PART 4 Natural environment (See Appendix F)

4.1 Generally

Landforms throughout the Shire tend to be gentle rather than spectacular. Contrast is evident in the Boginderra Range and the Narraburra Hills formation, north of Temora town, with the latter rising some 200m above the surrounding plain country. East of Springdale, a cluster of lower hills is evident. Pockets of low-lying marshland occur in the localities of Carumbi, Dinga Dingi and Wallundry. There are no major mountains and no major stream. Scenic interest springs generally from subtleties in the ground cover and terrain, and in the contrast between cultivated fields and areas of remnant native bushland. Forested areas tend to be small and scattered.

Vegetation cover within the Shire reflects soils type, moisture holding capability and past human activity by way of land clearing and agricultural activity. Soil erosion has been identified as serious in a number of localities, as have agricultural threats such as salinity and soil acidity (State of Environment Report, 2000). Clearing of native vegetation exacerbates the soil erosion threat. A valuable revegetation program is being undertaken by Land care groups coordinated by the Council.

Remnant patches of woodland and forest generally occur on the rocky ridges of hills which overlay sedimentary material - country which has minimal agricultural value. Most of these remnant wooded areas are in State forests or reserves; and much native woodland occurs within the network of road reservations and travelling stock routes throughout the Shire. Many of these latter are on Crown Land.

The Council's State of Environment reporting has identified as 'environmentally sensitive' areas the ironbark ridges scattered throughout the Shire; all State forests; the western slopes of the Gundibindyal Range; certain areas of nature conservation including wetlands and habitats; the drainage systems of the Mirrool, Thanowring, Narraburra, and Bland Creeks; and the Narraburra Hills, Boginderra Ranges and the Pinnacle. Additions to this list would include travelling stock routes, national parks and nature reserves.

Council's natural environment data base has recently been significantly augmented by the special data set for the Murray - Murrumbidgee region provided by DEC, DPI and DNR to the Council's GIS Group. This data will facilitate the preparation of overlay mapping for incorporation within the new LEP.

4.2 Climate

Temora Shire experiences low summer humidity with an average temperature of 30 degrees Celsius, contrasted with high winter humidity with an average temperature of 15 degrees. Rainfall within the area is commonly reported as being around 580mm per year, coming predominantly from the west and falling during the winter and spring months. Summer rainfall consists typically of precipitation from short heavy storm events, often resulting in minor local short term flooding.

4.3 Geology and landform

In 1975 the NSW Soil Conservation Service reported on the geology of the Narraburra and Duck Creek sub-catchment. Briefly, that report indicated that the oldest rocks exposed within the area are the Upper Ordovician metamorphic, formed in the central part of what is known as the Wagga trough. This trough extends from south-eastern Victoria to Bourke, where it is now covered by Mesozoic sediments.

The marine sediments which underlay Temora have been extensively folded and metamorphosed, and as a distinct entity the Wagga trough has been deformed into a series of shelves, arches and troughs which now form the Trundle Trough Complex. More recent geological history has seen the area experiencing steady erosion, with extensive terrestrial cover of Quaternary sediments developing over the eastern and northern sections of the district.

Through the central position of the shire (from southeast to northwest) there is a belt of Ordovician aged volcanics and related intrusions. These are highly mineralised, comprising part of the 'Macquarie Arc' which hosts the Cadia-Ridgeway and North Parkes copper-gold deposits.

The sub-catchment consists in the main of flat to undulating land separated by several lateral hill extensions to the south-west. Altitude varies from 380m in the east to 200m in the west. Four land slope categories are evident:

2 *Slopes greater than 30%* - very rare
3 *Slopes between 10-30%* - mainly in the east - not very extensive - slopes frequently associated with ironbark ridges - clearing for pastures has resulted in sheet and gully erosion
4 *Slopes between 3* - 10% - large areas in the centre and west - some of the best soils - important arable areas - erosion not severe
5 *Slopes between 1*-3% - extensive areas in the east and west - main drainage systems are contained in these areas - flooding and ponding is common during wet seasons.

4.4 Water

The Shire has no major waterway or river (Figure 3). The greater part of the Shire drains north to the Lachlan River by way of small streams such as the Gundbindyal, Narraburra and Trigalong tributaries of Bland Creek, which latter drains to Lake Cowal and the river. To the west, Mirrool Creek takes water from a much smaller catchment in its south-westerly journey to the Murrumbidgee. Limited ground water is available in some areas; and there are numerous farm dams. Surface water is almost completely absent. Mains water is supplied by Goldenfields Water County Council. Water supply constraints are a major obstacle to diversification of agriculture in the Shire; they probably stand as a safeguard against moves to create smallholdings in many areas.

As noted above, there are several small streams within the Shire's drainage system. Ephemeral creeks such as Narraburra, Duck, Trigalong, Gundibindyal, Combaning, Back, Campbells and Berri Jerri lead either into Bland Creek and hence to Lake Cowal and the Lachlan River, or into Mirrool Creek and thence into the Murrumbidgee River. The streams which drain into Bland Creek are part of the endangered 'Aquatic Ecological Community of the Lowland Catchment of the Lachlan River, whilst those entering Mirrool Creek are part of the endangered AEC of the Lower Murray River.

Council recognises that any degradation of these ephemeral creeks will bring adverse impacts for downstream aquatic habitats. As well, erosion of stream banks could bring sediments and turbidity to those habitats. For these reasons (amongst others) the new LEP will incorporate provisions currently being promulgated by DoP, DWE and DECC to protect sensitive waterways and 'prescribed streams'.

Other aspects of the Shire's hydrological character include the following.

- As the major stream in the Shire, Bland creek has been the subject of a Catchment Action Plan prepared by a committee which included Shire Council representation. This plan has been designed to address natural resource, land management and local economic issues as well as drainage as such. Within this catchment, the Narraburra and Duck Creek sub-catchments (totalling 109,510 ha) drain the bulk of the lands within the Shire. Regular testing for water quality has not yet been undertaken.

- Temora has an average annual rainfall of 584 mm, falling mainly in the winter and spring months. Intense summer storms can lead to minor local flood events.

- Extensive waterlogging in some low-lying areas has resulted in a high proportion of land remaining under native grasses, as crops and pastures are difficult to establish in such areas.

- Since 1980 In Temora town, effluent from the sewage treatment plant has been used to irrigate the golf course, sports field, landscaped parklands and cemetery.

- In Temora town, a stormwater management plan has been developed covering issues associated with wildlife habitats, water quality in Trigalong Creek, recreational fishing, aesthetics, and the

needs of downstream users. The plan has had a positive impact on water quality in Lake Centenary and Trigalong Creek (Figure 5).

4.5 Soils and rural land use

Soils: Within the Lachlan catchment, soil types vary considerably, creating significant management challenges for erosion control, and nutrient management. Within the Temora district, soil types have been mapped by the (then) Soil Conservation Service of NSW.

Salinity remains a major concern, with the catchment being identified as 'high risk' within the Murray-Darling basin. Dry land salinity, declining surface water quality, and declining health and loss of native vegetation are continuing environmental threats, together with a gradual loss of native biodiversity and the degradation of riparian and wetland ecosystems.

Despite some successful remedial efforts over past decades, soil erosion remains an issue of concern, especially in the Trungley Hall area and in locations on the sides and lower slopes of the Ironbark ridges which are scattered throughout the Shire. The general situation Shire-wide is that there has been no appreciable erosion in areas covered by red-brown and red earths, and grey clays on flat or low slope lands. Severe sheet erosion is evident in an area near Springdale, where moderate gully erosion is also recorded. Land care groups are actively working on acid soils and salinity projects in the Morangarell, Grogan and Trungley Hall areas. Soil acidity affects the majority of landholders. Compilation of data on salinity, acidity, soil structure, erosion, waterlogging and stream bank erosion is continuing.

Land use: The Temora district is predominantly a wheat-sheep area. On most classes of country, a rotation of 3-years of cropping followed by 2-years pasture period has been the norm for a number of years. With the exception of forested areas, three land use classes have been delineated. [Note: The following 3-tier classification is necessarily simplistic: notwithstanding, it underpins the important fact that the bulk of land in the Shire is suitable for (and used for) agriculture].

- Arable 1: undulating to rolling - deep friable red earth - ideally suited to wheat/pasture rotation - good water holding capacity - undulating landform provides adequate drainage - used for regular cropping.

- Arable 2: the major land use unit in the Shire - ranges from flat, often swampy areas through undulating cropping areas to stony ridges - intermediate slopes in this unit suited to basic wheat/pasture rotation, with cropping during typical dry seasons; during drought, lower areas are more productive.

- Grazing lands: steeper cleared land adjacent to rocky outcrops - predominantly used for grazing but with some cropping to lower yields - crop rotation involves a longer cropping phase - often leading to serious sheet or gully erosion.

Soil Conservation Service mapping shows Temora town encircled on the south by grazing land and on the north by Arable 2. Ariah Park is completely surrounded by Arable 2. Springdale is surrounded by grazing land.

4.6 Native flora and fauna; forests

Early research by Moore (1953), and cited in 1975 by government, identified the following vegetation communities in Temora. [Note: More recently, DEC has undertaken research on vegetation communities in Temora and the NSW south-west slopes generally. When published, the findings of this work will augment and up-date the current information base].

Current knowledge confirms the presence of the following: Dry sclerophyll forest: Dwyer's Mallee Gum; Mugga Ironbark Woodland; River Red Gum; Grey Box; White Box; Yellow Box; Blakely's Red Gum. These last three constitute an endangered ecological community, examples of which occur near Temora town and in the Sebastopol locality. The NSW Scientific Committee (3/06) has made a preliminary

determination to support a proposal to list the Inland Grey Box Woodland which is found in Temora Shire.

From the above list, the former communities are restricted to elevated areas including the Cowabbie Range, The Pinnacle, and Mount Narraburra. Generally, the more rugged and rockier areas are host to Dwyer's Mallee Gum. Most of the Grey Box and White Box communities have been extensively cleared for agriculture, with the river red gum communities occupying only relatively small tracts along watercourses. The white box woodlands are endangered communities under the Environmental Protection and Biodiversity Conservation Act 1999.

Other species which are found across the whole Shire are White Cypress Pine, Black Cypress Pine, River She-Oak and Bull Oak. The Woolly Ragwort *(Scenecio garandi)* is a declared rare flora species listed under the TSC Act. There are several vulnerable and/or endangered species throughout the Narraburra-Duck Creek catchment (TSC; SoE Report 2000-2001 update).

Whilst the native vegetation within the Shire has been substantially modified and cleared by pastoral activity, vegetation patches which remain constitute important habitat for protected and threatened native fauna species. These include at least 21 species of threatened birds and several mammals.

Table 4.6.1 Vegetation communities in Temora Shire

Vegetation type	Comments	% cleared
Box-ironbark forest	High conservation values, likely to support a range of threatened species	85%
Floodplain forest and woodland	Includes Black Box woodlands	80%
Grey Box / White Cypress Pine / Yellow Box woodland	Some areas may conform to Inland Grey Box woodland provisional EEC	90%
Grey Box Woodland	Inland Grey Box Woodland provisional EEC	90%
Riverina Plains Grasslands complex		70%
Rocky scarps and ranges complex		10%
River Red Gum forest		40%
Stringybark / Black Cypress pine open forest		65%
White Box / White Cypress Pine woodland	Some areas may conform to EEC (Box Gum)	95%
White Box / Yellow Box / Blakely's Red Gum woodland	EEC (Box Gum Woodland)	95%
Yellow Box woodland	EEC (Box Gum woodland)	95%

Source: Attachment 1 to DEC correspondence to TSC, 1 February 2007

Table 4.6.1 above shows that within Temora Shire there are two known EECs - Box Gum Woodlands and Inland Grey Box Woodlands. In addition to these two EECs, other native vegetation in the Shire provides valuable habitat for threatened species. Ironbark forests provide important habitat for endangered birds including the Swift Parrot and Regent Honeyeater, whilst threatened woodland birds are supported by the White Box, Yellow Box and Grey Box communities.

4.7 Flood-prone lands

Local short-term flooding can occur in two locations in Temora town and in the village of Springdale. In the localities affected, water depths are typically insufficient to cause serious property damage, and flood waters disperse rapidly.

Historical evidence supports Council's position to the effect that the risk of serious flooding has never been such as to warrant an investment in a comprehensive flood study. However, Council is currently working towards the completion and progressive implementation of a stormwater management plan for Temora town: when this is in place it is expected that damage and inconvenience due to the average flood event will be minimal.

Localities affected:

- in the vicinity of Kitchener Road, Trungley Hall Road and Barmedman Road
- in the vicinity of the Eastern Industrial area, Oval on Nixon Park
- in Springdale (village centre)