Parliamentary Report, 13/14 Oct 2022 flood on Maribyrnong River

1. Introduction and comments about grossly inaccurate and belated major flood warning for Maribyrnong Township by Melbourne Water
2. Maribyrnong Township flooding
3. Rivervue Retirement Village flooding as a consequence of planning revisions and multiple failures by Melbourne Water to carry out their statutory role as Responsible Drainage Authority.
4. Conclusions and Recommendation for simple solution to all flooding along the Maribyrnong River.

1 INTRODUCTION

I am Ron Sutherland, employed by Melbourne Water from 1982 to 2002 in the drainage section. My role was an engineer specialist in hydrology. In 1986 I was in a small group tasked with the investigation of flooding issues along the Maribyrnong River that resulted in the production of a comprehensive report that is now well known in the various Councils and those concerned about flooding on the Maribyrnong River. My role was to develop a computer model of the Maribyrnong River and to report solutions to stop some 500 houses from flood damage. I used what was then a Monash University catchment runoff routing model suitable for the newly introduced personal computers. The model uses rainfall information from Melbourne Water's comprehensive flood warning system that was later used automatically with the computer model I developed, This system was used comprehensively in the years to follow as a very accurate predictor of flood flows. These flows could then be input into an additional computer model using very accurate "rating tables" to give predicted flood heights. Rating tables were derived for each river level gauging site in the catchment from accurate flood flow measurements and river levels at each level gauge to give a relationship between flood flows and resultant flood levels. I used the "RORB" computer system in 1986, as per my report that year. This gives a very accurate result and I calibrated it using extensive data from several actual flood events.

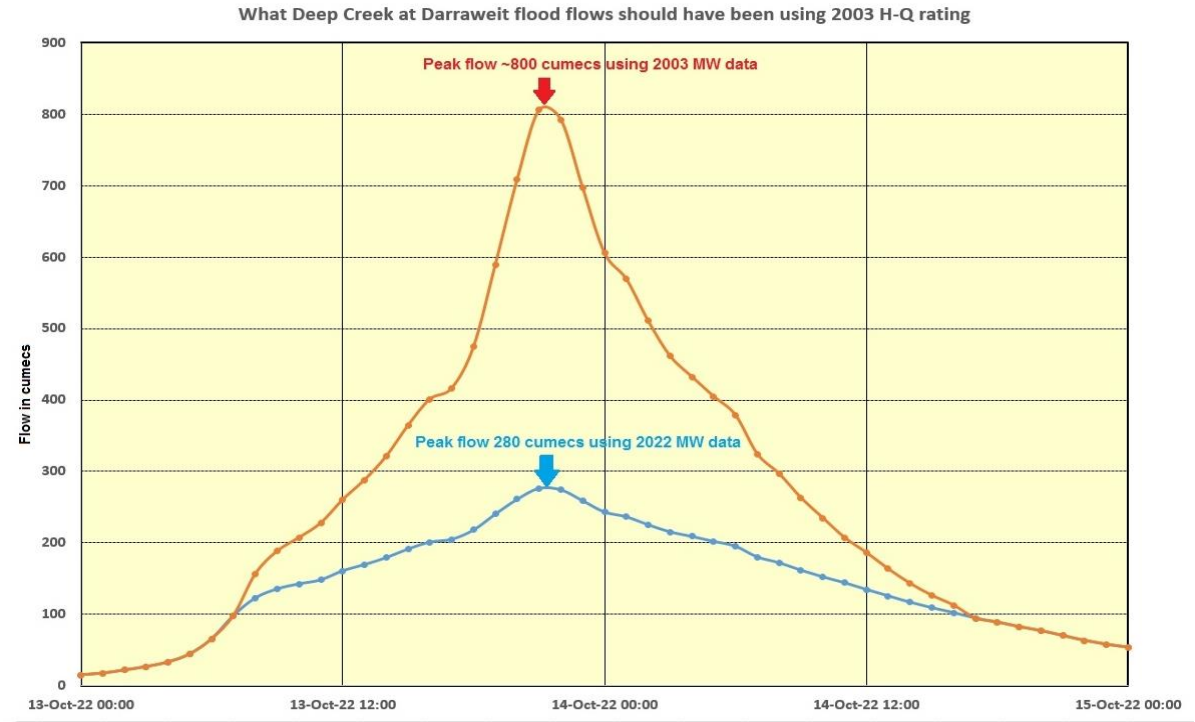
I was a flood warning officer on call on a rostered system after weekday hours and on a rostered weekend. My experience with the flood warning system is excellent and it enabled flood predictions to give upwards of 6 hours warning to households in the Maribyrnong township prior to the onset of major flooding; this being the key area where inundation of floor levels occurred.

I do not intend to go into too much detail of the flood warning system, as my colleague [redacted] has done so in his submission. [redacted] is clearly the expert as he helped design and ran Melbourne Water's flood warning system from the 80s to his departure at the end of 2003. [redacted] is now retired but retains an interest such that he was tracking the 13 Oct'22 rainfall and flood event at his home. He actually contacted me during the storm to say that the warnings issued by Melbourne

Water (to the met bureau) at that stage were greatly in error. [redacted] knew that a major flood had occurred at a small town north of Keilor called Darraweit Guim, and was in serious flooding yet the Melbourne Water flood modelling did not indicate anything significant further downstream. It was obvious to [redacted] that the "rating table" for that gauging station was grossly in error to record accurate flows that had burst the natural waterway and hence were in error for any overbank flows. The rating table used by Melbourne Water did not accurately show flows overbank. Clearly watercourse flows increase dramatically once the water overtops the banks. The correct rating table, used for 20 or so years does accurately show overbank flows. Melbourne Water apparently is still not aware of their error. The end result was that instead of at least a 5 hour warning of an impending flood to the downstream Maribyrnong township, there were only a few minutes available for the SES and Police to door knock residents at 3am to advise them that flood waters were about to enter their houses.

[redacted]s submission will contain more detail, but can be very well summed up by viewing the graph of what Melbourne Water results were at Darraweit Guim compared to [redacted]'s far more accurate flow results; all due to Melbourne Water using an incorrect revised rating table! Melbourne Water's submission to their own flood review still does not recognise their error, something that [redacted] realised on the night of the flood!

This terrific graph below shows the result of flows at Darraweit Guim comparing the Melbourne Water result using their flawed rating table, compared to [redacted]'s result using the original and accurate 2003 rating table. The error is that the new Melbourne Water rating table is wildly inaccurate in estimating flow once the river banks are overtopped. It is clearly evident that Melbourne Water incorrectly revised the flow/water height rating table and hence failed to



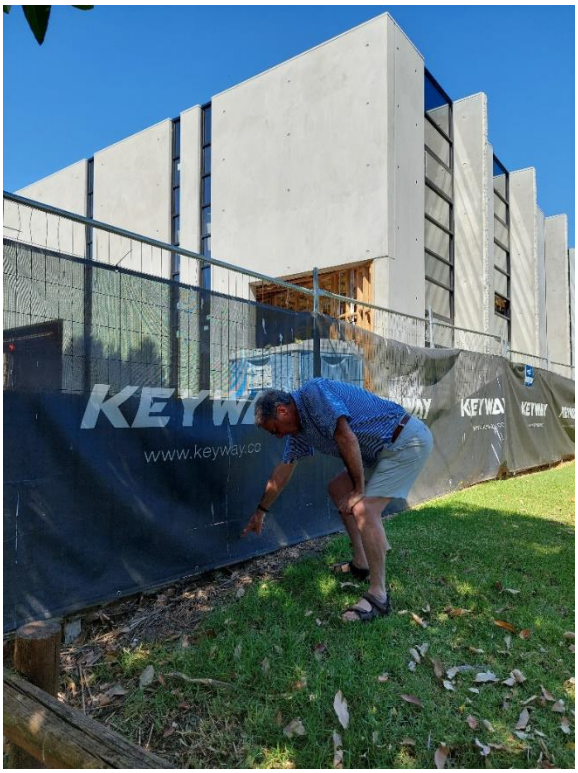
understand the severity of the flood and only recognised the danger to township house owners only a few minutes before their houses were inundated, some to ceiling height.

.

2. MARIBYRNONG TOWNSHIP

In 1975, the Drainage of Land Act was introduced in Victoria, and was later incorporated into the Water Act 1989. Hence this applied to the drainage authority in this case Melbourne Water (Previously Board of Works). The important part of this legislation is that any new homes built after 1975 was to ensure that they be flood free. This meant that older dwellings built before 1975, like those in the Maribyrnong Township, could be subject to flooding. There are some 500 houses in the township that flood. Serious and dangerous flooding can occur where flood waters completely inundate houses up to their ceiling level. Obviously an accurate flood warning system is needed to save residents from drowning in this area. My previous comments describe how the Melbourne Water flood warning system can accurately give flood warnings provided it is not incorrectly interfered with by staff at Melbourne Water.

I note that a revised flood plain management (FPM) system has been used in this township whereby newly constructed houses that have their land flooded have been allowed to build multistorey dwellings in the township. An example of recent very poor flood plain management is [redacted] Newstead Street



. I am pointing to the 100yr flood level. [redacted]Newstead St. Note filling such that the slab floor is approximately one metre above flood level leaving the dwelling surrounded by flood waters.

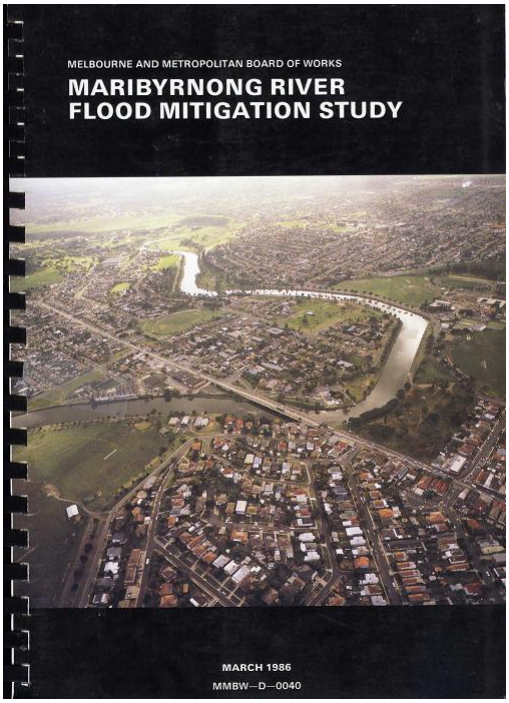
This photo show the height that the 13 Oct'22 flood reached in the Maribyrnong Township, 4.2m AHD and as can be seen, that is some 2.2m above ground level.

This approval by Maribyrnong Council of the Newstead property is contrary to common sense and definitely contrary to FPM principles. Residents would have to stay indoors up to 3 days in a significant flood. This practice should be stopped and the Water Minister should immediately advise Melbourne Water and Maribyrnong Council to obey the Water Act**. It is ridiculous to have residents trapped inside a building surrounded by water nearly one metre deep, and expect them to stay in the house for several days during a flood, or have the SES rescue them by boat**. This nonsense of proper FPM also occurs in Brisbane and is just plain wrong. I understand that planning revisions have also been changed such that the drainage authority (Melbourne Water) is not always advised of a construction proposed in a declared flood area. Clearly this is wrong and the practice should be immediately stopped by the relevant Minister.

On 13/14 Oct 2022, residents were advised by courageous SES and Police to leave their properties at approximately 3am. This gave no time for residents to move valuables or precious belongings out of the way as flood waters were at their doorstop.

In a 100 year flood, some 500 properties are affected. The 13 Oct'22 flood was a 50 year flood and similar to that recorded in 1974. Approximately 300 residents were affected. The damage was huge with many houses now needing to be rebuilt. Many houses had newly renovated rooms badly damaged. Some owners have insurance, but many do not as it is a well-known flood area. Typically residents are asked to pay an outrageous insurance premium of $20,000, yes $20,000.

The solution to this mess in the township is detailed in the 1986 Maribyrnong River Flood Mitigation Study report. It is about time that the Government actually did something to fix the problem instead of ignoring the plight of these owners (and voters!). I will detail the solution to flooding of residential areas, as outlined in the 1986 report discussed below in a later section.



3. RIVERVUE RETIREMENT VILLAGE

This section is vitial to understand how Melbourne Water has made serious errors in their role as a Drainage Authourity and have placed some 47 families in serious danger. Very basic flood plain tools have been seriously misused due entirely to incompetence by the Drainage Authority.

The retirement village is located at [redacted] Canning Street Avondale Heights and is a few kilometres upsteam of the Maribyrnong Township. It is a huge development with most of the dwellings, some 200 of them as an estimate, built above flood level adjoing the Maribyrnong River. The serious problem concerns 47 dwellings built on the north eastern side that adjoin the river up to Canning Street.

In 2006, the owners applied to Moonee Valley Council for a planning permit to commence their retirement village. Of interest to this Parliamentary Committee is only the 47 dwellings that flooded in the 13/14 Oct'22 event. The 2006 planning permit request was referred to VCAT because of the objections from Council and other residents over the area of the 47 dwellings. **It is strange that the dwellings are on land zoned for public purposes, and not for residential use!** There is a "Land Subject to Inundation Overlay (LSIO) over these dwellings. Basically, the Drainage Authority had correctly applied a flood planning control over the 47 units because the area for these 47 units was subject to flooding. The history then becomes hard to understand because Melbourne Water

approved the dwelling construction with conditions such that floor levels had to be 600mm higher than the flood level of 6.6m AHD (Australian Height Datum). The meant that flood waters could flow down the streets serving these dwellings. Melbourne Water strangely never attended the VCAT hearing in 2006 and only provided written advice to Council. VCAT subsequently approved the plan for these 47 dwellings and included Melbourne Water's conditions relating to floor levels being 600mm higher than the flood level.

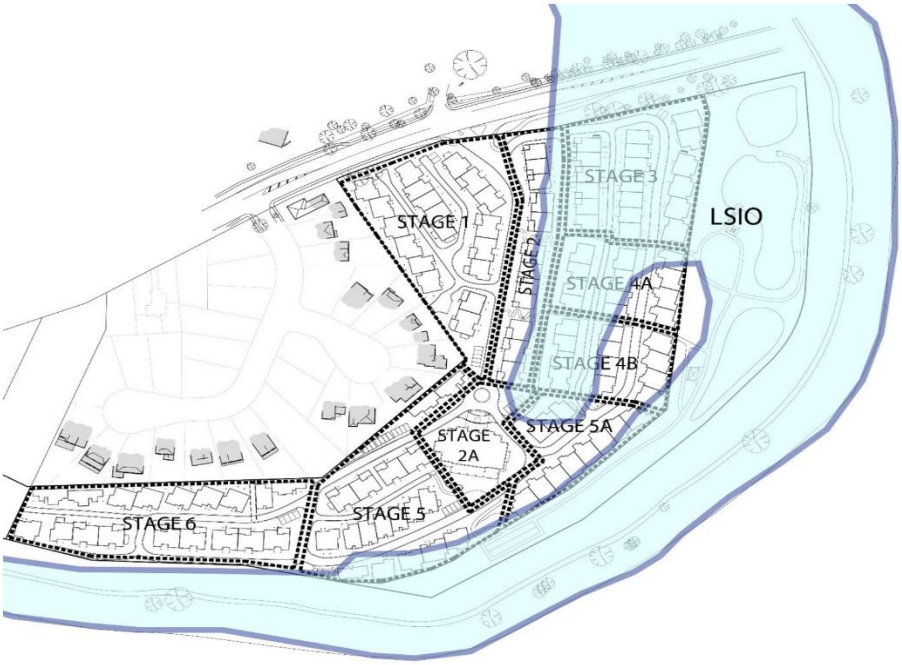
Velocity * Depth ratio. The VD ratio was used to limit use of roadways used as floodways. A VD had a to be less than 0.6, with velocity limited to 1m/sec and depth no more than 0.6 metre. Retirement Villages are used by retired people, generally by the elderly who may or may not need assistance to traverse these roads. In my experience dealing with planning permit applications in the 80s and 90s, I considered it far too dangerous to allow roadways in retirement villages to be used to convey flood waters. The VD limit of 0.6 was derived from model studies at Monash University and related to the conditions when a car would float. Obviously it is way too dangerous for a retired and limited mobility person to enter a roadway with moving floodwaters. Hence I never approved such designs for retirement constructions. However, Melbourne Water in 2006 did approve it!

After 2006, ownership of the village changed hands to TIGCORP. **In 2015, there was a major and very damaging change to the planning controls.** TIGCORP had engaged consultant, [redacted] to examine flooding up stream of Canning St on the Maribyrnong River. The 100 year flow flow was reduced and the area occupied by the new smaller flow was reduced. Melbourne Water amazingly agreed with these changes and applied to Council under planning admendment C151, headed by [redacted] as the sole decider, and the LSIO was subsequently changed in 2015 as shown on the plans below. This meant that the land where the 47 units were proposed was no longer covered by the revised LSIO. A quick look at the plans below shows that the LSIO was moved about 80 metres away from the proposed dwellings. There was, strangely, flood mitigation works consisting of two small ponds that are supposed to work as mini retarding basins. The aerial photo below shows the area today. These plans for the relocation of the LSIO, the resultant freeing of a flood zone for the 47 dwellings, and the "retarding basins", was all approved by Melbourne Water. History of the 13 Oct'22 flood clearly shows that the revised flow and area inundated as shown by the new LSIO is clearly wrong. The Oct22 flood easily flooded the area where the 47 dwellings are now built and extended approximately up to the orignal LSIO. The ponds constructed to reduce flooding as shown in the photo below, are not going to make any difference to flows. They are simply two small ponds filled with water and hence cannot possibly act as retarding basins. There would be no volume available to flood flow to have any hope of working as retarding basins. It staggers me to think that Melbourne Water actually approved such nonesense design.

There is a major fault in the LSIO plans that apparently was never pickup by Melbourne Water. If you compare the old LSIO and the new LSIO at Canning Street, you see that the upstream LSIO where the units are built is signicantly smaller than the original, whereas the land inundated downstream of Canning St is unaltered. If the consultant's calculations reduced the flow, I would have thought that this would also reduce the flood area downstream of Canning St. This obvious

error was never picked up by Melbourne Water and in 2015 they applied to Moonee Valley Council to have the new LSIOs adopted. It remains unknown if any change was made to the design of the 47 dwellings, and as it stands the conditions applied by VCAT in 2006 still apply.

Pre-Amendment LSIO (22 December 2005 to 9 July 2015)



WHAT HAPPENED AT RIVERVUE ON 13/14 OCT'22

Despite the revised lower dischages and levels calculated by TIGCORP and approved by Melbourne Water in 2015, the 13 Oct'22 flood event flooded land as depicted by the previous LSIO! The 2022 flood event is regarded as a 50 year event whereas an LSIO is for a 100 year event**. Obviously the revised LSIO is hugely wrong.** The 47 dwellings were built about 900mm lower than the 2006 VCAT requirements. The 2006 VCAT requirement was to build the flooe levels of the 47 units 600mm higher than the flood level of 6.6m AHD. The 2015 revision was to build 300mm above the revised flood level of 6m AHD, hence comparing 6.6+.6 = 7.2 m floor level to the 2015 result of 6m + 0.3= 6.3m AHD, compare 7.2m to 6.3 is a 900mm difference. All 47 units were flooded to approximately 500 mm flood depths inside these houses. Despite the Water Act requesting that new dwellings built after 1975 be free of flooding, these dwellings were built after 2015 and had extensive damage. It seems little point in rebuilding these dwellings as they have been shown to flood in a 50 year event. Typically these 47 dwellings are valued at about $800,000. The owners have advised me that the village insurance is very limited and they fear it is inadequate. **TIGCORP recently in their submission to Melbourne Water's review has admitted that the insurance cover is inadequate** to rebuild the 47 dwellings. **There is very little point in rebuilding these dwellings as they obviously could easily flood again in the future.** I regard Melbourne Water as the culprit in the Rivervue disaster. They failed to appear at the 2006 VCAT and should never have approved the 47 dwellings they were surrounded by flood waters, they failed to properly assess the consultant engaged to redo the discharges and area inundated in 2015, and failed to take an active interest in this development. They requested a change to the LSIO that is clearly in serious error and hence must accept the blame for damage done.

Photo of Rivervue Retirement Village, showing the constructed retarding basins in the area of the site close to the river corridor land. Canning Street is seen at the right of photo.

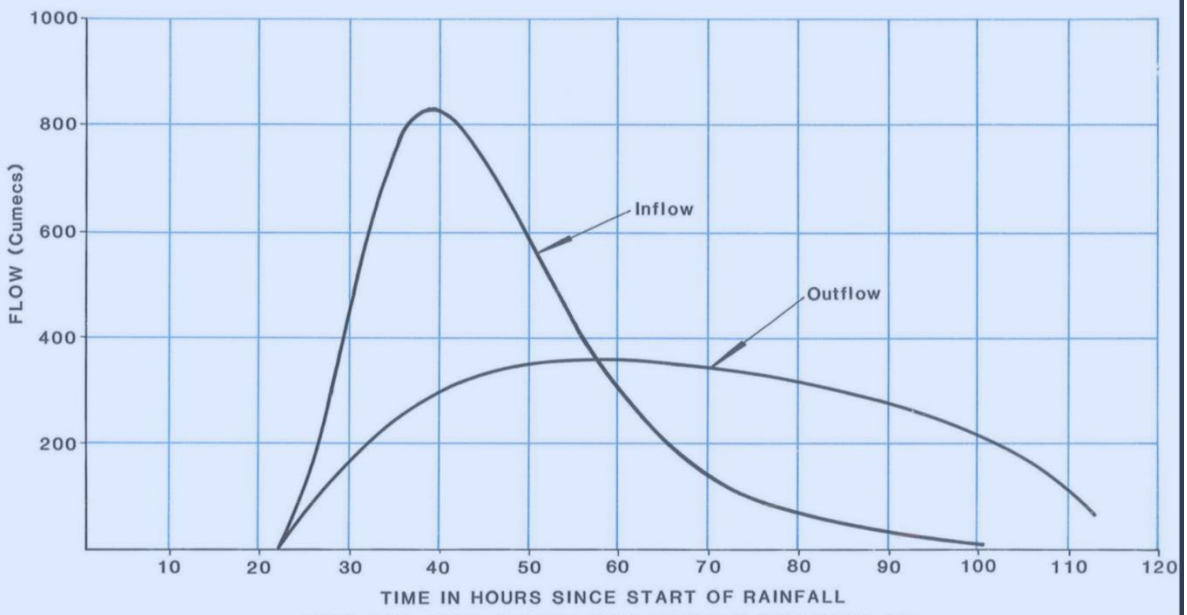
5. PLANNING SOLUTION

The 1986 Maribyrnong River Flood Mitigation Study involved a group of engineers who investigated to whole catchment to understand its makeup and to analyse the flood conditions and to eventually do initial design work for a solution to flooding. My role was as a hydrologist who had very good knowledge of a runoff routing computer program that was used to analyse the flood frequency calculations. I used the RORB model, a runoff routing model written by Monash University's Professor [redacted] and his assistant Dr [redacted] The timing was such that it could be run on the, then, newly introduced personal computers. The PCs gave very fast results.

The catchment plan below shows the various rainfall and stream flow gauges installed by Melbourne Water. The side benefit of doing this modelling work was to later use the RORB model together with these gauges, that produce automatic telemetered values to the computing sytem. Hence the eventual use of the model was to assist with flood warning for the catchment. Similar models were then developed for all of the major watercourses in Melbourne Water's control.

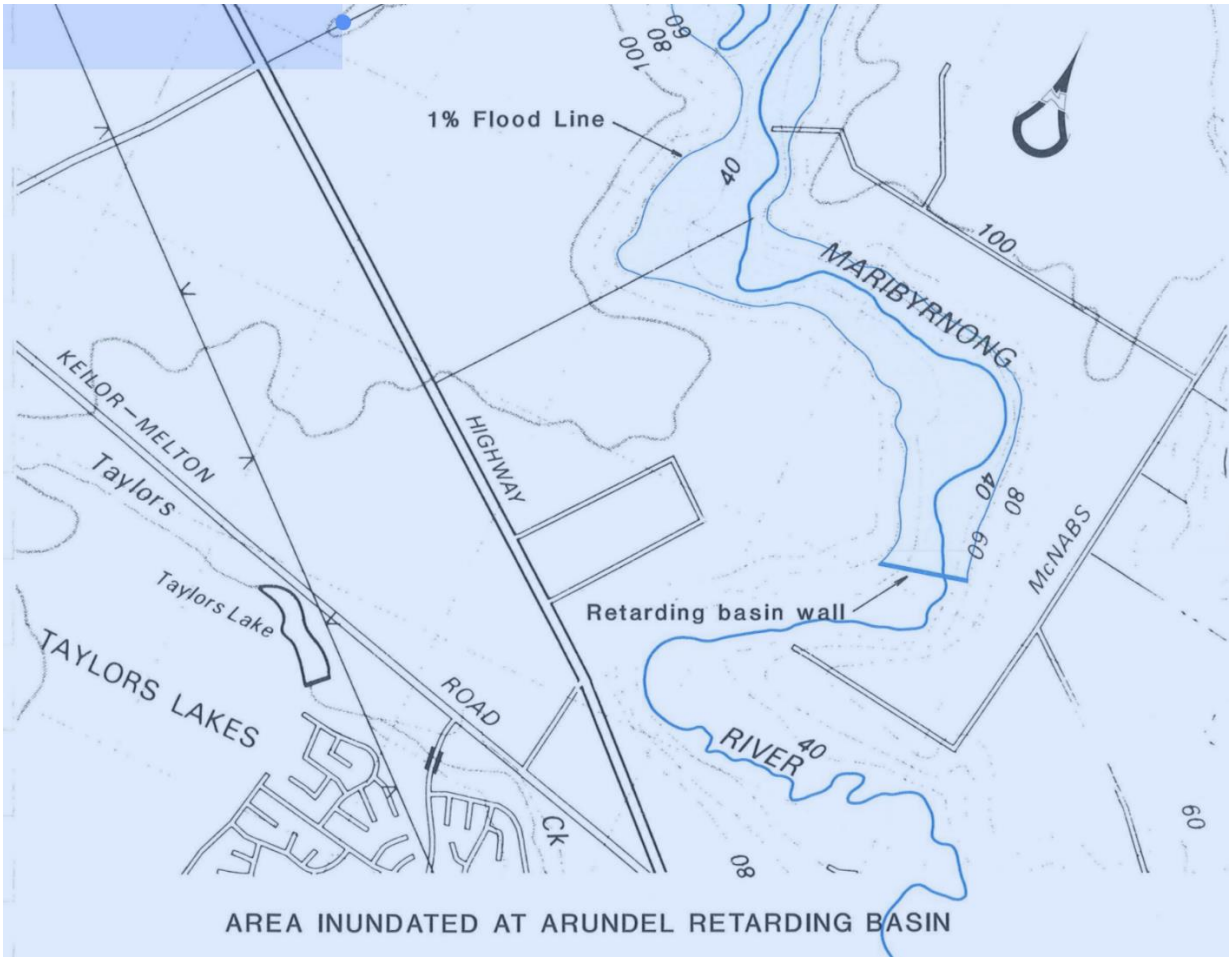
The 1986 report was very extensive and considered various solutions to flooding on the Maribyrnong. These included various levee banks and several retarding basin locations. The overwhelming best option was to build a retarding basin at ARUNDEL. This would be located on rural lands just north of Keilor and capture flows from the two main tributaries, Deep Creek and Jacksons Creek. The intention was to do feasibility designs of the basin such that it would temporarily retard 100 year flows and discharge flows to not exceed the capacity of the natural Maribyrnong channel downstream. Hence all flooding downstream of the basin, and particularily the Maribyrnong Township, where flooding of some 500 dwellings would be eliminated.

The hydrograph below shows the 100 year flow, 840 cumecs, being reduced to 350 cumec. The retarding basin ended up 34m high with a piped outlet 5.4m diameter. A big element is the design of the spillway that needs to conform with a 10,000 year storm where lives are at risk.

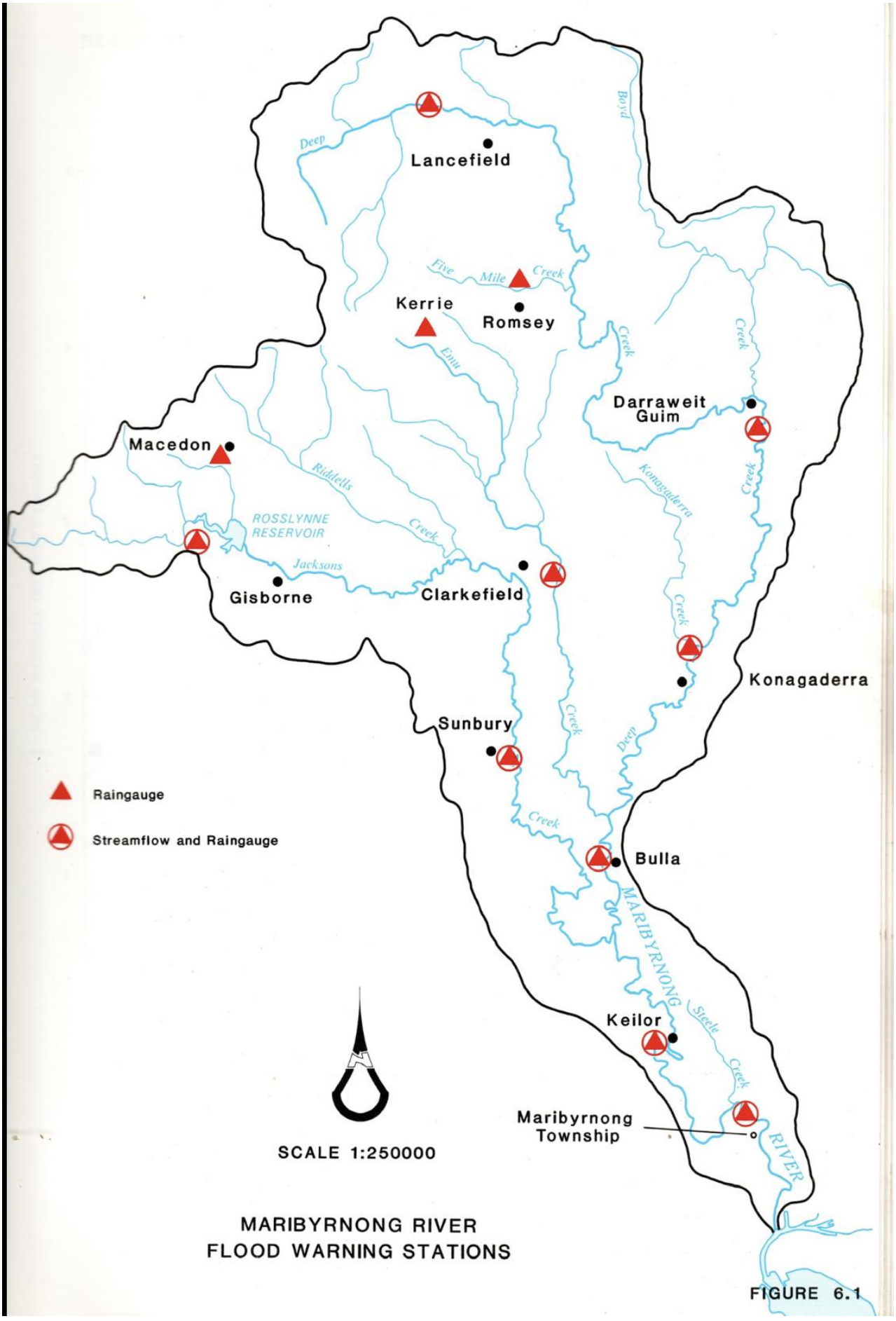


INFLOW AND OUTFLOW HYDROGRAPHS AT
ARUNDEL RETARDING BASIN FOR 100 YEAR FLOOD EVENT

FIGURE 11.5



AREA INUNDATED AT ARUNDEL RETARDING BASIN



MARIBYRNONG RIVER
FLOOD WARNING STATIONS

FIGURE 6.1

I note that the 1986 conditions of land use have not essentially changed. Upstream of Keilor where 90% of the catchment lies, the land is generally rural with pockets of more developed land, such as in Gisborne. The RORB model can easily cope with such minor changes and has runoff coefficients for such changes. A recent run of the 1986 model using 13 Oct'22 rainfall values showed that it produces highly accurate runoff values.

The cost in 1986 of the ARUNDEL retarding basin was $16.4 million. In 2023 values, this would be about $80 million. The benefits to current flooded households is that some 500 would no longer have potentially life threatening events. As a consequence, the values of these houses would grow substantially, possibly even doubling in value. The horrendous flooding of the newly constructed 47 dwellings at Rivervue Retirement Village would also be free of flooding from a 100 year event.

On a recent news program, Premier Andrews was asked why hasn't he built the ARUNDEL basin. He said "Labor does not build dams". This response is inaccurate simply because a retarding basin is not a dam. Dams, like Silvan Dam, are kept for drinking water purposes. Whereas a retarding basin only holds flood waters for a very limited time such as 110 hours as shown in the hydrograph above. It has been 37 years since the 1986 report concluded that ARUNDEL was the best option for this watercourse. The government has done nothing to help the flooded residents and it is about time that a comittment was made to now fix the problem.

6. CONCLUSIONS AND RECOMMENDATION

1. Earliest recordings of flows in the Maribyrnong River show that it has flooded since 1906 when the biggest flow ever seen happened. Significant smaller floods have occurred since and have been recorded by the drainage authority. On 13th and 14th October 2022 a large rainfall occurred mainly on the upper catchment that resulted in extensive flooding of some 200 or so houses at the Maribyrnong Township, and surprisingly also flooded 47 new dwellings recently constructed at the Rivervue Ritirement Village.

2 Analysis of the event showed that Melbourne Water's flood warning system failed due to the use of an incorrect rating table for a gauge at Darraweit Guim, located about halfway up the catchment. This major error resulted in only a few minutes warning by SES and Police to township residents instead of the previous warning time of some 5 hours. The flood was considered to be a 50 year event and it was fortunate that rainfall in the lower section was lighter than the upper reaches.

3. The Rivervue Retirement Village on Canning St, a few kilometres upstream of the Maribyrnong Township had 47 new dwellings inundated in this 50 year flood. It was found that

in 2015 a consultant engaged by the retirement village owner, TIGCORP, had incorrectly revised flows and resultant area inundated at the village. Amazingly, Melbourne Water approved the changes and the planning overlay advising of flooding was modified to then show the dwellings to be free of flooding. This was a massive error for all concerned. There are now the buyers of these 47 dwellings that had to immediately leave their flood dwellings and TIGCORP commenced repairs. It was then found that TIGCORP has inadequate insurance to cover the damage.

4. A thorough report was done by Melbourne Water in 1986 regarding the Maribyrnong flooding and concluded that a retarding basin built at ARUNDEL, just norh of Keilor, would solve the flooding problem to give river flows contained within the banks in a 100 year event. The Labor Government with Premier John Cain did not proceed with this construction, and neither have any state Government since. In the time since 1986, nothing has been done to help the 500 or so dwelling owners .

5. RECOMMENDATION

The simple solution to the flooding of substantial properies along the Maribyrnong is to build the ARUNDEL retarding basin, as also recommended in Melbourne Water's 1986 extensive report. Estimated current costing for this basin is $80 million.

Inquiry into the 2022 Flood Event in Victoria, namely Maribyrnong River

Writer: Mr Ron Sutherland

Private person, Engineer & ex-employee of Melbourne Water 1982-2003

[redacted]

[redacted]

Address: [redacted]

I am now retired.