around Newbury, is a peak in rainfall in February compared with January and March. Late summer thunderstorm activity could explain this increase. The driest season in most areas is summer, although depressed rainfall levels usually extend into early autumn,

### Effect of climate on plant growth

Temperature significantly affects plant growth. At average daily temperatures below about 10°C plant growth is reduced (Trumble 1939), and below about 5°C plant growth almost ceases (Manley 1945). In the northern areas this restriction occurs during June-August; however, in the south at Newbury the temperature-restricted period extends from May to November. The chart indicates the months for which the average daily temperature is less than 10°C.

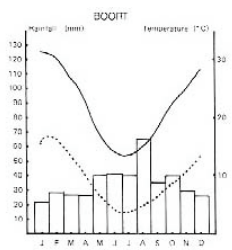
***Months average daily temperatures less than 10°C***

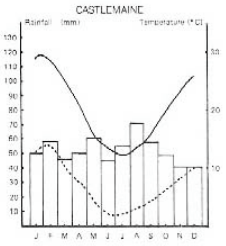
| Location | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ballarat | | | | | ◄ | ─ | ─ | ─ | ─ | ► | | |
| Bendigo | | | | | | ◄ | ─ | ► | | | | |
| Boort | | | | | | ◄ | ─ | ► | | | | |
| Castlemaine | | | | | ◄ | ─ | ─ | ─ | ─ | ► | | |
| Clunes | | | | | ◄ | ─ | ─ | ─ | ─ | ► | | |
| Creswick | | | | | ◄ | ─ | ─ | ─ | ─ | ► | | |
| Maldon | | | | | | ◄ | ─ | ► | | | | |
| Maryborough | | | | | | ◄ | ─ | ► | | | | |
| Newbury | | | | | ◄ | ─ | ─ | ─ | ─ | ─ | ─ | ► |

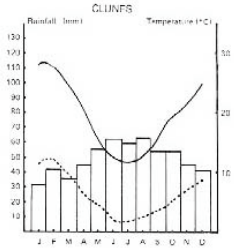
Source: Commonwealth Bureau of Meteorology (1975)

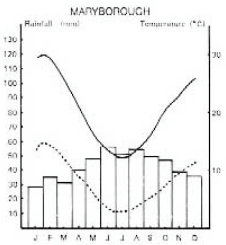
Many agricultural plants are sensitive to frost, including fruit trees, which are most sensitive during their early growth period in spring. Severe frosts during this period may cause damage to flower buds and reduce fruit set.

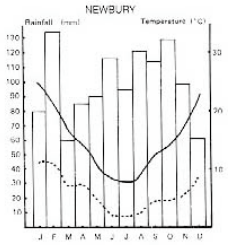
The concept of 'effective rainfall' is also a useful indicator of the plant growing season. The rainfall is said to be effective for plant growth for the period when rainfall exceeds potential evapotranspiration, allowing for an average store of 100 mm of water in the soil. This provides a useful guide for shallow-rooted perennial species, especially native plants. Rainfall in the south-east exceeds potential evapotranspiration early in the season (late February-early March) and this condition is maintained until December. In the drier northern areas, however, rainfall does not exceed potential evapotranspiration until about April-May and water becomes limiting again in October. The combined influence of water-limiting conditions during winter means that most plant growth occurs during autumn or spring, with the actual length of the growing season for each location influenced by local climatic factors.



Map C: Climate map