## 6 RETARDING BASINS

### 6.1 INTRODUCTION

As discussed in Section 5.1.1, the Board of Works prepared an improvement plan for Moonee Ponds Creek in 1953. It was proposed that the creek should be partially concrete-lined for much of its length, and that it should be realigned at several localities. Lack of funds, however, prevented the plan from being implemented. Immediately after the flood of September 1960, the Board decided to review its drainage policy for Moonee Ponds Creek. In October 1960, the Engineer-in-Chief approved a report recommending that certain channel improvement works should be expedited without delay (see Section 5.1.3 and 5.2.5), and that three retarding basins would ultimately be required to control flood flows. The retarding basins were deemed to be necessary because it was considered to be impractical to improve to any significant extent the capacity of many of the incised middle reaches of the creek where subdivision had been permitted down to the bank or water's edge. In addition, it was not considered to be viable economically to increase the capacity of the 5 000 cusec channel downstream of Flemington Road Bridge.

The sites selected for the retarding basins were at Jacana and upstream of Westmeadows Township on Moonee Ponds Creek, and on Yuroke Creek at the junction with the Otway Crescent Drain (Fig 6-1). On 7 November 1960, the Board's Sewerage Committee approved the report and recommended that the necessary land should be acquired at Jacana, and that a retarding basin should be constructed on the site without delay. No recommendations were made at the time concerning the purchase of land at the other two sites.

### 6.2 THE JACANA RETARDING BASIN

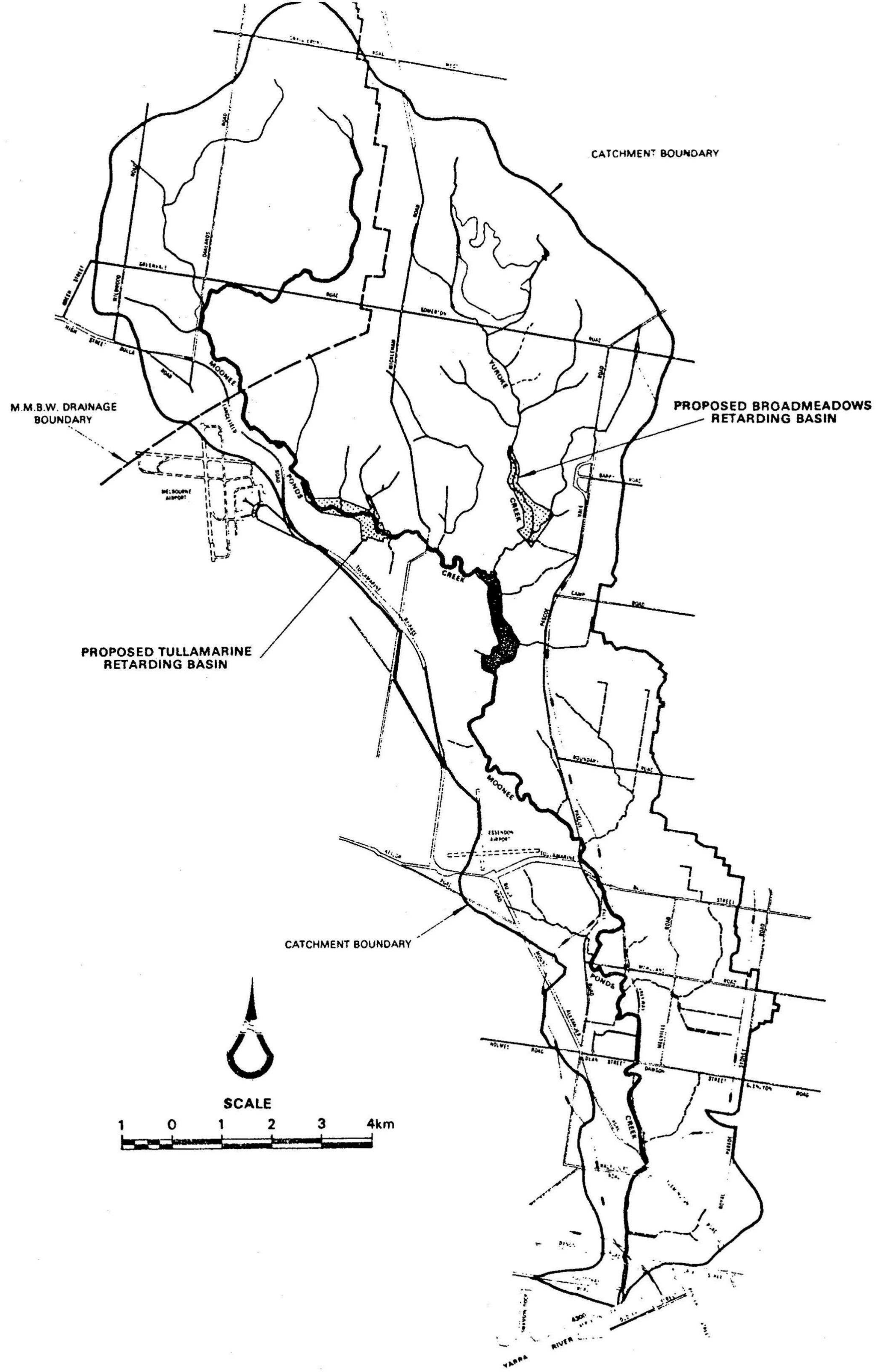
The acquisition of land for the Jacana Basin was inevitably a protracted business[1], and it was not until late October 1965 that the Board was able to recommend that authority be given for the basin to be constructed by day labour. Work commenced on the project on 5 November 1965, and the job was completed on 30 June 1967 at a cost of $698 147.

The Jacana Retarding Basin site, with the exception of two strips of land that were retained as Proposed Main Road Reservations, were reserved for Public Purposes (Board of Works) on 11 February 1970 as part of Amendment No 2 to the Melbourne Metropolitan Planning Scheme. The location of the two road reservations that traverse the basin can be seen in Figures 9-5 and 9-6F: one of the reservations crosses the upper part of the basin from south to north, while the other crosses the lower part of the basin from west to east.

The Jacana Retarding Basin is by far the largest of the Board's twenty-five retarding basins. Its total length is in the order of 2 000 m, and its average width is approximately 325 m (Plate 6-2). The storage capacity of the basin at design top water level is 2 899 Ml, although it has never been filled to this level. Water ponded in the basin after a storm in November 1971 is shown in Plate 2; unfortunately there are no photographs of reproducable quality of water ponded in the basin after the severe storm of May 1974, when the water level rose to within about a metre of the main (glory hole) overflow spillway.

Visually, the most impressive features of the Jacana Basin are the 12.2 m -high (40 ft) compacted earthfill embankment (Plate 6-3A and B), the glory hole spillway that is sited on the upstream side of the embankment (Plates 6-3A and 6-4A), and the main outlet

[1] Some of the land at the upper end of the basin was not acquired until after the basin had been constructed: one piece of land was not acquired until January 1971 and another until June 1980.




THE LOCATION OF THE JACANA RETARDING BASIN AND THE PROPOSED BROADMEADOWS AND TULLAMARINE RETARDING BASIN SITES

Figure 6-1

# THE JACANA RETARDING BASIN LOCATION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1979

Plate 6-1

structure with its concrete retaining walls, energy dissipating wall, and low-flow channel (Plate 6-5). In addition to the glory hole spillway, there is also a sidelong spillway at the western end of the embankment (Plates 6-1 and 6-3). The base of this spillway is 1.53 m (5 ft) higher than the top of the glory hole, and it will rarely be operational. It is essentially an emergency spillway which will come into operation during a rare storm of exceptional magnitude, or if the glory hole and/or normal outlet should become blocked. A number of statistical details concerning the basin are summarised in Tables 6-1 and 6-2, and the form of the embankment and outlet structure is illustrated in Figure 6-2.

**TABLE 6-1 JACANA RETARDING BASIN : PHYSICAL AND TECHNICAL DETAILS**

| | | |
|---|---|---|
| **Physical details** | Total catchment area | 8 544 ha |
| | Length of basin | 2 012 m |
| | Width of basin (average width of valley) | 335 m |
| | Embankment Height | 12.19 m |
| | Embankment R L | 69.58 m (AHD) |
| | Type of embankment | Compacted earthfill |
| | Top water level | 68.06 m (AHD) |
| | Capacity to glory hole spillway level | 1 974 Ml |
| | Capacity to top water level | 2 899 Ml |
| | Area at top water level | 64.75 ha |
| **Normal outlet** | Normal outlet type | Pipeline |
| | Normal outlet size | 2.7 m |
| **Spillway** | Spillway type | Glory hole spillway |
| | Spillway size | 12.19 m diameter |
| | Spillway level | 66.53 m (AHD) |
| | Outlet pipe size * | 4.9 m |
| **Additional Sidelong** | Spillway type | Sidelong spillway |
| **Spillway** | Spillway size | 45.7 m wide |
| | Spillway level | 68.06 m (AHD) |

* Normal outlet plus spillway flows combined

**TABLE 6-2 DISCHARGES AT OUTLETS - CUMECS (CUSECS)**

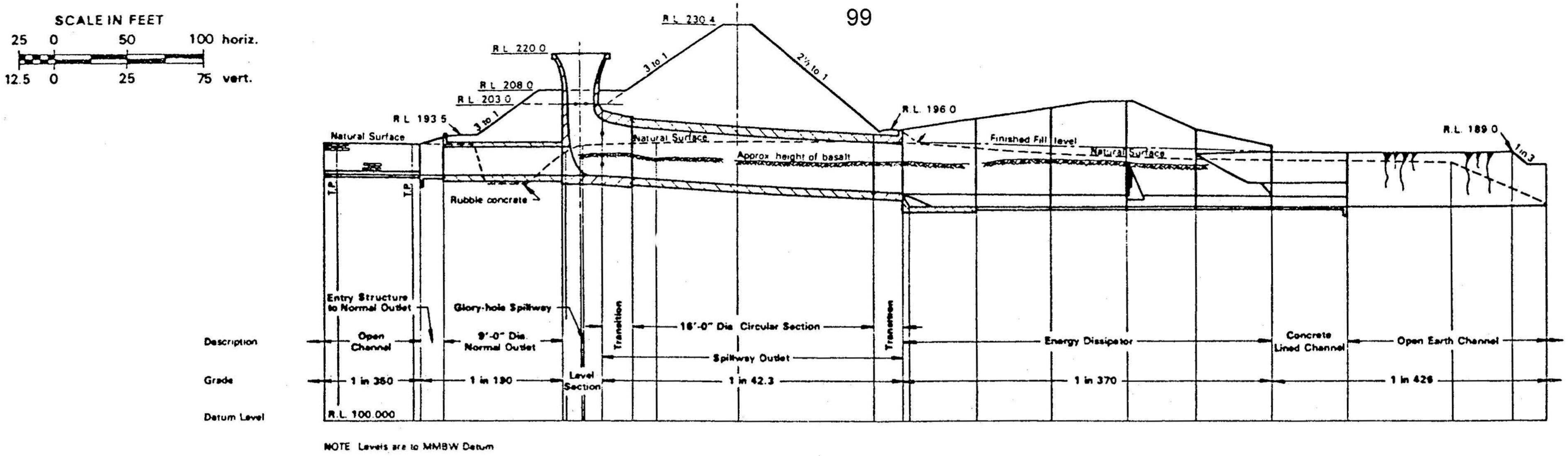
| Outlet type | Level of Glory hole Spillway | Level of Sidelong Spillway | Maximum Water Level (incl freeboard) | Top of Embankment |
|---|---|---|---|---|
| | AHD 66.53 m (RL 220 ft) | AHD 68.06 m (RL 225 ft) | AHD 69.27 m (RL 229 ft) | AHD 69.58 m (RL 230 ft) |
| Normal outlet | 62.30 (2 200) | 65.13 (2 300) | 22.65* (800) | 16.99 * (600) |
| Glory hole Spillway | - | 135.92 (4 800) | 356.09 (12 600) | 186.89 (6 600) |
| Sidelong Spillway | - | - | 133.79 (4 700) | 382.28 (13 500) |
| Total | 62.30 ( 2 200) | 201.05 (7 100) | 512.53 (18 100) | 586.16 (20 700) |

* Lower value due to impeding effect of overflow from the glory hole spillway.

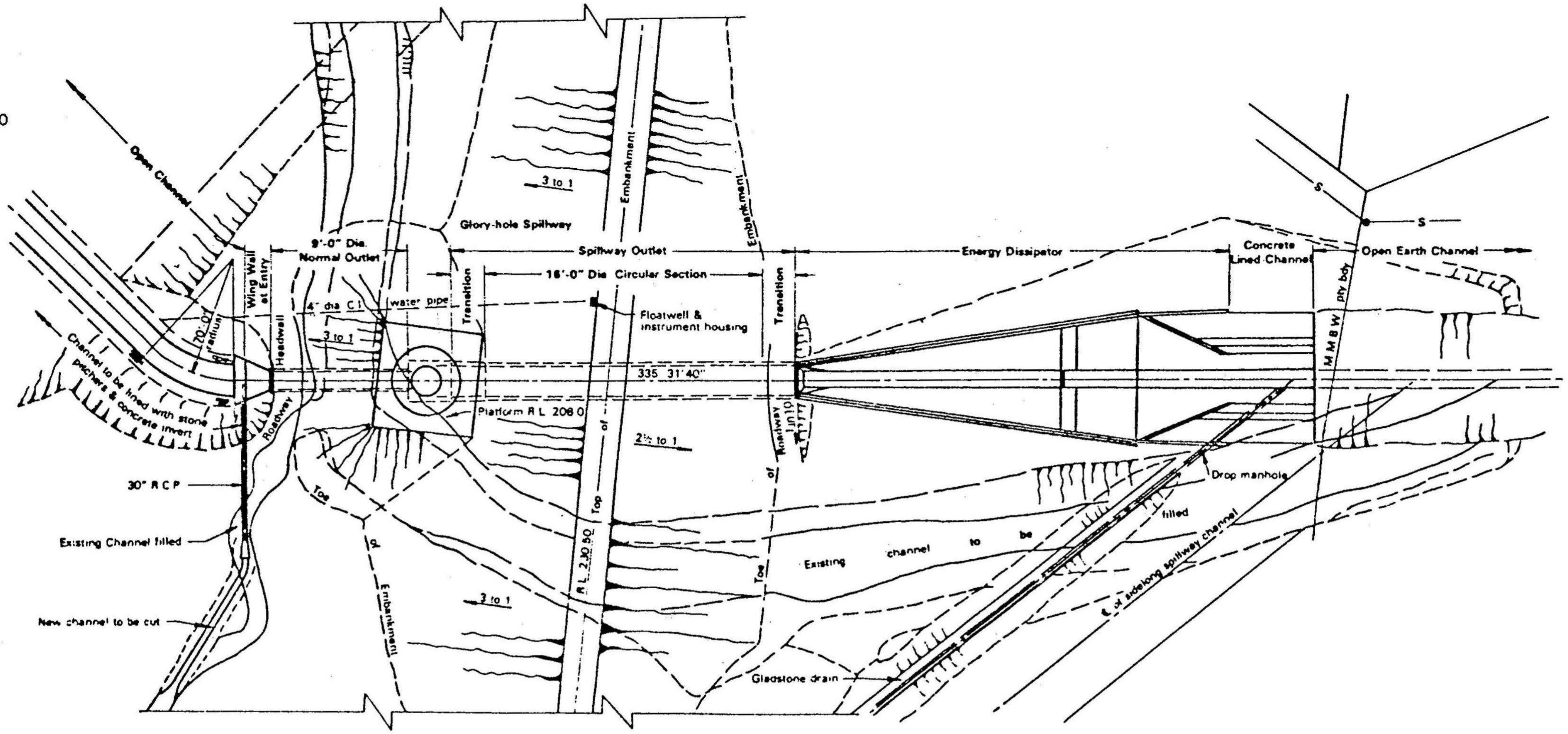
Stage storage and stage discharge curves for the basin are shown in Figure 6-1. The normal outlet pipe is 2.7 m (9 ft) in diameter (Plate 6-4A), and the discharge through the pipe at glory hole spillway level is 62.3 cumecs (2 200 cusecs). When the basin was designed it was assumed that the glory hole spillway would become operational if a 1 in 20 year or greater storm occurred, and the sidelong spillway would become operational if a 1 in 100 year or greater storm occurred. It has been estimated that discharge through the glory hole spillway at design top level (that is the level of the base of the sidelong spillway) would be 135.95 cumecs (4 800 cusecs), which combined with a flow of 65.15 cumecs (2 300 cusecs) through the normal outlet, gives a total outflow from the basin of 201.10 cumecs (7 100 cusecs). In the extremely unlikely event of water flowing over the sidelong spillway, this would be added to the discharge from the normal and glory hole outlets. As the height of water flowing over the sidelong spillway increased, discharge through the glory hole spillway would also progressively increase because of the additional head created (Table 6-2).

To date, neither spillway has been operational. The hydrograph peaks for the storms of 15 - 16 May 1974 and 8 April 1977 (the Easter Storm) reached levels of 65.16 m AHD (RL 215.5 ft) and 64.68 m AHD (RL 213.9 ft), which is 1.37 m and 1.85 m respectively below the level of the glory hole spillway. The stage hydrographs for these two events are shown in Figure 6-4.

Discharges of any magnitude from the outlet pipe have relatively high velocities; for example, if the water level was at 60.44 m AHD (200 ft RL), the normal 2.7 m diameter outlet pipe would be running full and the velocity would be 9.8 m/sec, while at 68.06 m AHD (225 ft RL) - design top water level - the velocity at the outlet would be 10.4 m/sec. In order to protect the channel immediately downstream of the outlet pipe, massive concrete retaining walls up 9 m-high were built along the sides of the channel, and a 3 m-high energy dissipating concrete wall was constructed across the channel 47 m downstream of the pipe outlet (Plate 6-5A and B). The channel invert is concrete lined,




A- LONGITUDINAL SECTION OF OUTLET

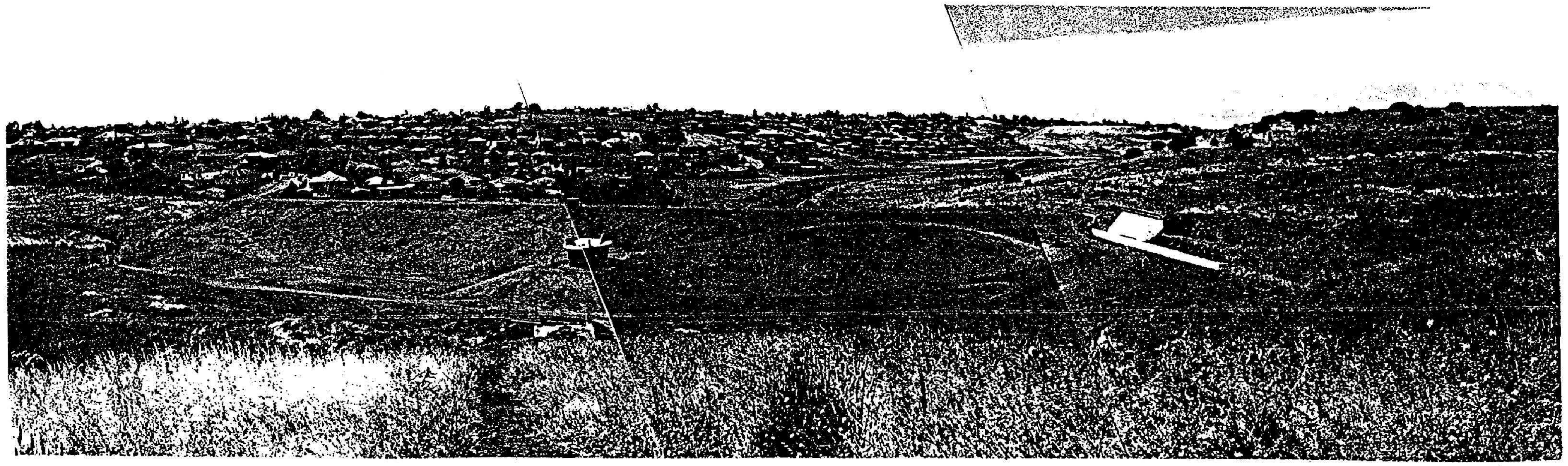



B- DETAIL PLAN OF OUTLET

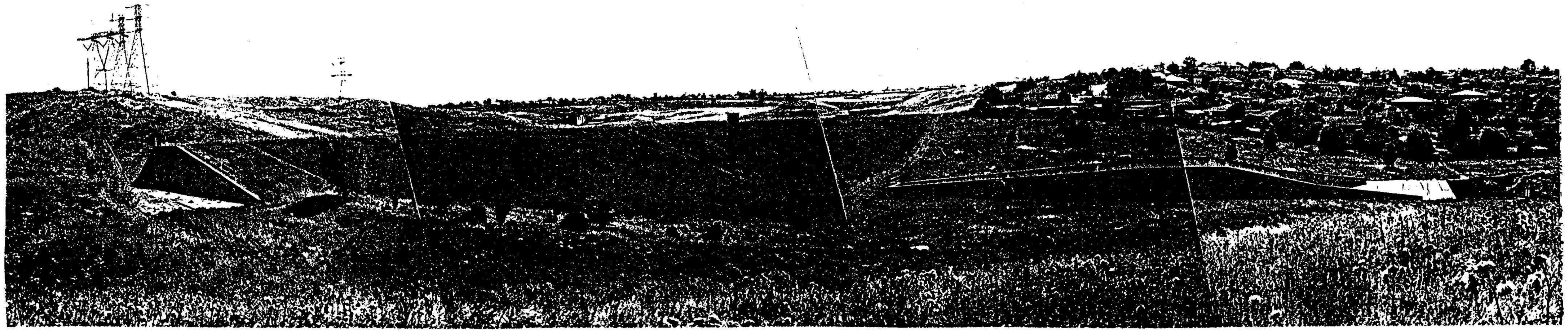
JACANA RETARDING BASIN

Figure 6-2

PLATE 6-2 Water ponded in the Jacana Retarding Basin, November 1971



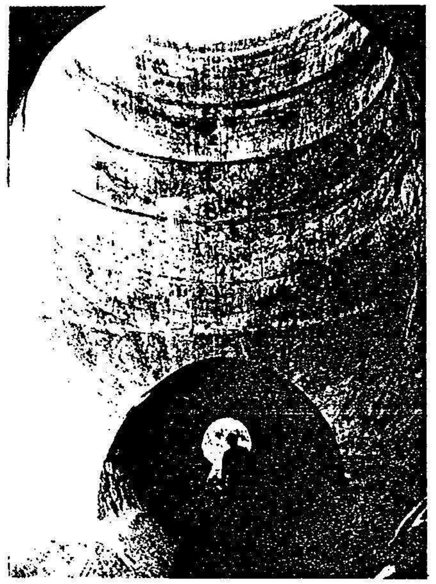
A View looking downstream towards the embankment



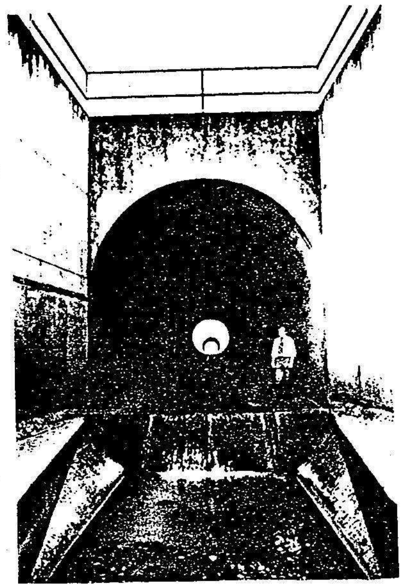
B View looking upstream towards the embankment

PLATE 6-3 The Jacana Retarding Basin embankment and low flows are conveyed by a 3 m-wide centre channel. During high flows considerable turbulence is created downstream of the energy dissipator (Plate 6-5 C and D). The turbulence extends beyond the lined section, and bank erosion has been a recurring problem along the straightened earth-lined channel downstream of the outlet structure.

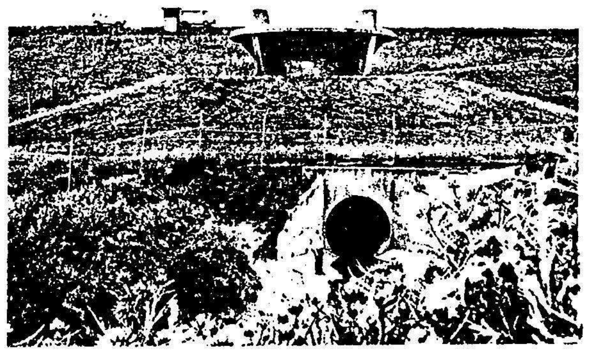
The effectiveness of the Jacana Basin in attenuating flood peaks downstream can be demonstrated theoretically and by reference to the two major flood events that have occurred since the basin became operational in 1967. A theoretical example is given in Table 6-3. The discharges listed in column three of the table are for a storm with a ten-year recurrence interval, and were calculated by the Unit Hydrograph Method assuming current planning zoning and that no retarding basin had been constructed. In the fourth column of the table, the frequencies for such discharges allowing for the storage effect of the basin are given. Immediately downstream of the basin the attenuating effect of the basin is considerable, but as might be expected, it progressively decreases with distance downstream.



B The entry of the glory hole spillway into the normal outlet pipe



C Close-up view of the combined normal and glory hole outlet pipe



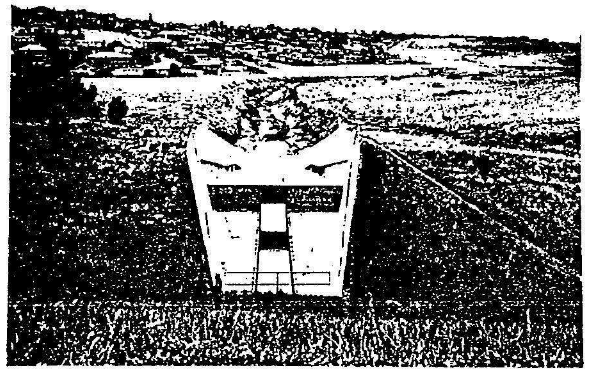
A The embankment, glory hole spillway structure and entrance to the normal outlet pipe

PLATE 6-4 Jacana Retarding Basin: the normal outlet pipe and the glory hole spillway

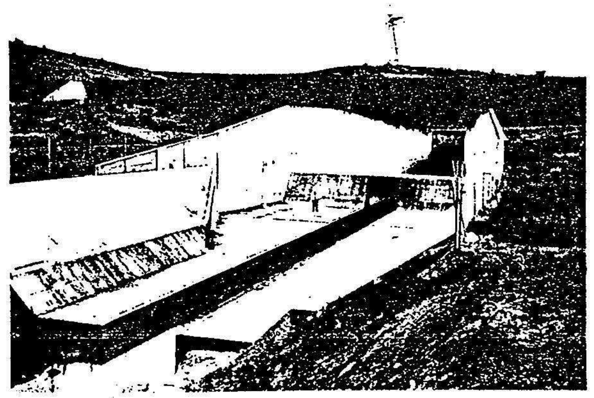
TABLE 6-3 COMPUTED* DISCHARGES DOWNSTREAM OF THE JACANA BASIN

| Station | Catchment Area (ha) | Q 10-year (cumecs) without Jacana Basin | Equivalent Frequency (Years) with Jacana Basin |
|---|---|---|---|
| Margaret Street | 9 207 | 153 | 100 |
| Tate Street | 10 360 | 172 | 100 |
| Moreland Road | 10 862 | 172 | 100 |
| Albion Street | 11 757 | 190 | 100 |
| Ormond Road | 12 236 | 197 | 64 |
| Mt Alexander Road | 12 730 | 204 | 52 |
| Arden Street | 13 329 | 218 | 50 |

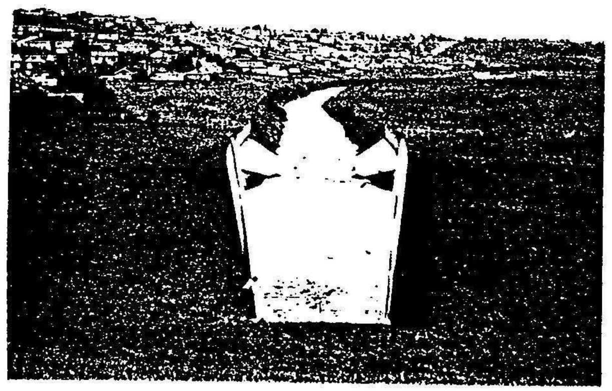
* Unit Hydrograph Method assuming mid 1980 planning zoning



A View looking downstream from the embankment. Note the low-flow channel, the energy dissipating wall and the straightened earth-lined channel



B View looking upstream towards the embankment. Note the figure for scale



C The same view as in A during a flood flow. Note the turbulence immediately downstream of the energy dissipator

D The same view as in B during a flood flow

PLATE 6-5 Jacana Retarding Basin: the outlet structure

The two severe storms that have occurred over the Moonee Ponds Creek catchment since the basin was completed are those of 15-16 May 1974 and 8 April (the Easter Storm) 1977. During the May 1974 storm between 80 to 90 mm of rain fell on a pre-wetted catchment, and on 8 April 1977 between 80 and 150 mm of rain fell over the upper part of the Moonee Ponds Creek basin during an extremely intense storm (Figure 6-5). As noted, considerable volumes of water were stored in the basin on both occasions (Fig 6-4), with the result that the flood peak was attenuated downstream and the banks were not overtopped. Flooding did, however, occur during the May 1974 and April 1977 storms within a number of neighbouring basins[1]; in May 1974 there was serious flooding within the Maribyrnong, Merri and Plenty basins, and in April 1977 flooding occurred along the Maribyrnong River and Merri Creek. The fact that flooding did not occur along the middle and lower reaches of Moonee Ponds Creek can be attributed to the retarding effect of the Jacana Basin and the efficiency of the sections of the creek downstream of the basin that were realigned and partially hard-lined between 1967 and 1975 (see Sections 7 and 8).

The storage capacity of the Jacana Retarding Basin will be reduced if roads are constructed along the two main road reservations that traverse it. The amount of storage lost would depend on the type of structure built. If earth-fill embankments were to be used a considerable volume of storage would probably be lost, but if the roads were elevated on structural piles far less storage area would be sacrificed. A small amount of storage has already been lost in the upper part of the basin as a result of the construction of a new road linking Mickleham Road and Johnstone Street. In addition to the roadworks, an elongated, landscaped earth mound has been constructed to the south of the new road.

It has not generally been the Board of Works' policy to allow the public access to its retarding basin sites (see Ref 6), but in 1965 the Board leased the major part of the Jacana Basin to the City of Broadmeadows for recreational purposes. To date, the City of Broadmeadows has laid out two sports ovals at the upper end of the basin where the land would be rarely inundated. In February 1973, the Broadmeadows Council requested permission to sublet a large part of the basin to sports clubs. It was proposed that the Broadmeadows Club, which is located just outside of the basin, should develop and operate a nine-hole golf course within the basin. The Board of Works would not consent to the Council subletting part of the basin because it was felt that the basin should be retained for passive recreation for the potential benefit of a greater number of people.

In 1977, a report entitled *The Moonee Ponds Creek Open Space Study* (Ref 7), which was commissioned by the City of Broadmeadows, was released. One of the recommendations contained in the report was that part of the Jacana Retarding Basin site should be developed as a golf course. The Broadmeadows Club submitted a request to the Broadmeadows Council asking them to sub-lease part of the basin to the Club. The Club indicated that it wished to develop a nine-hole golf course on the site. The Council reapproached the Board of Works, but the Board reaffirmed its earlier decision.

## 6.3 THE PROPOSED BROADMEADOWS AND TULLAMARINE RETARDING BASINS

In 1960, when the Board of Works decided that the best method of controlling flood flows along Moonee Ponds Creek would be through the construction of retarding basins in the upper half of the basin, the land upstream of two of the three proposed basin sites, those at Broadmeadows and at Tullamarine (Figs 6-1 and 6-6), was rural in character with little immediate prospect of being developed for residential purposes. No attempt was therefore made by the Board to acquire land at these two sites. By the late 1960s, however, the situation had changed. In December 1967, the Shire of Bulla notified the Board of Works that under Amendment No 6 of its planning scheme it proposed to rezone some 150 acres of land in the vicinity of Mickleham Road and Kenny Street from Rural to Residential, and it was becoming increasingly apparent that the land owned by the Housing Commission in the upper part of the basin would be developed in the not too distant future.

In order to ensure that the two sites were not developed for other purposes, the Main Drainage section of the Board of Works requested the planning authority (the Board of Works) to reserve the sites for Public Purposes. The planning authority complied, and the sites were declared Proposed Public Purpose Reservations (for the Board of Works) on 11 February 1970 under Amendment No 2 to the Metropolitan Planning Scheme. During the 1970s the Board acquired titles to land within the Tullamarine basin site as it became available from private owners. The extent of the land currently owned by the Board is shown in Figure 6-6B. The land within the Broadmeadows basin site is owned by the Housing Commission. The Board first approached the Housing Commission with a view to arranging transfer of the land in 1963, but by mid 1980 the transfer had still to be finalised.

The construction of the Broadmeadows basin is scheduled for the early/mid 1980s if funds permit. Part of the catchment area of the proposed basin has already been developed and much of the remaining area is zoned Reserved Living or Corridor A, and it is assumed that these areas will be developed in the coming years.

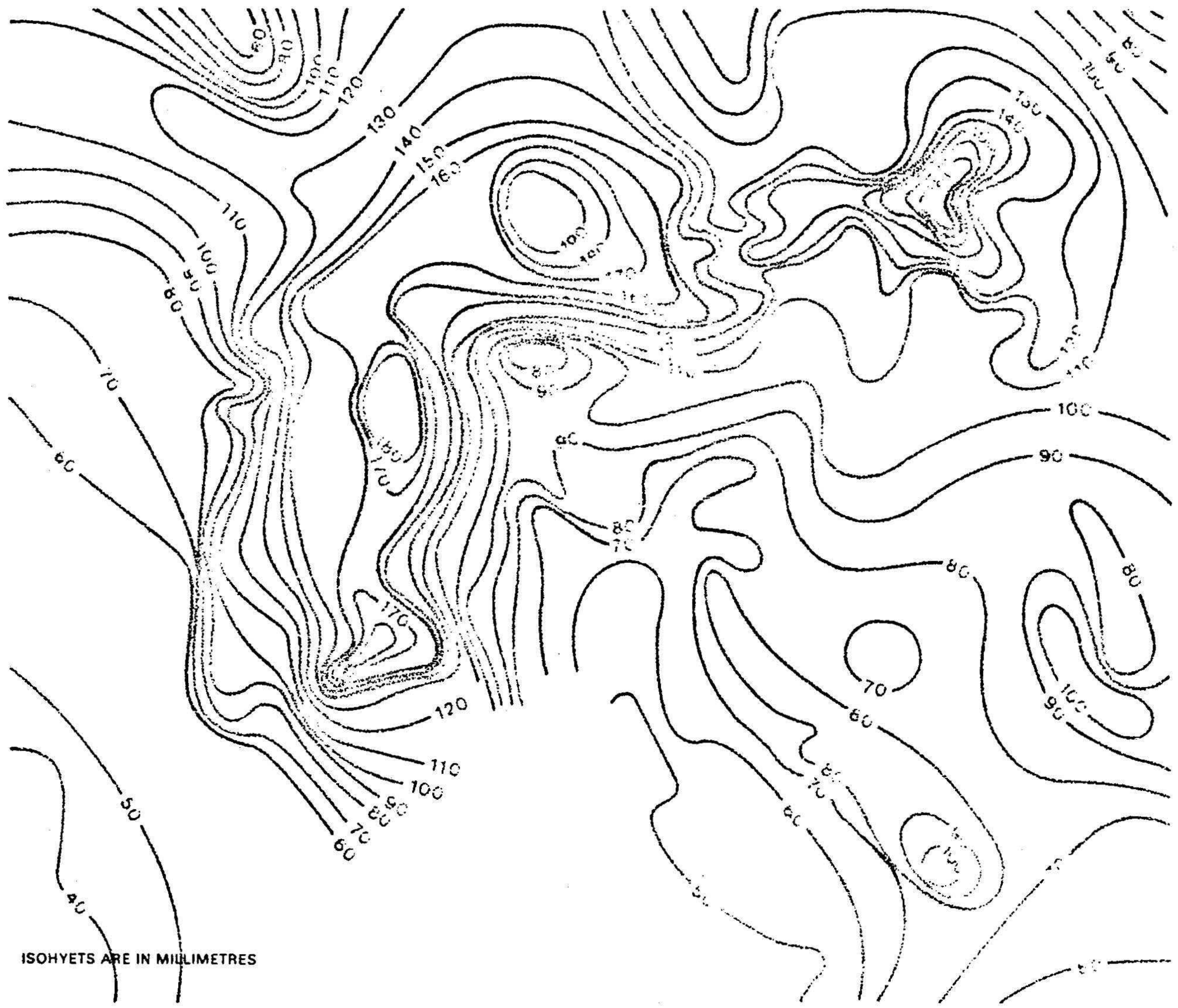
There are no plans for the construction of a retarding basin at the Tullamarine site in the near future. Much of the land upstream of the site is zoned General Farming A and Conservation A (the Gellibrand Regional Park), which should ensure that residential development will be minimal. Two situations can be envisaged, however, which would necessitate the construction of a basin at this site: if the planning scheme was amended at some future date to allow extensive residential development to take place, and if the storage capacity of the Jacana Basin were substantially reduced. The Board intends to retain the Tullamarine site, and will acquire the balance of the land within the basin site as it becomes available.

As development proceeds in the upper parts of the basin that are zoned for residential purposes, consideration will be given to controlling flows along the tributary watercourses by the construction of local retarding storages. However, the existence of minor storages along such tributaries as the Broad Street Drain and tributary No 4363, will not substantially affect the need for the construction of a major basin on Yuroke Creek, or for the need to retain the Tullamarine basin site.

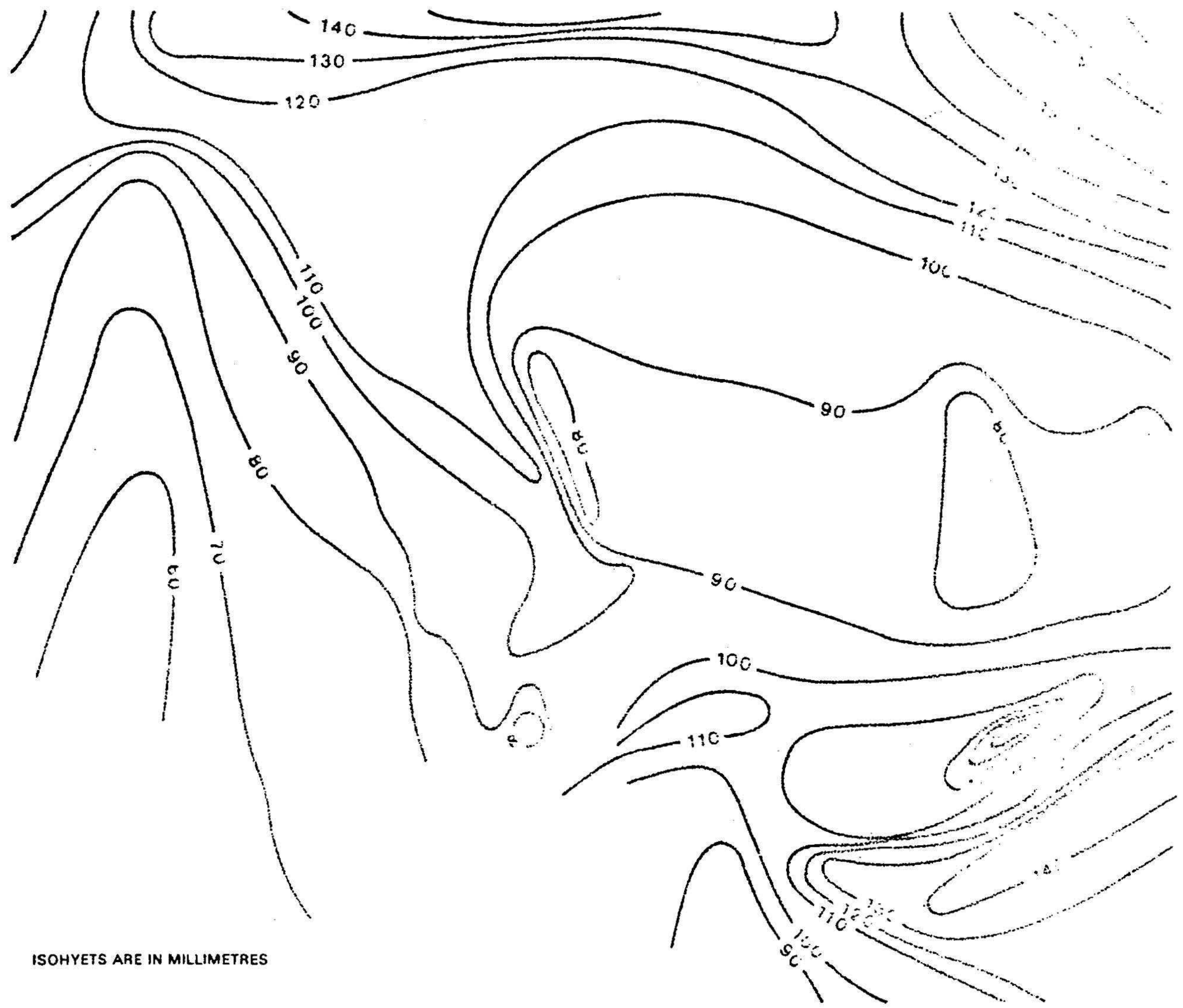
## 6.4 THE BROAD STREET DRAIN RETARDING BASINS

In 1980, a developer applied to the Board of Works for conditions relating to the provision of main drainage facilities for a proposed subdivision straddling the Broad Street Drain immediately downstream of Mickleham Road, Broadmeadows (Fig 6-7). Downstream of the proposed subdivision the Broad Street Drain is badly eroded (see Plate 9-20); gullying has occurred and bare vertical banks up to 10 metres high have developed. The Board was anxious that runoff from the proposed subdivision would not exacerbate the problem and informed the developer that *"on-site detention of stormwater runoff will be required on the Board's Broad Street Drain traversing the land to minimise downstream erosion of the watercourse"*. The Board stipulated that two

[1] For accounts of flooding in May 1974 in the Maribyrnong, Merri and Plenty basins, see References 1, 2 and 3, and for a detailed account of rainfall and runoff associated with the Easter Storm of 1977, see References 4 and 5



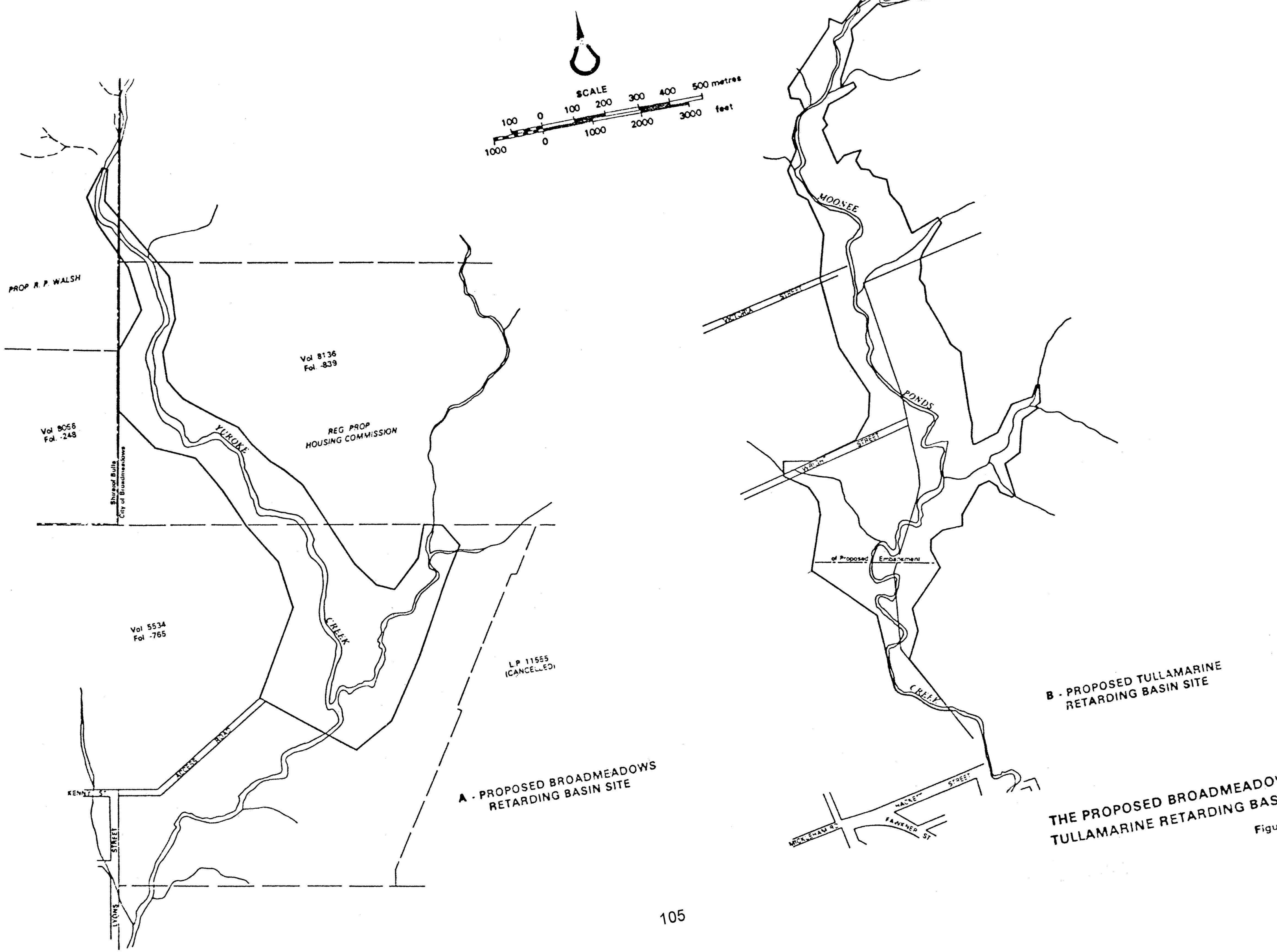

24 HOUR DURATION
STORM 7-8 APRIL 1977



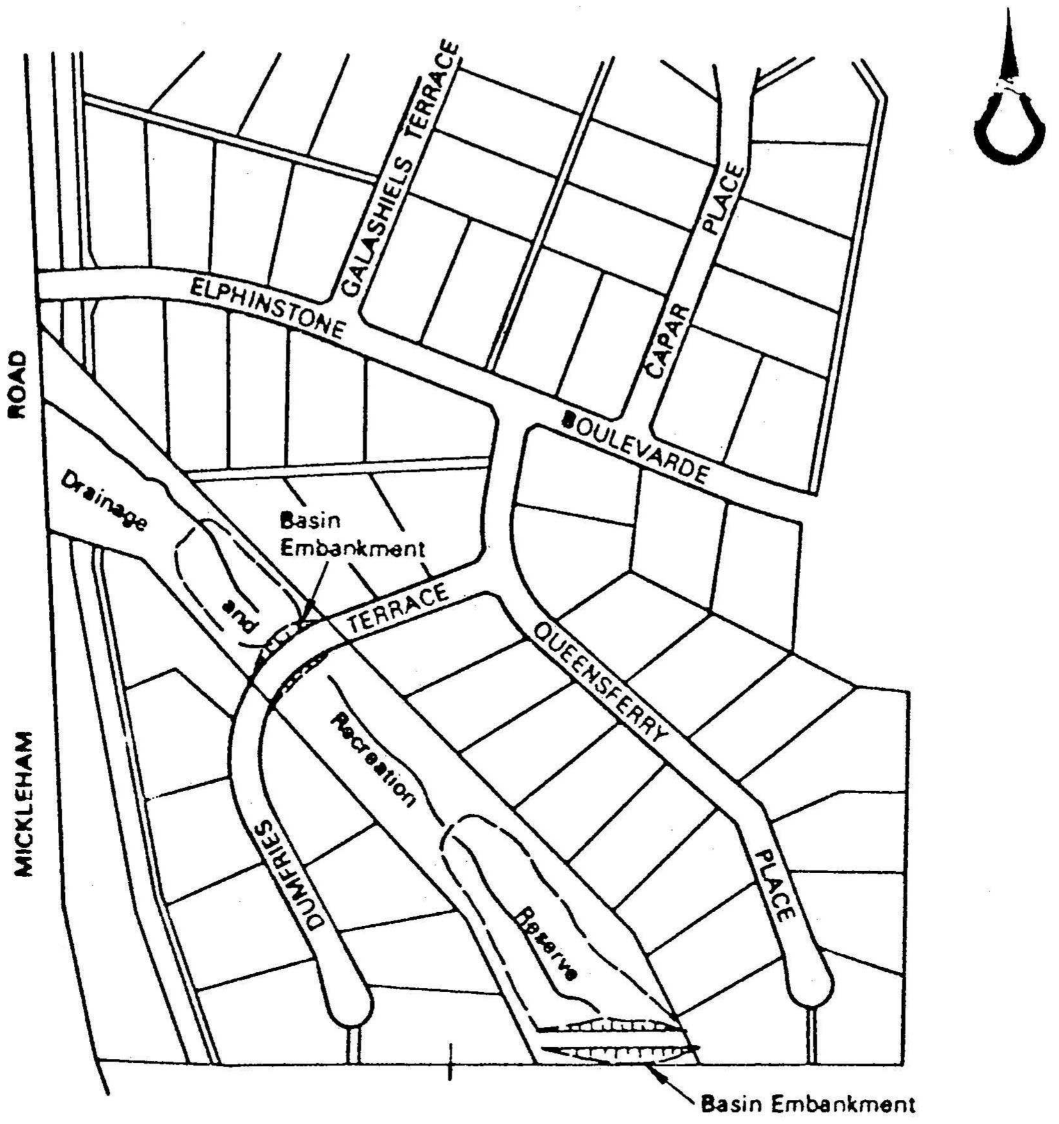

63 HOUR DURATION
STORM 16-17 MAY 1974

**ISOHYETS FOR THE STORMS OF MAY 1974 AND APRIL 1977**

Figure 6-5




THE PROPOSED BROADMEADOW
TULLAMARINE RETARDING BAS
Figu




THE BROAD STREET DRAIN RETARDING BASINS
LOCALITY PLAN
**Figure 6-7**

small retarding basins should be constructed within the existing drainage and recreation reserve (Fig 6-7), and that the basins should be designed and constructed by the developer to the Board's approval with costs being met by the developer. The basins were constructed in early/mid 1981, and the works will vest in the Board by virtue of the provisions of Section 269A(4) of the MMBW Act 1958 (No 6310).

## 6.5 REFERENCES


1 Melbourne and Metropolitan Board of Works, 1975. *Report of floods of May 1974 Maribyrnong River Basin*. MMBW-D-0001; Melbourne.

2 Earl, C T, 1974. *The Merri Creek Flood 15th - 16th May 1974*. Melbourne and Metropolitan Board of Works; Melbourne.

3 Melbourne and Metropolitan Board of Works, 1976. *Plenty River Basin Study Phase 1*. MMBW-D-0002; Melbourne.

4 Melbourne and Metropolitan Board of Works, 1977. *Report on the Easter Storm 1977. Volume 1 - Rainfall*. MMBW-D-0018; Melbourne.

5 Melbourne and Metropolitan Board of Works, 1977. *Report of the Easter Storm 1977. Volume 2 - Runoff*. MMBW-D-0018; Melbourne.

6 Senior, J G and Leigh, C H, 1979. "Stormwater retarding basins - the slow process of urban drainage", *Memo*, 36, 19-23.

7 Hellier, R *et al*, 1976. *Moonee Ponds Creek Open Space Study*. City of Broadmeadows; Melbourne.

## 7 THE TULLAMARINE FREEWAY : ASSOCIATED DRAINAGE WORKS

### 7.1 INTRODUCTION

When Tullamarine Airport was being planned it was apparent that a new road link with the City would be required. In the MMBW's 1954 Planning Scheme provision had been made for a new highway running northwards along the valley of Moonee Ponds Creek from Flemington Road to Broadmeadows, and during the early 1960s the Country Roads Board had been planning to extend Bell Street to link up with the Calder Highway (Ref 1). It was decided, therefore, that a Freeway should be built along the line of these two planned routes, and then swing northwards along the western side of Essendon Airport to Tullamarine (Fig 7-1). It was decided that the Country Roads Board would be responsible for the construction of the Freeway between Tullamarine and Bell Street and the Board of Works for the section between Bell Street and Flemington Road. The State Government agreed to the works undertaken by the Board being classified as a 'Special Project', which meant that the Government provided three-quarters of the necessary finance with the Board providing the balance. The construction of the Freeway commenced in January 1967.

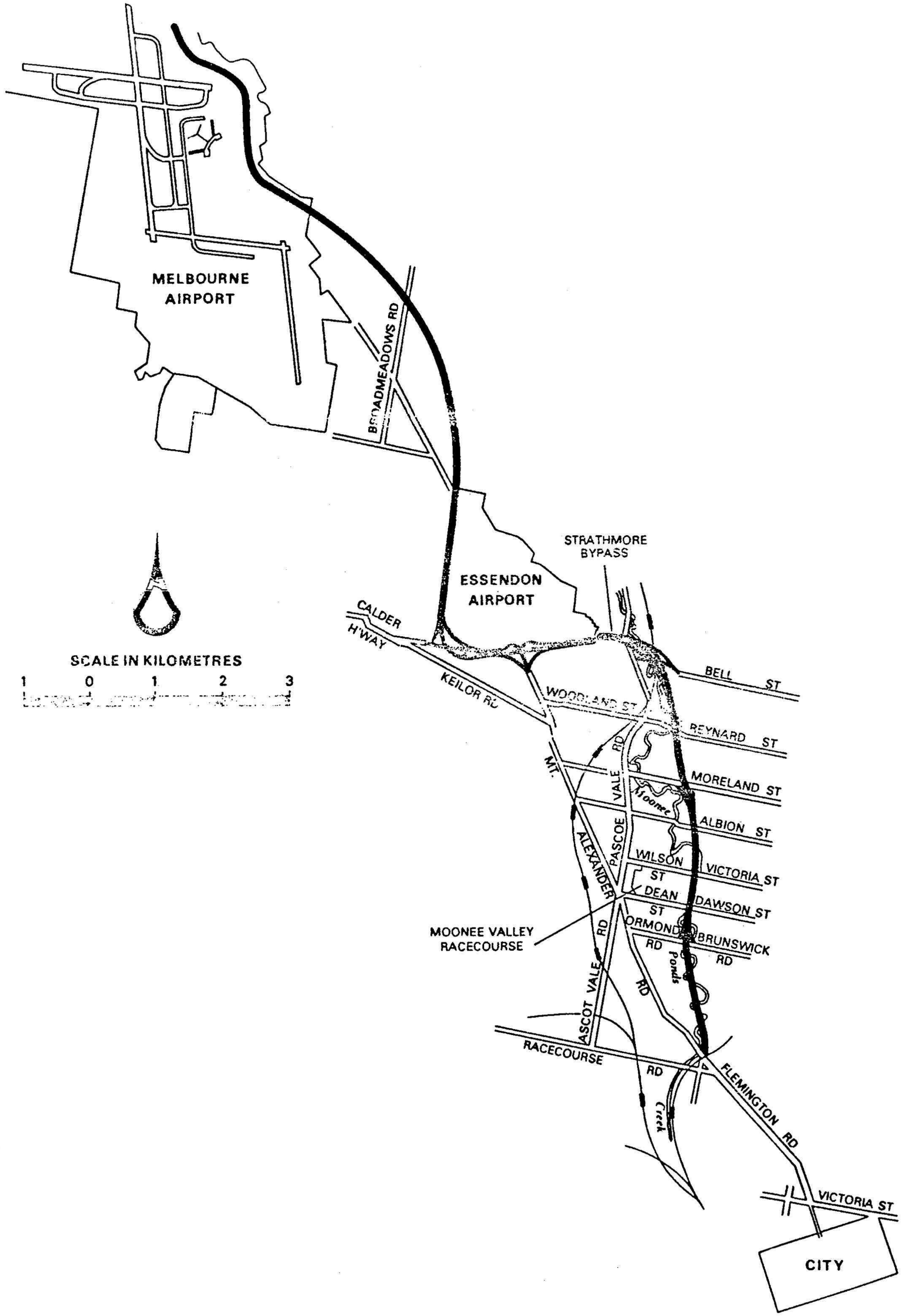
For financial and other reasons it was considered to be impractical for the Freeway to follow the sinuous course of Moonee Ponds Creek, or to construct a large number of bridges across the creek. It was therefore decided that the creek would have to be realigned at three localities : between Flemington Road and Ormond Road, from Dawson Street to Evans Street, and in Bell Street area (Figs 7-1 and 7-2). In addition, the construction of the Freeway necessitated modifications to three tributary drains. The realignment of the creek between Flemington Road and Ormond Road necessitated the extension of the Royal Park Drain, an underground section of the Coonans Road Main Drain had to be relocated to pass under the Freeway, and a section of the Melville Main Drain was undergrounded immediately upstream and downstream of the Freeway. The location of the various drainage works associated with the construction of the Freeway is shown in Figure 7-2.

In addition to the planned Freeway, there were also proposals for the construction of a railway line between the Airport and the existing Essendon -Broadmeadows line, and for the construction of an aero-train track between the Airport and the centre of the City. A Bill to authorise the construction of a railway line between Glenroy and the Airport was read before the Legislative Assembly on 27 June 1965. It was intended that a line should be built from the vicinity of Jacana Station westwards to Mickleham Road and then north-westwards alongside of the Freeway. The line would have bisected the Jacana Retarding Basin site, and the Board of Works was concerned that it would have impaired the functioning of the proposed basin. The Bill was not, however, passed by Parliament and the project lapsed.

Following the rejection of the proposal for a conventional rail link, the State Government gave approval to a consulting group of companies to carry out a feasibility study for a futuristic aero-train link between Tullamarine and the Central Business District of the City. The consultants proposed that the track should run along the western side of the Freeway. The Board of Works was not in favour of the proposal for financial and aesthetic reasons and the project was dropped.

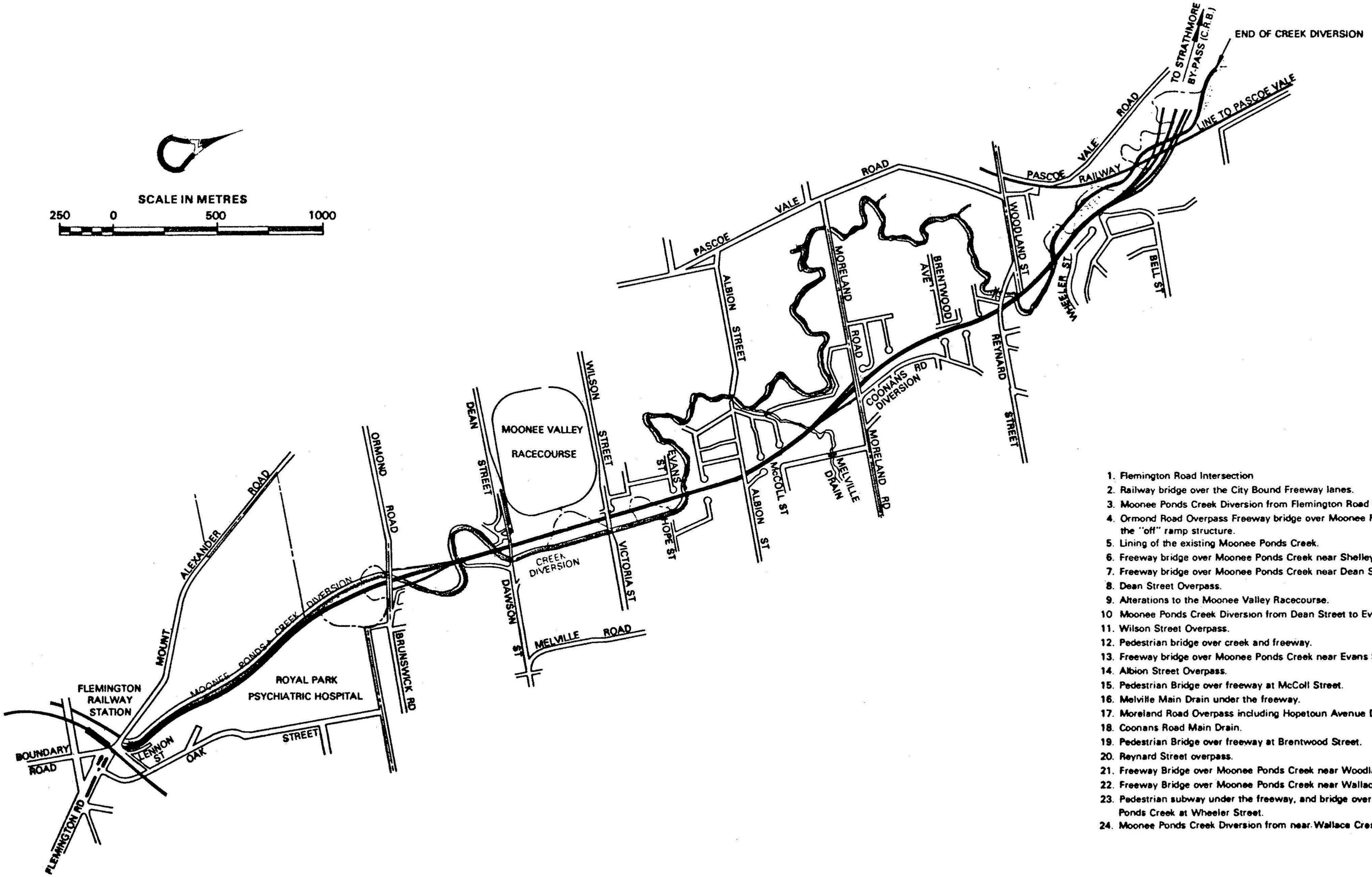
### 7.2 DRAINAGE WORKS BETWEEN FLEMINGTON ROAD AND ORMOND ROAD

Between Flemington Road and Ormond Road the Freeway was constructed across the floodplain of Moonee Ponds Creek necessitating the almost complete realignment of the watercourse (Plate 7-1). Work commenced on the realignment of the creek in January 1967, and the job was completed in the December of that year at a cost of $765 419. As reference to Plates 7-1 and 7-2 will show, a partially concrete-lined, embanked




**PLAN OF THE TULLAMARINE FREEWAY**

Figure 7-1

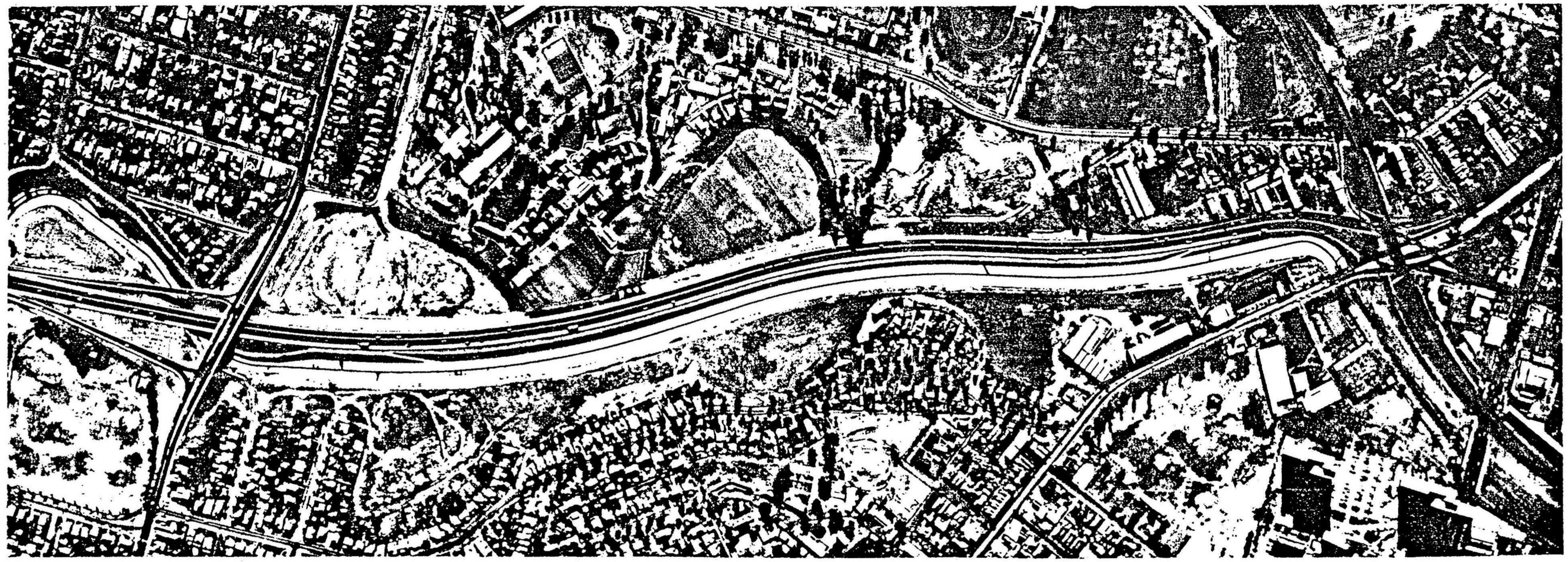



1. Flemington Road Intersection
2. Railway bridge over the City Bound Freeway lanes.
3. Moonee Ponds Creek Diversion from Flemington Road to Ormond Road.
4. Ormond Road Overpass Freeway bridge over Moonee Ponds Creek and the "off" ramp structure.
5. Lining of the existing Moonee Ponds Creek.
6. Freeway bridge over Moonee Ponds Creek near Shelley Street.
7. Freeway bridge over Moonee Ponds Creek near Dean Street.
8. Dean Street Overpass.
9. Alterations to the Moonee Valley Racecourse.
10 Moonee Ponds Creek Diversion from Dean Street to Evans Street.
11. Wilson Street Overpass.
12. Pedestrian bridge over creek and freeway.
13. Freeway bridge over Moonee Ponds Creek near Evans Street.
14. Albion Street Overpass.
15. Pedestrian Bridge over freeway at McColl Street.
16. Melville Main Drain under the freeway.
17. Moreland Road Overpass including Hopetoun Avenue Diversion.
18. Coonans Road Main Drain.
19. Pedestrian Bridge over freeway at Brentwood Street.
20. Reynard Street overpass.
21. Freeway Bridge over Moonee Ponds Creek near Woodland Street.
22. Freeway Bridge over Moonee Ponds Creek near Wallace Crescent.
23. Pedestrian subway under the freeway, and bridge over the Moonee Ponds Creek at Wheeler Street.
24. Moonee Ponds Creek Diversion from near Wallace Crescent to Railway.

**TULLAMARINE FREEWAY**
**LOCATION OF WORKS,**
**BELL STREET TO FLEMINGTON ROAD**

**Figure 7-2**

A-1966

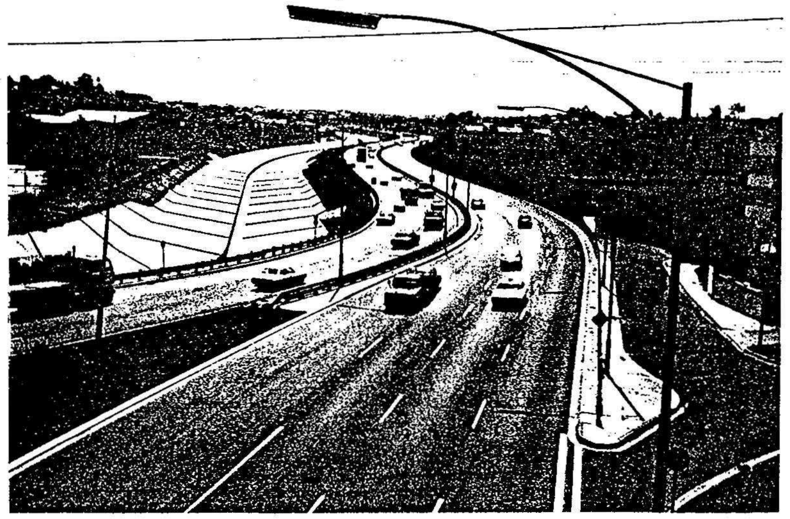


B-1972

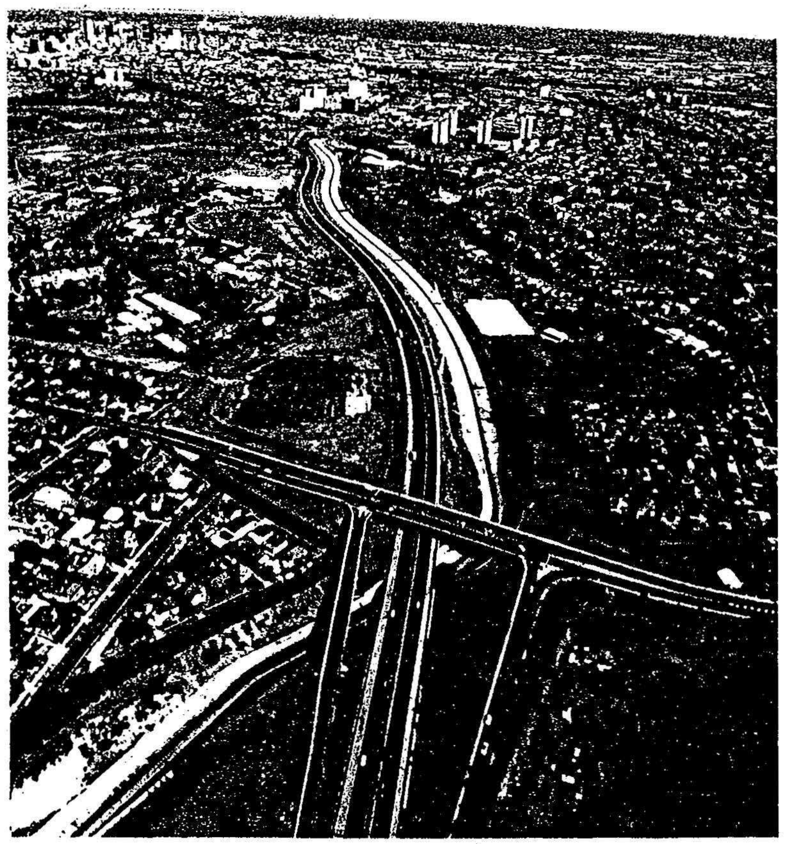
METRES 120 60 0 120

Plate 7-1

channel was constructed along the western side of the Freeway. Two types of lined channel were constructed (Fig 7-3). Immediately downstream of Ormond Road the channel invert is 10.7 m (35 ft) wide and the lower 2.7 m (9 ft) of the banks are concrete-lined (Plate 7-2A). From a point 191 m (627 ft) south of Ormond Road downstream to Flemington Road the channel invert is wider (24.4 m - 80 ft) and there is a 1.8 m - wide (6 ft), 0.9 m -deep (3 ft) concrete-lined centre channel (Plate 7-2 A and B).

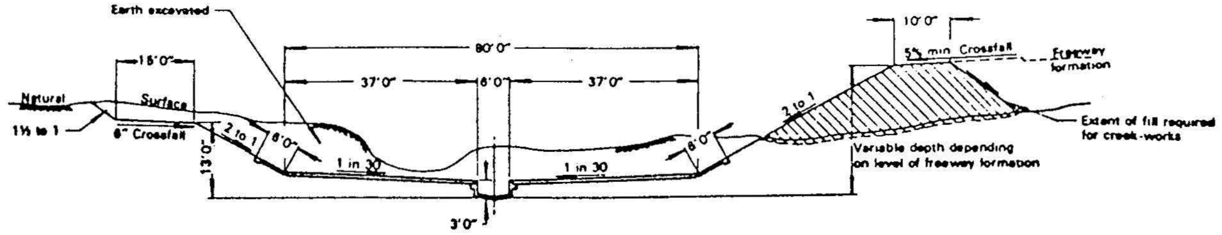


A View looking upstream from near Flemington Road. The concrete ridges across the channel invert were installed to deter trial bike riders

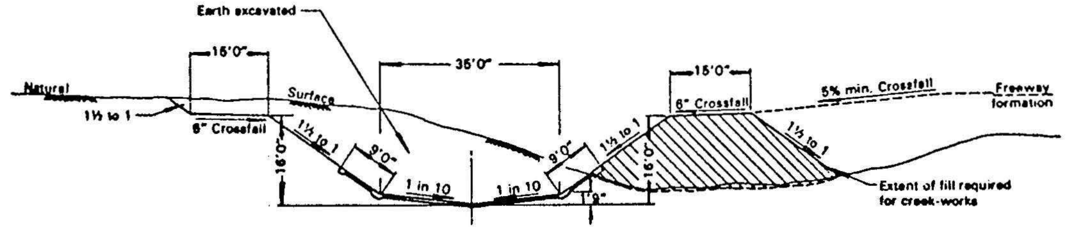


B View looking downstream from Ormond Road

PLATE 7-2 The realigned channel between Flemington Road and Ormond Road




TYPE SECTION A




TYPE SECTION 3

THE REALIGNED CHANNEL BETWEEN FLEMINGTON ROAD AND ORMOND ROAD.

Figure 7-3

The estimated discharge capacities and recurrence intervals for this section of the channel are given in Table 7-1. The values were obtained by the Unit Hydrograph Method assuming current planning zoning (see Appendix B). The design discharge for both type sections is in excess of the one in a hundred year flow, and considerably in excess of the capacity of the '5 000 cusec' channel downstream of Flemington Road.

**TABLE 7-1 DISCHARGE CAPACITY AND FREQUENCY ESTIMATES FOR MOONEE PONDS CREEK BETWEEN ORMOND ROAD AND MACAULAY ROAD**

| Estimated Discharges | | Full Bank Flow | | | | Flow with 0.5 m Freeboard | | | | Flow at top of Lined Portion | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q * 100yr | Q 5 yr | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq |
| Ormond Road to Flemington Road | | | | | | | | | | | | | |
| TYPE A | | | | | | | | | | | | | |
| 222 | 112 | 328 | 3.8 | 4.0 | 100 | 245 | 3.6 | 3.5 | 100 | 90 | 3.3 | 2.3 | 5 |
| Ormond Road to Flemington Road | | | | | | | | | | | | | |
| TYPE B | | | | | | | | | | | | | |
| 222 | 112 | 328 | 3.8 | 4.0 | 100 | 259 | 3.9 | 4.4 | 100 | 97 | 4.3 | 2.1 | 5 |
| Flemington Road to Macaulay Road | | | | | | | | | | | | | |
| 246 | 120 | 130 | 1.35 | 3.4 | 8 | 82 | 1.1 | 2.9 | 5 | 3.4 | 1.1 | 1.01 | 5 |

(* Q in cumecs)

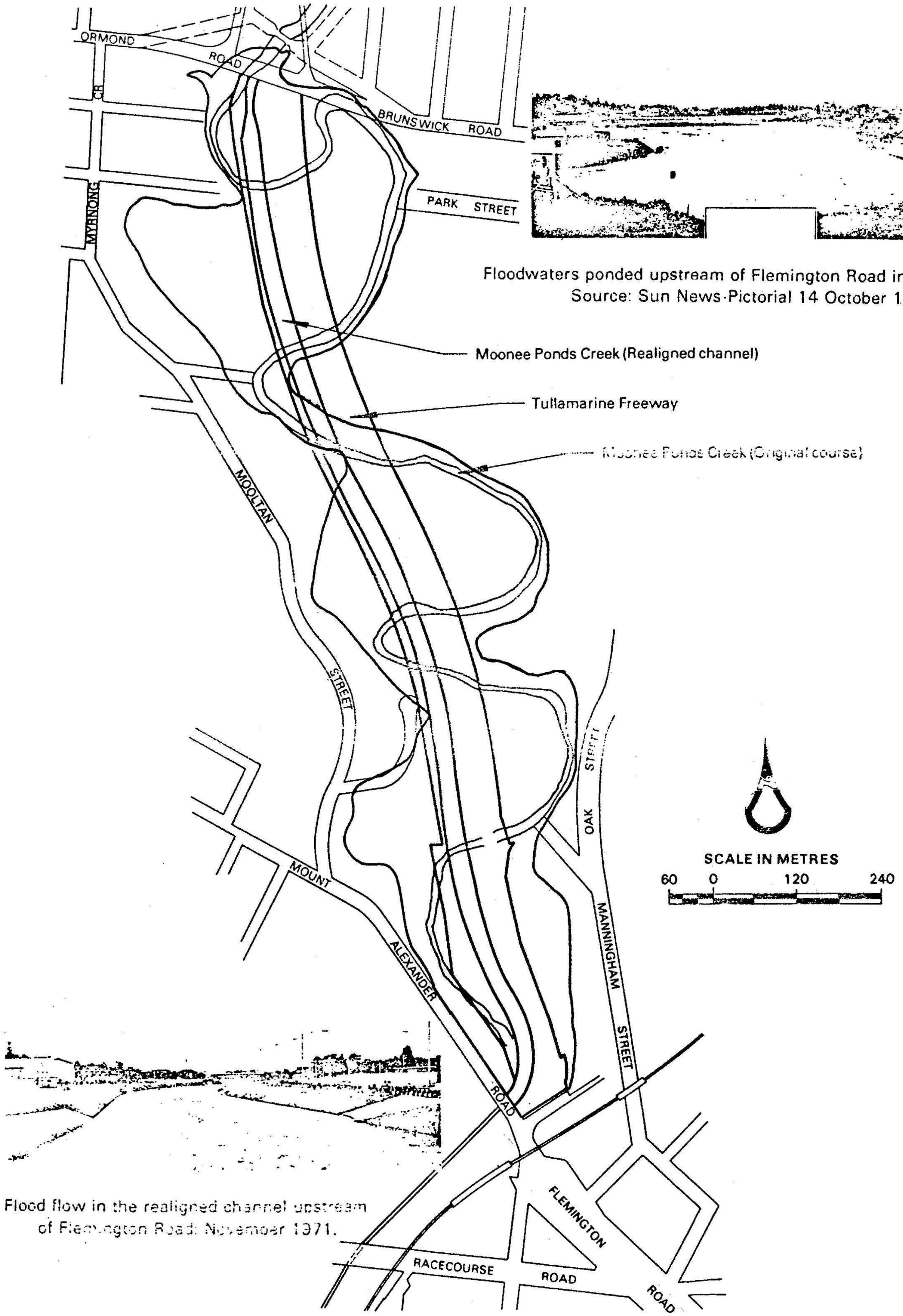
PLATE 7-3 Floodwaters ponded upstream of Flemington Road. The photograph was probably taken during the February 1946 flood

A considerable amount of criticism has been levelled at the Board of Works over the design of this section of Moonee Ponds Creek. It has been criticised on the grounds that the channel is unnecessarily large, although few people have probably seen it during times of high flow (see Plate 7-3 and Fig 7-4), and as being aesthetically unpleasing because of the concrete lining. However, many critics have failed to appreciate the design constraints that were placed upon the Board. Prior to the construction of the Freeway, the 'natural' channel was incapable of accommodating flood flows, and the floodplain acted as a natural storage area (Plate 7-3). The construction of the Freeway, and the subsequent filling of parts of the floodplain severed by the Freeway, reduced the floodplain storage area to a minimum (Fig 7-4), and it was apparent that if frequent flooding of the Freeway and adjacent private land was to be avoided, the new channel had to be designed to convey all but the most severe flood flows within the confines of its banks.

The potential width of the channel that could be built was limited by the Freeway along one side and by private allotments, some with houses, along the other (Plate 7-1). In these circumstances the only practical solution was to construct a partially hard-lined channel. A fully grass-lined channel would have been incapable of conveying the required flows, grass producing far greater resistance to flow than concrete. A partially lined channel was also deemed to be necessary to prevent the channel invert and the lower banks from being eroded. In the realignment of the creek immediately upstream of Flemington Road in 1962, the channel design included a grass invert with a concrete-lined centre channel. In this case the grass invert proved to be unsatisfactory because of its high susceptibility to erosion (see Section 5.2.6 and Plate 5-22). In view of the development that was anticipated within the Moonee Ponds Creek basin during the decade after the construction of the Freeway and the concomitant increase in the frequency of flood flows, the use of a grass invert in the creek realignment accompanying Freeway construction was regarded as being completely unsound, and a fully lined invert was seen as the only satisfactory alternative. The constructed creek occupies the minimum of space and has permitted the municipal councils to develop the former swamp lands as valuable recreational land.

## 7.3 DRAINAGE WORKS BETWEEN ORMOND ROAD AND EVANS STREET

Between Ormond Road and Evans Street, the projected line of the Freeway crossed Moonee Ponds Creek no fewer than eight times. In order to eliminate the need for four creek crossings, the creek was realigned to the east of the Freeway between Dawson Street and Hope Street (Plate 7-4; Fig 7-2). Because it was not possible to acquire one residential allotment, the realigned section has a sharp bend about half way along its length, which is far from desirable from a hydraulic point of view (Plates 7-4 and 7-5). During flood flows turbulence is generated at the bend which increases the likelihood of erosion if the flow is above the level of the concrete lining. A tagedy occurred at this spot during a flood in April 1977 when a person illegally canoeing down the creek capsized at the bend and was drowned.




Floodwaters ponded upstream of Flemington Road in October 1932.
Source: Sun News-Pictorial 14 October 1932.

Flood flow in the realigned channel upstream of Flemington Road: November 1971.

**ORMOND ROAD TO FLEMINGTON ROAD FLOODPLAIN AREA LOST AS RESULT OF FREEWAY CONSTRUCTION**

Figure 7-4

Between Ormond Road and Dawson Street the existing course of the creek was retained, and the existing improvement works at Pattison Street (see Section 5.1.3 (b)) were incorporated into the new channel. A slight modification was made to the original design for this section of the creek in order to preserve an outcrop of Silurian rock on the eastern side of the creek approximately one hundred metres upstream of Ormond Road (Plate 7-6). The Director of the National Museum of Victoria requested that the outcrop should be preserved because:

*It is the type of locality for the widespread rocks of the Melburnian Stage (Silurian) in Victoria.*

*Rocks of this age form the bedrock of Melbourne, but fossil localities such as this are rare.*[1]

*A detailed scientific investigation of this key outcrop has not yet been carried out.*

An on-site inspection was held by representatives of the National Museum and by officers of the Board of Works, and a mutually acceptable solution was arrived at. It was agreed that no alterations would be made to the eastern bank of the creek in the vicinity of the outcrop above the level of the concrete lining, which meant that less than a metre of the outcrop would be affected by the creek works. It was also agreed that care would be taken during the construction of the channel to ensure that the outcrop was not damaged.

The form of the channel and of the outcrop as they appear today is shown in Plate 7-6A, and the appearance of this section of the creek in 1902 and during the late 1950s in Plate 7-6B and C. The contrast between the barren nature of the creek around the turn of the century and its vegetation/debris - choked condition before the improvement works were carried out is particularly striking.

The dimensions and form of the lined invert and lower banks between Ormond Road and Evans Street are identical to those of the section immediately downstream of Ormond Road (see Fig 7-3B). Along the realigned section of the creek upstream of Dawson Street two sets of small drop structures were constructed (Plate 7-5) to slow down flow velocities. For most of the distance between Ormond Road and Evans Street the channel is flanked by steep banks and maintenance tracks with concrete ramps leading down to the invert. The tracks have been constructed along one or both banks at varying heights above the level of the bank lining.

Discharge capacity and frequency estimates for this section of the creek are given in Table 7-2.

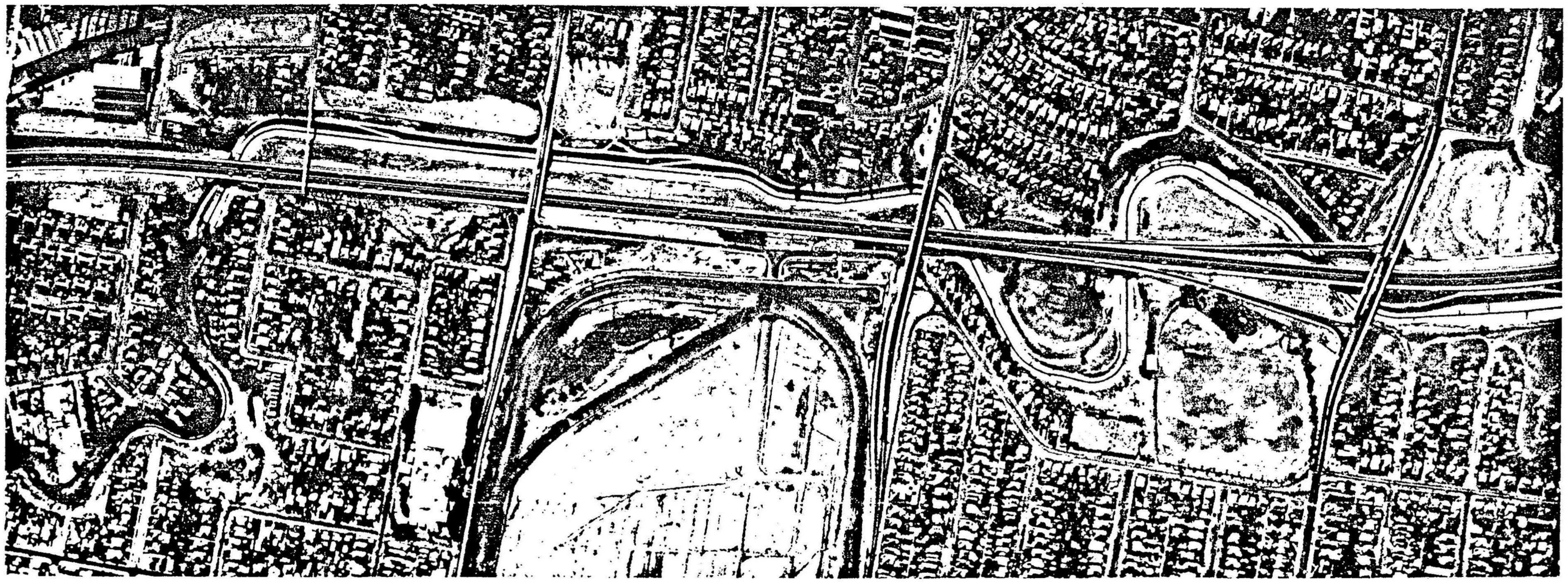
**TABLE 7-2 DISCHARGE CAPACITY AND FREQUENCY ESTIMATES FOR MOONEE PONDS CREEK BETWEEN ORMOND ROAD AND EVANS STREET**

| Estimated Discharges | | Full Bank Flow | | | | Flow with 0.5 m Freeboard | | | | Flow at top of Lined Portion | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q * 100yr | Q 5 yr | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq |
| 190 | 97 | 296 | 3.8 | 4.9 | 100 | 259 | 3.9 | 4.4 | 100 | 97 | 4.3 | 2.1 | 5 |

(* Q in cumecs)

[1] Fossils found at the site are listed on page twenty-five of Reference 2.

A-1966



B-1972

METRES 120 60 0 120

Plate 7-4

PLATE 7-5 View looking upstream along the realigned cnannel between Dawson Street and Victoria Street Bridge. Note the double bend in the channel and the drop structure

The work between Ormond Road and Evans Street was undertaken in two stages : Ormond Road to Dawson Street, which was issued to construction in February 1969 and completed in September 1971; and Dawson Street to Evans Street which was issued to construction in July 1967 and also completed in September 1971. The cost for the Ormond Road - Dawson Street section was $338 714 and the Dawson Street - Evans Street section $462 295.

## 7.4 DRAINAGE WORKS BETWEEN REYNARD STREET AND TATE STREET

The construction of the Freeway necessitated the realignment of the creek at Bell Street to accommodate the Freeway - Bell Street intersection (Fig 7-2; Plate 7-7). The channel was partially hard-lined from the existing lined section at Avoca Crescent [ See Section 5.1.3 (f) ] downstream to Reynard Street. Unfortunately, it was not possible to relocate the Essendon - Broadmeadows railway bridge, and the new channel passes under the bridge in a tight 'S' bend which is hydraulically far from ideal. The channel invert is dish-shaped, and at a number of points along the channel there are energy dissipating drop structures (Fig 7-5; Plate 7-8). Discharge capacity/frequency estimates for the improved channel are given in Table 7-3.

The work between Reynard Street and Tate Street was undertaken in three stages. The Board gave approval for work to commence on the section near Reynard Street to just north of the Essendon - Broadmeadows railway line in December 1967. The job was completed in September 1971 at a cost of $252 700. Approval for work to commence on the other main section, from north of the railway line to Tate Street, was given in September 1967 and was also completed in September 1971. The cost for this section

### TABLE 7-3 DISCHARGE CAPACITY AND FREQUENCY ESTIMATES FOR MOONEE PONDS CREEK BETWEEN REYNARD STREET AND TATE STREET

| Estimated Discharges | | Full Bank Flow | | | | Flow with 0.5 m Freeboard | | | | Flow at top of Lined Portion | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q * 100yr | Q 5 yr | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq | Q | V m/s | Depth m | Approx Freq |
| 140 | 74 | 235 | 3.2 | 5.5 | 100 | 194 | 3.1 | 5.0 | 100 | 27.5 | 3.2 | 1.32 | 5 |

(* Q in cumecs)

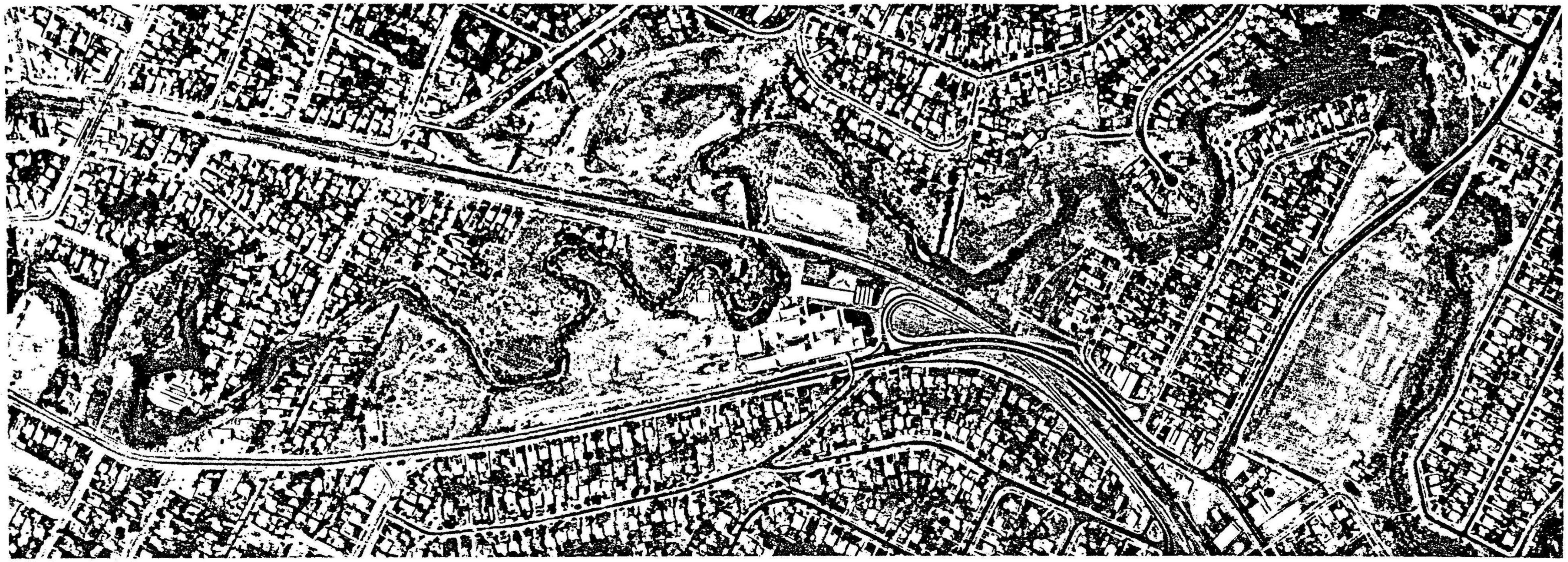
A The channel around the turn of the century. The area is being used as a rifle range

B The vegetation/debris-choked channel in the late 1950s

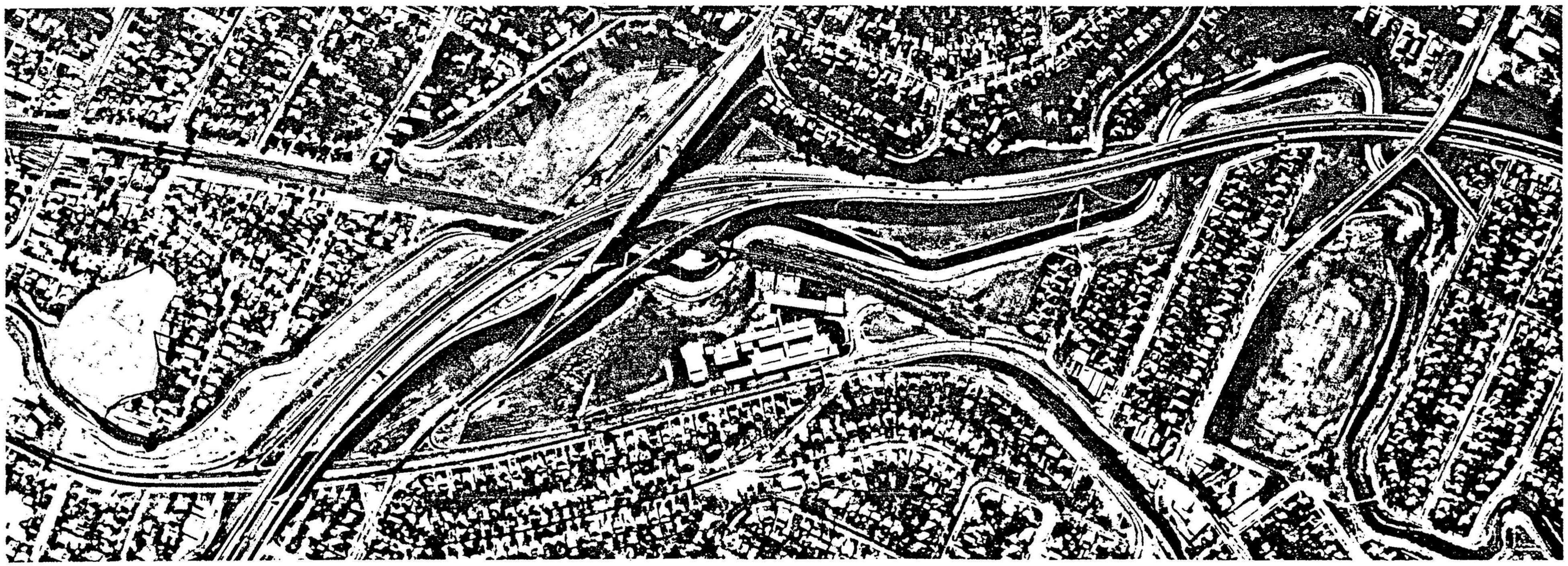
C The improved channel mid 1980

PLATE 7-6 The Silurian outcrop on the east bank of the creek upstream of Ormond Road

## REALIGNMENT OF THE CHANNEL BETWEEN REYNARD STREET AND TATE STREET



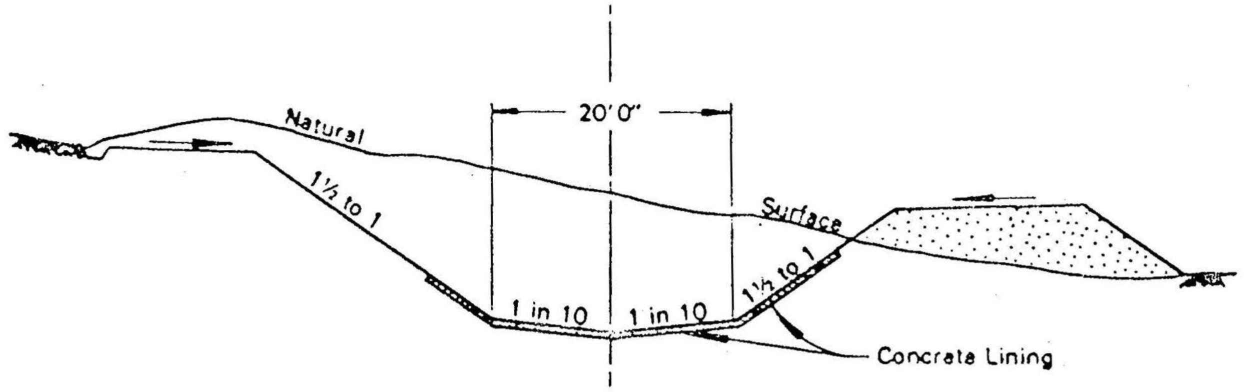
A-1966



B-1972

METRES 120 60 0 120

Plate 7-7




TYPE SECTION

DRAINAGE WORKS REYNARD STREET TO TATE STREET

Figure 7-5

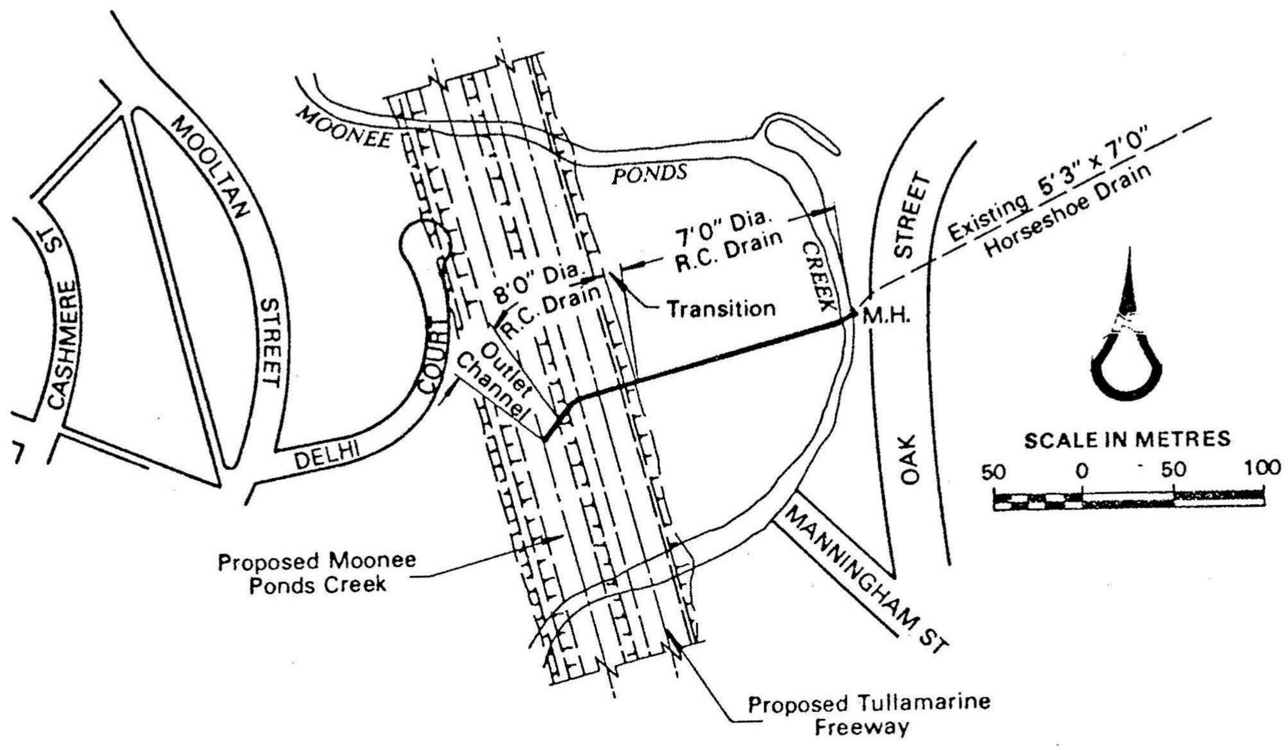
was $237 738. The third stage of the project, the lining of the creek in the vicinity of Reynard Street, was issued to construction in March 1970 and was completed later in the year at a cost of approximately $111 000.

## 7.5 ASSOCIATED DRAINAGE WORKS ON TRIBUTARIES

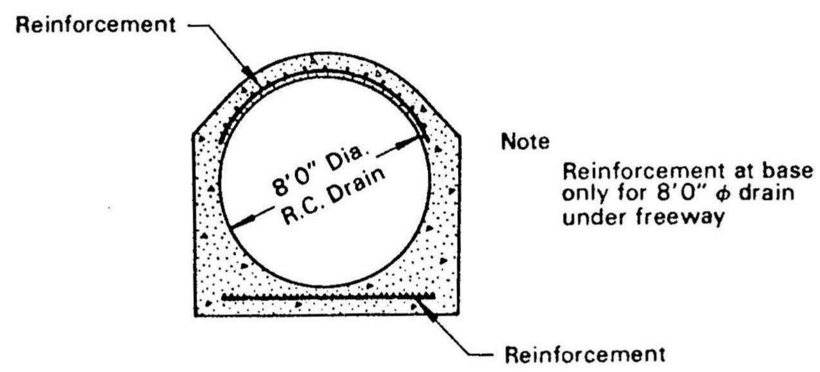
In addition to the works required along Moonee Ponds Creek as a result of the construction of the Tullamarine Freeway, drainage works were also required along three of the tributary drains : the Royal Park Drain, the Melville Main Drain, and the Coonans Road Main Drain (Fig 7-2). The realignment of Moonee Ponds Creek between Flemington Road and Ormond Road necessitated the extension westwards of the Royal Park Drain (Fig 7-6), the extension comprising a 7 ft to 8 ft diameter reinforced concrete pipe. Work on the extension commenced in March 1967 and was completed in February 1968 at a cost of $35 651.

PLATE 7-8 The realigned channel between Reynard Street and Tate Street. View looking upstream towards Talbot Street Footbridge. Note drop structure and raised lining on outside of bend

With respect to the Melville Main Drain, it was decided that it would be an opportune time to underground the drain for some distance upstream and downstream of the culvert that would have to be constructed under the Tullamarine Freeway. The undergrounding was extended upstream to the open section of horseshoe drain below McLean Street [ see Section 5.3.2 (c) ], and the open horseshoe drain was covered (Fig 7-7 A and B). Downstream of the Freeway, the undergrounding was extended to a point midway between Hopetoun Street and the junction with Moonee Ponds Creek. The combined jobs were issued to construction in October 1967 and the work was completed in December 1968.



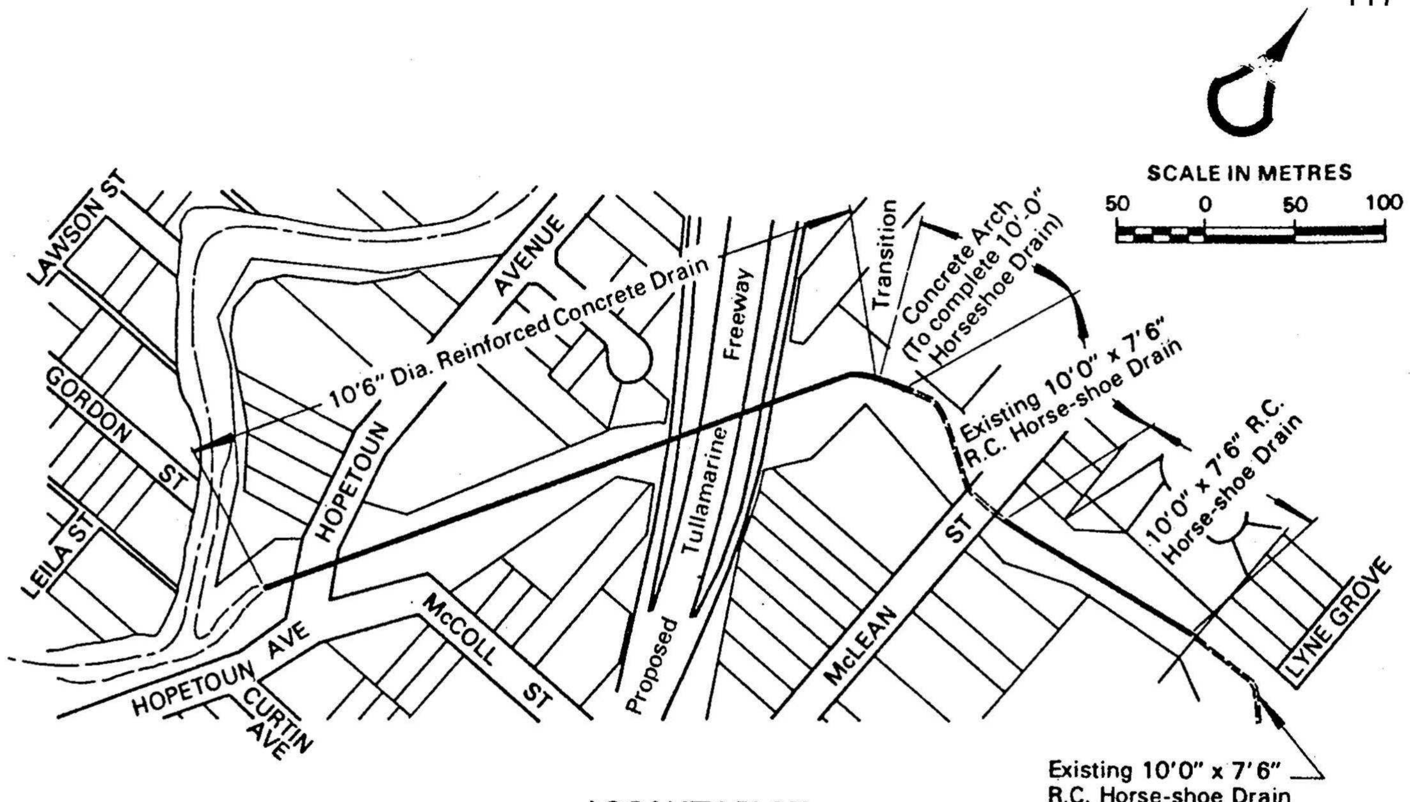

A- LOCALITY PLAN




B- TYPE SECTION

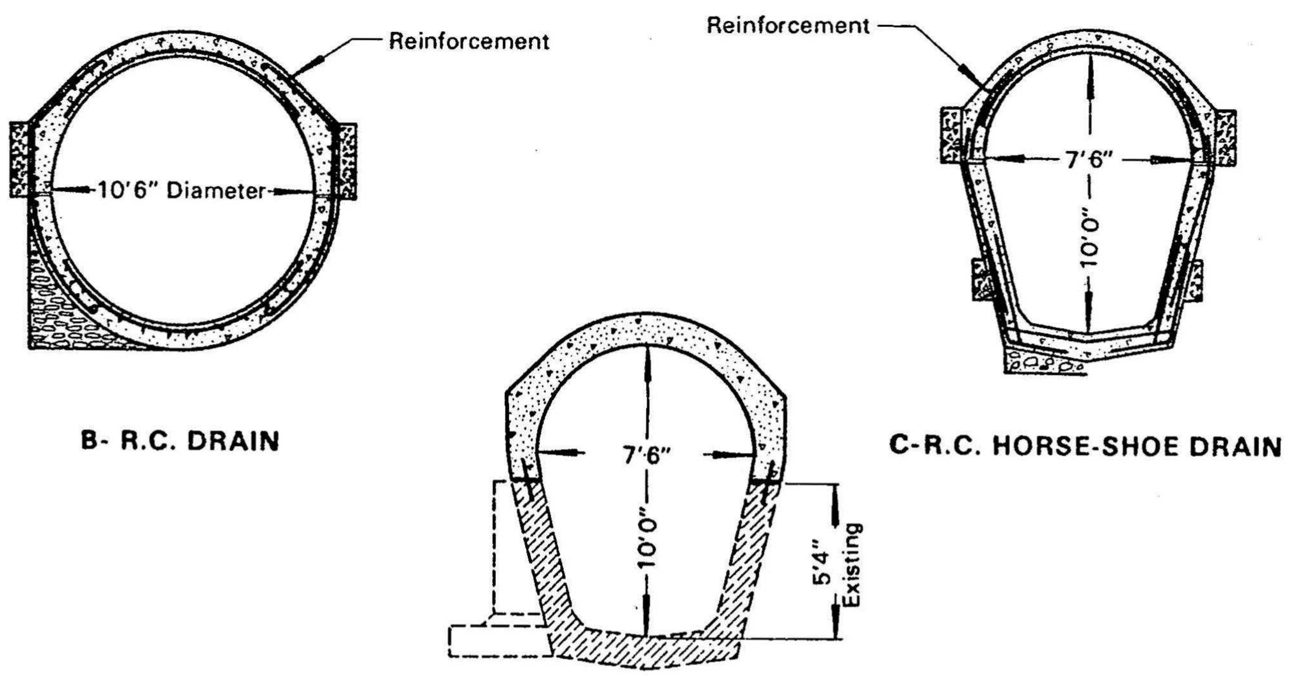
EXTENSION OF THE ROYAL PARK DRAIN

Figure 7-6




LOCALITY PLAN

A- IMPROVEMENTS BETWEEN HOPETOUN AVENUE AND DUNSTAN RESERVE




B- R.C. DRAIN

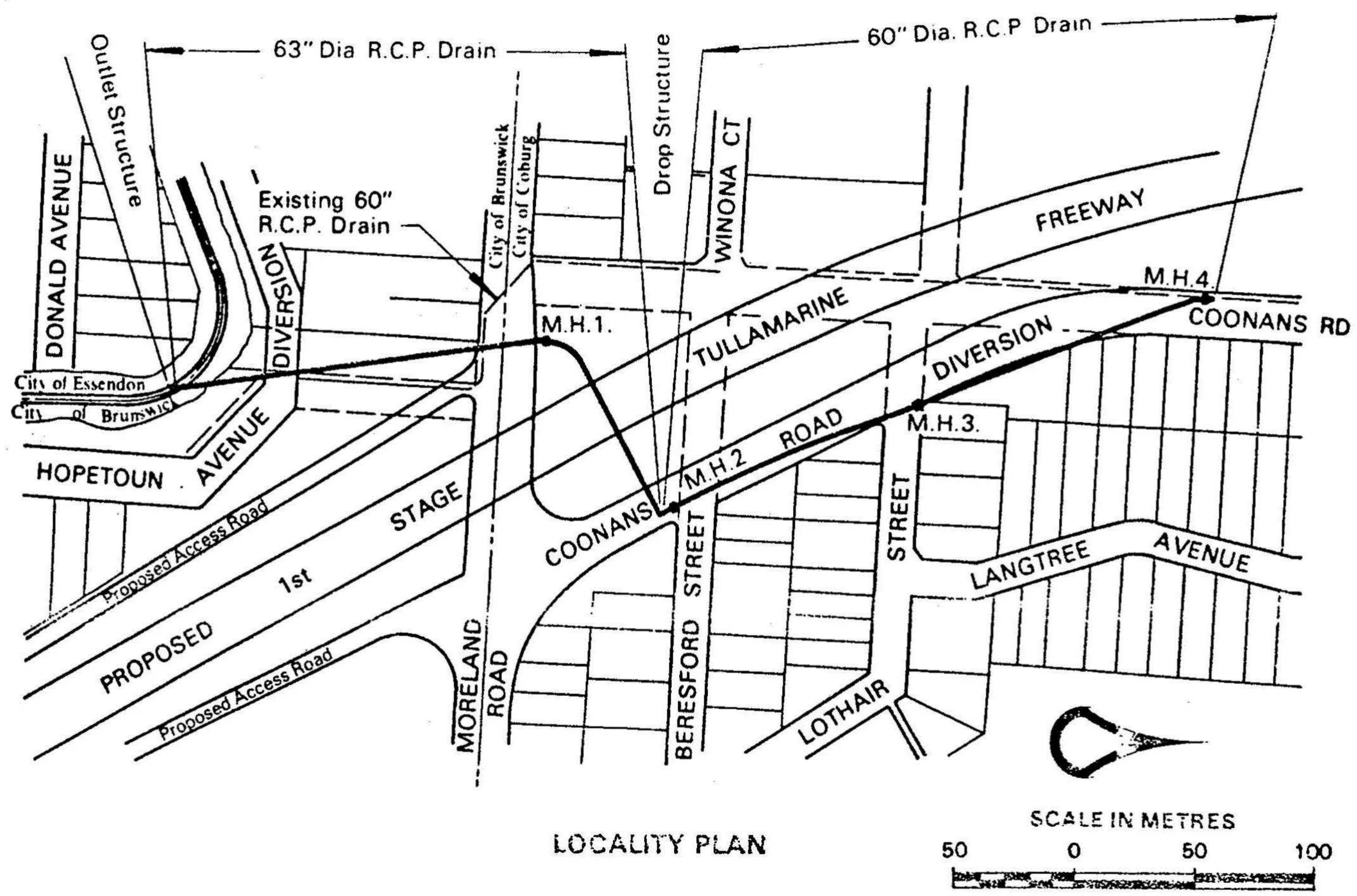
C-R.C. HORSE-SHOE DRAIN

D- CONCRETE ARCH

TYPE SECTIONS

DRAINAGE WORKS ON THE MELVILLE MAIN DRAIN

Figure 7-7




LOCALITY PLAN

DIVERSION OF COONANS ROAD MAIN DRAIN

Figure 7-8

On receiving notification of the proposed works downstream of McLean Street, the City of Brunswick requested the Board to consider undergrounding the section of the creek between McLean Street and the Dunstan Reserve, noting that part of the wall of the pitched drain along this reach of the creek had recently collapsed. The Board of Works agreed that it would be logical to underground this reach of the creek in conjunction with the works to be undertaken downstream of McLean Street. The open pitched drain was demolished and replaced by a 10 ft x 7 ft 6 in horseshoe drain (Fig 7-7 C and D). The total cost of the two projects was $147 850.

The construction of the Tullamarine Freeway necessitated the realignment of the undergrounded Coonans Road Main Drain between Moonee Ponds Creek and a point on Coonans Road midway between Lothian Street and Woodlands Road (Fig 7-8). The work was undertaken in 1968 at a cost of $142 500.

## 7.6 REFERENCES

1 Melbourne and Metropolitan Board of Works, 1968. "Tullamarine - freeway to the jet age", *Living City*, 4, 8 - 13.

2 Talent, J A, 1967. "Sedimentary petrology and palaeontology", In, *Geology of the Melbourne District, Victoria*; Geological Survey of Victoria Bulletin No 59. Mines Department; Melbourne, 24 - 29.