INTRODUCTION

This chapter follows on from Chapter 1 as it focuses on the impact of settlement by non-Aboriginal people on the natural environment. These impacts in Victoria generally are well documented and the non-Aboriginal settlers in the study area followed the same pattern of modifying the landscape to make it more suitable for urban development.

As this chapter shows through describing changes to the indigenous vegetation, fauna, waterways, and landforms, environmental impacts of European settlers were immediate and dramatic when compared to the gradual changes across previous millennia. Forests were cleared and indigenous flora and fauna were decimated. Remarkably, there are some survivors and this chapter describes them. Waterways came under dual attack from pollution created by the ever-expanding city of Melbourne and from efforts to control man-made problems of flooding and erosion. Today, little of Gardiners Creek remains unaltered and its water, along with that of the Yarra, is of poor quality and supports less wildlife than it once did, although as we shall see steps are being taken to redress this situation. Nonetheless, the grossly modified landscape that exists today is a stark contrast to the pre-settlement landscapes described in Chapter 1.

This chapter incorporates the following theme:

Australian Heritage Criteria (AHC)
Tracing the evolution of the Australian environment.

HISTORY

2.1 Changing the landscape

This section considers how activities associated with the urban development of the study area in the nineteenth and twentieth centuries resulted in physical changes that, in some cases, quite dramatically altered the landscape. This ranged from the immediate impact of the loss of vegetation to the more gradual changes that have resulted in new courses of waterways, the loss of swamps and the levelling of hills.

2.1.1 Clearing of timber

Timber of course was initially the primary fuel for the new settlement, as well as the most widely used structural building material. The study area wasn’t rich in tall straight timber, being mostly woodlands, and evidence suggests that most of the suitable timber for construction was cut down by the mid-nineteenth century. A map prepared by Collis and Couchman in 1857 includes annotations, which suggest that much of the municipality east of Tooronga Road was still forested in 1857. Selwyn (1860), however, shows almost all the study area being cleared, with the exception of Toorak, which was cleared in the succeeding decades as the land was subdivided.
Little is known of any early timber industry in the study area, but presumably the better timber would have been used in local buildings and fences by the early European settlers, as clearing took place. Much of the forest was cleared for grazing and burnt. Wattles were valued for their bark, which was used for tanning, but the removal of the bark killed the tree. The remaining poorer quality timber would have been cut for firewood, and what was too small for firewood (such as the thickets of tea-tree along Gardiners Creek) was cut for brushwood fences and garden brush houses (Burns, unpubl., p.41). Firewood was in great demand fueling, the kilns of the study area’s brickworks and Tibbets (1983:6) also believes that the South Yarra, Toorak and Prahran areas ‘quickly became the principal sources of firewood for the Melbourne settlement’. Itinerant timber gatherers are said to have taken wood to the township either by boats along the Yarra or on bullock-drays.

As well as active clearing, the use of the land for grazing compounded the effects on the native vegetation not only because of the clearing necessary to create good grass, but as a result of the trampling with sharp hooves so different to the native grazers, and also of the intense and close grazing which sheep and cattle do. Native plants struggled to survive the higher soil nutrient levels resulting from sheep and cattle grazing. Often graziers deliberately introduced exotic grasses to compete with the native vegetation to ‘improve’ their pasture. It is not clear how much of the municipality was grazed, but grazing began from the first years of settlement of Melbourne, and John Gardiner is known to have moved herds of cattle into Gardiners Creek in 1835, having brought them overland from Sydney (Cooper, 1935).

Consequently, by the end of the nineteenth century very little remained of the original vegetation. However, a number of reserves were set aside very early (Collis and Couchman, 1857). These included a reserve on Gardiners Creek each side of where High Street crosses and the Police Reserve around present-day Malvern East Station. These reserves were supplemented by acquisitions by the City of Malvern, which aimed to create parkland with a boulevard road all along the creek. This is discussed further in Chapter 8.8.

The indigenous vegetation was often replaced by trees and gardens using exotic species in an attempt to ‘civilise’ the landscape and make it more European in appearance. The three scenes in Illustration iv and photographs v at the start of Chapter 1. show the beginnings of this gradual transition from the natural to cultural landscape in the area surrounding the property known as Avoca in South Yarra.
2.1.2 Quarrying

The study area was naturally endowed with deposits of alluvial clay suitable for making bricks. With the high demand for building materials in early Melbourne, particularly in the gold boom years of the 1850s, large quarries were established throughout the study area and brickmaking became the chief industry.

From at least the early 1840s small operators were working in the low-lying parts of South Yarra, Prahran and Windsor, however the northern end of Chapel Street from Toorak Road to the river became the major centre of brick production. As we shall see in chapter 6.3.1, the longest-running works was on the corner of Toorak Road, where Robert ‘Daddy’ Davis quarried the clay for three decades (Malone, 2000:8–9).

The quarrying at the north end of Chapel Street profoundly altered the landscape in that area. Illustration xi (opposite) is an impression of the cutting that once existed at the north end of Chapel Street where it passed through what was known as ‘Forrest Hill’. Quarrying to exploit the clay and stone deposits had all but removed the part of the hill on the east side of Chapel Street by the early twentieth century as shown in photograph xii. This left a crater at the side of the road with a cliff behind, threatening the foundations of nearby houses. This was in turn filled in by later industrial development and now is the site of high-rise residential buildings.
2.1.3 Making roads and railways

The construction of roads and railways also had a significant impact upon the landscape in the form of cuttings and embankments. In 1860, the construction of the railway to Windsor via South Yarra required major earthworks to create an embankment where the bridge over the Yarra entered the study area as it passed through the swamp at the foot of Forrest Hill, and then to form cuttings where it passed through South Yarra and Windsor. Cooper (1924:181) cites a report, which states that in the construction of the line 200,000 yards of earth were removed.

In the early twentieth century the construction of Alexandra Avenue resulted in dramatic changes to the Yarra bank. As we shall see in Chapter 4, Alexandra Avenue was a late addition to the study area’s road system and unlike most of the other roads did not follow the straight lines of Hoddle’s grid, following instead the serpentine curves of the Yarra. In 1903 work commenced on cutting through the steep Yarra bank from Punt Road, but by 1918 it had only reached Chapel Street. Prahran Council continued the work during the 1920s, partly as a way of employing unemployed workers. The project was stepped up in the early 1930s, when various sources of unemployment relief funds, including a large contribution by Sidney Myer, enabled Alexandra Avenue to be extended to Grange Road. The construction of this stage required deep cuttings into the side of the Yarra bank, creating steep walls as shown in photograph xiv. Soil from Como Park was used to create a levee that formed the basis of the roadway connecting Alexandra Avenue with Williams Road. As we shall see in Chapter 8.8 Alexandra Avenue developed into a pleasant boulevard and a cause for civic pride (Wilde, 1993:13 and 34–36), but it forever changed the character of this part of the study area, which until then had remained largely undeveloped.

2.1.4 Taming the waterways

As we have seen in Chapter 1, the Yarra and to a lesser extent Gardiners Creek were important features for Aboriginal people and the European settlers. The Yarra provided reliable drinking water, was navigable by small boats upstream to Dight’s Falls and provided fish and waterbirds for food. Gardiners Creek was a reliable freshwater resource invaluable for the cattle grazing it allowed John Gardiner. Both waterways were barriers to land movement and so it is not surprising that they have historically formed the northern boundaries of the study area. However, the waterways were also prone to flooding with disastrous consequences for the developing urban areas.

The following section describes how the waterways in the study area have been modified since the late nineteenth century. The extent of the changes is shown on Figure 3. As shown on this map, all waterways in the study area, other than the Yarra River and Gardiners and Scotchmans Creeks, have been converted over the years into underground pipes collectively known as the stormwater system, managed now by Council and Melbourne Water. The changes to the Yarra River, Hawksburn Creek and Gardiners Creek are described below.
Yarra River and Hawksburn Creek

According to the Yarra River Precinct Association (2005), severe flooding was a regular feature of the Yarra River’s original narrow and twisting watercourse. The first flood was recorded in 1839. The biggest recorded flood – in 1891 – saw the water rise 14 metres higher than normal. It destroyed 200 houses in Collingwood and Richmond.

A bar of rock, just downstream of Princes Bridge, banked up water which regularly flooded South Melbourne and kept much of the land south of the Yarra as permanent swamp. A lengthy program of works was carried out from the late 1880s to help alleviate the flooding. The rock bar was blasted and the river was widened and straightened, including construction of the 1.5 km Coode Canal at Fishermans Bend. This led to the river becoming brackish as far upstream as Dight’s Falls.
The 1896 Yarra Improvement Act enabled the Melbourne and Metropolitan Board of Works (MMBW) to carry out major widening and realignment works between the city and Chapel Street, including removal of the billabongs on the north bank upstream of Princes Bridge, near the Botanic Gardens. However, flooding was not really controlled in the Yarra until a series of dams in the upper catchment caught the peak flood flows. In addition, between 1924 and 1929, the MMBW removed 24,400 items of natural debris from the river to improve flood control and navigation. In 1929 a new river channel was cut at Burnley opposite Como Park, to make a straight, wide section, creating Herring Island in the process. These works did not prevent another disastrous flood occurring in 1934 when floodwaters reached Toorak Road.
Fringing swamps were less suitable for settlement, but were gradually drained and filled. As shown in the photograph xvi, the swamp between the Yarra and Williams Road became Como Park and was regraded after floods in the 1920s and 1930s, with excess material used to form a levee between the park and the Yarra to carry what is now Alexandra Avenue. Another swamp, upstream on Hawksburn Creek from its confluence with the Yarra adjacent to Yarra Street, was drained and filled and now forms the grounds of Melbourne High School. During the 1960s the construction of the South Eastern Freeway (now the Monash Freeway) further altered the course of the river, removing a point of land near Yarradale Road.

Hawksburn Creek was a tributary of the Yarra, which as shown on Figure 3 crossed the study area from a point near what is now the corner of Wattletree and Glenferrie roads and joined the Yarra near what is now Melbourne High School. In the lower reaches of the Hawksburn it formed a series of swamps around what is now Toorak Road and Chapel Street. The low lying land around these swamps was progressively developed for housing and industry and the water in the Hawksburn increasingly carried sewage and industrial waste, creating a major health hazard. The creek was converted into an open drain in the 1870s and gradually ‘improved’ until the underground Main Drain was completed about 1915. The swamps were drained and filled and part of the land now forms the grounds of Melbourne High School.

(A Place in History, No. 14)
Flooding

Gardiners Creek

The route of Gardiners Creek through the study area has been almost completely altered. Once tree clearing and brush removal along the valley and on surrounding hills commenced, a self-reinforcing chain of events happened. With less vegetation to absorb rainfall and help it soak into the ground, rainfall ran off into waterways much faster, leading to higher peak flows. These flows were no longer slowed by the dense tea-tree thickets on the valley floors, and with the trampling by cattle of the creek banks, soils erosion commenced. Concern about flooding and erosion led to efforts to speed flows safely downstream to the Yarra. The areas that were treated and straightened only exacerbated erosion problems elsewhere, and by the 1930s much of the creek had become an erosion gully cut by the raging water and straightening works tens of metres down into the flood plain (Burns, unpubl., p.41). Ironically, with the natural retarding qualities of the creek removed, the MMBW had to construct ten retarding basins on the upper Gardiners Creek to slow somewhat the flow of floodwaters down the creek.

In the nineteenth and early twentieth centuries river flats along the creek were often used as rubbish dumps, or filled to create more useable land, often for industry. One example is downstream of Burke Road where Gardiners Creek once had two channels, but the northern one was filled in and became part of the Melbourne Brick Company land.

Another use of the creek was for open space. In Malvern East, the alignment of the creek was altered in the inter-war period by the works to create the Malvern Municipal Golf Links. The course of the creek, which consisted of a series of streams surrounded by swamps, was drained and filled and a new creek bed was cut by sustenance workers from Scotchman’s Creek to Warrigal Road. Despite these works, flooding on the course was frequent and Malvern Council undertook further works to straighten deepen and widen the creek.

In the later twentieth century a new threat to Gardiners Creek emerged in the form of roads or, more particularly, freeway construction. The Gardiners Creek Valley Study Drainage Study Team Status Report (February 1977) describes re-alignment and erosion control works over the length of the creek between Toorak Road and Warrigal Road, as does Burns (1984). These studies were carried out at the request of councils and the community to understand the impact of the construction of a freeway along Gardiners Creek, which was subsequently constructed as an arterial road, now the Monash Freeway. Roadworks of this kind have had major detrimental effects on Gardiners Creek, especially downstream of Burke Road.

From these descriptions it is evident that little if any of the creek banks were left undisturbed. Nonetheless remnants of the original vegetation survive and, as we shall see in chapters 8 and 10, steps are being taken to restore some of the original vegetation.
Altering the Environment

Figure 5 - Remnant Vegetation Sites

Legend
- Remnant Vegetation (Site or Track)

Source: Remnant vegetation information prepared by Tony Farrelly 2006.

Note: Indicative only. Information about remnant vegetation was collected across a range of sometimes unmanaged areas. Information may not be relied upon for accuracy.
2.2 Environmental impacts

Although the flora and fauna communities of the study area were still subject to dynamic change at the time of settlement by non-Aboriginal people, the speed of change increased enormously during the nineteenth century. As we shall see in later chapters, urban development in Stonnington began early and was effectively complete by the early twentieth century. The environmental impact of the modifications made to the landscape since the mid-nineteenth century have been dramatic, with few surviving remnants of the pre-contact landscape. This section considers the environmental impacts of changes to the landscape brought about by non-Aboriginal settlement in the nineteenth century.

The known sites of remnant indigenous vegetation in the study area are shown in Figure 5. This map is based on the limited surveys and studies described in the following section and should not be considered as complete, particularly in relation to isolated remnant indigenous trees.
2.2.1 Reducing biodiversity – effects on flora and fauna

Today the indigenous vegetation of the study area has been almost totally removed, with only one site recorded on the Oates and Taranto (2001) mapping of remnant vegetation. This site is a narrow strip along either side of the railway line adjacent to Kooyong Lawn Tennis Club and Warra Street, Toorak. This constitutes less than 0.1% of the original indigenous vegetation. Even this small area is unprotected and under threat. The site is actually larger than indicated on the map and extends from Glenferrie Road to the Yarra River.

A very significant omission from the Oates and Taranto (2001) map is the remnant vegetation site on a very steep escarpment above the Yarra River below Heyington Station. This is recorded on Biosites mapping (Department of Natural Resources and Environment, 2002) as being regionally significant. It is the only site recorded in the study area on the Biosites mapping, and the only site recorded for the study area in the Society for Growing Australian Plants Maroondah Inc (1993), which mentions a 1945 plant list for the site. The site includes at least one massive remnant Eucalyptus globulus, now rarely found as remnants in Melbourne. It occurs along with at least 13 other remnant species. These sites have been protected by default by the rail reserve.

A number of small sites along Gardiners Creek and railway lines were not recorded on DSE’s maps, including at Glenburn Bend, either side of High Street, Hedgeley Dene Gardens, north of the Malvern East Tennis Club, and at the Malvern Valley Public Golf Course. These sites typically have three or four species, commonly including River Red Gums (Eucalyptus camaldulensis) and Tea Tree (Melaleuca ericifolia).

An unknown number of isolated remnant indigenous trees occur in parks and private property across the municipality. Only one is listed on the National Trust’s Register, being the Bursaria spinosa at 391 Toorak Road, South Yarra, which is listed as being of regional significance. Four indigenous trees are listed in the Prahran Significant Tree and Garden Study, all identified as River Red Gums. The study deliberately did not focus on indigenous remnants, or on public parkland, and as a result makes almost no mention of the significant number of remnant indigenous trees in the Heyington area. One that is mentioned, the Yellow Gum (Eucalyptus leucoxylon) at the northern end of Kooyong Road is misidentified as E. camaldulensis. Casual observations even in private land have turned up a number of other records. Other undocumented isolated trees undoubtedly occur scattered throughout the municipality.

The known remnant indigenous vegetation sites in the study area are shown in Figure 5. However, this list has been compiled from the incomplete surveys as described above and should not be relied on for accuracy.

Of the approximately 280 indigenous plant species thought to have occurred in the study area at the time of settlement, only 19 were known to remain in 2005. Of the 140 species recorded in the Department of Natural Resources and Environment’s (DNRE) Flora database (which includes records from soon after the time of settlement), only three taxa have Victorian rare or threatened species status and only one of these is listed under the Flora and Fauna Guarantee Act. The reliability and locational accuracy of these important records requires confirmation and should be treated with caution. The records of Callitriche palustris and Lepidium pseudohyssopifolium are based on apparently unvouched lists generated by Jim Willis in the 1940s and the specimen records of Thelymitra X merraniae are undated with the collector unknown. It is highly unlikely that these species still survive in the study area.

Since the early 1970s a movement to restore native vegetation has emerged in the study area. As will be discussed further in chapters 8 and 10, sites where significant revegetation work has occurred include the Gardiners Creek Valley, the Malvern Urban Forest, and a small patch above Heyington railway station known as WM Dane Park.
The loss of indigenous vegetation has had a predictable impact upon indigenous fauna in the study area. The Department of Sustainability and Environment (DSE) Flora Database records 140 indigenous species occurring in the study area (DSE, pers. comm.). As discussed in Chapter 1.3 it is estimated that at least double that used to occur. The DSE estimate is based on surveys at various key sites in the study area. A more detailed picture is provided by two surveys carried out within or close to the study area:

» The first was a survey of fauna of Herring Island (which is just outside the study area within a bend in the Yarra opposite Como Park) carried out by Larwill (1994), which listed 18 indigenous bird species, three indigenous mammal species, three indigenous reptile species, and no amphibians. Fish were not surveyed.

» Secondly, the Malvern Urban Forest Masterplan Report lists 25 native bird species, four species of native mammal, no reptiles, no amphibians and no native fish.
Combining the lists compiled by these surveys provides a representative list of the following species:

- 33 birds (out of the 300 estimated to be present at settlement)
- four mammals out of 51
- three reptiles out of 41
- no amphibians out of 22
- no fish out of 26.

The Grey-headed Flying Fox recorded from both the sites is listed as vulnerable under the Federal Environment Protection and Biodiversity Conservation Act, and listed as threatened under the Victorian Flora and Fauna Guarantee Act (DSE 2005). Unfortunately it is not clear from the reports whether this species roosts at the Urban Forest or Herring Island (which would be significant) or was just seen flying overhead (which would not be significant).

Some improvement to these numbers would be expected with additional survey effort, but it is clear that much of the fauna of the study area has been decimated.

2.2.2 Geodiversity

Few areas within the study area retain significant geodiversity values today. Most of the exposures of bedrock or geomorphological features have been excavated, levelled, filled, smoothed, straightened, built over or otherwise removed. As we have seen, the northern end of Chapel Street provides just one example, but there are many others.

One exception is the Yarra River bank below Heyington Station, which retains the Silurian outcrop to water level. This assists in understanding the processes described in Chapter 1 that formed the distinctive landscape in that area.

On the other hand, the cuttings created by road and rail and other urban development have also exposed some of the underlying geology of the area. This can be seen in Alexandra Avenue, (refer to photograph xix, opposite) and in the railway cuttings through South Yarra and Prahran. These may be significant from an educational point of view if they provide good views of the geology, geomorphology or soil development.

2.2.3 Turning rivers into sewers – impacts on waterways

As the development of Melbourne progressed its waterways carried not just rainwater run-off, but sewage and industrial waste. From the nineteenth century until well into the twentieth industry viewed the waterways as little more than convenient dumping grounds for all manner of industrial waste. The lower Yarra in particular received a heavy load of toxic and organic pollutants. Finn (1967:37) eloquently describes the Yarra of around the 1870s:

… a fetid, festering sewer befouled midst the horrors of wool-washing, fellmongering, bone crushing and other unmentionable abominations …

In the late nineteenth and early twentieth century the MMBW started construction of sewers to reduce the pollution of rivers and improve public health. Construction of sewers in Prahran commenced in 1897 and the first house connections were made by 1898. By the middle of the twentieth century the study area was almost entirely connected and this led to an improvement in water quality. With the creation of the Environment Protection Authority (EPA) in the 1970s less industrial waste was disposed of into the Yarra and its tributaries and the health of the waterways has steadily improved. However, stormwater run-off continues to degrade water quality, particularly because of illegal sewer connections to stormwater pipes.

Today, Melbourne Water (2005a) rates the lower Yarra as having moderate water quality, poor aquatic life, moderate habitat and stability, poor vegetation and very poor flow characteristics.

… a fetid, festering sewer befouled midst the horrors of wool-washing, fellmongering, bone crushing and other unmentionable abominations …
HERITAGE

The modified natural and cultural landscape associated with the themes of *Creation* and *Altering the Environment* within the study area has important natural and historic values. These values are sometimes expressed in tangible ways, such as by surviving fabric (for instance, buildings, structures, trees and landscapes), but are also apparent in the associations and meanings embodied by the place for different communities. This chapter provides a summary of values associated with these places and provides a representative list. It should, however, be noted that the places described in this history are based on limited surveys and it is probable that additional sites would be identified if a comprehensive study of the places of natural and geological significance of the study area was to be undertaken.

*Creation*

The remnant parts of the natural environment and landscape within the study area are important for their contribution to biodiversity values of the region and for providing valuable habitat for native fauna. They are also important as they provide valuable and now rare evidence of the landscape as it would have appeared prior to non-Aboriginal settlement.

The confluence of the Yarra River and Gardiners Creek and the area around Heyington Station provide evidence of the creation of the present-day course of the Yarra, and the draining of the lake that was formed by lava flows blocking the course of the Yarra and Gardiners and Hawksburn creeks. This site provides an important opportunity for further research that would increase our understanding of this process. Examples of heritage places associated with the theme of *Creation* include:

- The landscape and geological formations along the banks of the Yarra at the confluence with Gardiners Creek.
- Remnant indigenous vegetation sites including:
  - The sites between Kooyong Tennis club and Warra Street, Toorak, and along Gardiners Creek (Glenburn Bend, High Street, Malvern Golf course and other locations) and the Yarra River
  - The cliff site adjacent to Heyington Station
  - The site adjacent to the rail line east of Gardiner Station.
- Remnant indigenous trees including the Bursaria spinosa at 391 Toorak Road, South Yarra (listed on the National Trust Tree Register), River Red Gums (*Eucalyptus camaldulensis*) Yellow Gums (*E. leucoxylon*) and others scattered through the study area.

*Altering the Environment*

The modifications to waterways in the area have historic significance as they provide evidence of the measures taken by European settlers to promote settlement by controlling the effects of flooding and reclaiming swamps for various forms of land use. The exposed cuttings formed by activities such as road and rail construction or quarrying have natural significance for their ability to provide further information about the geological development of the study area. Examples of heritage places associated with the theme of *Altering the Environment* include:

- Como Park and the adjacent levee bank/roadway that connects Williams Road with Alexandra Avenue
- ‘Exposures’ of geological formations such as along Alexandra Avenue, particularly the cliff and levee formations between Chapel Street and Williams Road, and railway cuttings in Armadale, Prahran and South Yarra
- The Prahran Main Drain (formerly part of Hawksburn Creek), created between c.1870 and 1915
- Herring Island (created as a result of Yarra River straightening), which is just outside of the study area
- Remnant c.1940 bluestone pitchers that that line part of Gardiners Creek downstream of Toorak Road, which provide evidence of the efforts to straighten the creek and reduce flooding impacts.