

## 8 POST FREEWAY WORKS

### 8.1 INTRODUCTION

A number of drainage works have been undertaken along Moonee Ponds Creek since the completion of the Tullamarine Freeway. The works were mainly undertaken to enable certain sections of the creek to convey flood flows more efficiently, and in order to minimise erosion. Since the Freeway was completed the creek has been partially concrete-lined between Evans Street and Gordon Street, Essendon and between Margaret and Gaffney Streets, Broadmeadows; has been reshaped between Pascoe Street and Lyons Street, Broadmeadows; and cleaned out and 'beautified' where it flows through Westmeadows Township (Fig 8-1). Works have also been carried out along some of the tributaries. These works have mainly involved the undergrounding of short sections of watercourses in areas that were being developed for residential purposes. In addition, maintenance works have been carried out along Moonee Ponds Creek from time to time. Such works have included the cleaning out of certain reaches of the creek, the construction of bank protection works, the reshaping of banks and minor realignments. These works are described separately in Section 9.

A number of the works that were undertaken by the Board along Moonee Ponds Creek and its tributaries during the 1970s have been the subject of considerable debate by local councils, conservation groups, and conservationally minded individuals. In keeping with trends elsewhere in Australia, there has been a growing concern for the environment in the Melbourne area, and local conservation and environment groups have become increasingly involved in issues relating to the utilisation and management of 'urban creeks' and adjoining land. Such groups are generally opposed to the undergrounding or concrete lining of watercourses, which is in marked contrast to public attitudes during the 1950s and 1960s when the Board of Works received numerous requests from local councils and associations, and from individuals, for creeks to be undergrounded or hard lined (see Section 5.1 and 5.3).

In the following sub-sections details of the works that were undertaken along Moonee Ponds Creek and its tributaries during the 1970s are given, and public attitudes towards the various projects are discussed.

### 8.2 IMPROVEMENT WORKS BETWEEN EVANS STREET AND GORDON STREET, ESSENDON

In late 1970, the Board of Works Sewerage Committee approved a plan for the improvement of Moonee Ponds Creek between Evans Street and Gordon Street, Essendon (Figs 8-1 and 8-2). Improvements to this section of the creek were considered to be necessary for two main reasons: to control the severe erosion that was taking place at a number of points, and to upgrade the hydraulic capacity of this section of the creek to match that of the improved sections immediately upstream and downstream [see Section 5.3.1 (a) and (e)]. It was noted that as long as the section of the creek between Evans and Gordon Streets remained under capacity, the hydraulic efficiency of the adjoining improved sections would be impaired.

Because of the lack of space available, it was decided that a partially concrete-lined channel would have to be constructed. The job was issued to construction in December 1971 at an estimated cost of \$197 021, this cost including provision for the undergrounding of a short section of the Melville Main Drain outlet. The form of the channel is similar to that of the improved section immediately downstream that was constructed when the Tullamarine Freeway was built (see Section 7.3). The concrete invert is 6.1 m (20 ft) wide, the banks are battered to a 1 in 1 1/2 slope, and the lower 3.0 m (10 ft) or 4.9 m (16 ft) of the banks are concrete lined (Type Sections 1 and 3 - Fig 8-2; Plate 8-1). The existing improvement works at Waxman Parade [See Section 5.1.3 (d)] were incorporated into the new channel (Type Section 2, Fig 8-2). The existing concrete

invert was widened and the newly excavated western bank was partially concrete lined, but the pitchers on the eastern bank were retained (Plate 8-1B). Maintenance tracks were constructed along the bank tops of the improved channel for most of its length and a number of access ramps leading down to the creek invert were built. The works were completed in December 1972.



A Looking downstream from Albion Street Bridge  
(Type Section 1)



B Looking upstream from near Salisbury Street  
(Type Section 2). Note bluestone pitchers on  
right-hand bank

PLATE 8-1 Improvements between Evans and Gordon Streets, Essendon

The cost of the project escalated, the final cost of \$293 879 being some forty-nine per cent in excess of the original estimate. Reasons given for the escalation included:

- Foundation difficulties along the length of the invert; up to four feet of waterlogged silt had to be replaced with imported compacted rockfill.
- The need to use more expensive construction materials than envisaged when laying the concrete batters because of the unsuitable nature of the silty bank materials.
- The need to import fill to fill batters and badly scoured sections at the rear of Waxman Parade.
- All creek diversions had to be built into the batters because of the confined nature of the channel between steep banks, and full width invert pours were necessary. This resulted in additional costs for the reinstatement of diversion trenches that had not been allowed for.
- Because of the friable nature of the ground and also because of vandalism, the lengths of the diversion trenches were relatively short which prolonged the time required to lay the concrete invert.
- Some unexpected difficulties due to the release of water from Greenvale Reservoir.

The discharge capacities and frequency estimates for this section of the channel are given in Table 8-1. As can be seen, both bankfull and design flow discharges are in excess of the 1 in 100 year flow.

**TABLE 8-1 IMPROVEMENTS BETWEEN EVANS STREET AND GORDON STREET : DISCHARGE CAPACITIES AND FREQUENCY ESTIMATES**

Estimated Discharges				Full Bank Flow				Flow with 0.5 m Freeboard				Flow in Lined Portion			
Q *	Q	Q	V	Depth	Approx	Q	V	Depth	Approx	Q	V	Depth	Approx		
100yr	5 yr		m/s	m	Freq	m/s	m/s	m	Freq	m/s	m/s	m	Freq		
Type Sections 1 & 2															
190	97	279	3.7	5.4	100	235	3.6	4.9	100	72.3	4.1	2.0	5		
Type Section 3															
190	97	275	3.9	5.4	100	240	4.0	4.9	100	147	5.1	3.0	30		

(\* Q in cumecs)

### 8.3 IMPROVEMENT AND BEAUTIFICATION WORKS AT WESTMEADOWS

In July 1972, the Board of Works received a letter from the Broadmeadows City Engineer expressing concern about a number of gum trees that were being undermined on the east bank of Moonee Ponds Creek just downstream of Fawkner Street, Westmeadows (Plate 8-2A). The City Engineer felt that it would be unfortunate if the gums were lost, and enquired whether the Board would be prepared to preserve the trees by reconstructing the bank around the exposed tree roots. He informed the Board that the Broadmeadows Council was "attempting to keep the Westmeadows area as much as possible in its original state, to prevent it appearing as though it has been overrun by suburbia."

The Board of Works agreed to protect the trees, and in late 1972 reconstructed the eroded bank using rock gabions (Plate 8-2B). Broken paving stones were used to fill the gabions, which not only reduced costs, but made them aesthetically more attractive. The gabions have successfully protected the trees, although during the May 1974 storm undermining caused some of the gabions to sag, exposing the alluvial bank behind (Plate 8-2C). The eroded bank was subsequently battered back and grassed (Plate 8-2D), but it was decided that there was no necessity to realign the gabions. The gabions sagged because they lack an adequate foundation.

As part of its policy of preserving and enhancing the environment of the Westmeadows area, the Broadmeadows Council approached the Board of Works in late 1972 concerning the possibility of beautifying Moonee Ponds Creek where it flows through Westmeadows Township. In particular, the council indicated that it hoped to make a feature of the old bluestone bridge over the creek at Fawkner Street (Fig 8-3 A and B). The Board of Works Engineer-in-Chief informed the council that the Board would be willing to clean out and improve the creek. Work commenced on the project in March 1974, and covered the section of the creek between Swan Avenue and the eastern end of Forman Street (Fig 8-1). The work undertaken included :

- The cleaning out of weeds, rushes and debris from the creek bed.
- The eradication of noxious weeds.
- The repair of eroded banks - rock fill was used to stabilise some banks.
- The grading of steep banks to provide easier and safer access.

- The planting of graded and reconstructed areas with grass, and the planting of numerous trees and shrubs (the latter in conjunction with the Broadmeadows Council).
- Improvement of council drain inlets - either open spoon drains or side entry pits with underground pipes leading to the creek bed were constructed depending on the nature of the site.

Care was taken throughout to avoid damage to trees and to disturb other vegetation as little as possible. The appearance of the creek prior to the work being undertaken and immediately after it had been completed can be seen in Plate 8-3.

One resident, whose property adjoined the creek immediately downstream of the improved section, complained to the Board of Works that the beautification works had increased the risk of his property being flooded. The Board concurred and decided to increase the capacity of the channel adjacent to, and immediately downstream of, his property, and in mid 1974 extended the improved channel downstream to near the eastern end of Black Street (Fig 8-1).

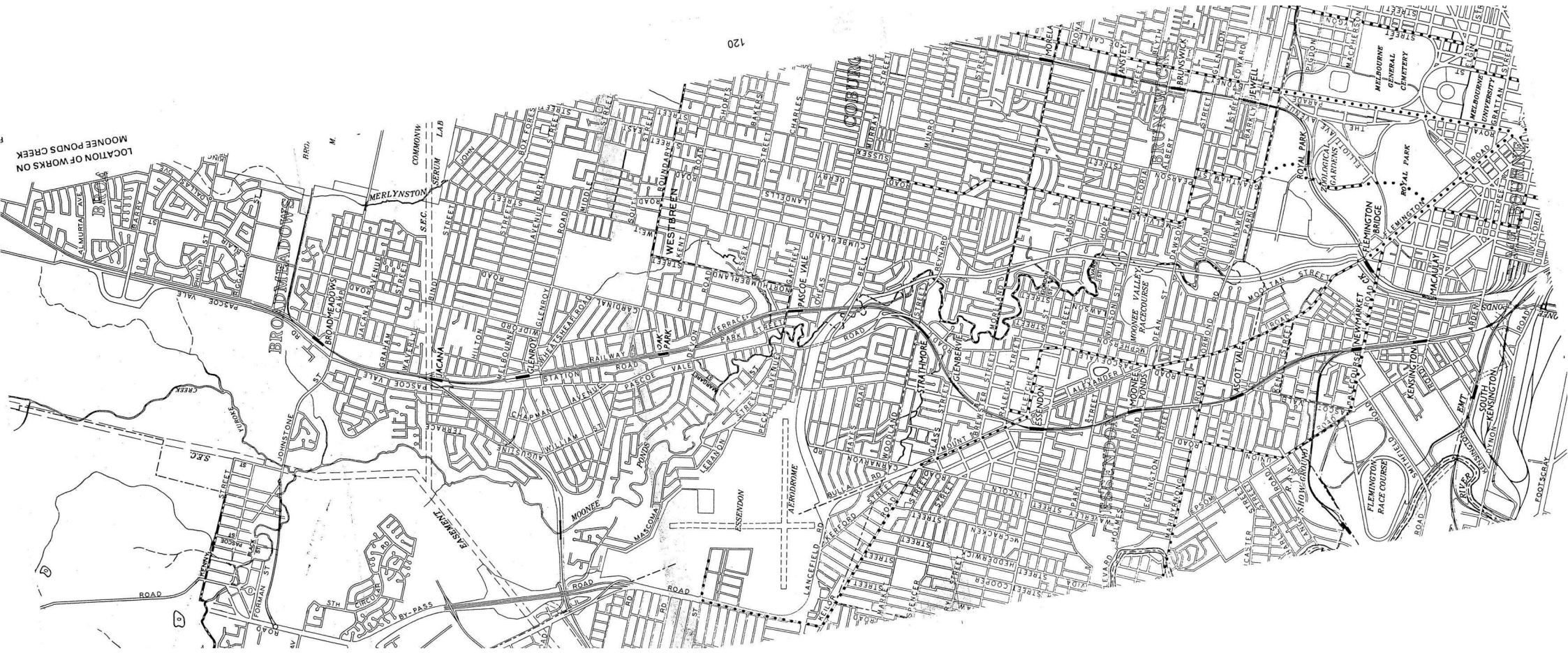
The total cost of the improvement works between Swan Avenue and Black Street was \$54 000, or \$28.00 per linear metre.

### 8.4 IMPROVEMENT WORKS BETWEEN MARGARET STREET AND GAFFNEY STREET, PASCOE VALE

The Board of Works received numerous complaints between 1940 and 1970 concerning bank erosion along the section of Moonee Ponds Creek between Margaret Street and Gaffney Street Footbridge, Pascoe Vale. As along other sections of the creek, title boundaries generally extended down to the water's edge, and a number of allotment owners progressively lost part of their land (Plate 8-4). The Board's 1953 scheme for the improvement and realignment of Moonee Ponds Creek (See Section 5) included this section of the creek, but because of financial constraints the scheme was never implemented. The Board continued its existing policy of repairing and protecting the most severely affected sections of bank.

As noted in Section 5.1.2, in early 1947 a short section of eroded bank was reconstructed and the toe protected with beaching stones just upstream of Gaffney Street Footbridge (Fig 5-4A). In 1956, rocks were placed to protect the banks at several localities in the vicinity of Main, Bass, Herbert, Marks and Adelaide Streets (for example, see Plate 8-4), and in early 1962 a short section of the creek was realigned just downstream of Gaffney Street Footbridge to protect the rear of a number of allotments on Somerset Street [ See Section 5.1.3 (c) ]. In 1971, bank protection works were undertaken at the rear of No 23 Stewart Street, Pascoe Vale. Undercutting on the outside of a bend had caused the bank to slip (Plate 8-5A), undermining a fence and threatening to undermine a large gum tree. The Board of Works decided that remedial action was urgently required because there was the danger that the tree might fall on to a house. The bank was reshaped and the toe protected by rocks (Plate 8-5B) at a cost of \$5 250.

The Jacana Retarding Basin afforded some protection to this section of the creek by attenuating the peaks of storm flows, but may have exacerbated erosion during a number of storms by prolonging the duration of medium level flows along the creek. It became apparent that as urban development within the upper part of the Moonee Ponds Creek basin proceeded the situation would deteriorate and permanent works would be required, and it was decided that the most effective solution would be to partially concrete line the channel.



LOCATION OF WORKS ON MOONEE PONDS CREEK

BROADMEADOWS

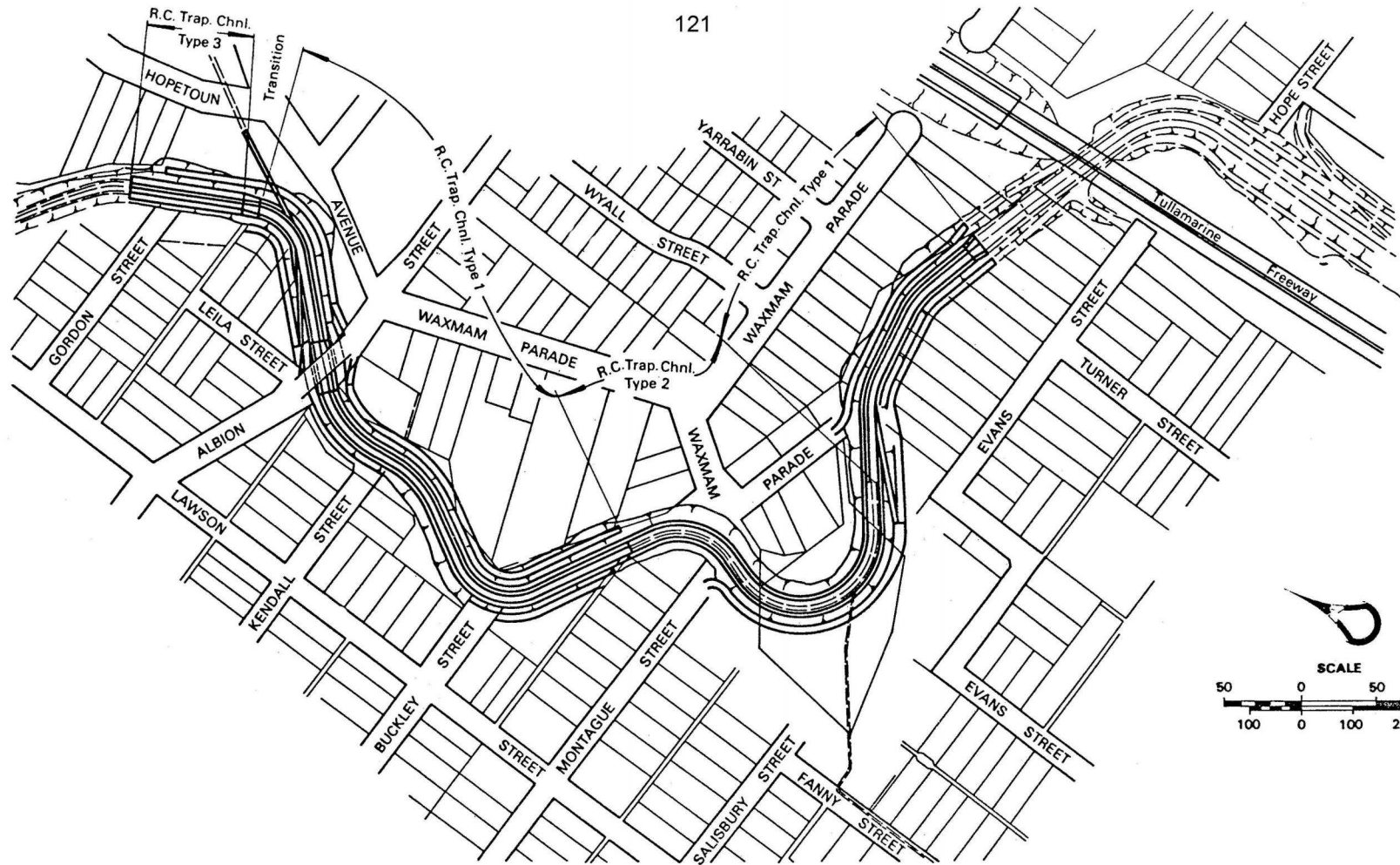
COBURG

FLEMINGTON RACE COURSE

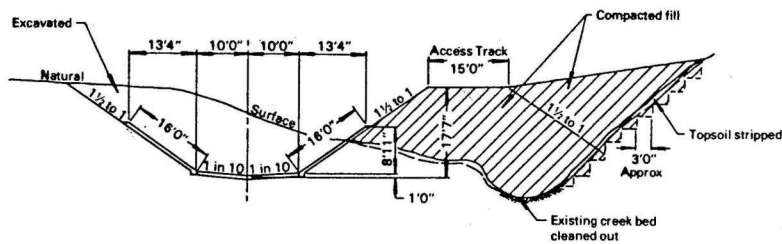
FLEMINGTON BRIDGE

FLEMINGTON STATION

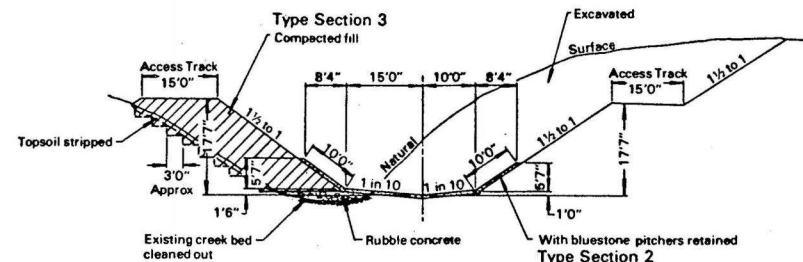
LOCATION OF WORKS ON MOONEE PONDS CREEK



LOCALITY PLAN



TYPE SECTION 1



TYPE SECTION 2 AND 3

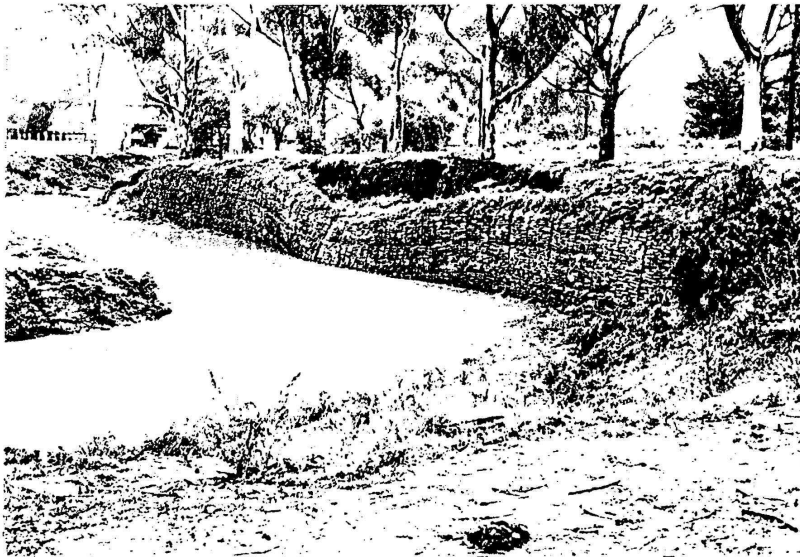
IMPROVEMENTS BETWEEN EVANS STREET AND GORDON STREET, ESSENDON



A Eroded bank, early 1972



B Gabions installed, August 1973



C Sagged gabions and eroded bank, May 1974



D View of the gabions in August 1980



A View looking upstream near Fawkner Road Bridge, December 1973



B The same view as in August 1974



C View looking downstream towards Raleigh Street, December 1973



D The same view as in C in December 1974



A View looking upstream. Note the deposition on the inside of the bend



B View looking downstream. Part of the bank has been protected with loose rock

PLATE 8-4 Bank erosion at the rear of properties on Main Street, Pascoe Vale, March 1955

The design of the channel provided for the creek to be reshaped and partially concreted between Margaret and Gaffney Streets and for its realignment at two localities: at Herbert Street, where a tight loop would be cut off; and immediately upstream of Pascoe Vale Road, where the creek would be straightened. The Broadmeadows Council approved the proposed realignment provided that a footbridge was constructed over the creek at Margaret Street and that there was no infringement of existing sports grounds.

The design of the improvement works attracted a considerable amount of criticism. The Broadmeadows Environment Committee (BECOMM) and the Environment Standing Committee of the North-West Regional Council for Social Development wrote to the Board of Works protesting at the proposal to partially concrete line the creek. The Environment Study Committee suggested that bluestone pitchers would be more appropriate, while BECOMM demanded that all work on the project should cease and an alternative design, avoiding hard-lining, should be investigated. BECOMM sent copies of their letter of protest to a number of public authorities and government officers, including the Premier of Victoria, the Victorian Ministry for Conservation and the Federal Minister of the Media. Reasons forwarded by BECOMM for wishing to retain the creek in its existing form included: visual and aesthetic appeal, maintenance of native flora and fauna, lower *E coli* levels, prevention of erosion downstream from the concreted sections, and educational benefits for the children of Broadmeadows and other municipalities. At the time that the protest was made, however, no representative of BECOMM had visited the Board of Works to discuss the reasons for the Board's choice of design and the constraints within which the Board had to work.

Because of the publicity that the issue attracted, the Main Drainage Division of the Board of Works prepared a report on the subject, a modified version of which was printed in *The Broadmeadows Observer* of 26 November, 1975. The Board pointed out that erosion was already a serious problem and that as urbanisation proceeded upstream the frequency and size of flood flows would increase, and that if improvement works were not undertaken flooding and erosion problems would be exacerbated. It was noted that although the construction of additional retarding basins might alleviate the situation, it would not solve all the problems. The Board, therefore, considered that it was essential that permanent creek works be undertaken, and that the type of treatment chosen would need to be stable under a wide range of flow conditions to ensure that design criteria could be satisfied. Other factors that the Board felt should be taken into account included:



A September 1971

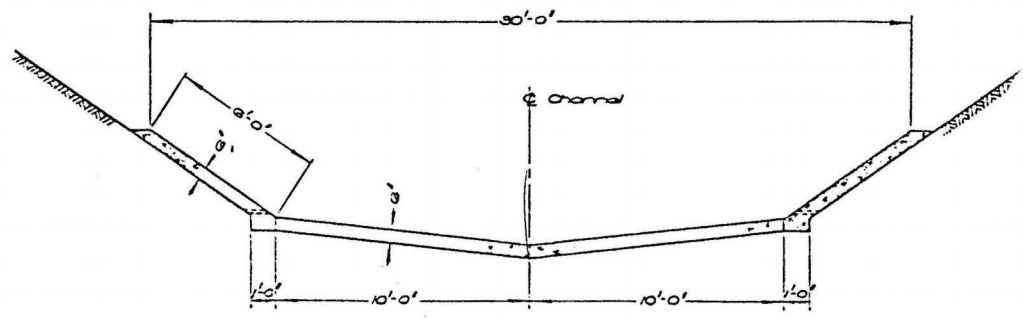
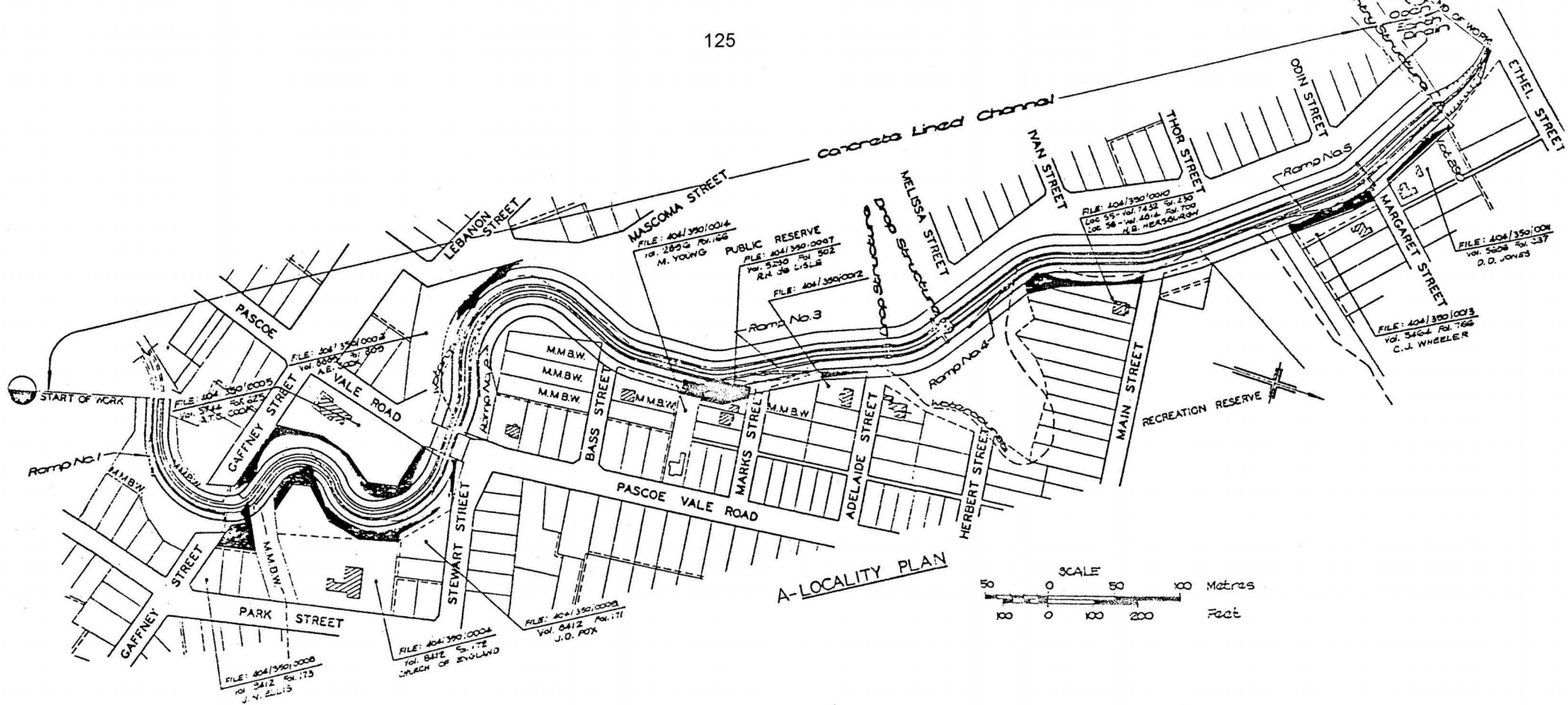


B November 1971



C August 1980

PLATE 8-5 Bank erosion and improvement works at the rear of No 23 Stewart Street, Pascoe Vale



**IMPROVEMENTS BETWEEN GAFFNEY STREET AND MARGARET STREET, BROADMEADOWS**

Figure 8.3



- That as little land as possible should be acquired from adjacent property owners.
- That sharp bends should be avoided in order to prevent excessive erosion and siltation.
- That low flow velocities should be adequate to prevent the deposition of sediment, the removal of which results in high maintenance costs.
- That materials should be readily available and that cost of delivery should not be excessive.
- That materials should be easy and inexpensive to place.
- That materials should be relatively resistant to damage by water and by vandalism.
- That maintenance costs should be kept to a minimum.
- That dangers to health should be eliminated, e.g. stagnant polluted water, habitats for vermin.

Given the objectives and constraints listed above, it was the Board's opinion that the most appropriate design would be a channel with a concrete-lined invert and partially concrete-lined banks. Such a channel would be stable, self-flushing, require minimal land acquisition, and require minimal maintenance. The channel was designed so that long duration flows from the Jacana Retarding Basin would be contained within the lined portion. It was accepted that there was the possibility that some damage to the grass banks might occur during the occasional flows that would overtop the lined portion of the channel.

The job was issued to construction in April 1975 and completed in early 1977 at a cost of approximately one million dollars. Estimates of discharge capacities and frequency for the improved channel are given in Table 8-2, the land that had to be acquired to accommodate the new channel is shown in Fig 8-3A, and a type section of the new channel is shown in Fig 8-3B. Two energy dissipating drop structures were installed in the channel where it cuts across the tight loop at Herbert Street (Fig 8-3A; Plate 8-6), and a number of concrete maintenance ramps leading down to the invert were constructed. The aerial photographs in Plate 8-7 show the character and alignment of the creek between Margaret and Gaffney Streets prior to and immediately after the construction of the improvement works.

**TABLE 8-2 IMPROVEMENTS BETWEEN MARGARET STREET AND GAFFNEY STREET : DISCHARGE CAPACITIES AND FREQUENCY ESTIMATES**

Estimated Discharges				Full Bank Flow				Flow with 0.5 m Freeboard				Flow in Lined Portion			
Q*	Q	Q	V	Depth	Approx	Q	V	Depth	Approx	Q	V	Depth	Approx		
100yr	5 yr		m/s	m	Freq	m/s	m/s	m	Freq	m/s	m/s	m	Freq		
88	57	165	3.1	4.6	100	135	3.0	4.1	100	27.5	3.2	1.32	5		

(\* Q in cumecs)

Some of the alternative solutions that were proposed would have been far more expensive both in terms of initial construction costs and regular maintenance costs, and would not have satisfied some of the fundamental design criteria listed above. At least one proposal would have required the removal of a number of private houses. As the Board pointed out, the problems of Moonee Ponds Creek could not be solved by simply landscaping the bed and banks of the creek.

A suggestion that bluestone pitchers should be used to line the creek instead of concrete was a completely impractical proposition. The work would have required some 100 000 pitchers, but since 1952 only a limited and intermittent supply of reclaimed pitchers has been available. Even if a supply of pitchers had been available, the cost of cutting and setting would have been prohibitively expensive.

As part of an investigation into the possibility of improving the aesthetic appearance of concrete lined channels, a number of experiments were carried out along one section of the new channel. At one locality rectangular grooves were cut into the surface of the concrete lining the bank (Plate 8-8A and B), while at another locality the surface was moulded to the form shown in Plate 8-8 C and D, and coloured with a wax impregnated blue pigment. Both types of treatment are more expensive than conventional concrete lining. One or two extra hands are required to groove concrete, adding an extra five per cent to the cost, while the addition of pigment raises the cost by approximately nine per cent.

As a result of the debate concerning the works between Margaret and Gaffney Streets, the Board of Works initiated the formation of a committee that would act as "a vehicle whereby the recreational potential of the valley between Strathmore Heights and Westmeadows can be planned to balance the needs and wishes of as many interests as possible." Initially, the committee was composed of the following representatives: the Broadmeadows Council representative to the Board of Works (the convener), another Broadmeadows Councillor, City of Broadmeadows engineering staff, two local interest representatives, a representative from the Commonwealth Department of Environment, Housing and Community Development, a representative from the Victorian Ministry for Conversation, and the Board of Works Engineer-in-Chief and Chief Engineer of Main Drains.



PLATE 8-6 Energy dissipating drop structures near Adelaide Street

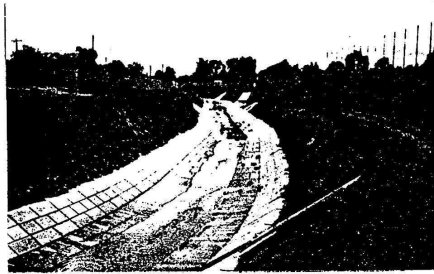


A Before construction



B After construction

PLATE 8-7 Improvements between Margaret Street and Gaffney Street, Pascoe Vale



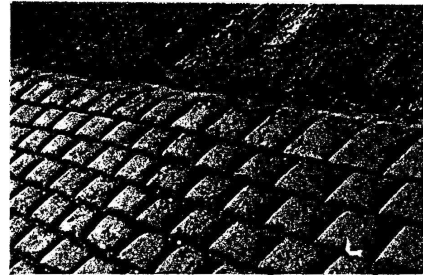
A Rectangular surface grooves



B Close-up of grooves



C Coloured (Bomanite) patterned surface



D Close-up of Bomanite surface

PLATE 8-8 Aesthetic treatment of concrete-lined channels

### 8.5 IMPROVEMENT BETWEEN PASCOE STREET AND LYONS STREET, BROADMEADOWS

In May 1975, the Board of Works received a request from the City of Broadmeadows to beautify the creek between Pascoe Street (the downstream end of the Westmeadows improvements) and the Broadmeadows - Essendon Railway Trastle Bridge (Fig 8-1). The council informed the Board that it had been allocated \$85 000 for such a project from the Commonwealth Department of Urban and Regional Development under its Area Improvement Program. The requested beautification works were viewed by the City of Broadmeadows as part of a broader strategy, and the council employed a firm of consultants to "examine the land adjacent to Moonee Ponds Creek and Yuroke Creek within the City of Broadmeadows and make recommendations as to its development for recreational purposes and for its overall landscape treatment" (Ref 1). The consultants presented their report to the council in May 1976 and recommended that the council should, *inter alia*:

- Resolve to develop the open space along Moonee Ponds Creek and the Yuroke Creek as continuous landscaped parklands for both active and passive recreational purposes, and should
- Negotiate with the Melbourne and Metropolitan Board of Works for an early agreement of the proposals for development in relation to flood control, pollution, landscape treatment along the banks, and maintenance.

In general, the report recommended that there should be "a minimum of disturbance to the natural features of the creeks".

With respect to the council's request to beautify the creek, the Board of Works convinced the council that there was no necessity for improvement works within the Jacana Retarding Basin, but agreed to design and undertake improvement works for the section of the creek between Pascoe and Lyons Streets (Fig 8-4A) if funds were made available. The Board had no plans to undertake major works along this part of the creek, for although the banks were being eroded at a number of points, there was little threat to private property.

The Board of Works submitted plans for the improvement works to the Broadmeadows Council who forwarded them to the Department of Urban and Regional Development for approval. The Board proposed that the creek should be cleaned out, the banks battered to a 1 to 1.5 slope, and that a 1.2 m - wide (4 ft) 0.6 m - deep (2 ft) concrete conduit should be installed along the centre-line of the creek to convey low flows (Fig 8-4B). The installation of a lined centre channel was proposed in order to reduce recurring maintenance expenditure; such a channel would have prevented weed growth, and minimised erosion and siltation. The Board also proposed that the meander loop opposite Riddell Street should be cut off to improve the flow and that the creek should be realigned opposite Eyre Street to facilitate the construction of a proposed road extension (Fig 8-4A).

The plans were rejected by the Department of Urban and Regional Development who considered the "concrete lining" to be environmentally unacceptable. The Department suggested that alternative solutions should be investigated, and allocated a sum of \$15 000 for the purpose. The matter was referred to the Joint Steering Committee, that had been recently formed (see Section 8-4). The Committee, utilising the grant from the Department of Urban and Regional Development, appointed a consultant to "provide detailed open space and recreation planning services within a study corridor bounded by Margaret Street, upstream to the Westmeadows area along Moonee Ponds Creek". The consultant presented a report to the Committee in 1976 (Ref 2). The report made a number of recommendations concerning the treatment of the creek, some of which were not acceptable to the Board of Works. As a result the report has never been published.

Following discussions by the Steering Committee, the Board of Works submitted a revised plan for the beautification of Moonee Ponds Creek between Pascoe Street and Lyons Street (Fig 8-4 C). The major revisions included: gentler 1 in 3 batters; a relatively narrow unlined invert; and the retention of the meander loop opposite Riddell Street, although it was proposed that a flood channel should be cut across the neck of the meander loop. The new plan was approved by the Department of Urban and Regional Development, and work commenced on the project in late April 1976. The cost of the project, \$86 124, was met by the Department of Urban and Regional Development.

The state of the creek immediately before work commenced, and approximately twelve months after completion, is shown in Plate 8-9A to C. Unfortunately, as predicted, erosion and siltation have been recurring problems and a considerable amount of money has had to be expended on maintenance. Erosion and siltation were particularly severe during the Easter storm of 1977 (Plate 8-9 D). The combined effects of erosion and deposition have caused the abandonment of the meander loop, even during low flow (Plate 8-10). The flood channel is now the regular waterway and the meander loop is almost completely silted up; in fact, the only time that flow now occurs within the loop is during a flood, which is virtually the opposite to what was planned!

Bank erosion from overland flow has been a recurring problem along the improved section between Lyons Street and Pascoe Street (Plate 8-11). It has proved difficult to establish a good grass cover on the banks along some reaches and rills have developed. Once initiated the rills tend to be self-perpetuating and bank repair work has been necessary at several points to prevent more serious damage occurring.

In early 1977, bank improvement works were extended for a short distance downstream of Lyons Street. The western bank of Moonee Ponds Creek was lined with basalt blocks, and a second set of blocks was set back from the creek to protect a bicycle track (Plate 8-12).



A Before construction. View looking downstream from upstream of Campbell Street



B Before construction. Reed-choked watercourse upstream of Lyons Street



C The improved channel. View looking downstream from Campbell Street



D Rocks, gravel and sand deposited along the improved channel during the Easter 1977 flood

PLATE 8-9 Improvements between Pascoe Street and Lyons Street, Broadmeadows



A Aerial view, 1980



B The floodway, August 1980

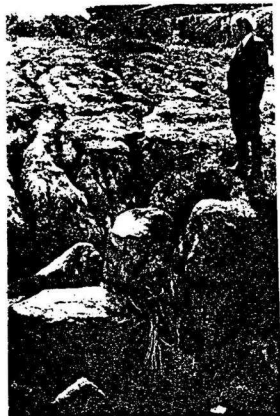


C Part of the vegetation and silt-choked loop in August 1980

PLATE 8-10 The loop and floodway opposite Riddell Street, Broadmeadows



A Undermining of a spoon drain on the south bank of the creek near Sulby Place by surface runoff from the Westmeadows Bicycle Track. April 1977



B Rills on the north bank of the floodway, August 1980

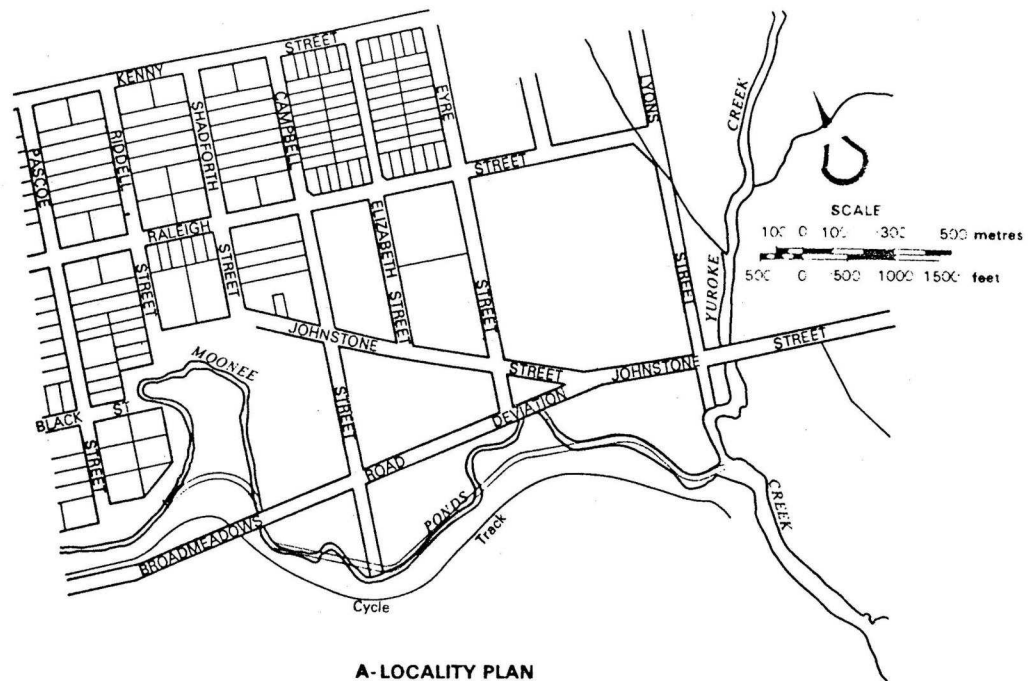


C Rills on the south bank of the creek immediately downstream of the floodway, August 1980

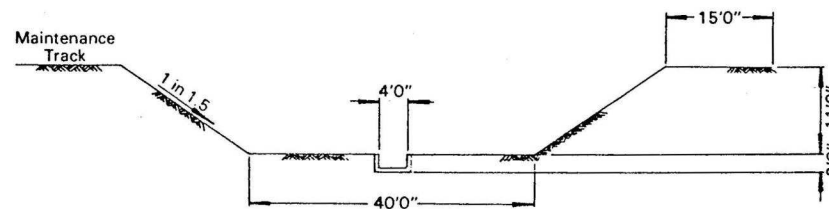
PLATE 8-11 Bank erosion: rills caused by surface runoff



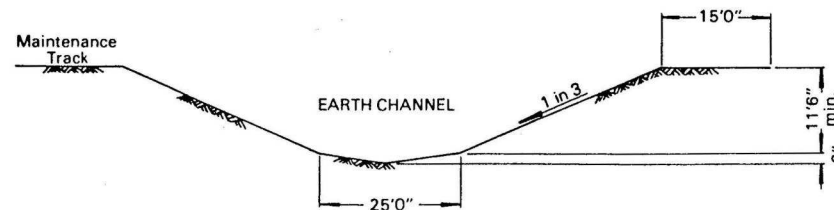
PLATE 8-12 Bank protection works downstream of Lyons Street, Broadmeadows



A- LOCALITY PLAN



B- PROPOSED TYPE SECTION



C- CONSTRUCTED TYPE SECTION

IMPROVEMENTS BETWEEN PASCOE STREET AND LYONS STREET, BROADMEADOWS

Figure 8.4

## 8.6 WORKS ON TRIBUTARIES : POST 1967

**8.6.1 Introduction.** During the late 1960s and the 1970s, a number of improvement works were carried out along some of the tributaries of Moonee Ponds Creek. The works mainly involved the undergrounding of short sections of watercourses that had deteriorated within existing urban areas, and the undergrounding of sections of watercourses in the areas that were to be developed for residential purposes. The location of the various works is shown in Figure 8-5 and summary details of the projects are given in Appendix D.

### 8.6.1

(a) **The Royal Park Drain, Melbourne.** In August 1968, the Board of Works received a request from the Committee of Management for the Mount Royal Special Hospital for the Aged, Parkville, to divert the Royal Park Drain to allow a new multi-storey hostel block to be constructed. The Board of Works agreed to divert the watercourse if the Hospital Authorities were prepared to bear the costs of the works. The Hospital Authorities accepted this condition, and the Board of Works installed an underground drain to the north of the existing creek during the first half of 1970 (Fig 8-5; Appendix D). The total cost of the project was \$35 413.

In July 1975, the Board of Works received a letter from the Public Works Department requesting conditions for the undergrounding of the Royal Park Drain through the grounds of the Mount Royal Hospital and the Parkville Psychiatric Unit between Poplar Road and the underground section that was constructed in 1970. The Board's Sewerage Committee approved the construction of an underground drain along this section of the watercourse provided that one-third of the costs were met by the Hospital Authorities. The work was undertaken during July and August 1977 at a cost of \$33 820 (See Appendix D).

(b) **Melville Main Drain, Brunswick and Coburg.** The Board of Works received complaints from the City of Coburg and local residents concerning flooding that occurred along the Melville Main Drain at the junction of Moreland Road and Shamrock Street in January 1970 and January 1971. An investigation conducted by the Board indicated that the capacity of the underground drain immediately upstream and downstream of Moreland Road, which was constructed in 1930 and 1938 (see Appendix A), was approximately eighty percent of current design standards, the difference being attributed to changes in catchment characteristics and to modifications in design assumptions. Supplementation of the drain was not considered to be necessary. However, it was noted that due to omission of part of the work designed to be constructed in 1930, and an apparent oversight to take this omission into account when further undergrounding was undertaken in 1938, the full effective capacity of the drain could not be utilised without the drain upstream from Moreland Road operating under pressure head. This resulted in:

- (i) Backflow occurring through side entry pits and manhole covers in and upstream of Moreland Road.
- (ii) Local floodwater being unable to enter the main drain at the upstream end of Moreland Road.
- (iii) Floodwaters from (i) and (ii) flowing overland along the route of the underground drain.

It was decided that an appreciable increase in the effective performance of the drain could be achieved by reconstructing a short section of the drain on the southern side of Moreland Road (see Fig 8-5). The project was approved by the Board's Sewerage Committee in October 1970, and the job was issued to Construction in May 1972. A short section of rectangular 2 692 mm (8 ft 10 in) x 1600 mm (5 ft 3 in) concrete drain was installed (Appendix D). The job was completed in September 1972 at a cost of \$24 747.

Minor flooding was reported in the area during storms in April 1977 and January 1980, but it is doubtful whether the Melville Main Drain was overtaxed on either occasion; it would appear likely that the local drainage system was unable to collect the surface runoff adequately and convey it to the Board's drain.

(c) **Five Mile Creek, Essendon.** Between 1930 and the late 1950s numerous complaints were received concerning the eroded and foul state of Five Mile Creek downstream of Pascoe Vale Road. In 1935, the Essendon Council cut a 300-foot long channel in the bed of the creek immediately downstream of Pascoe Vale Road (see Appendix A), and the Board of Works subsequently constructed a timber weir to control erosion. Proposals to divert the creek to Moonee Ponds Creek by a shorter route, to underground the creek, and to line the creek did not materialise.

In mid 1969, the Board of Works received an enquiry requesting the conditions under which the Board would be prepared to underground Five Mile Creek through private land immediately downstream of Pascoe Vale Road. The Board replied to the effect that it was prepared to carry out the work if the cost was borne by the landowner.

The work was issued to Construction in February 1972 and completed three months later at a cost of \$34 310 (Fig 8-5; Appendix D). At the downstream end of the underground pipe, a short transitional section of open channel was constructed; part of this channel was fully lined with large rock spalls set in cement, part partially hard-lined, and part open earth channel.

(d) **Westbreen Creek, Broadmeadows and Coburg.** As noted in Section 5.3.2 (f), residential development within the upper parts of the Westbreen Creek catchment during the 1950s and the subsequent undergrounding of the Acacia Street, West Street and Cardinal Road Drains, exacerbated drainage problems along Westbreen Creek. Flood flows became more frequent and severe, and bank erosion became more pronounced. The creek was undergrounded between Northumberland Street and Rhodes Parade, and between the Essendon - Broadmeadows railway line in the early/mid 1960s, and additional works were carried out along the creek in the late 1960s and the mid/late 1970s. These latter works are described below.

In 1968, the City of Coburg approved the subdivision of a piece of land straddling the meandering Westbreen Creek near Darryl Street into eight allotments. In order to make the allotments more useable, the developer requested the Board of Works to straighten the creek, and to concrete-line the invert. The Board agreed to design and construct the works at cost to the developer, and the project was completed in November 1968 (Fig 8-5; Appendix D).

In the mid 1960s, and again in early 1974, the City of Coburg approached the Board of Works concerning the possibility of constructing culverts on Westbreen Creek at Pleasant Street and Essex Street. The Board advised the council that it considered that it was *"neither desirable nor practicable to construct isolated culverts along this section of the creek, but that the correct solution would be to extend the undergrounding of the creek from its present termination on the east side of Northumberland Road, up to and across Essex Street"*.

Erosion was becoming an increasing problem along the watercourse between these two streets, and the Board decided that the undergrounding of this section of creek should be placed on its list of works. In February 1975, the City of Coburg informed the Board that it would be appreciated if the work could be carried out as soon as possible. The job was issued to construction in February 1976, and

completed in the May of that year at a cost of \$77 947. A 2 100 mm diameter reinforced concrete pipe was laid along an existing drainage and sewerage easement (Appendix D) and the old bed of the creek was filled, thus enabling property owners to make greater use of their land.

Erosion continued apace along the 'unimproved' section of the creek between Essex Street and the lined channel constructed in 1968. The erosion was particularly severe immediately downstream of the lined section. Several allotments were affected, and the Board received requests from residents to improve this section of the creek. However, because of its relative inaccessibility, regular maintenance operations were not possible, and it was decided that the most satisfactory solution would be to relocate and underground the creek between Essex Street and Arndt Street (Fig 8-5).

In the meantime, the City of Coburg decided to develop a linear parkway along this section of the creek, linking Essex Street with the K W Joyce Reserve, which was being developed at that time.<sup>1</sup> The council proceeded to clean up the creek banks prior to laying a walking track. However, some of the land that the council cleared was privately owned, the title boundaries of some allotments extending to the watercourse even though the fences were set further back. Not surprisingly, the landowners did not wish to have a public path across their properties and were not prepared to donate or sell the land to the council. The affected residents demanded that the council cease work on their land, and also requested the council to relinquish their opposition to the Board of Works plan to underground this section of the creek. The residents forwarded copies of their petition to the MMBW, to their local MLA, and to the Minister for Conservation. In their petition, the residents listed three reasons for wanting the creek undergrounded :

- that it was a health hazard, particularly with respect to the potential danger of children contracting hepatitis,
- that while it remained open and was used as a rubbish dump it was dangerous for children,
- that flooding was likely to occur (as in 1963 and 1978),

and commented that "*a minority group should not be able to 'over-ride' the wishes of the general public*". The minority group referred to was presumably the Pascoe Vale Naturalists Club, who had earlier written to the Board of Works urging it to abandon its plans to underground the watercourse.

As a result of the residents' actions, the Coburg Council decided to abandon its plan to develop a linear park between Essex Street and the K W Joyce Reserve, and acceded to the wishes of the local residents with respect to the undergrounding of the creek between Essex Street and the upstream end of the existing lined channel. The council wrote to the Board of Works requesting that the undergrounding be carried out as soon as possible. The Board complied with the request, and the work was carried out during the first half of 1979 at a cost of approximately a quarter of a million dollars.

The controversy over the mode of development of this section of the creek clearly illustrates that council policies may radically change over relatively short periods of time, and that the attitudes of people living in close proximity to watercourses may be very different to those of people living further away.

Between mid 1975 and early 1977, the lower end of Westbreen Creek was undergrounded in conjunction with the improvements that were being undertaken along Moonee Ponds Creek between Gaffney Street and Margaret Street (see Section 8.4). A 2 700 mm diameter reinforced concrete pipe was installed between the junction with Moonee Ponds Creek and the existing underground drain at Park Street (Appendix D).

- (e) **West Street Drain, Coburg.** In June 1974, the Coburg City Engineer contacted the Board of Works concerning the possibility of undergrounding the West Street Drain through the K W Joyce Reserve. The City Engineer reported that the watercourse was quite deeply incised and that the banks were badly eroded, and commented that in his opinion the section of the drain was "*potentially dangerous for workmen, children, and others who may be in the area*".

The Board of Works advised the council that because of the backlog of what it considered to be more urgent works it was unlikely that the cost of undergrounding this section of the West Street Drain could be justified for a number of years. The Board suggested that the council might approach the Commonwealth Department of Urban and Regional Development for funds under their Area Improvement Scheme. The Council made an application to the Department and in November 1975 was granted \$30 000. The Board of Works agreed to undertake the work which was completed in July 1976 at a cost of \$57 617, the balance being borne by the Board (Fig 8-5; Appendix D).

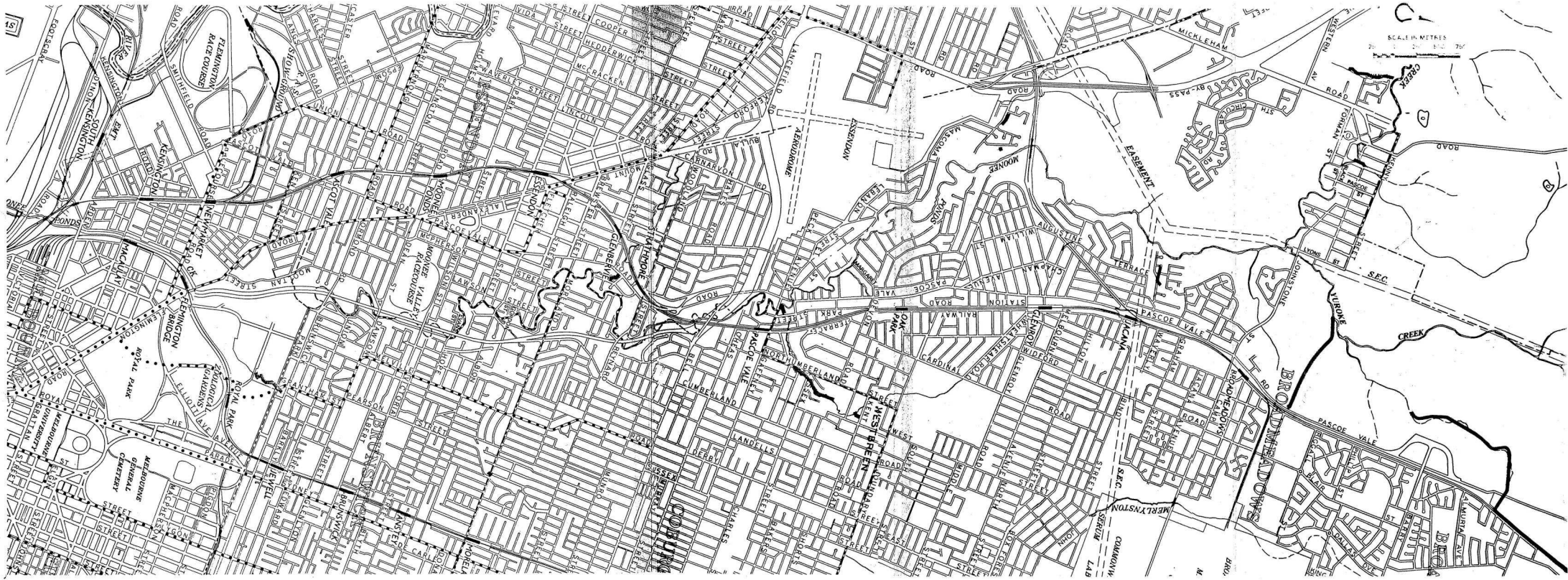
- (f) **Mascoma Street Drain, Essendon.** As described in Section 5.3.2 (h), parts of the Mascoma Street Drain were undergrounded in 1965 and 1966 to enable residential subdivisions to proceed. In mid 1969, the intervening section of drain between Vickers Avenue and Caravelle Crescent (Fig 8-5) was undergrounded for similar reasons at cost to the developer (see Appendix D).

In March 1974, the Board of Works received a complaint from a local resident concerning erosion at the outlet of the underground section of the drain. The Board decided that remedial action was necessary, and installed a five-metre length of 1 650 mm reinforced concrete pipe and constructed a short length of transitional pitcher-lined channel (Appendix D). The work was issued to construction in November 1974 and completed in March 1975 at a cost of \$4 481.

In July 1976, the Strathmore Progress Association requested the Board of Works to underground the drain through the parkland between the rear of houses in De Havilland Avenue and Moonee Ponds Creek for aesthetic and safety reasons. The Board informed the Association that it would be unable to justify undertaking such a project for a number of years. The issue was raised again in late 1979 by Essendon Council's Area Commissioner, and in April 1980 the City of Essendon formally requested the Board to prepare an estimate for the job. The Board estimated that the cost of the work through the council land would be \$51 000 with an additional \$4 000 for the short section of the drain that would traverse Board owned land adjacent to Moonee Ponds Creek. In accordance with the Board's policy concerning the undergrounding of drains through council parks, the council was informed that they would be expected to contribute towards the cost of the undergrounding of the drain through the council owned land.<sup>1</sup> The Council has accepted the Board's offer and it is anticipated that the drain will be constructed during the latter half of 1981.

<sup>1</sup> See, *A Plan for a Park. Development Plan for K W Joyce Reserve City of Coburg*. Preston Institute of Technology, June 1976.

<sup>1</sup> The Board's policy with respect to the undergrounding of Board drains and watercourses where they traverse council parks or reserves within fully developed or partially developed catchments, if the work is requested solely or mainly for the improvement of the park or reserve, is that the council must contribute towards the cost of the work. Between 1 July 1980 and 30 June 1981, councils were required to contribute forty-four per cent of the cost, and from 1 July 1981 will be required to contribute thirty-three and one-third percent.



LOCATION OF WORKS ON TRIBUTARIES

Figure B.5



(g) **Widford Road Drain, Broadmeadows.** In July 1976, a request was received from a developer concerning the conditions under which the Board of Works would be prepared to relocate and underground a section of the Widford Road Drain to enable residential construction to proceed on a subdivision at Karin Crescent, Broadmeadows. The relocation and undergrounding of the watercourse was required to enable more effective use to be made of some of the allotments. The Board agreed to undertake the work at cost to the developer. The works involved the construction of an underground drain, an open earth channel, a concrete-lined channel, and a rock-lined outlet structure at the downstream end of the underground pipe. The hard lining at the outlet of the pipe was considered necessary because of the relatively steep grade of the watercourse. The job was issued to construction in March 1979 and completed three months later at a cost of approximately \$85 000.

(h) **Railway Crescent Diversion Drain, Broadmeadows.** During the late 1960s it became apparent that the planned development of extensive areas within the upper part of the Railway Crescent Drain catchment would overtax the drain, and that a diversion drain would eventually have to be constructed. In 1969, the Housing Commission advised the Board of Works that it planned to commence road design for part of the area, and in mid 1970 requested the Board to proceed with the design and construction of a diversion drain before the road network was established. The Board of Works informed the Housing Commission that it was prepared to construct a diversion drain, but was not in a position to finance the work and requested that the Housing Commission bear the cost.

The diversion drain was completed in June 1972 at a cost of \$201 204. Between Pascoe Vale Road and Ripplebrook Drive, an underground drain was installed, while between Ripplebrook Drive and Yuroke Creek a fully concrete-lined channel was constructed (Fig 8-5; Appendix D; Plate 8-13). A fully concrete-lined channel, with several drop structures, was deemed to be necessary downstream of Ripplebrook Drive because of the steep gradient and highly erodible nature of the bed and bank materials.

(i) **Broad Street Drain, Broadmeadows.** In October 1970, the Broadmeadows City Engineer requested the Board of Works to advise under what conditions it would be prepared to underground the whole or part of the Board Street Drain between Kenny Street and Moonee Ponds Creek. Flooding was a recurring problem along this section of the drain, the narrow bridge at Raleigh Street obstructing the passage of flood flows.

The Board advised that it would be prepared to underground the drain at cost to the council. The Board estimated that it would cost in the order of \$29 000 to underground the drain between Moonee Ponds Creek and Raleigh Street, and in the order of \$100 000 to underground it between Moonee Ponds Creek and Kenny Street. The council chose the less expensive of the two options. The work was undertaken in early 1972 at a final cost of \$34 310. (see Fig 8-5; Appendix D).

The only other work that has been undertaken to date along the Broad Street Drain has been the construction of two small retarding basins immediately downstream of Mickleham Road (Fig 6-7). Details of this project are given in Section 6-4.

(j) **Booths Drain, Broadmeadows.** Works on Booths Drain were undertaken between 1969 and 1979 to enable residential subdivisions to be developed, and were at cost to the developers. In mid 1969 a culvert was constructed under Bamford Avenue (Fig 8-5), and in late 1973 the drain was undergrounded from Bamford Avenue

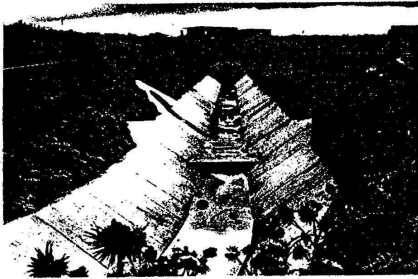
downstream to Moonee Ponds Creek. The undergrounding was extended upstream to Hillcrest Road in late 1978/early 1979 to enable Stage 4 of the Hillcrest Estate to proceed (Appendix D).



PLATE 8-13 The Railway Crescent Diversion Drain downstream of Ripplebrook Drive

(k) **Otway Crescent Drain, Broadmeadows.** Between 1973 and 1975, a considerable length of the Otway Crescent Drain was undergrounded in conjunction with the development of the Housing Commission's Broadmeadows Estate. The works were financed by the Housing Commission.

The work was undertaken in four stages : from Pascoe Vale Road to Thorpedale Avenue, from Thorpedale Avenue to Glenelg Street, from Glenelg Street to near Somerton Road, and from the Eastern Railway Line to Barry Road. A section of open drain that was constructed between the Eastern Railway Line and Pascoe Vale Road during the first stage of the work was undergrounded during the fourth stage. At the downstream end of the underground section of the drain, a 150 metre-long partially concrete-lined transitional channel was constructed in order to prevent erosion from taking place immediately downstream of the pipe outlet (Plate 8-14A). Rock mattresses were placed at the downstream end of the lined channel, and above the lined channel where it passes under the Barry Road Bridge, for erosion protection, but they have not been entirely successful (Plate 8-14B).



A View looking upstream from Barry Road



B Rock mattress being undermined on the downstream side of the Barry Road Bridge

PLATE 8-14 The Otway Crescent Drain

- (ii) **Shankland Drain and Somerton Reservoir Overflow Drain.** In 1971, a culvert was constructed on the Shankland Drain immediately downstream of Somerton Road (Fig 8-5). The culvert was required to pass the drain under an embankment that was being constructed to carry the 54 in - diameter Greenvale Reservoir Inlet Pipe. A 69 in - diameter reinforced concrete pipe was installed. At the upstream end, the pipe connected with an existing bluestone culvert under Somerton Road (Appendix D).

In late 1973, the Shire of Bulla informed the Board that it intended to reconstruct Somerton Road, and that this would require the extension of the culvert that had been constructed under the water main embankment.

In May 1976, the Board informed the Shire of Bulla that it was prepared to allow the Shire to design and construct (to Board approval) the culvert extension. The

existing 69 in - diameter culvert was extended through the bluestone culvert and under the newly constructed section of Somerton Road, and an additional 84 in - diameter floodway culvert was provided (Appendix D). The latter culvert was required to prevent water ponding behind the new embankment. Although the works were designed and constructed by the Shire of Bulla, they vest in the Board of Works.

The land within the catchments of the Shankland Drain and the Somerton Reservoir Overflow Drain to the south of Somerton Road and to the west of Pascoe Vale Road is, for the most part, owned by the Housing Commission of Victoria and will eventually be developed for residential purposes. In February 1979, the Board of Works offered to provide main drainage facilities for Stage 3 of the Housing Commission's Callan Estate. The offer made by the Board was accepted by the Housing Commission. The Shankland Drain will be undergrounded from its junction with Yuroke Creek to just upstream of the Somerton Reservoir Overflow Drain (Fig 8-5), and the Somerton Reservoir Overflow Drain will be undergrounded from the Shankland Drain, through the Callan Estate to just west of Pascoe Vale Road (Appendix D). It was decided to underground the drains because of the potentially erodible nature of the terrain that they traverse. Work commenced on the project in late 1980 and was completed in March 1981.

## 8.7 REFERENCES

- 1 Heller, R *et al*, 1976. *Moonee Ponds Creek open space study*. City of Broadmeadows; Melbourne.
- 2 Scott and Furphy Engineers Pty Ltd, 1976. *Moonee Ponds Creek and environs study*. MMBW; Melbourne.